Sources of cross-sectional variations in stock returns and risk: an empirical analysis of emerging markets

SOURCES OF CROSS-SECTIONAL VARIATIONS IN STOCK RETURNS AND RISKS: AN EMPIRICAL ANALYSIS OF EMERGING MARKETS

by

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Don't venture all your Eggs in One Basket.

---*S. Palmer, Moral Essays on Proverbs, 1710*

ABSTRACT

It is well established in the financial economics literature that potential gains from international diversification are generated from the imperfect correlation between national stock market returns. This empirical study explores the factors that impede perfect integration among national equity markets by examining emerging markets data.

The first major topic of the dissertation is to re-visit the debate on the relative importance of country and industry effects in the cross-sectional variation of stock returns. By applying the standard Heston and Rouwenhorst (1994) dummy variable decomposition method to $U.S. nominal returns from 11 industry sectors of 13 emerging markets from 1984 to 2004, this work confirms that country effects do play a dominant role in determining the cross-sectional variation in stock returns in emerging markets but since late 1990s, the industry effects have become increasingly important. This conclusion is robust even after the removal of three potential biases: inflation rate, exchange rate and interest rate effects, all of which may amplify the country effects.

The second topic is to investigate the debate from the perspective of stock risk. Stock risk is modeled and calculated independently from a return model with ARCH type errors. By applying the standard dummy variable decomposition method to stock risks, the empirical evidence is found to support the conclusions drawn on stock return decompositions.

Finally, in order to find the fundamental sources of the country and industry factors, pure country and industry effects are then regressed on fundamental characteristics of country and industry. The findings show that the change in the variables representing the exchange rate can explain a substantial amount of the country effect variations, while at the same time, banking and stock markets development also contribute to the variations. The regressions also find evidence that the legal origin of the market does matter to stock returns. Regressions on industry effects are not as promising as the results of the country effects regression. Only the geographical concentration of industries is found to explain a small amount of the industry effects.

Keywords:
Diversification, Country and Industry Effects, Cross-sectional Stock Return Variation, Emerging Markets, Financial Development, Legal System, Firm Characteristics

JEL Classification:
G12; G15; G21; K22; K40; L16; E44

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BRIEF CONTENTS

TABLE OF CONTENTS

List of Tables

List of Charts

SOURCES OF CROSS-SECTIONAL VARIATIONS IN STOCK RETURNS AND RISKS: AN EMPIRICAL ANALYSIS OF EMERGING MARKETS

CHAPTER 1:

INTRODUCTION

Finding the determinants of cross-sectional variation in stock returns is one of the most important issues in finance. It is well established in the financial economics literature that potential gains from international diversification are generated from the imperfect correlation between national stock market returns. Many academics and practitioners have observed that national stock market returns tend to have a low degree of co-movement despite the increasing trend towards globalization and liberalization of capital markets. Therefore exploring factors that impede perfect integration among national equity markets is one of the central issues in financial economics.

Following Lessard (1974) one strand of research in this area has focused particularly on whether global ('world') factors, country factors or industrial factors are the main driving forces of international stock return variations. The conclusion that country effects are dominant has already been used in practice by the portfolio selection top-down approach. The first decision to be made by portfolio managers is how much to allocate to each equity market. The second is then the optimal allocation within each industry sector.

Studies of stock return determinants are relevant to emerging markets. However due to the limited availability of emerging market data, research on emerging markets is relatively scarce; the majority of publications tend to concentrate on developed markets such as the US and UK. However emerging markets have become particularly interesting to practitioners with the integration progress in developed markets. As compared with developed stock markets, emerging markets tend to exhibit: lower correlation with the developed markets and among themselves, higher returns and higher volatilities (Bekaert and Harvey, 1997).

The empirical investigations in this work apply data on emerging market securities to re-visit the debate on country and industry effects from three different perspectives.

In the first empirical chapter (Chapter 3) the standard dummy variable decomposition model is applied to individual stock returns of 13 emerging markets from 1984 to 2004 and the relative importance of country and industry effects are examined. The base for this is a month-by-month set of cross-section regressions of stock returns on industry and country dummies. These are then analyzed from three different aspects. First, *F*-tests are carried out for industry and country dummies in each month. The time series of these *F*-statistics gives a big picture of the time-varying changes in the significance of the country and industry effects. It provides a firmer foundation for the more detailed return decomposition methodology. Second, the cross-section regressions provide a return decomposition, which yields a time series of industrially-diversified country returns and geographically-diversified industry returns. The standard deviations (SD) of the pure country (industry) effects time series give an absolute measure of how important the pure country (industry) effects are in determining the variation of industrially (geographically) diversified country (industry) index returns. Finally, the mean absolute deviations of pure country and industry effects show the relative importance of country and industry effects.

Chapter 4 is a further investigation that extends Chapter 3. It can be argued that a regression of nominal stock returns denominated in a single currency on country and industry dummies introduces no less than three separate biases, suggesting that the methodology may amplify the importance of country factors in returns-generation. In order to check the robustness of the standard dummy variable method, the specification of the dummy variable regressions is adjusted to remove the three potential factors (interest rate, exchange rate and inflation rate) that may amplify country effects.

In the third empirical chapter (Chapter 5) the relative importance of country and industry effects in the cross-sectional variation of stock risk is examined more directly.

Stock risk is modeled and calculated independently from a return model with ARCH type errors. By applying the standard dummy variable decomposition method to stock risks, the relative significance, variation and size of country and industry effects are examined under the stock risk context.

The fourth empirical chapter (Chapter 6) takes a different approach from the first and the third by focusing on the fundamental variables that drive country and industry effects. First the variations in pure country and industry effects are explored by regressing the modulus of the pure country and industry effects on the underlying characteristics of countries and industries respectively. In this analysis it is the size of the country or industry factor that is relevant. Second, the original country and industry effects, which are essentially stock returns, are examined. This analysis focuses on the size and, more importantly, the direction of the influences of country and industry factors on stock returns. At the same time, Chapter 6 further investigates the links between the exchange rate, inflation and the risk-free interest rate and stock returns using a different approach to Chapter 4.

Chapter 2 provides a review of the foundation literature for the three empirical chapters: 3, 4 and 5. More detailed literature reviews are also required in the context of each specific empirical analysis, so these are presented as individual sections within Chapters 4, 5 and 6. Chapter 7 concludes and discusses avenues for further research.

The contributions of the work can be summarized as follows: the whole empirical investigation focuses on ESMs, which has enriched the small amount of existing studies on the country and industry effects debate in the context of ESMs. The work of earlier studies on emerging markets is extended by using a large number of individual firm data from emerging markets. Since much of the earlier work uses indices, new firm-specific evidence on the debate is provided by using individual stocks. Also in addition, a longer sample period than that used in previous studies allows different explanations to be developed that are based on the different dataset used here.

In terms of methodology, one of the innovations in this study is to apply F-tests to the cross-section dummy variable regression. The time series of the F-statistics from every month gives a rigorous picture of the time-varying properties of the significance of the country and industry effects.

It can be argued that a regression of nominal stock returns denominated in a single currency on country and industry dummies introduces no less than three separate biases, suggesting that the exercise overstates the importance of country factors in returns-generation. The adjusted dummy variable decomposition analysis in this work shows that the dominant country effects found both by existing literature and this work are robust.

Existing studies of industry and country factors have focused only on the decomposition of stock returns (either index returns or individual firm returns). The relative importance of country and industry effects has also been examined in this work from the perspective of stock risk.

This work extends existing work, such as Campa and Fernandes (2006), by applying their model to some more fundamental variables to explain the modulus country and industry effects with higher frequency data. This thesis also presents a systematic study of the links between stock returns and various legal, institutional, economic and firm characteristics variables.

CHAPTER 2:

INDUSTRY AND COUNTRY FACTORS IN STOCK RETURNS: A REVIEW OF THE LITERATURE

2.1. Introduction

International trade theory shows that countries gain from trade in goods and services through specialization and comparative advantage. Grubel (1968) was the first to point out that wealth holders could also gain from trade in securities. Wealth holders may generate welfare gains by diversifying their portfolios internationally by including overseas as well as domestic securities in their portfolios. In the standard mean-variance model of portfolio selection, international diversification increases welfare by improving the risk-return trade-off available to investors in comparison with that trade-off available using only domestic country securities. Levy and Sarnat (1970) and Solnik (1974) documented that diversifying a portfolio internationally could lead to greater gains than the domestic diversification gains that arise from increasing the universe of available securities within a single country.

Gains from international diversification are generated from the imperfect correlation between national stock market returns. Many academics and practitioners have identified the existence of relatively low correlations among national equity market returns, (for example: Akhogan, 1995). Furthermore, despite the increasing trend of globalisation and liberalisation of capital markets recently, there is only weak evidence supporting increasing cross-country co-variance in returns (Longuin and Solnik, 1995).

Research in this area has focused particularly on the factors that have impeded perfect integration among national equity markets. Following Lessard (1974) a distinction is usually drawn between global ('world') factors, country factors and industrial factors as the main driving forces of international stock return variations. The distinction has been used in practice by the portfolio selection 'top-down' approach. The first decision of portfolio managers is how much to allocate to each international equity market. The second is then the optimal allocation within each market.

Early studies in the 1980s and 1990s (for example, Roll, 1992) claim that the low correlation of returns between countries arises from diversity of industrial structure across countries, mirrored by national stock market indices that have a different industrial composition. On the other hand, Heston and Rouwenhorst (1994) among others, show that only a small amount of the cross-country variation in stock prices can be attributed to the industrial composition of the national indices (so called industry effects). Country factors seem to be the dominant force in international stock returns according to their results. They proposed that local monetary and fiscal policies, domestic economic shocks and differences in institutional and legal regimes lead to the relatively large country-specific variation in stock returns.

However in the last decade there has been an increasing liberalization of financial markets (Bekaert and Harvey, 2000) and associated globalization of the world's economies. We would expect this to have increased the correlations among international financial markets. Studies carried out after the millennium have generally shown that the importance of industry factors relative to country factors has tended to increase and has even overtaken country factors in importance in some OECD countries (Phylaktis and Xia, 2006a). The ongoing debate on the relative importance of industry and country factors in determining the cross-sectional variation of stock price movements is far from drawing a definite conclusion.

It is well established that emerging market equities have different characteristics from equities in developed capital markets – in particular, higher average returns, low correlations with developed market returns, higher volatility and greater predictability (Bekaert and Harvey, 1997). Bekaert (1995a) examined the predictability of excess returns earned on investments in emerging markets using 19 IFC (International

Finance Corporation) emerging-market indexes from 1985 to 1992. According to Bekaert (1995a), most of the correlations between emerging-market monthly returns and the U.S. are either negative or lower than 0.49, which is far lower than that between the U.K. and U.S. of 0.67 (Table 2-1). Bekaert (1995a) found that some investment barriers in emerging markets have impeded effective global equity-market integration, such as poor credit ratings, high and variable inflation, exchange rate controls, the lack of a high-quality regulatory system and limited size of some stock markets.

Table 2-1 Correlations between selected emerging markets and the U.S. stock market

	December 1985-December 1992		
Market	Return	Expected return	Unexpected return
Brazil	0.13 (0.08)	-0.06 (0.38)	0.15 (0.09)
Chile	0.32 (0.12)	0.49 (0.48)	0.30 (0.17)
India	-0.13 (0.08)	-0.57 (0.35)	-0.07 (0.08)
Malaysia	0.66 (0.07)	0.80 (0.24)	0.64 (0.10)
Mexico	0.49 (0.09)	0.33 (0.52)	0.54 (0.13)
Pakistan	-0.02 (0.10)	0.25 (0.37)	-0.05 (0.10)
South Korea	0.21 (0.08)	0.14 (0.39)	0.21 (0.08)
Taiwan	0.20 (0.12)	0.12 (0.67)	0.20 (0.13)
Thailand	0.43 (0.14)	0.30 (0.68)	0.44 (0.16)
Turkey	-0.16 (0.15)	-0.71 (0.34)	-0.08 (0.11)
Emerging-markets composite	0.40 (0.12)	0.19 (0.77)	0.42 (0.15)
United Kingdom	0.67 (0.06)	0.96 (0.13)	0.67 (0.07)

Note: 1.Sources: Bekaert (1995a)

2. The correlations are computed using the dynamic structure of a vector autoregressive framework on the United States excess return, the emerging-market excess return, the two dividend yields, and the relative U.S. interest rate. Standard errors (in parentheses) are computed as in Bekaert (1995b) using three Newey-West lags.

3. Returns are regressed on the instruments plus the world market portfolio return.

4. Emerging-markets composite includes the 19 emerging markets in Bekaert's (1995a) sample.

5. Three countries: China, Israel and South Africa in our sample are not included in Bekaert (1995a).

All the distinguishing features of emerging markets make them important for international portfolio diversification strategies. However most studies on the relative importance of country and industry effects are focused on OECD countries. Campa & Fernandes (2004) is one of the few using emerging markets data. They have included a large amount of emerging stock market index data. Serra (2000) also uses emerging market data but she only covers the period from 1990 to 1996.

The main aim of this chapter is to summarize the key studies of industry and country effects. Chapters 3, 4 and 5 examine this debate from different angles therefore they share Chapter 2 as their common literature base but more detailed literature accounts relating to the specific areas tackled in this dissertation are provided in the empirical chapters themselves (in Chapter 4 and 5). This chapter is organized as follows. Section 2 contains an overview of studies on the country and industry effects debate. With developments in the world economy, the relative importance of country and industry effects is changing. Therefore data, methodologies and conclusions in these studies have also developed. Section 3 describes the literature on inter-industry differences in the relative importance of country and industry effects. Section 4 concludes.

2.2. Literature Review

2.2.1. Industry Factors or Country Factors?

2.2.1.1. Only country effects are dominant

The debate concerning the relative importance of industry and country factors in stock returns is by no means settled. The results vary when the sample periods, dataset and data frequencies employed in various studies are changed. The key studies can be divided into three groups.

First, early studies, such as Lessard (1974) and Solnik (1974), suggested that global and country factors dominated industry factors in the determination of stock returns.

The second group of studies consists of those published during the 1980s and 1990s. The majority of them documented the dominating explanatory power of the country factors. Roll (1992) was one of the very few studies that found dominant industry effects in explaining the stock return variations. Roll (1992) uses the same sample as Grinold *et al.* (1989) from the Financial Times Actuaries/Goldman Sachs (FTA/GS) International Indexes database covering 24 countries and 36 industry groups. Roll updated the daily data of Grinold *et al.* (1989) from 1979-1989 to 1988-1991. The dollar-denominated national index return was decomposed into weighted average of global industry index returns plus a country-specific disturbance. By using a cross-country Fama/MacBeth-type (Fama and MacBeth, 1973) regression, Roll found that a significant part of the international structure of country correlations could in fact be explained by the industry composition of national stock market indices. Roll argued that the specific industrial structure of each country is reflected in the particular industrial composition of its stock market index. This means that industry compositions of stock market returns will vary across countries depending on their industrial structure. As industries are not perfectly correlated, stock indices with various industry compositions will not be perfectly correlated either.

However, other researches have found conflicting evidence to Roll (1992). Examples include Solnik and de Freitas (1988), Grinold *et al.* (1989), Drummen and Zimmermann (1992), Beckers *et al.* (1992), Heston and Rouwenhorst (1994, 1995), Rouwenhorst (1998), Beckers *et al.* (1996) and Griffin and Karolyi (1998). In general, these studies found that the explanation for the low correlation of international stock returns is that local monetary and fiscal policies, domestic economic shocks and differences in institutional and legal regimes lead to large country-specific variations in returns. This explanation implies that country factors dominate industry factors in determining return variation. For example, based on a dummy variable or fixed effects model, Heston and Rouwenhorst (1994) used a similar methodology to Grinold, *et al.* (1989) and Beckers, *et al.* (1992). They decomposed the returns on 829 European stocks into 7 industry components and 12 country components, using data from 1978 to 1992. They found that low correlations among international stock returns were almost all due to country-specific factors in return variation. Heston and Rouwenhorst (1994) found that industrial structure explains only about 1% of the variance of value-weighted excess returns. They argued that the big difference in their conclusion compared to Roll (1992) arises because the regressors in Roll (1992) are industry returns, rather than industry effects. The regressors in Roll (1992) include the average return across all the markets in the sample. In contrast, industry effects are measured as deviations from the average returns across all the markets in Heston and Rouwenhorst (1994). Since only the differences in industrial structure between countries can be measured, Heston and Rouwenhorst measured the importance of industrial composition by measuring the incremental variance explained by industry effects.

Beckers, *et al.* (1996) applied a similar methodology to Heston and Rouwenhorst (1994, 1995) to a similar dataset to that used by Roll (1992) but still failed to find dominant industry effects. Like Roll (1992) they examined monthly data from the FT/AGS World Index but the period covered in their study is longer, from December 1982 to February 1995. Beckers, *et al.* (1996) grouped their sample into seven broad economic sectors instead of 36 industries as Roll (1992). Following Lessard (1974), they extend the factor modeling approach of Heston and Rouwenhorst (1994, 1995) by including a global market factor, country factors and global industry factors. Beckers, *et al.* (1996) found that 21% of the typical equity return variations were due to the global market factors, another 14% could be explained by country factors and only 4% was explained by global industry factors. Beckers, *et al.* (1996) generally conclude that both global and country influences are equally important. They explained the result as the trend toward greater worldwide integration, especially among EMU countries.

Rouwenhorst (1999) extended the data of Heston and Rouwenhorst (1994) to 1998, and found that, despite increased monetary and fiscal policy coordination among EMU member states, country factors still dominated industry factors.

2.2.1.2. Industry effects have become more and more important

A third group of studies published since 2000 has suggested that developments in the world economy may have led to shifts in the relative importance of economic, financial and institutional factors in global stock market returns. The increasing liberalization of financial markets (Bekaert and Harvey, 2000) and the economic globalization of the last decade have increased the correlations among the international financial markets. Studies after the millennium have shown that the importance of industry factors has shifted upwards and has even overtaken country effects in some OECD countries (L'Her *et al.*, 2002; Phylaktis and Xia, 2006).

Baca *et al.* (2000) examined data from Datastream Global indices (10 sectors in the 7 largest countries[1]) from 1979 to 1999. They found that industry factors played an approximately equal role to country factors in determining variation in international equity returns. L'Her *et al.* (2002) extracted data from Standard & Poor's Compustat(R) Global Vantage database for the period July 1989 to December 2000 covering 7,348 stocks from 20 countries[2] and 11 industries. They found that the relative importance of country effects declined significantly during their sample period, dropping from 26.81% in 1992 to 7.85% in 2000. On the other hand, the amount of return variation accounted for by industry effects increased from 5.54% in 1992 to 17.39% in 2000. Therefore during 1999 and 2000, industry effects exceeded country effects as a dominant source of variation in cross-sectional return variations. This suggests that diversifying across countries was more efficient than diversifying across industries during the 90s. Their results are consistent with other studies (Baca *et al.*, 2000; Cavaglia, *et al.*, 2000; Kerneis and Williams, 2000; Hopkins and Miller, 2001), which have also revealed the increasing importance of industry effects. Therefore the ongoing trend toward integration has decreased the benefits of country diversification and increased the benefit of industry diversification, which suggests that top-down approaches to global equity portfolio allocation should take into account both country and industry factors (L'Her *et al.* 2002).

With the increasing evidence supporting the importance of industry factors, Brooks and Del Negro (2003) cast doubt on whether the increasing importance of industry

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[1] The seven largest countries are defined by market capitalization on March 31, 1999. They are France, Germany, Japan, Netherlands, Switzerland, United Kingdom and United States.

[2] The 20 countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, U.K. and U.S.

factors is associated with the global integration, as most studies have suggested, or whether it is a temporary phenomenon. Applying firm-level data of 42 developed and emerging stock markets from 1985 to 2002 to the standard dummy variable/fixed-effect model, they argue that the apparent trend of increasing importance of industry factors over country factors may be limited to the Technology, Telecommunication and Media (TMT) industry sectors. Instead of indicating global integration, the data may just reflect the equity market IT bubble of the late 1990s.

However, Phylaktis and Xia (2006a) covered 34 developed and emerging stock markets from 1992 to 2001 with 51 well-defined industry groups. According to their robustness test, the increased importance of industry effects is not confined to the TMT sectors and the phenomenon is not temporary. Therefore the general belief is that the importance of country and industry factors is correlated with measures of economic and financial international integration and development. Country factors would be expected to be smaller and industry factors larger in those countries that are more integrated in the global market and these should, respectively, further decrease or increase as the degree of financial liberalization and economic integration increases. Therefore countries with a higher degree of production specialization should be more affected by country shocks.

Most of the studies on this issue are focused on OECD countries. A lot of research has shown that the isolation of returns between emerging markets on the one hand and mature markets on the other hand imply low correlations, so that including equities from emerging markets in a portfolio would lead to gains from diversification. However recent studies on integration have shown that the correlations may increase in emerging markets with the increasing degree of economic integration and financial liberalization. The change may have a significant impact on the relative importance of country and industry effects on emerging stock market returns and therefore on the portfolio diversification strategies.

Scheicher (2001) studied three Eastern Europe emerging markets: Hungary, Poland

and the Czech Republic, and found that they were influenced by Western financial markets. Regional integration among the three countries was also documented. Bekaert and Harvey (1995) examined capital market integration in a sample of emerging markets: Brazil, Chile, India, Mexico, Pakistan, Turkey, Korea, Taiwan, Malaysia and Thailand over the period 1975 to 1992. They did not assume the degree of segmentation to be constant through time, but allowed conditionally expected returns in a country to be affected by their covariance with a world benchmark portfolio and also by the variance of country returns. They argued that if the market was perfectly integrated then only covariance counted. However if the market was completely segmented then the variance was the relevant measure of market risk. Using a conditional regime-switching model they found that integration was substantial for the entire period not only for Malaysia, which had less investment restrictions, but also for Korea and Taiwan, which had substantial foreign ownership restrictions. In the case of Thailand, significantly increased integration was noted in 1987 when foreign ownership restrictions were removed. After liberalization, a dramatic decrease in volatility is found in Mexico, Taiwan and Brazil.

Phylaktis and Ravazzolo (2002) examined the covariance of excess returns in a group of Pacific-Basin emerging stock markets during 1980 to 1998. They find that the substantial trade between each of the sample countries and the two largest economies of Japan and U.S. plays an important role in economic integration. Also, substantial evidence has been found that economic integration provides a channel for financial integration at regional and global level. Their results show that the correlations between future domestic excess returns and future foreign dividend news are significantly high. In particular, the correlations between future excess return of Hong Kong, Philippines and Singapore and future dividend news of the U.S. are no less than 0.797. However, there is weaker evidence to support the proposal that there is significant financial integration of the sample emerging markets with world financial markets.

As yet there is little understanding of the main factors that affect the variation of stock prices in emerging markets. Serra (2000), Campa and Fernandes (2006) and Phylaktis and Xia (2006a) are the few studies to have included large data samples for emerging markets. Overall, they have found that country factors have remained relatively stable while industry factors have significantly increased in importance during the last decade. Campa and Fernandes (2006) using data from 17 emerging markets and 22 developed countries from 1973 to 2002 find that country effects have remained stable over their sample period, but industry effects have become significantly more important in the last ten years. They suggest that the change of their relative importance is due to economic and financial integration and development.

Serra (2000) employed weekly data from 26 emerging markets during January 1990 to December 1996, repeating the same exercise as Heston and Rouwenhorst (1994). Serra concluded that country factors are still the dominant driving force in emerging markets and that cross-country variations are not affected by the industrial composition of the indices. Generally speaking, the limited studies on emerging markets suggest that it remains an open question whether these factors have a similar pattern of influence in emerging stock markets as in the main industrial markets. See Table 2-2 for a summary.

Table 2-2 Summary of key studies on the industry and country factors debate.

This table summarizes the key studies on the relative importance of industry and country factors using both main industrial and emerging markets data.

	Heston & Rouwenhorst (1994)	**Phylaktis & Xia (2006)**
Time period	1978-1992	1992-2001
Number of Countries	12 European countries	11 emerging, 23 developed
No. of Industries	7	51
Frequency	Monthly	Weekly
Data level	Firm level, 829 firms	Dow Jones global Indexes
Main conclusion	Country factors are dominant	Country factors still dominate, but there is a major shift in the industry effects
	Brooks & Negro (2003)	**Campa & Fernandes (2004)**
Time period	1985-2002	1973-2002
Number of Countries	2 emerging, 18 developed,	17 emerging, 22 developed
No. of Industries	39	36
Frequency	Monthly	Monthly
Data level	Firm level, 1,239 firms	Datastream industrial indices
Main conclusion	The shift in the industry effects is due to the IT bubble, not permanent.	Same as Phylaktis & Xia (2006).

2.2.2. Traded Vs. Non-traded Goods Industries

The literature on exchange rate exposure has examined whether the competitive effects of bilateral exchange rate shocks are economically significant for stock returns. This question has been studied by classifying industry groups into non-traded (not producing internationally-traded goods) and traded goods industries. Firms producing different products are exposed to different shocks. Compared to firms operating only in non-traded goods industries, firms in traded goods industries are more likely to be affected by the variation in global industry factors.

Griffin and Karolyi (1998) argue that the profitability, cash flow and the stock returns of firms in traded-goods industries are more likely to be affected by: a) international price fluctuation of their output goods or products, which is common to all the firms in that industry, b) price fluctuation of their international competitors' input goods, and c) changes in the trading conditions or environment, such as the exchange rate. For example, the automobile industry produces internationally traded goods. The global change in supply or demand of automobiles can cause fluctuations in sales, profitability, present and future cash flows and stock prices of automobile–producing firms worldwide. Changes of exchange rates would also influence relative input and output prices and therefore the terms of competition for domestic and foreign automobile-producing firms. For example, the depreciation of the Yen increases the Japanese automobile industry's competing advantage. Since the exchange rate is the relative price of domestic and foreign products, changes of exchange rates alter relative input and output prices, influencing the profitability of the industries. Theory predicts that changes in input and output prices imply a common industry source of variation. The common industry source is a more important factor for the stock returns of traded-goods firms rather than for the non-traded goods firms.

Some empirical analyses of exchange rate exposure did not find strong evidence to support this theory. A study by Griffin and Stulz (2001) examines industry indices from the United States, Canada, United Kingdom, France, Germany and Japan from

1975 to 1997. They found that the common shocks to industries across countries are more important than exchange rate shocks, which explains almost nothing of the relative performance of industries. Using returns measured over longer horizons, the importance of exchange rate shocks increases slightly but the importance of industry-common shocks increases more significantly. Both industry and exchange rate shocks are more important for traded-goods industries, but the importance of these shocks is economically small for these industries as well.

A more recent exchange rate exposure study by Bodnar and Wong (2003) investigates exchange rate exposure by using stock returns from a large sample of U. S. firms from 1977 to1996. They show that the return measurement horizon and model specification both have evident influence on exposure estimation results for U.S. stock returns. The difficulty in obtaining statistically significant and economically meaningful exchange rate exposure estimations casts doubt on the usefulness of exchange rate exposure desired by practitioners. Both investors who are looking to hedge their portfolios and managers who are attempting to make corporate risk management decisions are understandably put off by the lack of statistical significance and the questionable economic interpretation of these estimates.

Inspired by the exchange rate exposure theory, despite the weak evidence found in empirical work, Griffin and Karolyi (1998) examined inter-industry differences in the relative importance of country and industry effects by classifying industry groups into non-traded and traded goods industries. Based on an industry classification provided in the early exchange-rate exposure literature, Bodnar and Gentry (1993), Griffin and Karolyi (1998) classified the Dow Jones World Stock Index industry groups from the period of 1991 to 1995 into traded and non-traded goods industries. They documented the mean and median industry-effect variances separately for the traded and non-traded goods industries and found that the pure industry effects were relatively more important for the stock returns of traded-goods firms.

A more recent study by Phylaktis and Xia (2006a) applied the same methodology to a new dataset, covering more emerging countries over a longer sample period: from 1992 to 2001. Most of their results support the same conclusion: pure industry effects are relatively larger in traded-goods industries. However, this result is not found in all sub samples of their data.

2.3. Conclusion

The principal aim of this chapter is to summarize the development of the literature on the relative importance of country and industry effects. Various datasets, sample periods and methodologies in the literature capture the changes of industry and country effects due to changes in the economic and financial environment. The main findings of the existing literature can be summarized as the following:

i) The general conclusion is that in emerging markets, country effects still play the dominant role. Industry effects are small but their importance is increasing from late 1990s.

ii) There are different explanations for the increasing importance of industry. Some studies find that this is correlated with measures of economic and financial global integration and development while others argue that this is just a temporary phenomenon possibly due to the boost in TMT industry.

iii) Studies on integration have shown that the correlations may increase in emerging markets with the increasing degree of economic integration and financial liberalization. The change may have a significant impact on portfolio diversification strategies by affecting the relative importance of country and industry effects in emerging stock market.

iv) Empirical studies find that exchange rate changes influence the relative input and output prices and therefore firms in traded goods industries are more likely to be affected by variation in global industry factors (for example, exchange rate changes) than the non-traded goods firms.

This literature review is directly linked to Chapter 3. Chapters 4 and 5 are also built upon this review but more detailed accounts of the literature relating to the main topics tackled in Chapter 4 and 5 are found in the respective empirical chapters.

CHAPTER 3:

INDUSTRY AND COUNTRY FACTORS IN STOCK RETURNS: ARE EMERGING MARKETS DIFFERENT?

3.1. Introduction

It is well established in the literature that potential gains from international diversification are generated from the imperfect correlation between national stock market returns. All the distinguishing features of emerging markets make them important for international portfolio diversification strategies. However most studies on the relative importance of country and industry effects are focused on developed equity markets.

The main aim of this chapter is to apply data on emerging market securities to re-examine the time-varying roles of country and industry effects in the cross-sectional variation in stock market returns. It is expected that country effects will be larger in emerging markets, especially those that are more isolated from world economic activities and financial markets. The markets in such countries are likely to be more sensitive to the specific shocks from those countries' economic environments. However the degree of sensitivity should decline as the pursuit of financial liberalisation and the degree of economic integration increase.

The dataset in this study covers 1,537 individual firms from 13 emerging markets, from August 1984 to July 2004. In terms of the dataset, this study contributes to the literature in the following ways: first, the work of earlier studies on emerging markets is extended by increasing the number of emerging markets covered; second, while much of the earlier work used indices, this study provides new firm-specific evidence on the debate by using individual stocks; third, a longer sample period than that used in previous studies allows different explanations to be developed based on the different dataset; fourth the longer sample period makes it possible to look more carefully at the time varying changes in the relative contributions of industry and country effects.

In terms of methodology, although a standard dummy variable model is used to decompose stock returns, one of the innovations in this study is to apply *F*-tests to the cross-section dummy variable regression. This simple test reveals dominant country effects in the last two decades and the increasing importance of industry effects since late 1990s. Following Griffin and Karolyi (1998) stocks are classified into non-traded and traded goods, in the expectation that a larger amount of variation in traded-goods industry returns will be explained by industry effects than for non-traded goods industries. The empirical results show that although there is an increase in the importance of industry effects, possibly from traded goods industries, most of the cross-sectional differences in the variation of returns across countries are still due to country effects.

The remainder of the chapter is organized as follows. Section 3.2 describes the data and their statistical properties. Section 3.3 discusses the methodology using nominal returns denominated in U.S. dollars and Section 3.4 shows the corresponding empirical results. Section 3.5 concludes.

3.2. Data and summary statistics

3.2.1. Data collection

In this research individual firm data were collected from Datastream (DS), which covers more countries than other databases. The total number of firms available from Datastream accounts for about 90%, on average, of the number of domestically listed firms reported by the World Bank's World Development Indicators (Bekaert et al., 2005). However, individual firm information for emerging markets is less readily available than for developed markets and the sample countries and periods are largely restricted by data availability. Monthly data have been used in most studies in this area so for comparability, monthly data are also used in this study. Specially, the data in this sample consist of the closing prices of the relevant shares on first day of each month. The sample includes adjusted prices for individual securities from 13 emerging markets, from January 1973 to July 2004. Table 3-1 shows the start date of each sampled country. The starting date of each country depends upon their base date in DS. Although data were available for Malaysia, South Africa and South Korea from 1973 (1980 for South Korea), only 25 firms were available by July 1984. The number of available firms increased from 25 in July 1984 to 138 in August 1984. Given the limited availability of firms before August 1984, the sample used in this study starts from August 1984. (Tables 3-2 and 3-3).

One of the features of emerging markets is thin (or infrequent) trading. Thin trading happens when stocks do not trade in every consecutive period. By the end of the sample period there are 78 Brazilian stocks in the sample, 59 of which have prices that remained unchanged for periods of up to seven months. In studies that test the efficiency of emerging markets, it is necessary to consider thin trading because infrequent trading can produce statistical biases in the time series of stock prices. The bias generated by thin trading arises from prices that are documented at the end of one period, but are the outcome of a transaction in an earlier period. Out-of-date information typically induces serial correlation (Al-Khazali *et al.*, 2007). Thin trading is likely to be a problem in a time-series study. However in this research, the model is based on cross-sectional regressions rather than time series of stock prices. In addition, thin trading only appears to be an issue in one out of 13 countries in the sample (Brazil) hence thin trading is not a major concern in this study.

The sample data were collected from DS country and industry sector firm local lists, sorted by Mnemonic code excluding 'dead' firms. Based on the length of company share histories, 1,537 firms were selected for analysis. 99% of firms in the final sample dataset start before 1997. After 1997, 25 firms were added to the sample in cases where there was no other firm available for a certain industry in a particular country.

Table 3-1 The starting date of each emerging market in the sample

Emerging country	Start date	Emerging country	Start date
Brazil	August 1990	Pakistan	March 1991
Chile	August 1989	South Africa	February 1973
China	March 1991	South Korea	December 1980
India	February 1990	Taiwan	November 1987
Israel	March 1986	Thailand	March 1987
Malaysia	February 1973	Turkey	March 1988
Mexico	March 1988		

The starting date of each country depends upon its base date in DS.

Table 3-2 The number of available firms in August 1984 in each industry sector.

Industry	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	IN	Sum
No. of firms in August 1984	12	46	14	14	1	10	2	0	7	1	31	138

Table 3-3 The number of available firms in August 1984 in each country.

Country	Brazil	Chile	China	India	Israel	Malaysia	Mexico
No. of firms in August 1984	0	0	0	0	0	14	0
Country	Pakistan	South Africa	South Korea	Taiwan	Thailand	Turkey	Sum
No. of firms in August 1984	0	10	114	0	0	0	138

Note: Tables 3-2 and 3-3 show the number of available firms in August 1984 in each country and each industry. The number of available firms has increased from 25 in July 1984 to 138 in August 1984. Given the limited available firms before August 1984, the sample used in this study starts from August 1984.

Table 3-4 Shares included in Datastream but excluded from this study

For the purpose of this study, only common shares of the sample firms are included.

Brazil	Preferred shares (PN)
Chile	Preferred shares (B)
South Africa	Preferred shares (PREF, CPF and PT), 'N': one type of share, neither common nor preferred shares
South Korea	Preferred shares (PF and p)
Taiwan	Preferred shares (A)

Note: data source: Datastream

Table 3-5 14-excluded industry sectors

Banks	Diversified industry
Investment COS.	Investment entities
Life assurance	Mining
Oil + Gas	Real estate
Speciality + Other Financial industry	Steel + other metals
Suspended equities	Tobacco
Unclassified	Unquoted equities

In some markets DS includes different types of shares issued by the same company, Table 3-4 shows the types of share that are included in DS but excluded from this study. For the purpose of this study, only common shares of the sample firms are included. Chinese firms normally issue A shares[3], but sometimes also issue B and/or H shares. To avoid overlapping information, only A shares are included in this analysis.

Most existing studies analyze stock or index returns denominated in a single 'world' currency, usually the U.S. dollar. For consistency in this research, monthly exchange rates from World Market Reuters from 1st August 1984 to 31st July 2004 are used to convert variables from their local currencies into U.S. dollars. All the exchange rates used in this study are in local currency per U.S. dollar.

DS classifies local firm lists into 39 industry sectors, based on the Dow Jones/FTSE Industry Classification Benchmark (ICB) level 4. 14 of these were excluded from the sample (Table 3-5). Some of the excluded sectors, such as Life Assurance and Investment companies, hold large amounts of equity from other sectors. It can be argued that variations in their stock returns are contaminated by returns in those sectors. By excluding these sectors, overlapping information is excluded from the sample. The identification of the forces that drive oil stock prices is extremely important given the size of the oil and gas industry and its links with the energy sector and environment.

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3. *A shares*: companies incorporated in mainland China and are traded in the mainland A-share markets. The prices of A shares are quoted in Renminbi, and currently only mainlanders and selected foreign institutional investors are allowed to trade A shares.

B shares: companies incorporated in mainland China and are traded in the mainland B-share markets (Shanghai and Shenzhen). B shares are quoted in foreign currencies. In the past, only foreigners were allowed to trade B shares. Starting from March 2001, mainlanders can trade B shares as well. However, they must trade with legal foreign currency accounts.

H shares: companies incorporated in mainland China and are listed on the Hong Kong Stock Exchange and other foreign stock exchanges.
(http://chinese-school.netfirms.com/China-shares.html.)

The United Nations Environment Programme (2003) explicitly documents the close link between the oil and gas industry and the environment. Dealing with the global warming issue is likely to affect oil and gas industries' sale performance, operating cost, asset values and shareholder value. Lanza *et al.* (2005) focus on analysing the financial determinants of oil stock prices by using multivariate cointegration techniques and vector error correction models. Weekly oil stock prices are analysed together with the relevant stock market indexes, exchange rates, spot and future oil prices from January 1998 to April 2003. They found that there is a positive relationship between the ratio of future and spot oil prices and the oil company market value. They also found that since the transaction currency in the oil market is U.S. dollars, the stock value of a non-U.S. firm decreases with the dollar appreciation relative to the local currency. Given the size of the oil and gas companies, it is better to separate them from studies on other smaller but different industries. Some other excluded sectors, such as Steel and Tobacco, are normally dominated by a small number of multinational conglomerates. Their cross border operations may expose their equities to different country- and industry-specific influences compared with local ESMs. Separate work can and should be done with these special sectors in future research.

Griffin and Karolyi (1998) argue that the seven broad industry groups used by Roll (1990) and Heston and Rouwenhorst (1994) may be too general to provide enough cross-sectional variation in returns across industries. This may be insufficient to distinguish the sources of variation between country- and industry-specific sources. Griffin and Karolyi (1998) and Phylaktis and Xia (2006a) use 66 and 51 industry groups respectively. However, defining the industry to which a firm belongs is a rather subjective art. An excessively coarse grouping will bundle together firms that are involved in different activities while an excessively fine grouping will involve arbitrary allocations of multi-activity firms to specific sectors. An important issue here is that emerging markets tend to have more conglomerates than the main OECD stock markets. At the same time they tend to have a narrower industrial base, and therefore a narrower range of industries. Therefore erring towards coarseness rather than fineness was preferred in the classification scheme used here. The initial 25 DS industry groups were classified into 11 industry sectors, based on the Dow Jones/FTSE Industry Classification Benchmark (ICB) level 3. This gives 11 industry groups in 13 countries, which are arguably more balanced in industry and country dimensions than many other studies (Table 3-6). Marsh and Pfleiderer (1997) study different industry classifications with the same data set and find that the broad 9-industry classification in the Dow Jones Global Index (DJGI) accounts for as much return variation as does the much finer 68-industry classification. The DJGI provides a classification of stocks into 9 sectors as well as into the 68 industries. When 9-industry classification is used, the average across all the countries of the stock movement explained by the industry effect is 29.61%, which is slightly higher than the 22.28% explained by the industry effect when 68-industry classification is used. The 38-industry classification in the Morgan Stanley Capital International (MSCI) World Index explains just marginally more than do both the 9-industry classification and 68-industry classification. On average, about 37% of the stock price movement is explained by the industry effect in the MSCI 38-industry classification. Marsh and Pfleiderer argue that there are 22 countries in the MSCI World Index versus 29 countries in the DJGI, and the extra countries in the DJGI are developing countries. Stock prices in developing stock markets tend to move together, i.e. the country factor is more important. Therefore in DJGI the industry effects are slightly smaller. Marsh and Pfleiderer show that the industry classification does not have crucial impact on the final results.

Griffin and Karolyi (1998) classified the Dow Jones World Stock Index industry groups into non-traded and traded goods using the definition given by Bodnar and Gentry (1993). The Dow Jones World Stock Index in Griffin and Karolyi (1998) was compared with the Dow Jones/FTSE level 3 industry classifications in this study and the industry sectors were then grouped into non-traded and traded goods industries. See Table 3-6 for the classification scheme. The Industry group column of Table 3-6 denotes traded goods industries by (T).

Table 3-6 Industry sectors

	Industry groups	Starting Date	Sub-industry groups
1	Industrial goods + services (T)	01/02/1984	Aerospace + Defense, Electronic + Electric support services, Transport, Engineering + Machine
2	Consumer goods (T)	01/02/1973	Automobile and Parts, Beverage, Food producer + Products, Household goods + Textile
3	Consumer services	01/02/1973	Food +drug retailers, Leisure +Hotels, Media + Entertainment, Retail general
4	Basic material (T)	01/02/1973	Chemical, Forestry paper
5	Utility	01/02/1983	Electricity, Other utility
6	Health care (T)	01/08/1984	Health care, Pharmacy + Biotech
7	Technology (T)	01/08/1984	I/T hardware, Software + Services
8	Telecom	01/03/1986	Telecom
9	Financials	01/07/1973	Non-life insurance
10	Personal & household goods	01/08/1984	Personal care + House
11	Basic Industrials	01/02/1973	Construction + Materials

Note: 1.The initial 25 DS industry groups were classified into 11 industry sectors, based on the Dow Jones/FTSE Industry Classification Benchmark (ICB) level 3. This gives 11 industry groups in 13 countries

2. Traded goods industries are denoted by (T) and the rest of the industries are non-traded goods industries

3.2.2. Data summary statistics over the whole sample period

Over the sample period of two decades, two dates are selected to show the time varying properties of the data. Tables 3-7-1 and 3-7-2 show the industry composition of the sample in December 1990 and December 2003. December 1990 was selected as the first data summary statistic checking date, for various reasons: most of the firms in the sample were available after 1984; Table 3-8 shows the official financial market liberalization dates provided by different studies. In particular, Bekaert and Harvey (2000) and Kim and Singal (2000) found that most stock markets in the sample were liberalized around 1990; and also all industries are reported for almost all the sample countries (except Brazil, China and Pakistan) in 1990. The second date is the last December of the sample period: December 2003.

By 1990 (Table 3-7-1) neither the industrial composition of emerging markets nor the geographical distribution of industries was uniform. Panel A shows that most firms belonged to one of four industrial groups: Consumer Goods, Industry Goods and

Services, Basic Industry and Basic Material. Not all countries had firms in the Personal and Household Goods Sector, Finance or Technology. The number of firms in the Telecom and Personal and Household Goods sectors was comparatively small. In some countries, such as China, Utilities were wholly government-owned and were therefore excluded. Almost 50% of the Utility firms in the sample were located in Chile, whereas most Industrial Goods and Services firms were concentrated in Asia. Two-thirds of Finance industry firms were either in Thailand or South Korea.

Panel B gives the average market value of stocks in each sector across all countries, measured as a percentage of the total market value of the 13 emerging markets in the sample. This reinforces the point that the distribution of firms across countries and industries was uneven in this period. The Utility sector had a similar number of firms as Technology but its capitalization was about four times larger. The number of firms in Chile was about four times that of Israel. However, Chile's contribution was only one third that of Israel in terms of capitalization. The single South Korean Utility stock accounted for 35.9% of all South Korean market capitalization, 72.5% of the total Utility sector and 7.6% of the total market capitalization of the whole sample[4].

[4] Korea Electric Power Corporation, founded in 1961, had 32,557 full time employees by 31 December 2004. There are 340 generating units including nuclear, thermal and hydro.

Table 3-7-1 Industry compositions by countries in December 1990

Panel A gives the number of stocks included in the sample by industry, for each country. Panel B gives the market capitalization of the countries by industry, expressed as percentage of the whole sample. Table 3-7-1 shows that by 1990 neither the industrial composition of emerging markets nor the geographical distribution of industries was uniform.

	Industry											
Country	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI	Total
A: Number of stocks by country and industry												
Brazil	-	-	-	-	-	-	-	-	-	-	-	0
Chile	5	12	2	4	11	1		4	-	-	7	46
China	-	-	-	-	-	-	-	-	-	-	-	0
India	26	33	7	37	5	9	3	1	-	5	11	137
Israel	2	1	1	1					1	-	1	7
Malaysia	13	50	13	7	3	3	1	2	2	-	21	115
Mexico	-	5	2	-	-	-	-	1		1	2	11
Pakistan	-	-	-	-	-	-	-	-	-	-	-	0
South Africa	13	12	12	3	-	1	1	-	3	-	5	50
South Korea	20	63	15	23	1	13	6	1	7	2	39	190
Taiwan	18	33	4	23	-	-	7	-	-	-	12	97
Thailand	5	36	13	8	-	3	2	-	7	4	6	84
Turkey	2	8	-	3	-	2	2	-	-	-	4	21
Sum	104	255	69	109	20	32	22	9	20	12	108	758
B: Market capitalization of stocks by country and industry												
Brazil	-	-	-	-	-	-	-	-	-	-	-	-
Chile	0.51	0.47	0.01	0.10	1.24	0.02	-	0.49	-	-	0.25	3.07
China	-	-	-	-	-	-	-	-	-	-	-	-
India	2.22	2.35	0.17	2.88	1.31	0.26	0.07	0.01	-	1.01	1.15	11.43
Israel	7.62	0.02	0.44	0.03	-	-	-	-	0.01	-	0.21	8.33
Malaysia	0.72	5.16	2.05	0.27	0.18	0.09	0.10	2.69	0.04	-	1.19	12.48
Mexico	-	1.23	0.67	-	-	-	-	-	-	-	-	4.36
Pakistan	-	-	-	-	-	-	-	-	-	-	-	-
South Africa	1.21	1.76	2.91	1.18	-	-	0.01	-	0.21	-	0.36	7.65
South Korea	1.89	4.30	0.73	0.91	7.56	0.32	1.28	0.15	0.51	0.20	3.19	21.05
Taiwan	3.20	6.58	0.64	6.74	-	-	1.43	-	-	-	4.51	23.10
Thailand	0.07	1.36	0.59	0.76	-	0.03	0.15	-	0.36	0.22	2.21	5.75
Turkey	0.11	1.49	-	0.08	0.13	0.50	0.08	-	-	-	0.41	2.79
Sum	17.54	24.73	8.21	12.94	10.42	1.22	3.11	5.12	1.14	1.73	13.85	100.00

Note:

IGS= Industrial goods + services, CG= Consumer goods, CS= Consumer services, BM= Basic material, UT= Utility, HC= Health care, TEC= Technology, TEL= Telecom, FI= Financials, PHG= Personal & household goods, BI=Basic Industrials

Each market capitalization is for December 1990 except China, Brazil and Pakistan because their earliest available shares in the sample are after December 1990.

Table 3-7-2 Industry compositions by countries in December 2003

Panel A gives the number of stocks included in the sample by industry, for each country. Panel B gives the market capitalization of the countries by industry, expressed as percentage of the whole sample. By December 2003, the picture is different from Table 3-7-1. In particular, the data reflect a boom in technology stocks. The number of stocks in traditional sectors has increased from 1990 to 2003 but their contribution in terms of market capitalization has decreased.

Country	Industry IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI	Total
A: Number of stocks by country and industry												
Brazil	12	14	5	8	9	1	-	9	2	2	4	66
Chile	7	16	8	6	12	1	-	4	-	-	10	64
China	36	23	32	5	7	20	6	3	-	3	9	144
India	33	38	9	42	9	18	9	3	-	5	13	179
Israel	7	4	3	5	-	2	2	1	3	-	2	29
Malaysia	34	82	26	16	8	4	4	5	5	-	53	237
Mexico	1	16	12	2	-	-	-	2	-	1	4	38
Pakistan	2	14	-	9	5	4	-	1	2	-	7	44
South Africa	16	13	19	3	-	2	6	1	3	-	6	69
South Korea	24	75	18	33	5	14	12	2	7	2	51	243
Taiwan	37	51	6	29	1	-	29	1	-	-	24	178
Thailand	16	67	24	21	2	8	6	6	14	4	16	184
Turkey	5	22	3	5	1	2	3	-	3	1	17	62
Sum	230	435	165	184	59	76	77	38	39	18	216	1537
B: Market capitalization of stocks by country and industry												
Brazil	0.25	4.43	0.34	0.29	1.17	-	-	0.99	0.03	0.01	0.02	7.51
Chile	5.45	0.37	0.70	0.60	1.69	0.04	-	0.54	-	-	0.23	9.62
China	1.28	0.77	0.95	0.48	1.05	0.66	0.16	0.11	-	0.05	0.28	5.77
India	1.87	1.00	0.26	2.40	0.78	1.42	2.18	0.30	-	1.12	0.58	11.90
Israel	0.17	0.08	0.10	0.28	-	2.01	0.06	0.30	0.30	-	0.08	3.39
Malaysia	0.64	2.05	1.39	0.13	1.99	0.03	0.13	0.96	0.06	-	0.77	8.15
Mexico	0.68	0.68	2.23	0.01	-	-	-	0.63	-	0.18	0.07	3.81
Pakistan	0.01	0.07	-	0.16	0.29	0.04	-	0.28	0.01	-	0.03	0.89
South Africa	0.74	0.60	1.09	0.54	-	0.14	0.11	0.81	0.17	-	0.23	4.42
South Korea	1.73	3.24	0.51	0.57	1.60	0.11	7.23	1.56	0.43	0.14	0.95	18.08
Taiwan	3.20	2.14	0.21	3.42	0.01	-	10.11	-	0.02	-	0.69	19.78
Thailand	0.47	0.49	0.44	0.89	0.13	0.07	0.41	0.74	0.09	0.08	1.44	5.24
Turkey	0.12	0.80	0.09	0.02	0.06	0.02	0.05	-	0.06	-	0.22	1.43
Sum	15.93	16.70	8.33	9.78	8.76	4.52	20.44	7.22	1.17	1.57	5.59	100.00

Note:

IGS= Industrial goods + services, CG= Consumer goods, CS= Consumer services, BM= Basic material, UT= Utility, HC= Health care, TEC= Technology, TEL= Telecom, FI= Financials, PHG= Personal & household goods, BI=Basic Industrials

Each market capitalization is for December 2003.

Table 3-8 Comparisons of official stock market liberalization dates across authors
Table 3-8 shows the official financial market liberalization dates provided by different studies. The dates in column (2) are constructed using the dating procedure described in Henry (2000). The dates in column (3) and (4) are taken in from Bekaert and Harvey (2000) and Kim and Singal (2000) respectively. The last column shows the earliest date given for a country in the preceding three columns.

(1) Country	(2) Henry	(3) Bekaert & Harvey	(4) Kim & Singal	(5) Earliest
Brazil	3-88	5-91	5-91	3-88
Chile	5-87	1-92	9-87	5-87
China	-	-	-	-
India	6-86	11-92	11-92	6-86
Israel	-	1993*	-	-
Malaysia	5-87	12-88	12-88	5-87
Mexico	5-89	5-89	11-89	5-89
Pakistan	-	1991*	-	-
South Africa	-	1996*	-	-
South Korea	6-87	1-92	1-92	6-87
Taiwan	5-86	1-91	1-91	5-86
Thailand	1-88	9-87	8-88	1-88
Turkey	-	1989*	-	-

Note: source: (Henry, 2000).
* Available from Bekaert, Harvey and Lundblad (2004) but not from Bekaert and Harvey (2000).

By December 2003, the picture is different (Table 3-7-2). In particular, the data reflect a boom in technology stocks. The Technology sector has only 5% of the stocks of all firms but contributes 20.4% to total market capitalization. The Technology firms in Taiwan contribute 10.1% market capitalization to total market capitalization. At the same time, the Technology sector is the largest industry in Taiwan (51% of Taiwan market capitalization). The number of stocks in traditional sectors such as Customer Goods, Customer Services, Basic Material, Utility and Basic Industry sectors has increased from 1990 to 2003 but their contribution in terms of market capitalization has decreased.

Table 3-9 summarizes the performance of the 13 countries and 11 industries during the period from August 1984 to July 2004. It shows substantial differences across countries and industries both in terms of average return and the volatility of returns. Returns are calculated as the log differences of the stock prices:

$$R_{i,t} = \ln p_{i,t} - \ln p_{i,t-1}$$

$R_{i,t}$: The return on security *i* that belongs to industry *j* and country *k* at time *t*

$\ln p_{i,t}$: The natural logarithm of security i price at time t

China, Mexico and Thailand have the highest average return, while Brazil, Chile and Taiwan are among the poorest performers. The difference between the highest (Mexico) and the lowest (Brazil) value-weighted returns (per month) is 1.81%. Each country is also different in terms of the means and standard deviations of their returns. Among the 13 countries in the sample, Brazil has the lowest return, highest risk and second highest correlation with the emerging markets. Chile has low return and low risk and a lower than average correlation with the sample average. China has the second highest return and second highest risk but the second lowest correlation with other markets.

Industry performance is less uniform than country performance (Table 3-9, Panel B). The difference between the highest value-weighted industry returns (TEC) and the lowest (IGS) is 2.00%. TEC has the highest return and highest risk and an above average correlation with other industries in the sample. BM has the lowest return, third highest risk and the second highest correlation with other industries.

Compared with the OECD sample in Heston and Rouwenhorst (1994), the emerging markets in this sample have more variable returns. The highest return is very similar to the OECD countries but the lowest return is much lower. Therefore it is impossible to make the generalization that emerging markets have higher returns than OECD countries. However it is true that they are more volatile than the OECD markets and that the correlations between different emerging markets are much lower.

Table 3-9 Summary Statistics (monthly data August 1984-July 2004)

Table 3-9 shows substantial differences across countries and industries both in terms of average return and the volatility of returns from August 1984 to July 2004. Returns are calculated as the log differences of the stock prices. Panel A summarizes the mean and the standard deviation of the monthly value-weighted (VW) cross-country firm returns. Panel B contains the summary statistics for the monthly value-weighted cross industry firms returns. All returns and market values are transferred from their local currencies to U.S. dollars and expressed in percent each month.

Panel A: By country

Country	VW return-per month		Correlation matrix													
	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	South Korea	Taiwan	Thailand	Turkey	Emerging markets*
Brazil	-0.284	17.807		0.135	0.185	0.026	0.246	0.178	0.161	0.105	0.190	0.050	0.208	0.088	0.150	0.620
Chile	0.203	6.833			0.065	0.236	0.159	0.230	0.303	0.100	0.269	0.198	0.291	0.269	0.158	0.380
China	1.491	16.581				-0.156	0.026	0.047	-0.007	-0.079	0.082	-0.079	0.054	-0.111	0.062	0.230
India	1.114	9.562					0.139	0.248	0.200	0.259	0.235	0.190	0.110	0.205	0.201	0.253
Israel	0.788	9.250						0.201	0.176	0.018	0.210	0.099	0.134	0.117	0.189	0.408
Malaysia	0.770	9.475							0.250	0.227	0.247	0.211	0.382	0.511	0.152	0.499
Mexico	1.528	9.835								0.260	0.293	0.211	0.318	0.277	0.248	0.395
Pakistan	0.885	11.560									0.112	0.190	0.134	0.212	0.208	0.198
S. Africa	0.775	8.198										0.222	0.303	0.451	0.292	0.626
S. Korea	1.172	10.537											0.303	0.491	0.185	0.351
Taiwan	0.662	12.070												0.422	0.210	0.718
Thailand	1.383	10.455													0.160	0.485
Turkey	0.994	15.256														0.314
Emerging markets*	0.959	6.944														

Panel B: By Industry

Industry	VW return-per month		Correlation matrix											
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI	Emerging markets*
IGS	-0.244	8.989		0.375	0.382	0.305	0.225	0.233	0.419	0.308	0.287	0.044	0.371	0.808
CG	1.147	6.463			0.287	0.442	0.436	0.343	0.651	0.454	0.489	0.237	0.697	0.505
CS	1.000	10.611				0.339	0.470	0.429	0.497	0.567	0.564	0.258	0.619	0.515
BM	0.936	9.054					0.347	0.335	0.499	0.364	0.398	0.277	0.632	0.735
UT	0.546	7.587						0.324	0.381	0.560	0.399	0.146	0.506	0.477
HC	1.553	7.145							0.302	0.368	0.351	0.316	0.427	0.386
TEC	1.760	10.555								0.465	0.453	0.213	0.660	0.668
TEL	1.163	8.769									0.358	0.184	0.555	0.575
FI	1.688	8.369										0.285	0.555	0.492
PHG	1.611	7.164											0.264	0.228
BI	1.269	6.966												0.709
Emerging markets*	0.959	6.944												

Note: 1. the adjusted prices have been converted from local currencies to U.S. dollars by using the daily exchange rate in World Market Reuters from DataStream and daily exchange rate from International Financial Statistics.
2. * Emerging markets summary statistics are based on the whole sample of this work rather than on all emerging markets worldwide.
3. S. Africa: South Africa, S. Korea: South Korea

3.2.3. Summary statistics during the three sub-sample periods

In order to keep all the summary statistics together, the summary statistics of the three sub-periods are discussed here before the identification of sub-sample period. The two dividing points of the three sub-sample periods are determined by observations on the dummy variable *F*-test results. The detailed discussion on identifying the three sub-periods is in section 3.4.2.2. (p.59).

Table 3-10 summarizes the performance of the 3 countries and 10 industries during the period from August 1984 to February 1986. Table 3-11 summarizes the performance of the 13 countries and 11 industries during the period from March 1986 to March 1997. Table 3-12 summarizes the performance of the 13 countries and 11 industries during the period from March 1997 to July 2004. These show time-varying differences across countries and industries both in terms of average return and the volatility of returns.

Table 3-10 shows that during the first sub-period the three available countries have very different means, but that their standard deviations are more similar. Industry means vary from –2.781(BM) to 1.32 (TEC). However, the industry standard deviations are less uniform than the country standard deviations, varying from 10.26 (BM) to 3.633 (BI). The correlations of the value-weighted industry returns are monthly much higher than the correlations of the value-weighted country returns.

In the second sub-period (Table 3-11), the 13 value-weighted country returns again exhibit wide variation in mean returns: from -0.615 (Brazil) to 2.705 (China). The unweighted average mean is much higher than in the first sub-period, as are the standard deviations of the value-weighted country returns. The latter vary from 23.26 (China) to 6.025 (South Africa). China has the highest return and the highest risk. Industry means vary from –0.359 (IGS) to 2.842 (PHG). However, Industry standard deviations are similar to those in the first sub-period, varying from 11.002 (IGS) to 5.917 (CG). Similar to the first sub-period, the correlations of the value-weighted industry returns are much higher than the correlations of the value-weighted country returns. Overall therefore, the value-weighted industry returns during the second sub-period are less variable than the value-weighted country returns and with higher correlations between the industries.

In the third sub-period (Table 3-12), the value-weighted country returns vary from -0.516 (Malaysia) to 1.213 (Israel). The average (0.472) is lower than the second sub-period but higher than the first. The standard deviations of the value-weighted country returns are also lower than in the second sub-period. Industry means vary from –0.061 (UT) to 1.616 (HC), and are generally lower than in the second sub-period. The standard deviations of industries are however quite similar to those in the second sub-period, varying from 12.307 (TEC) to 4.971 (HC). In the third sub-period, most of the correlations of the value-weighted industry returns are higher than those of the value-weighted country returns. Overall, the value-weighted industry returns during the third sub-period are less dispersed than the value-weighted country returns, with higher correlations between industries.

The different features of emerging markets provide a motivation to apply a similar methodology to previous studies – to check whether similar results can be obtained from a different dataset or whether a special pattern exists for emerging markets.

Table 3-10 Summary Statistics (monthly data August 1984-February 1986)

Table 3-10 shows substantial differences across countries and industries both in terms of average return and the volatility of returns from August 1984 to February 1986. Returns are calculated as the log differences of the stock prices. Panel A summarizes the mean and the standard deviation of the monthly value-weighted (VW) cross-country firm returns. Panel B contains the summary statistics for the monthly value-weighted cross industry firms returns. All returns and market values are transferred from their local currencies to U.S. dollars and expressed in percent each month.

Panel A: By country

Country	VW return		Correlation matrix												
	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	South Korea	Taiwan	Thailand	Turkey
Brazil	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Chile	-	-			-	-	-	-	-	-	-	-	-	-	-
China	-	-				-	-	-	-	-	-	-	-	-	-
India	-	-					-	-	-	-	-	-	-	-	-
Israel	-	-						-	-	-	-	-	-	-	-
Malaysia	-1.065	1.084							-	-	0.015	-0.128	-	-	-
Mexico	-	-								-	-	-	-	-	-
Pakistan	-	-									-	-	-	-	-
S. Africa	-2.257	3.162										0.394	-	-	-
S. Korea	1.187	1.130											-	-	-
Taiwan	-	-												-	-
Thailand	-	-													-
Turkey	-	-													
Average*	-0.712	1.792													

Panel B: By Industry

Industry	VW return		Correlation matrix										
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	-0.444	6.242		0.557	0.304	0.586	0.183	0.272	0.588	-	0.392	0.390	0.424
CG	0.199	5.571			0.313	0.719	-0.091	0.206	0.225	-	0.525	0.056	0.809
CS	-0.812	6.169				0.632	0.257	0.461	-0.039	-	0.580	-0.153	0.408
BM	-2.781	10.260					0.060	0.180	0.360	-	0.667	0.194	0.624
UT	-2.147	6.880						0.020	0.151	-	-0.138	-0.202	-0.145
HC	-1.519	3.818							0.047	-	0.500	0.187	0.212
TEC	1.320	9.990								-	0.307	0.182	0.139
TEL	-	-									-	-	-
FI	-1.389	4.498										0.118	0.437
PHG	-0.173	4.603											-0.078
BI	-0.822	3.633											
Average#	-0.857	6.166											

Note: 1. the adjusted prices have been converted from local currencies to U.S. dollars by using the daily exchange rate in World Market Reuters from DataStream and daily exchange rate from International Financial Statistics
2. * These are the averages means and standard deviations of 3 country portfolios.
3. # These are the averages means and standard deviations of 10 industry portfolios.
4. S. Africa: South Africa, S. Korea: South Korea

Table 3-11 Summary Statistics (monthly data March 1986-March 1997)

Table 3-11 shows substantial differences across countries and industries both in terms of average return and the volatility of returns from March 1986 to March 1997. Returns are calculated as the log differences of the stock prices. Panel A summarizes the mean and the standard deviation of the monthly value-weighted (VW) cross-country firm returns. Panel B contains the summary statistics for the monthly value-weighted cross industry firms returns. All returns and market values are transferred from their local currencies to U.S. dollars and expressed in percent each month.

Panel A: By country

Country	VW return		Correlation matrix												
	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	South Korea	Taiwan	Thailand	Turkey
Brazil	-0.615	21.520		-0.088	0.219	-0.236	0.177	-0.152	-0.043	-0.152	-0.052	-0.094	-0.071	-0.232	-0.034
Chile	0.884	7.823			0.088	0.170	0.036	0.175	0.190	0.128	0.129	0.110	0.177	0.141	-0.008
China	2.705	23.260				-0.225	0.118	-0.011	-0.010	-0.116	0.195	-0.152	0.048	-0.161	0.112
India	1.461	10.391					-0.004	0.100	0.141	0.240	-0.008	0.074	-0.068	0.104	0.056
Israel	0.506	10.249						0.250	0.076	0.017	0.155	0.092	0.116	0.146	0.097
Malaysia	1.801	7.483							0.218	0.227	0.271	0.137	0.361	0.545	0.120
Mexico	2.246	11.217								0.425	0.127	0.178	0.240	0.252	0.102
Pakistan	1.393	8.928									0.041	0.309	0.066	0.239	0.114
S. Africa	1.278	6.025										0.137	0.246	0.243	0.052
S. Korea	1.495	7.778											0.156	0.167	0.029
Taiwan	0.884	13.147												0.331	0.130
Thailand	1.729	8.773													0.075
Turkey	1.320	13.607													
Average*	1.314	11.554													

Panel B: By Industry

Industry	VW return		Correlation matrix										
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	-0.359	11.002		0.351	0.332	0.196	0.137	0.208	0.312	0.254	0.178	-0.040	0.281
CG	1.744	5.917			0.591	0.543	0.477	0.493	0.810	0.481	0.355	0.168	0.835
CS	1.583	6.041				0.492	0.450	0.414	0.472	0.389	0.447	0.212	0.561
BM	2.004	10.572					0.250	0.318	0.486	0.283	0.244	0.254	0.587
UT	1.200	7.884						0.314	0.268	0.458	0.219	-0.007	0.437
HC	1.950	8.523							0.344	0.334	0.332	0.284	0.472
TEC	2.033	9.386								0.325	0.355	0.118	0.740
TEL	1.540	7.631									0.142	-0.013	0.487
FI	2.660	8.399										0.254	0.403
PHG	2.842	7.436											0.217
BI	2.090	6.985											
Average#	1.753	8.161											

Note: 1. the adjusted prices have been converted from local currencies to U.S. dollar by using the daily exchange rate in World Market Reuters from DataStream and daily exchange rate from International Financial Statistics

2. * These are the averages means and standard deviations of 13 country portfolios.

3. # These are the averages means and standard deviations of 11 industry portfolios.

4. S. Africa: South Africa, S. Korea: South Korea

Table 3-12 Summary Statistics (monthly data April 1997–July 2004)

Table 3-12 shows substantial differences across countries and industries both in terms of average return and the volatility of returns from April 1997 to July 2004. Returns are calculated as the log differences of the stock prices. Panel A summarizes the mean and the standard deviation of the monthly value-weighted (VW) cross-country firm returns. Panel B contains the summary statistics for the monthly value-weighted cross industry firms returns. All returns and market values are transferred from their local currencies to U.S. dollars and expressed in percent each month.

Panel A: By country

Country	VW return		Correlation matrix												
	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	South Korea	Taiwan	Thailand	Turkey
Brazil	0.036	14.313		0.558	0.099	0.422	0.343	0.445	0.505	0.343	0.390	0.159	0.510	0.342	0.372
Chile	-0.508	5.572			-0.033	0.345	0.375	0.303	0.504	0.086	0.430	0.320	0.485	0.440	0.371
China	0.454	7.022				-0.010	-0.164	0.154	-0.017	-0.090	0.016	-0.050	0.098	-0.133	-0.031
India	0.767	8.675					0.323	0.370	0.286	0.288	0.411	0.292	0.347	0.302	0.354
Israel	1.213	7.529						0.193	0.413	0.025	0.324	0.130	0.173	0.098	0.314
Malaysia	-0.516	12.585							0.330	0.224	0.261	0.253	0.455	0.493	0.171
Mexico	0.639	7.764								0.160	0.517	0.300	0.480	0.351	0.480
Pakistan	0.443	13.383									0.132	0.155	0.162	0.205	0.259
S. Africa	0.558	9.823										0.417	0.400	0.567	0.424
S. Korea	1.199	14.361											0.481	0.670	0.276
Taiwan	0.376	10.595												0.561	0.311
Thailand	0.907	12.441													0.217
Turkey	0.574	17.091													
Average*	0.472	10.858													

Panel B: By Industry

Industry	VW return		Correlation matrix										
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	0.375	5.548		0.812	0.698	0.782	0.604	0.364	0.779	0.546	0.673	0.303	0.790
CG	0.678	6.451			0.820	0.840	0.712	0.359	0.682	0.620	0.755	0.253	0.886
CS	0.389	6.010				0.708	0.744	0.498	0.631	0.778	0.725	0.349	0.819
BM	0.630	7.130					0.693	0.402	0.632	0.547	0.689	0.317	0.861
UT	-0.061	7.223						0.390	0.574	0.705	0.716	0.416	0.765
HC	1.616	4.971							0.326	0.516	0.395	0.427	0.365
TEC	1.443	12.307								0.584	0.590	0.339	0.641
TEL	0.593	10.274									0.591	0.416	0.634
FI	0.884	8.777										0.300	0.748
PHG	0.137	6.891											0.310
BI	0.334	7.326											
Average#	0.638	7.537											

Note: 1. the adjusted prices have been converted from local currencies to U.S. dollar by using the daily exchange rate in World Market Reuters from DataStream and daily exchange rate from International Financial Statistics

2. *These are the average means and standard deviations of 13 country portfolios.

3. # These are the average means and standard deviations of 11 industry portfolios.

4. S. Africa: South Africa, S. Korea: South Korea

3.3. Methodology

3.3.1. Dummy variable model

In order to separate country and industry influences, we follow other studies in this area and adopt the dummy variable (fixed-effect) model of Heston and Rouwenhorst (1994). They employ the following model:

$$R_{i,t} = \alpha_t + \beta_{j,t} + \gamma_{k,t} + e_{i,t} \tag{3.1}$$

$R_{i,t}$: The return on security i that belongs to industry j and country k at time t

α_t: A base level of return at time t

$\beta_{j,t}$: The industry j factor at time t

$\gamma_{k,t}$: The country k factor at time t

$e_{i,t}$: Idiosyncratic disturbance of index i (or firm specific disturbance)

$E(e_{i,t}) = 0, \forall t$: (firm-specific disturbances have a zero mean for returns in all countries and industries)

$Var(e_{i,t}) = \sigma^2, \forall t$: (firm-specific disturbances have finite variance for returns in all countries and industries)

$Cov(e_{i,t}, e_{g,t}) = E(e_{i,t}, e_{g,t}) = 0, \forall i \neq g$: (firm-specific disturbances are uncorrelated across firms.)

The following dummy variable model states that each return observation is explained as the sum of a constant, an industry component, a country component, and an error term.

$$R_i^{\$} = \alpha + \sum_{j=1}^{11} \beta_j D_{i,j} + \sum_{k=1}^{13} \gamma_k C_{i,k} + e_i \tag{3.2}$$

$R_i^{\$}$: The return on security i denominated in US dollars that belongs to industry j and country k at time t

$D_{i,j}$ and $C_{i,k}$: Industry and country dummies, where

$$C_{i,k} = \begin{cases} 1 & \text{if security } i \text{ belongs to country } k \\ 0 & \text{otherwise} \end{cases}$$

$$D_{i,j} = \begin{cases} 1 & \text{if security } i \text{ belongs to industry } j \\ 0 & \text{otherwise} \end{cases}$$

There is an identification problem in estimating this equation since each firm belongs to one industry and one country. This implies that each set of regressors ($C_{i,k}$ and $D_{i,j}$) are perfectly collinear so that direct cross-sectional regression estimation is impossible. Equivalently it can be said that the industry and country effects can only be identified if further restrictions are imposed on the model. One way to solve this problem is to use a country or industry as a benchmark factor. However instead of choosing an arbitrary industry or country as a benchmark, it is more reasonable to measure the industry and country effects by comparing them to the 'average firm' in the sample. This can be done by applying the following constraints to equation (3.2) for each period t:

$$\sum_{k=1}^{13} v_k \gamma_k = 0 \qquad (3.3a)$$

where v_k is the market value share of country k in the world market,

$$\sum_{j=1}^{11} w_j \beta_j = 0 \qquad (3.3b)$$

where w_j is the market value share of industry j in the world market and

$$\sum_j w_j = \sum_k v_k = 1$$

Under these restrictions, the Ordinary Least Squares (OLS) of γ and β are fully identified. In addition the estimated disturbances are, by construction, orthogonal to all the industry and country dummies:

$$\text{Cov}(D_{ij,} e_i) = 0 \ \ \forall i, j \ \text{ and } \text{Cov}(C_{ij,} e_i) = 0 \ \ \forall i, j$$

so that the average residual is zero in every country and industry. Applying restrictions (3.3a) and (3.3b) to (3.2) gives

$$R_i^{\$} = \alpha + \sum_j^{J-1} \beta_j D_{i,j} + \beta_J D_{i,J} - (\sum_j^{J} w_j \beta_j) \frac{D_{i,J}}{w_J} + \sum_k^{K-1} \gamma_k C_{i,k} + \gamma_K C_{i,k} - (\sum_k^{K} v_k \gamma_k) \frac{C_{k,K}}{v_K}$$

$$R_i^{\$} = \alpha + \sum_j^{J-1} \beta_j D_{i,j} - \sum_j^{J-1} w_j \beta_j \frac{D_{i,J}}{w_J} - w_J \beta_J \frac{D_{i,J}}{w_J} + \sum_k^{K-1} \gamma_k C_{i,k} - \sum_k^{K-1} v_k \gamma_k \frac{C_{i,k}}{c_K} - v_K \gamma_K \frac{C_{i,K}}{v_K}$$

$$R_i^{\$} = \alpha + \sum_{j=1}^{J-1} \beta_j \left(D_{i,j} - \frac{w_j}{w_J} D_{i,J} \right) + \sum_{k=1}^{K-1} \gamma_k \left(C_{i,k} - \frac{v_k}{v_K} C_{i,K} \right)$$

$$R_i^{\$} = \alpha + \sum_{j=1}^{J-1} \beta_j d_j + \sum_{k=1}^{K-1} \gamma_k c_k$$

Hence:

$$R_i^{\$} = \alpha + \sum_{j=1}^{10} \beta_j d_{i,j} + \sum_{k=1}^{12} \gamma_k c_{i,k} + e_i \qquad (3.4)$$

where $d_{i,j} = (D_{i,j} - (w_j / w_J) D_{i,J})$ and $c_{i,k} = (C_{i,k} - (v_k / v_K) C_{i,K})$.

3.3.2. Significance of the country and industry effects---*F*-test

F-tests have been applied to the cross-sectional dummy variable regression on nominal returns in U.S. dollar (equation 3.4). It has not been possible to find any other published study in this area that has presented *F*-tests of the dummy variable cross-section regression. The *F*-test is a test on the null hypothesis that all the country (or industry) dummies are jointly equal to zero. The *F*-tests have been done separately for industry and country dummies in each month. The *F*-test is a straightforward test on the significance of the country or industry dummies in the dummy variable model. A general picture of the significance of the country and industry effects in determining the return variations is given by comparing their *F*-statistics significances in the model. This supplements the information in the coefficients on the size of the effects. The time series of the *F*-statistics results in every month gives a big picture of the time-varying properties of the significance of the country and industry effects. It builds the foundation for the more detailed return decomposition methodology.

3.3.3. Decomposition of returns into industry and country components

Essentially equation (3.4) is a factor model in which γ_k and β_j are the estimates of the country and industry factors, where $c_{i,k}$ and $d_{i,j}$ are the factor coefficients. The restriction on the dummies implies that this factor model is different from those that are commonly used in the international APT studies because the factor model is identified. The zero restrictions pin down the rotation matrix and hence an economic interpretation can be attached to the factors, characterizing them as country-specific or industry-specific factors. The factor sensitivities, $c_{i,k}$ and $d_{i,j}$ are set to be unity according to the dummy restriction, i.e. all firms in the same country are exposed to the same country risks, and all firms in the same industry are exposed to the same industry risks (Brooks and Del Negro, 2003). While this assumption is restrictive it is not unreasonable in the present context.

The application of OLS to equation (3.4) is equivalent to Weighted Least Squares (WLS) estimation with weights equal to the shares of each firm in the world (sample) market capitalization. $\hat{\alpha}$ is the OLS estimate of the return on the overall value-weighted average of all stocks in the entire world (sample). Following the APT literature, (3.4) is a model of excess returns over a riskless benchmark $\hat{\alpha}$. The expected value of the right hand side of (3.4) can be interpreted as the risk premium of stock i over the riskless asset. This can be seen as follows.

Define $p_{i,k}$ and $p_{i,j}$ as the shares in the total world (sample) market value of firm i belonging to country k, and firm i belonging to industry j respectively, where

$$\sum_{i=1}^{N} p_{i,k} = 1, \text{ and} \sum_{i=1}^{N} p_{i,j} = 1$$

Using the notation $i = 1 \ldots n(k)$ in country k and $i = 1 \ldots n(j)$ in industry j,

$$\sum_k n(k) = N = \sum_j n(j)$$

WLS gives:

$$P_{i,k} r_i^{\$} = p_{i,k}\alpha + \sum_{j=1}^{J} \beta_j p_{i,k} d_{i,j} + \sum_{k=1}^{K} \gamma_k p_{i,k} c_{i,k} + p_{i,k} e_i$$

Sum over all firms, $i = 1 \ldots n(k)$ in country k

$$R_k^{\$} \equiv \sum_{i \in k}^{N} p_{i,k} r_i^{\$} = \sum_{i \in k}^{N} p_{i,k}\alpha + \sum_{i \in k}^{N} \sum_{j=1}^{J} \beta_j p_{i,k} d_{i,j} + \sum_{i \in k}^{N} \sum_{k=1}^{J} \gamma_k p_{i,k} c_{i,k} + \sum_{i \in k} p_{i,k} e_i$$

$$R_k^{\$} = \hat{\alpha} + \sum_{j=1}^{J-1} p_{k.j} \hat{\beta}_j d_{i,j} + \hat{\gamma}_k \qquad (3.5)$$

where $p_{k,j}$ = the share of the total market value of country k included in industry j

The above estimation procedure allows $R_k^{\$}$ (the value-weighted index return of country k) to be decomposed into a component that is common to all countries ($\hat{\alpha}$), the average industry effects of the stocks that make up its index $\left(\sum_{j=1}^{J-1} p_{k,j} \hat{\beta}_j d_{i,j}\right)$ and a country-specific component ($\hat{\gamma}_k$). Equation (3.5) states that the return in country k (for example, Brazil) may be different from the overall sample average return for two reasons: first, the industrial structure of Brazil is different to that of emerging markets as a whole; second, the return of Brazilian stocks may differ from that of stocks in the same industry but located in a different country.

In equation (3.5), each country index excess return is decomposed into a pure country effect ($\hat{\gamma}_k$) and a sum of 11 industry effects $\left(\sum_{j=1}^{J-1} p_{k,j} \hat{\beta}_j d_{i,j}\right)$. Equation (3.5) produces the industry and country effects for one particular month. By running a cross-sectional regression for every month, the estimation yields a time series of industrially-diversified country returns. $\hat{\alpha} + \hat{\gamma}_k$ is the estimate of the return on an industrially-diversified portfolio of firms in country k, which has the same industry composition as the average firm in the emerging market sample. Calculating the standard deviations (SD) of the pure country effects time series gives an absolute measure of the importance of pure country effects in determining the variation of industrially-diversified country index returns. A relative measure is the ratio of the SD of pure country effect to the SD of each country's portfolio excess return (equation 3.6a). This shows how much variation in each country index excess return explained by the pure country effect.

$$\frac{\text{SD of } (\hat{\gamma}_k)}{\text{SD of}\left(\hat{\gamma}_k + \sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}\right)} \tag{3.6a}$$

The variation in each country portfolio excess return explained by the sum of industry effects is given by:

$$\frac{\text{SD of}\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}\right)}{\text{SD of}\left(\hat{\gamma}_k + \sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}\right)} \tag{3.6b}$$

Similarly, each value-weighted industry index return $R_i^{\$}$ can be decomposed into a component common to all industries, $\hat{\alpha}$, the weighted average of 13 country components $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k}\right)$ and an industry-specific component, $\hat{\beta}_j$. For industry j:

$$R_j^{\$} \equiv \sum_{i \in k}^{N} p_{i,j} r_i^{\$} = \sum_{i \in k}^{N} p_{i,j}\alpha + \sum_{i \in j}^{N}\sum_{j=1}^{J} \beta_j p_{i,j} d_{i,j} + \sum_{i \in j}^{N}\sum_{k=1}^{J} \gamma_k p_{i,j} c_{i,k} + \sum_{i \in k} p_{i,j} e_i$$

$$R_j^{\$} = \hat{\alpha} + \sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k} + \hat{\beta}_j \tag{3.7}$$

Where $p_{j,k}$ = the share of the total market value of industry j included in country k,

Equation (3.7) states that the return in industry j (for example, Industry Goods and Services) may be different from the overall sample average return for two reasons: first, the geographical distribution of Industry Goods and Services is different to that of emerging markets as a whole; second, the return of Industry Goods and Services stocks may differ from that of stocks in the same country but involved in a different industry.

In equation (3.7), each industry index excess return is decomposed into a pure industry effect ($\hat{\beta}_j$) and a sum of 13 country effects $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k}\right)$. Equation (3.7) produces the industry and country effects for one particular month. By running a cross-sectional regression for every month, the estimation yields a time series of a geographically-diversified portfolio of firms in the j^{th} industry. $\hat{\alpha}+\hat{\beta}_j$ is the estimate of the return on a geographically-diversified portfolio of firms in the j^{th} industry, which has the same geographical composition as the average firm in the emerging market sample. Calculating the standard deviations (SD) of the pure industry effects time series give an absolute measure of how important the pure industry effects are in determining the variation of geographically-diversified industry portfolio returns. A relative measure is the ratio of the SD of each pure industry effect to the SD of each industry portfolio excess return. This shows how much variation in each industry portfolio excess return explained by the pure industry effect.

$$\frac{\text{SD of}\left(\hat{\beta}_j\right)}{\text{SD of}\left(\hat{\beta}_j+\sum_{j=1}^{J-1} p_{j,k}\hat{\gamma}_k c_{i,j}\right)} \tag{3.8a}$$

The variation in each industry portfolio excess return explained by the sum of the country effects is given by:

$$\frac{\text{SD of}\left(\sum_{j=1}^{J-1} p_{j,k}\hat{\gamma}_k c_{i,j}\right)}{\text{SD of}\left(\hat{\beta}_j+\sum_{j=1}^{J-1} p_{j,k}\hat{\gamma}_k c_{i,j}\right)} \tag{3.8b}$$

Computing the standard deviation of these returns can provide insight into the underlying sources of variation in the country and industry returns. The higher the standard deviation of country effects, the higher the proportion of the variation in excess returns explained by country factors, and correspondingly for the industry effects.

The above estimation yields a time series of the intercept and the country and industry coefficients. The coefficients $\beta_{j,t}$ can be interpreted as pure industry effects with country effects excluded, while $\gamma_{k,t}$ are pure country effects with industry effects excluded. These pure effects can be used to measure the opportunities for portfolio managers to outperform the sample emerging market index with systematic industry or country tilts in their portfolios. The return decomposition method is used to gauge the importance of the country and industry effects relative to each other.

3.3.4. Mean Absolute Deviation

Rouwenhorst (1999) and Cavaglia *et al.* (2000) also apply Mean Absolute Deviations (MAD) to measure the size of the pure industry and country effects. The industry or country MAD is defined as the absolute value of the estimated pure industry or country effect at time *t* multiplied by the corresponding market value share of firms at that time. The larger is the MAD of the country (industry) effects, the bigger is the size of the country (industry) effects. It can be interpreted as the average cross-sectional SD indicator in each month. The higher the MAD is, the more dispersed are the country (industry) returns around the world (sample emerging markets) average in that month. The following are country and industry MADs:

$$MAD_{kt} = \sum_{k=1}^{13} v_{kt} \,|\, \gamma_{kt} \,| \qquad (3.9a)$$

$$MAD_{jt} = \sum_{j=1}^{11} w_{jt} \,|\, \beta_{jt} \,| \qquad (3.9b)$$

MAD_{kt} = the MAD of the value-weighted industry-neutral country portfolios

MAD_{jt} = the MAD of the value -weighted country-neutral industry portfolios

3.3.5. Traded vs. non-traded goods industries

To distinguish industries by classifying them as traded-goods and non-traded goods industries provides a useful way to measure the inter-industry relative importance of country and industry effects. The method used by Griffin and Karolyi (1998) is to calculate the mean and median industry-effect variances separately for the non-traded and traded goods industries.[5] According to the exchange-rate exposure literature, it is anticipated that a larger amount of variation in traded-goods industries will be explained by pure industry effects than in non-traded goods industries (where more variation should arise from the sum of the country effects).

According to the classification in Table 3-6, 11 industry sectors are grouped into 5 traded-goods industry groups and 6 non-traded goods industry groups. Since the return decomposition of section 4.3. has already calculated the standard deviations of the components of the excess return for each industry portfolio, i.e. SDs of the sum of country effect, $\sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k}$ and the pure industry effect, $\hat{\beta}_j$ and also the ratios of the two components (equations 3.8a and 3.8b) over the excess returns, the means (medians) of these standard deviations in the traded-goods industry group are calculated for each of three sub-sample periods and the whole sample period, and correspondingly for non-traded goods industry groups.

3.4. Empirical results

3.4.1. *F*-test *($)* on dummy variables for nominal return in U.S. dollars

Table 3-13 and Chart 3-1 show results of *F*-tests on the cross-sectional dummy variable regression on nominal returns in $US (equation 3.4). This set of tests is referred to in Table 3-13 as *F*-tests ($) in order to distinguish them from tests using real returns in local currency (to be referred to as *F*-tests (LC)). The *F*-tests are presented separately for industry and country dummies in each month. The first column in Table 3-13 shows

[5] The alternative method in Griffin and Karolyi (1998) involves measuring variations in country and industry effects between traded and non-traded goods industries by pooling the individual industry distinctions within each sector and by evaluating the average industry effect and the cumulative sum of country effects directly from the dummy variable regression model. This method enables Griffin and Karolyi to test formally with *F*-tests.

the three sub-periods and the second column shows the number of months in each sub-sample period. Each sub-period has been divided into three categories. The first shows the percentage of months in which industry or country dummies are significant between 0 to 5%, the second category shows the percentage of months in which dummies are significant between 6 to 10% and the last category shows the percentage of months with insignificant dummies.

From August 1984 to February 1986, both industry factors and country factors have significant influence on returns but industry factors play the more important role – there are over 26% more months with insignificant country dummies than there are months with insignificant industry dummies. March 1986 is the first obvious dividing point because since then country dummies are almost always very significant throughout the rest of the sample period. From March 1986 to March 1997, in over 99% of the months, country dummies are significant at the 5% level or better, while only 29% of the industry dummies are similarly significant. Country factors evidently play a dominant role during these 11 years. April 1997 is the second obvious dividing point because since then industry dummies become more consistently significant (although still less so than the country dummies). During the third sub-period, the percentage of the months with significant industry dummies increases by 51.02%. Chart 3-1 shows probability values of the F statistics for both industry dummies and country dummies from August 1984 to July 2004. It shows that after March 1986 the spikes of country dummy p-values are well below 0.10. The increasing importance of industry effects after 1997 is shown more obviously in Chart 3-1. It is easy to see that, most of the time, the spikes of industry dummy p-values are well above 0.10, but that after 1997 the number of huge spikes falls with most well below 0.10. Further details on dividing sub-periods are given in section 3.4.2.2.

3.4.2. Decomposition of returns in industry and country components

3.4.2.1. Decomposition of returns in industry and country components in the full sample period

Table 3-14 shows the decomposition results of excess nominal returns in U.S. dollars. Panel A shows the decomposition of country portfolio excess returns. Each country portfolio excess return ($R_k^{\$}$) is decomposed into a pure country effect ($\hat{\gamma}_k$) and a sum of 11 industry effects, $\sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}$. The main conclusion is that most of the variation in the value-weighted country and industry returns can be attributed to country-specific effects. Table 3-7-2 shows that Industrial Goods plus Services (IGS) contributes most to Chile in terms of market capitalization. Table 3-14 (Panel A) shows that Chile has the highest proportion of the country portfolio returns explained by pure country effects. In Panel B, the industry portfolio returns of IGS are explained mostly by the sum of the country effects. The sum of the country effects explains about 37% more of the industry index returns of IGS than do the pure industry effects, so it is no surprise to see that country effects are dominant in Chile.

Table 3-13 *F*-test (*$*) results for nominal returns in U.S. dollar.

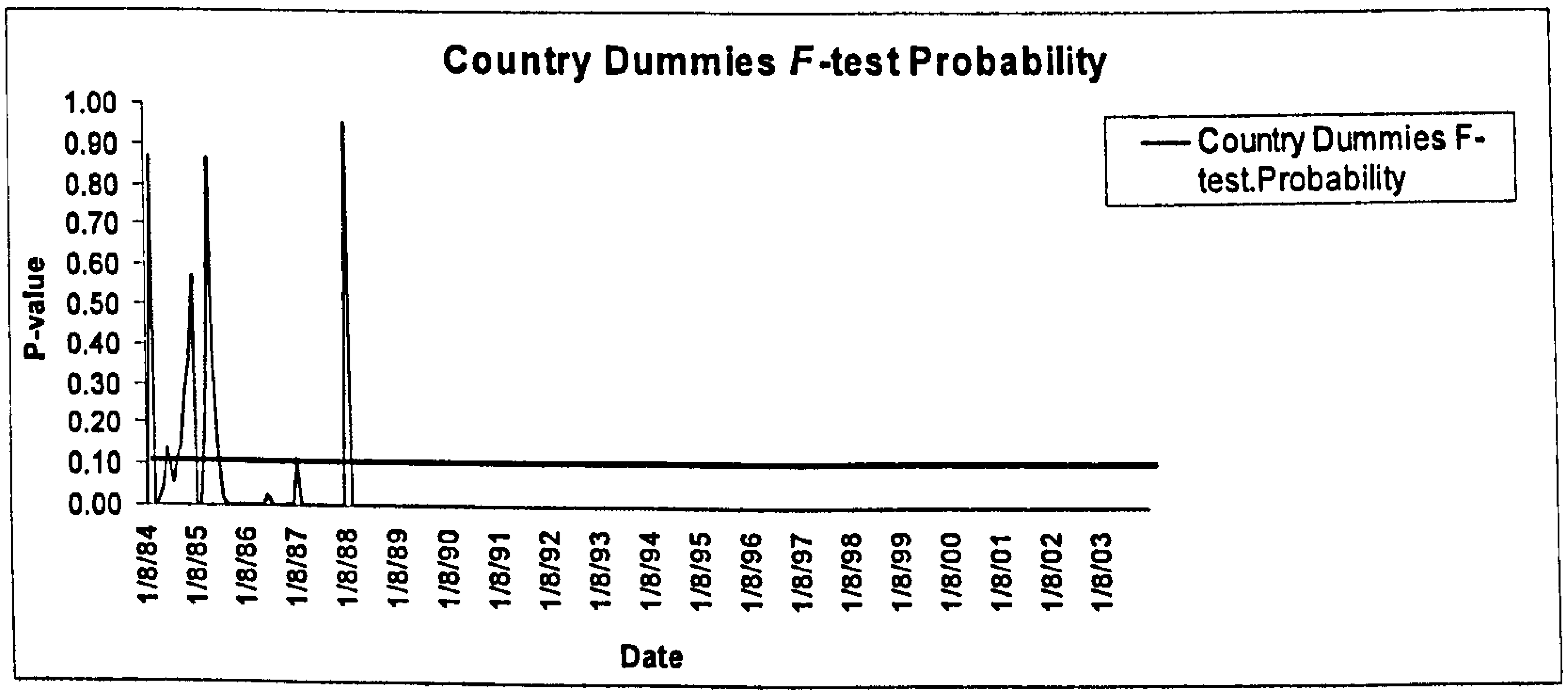
The first column in table 3-13 shows the three sub-sample periods and the second column shows the number of months in each sub-sample period. Each sub-sample period has been divided into three categories.

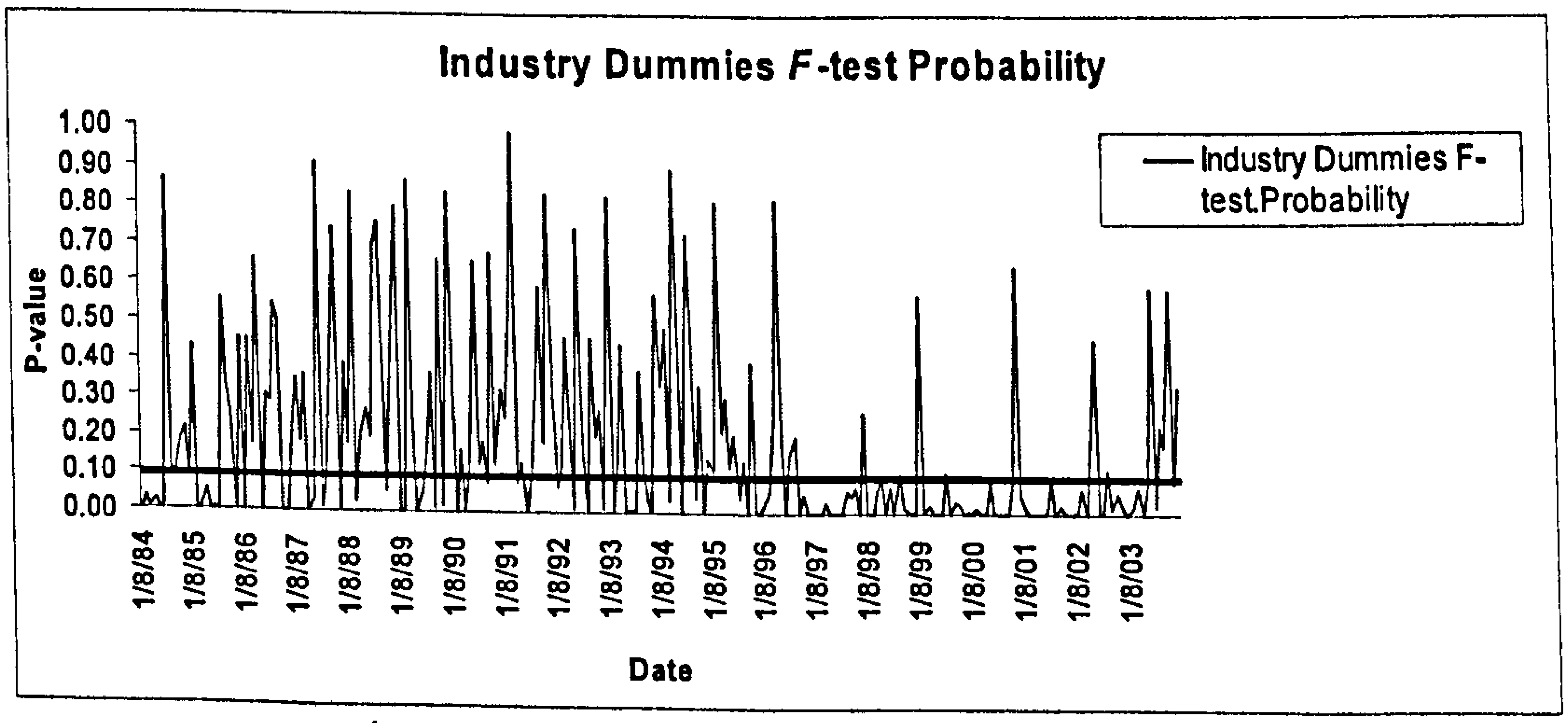
		Industry dummies				Country dummies			
Sample period	Number of months	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)
08.84-02.86	19	57.9	15.8	26.3	100	42.1	5.3	52.6	100
03.86-03.97	133	28.6	6.8	64.7	100	99.3	0	0.8	100
04.97-07.04	88	73.9	12.5	13.6	100	100	0	0	100

Note: the *F*-tests have been done separately for industry and country dummies in each month.
Table 3-13 shows the percentage of significant and insignificant months during each sample period.

Chart 3-1 *F*-test ($) probability of each month for nominal returns in U.S. dollar

Chart 3-1 shows probability values of the *F* statistics for both industry dummies and country dummies from August 1984 to July 2004. After March 1986 the spikes of country dummy p-values are well below 0.10. The increasing importance of industry effects after 1997 is shown more obviously in Chart 3-1.





On average, according to the relative term (equations 3.6a and 3.6b), the standard deviation of the sum of the industry effects explains only 14.1% of the standard deviation of excess country portfolio returns, and is about 76.3% smaller than the portion explained by the pure country effects. These findings are reinforced by the decomposition of industry indices in Panel B. Even in the value-weighted industry portfolio returns, more variation in industry returns is due to the sum of country effects. The largest standard deviation of the pure industry effect is 0.133, for the Financial industrial sector (FI), which is much lower than the largest standard deviation of the pure country effects (0.368, for South Korea). The average standard deviation of the pure industry effects is 0.092, which is still much smaller than the average standard deviation of the sum of 13 country effects (0.281). Except for the standard deviation of the Basic Material (BM) industry sector, all the standard deviations of the sum of country effects are larger than any of the standard deviations of the pure industry effects. The most important conclusion is that, on average, the standard deviation of the pure country effect is much larger than that of the pure industry effect, so that country factors are more likely to play a significant role in explaining the cross-country correlations. Section 3.4.2.2. will give more details on the change of the relative importance of country and industry effects by dividing data into three sub-periods.

Brooks and Del Negro (2002) argue that the increasing importance in industry effects disappear if discount of TMT (Technology, Media and Telecommunications) industry sectors. The results in Table 3-14 shows that the standard deviation of pure industry effects for TEC (Telecommunications, 0.069) sector is the lowest among all the industry sectors. The standard deviation of pure industry effects for TEL (Technology, 0.082) sector is also one of these lower ones as well. This phenomenon also reflects on the ratios of variations explained by their pure industry effects. Therefore in our sample, the TMT industry sectors do not show excessively big industry effects, which support the conclusions drawn by studies such as Phylaktis and Xia (2006a).

Table 3-15 presents summary statistics for $\hat{\alpha}+\hat{\gamma}_k$, the estimate of the return on an industrially-diversified portfolio of firms in the k^{th} country, which has the same industry composition as the average firm in the emerging market sample and $\hat{\alpha}+\hat{\beta}_j$, the estimate of the return on a geographically-diversified portfolio of firms in the j^{th} industry, which has the same geographical composition as the average firm in the emerging market sample. The entries in this table can be compared directly with the original returns in Table 3-9 to gauge the importance of the country composition of industry returns and the industry composition of country returns. If country effects are important in explaining cross-industry differences then correction for these effects should lead to greater cross-industry uniformity in average returns and return variation.

Table 3-14 Decomposition of excess index nominal return in U.S. dollar into country and industry effects

The table gives the standard deviation (SD) of the components of the value-weighted excess country and industry portfolio returns. Each country portfolio excess return is decomposed into a pure country effect and a sum of 11 industry effects. Each industry portfolio excess return is decomposed into the sum of 13 country effects and a pure industry effect. The ratio relative to the market gives the ratio of the SD of that component to the SD of the sum of that pure effect and the sum of the value weighted industry (country) effects.

Panel A	VW country indices				Panel B	VW industry indices			
	Pure country effect		Sum of 11 industry effects			Sum of 13 country effects		Pure industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	Industry	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	0.121	0.997	0.017	0.139	IGS	0.217	0.691	0.101	0.321
Chile	0.090	1.017	0.013	0.149	CG	0.327	0.817	0.077	0.192
China	0.143	0.995	0.010	0.072	CS	0.162	0.637	0.101	0.398
India	0.124	1.003	0.007	0.057	BM	0.104	1.242	0.104	1.244
Israel	0.305	0.857	0.058	0.163	UT	0.342	0.847	0.073	0.179
Malaysia	0.202	0.490	0.065	0.158	HC	0.353	0.841	0.075	0.178
Mexico	0.107	0.997	0.013	0.123	TEC	0.355	0.838	0.082	0.193
Pakistan	0.105	0.994	0.012	0.114	TEL	0.356	0.842	0.069	0.164
South Africa	0.299	0.770	0.093	0.241	FI	0.311	0.721	0.133	0.308
South Korea	0.368	0.884	0.052	0.124	PHG	0.278	0.794	0.091	0.258
Taiwan	0.119	1.005	0.016	0.131	BI	0.288	0.781	0.088	0.239
Thailand	0.202	0.728	0.081	0.290	**Cross-industry average**	**0.281**	**0.823**	**0.092**	**0.334**
Turkey	0.169	1.016	0.011	0.067					
Cross-country average	**0.201**	**0.904**	**0.034**	**0.141**					

i. The pure country effect measures the average return of firms in a country relative to firms that are in the same industry but located in a different country.
ii. The sum of the eleven industry effects represents the component of a country's return that can be attributed to the difference between the industrial composition of its market and the industrial composition of the emerging markets.
iii. The pure industry effect measures the average return of firms in an industry relative to firms which are located in the same country but belong to a different industry.
iv. The sum of the thirteen country effects represents the component of an industry's return that can be attributed to the difference between the geographical composition of its index and the geographical composition of the emerging markets as a whole.

Table 3-15 Summary statistics: Estimated country and industry indices (August 1984-July 2004)
Panel A contains the summary of the mean and the standard deviation of the monthly value-weighted estimated country returns, corrected for industry effects.
Panel B summaries the statistics for the monthly returns on value-weighted industry indices, corrected for country influences. All returns are measured in U.S. dollars and expressed in percent per month.
The entries in this table can be compared directly with the original returns in Table 3-9 to gauge the importance of the country composition of industry returns and the industry composition of country returns.

A: Country indices adjusted for industry effects															
	VW return		Correlation matrix												
Country	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	Korea	Taiwan	Thailand	Turkey
Brazil	-1.231	17.504	1.000	0.204	0.086	0.016	0.114	0.103	0.063	0.137	0.145	0.027	-0.005	0.417	0.217
Chile	0.493	6.173		1.000	0.130	0.346	0.279	0.353	0.434	0.299	0.383	0.263	0.244	0.620	0.261
China	0.807	13.339			1.000	-0.060	0.075	0.081	0.017	-0.058	0.008	-0.020	0.106	0.261	0.137
India	0.132	10.486				1.000	0.223	0.214	0.175	0.283	0.207	0.157	0.004	0.409	0.186
Israel	-2.092	70.714					1.000	0.545	0.248	0.133	0.817	0.447	0.153	0.963	0.207
Malaysia	-0.145	13.609						1.000	0.189	0.300	0.518	0.497	0.289	0.638	0.163
Mexico	0.651	8.511							1.000	0.317	0.327	0.145	0.257	0.517	0.243
Pakistan	0.469	8.285								1.000	0.198	0.230	0.129	0.487	0.256
S. Africa	0.391	14.869									1.000	0.475	0.256	0.846	0.280
S. Korea	-0.021	12.421										1.000	0.149	0.508	0.098
Taiwan	-0.117	13.022											1.000	0.501	0.118
Thailand	-0.572	19.062												1.000	0.565
Turkey	-0.530	16.671													1.000
Average*	-0.136	17.282													

Industry	VW return		Correlation matrix										
B: Industry indices adjusted for country effects													
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	-0.676	50.943	1.000	0.995	0.993	0.992	0.990	0.992	0.985	0.996	0.975	0.985	0.988
CG	-0.311	33.890		1.000	0.997	0.997	0.995	0.996	0.988	0.999	0.981	0.988	0.993
CS	-0.151	31.541			1.000	0.996	0.993	0.995	0.986	0.999	0.983	0.988	0.994
BM	-0.406	31.300				1.000	0.993	0.995	0.986	0.998	0.981	0.988	0.993
UT	0.076	35.331					1.000	0.992	0.984	0.995	0.977	0.983	0.990
HC	-0.260	34.718						1.000	0.985	0.997	0.980	0.986	0.989
TEC	-0.099	35.055							1.000	0.991	0.968	0.976	0.981
TEL	-0.040	36.261								1.000	0.984	0.991	0.995
FI.	0.496	30.012									1.000	0.970	0.975
PHG	0.031	34.227										1.000	0.983
BI	-0.296	33.594											1.000
Average#	-0.149	35.170											

Notes: 1. The corrected country index returns are computed as the sum of the return on the emerging market and the estimated country-specific component of return in each country, $(\hat{\alpha} + \hat{\gamma}_k)$, and therefore exclude the sources of variation that due to the industrial composition of the country indices, $\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}\right)$.

2. The corrected industry index returns are computed as the sum of the return on the emerging market and the estimated industry-specific component of return in each sector, $(\hat{\alpha} + \hat{\beta}_j)$, and therefore exclude the sources of variation that are due to the geographical composition of the industry indices, $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k}\right)$.

3. *These are the average means and standard deviations of 13 country portfolios.

4. # These are the average means and standard deviations of 11 industry portfolios.

5. S. Africa: South Africa, S. Korea: South Korea

Likewise, if country effects are important for explaining low correlations between industry returns, then the correction for country composition should increase the correlations between industry indices. And indeed, a comparison between Tables 3-9 and 3-15 shows that correcting for country effects leads to industry indices that perform worse (and are more variable) than before and to increased correlation between the different industry indices. However a corresponding phenomenon has not been found in country portfolios after correcting the industry effects. The value-weighted industry returns corrected for country effects are negative in 8 out of 11 industries. The average standard deviation increases from 0.371 to 35.170. Before correcting for country effects only IGS has a negative mean but after correcting for country effects only the Utility industry sector (UT), Personal and Household Goods (PHG) industry and FI industrial sectors have positive means. In terms of the standard deviation, there is not a big difference between the country indices in Table 3-9 and those in Table 3-15. On the other hand, after correcting for country effects, the industry index standard deviations go up from single to double digits in most industries while the correlations between industries increase to no less than 0.968 (in Table 3-9, the highest correlation between the industries is only 0.697).

Country effects appear to predominate – countries such as Thailand perform poorly after correcting for industry effects because the country-specific component of their index returns is low, not because of poor industrial performance. Thailand is one of the best performers with the third highest mean in the original data (Table 3-9). Basic Material (BM) industry sector is the second largest industry in Thailand by December 2003 in terms of market capitalization (Table 3-7-2). At the same time BM is one of the poorest performing industries in Table 3-9. After correcting the industry effects, Instead of getting better, Thailand actually gets much worse. Therefore Thailand does poorly even though the bad performing industry (BM), which has the second highest market capitalization among all the industries in Thailand, has been removed. Country effects contribute to a larger proportion of the variance of industry returns than industry effects do to country returns, so the country correction has a larger effect on the industry correlations. Overall, instead of industry specialization, it is cross-sectional variation of country effects that explains most of the cross-sectional variation in the stock returns.

3.4.2.2. Decomposition of returns in industry and country components in three sub-sample periods

In section 3.4.1., *F*-tests show the general picture of time-varying properties of the industry and country effects due to the changes in the sample country economy. These *F*-tests identify three sub-periods during which the industry and country factors play different roles. The two dates (March 1986 and April 1997) that divide the whole sample period into three sub-periods are decided purely by the observation on the significance of *F*-test result time series. Although the dividing points are not decided by formal tests, it is not coincidence that these two points stand out in the whole sample period. The changes in the sample countries economies during different sample periods may have the explanation for the time-varying properties of country and industry effects. They do reflect the important economic change over the two decades in the sample countries.

February 1986 is the month in which most countries started appearing in the sample, due to market liberalization. According to Henry (2000) in Table 3-8, many sample emerging markets officially liberalized their stock markets around 1986. According to Chart 3-2, the total sample market capitalization starts increasing after 1986. After 1986 the number of emerging markets starts increasing in the sample as well.

Chart 3-2 The total market capitalization (in U.S. dollar) of the sample.

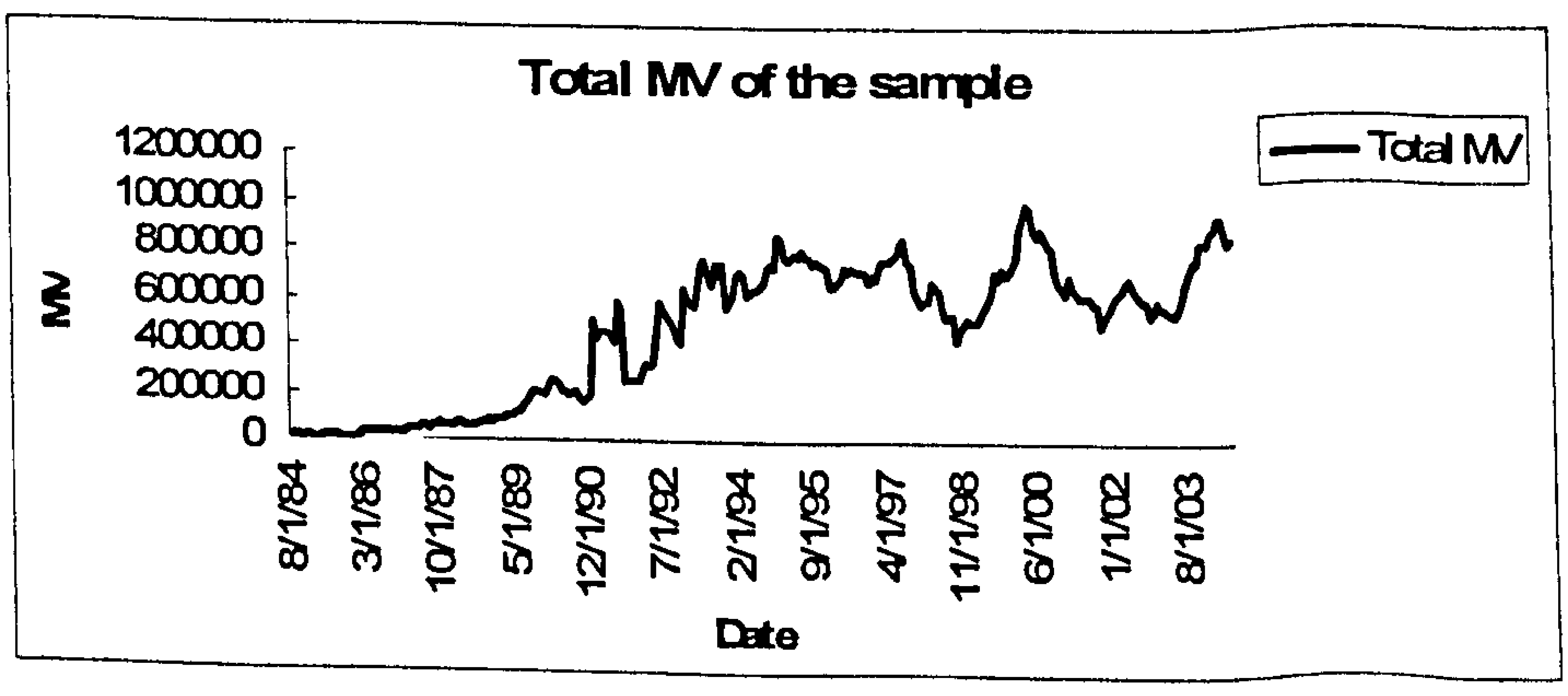


Table 3-16 Decomposition of excess value-weighted nominal returns in U.S. dollar into country and industry effects in three sub-sample periods

	08.84---02.86				03.86---03.97				04.97---07.04			
	Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Brazil					0.151	1.014	0.015	0.099	0.083	0.949	0.018	0.210
Chile					0.119	1.028	0.012	0.100	0.042	0.949	0.015	0.330
China					0.189	1.009	0.006	0.034	0.089	0.957	0.013	0.137
India					0.153	1.003	0.007	0.044	0.088	1.010	0.008	0.086
Israel					0.386	0.850	0.074	0.163	0.094	1.018	0.015	0.160
Malaysia	0.044	0.870	0.014	0.274	0.462	0.846	0.087	0.159	0.123	1.024	0.015	0.124
Mexico					0.132	0.999	0.011	0.081	0.064	0.994	0.016	0.245
Pakistan					0.127	1.001	0.007	0.057	0.083	0.983	0.015	0.1784
South Africa	0.029	1.010	0.012	0.421	0.398	0.766	0.125	0.242	0.074	0.975	0.011	0.143
South Korea	0.019	0.960	0.007	0.355	0.484	0.880	0.069	0.126	0.133	0.997	0.007	0.050
Taiwan					0.144	1.004	0.008	0.057	0.078	1.017	0.022	0.284
Thailand					0.265	0.728	0.106	0.290	0.026	1.064	0.009	0.356
Turkey					0.173	1.007	0.009	0.050	0.165	1.028	0.014	0.087
Average	**0.031**	**0.947**	**0.011**	**0.350**	**0.245**	**0.933**	**0.041**	**0.115**	**0.088**	**0.997**	**0.013**	**0.184**
Industry	**Sum of 3 country effects**		**Pure industry effect**		**Sum of 13 country effects**		**Pure industry effect**		**Sum of 13 country effects**		**Pure industry effect**	
	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
IGS	0.016	0.427	0.032	0.857	0.292	0.691	0.135	0.319	0.015	0.652	0.017	0.723
CG	0.012	0.713	0.013	0.749	0.440	0.817	0.102	0.189	0.017	0.736	0.021	0.884
CS	0.015	0.319	0.036	0.758	0.216	0.636	0.135	0.396	0.029	0.902	0.019	0.579
BM	0.021	0.739	0.019	0.699	0.139	1.272	0.139	1.274	0.019	0.609	0.023	0.704
UT	0.044	0.896	0.011	0.225	0.460	0.847	0.094	0.173	0.030	0.764	0.032	0.809
HC	0.022	0.571	0.035	0.905	0.473	0.841	0.098	0.174	0.050	0.900	0.025	0.442
TEC	0.020	0.287	0.064	0.923	0.477	0.840	0.099	0.174	0.038	0.600	0.053	0.837
TEL	-	-	-	-	0.459	0.842	0.089	0.163	0.031	1.023	0.009	0.312
FI	0.020	0.690	0.031	1.063	0.417	0.720	0.176	0.303	0.047	0.898	0.037	0.721
PHG	0.019	0.333	0.048	0.836	0.371	0.792	0.115	0.246	0.067	0.904	0.044	0.596
BI	0.017	0.307	0.054	0.982	0.387	0.782	0.114	0.230	0.018	0.563	0.031	0.960
Average	**0.021**	**0.528**	**0.038**	**0.800**	**0.376**	**0.825**	**0.118**	**0.331**	**0.033**	**0.777**	**0.028**	**0.688**

The finding that before February 1986 country factors were not as dominant as they were subsequently may be due to the number of country dummies. There are fewer country dummies than industry dummies in the early part of the sample because the number of available firms is limited before the stock market liberalization in most of the emerging markets. Before February 1986 there were only three countries in the sample: Malaysia, South Africa and South Korea. Table 3-2 shows the starting date of each industry group. Except for the Telecom industry, all industry groups have data from August 1984. Therefore the limited number of sample countries reflects the emerging markets liberalization history, which affects the relative importance of the country and industry effects on stock return variation. Although many emerging markets are officially liberalized, the dominant country effects after 1986 show that there was still long way to go from official liberalization to integration with other emerging and developed stock markets.

March 1997 may reflect the fact that about half of the sampled countries were affected in the East Asian Financial Crisis. During the East Asian financial crisis, which started in July 1997 in Thailand, there was severe economic turbulence. Of the countries included in the present sample, South Korea and Thailand were most affected by the crisis. Malaysia was also hit by the depression. Mainland China and Taiwan were relatively unaffected. However, all markets mentioned above saw their currencies depreciating drastically relative to the US dollar, even though the degree of depreciation varied across nations. The countries/regions that were directly affected in the crisis contribute 64.15% to the present sample in terms of the number of the firms. In terms of market capitalization, the five East Asian countries/regions contributed 57.02% of the total, as at December 2003.

Applying the same decomposition methodology to each sub-period may reveal more detailed time-varying properties of the industry and country effects. Table 3-16 shows the decomposition of value-weighted nominal returns in U.S. dollars for each sub-period, showing results very similar to the *F*-test results. In the first sub-period

(August 1984 to February 1986), pure country effects play a dominant role in explaining country returns and pure industry effects explain a large part of industry returns. On average, about 94.7% of the country portfolio return SD is explained by the pure country effects SD, which is about 59.7% more than the amount explained by the sum of industry effects SD. The pure industry effects on average have similar standard deviations to those of the pure country effects. The pure industry effects SD on average also explain just marginally more of the SD in industry portfolios than is explained by the sum of country effects. This suggests that during the first sub-sample period, country effects and industry effects play approximately equal roles.

In the second sub-period (March 1986 to March 1997) most of the SD of excess value-weighted country returns can be attributed to country-specific effects. The average standard deviation of the pure industry effects is smaller than the average standard deviation of the pure country effects. Furthermore, most of the SD in excess industry returns is due to the SD of the sum of country effects. The proportion of the industry portfolio SD explained by pure industry effects SD has decreased about 46.9% compared with the first sub-period. Therefore the finding in the second sub-sample period is that country effects play the dominant role in explaining the stock return SD.

During the third sub-period (April 1997 to July 2004), country effects still play a dominant role in explaining excess country value-weighted portfolio return SDs. The average SD of pure country effects is much larger than the average SD of the sum of industry effects. Therefore country effects are more important in explaining excess country portfolio return SDs. However, in this sub-sample, pure industry effects play an approximately equal role to the sum of country effects in explaining excess industry value-weighted return SDs, with very similar absolute and relative measurements. The sum of industry effects is still much smaller than the sum of the country effects and in general, industry effects could be considered as 'catching up' with the dominant country effects after 1997. Overall, the return decompositions are very close to the *F*-tests results but show more details of the time-varying properties in the relative importance of country and industry effects.

The impact of IT bubble issue argued in Brooks and Del Negro (2002) has not been found to be large in this dataset. The comparison between the 2nd and 3rd sub-period shows that the amount of variation explained by TEC sector has increased but not more than the increases in other sectors and in fact, the ratio has decreased in TEL sector case in the 3rd sub-period. Therefore the studies on sub-periods have supported findings in Phylaktis and Xia (2006a).

It is possible that the economic turbulence after 1997 that affected a large part of the sample led to the upward shift in industry effects. A narrow view of contagion that has historically been used in the relevant literature, defines it as a significant increase in cross-market linkages after a shock to one or a group of countries. (Forbes and Rigobon, 2002). Various studies examined whether the 1997 Asian financial crisis resulted in contagion. For example, Bekaert *et al.* (2003) found that, during the crisis, when markets were hit by unexpected negative shocks and the advantage of diversification was most needed, there was an increase in residual correlation among the affected countries. The increased correlation may explain the increase in global industry effects after 1997 in the sample used here.

Table 3-17 presents summary statistics for $\hat{\alpha}+\hat{\gamma}_k$ during the first sub-period (the estimated return on an industrially-diversified portfolio of firms in the k^{th} country) and $\hat{\alpha}+\hat{\beta}_j$ (the estimated return on a geographically-diversified portfolio of firms in the j^{th} industry). The entries in this table can be compared directly with the corresponding original returns in Table 3-10 to gauge the importance of the country composition of industry returns and the industry composition of country returns.

A comparison between Tables 3-10 and 3-17 shows that correcting for country effects leads to industry indices that perform slightly worse than before. Two out of ten industry means (Consumer Goods and Technology) are positive in the original data. However, after correcting the country effects all the means are negative. The standard deviations of the industry returns in Table 3-17 are very similar to the original data. Some of them are even lower. The correlations between the different industry portfolios after correcting the country effects are still very similar to the original data in Table 3-10. The corresponding phenomenon has also been found in country portfolios after correcting the industry effects. The differences between the country portfolios in Table 3-10 and those in Table 3-17 are not big. Country effects contribute a similar proportion of the variance of industry returns as industry effects do to country returns, so the country correction has a similar effect on the industry correlations. Overall during the first sub-period, the cross-sectional variations in both country and industry effects explain the cross-sectional variation in stock returns, supporting the conclusion drawn in the F-test and decomposition estimation in the first sub-period.

Table 3-18 presents summary statistics for the second sub-period. As in the first one, the entries in this table can be compared directly with the corresponding original returns in Table 3-11. In general the comparison of Table 3-11 and Table 3-18 is very similar to the comparison between Table 3-9 and 3-15 in section 3.4.2.2. The comparison of Table 3-11 and Table 3-18 also shows that correcting for country effects leads to industry indices that perform worse (i.e. even more variable) than before and to increased correlation between the different industry indices. However a corresponding phenomenon has not been found in country portfolios after correcting the industry effects.

In Table 3-11, the original average value-weighted industry return is 1.753. In Table 3-18, the average value-weighted industry returns corrected for country effects is 0.402, which has decreased about 77%. After correcting for industry effects, the average country portfolio mean has decreased a similar amount. The average industry portfolio SD increases from 8.161 to 46.785 after correcting the country effects, but the average country portfolio SD only goes up from 11.554 to 20.165. The increased average SD of the industry portfolio after the correction of country effects is about six times larger than the amount changed after industry correction.

Table 3-17 Summary statistics: Estimated country and industry indices (August 1984-February 1986)

Panel A contains the summary of the mean and the standard deviation of the monthly value-weighted estimated country returns, corrected for industry effects.

Panel B summaries the statistics for the monthly returns on value-weighted industry indices, corrected for country influences. All returns are measured in U.S. dollars and expressed in percent per month.

The entries in this table can be compared directly with the original returns in Table 3-10 to gauge the importance of the country composition of industry returns and the industry composition of country returns.

A: Country indices adjusted for industry effects															
Country	VW return		Correlation matrix												
	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	South Korea	Taiwan	Thailand	Turkey
Brazil				-	-	-	-	-	-	-	-	-	-	-	-
Chile					-	-	-	-	-	-	-	-	-	-	-
China						-	-	-	-	-	-	-	-	-	-
India							-	-	-	-	-	-	-	-	-
Israel								-	-	-	-	-	-	-	-
Malaysia	-2.311	4.468							-	-	-0.033	-0.163	-	-	-
Mexico										-	-	-	-	-	-
Pakistan											-	-	-	-	-
S. Africa	-1.911	5.068										0.771	-	-	-
S. Korea	-0.195	2.903											-	-	-
Taiwan														-	-
Thailand															-
Turkey															
Average*	-1.472	4.147													

B: Industry indices adjusted for country effects													
Industry	VW return		Correlation matrix										
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	-1.471	4.803		0.603	0.241	0.712	0.860	0.524	0.730	-	0.382	0.355	0.083
CG	-0.792	2.775			0.388	0.633	0.738	0.452	0.355	-	0.387	-0.046	0.277
CS	-0.624	4.030				0.437	0.542	0.615	-0.164	-	0.326	-0.113	0.557
BM	-1.434	3.400					0.795	0.521	0.417	-	0.507	0.109	0.310
UT	-1.357	2.836						0.701	0.624	-	0.557	0.188	0.344
HC	-2.429	4.342							0.213	-	0.524	0.162	0.245
TEC	-1.321	7.323								-	0.318	0.173	-0.073
TEL	-	-									-	-	-
FI	-1.508	3.316										-0.117	0.052
PHG	-1.095	3.828											-0.364
BI	-2.297	6.051											
Average#	-1.433	4.270											

Notes:

1. The corrected country index returns are computed as the sum of the return on the emerging market and the estimated country-specific component of return in each country, $\hat{\alpha} + \hat{\gamma}_k$, and therefore exclude the sources of variation due to the industrial composition of the country indices, $\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}\right)$.
2. The corrected industry index returns are computed as the sum of the return on the emerging market and the estimated industry-specific component of return in each sector, $\hat{\alpha} + \hat{\beta}_j$, and therefore exclude the sources of variation due to the geographical composition of the industry indices, $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k}\right)$.
3. *These are the average means and standard deviations of 3 country portfolios.
4. # These are the average means and standard deviations of 10 industry portfolios.
5. S. Africa: South Africa, S. Korea: South Korea

As in the whole sample period, described in section 3.4.2.2., country effects appear to dominate – countries such as Turkey perform poorly after correcting for industry effects because the country-specific component of their index returns is low, not because of poor industrial performance. Country effects contribute to a larger proportion of the variance of industry returns than industry effects do to country returns. Overall it can be concluded that during the second sub-period, the cross-sectional variation of country effects explains a major part of the cross-sectional variation in the stock returns.

Table 3-12 presents the third sub-sample summary statistics. As in the last two sub-samples, the entries in this table can be compared directly with the corresponding original returns in Table 3-19 to gauge the importance of the country composition of industry returns and the industry composition of country returns. In general, the comparison between Table 3-12 and 3-19 is very similar to the comparison between Table 3-9 and 3-15.

All the Value-weighted industry returns corrected for country effects are negative. The average standard deviation decreases from 0.638 to -0.731, or 215%. The average mean decreases from 0.472 to -0.587, or 224%. Therefore, in terms of the mean, the change is slightly bigger in country portfolios after correction of industry effects. The average SD of country portfolios decreases from 10.858 to 10.503, or about 3%. The average SD of industry portfolio decreases from 7.537 to 6.636, or about 12%. Therefore, in terms of SD, the change is bigger in industry portfolios after correction of country effects. In terms of correlation the correction of country effects leads to higher correlation among industry portfolios than correction of industry effects does to country portfolios.

During the third sub-period, country effects are more dominant but industry effects also have influence on country portfolios. Countries such as South Korea perform poorly after correcting for industry effects not because the country-specific component of their index returns is low, but because of poor industrial performance.

Table 3-18 Summary statistics: Estimated country and industry indices (March 1986-March 1997)

Panel A contains the summary of the mean and the standard deviation of the monthly value-weighted estimated country returns, corrected for industry effects.

Panel B summaries the statistics for the monthly returns on value-weighted industry indices, corrected for country influences. All returns are measured in U.S. dollars and expressed in percent per month.

The entries in this table can be compared directly with the original returns in Table 3-11 to gauge the importance of the country composition of industry returns and the industry composition of country returns.

A: Country indices adjusted for industry effects																
Country	VW return		Correlation matrix													
	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	Korea	Taiwan	Thailand	Turkey	
Brazil	-1.164	23.052		0.012	0.091	-0.085	-0.019	-0.005	-0.126	0.062	-0.006	-0.192	-0.168	0.369	0.109	
Chile	1.428	6.293			0.167	0.260	0.095	0.076	0.281	0.249	0.177	0.057	0.107	0.373	-0.002	
China	1.820	18.086				-0.130	0.147	0.050	0.015	-0.100	-0.007	-0.009	0.107	0.464	0.219	
India	0.345	10.728					0.093	0.024	0.123	0.197	-0.083	-0.014	-0.081	0.227	0.132	
Israel	-3.592	90.874						0.753	0.157	0.014	0.870	0.692	0.186	0.980	0.062	
Malaysia	1.346	12.816							0.122	0.134	0.690	0.580	0.282	0.799	0.184	
Mexico	1.554	9.282								0.338	0.136	0.112	0.176	0.431	0.076	
Pakistan	0.463	7.674									0.021	0.068	-0.003	0.339	0.050	
S. Africa	1.148	18.541										0.654	0.244	0.920	0.113	
S. Korea	1.029	10.537											0.154	0.689	-0.009	
Taiwan	0.704	14.326												0.516	0.025	
Thailand	-0.576	24.477													0.488	
Turkey	-0.613	15.462														
Average*	0.299	20.165														

B: Industry indices adjusted for country effects

Industry	VW return		Correlation matrix										
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	-0.610	68.328		0.996	0.995	0.993	0.992	0.994	0.994	0.997	0.979	0.989	0.992
CG	0.121	45.371			0.998	0.998	0.996	0.997	0.997	0.999	0.984	0.992	0.995
CS	0.411	42.113				0.998	0.995	0.997	0.995	0.999	0.986	0.992	0.996
BM	-0.030	41.809					0.995	0.996	0.995	0.998	0.983	0.992	0.995
UT	0.773	47.217						0.994	0.993	0.996	0.980	0.987	0.993
HC	0.196	46.443							0.994	0.998	0.984	0.989	0.993
TEC	0.424	46.385								0.997	0.979	0.988	0.992
TEL	0.429	46.533									0.986	0.993	0.996
FI	1.559	39.982										0.976	0.979
PHG	0.679	45.689											0.988
BI	0.465	44.761											
Average#	0.402	46.785											

Notes:

1. The corrected country index returns are computed as the sum of the return on the emerging market and the estimated country-specific component of return in each country, $\hat{\alpha} + \hat{\gamma}_k$, and therefore exclude the sources of variation due to the industrial composition of the country indices, $\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\beta}_j d_{i,j}\right)$.

2. The corrected industry index returns are computed as the sum of the return on the emerging market and the estimated industry-specific component of return in each sector, $\hat{\alpha} + \hat{\beta}_j$, and therefore exclude the sources of variation due to the geographical composition of the industry indices, $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\gamma}_k c_{i,k}\right)$.

3.*These are the average means and standard deviations of 13 country portfolios.

4.# These are the average means and standard deviations of 11 industry portfolios.

5. S. Africa: South Africa, S. Korea: South Korea

Table 3-19 Summary statistics: Estimated country and industry indices (April 1997-July 2004)

Panel A contains the summary of the mean and the standard deviation of the monthly value-weighted estimated country returns, corrected for industry effects.

Panel B summaries the statistics for the monthly returns on value-weighted industry indices, corrected for country influences. All returns are measured in U.S. dollars and expressed in percent per month.

The entries in this table can be compared directly with the original returns in Table 3-12 to gauge the importance of the country composition of industry returns and the industry composition of country returns.

A: Country indices adjusted for industry effects															
	VW return		Correlation matrix												
Country	Mean	Std. Dev.	Brazil	Chile	China	India	Israel	Malaysia	Mexico	Pakistan	South. Africa	Korea	Taiwan	Thailand	Turkey
Brazil	-1.291	10.274		0.672	0.071	0.239	0.463	0.282	0.540	0.302	0.386	0.249	0.352	0.662	0.472
Chile	-0.485	5.924			0.048	0.442	0.561	0.519	0.612	0.349	0.526	0.391	0.417	0.825	0.516
China	-0.033	7.413				0.066	-0.066	0.140	0.009	-0.005	0.015	-0.060	0.130	0.142	0.035
India	-0.076	10.301					0.383	0.333	0.236	0.351	0.387	0.252	0.106	0.551	0.234
Israel	0.175	10.337						0.313	0.482	0.240	0.344	0.202	0.090	0.591	0.444
Malaysia	-1.930	15.742							0.247	0.380	0.256	0.431	0.334	0.671	0.165
Mexico	-0.467	7.345								0.310	0.530	0.185	0.391	0.647	0.484
Pakistan	0.475	8.809									0.272	0.297	0.203	0.568	0.392
S. Africa	-0.257	8.832										0.304	0.294	0.652	0.391
S. Korea	-1.572	15.795											0.169	0.587	0.157
Taiwan	-1.172	11.119												0.512	0.248
Thailand	-0.566	6.505													0.635
Turkey	-0.428	18.147													
Average*	-0.587	10.503													

B: Industry indices adjusted for country effects													
Industry	VW return		Correlation matrix										
	Mean	Std. Dev.	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
IGS	-0.604	6.402		0.963	0.948	0.942	0.864	0.908	0.786	0.969	0.841	0.763	0.915
CG	-0.859	5.439			0.961	0.957	0.870	0.916	0.736	0.969	0.870	0.787	0.931
CS	-0.898	6.131				0.950	0.866	0.904	0.759	0.973	0.864	0.798	0.909
BM	-0.751	6.019					0.862	0.898	0.707	0.958	0.853	0.763	0.915
UT	-0.669	6.572						0.852	0.651	0.906	0.818	0.771	0.842
HC	-0.482	5.771							0.745	0.940	0.810	0.777	0.851
TEC	-0.625	9.960								0.819	0.597	0.554	0.650
TEL	-0.750	6.225									0.874	0.827	0.926
FI	-0.678	6.539										0.709	0.832
PHG	-0.705	6.823											0.808
BI	-1.014	7.112											
Average#	-0.731	6.636											

Notes:

1. The corrected country index returns are computed as the sum of the return on the emerging market and the estimated country-specific component of return in each country, $\hat{\alpha} + \hat{\gamma}_k$, and therefore exclude the sources of variation due to the industrial composition of the country indices, $\left(\sum_{j=1}^{J-1} p_{k,j} \hat{\beta}_j d_{i,j}\right)$.

2. The corrected industry index returns are computed as the sum of the return on the emerging market and the estimated industry-specific component of return in each sector, $\hat{\alpha} + \hat{\beta}_j$, and therefore exclude the sources of variation due to the geographical composition of the industry indices, $\left(\sum_{k=1}^{K-1} p_{j,k} \hat{\gamma}_k c_{i,k}\right)$.

3. *These are the average means and standard deviations of 13 country portfolios.
4. #These are the average means and standard deviations of 11 industry portfolios.
5. S. Africa: South Africa, S. Korea: South Korea

South Korea has the second highest mean and is one of the best performers in the original data. Technology (TEC) is the largest industry in South Korea in terms of market capitalization by December 2003 (Table 3-7-2). At the same time TEC is the second best performing industry in Table 3-12. After correcting the industry effects, South Korea has the second lowest mean. Therefore South Korea does poorly after the well-performing industry (TEC), which has the highest market capitalization among all the industries in South Korea, has been removed.

The Basic Industry (BI) is one of the good performers in the original data. Most of its capitalization is concentrated in Thailand by December 2003 (Table 3-7-2). At the same time, Thailand is the third best performing country in Table 3-12. After correcting for country affects, BI performs worst among 11 industry portfolios. Industries such as BI perform well because they are concentrated in countries that perform well, not because the industry-specific component of their index returns is high.

The above analysis shows that the country correction has a similar effect as the industry correction, so country effects contribute a similar proportion to the variance of industry returns as industry effects do to country returns. Overall the conclusion is that instead of either country or industry effects being dominant, the cross-sectional variations in both country and industry effects explain the cross-sectional variations in stock returns.

Therefore by comparing the summary statistics after correction of country and industry effects with the summary statistics of their original data in the three sub-periods, similar conclusions to F-test and decomposition estimations can be drawn. From August 1984 to February 1986, both industry and country factors have significant influence on returns. In the second sub-period, the dominant country effects are shown mainly by the big differences in the standard deviations of the industry portfolios after the correction of the country effects. In the third sub-period, although country effects are still very important, there is increasing importance of the industry effects. The importance of the country effects is mainly shown in the much higher industry correlations after the correction of country effects and by the bigger changes in the SDs of industry portfolios after correction of country effects. The 'catching-up' by industry effects is mainly shown by the bigger changes on country portfolio means after the correction of the industry effects compared with the change of industry portfolio means.

The dominant country effects through the 1990s and the increasing importance of the industry effects found in the present study are consistent with previous studies. Phylaktis and Xia (2006a) found that over the period 1992 to 2001 country factors play a dominant role but that after 1999 there is a major increase in industry effects, especially in Europe and North America where the industry effects have become more important than country effects. However in both Asia-Pacific and Latin America, the industry effects are still dominated by the country effects. Results in this study for the second and third sub-periods (March 1986 to July 2004) support Phylaktis and Xia's finding in both Asia-Pacific and Latin America markets even though monthly individual firm data have been used rather than weekly index data. The results also extend to a longer sample period. Campa and Fernandes (2006) employed monthly industry indices data from 17 emerging markets from 1973 to 2002. They found that country factors were still dominant but there was a major upwards shift in the industry effects. Results in this study support the conclusion of Campa and Fernandes (2006) with individual firm data during a similar sample period.

The results of the three sub-sample return decompositions further support the *F*-test findings and give a detailed picture of the time-varying properties of the country and industry effects. Therefore they also support the rationale of the decision on how to identify the sub-periods.

3.4.3. Mean Absolute Deviation estimation

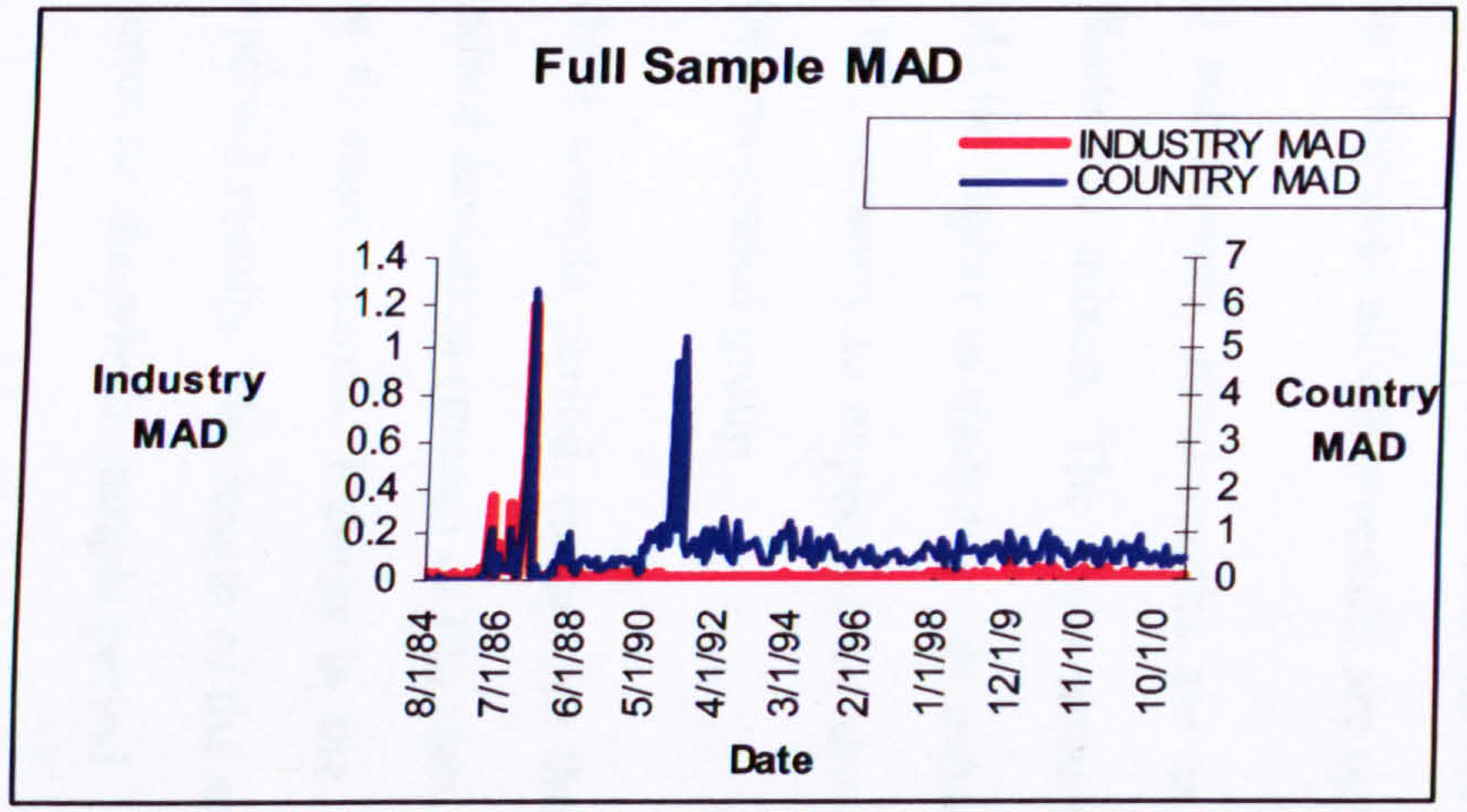
The Mean Absolute Deviation (MAD) estimation was applied to the pure industry effect β_{jt} from the decomposition of the industry portfolio returns and to the pure country effect γ_{kt} from the decomposition of the country portfolio returns, to measure the size of the pure industry and country effects. It can be interpreted as the average cross-sectional SD indicator in each month. The larger is the MAD, the more dispersed are the country (industry) returns around the world (sample emerging markets) average in that month.

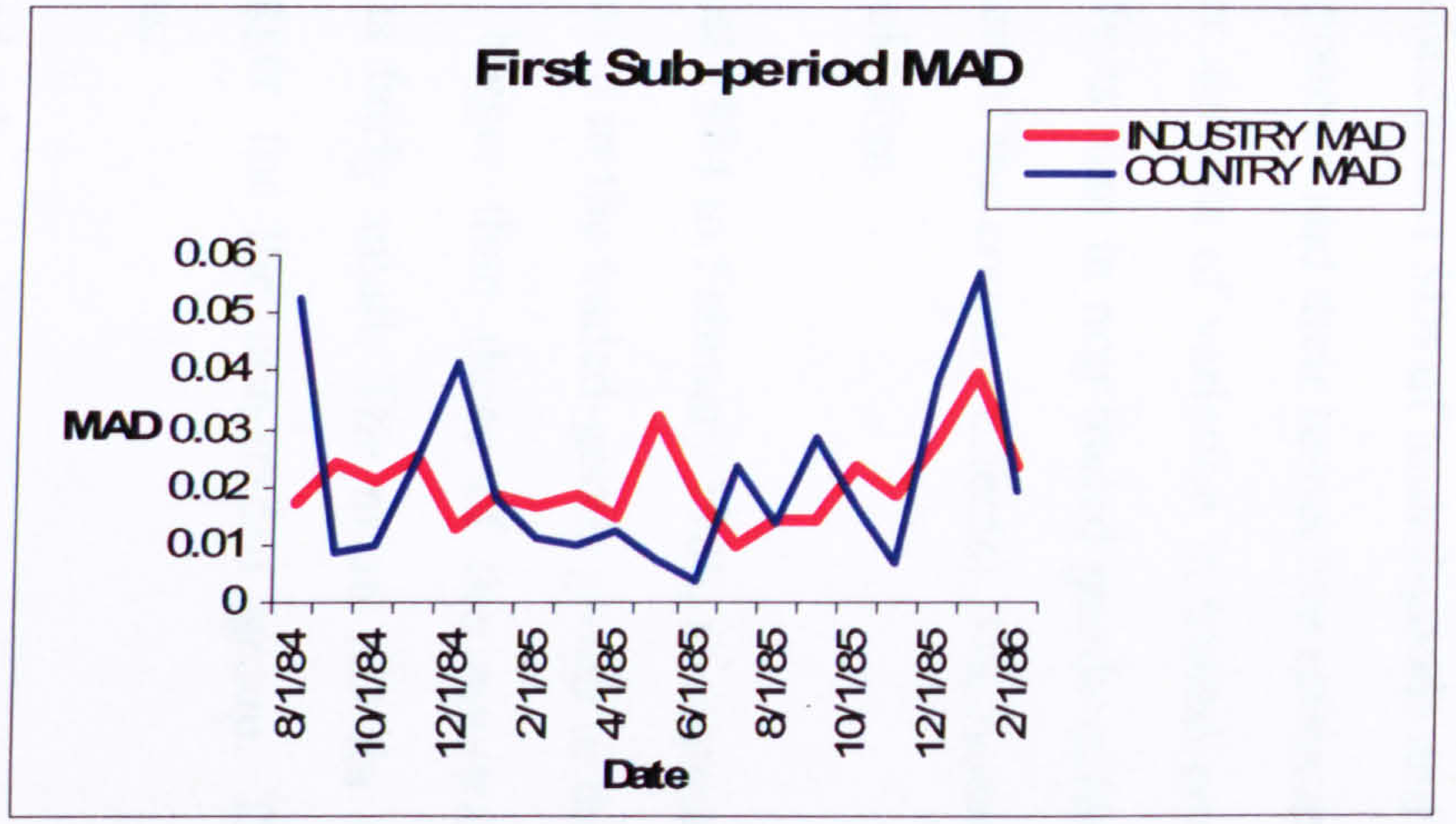
Chart 3-3 plots the industry and country MADs for value-weighted returns. The chart contains four figures. These are the MAD of the whole sample period and MADs for the three sub-sample periods. The top left figure shows the plot of industry and country MADs calculated over all 240 months. In general the MAD results support the *F*-tests results by measuring the sizes of country and industry effects. The main conclusion is that country MAD is much higher than the industry MAD, especially after early 1986.

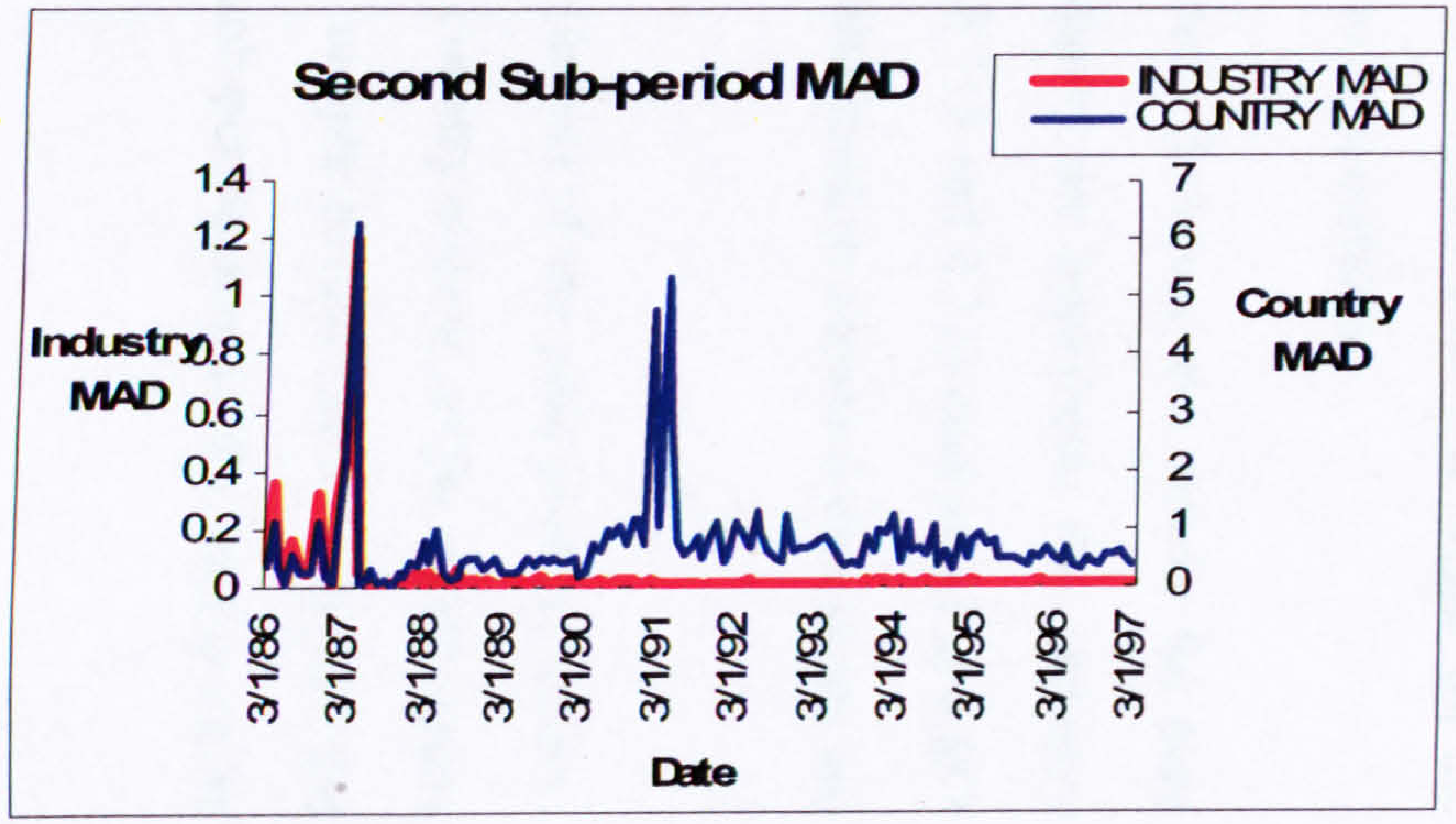
However, big differences in the values of the country and industry MADs among three periods mean that a single scale does not show the details of variations very well. Therefore the industry and country MADs are also plotted for the three sub-sample periods separately. These data suggest that country and industry effects had a similar influence on the stock return variations during the first sub-sample period. During the second sub-sample period the country MAD is constantly larger than the industry MAD, therefore the country effects are clearly dominant in terms of the size of the effects. In the third sub-sample period, the industry MAD is slightly larger than in the second sub-sample, but the industry MAD values are still very small. Country MAD values are much greater than the industry MAD, showing that country effects are still dominant. The increasing importance of industry effects is more obvious in terms of the significance of industry effects in *F*-tests but the upward trend is not so obvious when the size of the industry effects is examined in the MAD test.

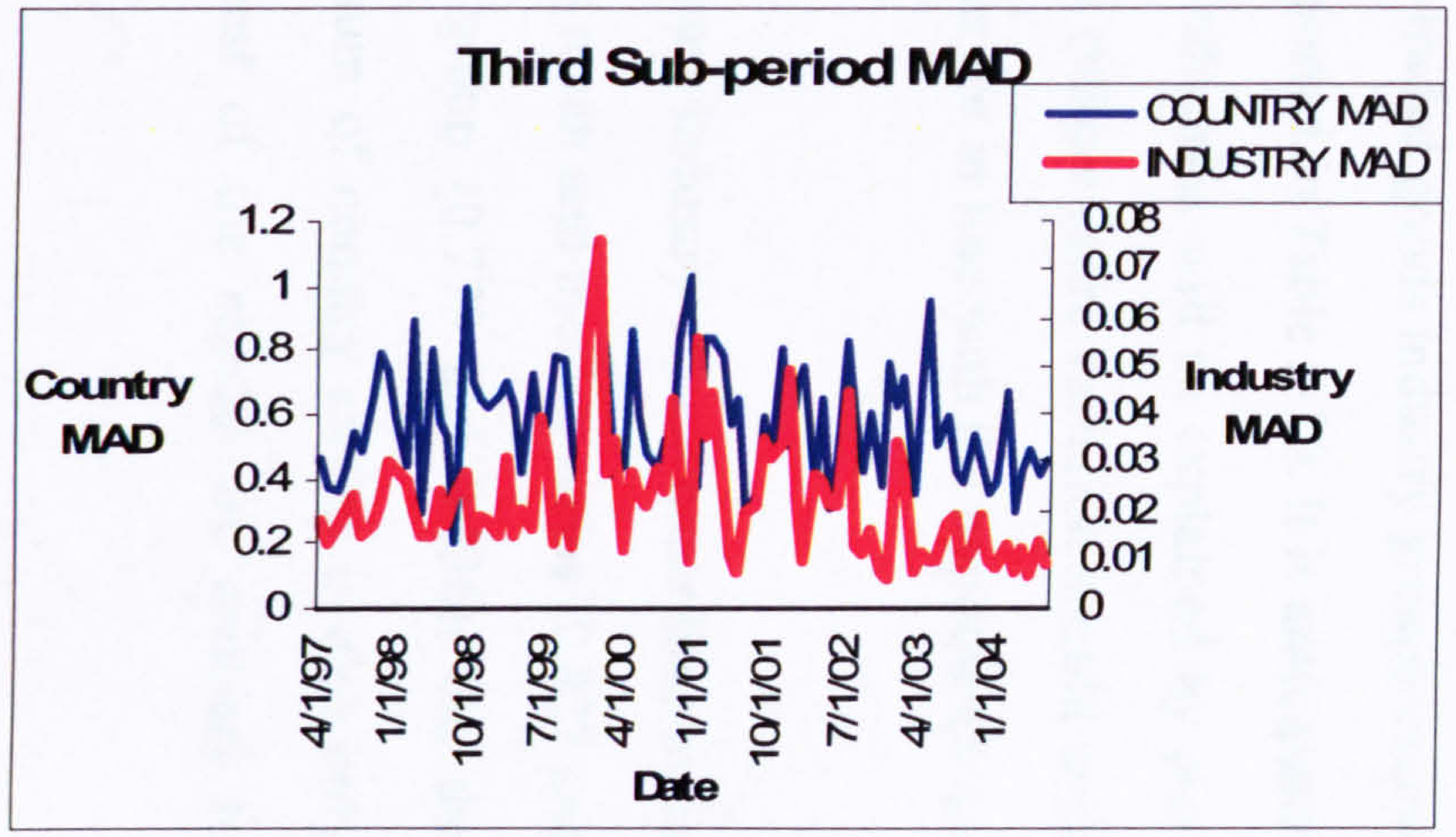
Chart 3-3 Mean Absolute Deviation estimation (nominal return in U.S. dollars)

Chart 3-2 plots the industry and country MADs for value-weighted returns. The chart contains the MAD of the whole sample period and MADs for the three sub-sample periods. In general the MAD results support the *F*-tests results by measuring the sizes of country and industry effects. The main conclusion is that the country MAD is much higher than the industry MAD especially after early 1986.









3.4.4. Traded vs. non-traded goods industries

The means (medians) SDs of traded-goods and non-traded goods industry groups excess return components and their respective ratios are reported in Table 3-20. It is anticipated that a larger amount of variation in traded-goods industries will be explained by pure industry effects than in non-traded goods industries (where more variation should arise from the sum of the country effects). The results that are in line with the hypotheses are shown in bold font.

From August 1984 to February 1986, as expected, pure industry effects contribute more to the variation in the traded-goods group in that its mean and median ratios (0.827 and 0.857) are bigger than those of the non-traded group (0.773 and 0.836), but the difference is fairly small. The mean SD for the sum of country effects is also only slightly bigger for the non-traded group. The rest of the results are contrary to expectations.

In the second sub-sample, the country and industry effects are again mixed. As expected, the mean SD of the sum of country effects is slightly larger for the non-traded group (0.385 compared to 0.364). The mean SD for the pure industry effects is bigger for the traded group. However all other results are opposite to expectations.

In the third sub-sample, most results are as expected. However, the results for pure industry effects are mixed. The ratio measures support the hypothesis that industry effects should be higher in traded-goods industries (0.718 and 0.723 compared to 0.663 and 0.658) but, contrary to expectations, the mean and median standard deviations are larger for the non-traded group.

Over the whole sample period, except for the ratio (mean) of the pure industry effects and the standard deviation (mean) of the sum of the country effects, all the other results are opposite to expectations. Results in the whole sample period seem to reflect the second sub-period results. The length of the second sub-period may be the reason for its strong influence on the whole sample period.

Table 3-20 Examination of industry effects for traded and non-traded goods industries (nominal return in U.S. dollars)

Mean (Median)	08.84—02.86				03.86—03.97				04.97—07.04				08.84—07.04			
	Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect	
	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Non-traded goods	**0.019** (0.018)	0.424 (0.326)	0.036 (0.036)	**0.773** **(0.836)**	**0.385** (0.402)	0.770 (0.787)	0.120 (0.114)	**0.252** (0.238)	**0.037** **(0.030)**	**0.842** **(0.900)**	0.029 (0.031)	**0.663** **(0.658)**	**0.290** (0.300)	0.770 (0.787)	0.092 (0.089)	**0.258** (0.248)
Traded goods	**0.018** (0.020)	0.548 (0.571)	0.033 (0.032)	**0.827** **(0.857)**	**0.364** (0.440)	0.892 (0.840)	0.114 (0.102)	**0.426** (0.189)	**0.028** **(0.020)**	**0.699** **(0.652)**	0.028 (0.023)	**0.718** **(0.723)**	**0.271** (0.327)	0.886 (0.838)	0.088 (0.082)	**0.426** (0.193)

Note: 1. 'Mean (Median)' across industries is calculated by taking the average (median) of the cumulative country effects, pure industry effects, or their respective ratio (note 2 and 3) across the industries during three sub-sample periods and the whole sample separately for traded and non-traded goods industries. See Table 3-6 for the classification scheme.

2. Variation in each industry portfolio excess return explained by the pure industry effect:

$$\frac{\text{SD of}\left(\hat{\beta}_j\right)}{\text{SD of}\left(\hat{\beta}_j + \sum_{j=1}^{J-1} p_{j,k}\hat{\gamma}_k c_{i,j}\right)}$$

3. Variation in each industry portfolio excess return explained by the sum of country effect:

$$\frac{\text{SD of}\left(\sum_{j=1}^{J-1} p_{j,k}\hat{\gamma}_k c_{i,j}\right)}{\text{SD of}\left(\hat{\beta}_j + \sum_{j=1}^{J-1} p_{j,k}\hat{\gamma}_k c_{i,j}\right)}$$

To summarize, hypotheses are generally supported in the third sub-sample, although differences between the traded and non-traded groups are fairly small. There are some potential explanations for the mixed results:

1) The industry classification used in this study may provide an explanation. Griffin and Karolyi (1998) used over 66-industry classification, and grouped these into non-traded and traded goods using the definition set out in Bodnar and Gentry (1993). Here the FTSE level 3 industry classification is used, which is coarser than that of Griffin and Karolyi (1998) and therefore leads to a coarser grouping of the traded and non-traded goods industries. (Reasons for using the FTSE industry classification in this study have been discussed in section 3.2.1.) And also, in section 3.2.1., Table 3-5 lists the 14-excluded industry sectors from this study. Some of these excluded industry sectors such as Oil, Steel and Tobacco are major export/import industries and have been included in Griffin and Karolyi (1998). This may also explain the mixed results here.

2) According to the literature review in section 2.2.2., some studies on exchange rate exposure did not find significant empirical evidence to support the importance of exchange rate. The changes in exchange rate compared with changes in other industry-common shocks is fairly small over the long time horizon, which is one of the explanations. Bodnar and Wong (2003) show that both return measurement horizon and model specification have evident influences on exposure estimation results. Therefore another explanation is attributed to the difficulty in obtaining statistically significant and economically meaningful exchange rate exposure estimations.

3.5. Conclusion

In the last three decades, research on portfolio diversification has focused particularly on the main driving forces of low co-movements among international equity markets.

So far, country and industry effects are the two most well-known forces. Which one is the main driving force, especially after late 1990s, is the main focus of debate. Various studies have looked at this issue by using data from different markets and different sample periods, relating the issue to major economic events in the last two decades, such as the introduction of the Euro, the IT bubble, and trade agreements. However, the ongoing debate on the relative importance of industry and country factors in determining the cross-sectional variation of the stock price movement is far from drawing a definite conclusion.

This chapter has aimed to shed light on the debate by using data on individual securities in emerging stock markets to re-examine the time-varying roles of country and industry effects on the variation of stock market returns. In terms of the dataset, this study contributes to the literature in the following ways. First, earlier studies on emerging markets are extended by using individual stocks from ESMs, which provides new firm-specific evidence on the debate. Also in addition, the use of a longer sample period than most previous studies allows different explanations to be developed. Finally, Griffin and Karolyi (1998) and Phylaktis and Xia (2006a) use 66 and 51 industry groups respectively. The fact that similar results have been found by using Dow Jones/FTSE level 3 industry classification in this study supports the conclusion in Marsh and Pfleiderer (1997) that the industry classification does not have a crucial impact on the final results.

In terms of methodology, one of the innovations in this study is to apply F-tests to the cross-sectional dummy variable regression. The F-test is a straightforward test of the significance of the country and industry dummies in the dummy variable model. It not only allows a general comparison of the importance of country and industry effects in determining the return variations but also gives a big picture of the time-varying property of the significance of the country and industry effects through the time series of the F-statistics results in every month. This supplements the information in the coefficients on the magnitude of the effects. It builds the foundation for the more detailed return decomposition methodology.

These *F*-tests have revealed very significant results. From 1984 to February 1986, both industry factors and country factors have significant influence on stock returns but industry factors play the more important role. From March 1986 to March 1997 country factors evidently play a dominant role. From April 1997 to July 2004, industry dummies become more consistently significant, although still less so than the country dummies.

The two dates (March 1986 and April 1997) that divide the whole sample period into three sub-samples are decided purely by the observation on the significance of the *F*-test result time series. However they also reflect important economic changes over the two decades in the sampled countries. February 1986 is the month in which most countries started appearing in the sample, due to the market liberalization. March 1997 may reflect the fact that about half of the sampled countries were affected by the 1997 East Asian Financial Crisis.

It is possible that the economic turbulence during the East Asian financial crisis affecting a large part of the sample has led to the upward shift in the importance of industry effects. The literature on contagion has found that when markets are hit by unexpected negative shocks, and when the advantage of diversification is most needed, the cross-country correlation between stock returns in the affected countries actually goes up (for example, Bekaert *et al.*, 2003). Several explanations have been provided by various contagion studies. One point of view is focused on the herd behavior of investors facing sudden shocks on market expectations and confidence. In a financial market where the same information is shared by participants, a piece of new information may cause a revision of market expectations. If the market's perception is interpreted by currency traders in other markets as a signal of crisis occurrence in the near future, this piece of news may lead to a capital outflow from the market. If the currency and reserves are under severe challenge and investor sentiment plays a major role, contagion may be a result of a shift in investors or lack of confidence in neighboring countries (Ito and Hashimoto, 2002). In addition to this explanation, there are at least three other possible explanations. First, currency crises can spread contagiously among countries that trade disproportionately with one another (Glick and Rose, 1998). Second, a common creditor may withdraw its capital from all countries when one of them experiences financial crisis in order to avoid further decline in asset values (Kaminsky and Reinhart, 2000). Third, when investors and lending agencies change the risk assessment to other countries, which have similar macroeconomic and financial conditions to the market in crisis, the 'Wake-up call' can be a channel for contagion (Sachs *et al.*, 1995).

The increased correlation may explain the increased importance of global industry effects after 1997 in the sample used here. Crisis in one country can spillover to a group of other countries through trade linkages, herding behavior by investors or shifts in assessments of lending agencies. During a volatile period the correlations between relevant markets are higher than during a stable period. This effect may last longer than the crisis itself. Therefore the observed increasing importance of global industry effects may not be a permanent phenomenon based on some fundamental reasons but a reflection of the more closely linked regional/emerging markets during and after crisis.

The dominant country effects through the 1990s found in the present study and the finding of the increasing importance of the industry effects are consistent with previous studies. Phylaktis and Xia (2006a) found that, over the period 1992 to 2001, country factors play a dominant role but that after 1999 there was a major increase in industry effects. However in both Asia-Pacific and Latin America, the industry effects were still dominated by the country effects. Results in this study on the second and third sub-periods (March 1986 to July 2004) support Phylaktis and Xia's finding for both Asia-Pacific and Latin America markets when using monthly data for individual firms rather than weekly index data. The results have also extended the findings to a longer sample period.

Campa and Fernandes (2006) employed monthly industry index data for 17 emerging markets from 1973 to 2002. They found that country factors were still dominant but there was a major upwards shift in the industry effects. Results in this study support the conclusion of Campa and Fernandes (2006) using individual firm data for a similar sample period.

In order to separate country and industry influences the methodology of existing studies has been used, in particular the dummy variable (fixed-effect) model of Heston and Rouwenhorst (1994). Overall it can be concluded that instead of industry specialization, country effects explain a major part of the cross-sectional variation of stock returns across countries. The *F*-tests, decompositions of value-weighted nominal $US returns in three sub-sample periods and the industry and country Mean Absolute Deviations estimation all give results that support this conclusion.

When investigating the relative importance of the country and industry effects at inter-industry level, Griffin and Karolyi (1998) utilized a comprehensive coverage of industry sectors using Dow Jones World Stock Index data. With less finely grouped industry sectors, the results here in general seem to support their conclusions: a larger amount of variation in traded-goods than non-traded goods industries can be explained by pure industry effects, and variation in the non-traded goods industries seems be more due to the sum of the country effects. However there are mixed results in this study that may have been caused by (i) the more coarsely defined industry groups, (ii) less changeable exchange rate than other industry-common factors over a long time horizon or (iii) difficulties in obtaining statistically significant and economically meaningful exchange rate exposure estimations.

To sum up, using monthly data for individual firms from emerging markets, various tests on the relative importance of country and industry factors have lead to the conclusion that, in emerging stock markets, country effects play a predominant role in determining the international cross-sectional variation of stock returns. The role of industry effects may not be as strong as in developed markets but industry effects do appear increasingly important in emerging markets after 1997, possibly linked to the 1997 Asian Financial Crisis. Future studies using more recent data may shed more light on the further development of the industry effects in emerging markets (especially Asian markets). In particular it is interesting to investigate whether this phenomenon is temporarily generated by economic turbulence or whether it is due to a more permanent globalization and integration process.

Whilst this chapter has drawn the same conclusion as other relevant studies on the dominant country effects, the conclusions of these studies may not be due to the underlying importance of country effects *per se* but to possible deficiencies in the underlying analytics of the exercise. In the following chapter, the specification of the dummy variable regressions will be reconsidered.

CHAPTER 4:

COUNTRY FACTORS IN STOCK RETURNS: FACTORS OR FANTASIES?

4.1. Introduction

Whilst Chapter 3 shows empirical evidence to support the dominant role of country effects in emerging markets, it is possible that the dominant country effects are not due to the underlying importance of country effects *per se* but to possible deficiencies in the basic analytics of the exercise.

It can be argued that a regression of nominal stock returns denominated in a single currency on country and industry dummies introduces no less than three separate biases, suggesting that the exercise may overstate the importance of country factors in returns-generation. First, to compare returns in different currencies, the data must be converted into a single 'world' currency, usually U.S. dollars. It can be argued that the exchange rate conversion automatically introduces a country effect into the returns series. A second related potential bias is that domestic returns contain the domestic rate of inflation. The third bias arises because domestic returns also contain a risk-free interest rate, which may differ across countries. To examine the importance of these issues, another innovation of this study is to reconsider the specification of the dummy variable regressions.

The remainder of the chapter is organized as follows. Section 4.2 reviews the literature. Section 4.3 shows the specification of the dummy variable models required to remove the three potential biases. Section 4.4 shows the empirical results of the specified dummy variable models. Section 4.5 concludes.

4.2. Literature Review

4.2.1. Potential biases in predominant country effects

There is the possibility that the predominant country effects are not due to their underlying importance but to imperfections in the basic methodologies used widely in the literature. Green (2005) has argued that there are at least three separate biases in a regression of nominal stock returns denominated in a single currency (e.g. US dollars) on country and industry dummies. These biases may lead to an overestimate of the importance of country effects in the decomposition exercise.

4.2.1.1. Potential exchange rate bias

First, to compare returns in different stock markets, the data are converted into a single 'world' currency, usually US dollars. Before they are converted to U.S. dollars, the stock prices in some stock markets, for example Brazil, can be the same in local currency for several consecutive months. If monthly exchange rates vary, this phenomenon would disappear after converting the stock returns to US dollars. The change of exchange rates reflects on the converted Brazilian stock returns and disguises the illiquidity of stocks in their local currency. It is therefore interesting to see whether the results are changed after controlling for exchange rate effects.

Different studies have looked from different perspectives at the rôle that exchange rates play in determining stock return variations. Roll (1992) found that a significant part of common currency denominated national index returns can in fact be explained by the variation in exchange rates, although the amount explained is less than the amount attributed to the industry composition of national stock market indices.

Heston and Rouwenhorst (1994) discussed the importance of the exchange rate factor in determining the international structure of country correlations from the country effects point of view. They admitted that strong country effects were possibly in part caused by the conversion of local currency returns into a common currency, affecting all securities of that country in the same way. They argued, however, that economic policy decisions could also induce a correlation between stock returns and exchange rates. For instance, an increase in the interest rate in France might lead to a depreciation of other currencies against the French Franc (the paper was written before the Franc was replaced by the euro). It might give competitive advantage to foreign firms in France, which might lead to an increase in stock prices in their local stock markets. If foreign central banks were to respond by increasing their interest rates in order to limit the appreciation of their currencies, the 'bad news' might affect their stock prices negatively, demonstrating that economic policies could induce a correlation between stock returns and exchange rates even without a currency conversion effect. Heston and Rouwenhorst suggested that the exchange rate was not an important factor in explaining cross-sectional variations in stock returns.

Section 2.2.2. summarized the literature on exchange rate exposure and whether the competitive effects of bilateral exchange rate shocks are economically significant for stock returns. Griffin and Stulz (2001) examined the importance of exchange rate movements and industry competition for stock returns, finding that common industry effects across countries are more important than competitive shocks arising from changes in exchange rates. They found the impact of exchange rate shocks to be trivial in explaining the relative performance of U.S. industries and small even in those countries where international trade is much more important than in the United States. However, the exchange rate appeared to be a key determinant of the profitability of traded and non-traded goods industries and may also help classify products (and therefore industries) into traded or non-traded in some other studies. Griffin and Karolyi (1998) have argued that pure industry effects explain a higher proportion of stock return variation in traded goods industries than in non-traded goods industries. For the latter, the sum of country effects is more important.

Therefore the conclusions on the importance of the exchange rate are rather mixed. From the point of view of investors or portfolio managers, since investors do not necessarily all consume in the same currency, whether U.S. dollars or any other, any conclusion drawn from stock returns converted into U.S. dollars would have limited usefulness in practice. Furthermore, since the exchange rate conversion affects all the equities in that market equally, it may introduce a country effect. If the exchange rate is important in determining the cross-sectional variation of stock returns, removing the exchange rate factor may alter the results from U.S. dollar denominated stock returns.

4.2.1.2. Potential inflation rate bias

The second related bias is that domestic returns contain the domestic rate of inflation. The Fisher hypothesis states that expected nominal rate of return on assets moves one-to-one with expected inflation. The Fisher equation defines the real rate $r_{i,r}^k$ as equal to the nominal rate r_i^k minus the expected rate of inflation ρ^k:

$$r_{i,r}^k = r_i^k - \rho^k$$

This has interesting implications for not only monetary policymakers but also investors since stocks (as real assets) may provide a hedge against inflation. However it is by no means agreed whether and to what extent the Fisher Effect is true for stock markets. Modigliani and Cohn (1979) suggested that stock market (but not bond market) investors were subject to inflation illusion. Irrational stock market investors fail to understand the effect of inflation on nominal dividend growth rates and extrapolate historical nominal growth rates even when the inflation rate is changing. Therefore when the inflation rate rises, bond market participants increase nominal interest rates, which are used by stock market participants to discount an unchanged expectation of future nominal dividends. The dividend-price ratio moves with the nominal bond yield because stock market investors have not rationally adjusted the nominal growth rate to match the nominal discount rate. From a rational investor's point of view, this implies that stock prices are undervalued when inflation is high, and may become overvalued when inflation falls. The dividend yield that emerges from the interaction of rational and irrational investors is positively correlated with inflation and the long-term nominal interest rate. Campbell and Vuolteenaho (2004) found that the level of inflation explains almost 80% of the time-series variation in stock market mispricing, which provides evidence to support the Modigliani-Cohn hypothesis.

Boudoukh and Richardson (1993) found that long-term, nominal stock returns were positively related to both *ex ante* and *ex post* long-term inflation. However, Fama and Schwert (1977) estimate the extent to which various assets were hedges against the expected and unexpected components of the inflation rate during the 1953–1971 period. They found a negative relation between *ex ante* nominal stock returns and expected inflation, supported more recently by Spyrou (2004) for certain emerging markets. Spyrou examines the relationship between inflation and nominal stock returns for ten Emerging Stock Markets (ESMs)[6] during the 1990s. He finds that the relationship between nominal stock returns and inflation from 1989 to 2000 is positive and statistically significant for three of the sample ESMs, while it is positive but statistically insignificant for another three. Only one ESM shows a significant negative relationship. However, from 1989 to 1995, 60% of the sample countries show negative links between inflation and nominal stock index returns. Financial economists consider this result surprising since stocks, as claims against real assets, should compensate for inflation. Overall the mixed empirical results on the link between inflation and nominal stock returns do not offer a consensus on whether and to what extent the Fisher Effect is true for stock markets.

Despite this mixed evidence, practitioners still incorporate the inflation rate in equity valuations. Stocks have to pay a competitive domestic rate of return and therefore nominal stock returns in a country must necessarily incorporate the national inflation rate. The leading practitioner model of equity valuation, the 'Fed model', relates the

[6] Chile, Mexico, Brazil, Argentina, Thailand, South Korea, Malaysia, Hong Kong, Philippines and Turkey.

yield on stocks (normally measured by the ratio of dividends or earnings to stock prices) to the yield on nominal Treasury bonds. Bonds are believed to compete with stocks for space in investors' portfolios. If the yield on bonds rises, then the yield on stocks must also rise to maintain the competitiveness of stocks. The Fed model is often augmented to include a measure of the relative risk premium on stocks versus bonds. Practitioners argue that a normal yield on stocks can be defined by the bond yield plus a risk premium, and that the actual stock yield tends to revert to this normal yield. If the measured stock yield exceeds the normal yield defined by the Fed model then stocks are attractively priced; but if the measured yield falls below the normal yield then stocks are overpriced. Historically, the major influence on nominal bond yields has been the rate of inflation. Thus the Fed model implies that stock yields are highly correlated with inflation (Campbell and Vuolteenaho, 2004).

Unless international investors all consume in the same currency, investors will be concerned about the real return on stocks in their own currency. Evidently there is a relationship between exchange rates and domestic price movements. If continuous Purchasing Power Parity (PPP) holds, national exchange rates and prices move one-for-one. There are many studies of the hypothesis that exchange rates return to levels consistent with PPP (see Rogoff (1996) for a survey) but there is little evidence that PPP holds continuously. The idea is that nominal and real exchange rates are volatile when allowed to float freely and hence deviate from their long-term levels. To the extent that PPP holds over the medium term, any current deviation in the real exchange rate from PPP should predict future exchange rate variations. However, many studies have found evidence that PPP does not hold in medium term. Meredith (2003), for example, found that PPP was of little use in forecasting medium-term movement in exchange rates because in-sample evidence in favor of the model reflected finite-sample estimation bias. Bayoumi and MacDonald (1998) and others have suggested that there will only be a transitory deviation if the predominant forces upsetting the PPP relationship are nominal (monetary). On the other hand, if the forces are real, it has been argued that they can have a more permanent effect on the real exchange rate. There is little evidence to suggest that PPP holds continuously, so price and exchange rate movements should be expected to have different effects on industry profits and investor consumption in different countries.

4.2.1.3. Potential risk-free interest rate bias

The third bias arises because domestic returns also contain a risk-free interest rate, which may differ across countries. Including the risk-free interest rate may amplify the country effects. Removing the interest rate makes it necessary to base the study on the strong assumption that international investors all have equal access to risk-free rates in different local currencies.

International investors may not all have equal access to risk-free rates in different local currencies, for example because of capital controls, asymmetric information or other limitations on cross-border lending. Some well-functioning developed capital markets such as the United States regard speculators as an integral part of the free-market system. Other countries, especially emerging countries, are typically concerned with excess volatility caused by foreign speculators. The possible herding by foreign investors in a few countries, such as Mexico, could increase security price volatility in the emerging markets and cause rapid switching of portfolios between markets (between developed and ESMs and between ESMs). This could make macroeconomic management difficult for policymakers. The increased demand for shares in a relatively liquid ESM may overheat the stock markets and lead to an appreciation of the real exchange rates in these countries. Any attempt to counteract this appreciation of the domestic currency by the monetary authorities, by devaluing the nominal exchange rate, will increase international reserves and perhaps be inflationary (Gooptu, 1993). Therefore less developed countries are more reluctant to open their capital markets. Even where investors have equal access to different risk-free rates in local currencies, they may prefer their home country rate because of the exchange rate risks involved in cross-border lending or borrowing. From the point of view of an international investor who consumes mainly in the currency of one country, the only true risk-free rate is that which is also denominated in the currency of that country. In this respect differences in country effects on stock returns should be calculated after removing the risk free rate (a country effect) from the domestic return.

4.3. Methodology: adjusting for the three potential biases

4.3.1. Removing inflation and exchange rates biases

In order to examine whether and to what extent these biases (exchange rate, inflation rate and risk-free interest rate) influence the results, an important issue is to set up regressions that eliminate identified national factors while retaining cross-sectional consistency. For example, in order to avoid the possibility that the common country factor – the exchange rate – amplifies the importance of the country effects, this factor can be removed from the returns data. However, while international investors are interested in a common metric of measurement, in practice it is hard to rationalize a comparison between nominal local currency returns in different stock markets. These practical issues restrict the scope for eliminating these national effects. For the purpose of this study, certain assumptions have to be imposed. Given the close (long-term) relationship between inflation and exchange rates, as a first step it seems possible to remove both from international stock returns (Green, 2005). Define:

$r_{i,t}^{k}$: The nominal return on stock i belonging to industry j and country k at time t, but denominated in the currency of country k;

Δ^{k}_{t}: The rate of appreciation (+)/depreciation (-) of the currency of country k vis-à-vis the 'world' currency (US$);

ρ_t^{k}: The inflation rate in country k

$\rho_t^{\$}$: The 'world' inflation rate

The local currency return on a firm in country k[7] is given by

[7] The sources of inflation rates refer to Table A6-1 in the appendix.

$$r_{i,t}^{k} = R_{i,t}^{\$} + \Delta_{t}^{k} \qquad (4.1)$$

The real return in the 'world' currency is:

$$R_{i,t}^{\$} - \rho_{t}^{\$} = r_{i,t}^{k} - \rho_{t}^{k} + (\Delta_{t}^{k} + \rho_{t}^{k} - \rho_{t}^{\$}) \qquad (4.2)$$

Equation (4.2) shows that the real return in U. S. dollars can be obtained by adding the real return denominated in local currency ($r_{i,t}^{k} - \rho_{t}^{k}$) to the change in the real exchange rate $(\Delta_{t}^{k} + \rho_{t}^{k} - \rho_{t}^{\$})$. In any cross-section, $\rho_{t}^{\$}$ is constant. Replacing $R_{i,t}^{\$}$ by ($R_{i,t}^{\$} - \rho_{t}^{\$}$) in the model will therefore simply affect the market return (α)[8] by converting it into real terms, leaving the industry-country decomposition unaffected. However, differences between the local currency real return and the world currency real return can be attributed to deviations from purchasing power parity $(\Delta_{t}^{k} + \rho_{t}^{k} - \rho_{t}^{\$} \neq 0)$. Such deviations will provide cross-sectional variation due to national differences in exchange rate changes and inflation rates. This suggests that a useful comparison can still be made between a decomposition of real returns at international prices ($R_{i,t}^{\$} - \rho_{t}^{\$}$) and a decomposition of real returns at local prices ($r_{i,t}^{k} - \rho_{t}^{k}$). This can be interpreted as a descriptive device aimed at identifying the influence of inflation and exchange rates on stock returns, or as a comparison between international investors who consume in the 'world' market (in dollars) and those who consume in the respective home markets of their investments. The following example shows the rationale and possibility for investors consuming in the respective home markets of their investments.

Most of the private capital invested in microfinance institutions (MFIs) to date is in hard currency debt. However, MFIs normally lend to their customers in their local currencies and most of their customers are from developing countries. This situation generates the possibility of foreign exchange risk for the MFIs because the risk of local currency devaluation in developing countries may make the debt repayment

[8] Refer to equation (3.4) in Section 3.3.1.

problematic, and therefore, the risk threatens the ability of MFIs to repay their investors. It is normally very expensive for MFIs to offer local currency capital by hedging loans on an investment-by-investment (i.e. currency-by-currency) basis, especially for emerging market currencies. Dodd and Spiegel (2004) suggest that it should be possible for emerging markets to borrow in their own currencies and for investors to lend by creating a global microfinance fund of local currency government debt securities that could be diversified enough across countries to cancel out foreign exchange rate losses. Pooling capital in a global local currency microfinance fund can not only reduce the exchange rate risk faced by MFIs but also enable investors to earn a premium on local currency MFI assets in emerging markets. Cross-sectional estimation of returns denominated in local currencies in this study can be rationalized by the existence of 'the global local currency microfinance fund'.

4.3.2. Removing the risk-free interest rate bias

The second step is to investigate the importance of the national risk-free rate in determining the industry-country decompositions. The standard metric for studying stock returns is the risk premium. This can be calculated for each firm as:

$$r_{i,t}^{k} - r_{F,t}^{k} = \left(r_{i,t}^{k} - \rho_{t}^{k}\right) - \left(r_{F,t}^{k} - \rho_{t}^{k}\right)$$

where $r_{F,t}^{k}$ is the risk-free interest rate[9] in country k (denominated in the currency of country k). These returns can be directly compared across countries on the assumption that different international investors have access to different risk-free rates in local currencies.

4.3.3. Decomposition of real return in local currencies into industry and country components

Applying the methodology used for the decomposition of nominal returns in U.S.

[9] The details of the risk-free rates used here are in Table A4-1 and A4-2 in the appendix.

dollars to local currency real returns makes it possible to compare the decomposition results before and after removing the potential biases. It shows whether or not exchange rates and inflation rates can amplify country effects. Omitting time subscripts to economize on notation, these considerations lead to the following regressions.

Dummy variable regression on real returns in U.S. dollars:

$$R_i^{\$} - \rho^{\$} = \alpha^{\$} + \sum_{j=1}^{10} \beta_j d_{i,j} + \sum_{k=1}^{12} \gamma_k c_{i,k} + e_i^{\$} \qquad (4.3a)$$

Dummy variable regression on real returns in local currencies:

$$r_i^k - \rho^k = \alpha^k + \sum_{j=1}^{10} \varsigma_j d_{i,j} + \sum_{k=1}^{12} \tau_k c_{i,k} + e_i^k \qquad (4.3b)$$

where $d_{i,j} = (D_{i,j} - (w_j/w_J)D_{i,J})$ and $c_{i,k} = (C_{i,k} - (v_k/v_K)C_{i,K})$.

Equation (4.3a) is almost the same as equation (3.4) in Chapter 3, the dummy variable regression on nominal return in U.S. dollars:

$$R_i^{\$} = \alpha + \sum_{j=1}^{10} \beta_j d_{i,j} + \sum_{k=1}^{12} \gamma_k c_{i,k} + e_i \qquad (3.4)$$

except that the market return (α) is converted into a real market return. Therefore no separate decompositions have been done on equation (4.3a). Since exchange rates and inflation rates only vary across countries (not across industries) the cross-industry F-test results of equation (4.3b) will be the same as for F-test of the nominal return of industry j in the world currency ($R_j^{\$}$). The significance of the industry dummies are not affected by the removal of exchange rate and inflation rate, but the size of the industry effects will change because the value of the dependent variables have changed. Therefore all the procedures are still applied to both industry and country effects.

Weighted Least Squares (WLS) estimation can still be used to estimate equation (4.3b). Although the exchange rate factor has been removed and the market value of each stock is also denominated in its corresponding local currency, the market value weight are just the ratios (w_j/w_J) and (v_k/v_K). The ratios are weighting devices in the cross-sectional dummy variable regression. Therefore it is possible to use them in the same WLS calculation.

Applying WLS to (4.3b), the decomposition methods give (4.4a) and (4.4b)

$$r_i^k - \rho^k = \hat{\alpha}^k + \sum_{j=1}^{J-1} p_{k,j}\hat{\varsigma}_j d_{i,j} + \hat{\tau}_k \quad (4.4a)$$

$$r_i^k - \rho^k = \hat{\alpha}^j + \sum_{k=1}^{K-1} p_{j,k}\hat{\tau}_k c_{i,j} + \hat{\varsigma}_j \quad (4.4b)$$

In equation (4.4a), the value-weighted portfolio real return in local currency, $r_i^k - \rho^k$, is decomposed into a pure country effect $(\hat{\tau}_k)$ and a sum of 11 industry effects $\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\varsigma}_j d_{i,j}\right)$. Equation (4.4a) produces the industry and country effects for one particular month. By running a cross-section regression for every month, the estimation yields a time series of industrially-diversified real country returns in local currencies. Calculating the standard deviations (SD) of the time series of the pure country effects gives an absolute measure of the importance of pure country effects in determining the variation of industrially-diversified country portfolio real returns in local currencies. The relative measure shows how much of the variation in each country portfolio excess return is explained by the pure country effect and, as before, is defined by:

$$\frac{\text{SD of }(\hat{\tau}_k)}{\text{SD of}\left(\hat{\tau}_k + \sum_{j=1}^{J-1} p_{k,j}\hat{\varsigma}_j d_{i,j}\right)} \quad (4.5a)$$

Correspondingly, the variation in each country portfolio excess return explained by the sum of industry effects is defined by:

$$\frac{\text{SD of}\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\varsigma}_j d_{i,j}\right)}{\text{SD of}\left(\hat{\tau}_k + \sum_{j=1}^{J-1} p_{k,j}\hat{\varsigma}_j d_{i,j}\right)} \tag{4.5b}$$

In (4.4b), the value-weighted portfolio real return in local currency is decomposed into a pure industry effect ($\hat{\varsigma}_j$) and a sum of 11 country effects $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\tau}_k c_{i,j}\right)$. This produces the industry and country effects for one particular month. By running a cross-sectional regression for every month, the estimation yields a time series of geographically-diversified industry returns. Calculating the standard deviations (SD) of the pure industry effects time series gives an absolute measure of the importance of pure industry effects in determining the variation of geographically-diversified industry index returns. The relative measure shows how much of the variation in each industry portfolio excess return is explained by the pure industry effect:

$$\frac{\text{SD of}\left(\hat{\varsigma}_j\right)}{\text{SD of}\left(\hat{\varsigma}_j + \sum_{k=1}^{K-1} p_{j,k}\hat{\tau}_k c_{i,j}\right)} \tag{4.6a}$$

The variation in each industry portfolio excess return explained by the sum of country effect is:

$$\frac{\text{SD of}\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\tau}_k c_{i,j}\right)}{\text{SD of}\left(\hat{\varsigma}_j + \sum_{j=1}^{J-1} p_{j,k}\hat{\tau}_k c_{i,j}\right)} \tag{4.6b}$$

4.3.4. Decomposition of local return risk premium into industry and country components

Applying the same decomposition methodology used for nominal returns in U.S. dollars to the risk premium makes it possible to compare the decomposition results before and after removing the potential bias, showing whether or not the risk-free interest rate amplifies the country effects. Omitting time subscripts to economize on notation, these considerations lead to the following dummy variable regression:

$$r_i^k - r_F^k = \alpha^F + \sum_{j=1}^{10} \iota_j d_{i,j} + \sum_{k=1}^{12} \eta_k c_{i,k} + e_i^F \tag{4.7}$$

where $d_{i,j} = (D_{i,j} - (w_j / w_J) D_{i,J})$ and $c_{i,k} = (C_{i,k} - (v_k / v_K) C_{i,K})$.

Weighted Least Squares (WLS) estimation is used to estimate equation (4.7). The market value weights used in section 4.3.3 are also used here. The weighting devices are the ratios (w_j / w_J) and (v_k / v_K). Applying WLS to (4.7), the decomposition methods give (4.8a) and (4.8b):

$$r_i^k - r_F^k = \hat{\alpha}^F + \sum_{j=1}^{J-1} p_{k,j} \hat{\iota}_j d_{i,j} + \hat{\eta}_k \tag{4.8a}$$

$$r_i^k - r_F^k = \hat{\alpha}^F + \sum_{k=1}^{K-1} p_{j,k} \hat{\eta}_k c_{i,j} + \hat{\iota}_j \tag{4.8b}$$

In equation (4.8a) $r_i^k - r_F^k$ is a portfolio risk premium that is decomposed into a pure country effect ($\hat{\eta}_k$) and a sum of 11 industry effects $\left(\sum_{j=1}^{J-1} p_{k,j} \hat{\iota}_j d_{i,j}\right)$.

The standard deviations of the country and industry effects again provide measures of their absolute and relative importance in explaining cross-sectional differences in country risk.

Variation in each country portfolio risk premium explained by the pure country effect:

$$\frac{\text{SD of } (\hat{\eta}_k)}{\text{SD of} \left(\hat{\eta}_k + \sum_{j=1}^{J-1} p_{k,j} \hat{\iota}_j d_{i,j} \right)} \tag{4.9a}$$

Variation in each country portfolio risk premium explained by the sum of industry effects:

$$\frac{\text{SD of} \left(\sum_{j=1}^{J-1} p_{k,j} \hat{\iota}_j d_{i,j} \right)}{\text{SD of} \left(\hat{\eta}_k + \sum_{j=1}^{J-1} p_{k,j} \hat{\iota}_j d_{i,j} \right)} \tag{4.9b}$$

In equation (4.8b) $r_i^k - r_F^k$ is a portfolio risk premium that is decomposed into a pure industry effect ($\hat{i}_j$) and a sum of 11 country effects $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\eta}_k c_{i,j}\right)$.

The standard deviations of the country and industry effects again provide measures of their absolute and relative importance in explaining cross-sectional differences in country risk. Variation in each industry portfolio risk premium explained by the pure industry effect:

$$\frac{\text{SD of}\left(\hat{i}_j\right)}{\text{SD of}\left(\hat{i}_j + \sum_{j=1}^{J-1} p_{j,k}\hat{\eta}_k c_{i,j}\right)} \tag{4.10a}$$

Variation in each industry portfolio risk premium explained by the sum of country effects:

$$\frac{\text{SD of}\left(\sum_{j=1}^{J-1} p_{j,k}\hat{\eta}_k c_{i,j}\right)}{\text{SD of}\left(\hat{i}_j + \sum_{j=1}^{J-1} p_{j,k}\hat{\eta}_k c_{i,j}\right)} \tag{4.10b}$$

4.3.5. The relationships between bias-corrected models

The relationships between (4.3a), (4.3b) and (4.7) can be seen by calculating the differences between (4.3a) and (4.3b) and between (4.3a) and (4.7). Thus, subtracting (4.3b) from (4.3a) gives:

$$(R_i^\$ - \rho^\$ - (r_i^k - \rho^k)) = (\alpha^\$ - \alpha^k) + \sum_{j=1}^{10}(\beta_j - \varsigma_j)d_{i,j} + \sum_{k=1}^{12}(\gamma_k - \tau_k)c_{i,k} + e_i^\$ - e_i^k$$

$$E(\Delta^k + \rho^k - \rho^\$) = (\alpha^\$ - \alpha^k) + \sum_{j=1}^{10}(\beta_j - \varsigma_j)d_{i,j} + \sum_{k=1}^{12}(\gamma_k - \tau_k)c_{i,k} \tag{4.11a}$$

Subtracting (4-7) from (4-3a) gives:

$$\left(R_i^{\$}-\rho^{\$}\right)-\left(r_i^{k}-r_F^{K}\right)=\left(\alpha^{\$}-\alpha^{F}\right)+\sum_{j=1}^{10}\left(\beta_j-\iota_j\right)I_{i,j} + \sum_{k=1}^{12}\left(\gamma_k-\eta_k\right)C_{i,k}+\left(e_i^{\$}-e_i^{F}\right) \quad (4.11b)$$

In (4.11a), $(\alpha^{\$}-\alpha^{k})=\Sigma\ (\Delta^{k}+\rho^{k}-\rho^{\$})$ is the average real exchange rate of all countries in the sample. With the dollar used as numeraire, this shows the average real appreciation or depreciation of the exchange rates of the sample countries against the dollar. Therefore, (4.11a) states that country k's real appreciation differs from the cross-country average due to industry and country factors. However, since the real exchange rate only differs across countries and not across industries, it must be the case that $\beta_j-\varsigma_j=0$. Any differences between (4.3a) and (4.3b) must therefore reside entirely in differences among the country effects $(\gamma_k-\tau_k)$. Similarly, (4.11b) shows that since the risk-free rate changes only among countries, the differences between (4.3a) and (4.7) must also lie entirely in differences among the country effects $(\gamma_k-\eta_k)$ with unchanged industry effects. These tests will help determine whether the dominant 'country' factor is amplified by including these 'country' elements: exchange rate, inflation rates and a nominal risk-free interest rate in stock returns.

4.3.6. Mean Absolute Deviation for real return in local currencies

As in section 3.3.4., the MADs of the country and industry effects are calculated to gauge the magnitude of the country and industry effects in explaining the cross-sectional variation in real returns in local currencies. The following are the MADs for country k and industry j:

$$MAD_{kt}=\sum_{k=1}^{13} v_{kt}\,|\,\tau_{kt}\,| \quad (4.12a)$$

$$MAD_{jt}=\sum_{j=1}^{11} w_{jt}\,|\,\varsigma_{jt}\,| \quad (4.12b)$$

MAD_{kt}: the MAD of the value-weighted industry-neutral country portfolios

MAD_{jt} : the MAD of the value -weighted country-neutral industry portfolios

v_k : the market value share of country k in the world market

w_j : the market value share of industry j in the world market

4.3.7. Mean Absolute Deviation for local return risk premium

Again, as in section 3.3.4., the MADs of the country and industry effects are calculated to gauge ability to explain the cross-sectional variation in stock risk premia. The following are the MADs for country k and industry j:

$$MAD_{kt} = \sum_{k=1}^{13} v_{kt} \,|\, \eta_{kt} \,| \quad (4.13a)$$

$$MAD_{jt} = \sum_{j=1}^{11} w_{jt} \,|\, \iota_{jt} \,| \quad (4.13b)$$

MAD_{kt} : the MAD of the value-weighted industry-neutral country portfolios

MAD_{jt} : the MAD of the value -weighted country-neutral industry portfolios

v_k : the market value share of country k in the world market

w_j : the market value share of industry j in the world market

4.4. Results of removing the three potential biases

4.4.1. *F*-tests *(LC)* on dummy variables in real returns in local currency model

Table 4-1 and Chart 4-1 show *F*-test *(LC)* results for the cross-sectional dummy variable regression model using real returns in local currency (LC), equation (4.3b). The *F*-tests were done separately on industry and country dummies in each month. The first and second columns of Table 4-1 show the three sub-periods and the number of months in each, respectively. Each sub-period has been divided into three categories, showing the percentage of months for which the industry dummies are significant between 0 and 5%, significant between 6 and 10% and insignificant. Correspondingly categories are shown for the country dummies during each sub-period.

From August 1984 to February 1986, both industry and country factors have a significant influence on returns but country factors seem to play the more important role because there are about 42% more months with insignificant industry dummies than months with insignificant country dummies. There is big difference between the *F*-test *($)* results for nominal returns in U.S. dollars dummy variables and *F*-test *(LC)*. From 1984 to February 1986 country factors play the more important role in *F*-test *(LC)* with about 16% months with insignificant country dummies but in *F*-test *($)* there are about 53% months with insignificant country dummies. *F*-test *(LC)* suggests that March 1986 is still the obvious dividing point between the first and the second sub-period because from that date country dummies are always significant at the 5% significance level or better throughout the rest of the sample.

From March 1986 to March 1996 country dummies are always significant at least at the 5% level, while only 50% of months have similarly significant industry dummies. Country factors are evidently dominant during this period. April 1996 is the second dividing date. Industry dummies become more consistently significant from that date onwards (country dummies do not show much variation after March 1986) although still less so than the country dummies. April 1997 is the second dividing date in *F*-test *($)* because from that date industry dummies become more consistently significant. Therefore the starting point of the second sub-period in *F*-test *($)* does not coincide with that of the second sub-period in *F*-test *(LC)*. The upward shift in the importance of industry effects appears 12 months earlier in *F*-test *(LC)*. Section 4.4.2.2. gives more detailed explanations for the choices of sub-periods dividing dates.

Table 4-1 *F*-test *(LC)* results for real returns in local currencies.

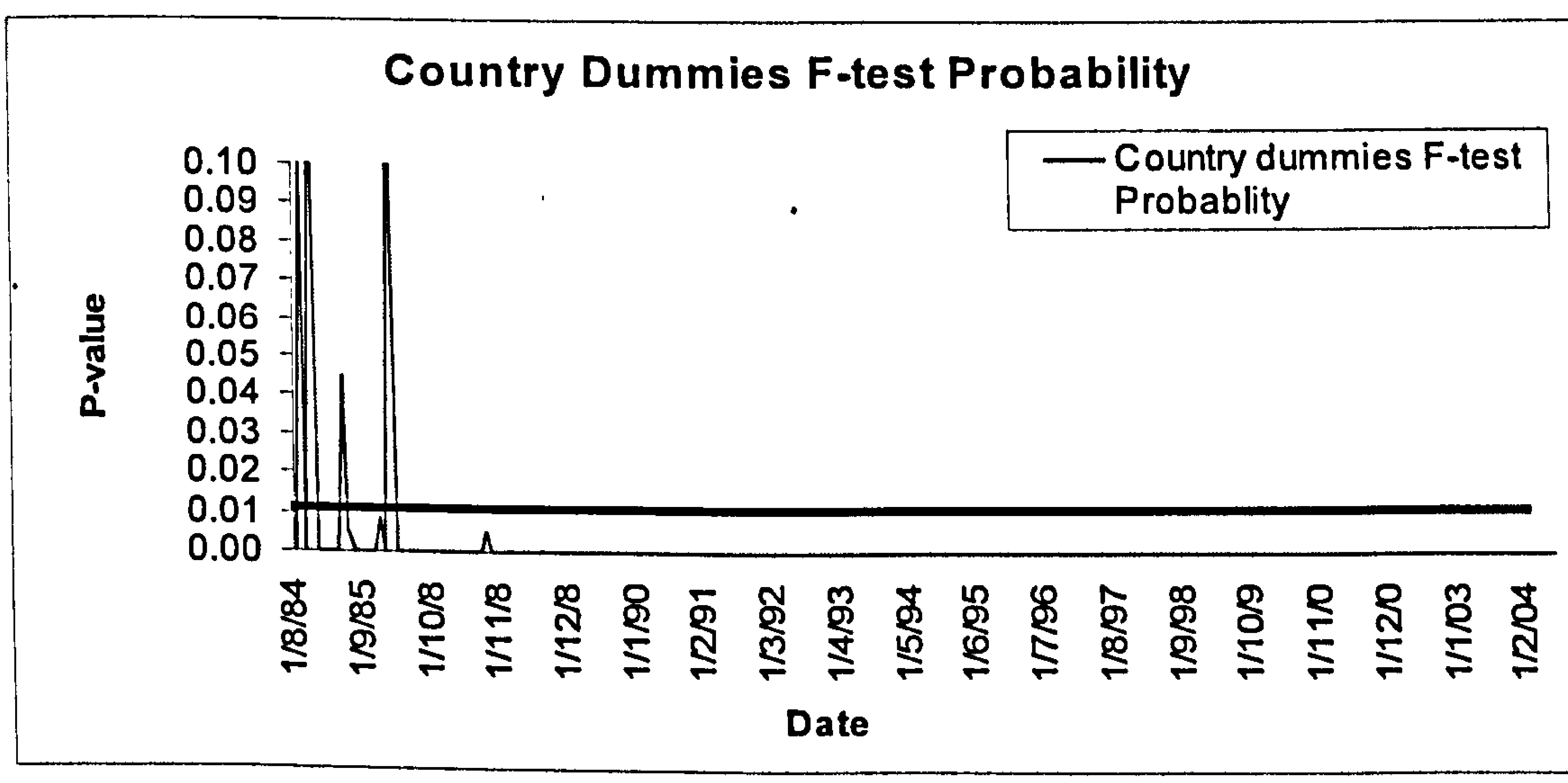
The first column in Table 4-1 shows the three sub-sample periods and the second column shows the number of months in each sub-sample period. Each sub-sample period has been divided into three categories.

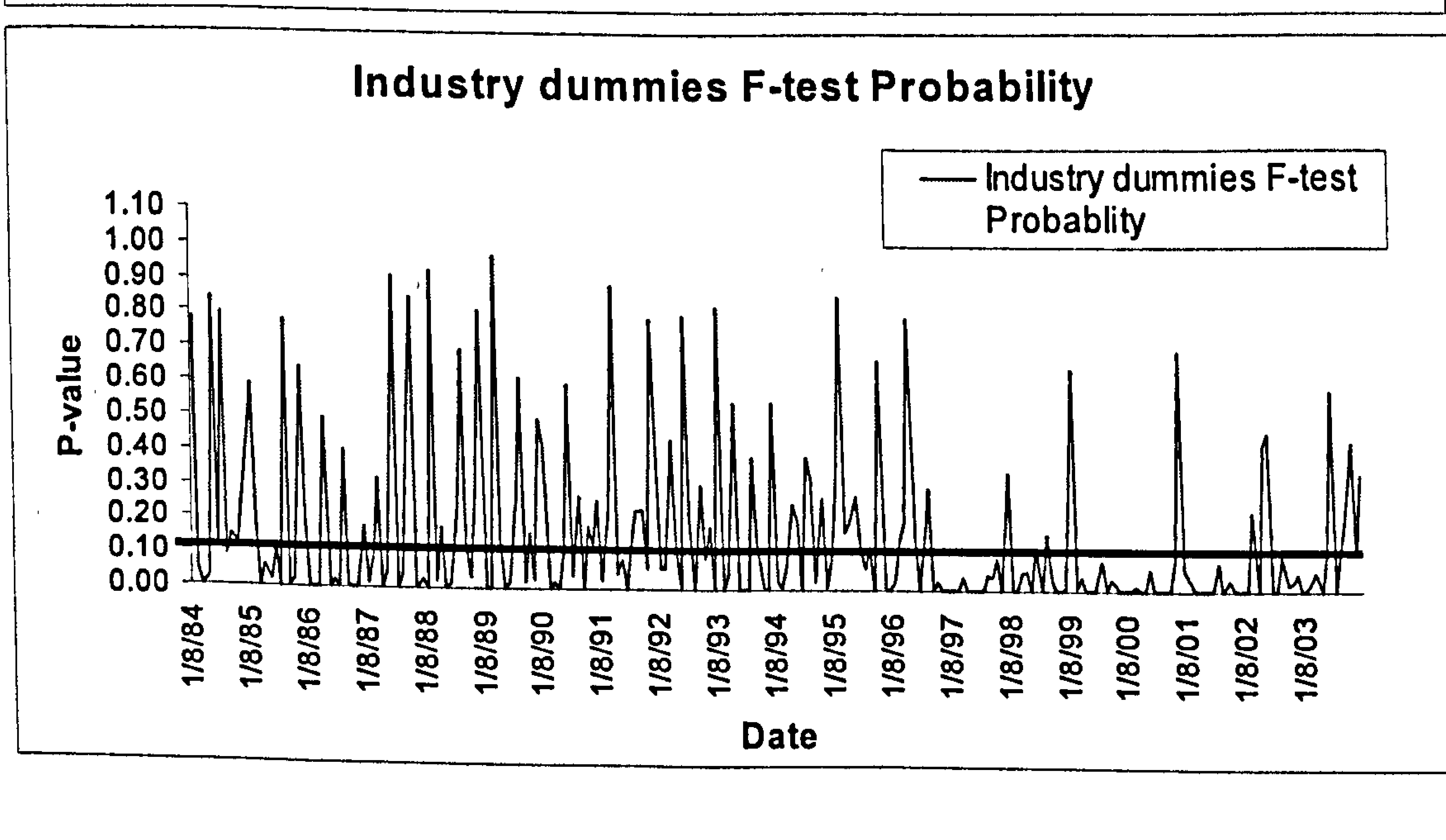
		Industry dummies				Country dummies			
Sample period	Number of months	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)
08.84-02.86	19	31.6	10.5	57.9	100	84.2	0.0	15.8	100
03.86-03.96	120	43.3	6.7	50.0	100	100.0	0.0	0.0	100
04.96-07.04	101	68.3	12.9	18.8	100	100.0	0.0	0.0	100

Note: The *F*-tests have been done separately for industry and country dummies in each month.
Table 4-1 shows the percentage of months with significant and insignificant country and industry dummies during each sample period.

Chart 4-1 *F*-test (*LC*) probability of each month for real returns in local currencies

Chart 4-1 shows probability values of the *F* statistics for both industry dummies and country dummies from August 1984 to July 2004. After March 1986 the spikes of country dummy p-values are well below 0.10. The increasing importance of industry effects after 1997 is shown more obviously in Chart 4-1.





During the third sub-period, the percentage of months with significant industry dummies increases by about 31% compared with the percentage of months with significant industry dummies in the second-period. Chart 4-1 shows probability values of the *F* statistics for both industry dummies and country dummies from August 1984 to July 2004. The strong country effects are even more obvious in Chart 4-1 compared with Chart 3-1 in Chapter 3. The industry dummy *F*-test probability chart is very similar to that of Chart 3-1. The increasing importance of industry effects after late 1990s is still very obviously in Chart 4-1.

F-test *(LC)* shows that country factors evidently played a dominant role during these 20 years. Compared with *F*-test *($)*, the significance of country effects appears to be even stronger after removing the country-specific influences of exchange rates and inflation rates.

4.4.2. Decomposition of the local currency real returns into industry and country components

4.4.2.1. Decomposition in the full sample period

Table 4-2 shows the decomposition results of excess local currency real returns. Panel A shows the decomposition of country portfolio excess returns. The main conclusion is that almost all of the variation in the value-weighted country returns can be attributed to country-specific effects. Table 4-2 (Panel A) shows that all the SDs of the pure country effects are much larger than any of the SDs of the sum of industry effects. In terms of the relative measure, all the ratios of equation (4.5a) are much larger than those of equation (4.5b). On average, the standard deviation of the sum of the industry effects explains only 0.5% of the standard deviation of excess country portfolio returns, and is very much smaller than the portion explained by the pure country effects. These findings are reinforced by the decomposition of industry indices in Panel B. Even in the industry portfolio returns, most variation is attributable to the sum of country effects. The average standard deviation of the pure industry effects is still much smaller than the average standard deviation of the sum of 13 country effects. All the standard deviations of the sum of country effects are larger than any of the standard deviations of the pure industry effects. The only conclusion from this table is that, no matter which measure is used, country factors play a dominant role in explaining the cross-country correlations.

When Table 4-2 is compared with Table 4-1, the stronger country effects found in local currency real return dummy variable *F*-tests also appear in the corresponding decomposition results. Before the removal of exchange rates and inflation rates, all the SDs of pure country effects are less than one (Table 3-14). However all the SDs of the pure country effects in local currency real return decomposition are at least 1.306 (China) or higher. In Table 4-2, the average SD of the sum of industry effects is much lower than that of the sum of industry effects in Table 3-14. Furthermore, the average ratio that the sum of industry effects contributes to the excess country return has decreased 13.5% compared with Table 3-14. Therefore it seems that after the removal of exchange rate and inflation rate, the country effects have become even stronger.

4.4.2.2. Decomposition in three sub-periods

In section 7.1, *F*-tests *(LC)* results show the general picture of the time varying properties of the industry and country effects after the removing of exchange rates and inflation rates from the dependent variable. These *F*-tests also identify three sub-periods during which the industry and country factors play different roles. Economic changes in the sampled countries during the different sample periods may provide the explanation for the time-varying properties of country and industry effects.

The two dates (March 1986 and April 1996) that divide the whole sample period into three sub-periods are decided by the time series observations of the significance of the *F*-test results. Applying the same decomposition methodology to each sub-period after the removal of exchange rates and inflation rates may reveal more detailed time-varying properties of the industry and country effects.

Table 4-3 shows the decomposition of local currency real returns for each sub-period, showing results very similar to the F-test results. In the first sub-period, pure country effects play a dominant role in explaining country returns and the sum of country effects explains a large part of industry returns. On average, about 92.8% of the SD of country portfolio returns is explained by the SD of pure country effects, which is much higher than the amount explained by the sum of industry effects SD. All of the SDs of pure industry effects are smaller than any SD of the pure country effects. The results suggest that during the first sub-period, country effects play the dominant role even though there are only three countries available during this period.

Table 4-2 Decomposition of excess portfolio local currency real return into country and industry effects

The table gives the standard deviation (SD) of the components of the value-weighted excess country and industry index returns. Each country index excess return is decomposed into a pure country effect and a sum of 11 industry effects. Each industry index excess return is decomposed into the sum of 13 country effects and a pure industry effect. The ratio relative to the market gives the ratio of the SD of that component to the SD of the sum of that pure effect and the sum of the value weighted industry (country) effects.

Panel A	VW country indices				Panel B	VW industry indices			
	Pure country effect		Sum of 11 industry effects			Sum of 13 country effects		Pure industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	Industry	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	8.367	1.159	0.015	0.002	**IGS**	2.542	1.001	0.020	0.008
Chile	3.174	1.155	0.012	0.004	**CG**	1.242	1.001	0.019	0.015
China	1.306	1.173	0.010	0.009	**CS**	1.354	1.000	0.021	0.016
India	3.173	1.138	0.006	0.002	**BM**	1.714	1.001	0.024	0.014
Israel	2.873	1.039	0.013	0.005	**UT**	2.994	0.998	0.039	0.013
Malaysia	2.778	1.000	0.012	0.004	**HC**	1.862	1.000	0.033	0.018
Mexico	3.057	1.096	0.012	0.004	**TEC**	2.029	1.000	0.045	0.022
Pakistan	1.351	1.173	0.012	0.010	**TEL**	2.857	0.999	0.046	0.016
South Africa	2.777	1.000	0.012	0.004	**FI**	11.460	1.001	0.056	0.005
South Korea	2.769	0.999	0.010	0.004	**PHG**	2.271	1.000	0.053	0.023
Taiwan	3.009	1.083	0.013	0.005	**BI**	4.648	1.000	0.032	0.007
Thailand	33.642	1.074	0.011	0.000	**Cross-industry average**	**3.179**	**1.000**	**0.035**	**0.014**
Turkey	3.047	1.197	0.012	0.005					
Cross-country average	**5.486**	**1.099**	**0.012**	**0.005**					

i. The pure country effect measures the average return of firms in a country relative to firms that are in the same industry but located in a different country.
ii. The sum of the eleven industry effects represents the component of a country's return that can be attributed to the difference between the industrial composition of its market and the industrial composition of the emerging markets.
iii. The pure industry effect measures the average return of firms in an industry relative to firms which are located in the same country but belong to a different industry.
iv. The sum of the thirteen country effects represents the component of an industry's return that can be attributed to the difference between the geographical composition of its index and the geographical composition of the emerging markets as a whole.

Table 4-3 Decomposition of excess value-weighted real return in local currency into country and industry effects in three sub-periods

	Panel A: 08.84—02.86				Panel B: 03.86—03.96				Panel C: 04.96—07.04			
	Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	-	-	-	-	10.616	1.161	0.012	0.001	0.064	0.963	0.019	0.288
Chile	-	-	-	-	4.228	1.186	0.011	0.003	0.040	0.928	0.015	0.352
China	-	-	-	-	1.660	1.175	0.005	0.004	0.091	0.962	0.015	0.154
India	-	-	-	-	4.183	1.158	0.006	0.002	0.095	1.011	0.008	0.081
Israel	-	-	-	-	3.601	1.000	0.013	0.004	0.081	1.008	0.014	0.178
Malaysia	0.049	0.976	0.009	0.182	3.586	1.000	0.011	0.003	0.104	1.028	0.014	0.140
Mexico	-	-	-	-	3.959	1.089	0.010	0.003	0.064	0.972	0.015	0.221
Pakistan	-	-	-	-	1.698	1.169	0.009	0.006	0.090	0.986	0.016	0.181
South Africa	0.054	1.001	0.008	0.155	3.600	1.000	0.014	0.004	0.063	0.992	0.011	0.172
South Korea	0.015	0.808	0.008	0.413	3.578	1.000	0.012	0.003	0.102	0.994	0.008	0.080
Taiwan	-	-	-	-	3.836	1.067	0.008	0.002	0.078	1.022	0.020	0.263
Thailand	-	-	-	-	43.968	1.050	0.013	0.000	0.783	2.925	0.008	0.029
Turkey	-	-	-	-	3.943	1.157	0.008	0.002	0.266	1.000	0.017	0.062
Average	**0.039**	**0.928**	**0.008**	**0.250**	**7.112**	**1.093**	**0.010**	**0.003**	**0.148**	**1.138**	**0.014**	**0.169**
Industry	**Sum of 13 country effects**		**Pure industry effect**		**Sum of 13 country effects**		**Pure industry effect**		**Sum of 13 country effects**		**Pure industry effect**	
	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
IGS	0.014	0.361	0.006	0.166	3.421	1.001	0.019	0.006	0.026	0.780	0.018	0.539
CG	0.009	0.785	0.004	0.371	1.569	1.001	0.017	0.011	0.025	0.785	0.022	0.688
CS	0.015	0.375	0.008	0.202	1.753	1.000	0.021	0.012	0.036	0.851	0.020	0.457
BM	0.039	0.810	0.006	0.128	2.188	1.000	0.026	0.012	0.042	0.838	0.023	0.458
UT	0.049	0.748	0.009	0.132	4.007	0.999	0.040	0.010	0.026	0.706	0.032	0.859
HC	0.016	0.442	0.007	0.182	2.371	1.000	0.037	0.016	0.047	0.854	0.027	0.492
TEC	0.016	0.220	0.010	0.136	2.639	1.000	0.037	0.014	0.046	0.690	0.048	0.726
TEL	-	-	-	-	3.769	1.000	0.053	0.014	0.043	0.728	0.035	0.589
FI	0.016	0.565	0.008	0.263	15.359	1.001	0.070	0.005	0.048	0.703	0.038	0.550
PHG	0.015	0.298	0.006	0.116	3.046	1.000	0.059	0.019	0.073	0.934	0.045	0.582
BI	0.011	0.234	0.009	0.179	6.251	1.000	0.029	0.005	0.086	1.000	0.031	0.358
Average	**0.020**	**0.484**	**0.007**	**0.187**	**4.216**	**1.000**	**0.037**	**0.011**	**0.045**	**0.806**	**0.031**	**0.572**

Comparing the first sub-period results in Table 4-3 with the corresponding part of Table 3-16, the biggest difference is the reduced strength of the pure industry effects. After the removal of exchange rates and inflation rates, the SD of pure industry effects on average explains about 61% less of the SD of industry portfolios than it does in Table 3-16.

The results of the second sub-period almost duplicate the full sample results. The dominant country effects are even stronger in the second sub-period. Almost all of the variation in country returns can be attributed to country-specific effects furthermore almost all the variation in industry returns can be attributed to the sum of country effects, so that the main finding in this sub-period is that country effects play a dominant role in explaining the SD of stock returns.

Comparing the second sub-period results in Table 4-3 with the corresponding part of Table 3-16, the biggest difference is the even weaker industry effects and stronger country effects. After the removal of exchange rates and inflation rates, the average SD of pure industry effects has decreased from 0.118 to 0.037. However the SDs of pure country effects have increased dramatically compared with those of Table 3-16. In Table 3-16, all the SDs of pure country effects are less than one while those in Table 4-3 Panel B are at least 1.660 (China) or higher.

During the third sub-period, country effects still play dominant roles in explaining both country and industry return SDs. However, according to the relative measure of industry portfolio returns, pure industry effects can explain about 57.2% of the SD of industry returns[10]. This is an increase of about 56% from the second sub-period. Therefore, the 'catching-up' of the industry effect during the third sub-period still appears after the exchange rates and inflation rates have been removed.

[10] The country and industry effects are not uncorrelated. As a result, SDs of country effects and industry effects do not sum to one, due to the relatively small covariance between them. This is most obvious in the third sub-period.

When the Panel C in Table 4-3 is compared with Panel C in Table 3-16, the country effects are stronger in Table 4-3 in terms of both absolute and relative measurements.

4.4.3. Mean Absolute Deviation estimation of local currency real return decomposition

Chart 4-2 plots the industry and country MADs for local currency real return decompositions for the full sample and three sub-periods. Clearly the country MAD values are much higher than the industry MAD values. The main conclusion is that the size of the country effect is much larger than the size of the industry effect in these two decades.

The big differences in the values of the country and industry MADs in the three different periods mean that a single chart does not show the details of variations very well. Since the significance of the country and industry effects have been examined in *F*-tests and decomposition estimations over three sub-periods, it is also important to examine the sizes of the country and industry effects during the three sub-periods. Therefore the industry and country MADs are also plotted for the three sub-periods separately.

In the top right figure, it can be seen that country effects are almost always larger than industry effects during this period. Judging from the values on the y-axis, the country MAD is clearly larger in Chart 4-2 than it is in Chart 3-3. This suggests that after the removal of exchange rate and inflation rate, the size of the country effects becomes larger than before the removal.

In the bottom left figure, during the second sub-period the big difference between the country and industry MAD values makes it convenient to use a secondary y-axis. The two y-axes show that the country effects are clearly dominant in terms of size. Compared with the corresponding figure in Chart 3-3, the value on the y-axis clearly shows that country MAD is much larger in Chart 4-2 after the removal of exchange and inflation rates.

In the bottom right figure, after April 1996, the country MAD values are much greater than the industry MAD values, showing that country effects are still dominant. The increasing importance of industry effects is more obvious in terms of the significance of *F*-tests but not so obvious when the size of the industry effects is examined in the MAD test. However, comparing the values on the *y*-axis in Chart 3-3 with those in Chart 4-2, it seems that after the removal of exchange and inflation rates, the size of country effects has decreased during the third sub-period.

To summarize, according to the hypotheses, it is expected that exchange rate and inflation rate are potential biases in a regression of nominal stock returns denominated in a single currency (e.g. U.S. dollars) on country and industry dummies. While these biases may lead to an overestimate of the importance of country effects in the decomposition exercise, the results of *F*-test, decomposition and MAD estimation all show that after the removal of the exchange rate and inflation rate, the dominant country effects become even more dominant.

In *F*-test *($)*, there are about 53% months with insignificant country dummies from 1984 to February 1986. However, country factors play the more important role after the removal of the exchange rate and inflation rate, in *F*-test *(LC)*, with only about 16% of months having insignificant country dummies. In the second sub-period, country dummies are always highly significant throughout the period in *F*-test *(LC)*. However in *F*-test *($)*, there are about 0.8% months with insignificant country dummies during this period. Therefore in terms of the significance of the country dummies, country effects are even stronger after the removal of the exchange rate and inflation rate.

In terms of the relative importance of country and industry effects in explaining the cross-sectional variation in local currency real returns, country effects are much more dominant. During the full sample period, the smallest SD of the pure country effects is 1.306 but in the nominal returns in U.S. dollars decomposition, the highest SD of the pure country effect is 1.017. The relative measures also show the same strong country effects. Similar results can be also found in the three sub-periods.

In terms of the size of the country effects, MAD estimation shows that during the full sample period the highest country MAD is about 50 but the corresponding MAD before the removal is about 7. The similar phenomenon can be also found during the first two sub-periods.

The only exception among all the tests is during the third sub-period when the country MAD is smaller than the corresponding value before the removal of exchange and inflation rates.

4.4.4. *F*-test *(RP)* on dummy variables in the local return risk premium model

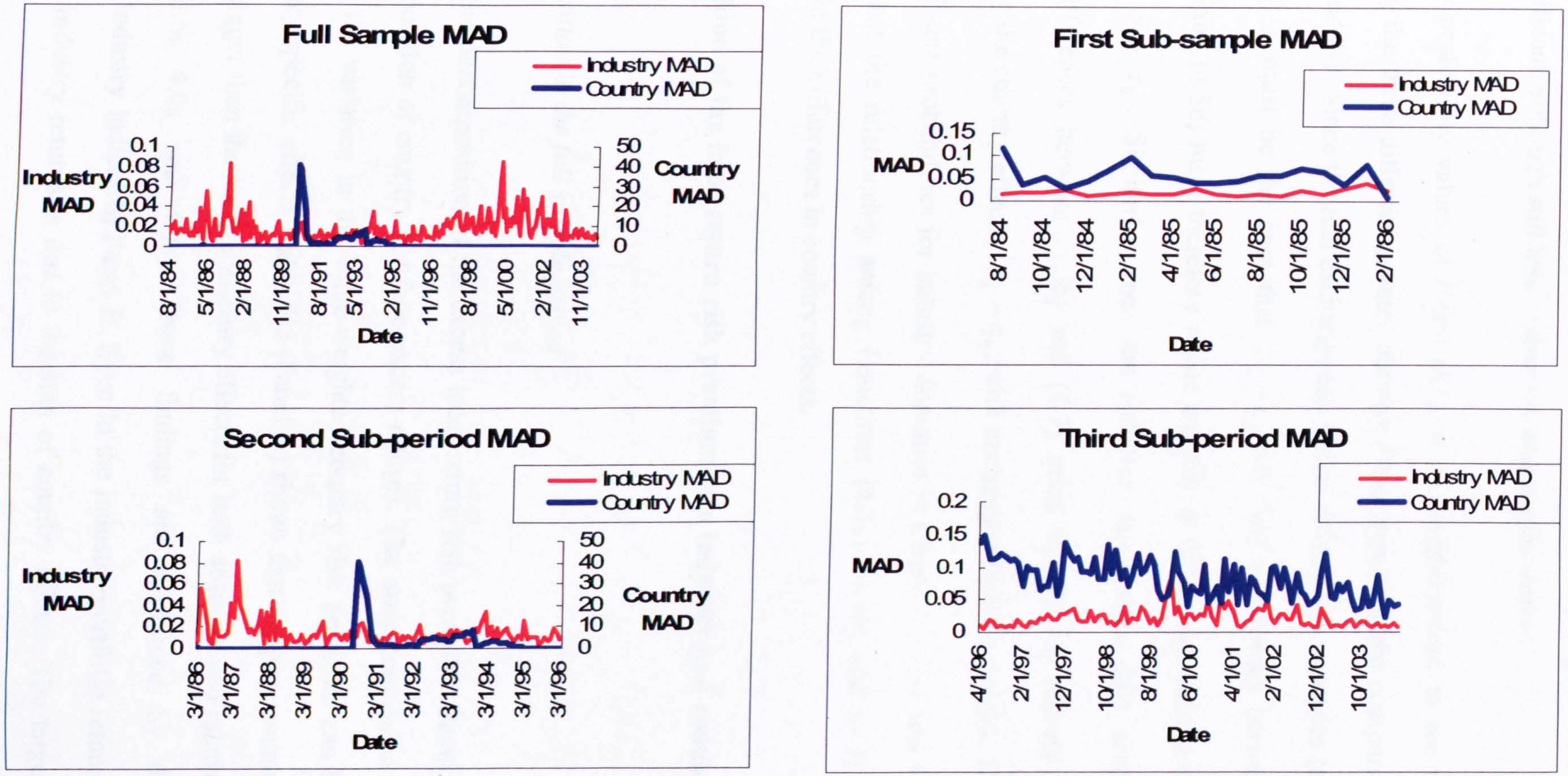
Table 4-4 and Chart 4-3 show *F*-test *(RP)* results on the cross-sectional dummy variable local return risk premium regression model, equation (4.7). Table 4-4 uses the same layout as Table 3-16.

From 1984 to February 1986 both industry factors and country factors have a significant influence on returns but country factors play the more important role. About 58% of months have insignificant industry dummies but only about 21% of months have insignificant country dummies. Comparing *F*-test *(RP)* with *F*-test *(LC)*, shows that in first sub-period there are a few more months with insignificant country dummies after removing risk-free interest rates than after removing inflation rates. However comparison between *F*-test *(RP)* and *F*-test *($)* suggests that the country effect is stronger in *F*-test *(RP)* after removing the risk-free interest rates.

As in as *F*-tests *($)* and *(LC)*, March 1986 is the first obvious dividing date because country dummies are almost always very significant from that date throughout the rest of the sample period.

Chart 4-2 Mean Absolute Deviation estimation (local currency real returns)

Chart 4-2 plots the industry and country MADs for value-weighted return MADs. The chart contains the MAD of the whole sample period and MADs for the three sub-sample periods. In general the MAD results support the F-tests results by measuring the sizes of country and industry effects. The main conclusion is that the country MAD is much higher than the industry MAD, especially after early 1986.



Similar to *F*-test *($)*, April 1997 is identified as the second dividing date mainly because of industry dummies since country dummies do not show much variation after March 1986. From April 1997 to July 2004, industry dummies become more consistently significant, although still less so than the country dummies.

Chart 4-3 shows probability values of *F*-test *(RP)*. It is straightforward to see the difference among the three different country dummy *F*-test results when comparing Charts 3-1, 4-1 and 4-3. Since the real exchange rate varies only across countries (not across industries) it must be the case that $\beta_j - \varsigma_j = 0$ Any differences between Equations (4.3a) and (4.3b) must therefore reside entirely in differences among the country effects, $\gamma_k - \tau_k$. Similarly, since the risk-free rate varies only across countries, the differences between (4.3a) and (4.7) must equally lie entirely in differences among the country effects, $\gamma_k - \eta_k$, with unchanged industry effects. The almost identical *F*-test probabilities for industry dummies in Charts 3-1, 4-1 and 4-3 reflect the fact that the relationship among Equations (4.3a), (4.3b) and (4.7) is entirely revealed in the differences in country effects.

4.4.5. Decomposition of the local return risk premium into industry and country components

4.4.5.1. Decomposition in the full sample period

Table 4-5 shows the decomposition of the excess local return risk premium. Panel A shows the decomposition of country portfolio excess returns. The main conclusion is that almost all of the variation in the value-weighted country risk premium can be attributed to country-specific effects. Table 4-5 (Panel A) shows that the pure country effects are much bigger than the sum of industry effects for both absolute and relative measures (Equations 4.9a and 4.9b). These findings are reinforced by the decomposition of industry indices in Panel B. Even in the industry portfolio returns, more variation in industry returns is due to the sum of country effects. The largest standard deviation of the pure industry effect is 0.056, for the Financials industrial sector (FI), which is much lower than the smallest standard deviation of the pure country effects (2.295, for South Korea). The only conclusion from this table is that, no matter which measure is used, country factors play a dominant role in explaining cross-country correlations.

Compared with Table 3-14, the stronger country effects found in F-tests *(RP)* also appear in the corresponding decomposition results. In Table 3-14 all SDs of pure country effects are less than one, but in the risk premium decomposition all SDs of pure country effects are at least 2.295 (South Korea) or higher.

4.4.5.2. Decomposition in three sub-periods

In section 4.4.4, F-tests *(RP)* results show the general picture of the time varying property of the industry and country effects. After removing the risk-free interest rate, F-tests *(RP)* identifies the same three sub-periods as F-tests ($).

Table 4-6 shows the decomposition of the local return risk premium for each sub-period, which is very similar to the F-test results. In the first sub-period, pure country effects play a dominant role in explaining country returns even there are only three countries available during this period. On average, about 96% of the country risk premium SD is explained by pure country effects SD.

Comparing the first sub-period results with the corresponding part of Table 3-16, the biggest difference is that pure industry effects are weaker. After the removal of risk-free interest rates, the SDs of pure industry effects on average explain about 61.4% less of the SD in industry portfolios than they do in Table 3-16.

Table 4-4 F-test *(RP)* results for local return risk premium

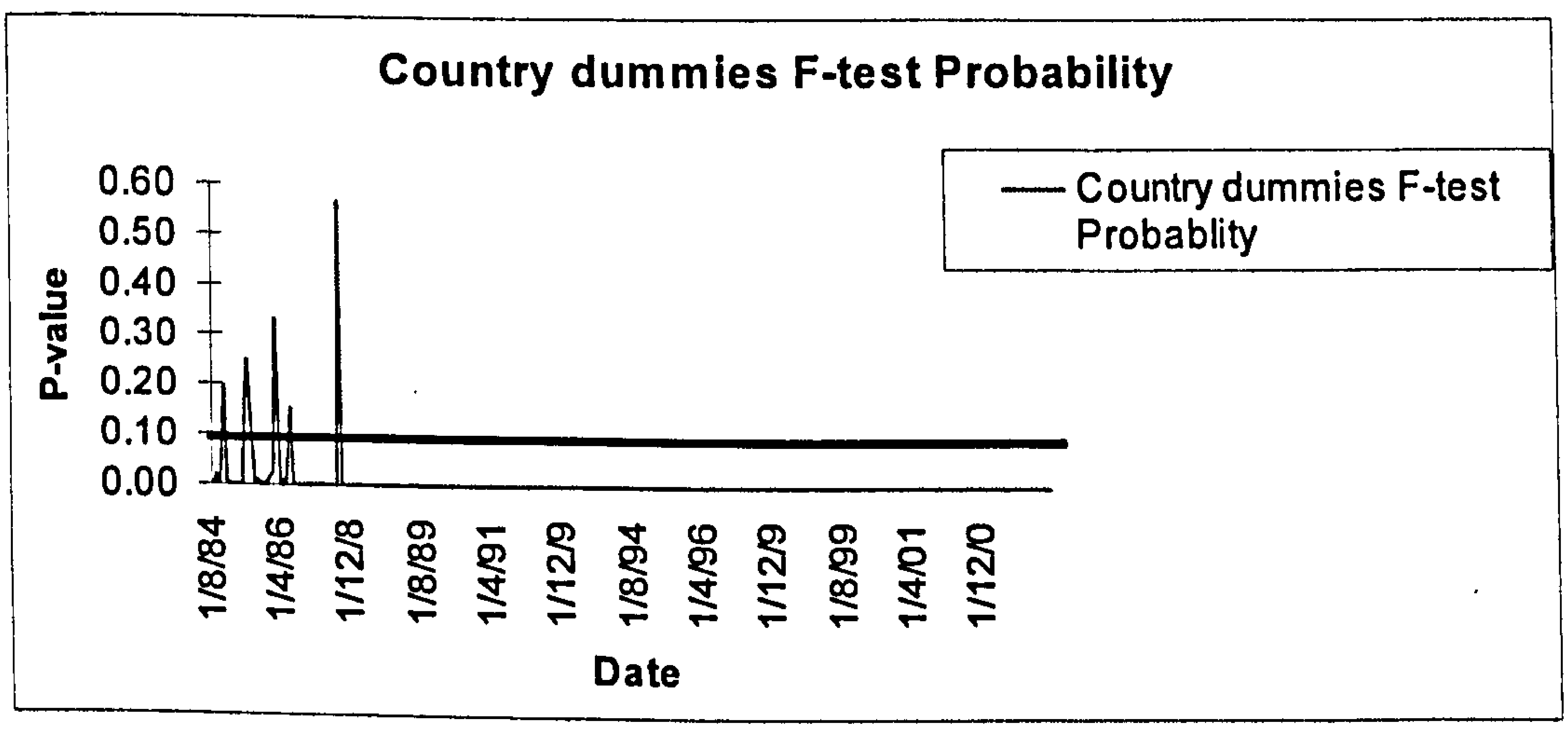
The first column in table 4-4 shows the three sub-sample periods and the second column shows the number of months in each sub-sample period. Each sub-sample period has been divided into three categories.

		Industry dummies				Country dummies			
Sample period	Number of months	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)
08.84-02.86	19	36.8	5.3	57.9	100	73.7	5.3	21.1	100
03.86-03.97	132	43.2	7.6	49.2	100	98.5	0.0	1.5	100
04.97-07.04	89	75.3	11.2	13.5	100	100.0	0.0	0.0	100

Note: The F-tests have been done separately for industry and country dummies in each month. Table 4-4 shows the percentage of months with significant and insignificant country and industry dummies during each sample period.

Chart 4-3 F-test (*RP*) probability of each month for risk premium

Chart 4-3 shows probability values of the F statistics for both industry dummies and country dummies from August 1984 to July 2004. After March 1986 the spikes of country dummy p-values are well below 0.10. The increasing importance of industry effects after 1997 is shown more obviously.



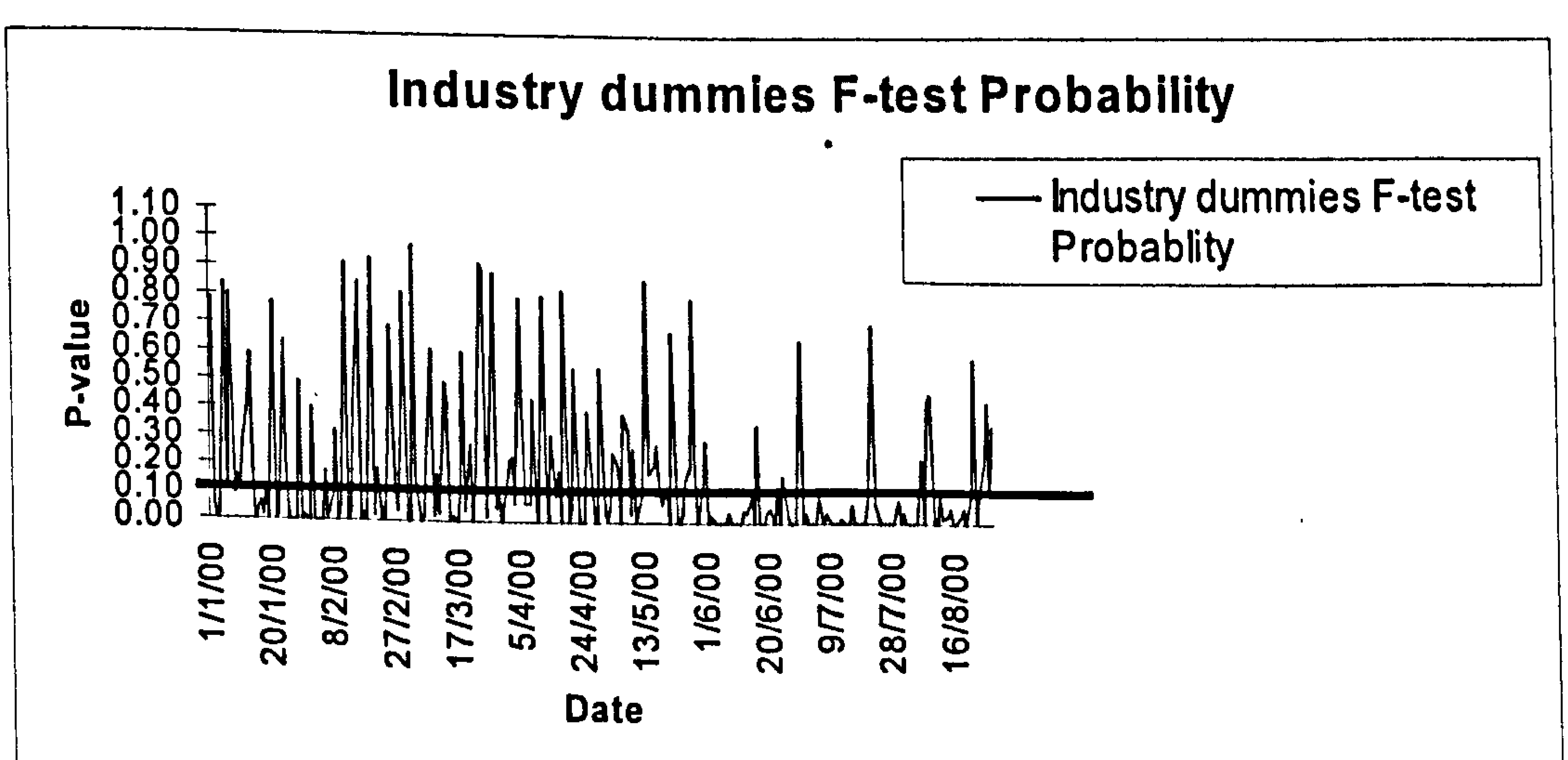


Table 4-5 Decomposition of excess index risk premium into country and industry effects

The table gives the standard deviation (SD) of the components of the excess country and industry index returns. Each country index excess return is decomposed into a pure country effect and a sum of 11 industry effects. Each industry index excess return is decomposed into the sum of 13 country effects and a pure industry effect. The ratio relative to the market gives the ratio of the SD of that component to the SD of the sum of that pure effect and the sum of the industry (country) effects.

Panel A	VW country indices				Panel B	VW industry indices			
	Pure country effect		Sum of 11 industry effects			Sum of 13 country effects		Pure industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	Industry	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	19.689	1.175	0.015	0.001	**IGS**	2.050	1.000	0.020	0.010
Chile	2.575	1.139	0.012	0.005	**CG**	2.220	1.000	0.019	0.009
China	2.563	1.181	0.010	0.004	**CS**	2.223	1.000	0.021	0.010
India	2.594	1.125	0.006	0.003	**BM**	2.242	1.000	0.024	0.011
Israel	2.393	1.035	0.013	0.006	**UT**	3.338	1.000	0.039	0.012
Malaysia	2.309	0.999	0.012	0.005	**HC**	2.262	0.999	0.033	0.015
Mexico	2.539	1.090	0.012	0.005	**TEC**	2.357	0.999	0.045	0.019
Pakistan	2.572	1.182	0.012	0.005	**TEL**	2.738	0.999	0.046	0.017
South Africa	2.307	1.000	0.012	0.005	**FI**	4.299	1.001	0.056	0.013
South Korea	2.295	1.000	0.010	0.005	**PHG**	2.495	1.000	0.053	0.021
Taiwan	2.481	1.076	0.013	0.006	**BI**	2.727	1.000	0.032	0.012
Thailand	12.226	1.072	0.011	0.001	**Cross-industry average**	**2.632**	**1.000**	**0.035**	**0.013**
Turkey	2.493	1.099	0.012	0.005					
Cross-country average	**4.541**	**1.090**	**0.012**	**0.004**					

i. The pure country effect measures the average return of firms in a country relative to firms that are in the same industry but located in a different country.
ii. The sum of the eleven industry effects represents the component of a country's return that can be attributed to the difference between the industrial composition of its market and the industrial composition of the emerging markets.
iii. The pure industry effect measures the average return of firms in an industry relative to firms which are located in the same country but belong to a different industry.
iv. The sum of the thirteen country effects represents the component of an industry's return that can be attributed to the difference between the geographical composition of its index and the geographical composition of the emerging markets as a whole.

Results of the second sub-period are very similar to those of the full sample period. The dominant country effects are even stronger in the second sub-period. The main conclusion is that country effects play the dominant role in explaining the SD of stock returns. Table 4-6 (Panel B) shows that the pure country effects are stronger than the sum of industry effects for both the absolute and relative measures (equations 4.9a and 4.9b).

Comparing the second sub-period results with the corresponding part of Table 3-16 reveals a similar phenomenon to the decomposition of local real returns. On one hand the industry effects become weaker, on the other hand the strong country effects become even stronger after removing the risk-free interest rates.

During the third sub-period country effects still play a dominant role in explaining the risk premium SDs. However, according to the relative measure, pure industry effects can explain about 48% of the industry risk premium SD, which has increased about 47% compared with the second sub-period. Therefore, the 'catching-up' by the industry effect during the third sub-period still appears after the risk-free interest rates have been removed. As in the decomposition of local real returns, the country effects are stronger for all measures after the removal of risk-free interest rates.

4.4.6. Mean Absolute Deviation estimation of local return risk premium decomposition

Chart 4-4 plots the industry and country MADs for local return risk premium decompositions for the full sample and three sub-periods. Clearly the two y-axes show that the country MAD values are much higher than the industry MAD values. The main conclusion is that the size of the country effect is much larger than the size of the industry effect in these two decades.

The big differences in the country and industry MAD values in the three different periods mean that a single chart does not show the details of variations very well.

Since the significance of the country and industry effects have been examined in *F*-tests and decomposition estimations over three sub-periods, it is also important to exam the sizes of the country and industry effects during the three sub-periods. Therefore the industry and country MADs are also plotted for the three sub-sample periods separately.

In the top right figure, it can be seen that country effects are almost always larger than industry effects during this period. Judging from the values on the axis, the country MADs are larger in Chart 4-4 than in Chart 3-3. This suggests that after the removal of risk-free interest rate the size of country effects become larger.

In the bottom left figure, during the second sub-period the big difference between the country and industry MAD values makes it necessary again to use a secondary *y* axis. The two *y*-axes show that the country MAD is consistently larger than the industry MAD implying that the country effects are dominant. Compared with the corresponding figure in Chart 3-3, the values on the *y*-axis show that country MAD is much larger after the removal of risk-free interest rates.

In the bottom right figure, after April 1997, the country MAD values are much greater than the industry MADs, showing that country effects are still dominant. The increasing importance of industry effects is more obvious in the *F*-test results but less obvious in the MAD test. However, comparing the values on the *y*-axis in Chart 3-3 with those in Chart 4-4, it seems that after the removal of risk-free interest rates, the size of country effects has decreased during the third sub-period.

Table 4-6 Decomposition of excess value-weighted risk premium into country and industry effects in three sub-sample periods

	08.84—02.86				03.86—03.97				04.97—07.04			
	Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Brazil					28.329	1.247	0.012	0.001	0.074	0.987	0.019	0.255
Chile					3.337	1.129	0.011	0.004	0.045	0.976	0.015	0.323
China					3.459	1.201	0.005	0.002	0.097	0.970	0.015	0.146
India					3.353	1.116	0.006	0.002	0.088	1.015	0.008	0.089
Israel					3.017	0.999	0.013	0.004	0.087	1.009	0.014	0.166
Malaysia	0.057	0.970	0.009	0.154	2.995	0.999	0.011	0.004	0.102	1.028	0.014	0.142
Mexico					3.296	1.077	0.010	0.003	0.081	1.002	0.015	0.182
Pakistan					3.459	1.203	0.009	0.003	0.094	0.984	0.016	0.172
South Africa	0.070	1.041	0.008	0.123	2.991	1.000	0.014	0.005	0.061	0.985	0.011	0.177
South Korea	0.016	0.869	0.008	0.418	2.986	1.000	0.012	0.004	0.107	1.001	0.008	0.077
Taiwan					3.169	1.056	0.008	0.003	0.074	1.037	0.020	0.281
Thailand					16.931	1.145	0.013	0.001	0.755	0.998	0.008	0.010
Turkey					3.188	2.661	0.008	0.006	0.328	1.012	0.017	0.051
Average	**0.048**	**0.960**	**0.008**	**0.231**	**6.193**	**1.218**	**0.010**	**0.003**	**0.153**	**1.000**	**0.014**	**0.159**
Industry	**Sum of 13 country effects**		**Pure industry effect**		**Sum of 13 country effects**		**Pure industry effect**		**Sum of 13 country effects**		**Pure industry effect**	
	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
IGS	0.015	0.385	0.006	0.168	2.832	1.000	0.019	0.007	0.036	0.910	0.018	0.451
CG	0.012	0.959	0.004	0.344	2.939	1.000	0.017	0.006	0.037	0.911	0.022	0.544
CS	0.012	0.332	0.008	0.222	2.958	1.000	0.021	0.007	0.052	0.908	0.020	0.339
BM	0.049	0.889	0.006	0.111	2.951	1.000	0.026	0.009	0.071	0.943	0.023	0.304
UT	0.057	0.806	0.009	0.121	4.710	1.000	0.040	0.009	0.032	0.813	0.032	0.818
HC	0.016	0.413	0.007	0.172	2.966	0.999	0.037	0.013	0.047	0.894	0.027	0.505
TEC	0.016	0.247	0.010	0.145	3.134	1.000	0.037	0.012	0.045	0.723	0.048	0.773
TEL					3.792	1.000	0.053	0.014	0.093	0.909	0.035	0.342
FI	0.017	0.624	0.008	0.280	6.048	1.001	0.070	0.012	0.067	0.805	0.038	0.456
PHG	0.016	0.310	0.006	0.113	3.379	1.001	0.059	0.017	0.070	0.927	0.045	0.604
BI	0.010	0.207	0.009	0.180	3.752	1.000	0.029	0.008	0.209	1.000	0.031	0.148
Average	**0.022**	**0.517**	**0.007**	**0.186**	**3.587**	**1.000**	**0.037**	**0.010**	**0.069**	**0.886**	**0.031**	**0.480**

To summarize, according to the hypotheses, it is expected that the risk-free interest rate is one of three potential biases in a regression of nominal stock returns denominated in a single currency (e.g. U.S. dollars) on country and industry dummies. However the results of *F*-test, decomposition and MAD estimation all show that after the removal of the risk-free interest rate the dominant country effects become even more dominant.

In *F*-test *($)*, there are about 53% months with insignificant country dummies from 1984 to February 1986. However after removing the exchange rate and inflation rate, country factors play a more important role, with about 16% months with insignificant country dummies in *F*-test *(LC)*. In *F*-test *(RP)*, after the removal of risk-free interest rates, country factors play a slightly less important role than in *F*-test *(LC)*, with about 21% months with insignificant country dummies.

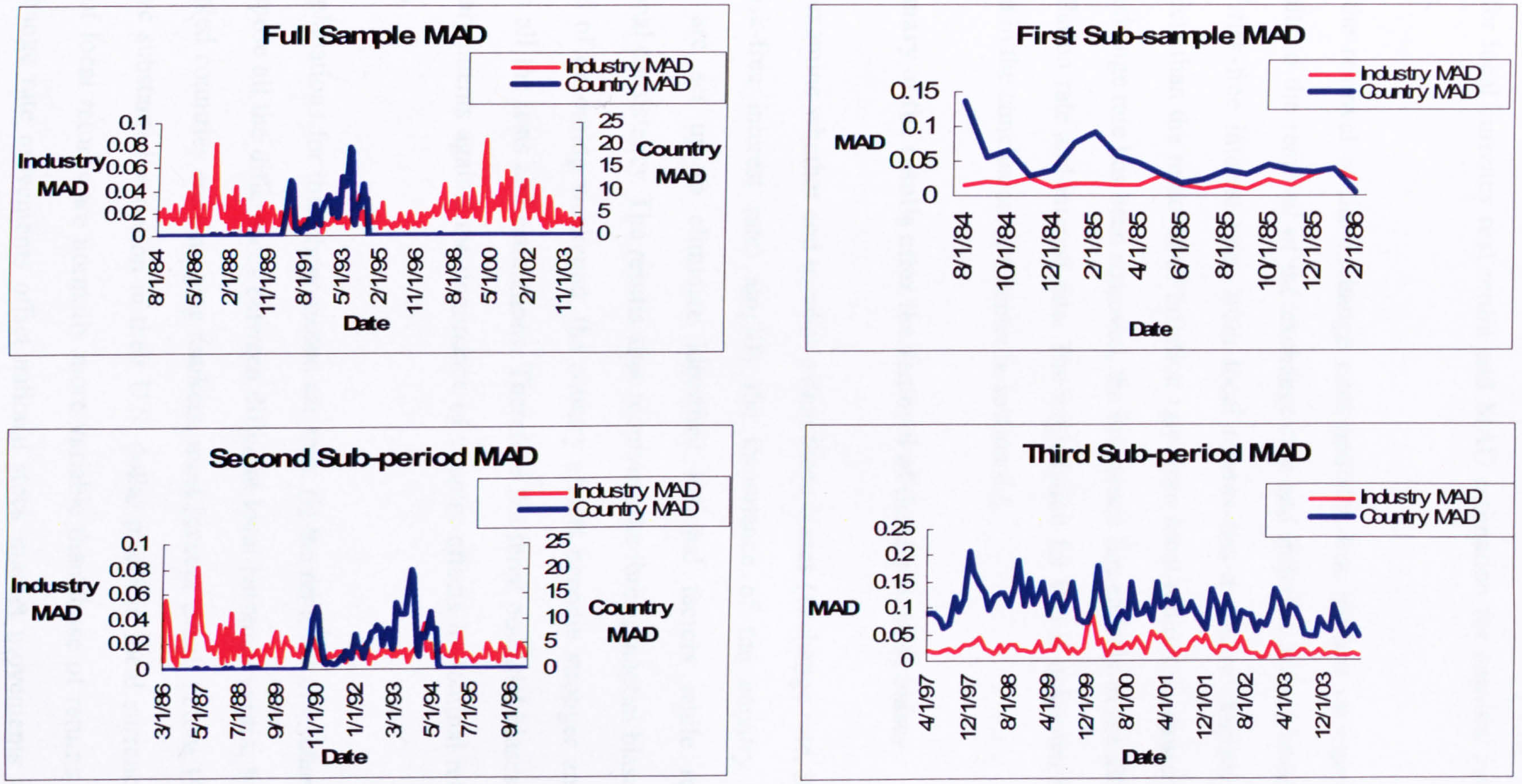
During the second sub-period, in *F*-test *($)*, there are about 0.8% months with insignificant country dummies. However country dummies are always highly significant throughout the period in *F*-test *(LC)*. In *F*-test *(RP)*, months with insignificant dummies increase to around 1.5%. Therefore in terms of the significance of the country dummies, country effects are strongest after the removal of the exchange rate and inflation rate and least strong after the removal of risk-free interest rate.

The decomposition results are very similar in terms of the relative importance of country and industry effects in explaining the cross-sectional variation in local return risk premiums and the local real returns.

In terms of the size of the country effects, in ascending order, they are: MAD estimation for nominal returns in U.S. dollars, MAD estimation for local return risk premium and MAD estimation for local currency real returns. The first two sub-periods show results similar to those of the full sample.

Chart 4-4 Mean Absolute Deviation estimation (risk premium)

Chart 4-4 plots the industry and country MADs for the whole sample period and the three sub-periods. In general the MAD results support the *F*-tests results.



The only exception among all the tests is that, during the third sub-period, the country MADs in ascending order are: MAD estimation for local return risk premium, MAD estimation for local currency real return and MAD estimation for nominal returns in U.S. dollars.

In general the removal of the exchange rates and risk-free interest rate gives very similar results to the removal of the exchange rate and inflation rates. However the removal of risk-free interest rates from local returns has a smaller impact on the country effects than the removal of inflation rate from local returns. Because in both cases the exchange rate has been removed, the difference lies entirely in the difference between inflation rate and interest rate. The explanation for this is unknown but will be discussed in the conclusion of Chapter 6, section 6.6.

4.4.7. Summary of the results after the removal of three potential biases

In order to examine whether and to what extent these biases (exchange rate, inflation rate and risk-free interest rate) amplify the importance of the country effects, regressions are set up to eliminate identified national factors while retaining cross-sectional consistency. The results after removing the three potential biases show that, instead of becoming weakened, the country effects become stronger and more dominant in all the tests and estimations. Therefore the three potential biases cannot be used as arguments against the dominance of country effects in nominal returns in U.S. dollars.

Possible explanations for this phenomenon are that: (i) the removal of exchange rate seems to expose all the differences between different local currency values, but since all the sampled countries are emerging markets, most (except Brazil before 1996 and Turkey) have substantial variation in their U.S. dollar prices in local currencies; (ii) the values of local returns are normally more variable than those of returns in U.S. dollar. Exchange rate movements offset national stock market movements to some extent; and (iii) the values of local returns are normally much larger than they are in

U.S. dollars. Since the exchange rates only vary across countries rather than across industries, the large returns lead to large country effect coefficients. These in turn directly lead to the larger country MAD. In the local currency real return decomposition, the exchange rate has been removed. Likewise, in the local return risk premium decomposition, the exchange rates are not included. In both cases, the country MADs are much larger than the country MADs for nominal returns in U.S. dollars. Instead of amplifying the country effects, converting returns in different local currencies to U.S. dollars has disguised an important country factor: the local currency values! By unifying the currencies, the methodology has demolished these big differences between local currency stock returns across different emerging markets. Therefore after the exchange rates have been removed, the differences between local currency stock returns across countries show even stronger country effects.

However according to various empirical studies, such as Roll (1992), exchange rates, inflation rates and risk free interest rates play important roles in explaining stock returns. Therefore there is further investigation of their roles in Chapter 6, in which country effects and modulus country effects are regressed on various variables including, the three macroeconomics variables here, in a panel dataset.

Since the real exchange rate only differs across countries but not across industries, it is expected that any differences between equations (4.3a) and (4.3b) must reside entirely in differences among the country effects. Similarly, since the risk-free rate changes only among countries, any differences between equations (4.3a) and (4.7) must also lie entirely in differences among the country effects, with the unchanged industry effects. However the results of removing the three potential biases show that industry effects have changed although most of the time, the changes are rather marginal.

This may be explained by the fact that the country and industry effects are not uncorrelated. Table 4-7 shows the correlations between the country and industry

MADs from three different decompositions: nominal returns in U.S. dollars, local currency real returns and local return risk premiums. It shows that during the full sample period and three sub-periods, country effects and industry effects are correlated to different degrees. The correlations are between 0.2 to 0.5 for nominal returns in U.S. dollars but for local currency real returns and local return risk premiums the correlations almost all become negative (except the third sub-period for the local return risk premium).

Table 4-7 Correlation between country and industry MADs from three decomposition estimations

	Nominal returns in $US	Local real return	Local return risk premium
08.84---07.04	0.546	-0.084	-0.169
08.84---02.86	0.245	-0.111	-0.154
03.86---03.97	0.560	-0.023	-0.106
04.97---07.04	0.294	-0.023	0.188

As argued by Green (2005), the correlation between country and industry effects may be explained by the fact that the distinction between industry and country factors in practice is not necessarily precise. It is common for emerging markets to have more conglomerates than the main OECD stock markets. At the same time they tend to have a narrower industrial base, and therefore a narrower range of industries. Table 3-7-2 shows the industrial compositions of countries in December 2003. It shows that emerging markets such as Taiwan have concentrated on technology industries. About 10% of total sample market value is contributed by Taiwan's Technology sector, which counts for 50% of Taiwan market value and 50% of the Technology industry sector market value in the sample. At the same time, Taiwan stock markets do not have firms in Health care or Telecom industry sectors. Therefore, as argued by Heston and Rouwenhorst (1994), it is hard to tell whether a diversified investment in the Taiwan stock market is an investment in Taiwan market assets or an investment in the Technology industry sector.

4.5. Conclusion

There is a possibility that the predominant country effects identified in this and other studies are not due to their underlying importance but to imperfections in the basic methodologies that are widely used in the related literature. An overestimation of the importance of country effects may arise when using single currency nominal returns include the effects of exchange rates, inflation rates and risk free rates in the decomposition exercise. However, after removing the three potential biases, the test results show that the dominant country effects do not disappear or become weaker but tend instead to become stronger than before.

One of the possible explanations for the results can be that instead of amplify the country effects, by unifying the currencies, the methodology has demolished these big differences between local currency stock returns across different emerging markets. Further investigation on the three macroeconomic variables' explanatory powers on stock returns is discussed in Chapter 6.

CHAPTER 5:

INDUSTRY AND COUNTRY FACTORS IN STOCK RISKS

5.1. Introduction

The debate on the relative importance of country and industry effects in the cross-sectional variation of stock returns was re-examined in Chapter 3 by using individual firm data from 13 emerging markets and 11 industry sectors from 1984 to 2004. In general, empirical evidence supports the conclusions of the existing literature that dominant country effects remain stable while industry effects become more and more important in the last ten years in emerging markets. The conclusion is robust in Chapter 4, where three potential biases are removed from the dummy variable decomposition model.

One of the important questions for modern financial economists is the quantification of the tradeoff between risk and expected return. Existing studies have only focused on the industry and country factors debate by decomposing stock returns (either index returns or individual firm returns). This chapter focuses on the risks of returns in emerging equity markets.

In segmented equity markets, risk premiums may be directly linked to the volatility of equity returns in the particular market. Higher volatility implies higher capital costs. Higher volatility may also increase the value of the 'option to wait', therefore delaying investments. One of the main benefits from portfolio diversification across countries and industries is risk reduction. Examining the relative importance of country and industry effects on the cross-sectional variation of stock risk directly rather than the cross-sectional variation of the stock returns will be very informative in guiding the portfolio composition strategy.

The main aim of this chapter is to examine the relative importance of country and industry effects on the cross-sectional variation of stock risks. Given close links between risk and return, it is expected that the decomposition of risk should give similar results to support the conclusion drawn on the decomposition of returns, but the analysis may shed some light on the debate by examining the issue from a different angle.

The remainder of the chapter is organized as follows. Section 5.2 is the literature review. Section 5.3 describes modeling and measuring the mean-variance relationship. Section 5.4 discusses the methodologies for using both conditional variance and conditional standard deviation as two risk measurements, followed by the corresponding empirical results in section 5.5. Section 5.6 concludes.

5.2. Literature Review

The main aim of this chapter is to examine the relative importance of country and industry effects on the cross-sectional variation of stock risk. It is necessary to model the mean-variance relationship and measure the risks of returns before decomposing the risks into country and industry effects.

Since the Capital Asset Pricing Model (CAPM) was introduced by Sharpe (1964), Lintner (1965) and Mossin (1966), it has been widely used by both practitioners and researchers to gauge the relationships between return and risk. The first part of literature review looks back at the history of CAPM, its theoretical extensions and validity. The second part of the literature review discusses the Autoregressive Conditional Heteroskedasticity (ARCH) model, Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and some extensions of GARCH models. A seminal study by Engle (1982) introducing the Autoregressive Conditional Heteroskedasticity (ARCH) model considers the variance of the current error term to be a function of variances of error terms in previous time periods. Since its introduction, ARCH has been widely applied in modeling the financial time series that exhibit time-varying volatilities. In the final part of the literature review, comparisons will be made between CAPM and (G)ARCH models.

5.2.1. Capital Asset Pricing Model (CAPM)

5.2.1.1. CAPM and its assumptions

Based upon the earlier work of Markowitz (1952) on diversification and modern portfolio theory, the development of the CAPM enables economists and investors to measure quantitatively the tradeoff between asset return and risk. CAPM is an asset-pricing model used for pricing both individual security and portfolios. A simple CAPM states that:

$$Er_{i,t} - r_{F,t} = \beta_i (ER_t - r_{F,t}) \tag{5.1}$$

$Er_{i,t}$: The expected return on the capital asset

$r_{F,t}$: The risk-free rate of return

$\beta_i = Cov(r_{i,t}, R_t) / Var(R_t)$: (beta) the sensitivity of the asset returns to market returns

ER_t : The expected return of the market

Equivalently the CAPM can be written as:

$$Er_{i,t} - r_{F,t} = Cov(r_{i,t}, R_t)\lambda_t \tag{5.2}$$

Here $\lambda_t = E(R_t - r_{F,t}) / Var(R_t)$ defines the market or risk premium (the expected market rate of return in excess of the risk-free rate)

The CAPM states that the risk of an asset is entirely determined by β_i (the systematic risk of the asset that cannot be diversified away). Therefore the risk premium of an individual asset equals its beta times the risk premium on the market portfolio.

The simplicity of the CAPM made it a very popular tool among practitioners and researchers since its introduction. However the simplicity of the standard CAPM does not come without price. The following are assumptions underlying the standard CAPM (Elton, *et al.* 2003):

1. All investors have rational expectations (investment decisions are purely based on expected values and risks of the return on the investment).

2. Either returns are normally distributed or investors have quadratic utility functions (in either case this reduces the choice space to portfolio mean and variance).
3. Investors have a single-period investment horizon.
4. Perfect, frictionless markets
   i. There is no transaction cost.
   ii. There is no personal income tax.
   iii. Stocks prices are not affected by the buying and selling actions of individual investors.
   iv. Assets are infinitely divisible (investors can invest in any fraction of an asset).
5. Either investors are permitted unrestricted lending or borrowing at the rate of interest for riskless securities or unrestricted short selling is permitted for any risky asset.
6. All assets, including real estate, artwork and human capital are tradable.
7. Homogeneous expectations (implying efficient capital markets and meaning that investors have identical expectations of expected returns, risks and the correlation structure between all pairs of stocks).

Assumptions 2 and 3 ensure that portfolio selection is reduced to a simple single-period model of mean-variance choice. Assumption 4 ensures a simplified model with a static opportunity space in which all points can be reached by trading (price-taking investors do not alter the shape or position of the efficient frontier when they trade). Assumption 5 allows the aggregation of portfolio choices of all individuals facing the same investment opportunities. Assumptions 6 and 7 ensure that all investors face identical trading opportunities (the same assets and the same means and variances). Jointly these assumptions imply that optimal portfolio choice leads to market equilibrium.

Many of the strong assumptions behind the standard CAPM cannot be maintained in the real world. It is understandable that in order to build a theoretical model it is necessary to simplify the problem but it is also necessary to be cautious where reality is excessively distorted by strong assumptions since this may affect the performance of the model in real world applications.

5.2.1.2. Validity of CAPM

In the 1970s, studies such as Black, *et al.* (1972) and Fama and MacBeth (1973) provided empirical evidence to support the CAPM. Black, *et al.* (1972) documented that the mean of the beta factor had a positive trend during the period 1931-1965 and was on the order of 1.0 to 1.3% per month in the two sample intervals from 1948 to 1965. This seemed to have been significantly different from the average risk-free rate and was approximately the same size as the average market return of 1.3 and 1.2% per month over the two sample intervals in this period. In addition, the standard deviation of the beta factor over these two sample intervals was 2.0 and 2.2% per month, as compared with the standard deviations of the market factor of 3.6 and 3.8% per month. Therefore Black *et al.* concluded that beta factor seemed to be an important determinant of security returns and was in line with the prediction of the CAPM. Fama and MacBeth (1973) using NYSE stocks return data from 1926 to 1968 drew similar conclusions.

Since the early study of Banz (1981), which provided serious contradictory evidence to CAPM through the so-called 'size-effect', the greatest challenge to the CAPM was from Fama and French (1992). They estimated the CAPM for the U.S. stock market from 1963 to 1990, comparing the cross-sectional explanatory power of beta with the explanatory power of an alternative set of variables including size, leverage and book-to-market value. They found that beta could not explain the excess return but that book-to-market value had explanatory power. They also found that when beta was corrected for the possible influence of firm size, the univariate relation between beta and average return from 1941 to 1990 was weak. Both DeBondt and Thaler (1985) and Jegadeesh and Titman (1993) found similar unfavourable evidence, claiming that firm characteristic variables had outperformed beta in explaining the cross-section of stock returns.

Santos and Veronesi (2005) apply a general equilibrium model with habit persistence and multiple assets to match both the time series properties of the market portfolio and the cross-sectional predictability of returns on price-sorted portfolios (the value premium) shedding some light on why the unconditional CAPM fails to price book-to-market sorted portfolios. They argue that the time series behaviour of the market portfolio imposes general equilibrium restrictions on the behaviour of the cross-section of average returns of price sorted portfolios. These general equilibrium restrictions on the market portfolio provide strict implications about the time varying properties of the value premium itself. The dynamic nature of the value premium explains why the conditional CAPM and a Fama and French (1993) factor model outperform the unconditional CAPM.

Other support for the CAPM has been found. Clare, *et al.* (1998) argued that Fama and French (1992) and other similar studies all employed variants of the two-step estimator of Fama and MacBeth (1973), which imposed implicitly the restriction that idiosyncratic returns were uncorrelated. Clare, *et al.* (1998) used one-step estimation due to McElroy *et al.* (1985) (which allows for correlation amongst idiosyncratic returns) and found a highly significant role for beta risk in the UK stock market. However, their conclusions were sensitive to both the method of portfolio formation and the choice of estimator. Kothari, *et al.* (1995) argued that the strong relation between average return and book-to-market value identified in Fama and French (1992) and other studies was overestimated, because of survivor bias in the COMPUSTAT sample. At the same time, they found a strong positive link between beta and average return with their annual data. A number of other studies such as Kothari and Shanken (1998) have shown further evidence on selection biases that supports the argument of Kothari, *et al.* (1995). Kothari and Shanken (1998) argued that using annual returns to estimate betas could help avoid measurement problems caused by non-synchronous trading, trading frictions and seasonality in returns. Despite these findings, Fama and French (1996a) have continued to argue that CAPM cannot be saved and that beta alone is not sufficient to explain average returns.

Apart from the ongoing debate on the performance of the single factor (beta) in the CAPM, some other studies cast doubts on the market risk-premium element of the model as well. The CAPM states that the risk premium for investing in an asset equals the product of its beta (risk) and the risk premium on the market portfolio (price of the risk). Recent studies show that the market risk premium that has been used over years is actually not estimated properly.

In order to measure the market risk premium, at least four decisions need to be made (Finnegan, 2005). First it is necessary to identify a market portfolio of all assets in net positive supply. However the famous 'Roll Critique' is about the unobservability of the market returns. Theoretically the market portfolio should contain all the assets that are held by investors (including real estate, art work, human capital, etc.). In practice, it is not possible to observe such a market portfolio so a stock index usually is used as a proxy. Unfortunately, as has been argued by Roll (1977), using a stock index proxy instead of the true (unobservable) market portfolio can be misleading in terms of the validity of the CAPM, so that the CAPM may not be empirically testable.

Since there is no way to identify the 'true' market portfolio, a portfolio of all traded U.S. stocks is typically used as a proxy for the market portfolio. The standard approach to estimate risk premium is simple: the actual returns earned on stocks over a long period of time is estimated, and compared to the actual returns earned on a risk-free (normally treasury bill/bond) asset. The difference, on an annual basis, between the two returns is computed and represents the historical risk premium.

Therefore in order to estimate risk premium, three decisions need to be made. First it is necessary to decide how the average returns on stocks, treasury bills and bonds are computed, i.e. whether the calculation should be based on either an arithmetic average or a geometric compounding of returns. Second, a historical period must be chosen for the proxy measurement. Finally, the market risk premium must be measured relative to a risk-free rate, so the choice of the risk-free asset must also be made. Because the yield curve in the United States has been upward sloping for the most of the last seven decades, the risk premium is larger when estimated relative to shorter-term treasury bills. In general, the risk free rate chosen in calculating the premium has to be consistent with the risk free rate used to calculate expected returns. All the decisions made here affect the market risk premium that will be used in the CAPM in practice.

Table 5-1, which is from Fernandez (2004) shows that when searching for an appropriate market risk premium based on historical data: (i) numbers calculated on arithmetic compounding are higher than geometric compounding for the same period, and (ii) in the U.S. market the market risk premium will be higher if it is based on a short-term Treasury bill risk-free rate rather than a long-term Treasury bond yield because the yield curve for Treasuries has been upward-sloping for most of the historical period. Therefore the choice of method, period and the risk-free rate for compounding of returns can affect the final results.

In order to use CAPM to price assets accurately, two inputs are required: the beta factor and the appropriate risk premium for the factor. The above literature shows that the validity of CAPM is challenged, since it will always be difficult to measure the risk premium accurately and there is unfavourable evidence against the single factor-beta.

Table 5-1 U.S. stock market average (arithmetic and geometric) in different periods of the market premium over the 3-month risk-free rate (T-Bills) and the 30-year risk-free rate (T-Bonds).

	Historical market risk premium over T-Bills (%)		Historical market risk premium over T-Bonds (%)	
	Arithmetic	Geometric	Arithmetic	Geometric
1926-2003	8.6	6.8	7.2	5.6
1951-2003	8.0	6.7	7.4	6.4
1961-2003	6.2	4.9	5.4	4.5
1971-2003	6.7	5.3	4.7	3.7
1981-2003	8.0	6.9	4.0	3.3
1991-2003	9.6	8.0	7.1	5.6
1991-1999	16.5	16.0	15.4	15.0

Note: Table 5-1 shows the average differential return between the market and the short-term risk-free rate (T-Bills), and the average differential return between the market and the long-term risk-free rate (T-Bonds) in different time periods. Arithmetic average and geometric average have been calculated for all parameters. Source: Fernandes (2004)

5.2.1.3. Theoretical extension of CAPM

The strong assumptions of the CAPM are also the focus of criticism. Therefore numerous studies have worked on theoretical extensions of the CAPM. Merton (1973) developed an inter-temporal CAPM, deduced from the portfolio selection behaviour of an arbitrary number of investors who maximize their expected utility of lifetime consumption by trading continuously in time. Unlike the traditional one-period CAPM, current demands are affected by the possibility of uncertain changes in future investment opportunities.

Breeden (1979) further extended the Merton inter-temporal CAPM by condensing the multi-beta pricing equation into a single-beta equation in a multi-good world. The consumption CAPM states that asset returns are closely linked to aggregate economic output as investors are interested in protecting their consumption over economic recession. The international asset pricing model has established the conditions under which fully integrated capital markets are in equilibrium. The after-tax CAPM has considered the fact that investors pay higher taxes on high dividend-yield stocks, requiring them to be compensated with higher pre-tax returns. Santos and Veronesi (2006) used labour income as a predictor of stock returns by regressing stock returns on lagged values of the labour-income to consumption ratio. They found that, using the labour-income to consumption ratio as a conditioning variable, the conditional CAPM (CCAPM) did a better job than the unconditional CAPM in capturing cross sectional variation in returns. In the CCAPM considered by Ferson and Harvey (1991 and 1993) and Cochrane (1996), the time-varying beta or risk premium is parameterised by a set of instruments in a linear fashion. The instrumental variables may be any variables that predict cash flows, betas or aggregate returns. Jagannathan and Wang (1996) found support for a conditional version of the CAPM that used a wider definition of assets (to incorporate human capital) and allowed for time-varying risk. The corrections imposed by Jagannathan and Wang effectively removed the significance of the size effect in the cross-section of returns.

For the purpose of this study, the main concern is to find a way to measure risks of returns. The unconditional CAPM has been seriously challenged not only on its strong assumptions but also through the empirical validity of the basic elements of the model: beta and market risk premium. The extensions of the CAPM, in particular the conditional CAPM, provide some remedies to the distance between the complex real world and the simplified unconditional CAPM but they are not very suitable for the purpose of this study. It is necessary to find another suitable candidate to model the mean-variance relationship and measure the risk in the individual stock returns.

5.2.2. Autoregressive Conditional Heteroskedasticity Model (ARCH) and its extensions

5.2.2.1. Autoregressive Conditional Heteroskedasticity (ARCH) Model

The concept of heteroskedasticity is initially introduced to researchers in cross-sectional contexts, where the variance of a cross-sectional estimation disturbance term may depend upon one or more of the regressors, but heteroskedasticity is also pervasive in time-series regressions using macroeconomic and financial data. Traditionally some characteristics of real financial market data are not considered in econometric models. For example, it was always assumed that the variance of the disturbance term is constant. However in reality volatility clustering is often observed, i.e. small/large changes tend to be followed by small/large changes of either sign. Traditional financial time series models did not model the time-varying volatility characteristics until 1982 when Engle introduced the ARCH model.

The seminal work of Engle (1982) on autoregressive conditional heteroskedasticity, the ARCH model, considers the variance of the current error term to be a function of the variances of the error terms of previous time periods. ARCH relates the error variance to the square of a previous period's error. Since its introduction, it has been widely applied in modeling financial time series that exhibit time-varying volatility. Numerous surveys have been done on the basic ARCH model and its extensions, including Engle and Bollerslev (1986), Bollerslev, *et al.* (1992), Bera and Higgins (1993) and Bollerslev, *et al.* (1994).

An ARCH process can be defined in terms of the distribution of the errors of a dynamic linear regression model. The dependent variable r_t is assumed to be generated by

$$r_t = x_t A + \varepsilon_t \quad (t = 1 \ldots T) \tag{5.3}$$

x_t: $M \times 1$ vector of exogenous variables, which may include the lagged value of the dependent variable.

A: $M \times 1$ vector of regression parameters.

ε_t: Error term, distributed as $N(o, \sigma_t^2)$.

Here $\sigma_t^2 = \tau_1 + \tau_2 u_{t-1}^2$, which can be easily extended to the ARCH (q) model with q lags of squared errors where $\sigma_t^2 = \tau_0 + \tau_1 u_{t-1}^2 + \ldots + \tau_q u_{t-q}^2$. In the literature, the variance is often denoted by h_t, so that the standard ARCH model is

$$r_t = x_t A + \varepsilon_t \tag{5.4}$$

$$\varepsilon_t \sim N(o, \sigma_t^2) \tag{5.5}$$

The conditional variance, h_t, of the error term is defined as:

$$h_t = \tau_0 + \tau_1 u_{t-1}^2 + \ldots + \tau_q u_{t-q}^2 \tag{5.6}$$

Here u is defined as the information set consisting of current and past observations of r_t. The required conditions to ensure a non-negative conditional variance are $\tau_0 > 0$

and $\tau_i > 0, \forall i = 1,...,q$.

The distinguishing feature of equations (5.4) and (5.5) is that h_t is a particular functional form of the information set, designed to capture the characteristics of the volatility. The common feature that conditional variance function (5.6) tries to mimic is the clustering of large shocks to the dependent variable. In equation (5.4), a large shock is shown by a large deviation of r_t from its conditional mean, $x_t A$, (a large positive or negative value of ε_t). ARCH states that the variance of the current error, ε_t, is conditional on the values of the lagged errors ε_{t-i}, $i = 1,...,q$ and is an increasing function of their magnitudes. Therefore, large errors of either sign normally tend to follow a large error of either sign, and similarly for small errors. The order of the lag q determines how long a shock continues to condition the variance of subsequent errors. The larger the value of q, the longer that volatility effect will last. The major input of the ARCH literature is in showing that obvious changes in the volatility of economic time series may be predictable and arise from a specific type of nonlinear dependence rather than exogenous structural change in the variance (Bera and Higgins, 1993).

5.2.2.2. The Generalized ARCH (GARCH) Model and extensions to GARCH

In the first empirical application of ARCH, Engle (1982, 1983) found that a large lag q was necessary in the conditional variance function, which would require estimating a great number of parameters subject to inequality restrictions. Bollerslev (1986) and Taylor (1986) separately proposed the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model, which has been applied widely in empirical work.

The GARCH (p,q) model (where p is the order of the GARCH terms and q is the order of the ARCH terms) is generated by assuming an autoregressive moving average model (ARMA model) for the error variance. It means that apart from the previous values of the lagged errors, the conditional variance is also allowed to be dependent upon previous own lags. In GARCH, the conditional variance equation (5.6) is written as

$$h_t = \tau_0 + \tau_1 u_{t-1}^2 + ... + \tau_q u_{t-q}^2 + \iota_1 h_{t-1} + ... + \iota_p h_{t-p} \qquad (5.7)$$

with inequality restrictions

$$\tau_0 > 0,\ \tau_i \geq 0, \forall i = 1,\ldots,q, \text{ and } \tau_i \geq 0, \forall i = 1,\ldots,p \tag{5.8}$$

These inequality restrictions ensure that the conditional variance is strictly positive.

GARCH not only has the advantage of being able to represent a high order ARCH process parsimoniously, it is also more likely to meet the non-negative restrictions than ARCH. GARCH models have been used extensively in macroeconomics and finance because of their appealing approximation-theoretic characteristics. This means that the GARCH model approximates conditional variance dynamics flexibly and parsimoniously in the same manner that ARMA models provide a flexible and parsimonious approximation to conditional mean dynamics.

A number of alternative functional forms for the conditional variance have been developed since the introduction of GARCH, including the Exponential General Autoregressive Conditional Heteroskedastic model (EGARCH) of Nelson (1991). In this case, the conditional variance function is as follows:

$$\log(h_t) = \tau_0 + \imath \log(h_{t-1}) + \gamma \frac{u_{t-1}}{\sqrt{h_{t-1}}} + \tau \left[\frac{|u_{t-1}|}{\sqrt{h_{t-1}}} - \sqrt{\frac{2}{\pi}} \right] \tag{5.9}$$

The log function ensures that the conditional variance is positive and that the model allows for asymmetric responses to the different effects generated by positive and negative innovations in volatility (Diebold and Lopez, 1995). Other extensions of GARCH include the GARCH-in-Mean model (GARCH-M), and the integrated GARCH model (IGARCH). These extended GARCH functional forms for the conditional variance have been developed in order to make the GARCH model work better with different data properties in the real world.

5.3. Data

5.3.1. The potential mean-variance models

The purpose of this empirical work is to apply the methodologies of Chapter 3 to stock risks in order to compare the results with the decomposition of stock returns. It appears that no other studies have examined this issue, so that there are no standard ways of measuring risk or modeling the mean-variance relationship. While the CAPM has been extensively used by both practitioners and researchers modeling the relationships between return and risk, its main merit of being simple is also a weak point attacked by the criticisms discussed in Section 5.2.1. The theoretical extensions of the CAPM, such as the conditional CAPM, provide some remedies to the distance between the complex real world and the simplified unconditional CAPM but the purpose here is to measure risk in a simple way rather than find a perfect model to capture the properties of stock returns. In the absence of a well-established equilibrium model of the risk-return relationship, it seems better to use the conditional variance of stock returns as the risk measure, rather than a conditional beta from a model where the true risk factors are unknown. Hence the conditional CAPM does not help here.

Both the ARCH model of Engle (1982) and the GARCH model of Bollerslev (1986) and Taylor (1986) have been widely used to model financial time series that exhibit time-varying volatility. Several alternative functional forms for the conditional variance have been developed in order to make the GARCH model work better with different data properties in the real world. In this study the time series properties of the mean and variance functions are both unknown. In Chapter 3 the summary statistic Tables 3-9, 3-10, 3-11 and 3-12 show that data from different emerging markets have different characteristics. The flexibility of (G)ARCH appears to be very appealing to fit the wide range of data in this work.

5.3.2. Modeling the mean-variance tradeoff and measuring risks

Returns and estimated risks of 1537 stocks of 13 emerging markets from 1984 to 2004 (stocks start in the sample at different point of time) are examined in the chapter. The return and risk (the conditional variance) for each individual stock are modeled and calculated independently from a returns model plus certain ARCH type errors. The econometric software EViews 5 has been used in all the calculations and regressions.

The correlogram statistics of each stock return has been checked to test the auto-correlation function of the return model. The autocorrelation and partial autocorrelation functions characterize the pattern of temporal dependence in the series. If the autocorrelation function dies off more or less geometrically with increasing lag, it is a sign that the series obeys a low-order autoregressive (AR) process. If the autocorrelation function drops to zero after a small number of lags, it is a sign that the series obeys a low-order moving-average (MA) process. Significance tests are used to check the exact order of the autocorrelation function.

In general, three types of return models have been identified from the correlogram statistics of each stock return They are a mean model without regressors, an univariate model with a constant only, and an ARMA (p,q) model. Panel B of Table 5-2 shows the percentages of the three types of mean model in the total sample for each country. For example, 2.54% of Brazilian firms can be represented by the ARMA (p,q) model. The return models of Brazilian, Chilean, Chinese and Indian stocks are mainly derived from the ARMA (p, q) model with $0 \leq p \leq 4,\ 0 \leq q \leq 4$. The returns of most stocks in the other countries (about 69.49% of the total) are represented by the model without regressors. The remaining stock returns, about 5.81% of the total, are represented by an univariate model with constant only.

ARCH LM tests have been applied to test for ARCH behavior. These are based on the Lagrange multiplier (LM) principle with the null hypothesis of no ARCH errors versus the alternative hypothesis that the conditional variance can be represented by an ARCH (q) process. Engle (1982) proposed the ARCH LM approach by regressing the squared residuals on a constant and q lagged values of the squared residuals. Panel A of Table 5-2 shows that among all the firms, about 58.85% of returns contain ARCH (q) errors. The main purpose of this step is to use GARCH models as tools to derive the conditional variance as a measure of stock risk for the decomposition procedure rather than to set up rigid GARCH models.

Panel C in Table 5-2 shows the percentage of the firms represented by one of the three return models with ARCH errors and the percentage of the firms represented by one of the three return models with GARCH errors. When setting up the (G)ARCH models, the main concern is to accommodate model accuracy, coefficient significance, achievement of convergence and the number of iterations before the convergence is achieved. It has been found that the majority of firms, about 82.16%, have GARCH (p,q) errors, $0 < p \leq 2,\ 0 < q \leq 2$. In total, about 97.08% of firms can be represented by one of the mean models with either ARCH or GARCH errors. Risk in the remaining stocks (about 2.92%) is measured by the EGARCH model. The conditional variance time series is saved for each security for the next stage decomposition process.

Table 5-2 Conditional variance calculations

Countries	No. of firms in each country	% ARCH LM test sig. at 5%	% ARCH LM test sig. at 10%	ARCH LM test Insig.	% mean model without regressor	% mean model with the constant only	% mean model ARMA(p,q)	% ARCH error	% GARCH error
		Panel A			Panel B			Panel C	
Brazil	64	0.72	0.33	3.06	0.98	0.65	2.54	1.69	2.34
Chile	64	0.85	0.65	2.6	0.72	0.07	3.38	0.91	3.12
China	144	2.86	1.24	5.27	2.08	0.00	7.29	3.58	5.53
India	178	4.55	1.30	5.60	5.86	0.65	5.14	2.41	8.98
Israel	29	0.78	0.26	0.85	0.59	0.13	1.11	0.39	1.30
Malaysia	237	11.45	0.78	3.19	12.56	1.30	1.30	0.72	14.38
Mexico	39	0.59	0.39	1.56	1.95	0.07	0.52	0.26	2.21
Pakistan	44	0.78	0.26	1.82	1.95	0.20	0.72	0.59	2.08
South Africa	69	2.41	0.20	1.89	2.99	1.11	0.26	0.59	3.51
South Korea	244	11.84	1.50	2.54	14.57	0.72	0.52	1.37	14.31
Taiwan	178	5.86	0.85	4.88	10.47	0.39	0.72	1.04	10.15
Thailand	185	5.53	0.85	5.60	11.19	0.39	0.46	0.91	11.13
Taiwan	62	1.63	0.39	2.28	3.58	0.13	0.33	0.46	3.12
SUM	1537	49.85	9	41.14	69.49	5.81	24.29	14.92	82.16
Sum of the panels		99.99			99.59			97.08	

Note: the percentage is calculated by dividing the number of the firms in each cell over the total number of the firms in the sample.

Table 5-2 Panel A shows the percentage of different LM tests results on individual returns. In general, three types of return models have been identified from the correlogram statistics of each stock return They are a mean model without regressors, an univariate model with a constant only, and an ARMA (p,q) model Panel B shows that in each country, the percentages of the three types of mean model in the total sample. ARCH LM tests have been applied to test for ARCH behavior. These are based on the Lagrange multiplier (LM) principle with the null hypothesis of no ARCH errors versus the alternative hypothesis that the conditional variance can be represented by an ARCH (q) process. Panel C shows the percentages of the firms represented by one of the three return models with the ARCH error or GARCH error.

5.4. Methodology

5.4.1. Conditional Variance as the measurement of risks

5.4.1.1. Conditional variance dummy variable model

In order to separate country and industry influences, following Chapter 3, the dummy variable (fixed-effect) model of Heston and Rouwenhorst (1994) is applied here to the conditional variance. Equation (5.10) states that each risk (conditional variance) is explained as the sum of a constant, an industry component, a country component, and an error term. The decomposition of risk has the following form:

$$\sigma_{ii}^{\$} = \delta + \sum_{j=1}^{11} \phi_j D_{i,j} + \sum_{k=1}^{13} \varphi_k C_{i,k} + \varepsilon_i \qquad (5.10)$$

$\sigma_{ii}^{\$}$ is the conditional variance of return on security i belonging to industry j and country k at time t, while $C_{i,k}$ and $D_{i,j}$ and are the country and industry dummies:

$$C_{i,k} = \begin{cases} 1 & \text{if security } i \text{ belongs to country } k \\ 0 & \text{otherwise} \end{cases}$$

$$D_{i,j} = \begin{cases} 1 & \text{if security } i \text{ belongs to industry } j \\ 0 & \text{otherwise} \end{cases}$$

The same procedure as in Chapter 4 has been applied to equation (5.10) for each period t to solve the identification problem, which gives:

$$\sigma_{ii}^{\$} = \delta + \sum_{j=1}^{10} \phi_j d_{i,j} + \sum_{k=1}^{12} \varphi_k c_{i,k} + \varepsilon_i \qquad (5.11)$$

with $d_{i,j} = (D_{i,j} - (w_j / w_J) D_{i,J})$ and $c_{i,k} = (C_{i,k} - (v_k / v_K) C_{i,K})$.

5.4.1.2. Significance of the country and industry effects – F-test

As in the returns decomposition, F-tests have been applied to the cross-sectional dummy variable regression for the conditional variance (equation 5.11) to give a general picture of the significance of the country and industry effects.

5.4.1.3. Decomposition of conditional variance into industry and country components

As equation (3.4), equation (5.11) is a factor model in which φ_k and ϕ_j are the estimates of the country and industry factors while $c_{i,k}$ and $d_{i,j}$ are their coefficients. The application of OLS to equation (5.11) is equivalent to a Weighted Least Squares (WLS) estimator with weights equal to the share of each firm in the world (sample) market capitalization. $\hat{\delta}$ is the Ordinary Least Square estimator of the conditional variance of the overall value-weighted average of all stocks in the entire world (sample). The averages in the decomposition models are not portfolio averages because they neglect the covariances among securities. Following the APT literature, estimating (5.11) is equivalent to estimating excess risks over an average benchmark $\hat{\delta}$. The expected value of the right hand side of (5.11) can be interpreted as the risk premium of stock *i* over the average risk. Following the same theoretical development in section 3.3.3. on page 47, it gives:

$$\Omega_k^{\$} = \hat{\delta} + \sum_{j=1}^{J-1} p_{k.j}\hat{\phi}_j d_{i,j} + \hat{\varphi}_k \qquad (5.12)$$

$$\Omega_j^{\$} = \hat{\delta} + \sum_{k=1}^{K-1} p_{j,k}\hat{\varphi}_k c_{i,k} + \hat{\phi}_j \qquad (5.13)$$

5.4.1.4. Mean Absolute Deviation for conditional variance

As in section 3.3.4, the MADs of country and industry effects are calculated to gauge the magnitudes of the country and industry effects in the cross-sectional variation in stock risks. The following are the MADs for country *k* and industry *j*:

$$MAD_{kt} = \sum_{k=1}^{13} v_{kt} \mid \varphi_{kt} \mid \qquad (5.14a)$$

$$MAD_{jt} = \sum_{j=1}^{11} w_{jt} \mid \phi_{jt} \mid \qquad (5.14b)$$

5.4.1.5. Traded vs. non-traded goods industries

Using the same classification scheme as Chapter 3, section 3.3.5, 11 industry sectors are categorized into industry groups by traded-goods and non-traded goods. The means (and medians) of the standard deviations of the components of excess risk for each industry portfolio (the sum of country effects and the pure industry effects) and the relative measures (equations 5.16a and 5.16b) are calculated for the traded-goods and non-traded goods industry groups for each sub-sample and the whole sample period.

5.4.2. Conditional standard deviation as the measurement of risks

5.4.2.1. Conditional standard deviation dummy variable model

The standard deviation ($\sqrt{\sigma_{ii}^{\$}} = \sigma_i^{\$}$) can also be used as the measure of risk since it is not known *a priori* if the relationship is linear in variance or standard deviation. The dummy variable decomposition model is a linear model but it is not known whether using $\sigma_i^{\$}$ or $\sqrt{\sigma_{ii}^{\$}}$ as the dependent variable is in line with the linear condition, therefore both are employed. Since the relationship between them is not linear, if one is linear in the model then the other definitely is not.

The decomposition of the conditional standard deviations has the following form:

$$\sqrt{\sigma_{ii}^{\$}} = \xi + \sum_{j=1}^{11} \theta_j D_{i,j} + \sum_{k=1}^{13} \vartheta_k C_{i,k} + \varepsilon_i \tag{5.15}$$

$\sqrt{\sigma_{ii}^{\$}}$ is the conditional standard deviation of return on security i belonging to industry j and country k at time t, while C_{ik} and D_{ij} are the country and industry dummies.

$$C_{ik} = \begin{cases} 1 & \text{if security } i \text{ belongs to country } k \\ 0 & \text{otherwise} \end{cases}$$

$$D_{ij} = \begin{cases} 1 & \text{if security } i \text{ belongs to industry } j \\ 0 & \text{otherwise} \end{cases}$$

Applying the normalization described in section 3.3.1. yields

$$\sqrt{\sigma_{ii}^{\$}} = \xi + \sum_{j=1}^{10} \theta_j d_{i,j} + \sum_{k=1}^{12} \vartheta_k c_{i,k} + \varepsilon_i \quad (5.16)$$

where $d_{i,j} = (D_{i,j} - (w_j / w_J) D_{i,J})$ and $c_{i,k} = (C_{i,k} - (v_k / v_K) C_{i,K})$.

As before, F-tests are applied to the cross-sectional dummy variable regressions on conditional standard deviation (equation 5.16) with WLS giving

$$\Theta_k^{\$} = \hat{\xi} + \sum_{j=1}^{J-1} p_{k,j} \hat{\theta}_j d_{i,j} + \hat{\vartheta}_k \quad (5.17)$$

$$\Theta_j^{\$} = \hat{\xi} + \sum_{k=1}^{K-1} p_{j,k} \hat{\vartheta}_k c_{i,k} + \hat{\theta}_j \quad (5.18)$$

5.4.2.2. Mean Absolute Deviation for conditional standard deviation

The relevant MADs for country k and industry j are

$$MAD_{kt} = \sum_{k=1}^{13} v_{kt} \mid \vartheta_{kt} \mid \quad (5.19a)$$

$$MAD_{jt} = \sum_{j=1}^{11} w_{jt} \mid \theta_{jt} \mid \quad (5.19b)$$

5.4.2.3. Traded vs. non-traded goods industries

As before, the analysis also separates industry groups by traded and non-traded goods.

5.5. Empirical results

5.5.1. *F*-test *(CV)* on the conditional variance dummy variables model

Tables 5-3 and 5-4 and Chart 5-1 show results of F-tests on the conditional variance dummy variable regression (equation 5.10). This set of tests is referred to in Tables 5-3 and 5-4 as F-tests *(CV)* in order to distinguish them from F-tests *(CSD)* (that use conditional standard deviation). The F-test results are presented in the same way as for

F-test *($)*, *F*-test *(LC)* and *F*-test *(RP)*.

Table 5-3 shows that from August 1984 to February 1986, industry factors play a more important role. Country dummies that are significant at 5% or better only appear in 21.1% of all months while similarly significant industry dummies appear in 31.6% of all months. Furthermore, there are substantially more months with insignificant country dummies than with insignificant industry dummies.

March 1986 is the first obvious dividing date since industry dummies are not significant in any month at all from March 1986 to October 1997. On the other hand, about 60% of months have significant country dummies. Industry effects seem not to influence the risk of stocks at all during this period while country effects are very significant.

October 1997 is the obvious dividing point between the second and the third sub-periods because country dummies are always significant from that date throughout the rest of the sample. Furthermore, from October 1997 industry dummies gradually become more and more important – the number of months with significant industry dummies increases by almost 60% compared with the second period. Country dummies are insignificant in about 40% of all months in the second sub-period, while they are significant in all months of the third period. Therefore, while country factors play an even more important role in the third period it is also the case that industry factors start catching up with country factors since late 1997.

Chart 5-1 shows probability values of the *F* statistics for both industry dummies and country dummies from August 1984 to July 2004. The results of *F*-test *(CV)* (Table 5-3) are shown in Chart 5-1 more directly. Before March 1986 most spikes of country dummy *p*-values are above 0.10 but the spikes for the industry dummies are mostly below 0.10. From March 1986 to October 1997 the insignificant industry effects are shown clearly by the block of high *p*-values. The increasing importance of industry effects after 1997 is shown more obviously in Chart 5-1. After 1997 the number of huge spikes falls and most are well below 0.10.

The dominant country effects and the increasing importance of the industry effects found in *F*-test *(CV)* are consistent with previous studies on stock returns. The finding that before February 1986 country factors were not as dominant as they were subsequently may be due to the number of country dummies. There are fewer country dummies than industry dummies in the early part of the sample, due to the different starting dates of data for the different markets. Before February 1986 only three countries appear in the sample: Malaysia, South Africa and South Korea.

As discussed in Chapter 3, the biggest difference between the results of *F*-test *(CV)* and *F*-test *($)* (nominal return in $US) is the number of months with insignificant country dummies during their respective second sub-samples. During this period, around 1% of months have insignificant country dummies in *F*-test *($)* while this percentage increases to 40.7% months in *F*-test *(CV)*. From March 1986 to October 1997, country dummies show some time-varying properties. From January 1988 to November 1991 and from December 1994 to August 1996, country dummies are insignificant in about 85% of months, suggesting the five further sub-divisions shown in Table 5-4.

Although the significance of country effects in *F*-test *(CV)* is not as strong as in *F*-test *($)*, its dominant role is still undeniable because of the even weaker industry effects. In *F*-test *(CV)*, none of the months has significant industry dummies.

During the third sub-period, the significance of industry effects in *F*-test *(CV)* is not as obvious as it is in *F*-test *($)*. However the increase in significance compared with their second sub-periods is not very large. The decrease in the number of months with insignificant industry dummies is similar in both *F*-test *(CV)* and *F*-test *($)*. Therefore the increased significance of the industry effect is very similar in both *F*-test *($)* and *(CV)* during the third sub-period.

Table 5-3 Conditional variance dummy variables model *F*-test (*CV*) results

		Industry dummies				Country dummies			
Sample period	Number of months	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)
08/84-02/86	19	31.6	26.3	42.1	100.0	21.1	5.3	73.7	100.0
03/86-10/97	140	0.0	0.0	100.0	100.0	55.7	3.6	40.7	100.0
11/97-07/04	81	45.7	13.6	40.7	100.0	100.0	0.0	0.0	100.0

The *F*-tests have been done separately for industry and country dummies in each month. Table 5-3 shows the percentage of significant and insignificant months during each sample period.

Table 5-4 Five sub-periods from March 1986 to October 1997 for country dummies

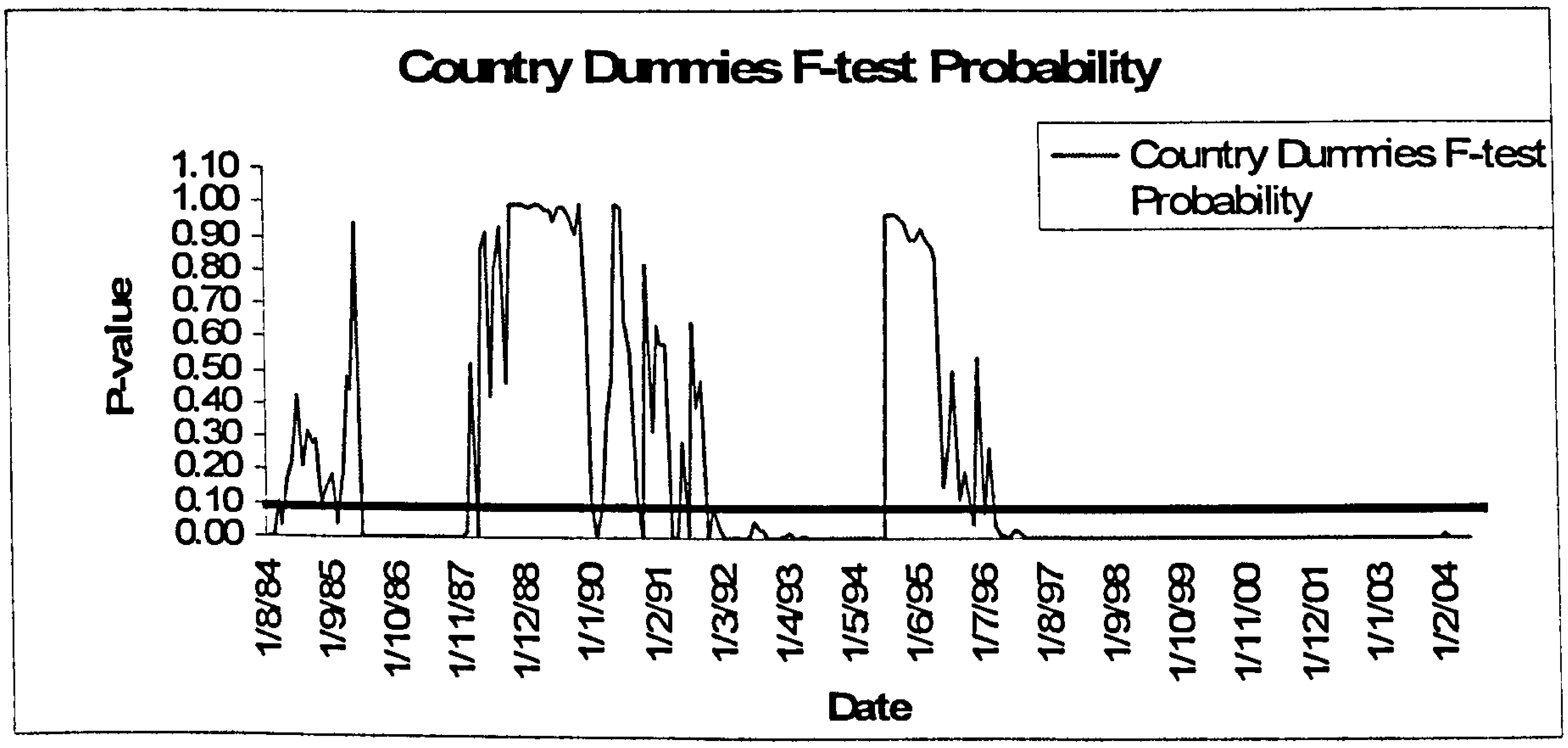
Sample period	Number of months	Sig. at 5% (%)	Sig. at 10% (%)	Insig. (%)	Total (%)
03/86-12/87	22	100.00	0.00	0.00	100.00
01/88-11/91	47	12.77	4.26	82.98	100.00
12/91-11/94	36	97.22	2.78	0.00	100.00
12/94-08/96	21	4.76	9.52	85.71	100.00
09/96-10/97	14	100.00	0.00	0.00	100.00

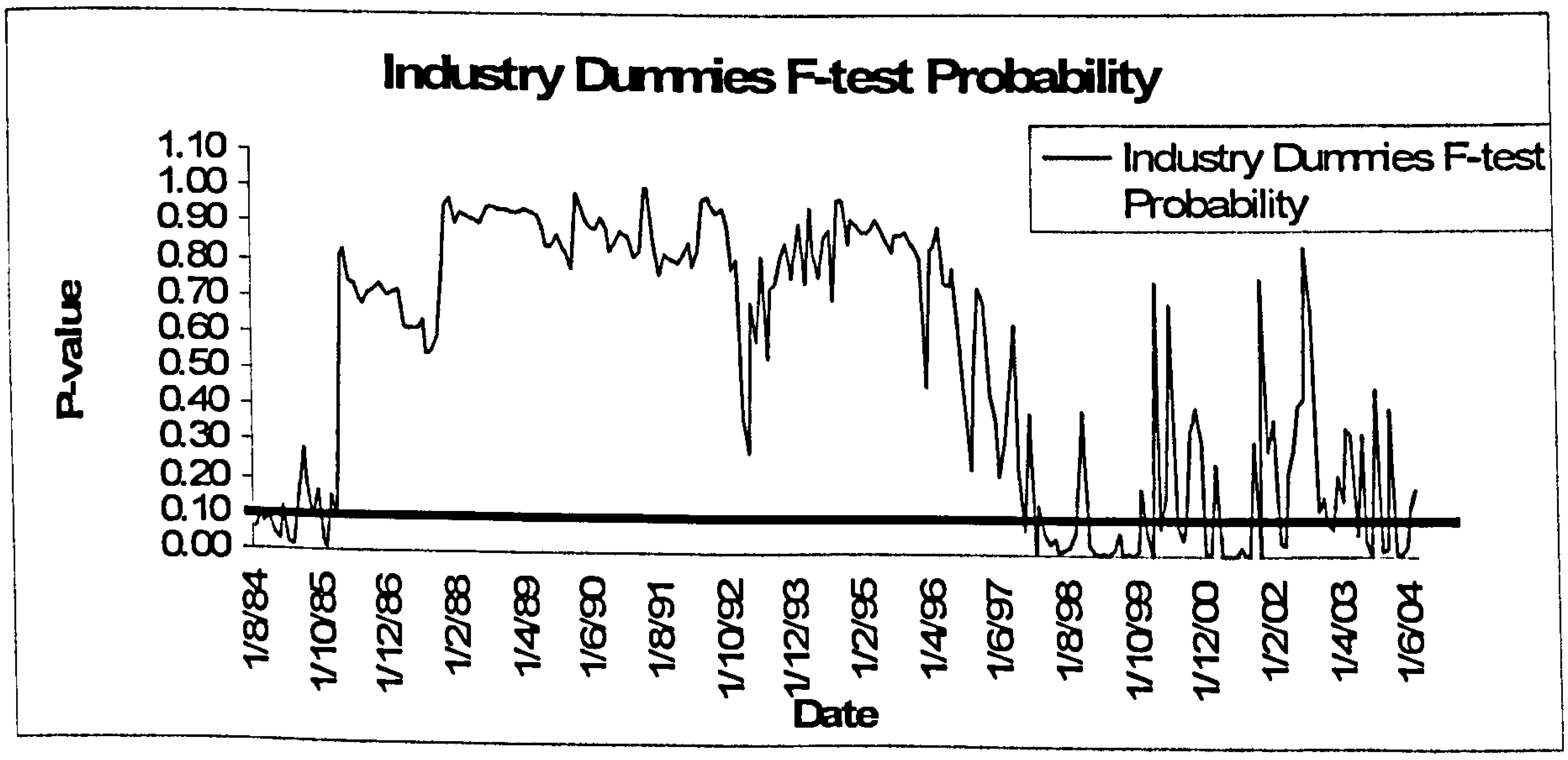
Notes:

1. Table 5-4 shows the percentage of months with significant and insignificant country dummies only during the second sub-period.

Chart 5-1 *F*-test (*CV*) probability of each month for conditional variance

Chart 5-1 shows probability values of the *F* statistics for both industry dummies and country dummies from August 1984 to July 2004. Before March 1986 most spikes of country dummy *p*-values are above 0.10 but the spikes for the industry dummies are mostly below 0.10. From March 1986 to October 1997 the insignificant industry effects are shown clearly by the block of high *p*-values. The increasing importance of industry effects after 1997 is shown more obviously in Chart 5-1.





5.5.2. Decomposition of conditional variance into industry and country components

5.5.2.1. Decomposition in the full sample period

Table 5-5 shows the decomposition results for the conditional variance for the full sample period. Panel A shows the decomposition of country conditional variance. Each country excess risk portfolio ($\Omega_k^{\$}$) is decomposed into the pure country effect ($\hat{\varphi}_k$) and the sum of 11 industry effects $\left(\sum_{j=1}^{J-1} p_{k,j}\hat{\phi}_j d_{i,j}\right)$. Panel B shows the decomposition of industry excess risk portfolio. Each industry excess risk portfolio ($\Omega_j^{\$}$) is decomposed into the pure industry effect ($\hat{\phi}_j$) and the sum of 13 country effects $\left(\sum_{k=1}^{K-1} p_{j,k}\hat{\varphi}_k c_{i,k}\right)$. Comparisons can be made both in absolute and relative terms. The main conclusion is that most of the cross-sectional variation in the country and industry conditional variances can be attributed to country-specific effects.

Table 5-5 shows sharply variable results. The standard deviations of pure country effects for Israel, Malaysia, South Korea, South Africa and Thailand are all relatively large (above 10), but those of the other 8 countries are both small (around 0.3 or less) and smaller than any individual pure industry effect. However, comparing the relative measures of pure country and industry effects gives a different picture. Each pure country effect can explain no less than 84% of the excess risk for any country. On the other hand, no pure industry effect can explain more than 30.4% of the excess risk in any industry. Even in the industry conditional variance portfolio, more variation is due to the sum of country effects (95.4%) than to pure industry effects (25.9%)[11]. The most important conclusion from this table is that country factors are more likely to play a significant role in explaining the cross-country correlations. The conditional variance decomposition results are very similar to those found for the decomposition of $US nominal returns.

[11] Note that the country and industry effects are not uncorrelated. As a result the variance of country effects and industry effects do not sum to one, due to the relatively small covariance between them.

5.5.2.2. Decomposition in three sub-sample periods

In section 5.5.1, *F*-tests *(CV)* identify three sub-sample periods during which the industry and country factors play different roles, very much in line with the results of *F*-tests *($)*. The two dividing dates (February 1986 and October 1997) are purely decided by examining the time series of *F*-statistics results. The first dividing date (February 1986) is the same as it is in *F*-test *($)* and is therefore explained in the same way. The second dividing date (October 1997) is seven months later than in *F*-test *($)*. Neither March 1997 nor October 1997 is far off the beginning of the 1997 East Asian Financial Crisis (which started in July 1997 in Thailand and South Korea). About half of the sampled countries were affected by the crisis. Therefore dividing dates given in *F*-tests *(CV)* also reflect the important economic events over the sample period.

Table 5-6 shows that, during the first sub-period, industry and country effects influence stock risks to almost the same degree. The average pure industry effect can explain about 97% of the industry excess risk. Similarly, on average about 100% of country excess risk can be explained by the pure country effects. During the second sub-period country effects are dominant. The average standard deviation of pure country effects is much higher than that of pure industry effects and on average around 100% of excess country risk is explained by pure country effects. On the other hand, only 25% of excess industry risk is explained by pure industry effects. The phenomenon that a few countries have extremely high standard deviations, while the rest are lower than the industry risk standard deviations, also appears here. However, as found during the whole sample period, all the relative measurements of pure country effects are much higher than any of pure industry effects. Therefore country effects are still dominant.

Table 5-5 Decomposition of conditional variance into country and industry effects

The table gives the standard deviation (SD) of the components of the country and industry conditional variance. Each country conditional variance is decomposed into a pure country effect and a sum of 11 industry effects. Each industry conditional variance is decomposed into the sum of 13 country effects and a pure industry effect. The ratio relative to the market gives the ratio of the SD of that component to the SD of the sum of that pure effect and the sum of the industry (country) effects.

Panel A	VW indices				Panel B	VW indices			
	Pure country effect		Sum of 11 industry effects			Sum of 13 country effects		Pure industry effect	
Country	St. Dev.	Ratio	St. Dev.	Ratio	Industry	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	0.302	1.198	0.009	0.036	IGS	9.620	0.696	4.201	0.304
Chile	0.240	1.154	0.004	0.019	CG	15.436	0.868	2.349	0.132
China	0.257	1.224	0.003	0.012	CS	7.166	0.767	2.182	0.234
India	0.238	1.148	0.002	0.012	BM	6.385	2.147	3.512	1.181
Israel	13.075	0.929	1.522	0.108	UT	16.181	0.892	1.960	0.108
Malaysia	16.179	0.904	1.722	0.096	HC	16.227	0.895	2.051	0.113
Mexico	0.229	1.099	0.005	0.024	TEC	16.198	0.888	2.051	0.112
Pakistan	0.256	1.218	0.003	0.016	TEL	16.180	0.895	1.974	0.109
South Africa	15.174	0.840	2.903	0.161	FI	14.650	0.779	4.159	0.221
South Korea	16.255	0.918	1.455	0.082	PHG	11.628	0.827	2.441	0.174
Taiwan	0.225	1.092	0.006	0.028	BI	13.513	0.843	2.518	0.157
Thailand	10.721	0.857	2.508	0.200					
Turkey	0.230	1.110	0.005	0.026					
Cross-country average	5.645	1.053	0.781	0.063	Cross-industry average	13.017	0.954	2.673	0.259

i. The pure country effect measures the average variance of firms in a country relative to firms that are in the same industry but located in a different country.
ii. The sum of the eleven industry effects represents the component of a country's variance that can be attributed to the difference between the industrial composition of its market and the industrial composition of the emerging markets.
iii. The pure industry effect measures the average variance of firms in an industry relative to firms which are located in the same country but belong to a different industry.
iv. The sum of the thirteen country effects represents the component of an industry's variance that can be attributed to the difference between the geographical composition of its index and the geographical composition of the emerging markets as a whole.

Table 5-6 Decomposition of conditional variance into country and industry effects in three sub-periods

Table 5-6 shows that during the first sub-period industry and country effects influence the stock risks to almost the same degree. During the second sub-period country effects are dominant. During the third sub-sample period country effects are still more important but the importance of industry effects increases.

	08.84-02.86				*03.86-10.97*				*11.97-07.04*			
	Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Brazil					0.412	1.264	0.011	0.035	0.015	1.011	0.003	0.216
Chile	-	-	-	-	0.322	1.186	0.004	0.015	0.008	0.882	0.003	0.319
China	-	-	-	-	0.368	1.336	0.003	0.009	0.006	0.958	0.002	0.352
India	-	-	-	-	0.318	1.175	0.003	0.011	0.007	0.953	0.002	0.217
Israel	-	-	-	-	16.366	0.892	1.983	0.108	0.035	1.014	0.003	0.076
Malaysia	0.002	0.717	0.001	0.467	21.092	0.904	2.244	0.096	0.027	0.993	0.002	0.078
Mexico	-	-	-	-	0.296	1.092	0.006	0.021	0.006	0.943	0.004	0.607
Pakistan	-	-	-	-	0.360	1.312	0.004	0.013	0.007	0.933	0.002	0.279
S. Africa	0.003	1.013	0.001	0.217	19.798	0.840	3.784	0.161	0.007	1.003	0.002	0.324
S. Korea	0.001	1.270	0.001	1.142	21.190	0.918	1.896	0.082	0.033	1.034	0.002	0.054
Taiwan	-	-	-	-	0.289	1.080	0.006	0.024	0.010	1.016	0.003	0.339
Thailand	-	-	-	-	13.668	0.836	3.276	0.200	0.004	0.892	0.002	0.370
Turkey	-	-	-	-	0.298	1.104	0.007	0.025	0.033	1.009	0.003	0.078
Average	0.002	1.000	0.001	0.609	7.291	1.072	1.017	0.062	0.015	0.972	0.002	0.255
	Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect	
Industry	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
IGS	0.001	0.788	0.002	1.241	12.539	0.696	5.480	0.304	0.004	0.627	0.005	0.833
CG	0.001	0.208	0.002	0.914	20.126	0.868	3.062	0.132	0.002	0.598	0.003	0.758
CS	0.001	0.177	0.004	1.086	9.348	0.768	2.843	0.234	0.003	0.518	0.005	0.915
BM	0.002	0.640	0.002	0.606	8.333	2.144	4.577	1.177	0.004	0.657	0.004	0.680
UT	0.002	0.882	0.001	0.273	21.096	0.892	2.554	0.108	0.009	1.153	0.005	0.588
HC	0.001	0.595	0.002	1.020	21.156	0.896	2.472	0.105	0.011	0.881	0.006	0.508
TEC	0.001	0.713	0.002	1.423	21.118	0.888	2.673	0.112	0.006	0.720	0.007	0.853
TEL	-	-	-	-	21.094	0.895	2.470	0.105	0.005	0.896	0.002	0.365
FI	0.001	0.399	0.003	1.133	19.101	0.779	5.420	0.221	0.010	0.580	0.016	0.947
PHG	0.001	0.683	0.002	0.992	15.149	0.827	3.183	0.174	0.006	0.775	0.009	1.093
BI	0.001	0.160	0.005	1.015	17.616	0.843	3.284	0.157	0.002	0.247	0.009	0.971
Average	0.001	0.524	0.003	0.970	16.971	0.954	3.456	0.257	0.006	0.696	0.006	0.774

During the third sub-sample period country effects are still more important but the importance of industry effects increases. The average standard deviation of pure country effects is 0.015, which is much larger than that of the sum of industry effects (0.002).

On the other hand, the amount of variation in industry excess risk explained by pure industry effects increases from 25% in the second sub-period to 77%, while the amount of variation explained by the sum of country effects decreases from 95% to 69%. Pure industry effects are almost as important as the sum of country effects in the third sub-period, so that industry effects could be considered as 'catching up' with the dominant country effects after 1997. The conditional variance decomposition results are in line with the *F*-test results and show more details of the time-varying properties in the relative importance of country and industry effects. Most of the findings are very close to those found in the returns decomposition.

5.5.3. Mean Standard Deviation estimation for conditional variance model

Chart 5-2 plots the industry and country MADs of the decomposition of the conditional variance for the full sample and three sub-periods. Clearly, country MAD values are much higher than industry MAD values. The main conclusion is that the size of the country effect is much larger than that of the industry effect in these two decades. Furthermore these MADs are much higher than the MADs of the decomposition of $US nominal returns (country MADs up to 7, Industry MADs up to 1.4).

As in the case of other MADs in Chapters 3 and 4, the country (industry) MADs in the three sub-periods have been plotted separately.

In the top right figure of Chart 5-2 it can be seen that country effects and industry effects overtook each other during the first sub-period. This suggests that both country and industry effects have similar influence on the variation in stock risks. However the MAD of industry effects is more often higher than the MAD of country effects – perhaps explained by the limited number of available countries during this period. However the MAD values here are up to 0.008 for both country and industry effects, which are much smaller than those of the decomposition of $US nominal returns (up to 0.06).

From March 1986 to October 1997, because of the big difference in the value of country and industry MADs, two y-axes with different scales have been used. The country effects are clearly dominant. The second sub-period MAD is very similar to the whole sample MAD. Since it is the longest sub-period, its big influence on the whole sample period is not a surprise.

The bottom right figure shows that the distance between the two MADs decreases during the third sub-period. The MADs of industry effects are catching up with the decreased MADs of country effects and are even occasionally higher towards the end of the sample period. However the country MADs are higher most of the time and therefore still show the dominant country effect. The values here are up to 0.04 for both country and industry MADs, which are smaller than those of the decomposition of $US nominal returns. In the latter case, these are up to 0.08 (industry MAD) or 1.2 (country MAD).

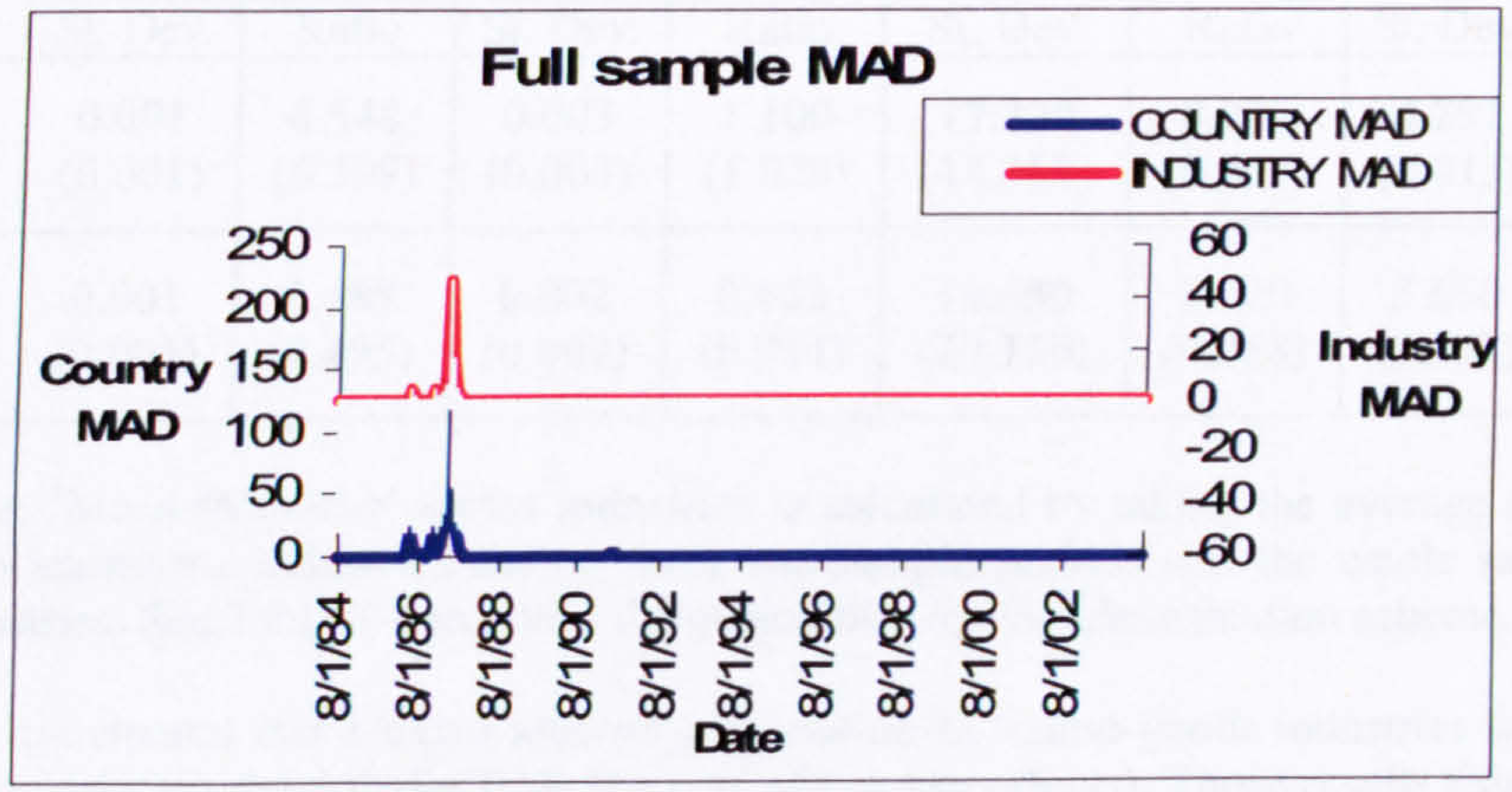
5.5.4. Traded goods industry vs. non-traded goods industry

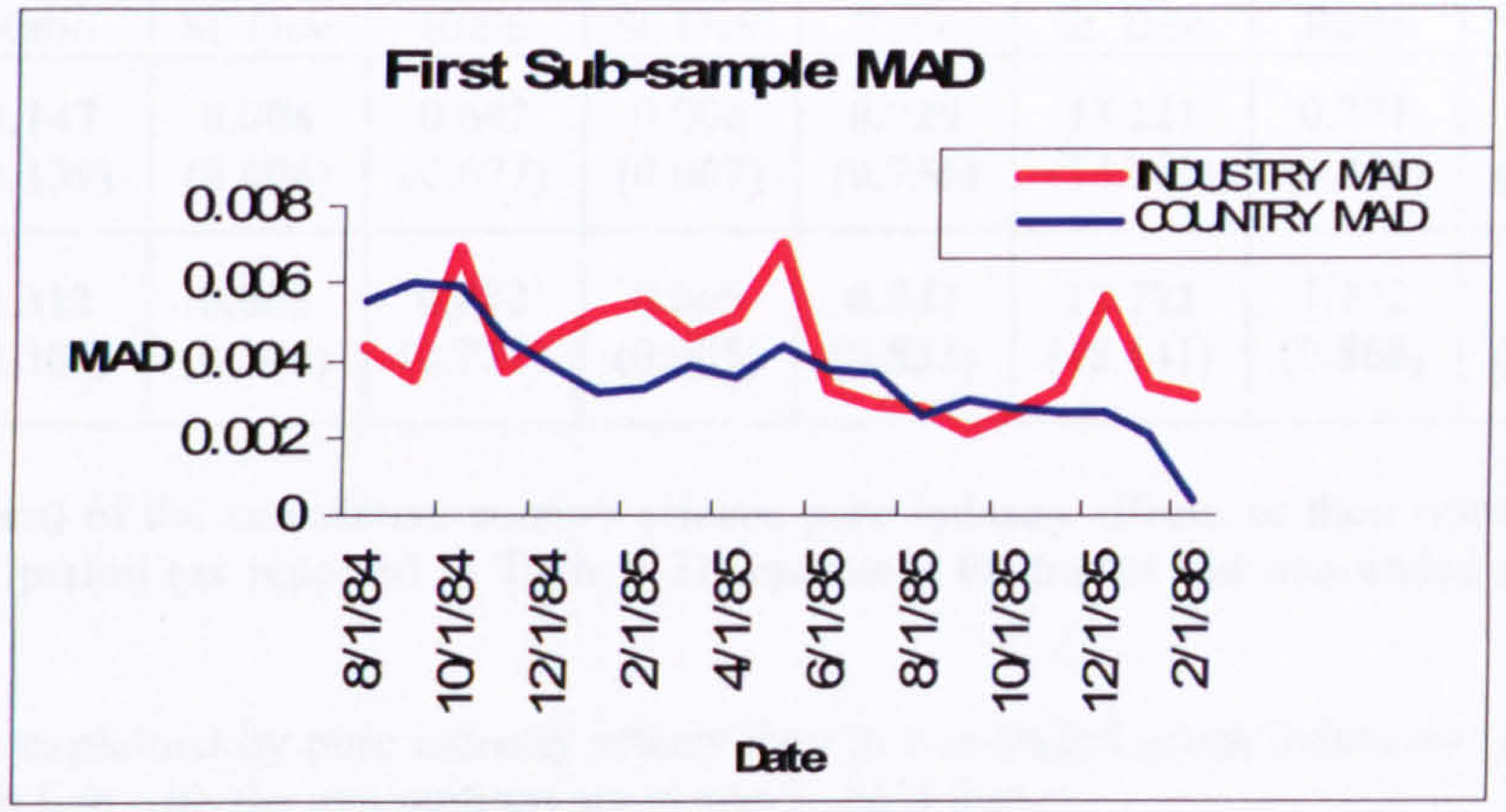
Following Chapter 3, the means (medians) SDs of the excess risk components of traded-goods and non-traded goods industry groups and their respective ratios are reported in Table 5-7. They have been calculated for three sub-sample periods and the whole sample period. Those results that are in line with expectations are shown in bold font. Some results confirm that traded-goods industries on average have higher industry effects and that a smaller proportion of the variation is explained by sum of country effects. Most of these results appear in the whole sample and the second sub-sample periods.

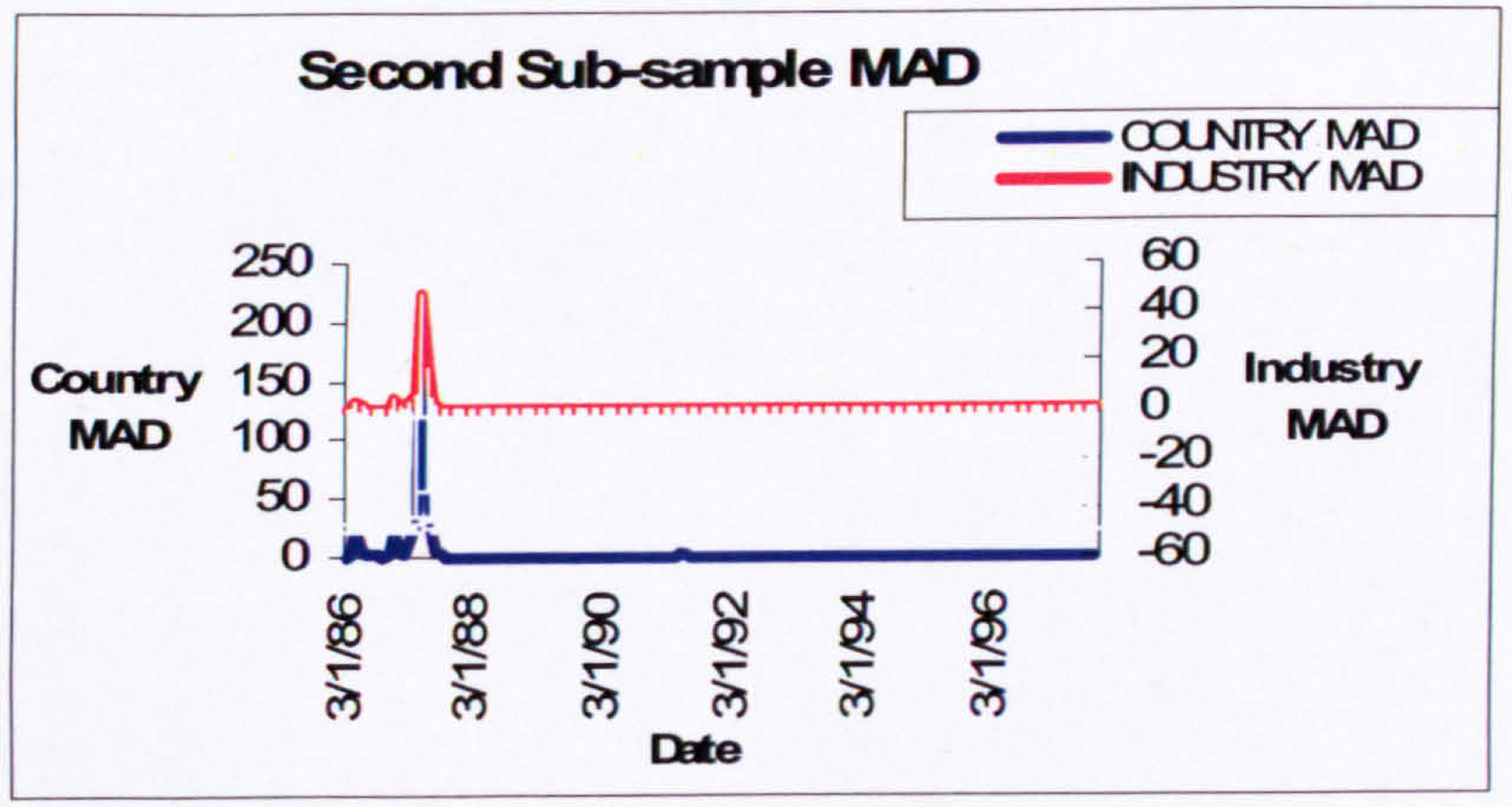
From August 1984 to February 1986, as expected, the mean ratio of the sum of country effects (0.548) in the non-traded-goods group is higher that of the traded-goods group (0.489) but the difference is fairly small. However all the other measurements are opposite to expectations.

Chart 5-2 Mean Absolute Deviation estimation for conditional variance

Chart 5-2 plots the industry and country MADs. These are the MAD of the whole sample period and MADs for the three sub-sample periods. In general the MAD results support the *F*-tests results by measuring the SIZES of country and industry effects. The main conclusion is that the country MAD is much higher than the industry MAD.







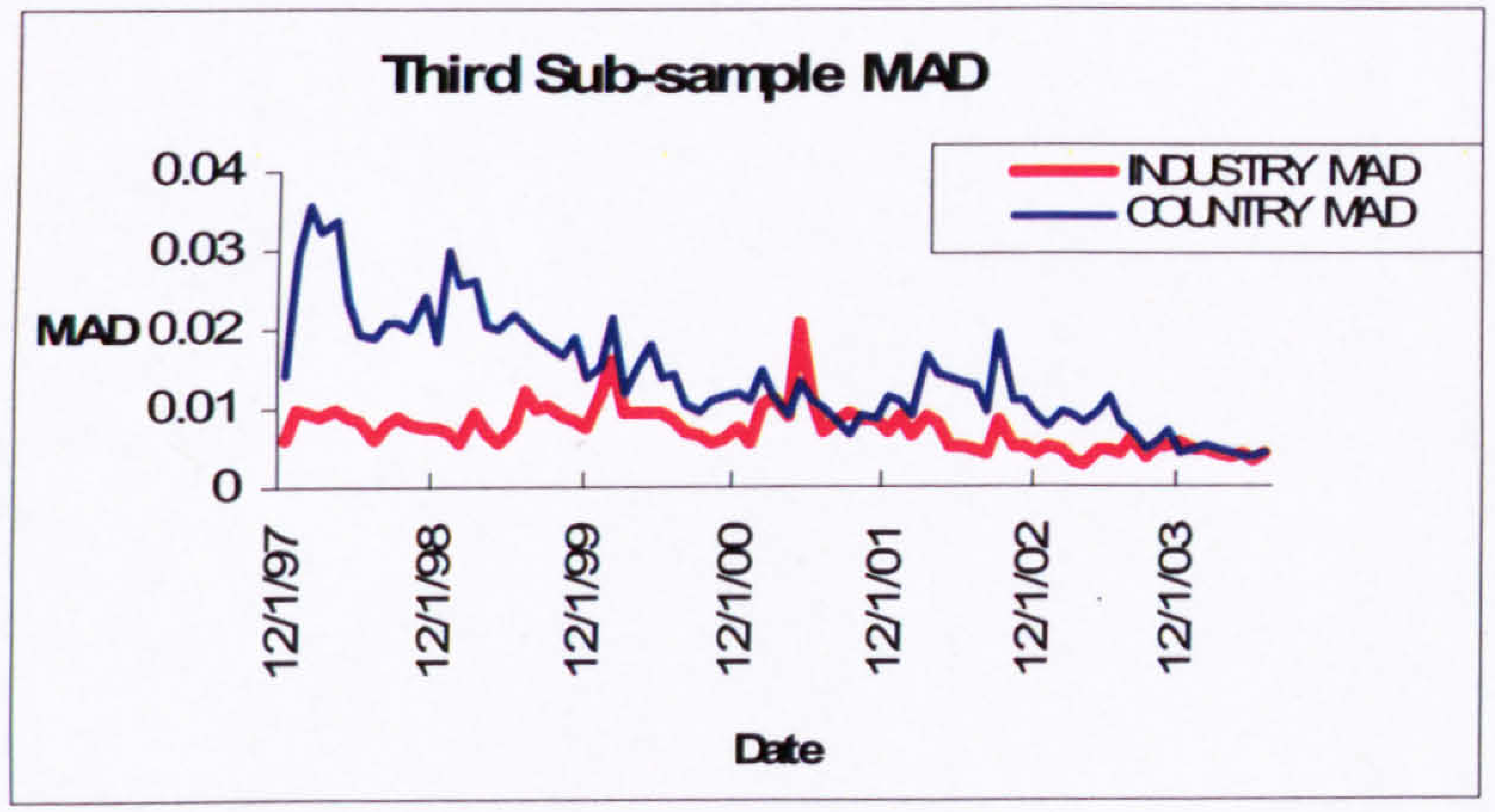


Table 5-7 Examination of industry effects for traded and non-traded goods industries (conditional variance decomposition)

Mean (Median)	08.84—02.86				03.86-10.97				11.97-07.04				08.84—07.04			
	Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect	
	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Non-traded goods	0.001 (0.001)	**0.548** (0.399)	0.003 (0.003)	1.100 (1.020)	**17.230** (18.360)	0.771 (0.835)	**3.292 (3.013)**	**0.147 (0.139)**	**0.006 (0.006)**	0.642 (0.677)	0.008 (0.007)	**0.729 (0.756)**	**13.221** (14.081)	0.771 (0.835)	**2.539 (2.312)**	**0.148 (0.139)**
Traded goods	0.001 (0.001)	**0.489** (0.495)	0.002 (0.002)	0.883 (0.914)	**16.650** (20.130)	1.720 (0.868)	**3.650 (3.062)**	**0.312 (0.304)**	**0.005 (0.004)**	0.882 (0.721)	0.005 (0.005)	**0.841 (0.833)**	**12.772** (15.441)	1.722 (0.868)	**2.802 (2.349)**	**0.313 (0.304)**

Note: 'Mean (Median)' across industries is calculated by taking the average (median) of the cumulative country effects, pure industry effects, or their respective ratio across the industries during three sub-sample periods and the whole sample period (as reported in Table 5-3) separately for traded and non-traded goods industries. See Table 3-6 in return decomposition for the classification scheme.

It is anticipated that a larger amount of variation in traded-goods industries will be explained by pure industry effects than in non-traded goods industries (where more variation should arise from the sum of country effects). Those results that are in line with the assumptions are shown in bold font.

The results in the second sub-period are much more promising than in the first. Most of the results are as expected. For example, the mean (median) ratio of pure industry effects for non-traded goods industries is 0.147 (0.139), which is lower than the mean (median) ratio of 0.312 (0.304) of the pure industry effects for traded-goods industries.

During the third sub-period, the results are again mixed. The mean (median) ratio of pure industry effects and the mean (median) standard deviation of the sum of country effects are in line with expectations while other measurements are opposite to expectations.

The results of the whole sample period largely reflect those of the second-period. Most measurements are in line with predictions. For example, the mean (median) ratio of pure industry effects in the non-traded goods group (14.8 and 13.9) is smaller than the mean (median) ratio of pure industry effects in traded goods group (31.3 and 30.4). The exceptions are the ratios and part of the standard deviation results of the sum of the country effects.

To summarize, the hypotheses are generally supported in the third sub-sample and the whole sample period, although differences between the traded and non-traded groups are fairly small. As was the case for the returns decomposition in section 3.4.4, this kind of confusing phenomenon may be explained by (i) industry groups being more coarsely defined, (ii) exchange rates being less changeable than other industry-common shocks over a long time horizon, or (iii) the difficulties in obtaining statistically significant and economically meaningful exchange rate exposure estimations.

5.5.5. *F*-test *(CSD)* on conditional standard deviation model dummy variables

Table 5-8 and Chart 5-3 show the results of *F*-tests on the conditional standard deviation dummy variable regressions (equation 5.16). This set of tests is referred to in Table 5-8 as *F*-tests *(CSD)* in order to distinguish them from tests using conditional variance (referred to as *F*-tests *(CV)* in section (5.5.1). The *F*-test results are presented in the same way as *F*-test *(CV)*.

Table 5-8 shows that from August 1984 to February 1986 both industry and country effects have significant influence on returns because there are similar numbers of months with significant industry and country dummies. However country effects play a slightly more important role: 84.3% months have country dummies significant at 5% or better whereas 73.7% months have similarly significant industry dummies.

In *F*-test *(CSD)*, the number of months with insignificant country dummies is 57.9% less than that in *F*-test *(CV)*. It seems that the importance of the country effects is more obvious in *F*-test *(CSD)*.

As in other *F*-tests, March 1986 is the first obvious dividing date mainly due to the difference in industry dummies. The number of months with insignificant industry dummies increases from 26.3% to 93.3% after March 1986.

In *F*-test *(CV)*, from March 1986 to October 1997 industry effects seem to have no influence at all on stock risk, while in *F*-test *(CSD)* both country and industry effects show more impact on stock risks – in particular, 36.5% more months have significant country effects.

April 1996 is an obvious dividing date between the second and the third sub-periods in *F*-test *(CSD)* because virtually all country and industry dummies are significant at 5% or better from this date until the end of the sample period. Therefore in *F*-test *(CSD)* country factors are still playing a dominant role but industry factors almost play the same important role as country factors since the middle of 1996. In comparison, in *F*-test *(CV)* industry dummies are insignificant in about 40.7% of months during the third sub-period.

Chart 5-3 shows probability values of the *F* statistics for both industry and country dummies from August 1984 to July 2004. What is observed in the *F*-test *(CSD)* statistic table (Table 5-8) is shown in Chart 5-3 more directly. Clearly, before March 1986 most spikes of country dummy *p*-values are below 0.10 but the spikes of industry dummy *p*-values are above 0.10 half of the time. From March 1986 to March 1996 the insignificant industry effects are shown clearly by the large spikes of high *p*-value. In *F*-test *(CSD)*, there are 4.2% months with insignificant country dummies, which is much lower than those in *F*-test *(CV)*. Furthermore, unlike *F*-test *(CV)*, the second sub-period in *F*-test *(CSD)* does not show five different periods for country dummies. It is also unquestionable that after March 1996 almost all the *p*-values of the industry dummies are well below 0.10. The increasing importance of industry effects after 1996 is shown more obviously in Chart 5-3.

There are also differences between results of *F*-test *(CSD)* and those of *F*-test *($)* for all three sub-periods. During the first sub-period country effects are less important than industry effects in *F*-test *($)* since there are around 26.3% more months with insignificant country dummies than with insignificant industry dummies (Table 3-13 in Chapter 3). The second sub-period of *F*-test *(CSD)* is 12 months shorter than that of *F*-test *($)*. However there are 28.6% more months with insignificant industry dummies. The dominant country effects are even more obvious in *F*-test *(CSD)*. During the third sub-period, in *F*-test *(CSD)*, industry effects are almost as important as country effects. The increasing importance of industry effects is even more obvious than in *F*-test *($)*.

In general, the dominant country effects and the increasing importance of industry effects that have been found in stock return studies have been further confirmed from the point of view of stock risks.

Table 5-8 Dummy variables model *F*-test *(CSD)* results for standard deviation

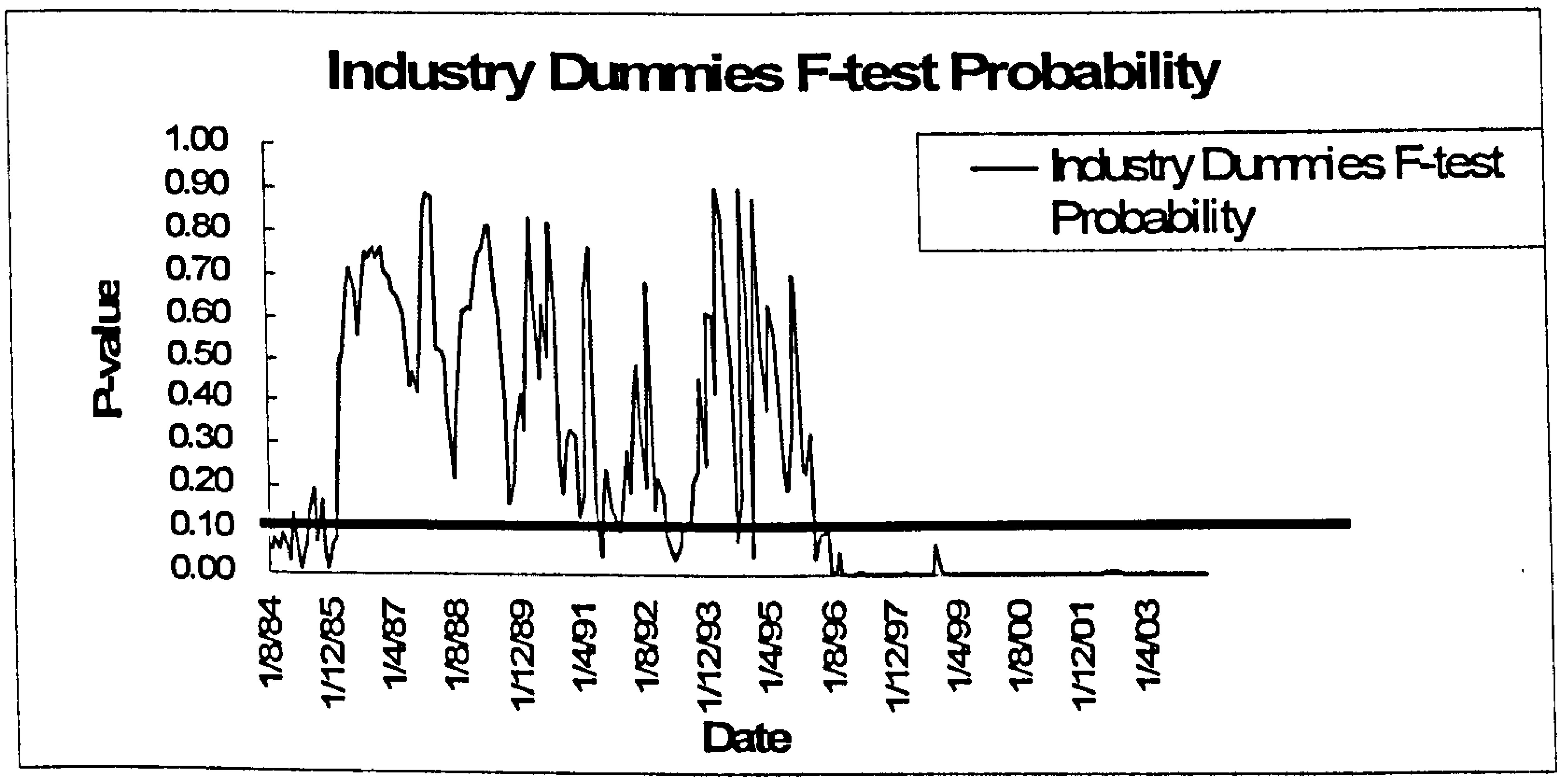
	Industry dummies					Country dummies			
Sample period	Number of months	Sig. at 5%	Sig. at 10%	Insig.	Total	sig. at 5%	sig. at 10%	Insig.	Total
08/84-02/86	19	21.1	52.6	26.3	100.0	63.2	21.1	15.8	100.0
03/86-03/96	120	3.3	3.3	93.3	100.0	95.0	0.8	4.2	100.0
04/96-07/04	101	96.1	3.9	0.99	100.0	100.0	0.0	0.0	100.0

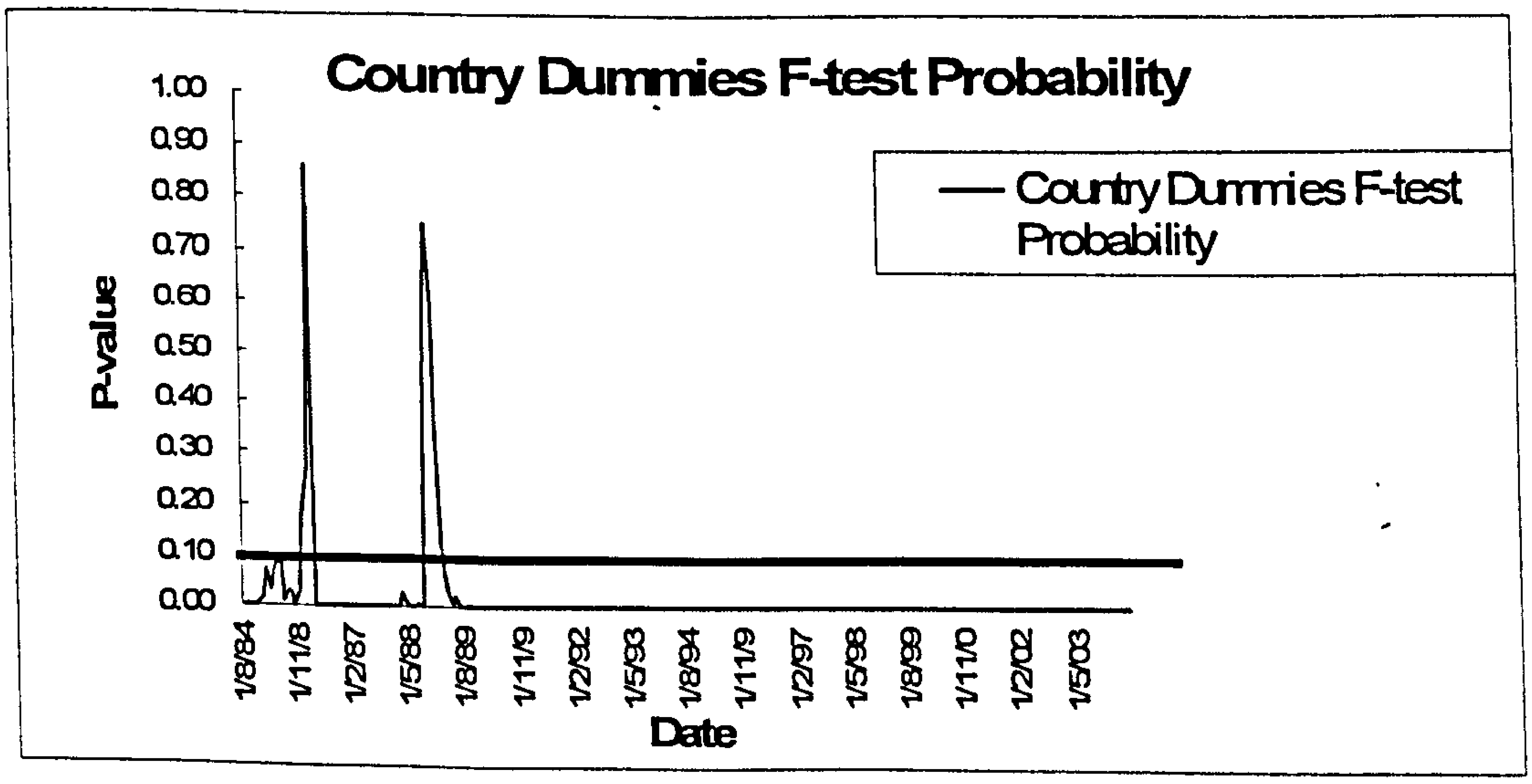
1. The *F*-tests have been done separately for industry and country dummies in each month.

Table 5-8 shows the percentage of significant and insignificant months during each sample period. From August 1984 to February 1986, both industry and country effects have significant influences on returns Country effects play the dominant role in explaining the stock risk variation during the second sub-period. but industry factors almost play the same important role as country factors since the mid of 1996.

Chart 5-3 *F*-test *(CSD)* probabilities of each month for conditional standard deviation

Chart 5-3 shows probability values of the *F*-test *(CSD)* for both industry dummies and country dummies from August 1984 to July 2004. The dominant country effects and the increasing importance of industry effects that have been further confirmed from the point of view of stock risks.





5.5.6. Decomposition of conditional standard deviation into industry and country components

5.5.6.1. Decomposition in the full sample period

Table 5-9 shows the decomposition results of conditional standard deviation during the full sample period, with country decomposition in Panel A. The results are presented in the same way as other decompositions in Chapters 3 and 4. Comparisons have also been made both for absolute and relative measures. The main conclusion is that most of the variation in country and industry risk, as measured by the conditional standard deviation, can be attributed to country-specific effects. Table 5-9 shows that during the full sample period (August 1984 to July 2004) the average standard deviation of pure country effects is higher than that of the pure industry effects. Almost all the country conditional standard deviation is explained by pure country effects, whereas only 23.7% of variation in industry conditional standard deviation is explained by pure industry effects. On the whole, the decomposition of conditional standard deviation shows that country effects play the major role in explaining the cross-sectional variation.

In the case of conditional variance decomposition, it is noticeable that most of the pure country effect standard deviations are smaller than any of the pure industry effect standard deviations. However this phenomenon disappears when the standard deviation dummy variable model is used – most of the standard deviations of the pure country effects are larger than those of the pure industry effects.

The results from using the conditional standard deviation are in general very similar to the analysis for $US nominal returns but the dominant country effects are even stronger. On average the variation in country returns explained by pure country effects is marginally less than the variation in country conditional standard deviation explained by pure country effects. This is also confirmed by the weaker industry effects in the country conditional standard deviation decomposition.

Table 5-9 Decomposition of conditional standard deviation into country and industry effects

The table gives the standard deviation (SD) of the components of the value-weighted country and industry conditional standard deviation. Each country conditional standard deviation is decomposed into a pure country effect and a sum of 11 industry effects. Each industry conditional standard deviation is decomposed into the sum of 13 country effects and a pure industry effect. The ratio relative to the market gives the ratio of the SD of that component to the SD of the sum of that pure effect and the sum of the value weighted industry (country) effects.

	VW indices					VW indices			
	Pure country effect		Sum of 11 industry effects			Sum of 13 country effects		Pure industry effect	
Country	St. Dev.	Ratio	St. Dev.	Ratio	Industry	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	0.086	1.074	0.007	0.091	IGS	0.265	0.721	0.105	0.286
Chile	0.077	1.111	0.006	0.088	CG	0.406	0.869	0.062	0.133
China	0.072	1.156	0.005	0.080	CS	0.183	0.773	0.056	0.237
India	0.080	1.133	0.003	0.043	BM	0.165	1.792	0.091	0.993
Israel	0.355	0.927	0.043	0.111	UT	0.424	0.903	0.049	0.105
Malaysia	0.425	0.906	0.046	0.098	HC	0.420	0.896	0.051	0.108
Mexico	0.075	1.083	0.005	0.070	TEC	0.418	0.873	0.064	0.134
Pakistan	0.083	1.209	0.005	0.066	TEL	0.423	0.888	0.059	0.124
South Africa	0.402	0.844	0.075	0.158	FI	0.427	0.816	0.104	0.198
South Korea	0.426	0.916	0.040	0.086	PHG	0.409	0.871	0.063	0.134
Taiwan	0.064	1.061	0.008	0.129	BI	0.381	0.852	0.068	0.153
Thailand	0.703	1.018	0.060	0.087					
Turkey	0.227	1.090	0.004	0.021					
Cross-country average	0.236	1.041	0.024	0.087	Cross-industry average	0.356	0.932	0.070	0.237

i. The pure country effect measures the average variance of firms in a country relative to firms that are in the same industry but located in a different country.
ii. The sum of the eleven industry effects represents the component of a country's variance that can be attributed to the difference between the industrial composition of its market and the industrial composition of the emerging markets.
iii. The pure industry effect measures the average variance of firms in an industry relative to firms which are located in the same country but belong to a different industry.
iv. The sum of the thirteen country effects represents the component of an industry's variance that can be attributed to the difference between the geographical composition of its index and the geographical composition of the emerging markets as a whole.

5.5.6.2. Decomposition in three sub-sample periods

In section 5.5.5, *F*-tests *(CSD)* show the general picture of time-varying properties of the country and industry effects. In line with the results of *F*-tests *(CV)* and *($)*, *F*-tests *(CSD)* identify three sub-periods during which the industry and country factors play different roles. The first dividing point, March 1986, is the same as all the other *F*-tests. The second dividing date, April 1996, is the same as in *F*-test *(LC)*. The explanations in section 4.4.2.2. also apply here. In particular, April 1996 may reflect the fact that, of the sampled countries which were going to be affected in the 1997 East Asian Financial Crisis, about half were aware of the potential crisis 12 months beforehand. In *F*-test *(LC)* after the removal of exchange rate, April 1996 appears to be the starting point of the third sub-sample period. It may suggest that investors who consume in the local currencies of these stock markets had already included their concerns on the potential crisis in their investment decisions. The same dividing date appears in *F*-tests *(CSD)*, which may suggest that concerns about the potential crisis had already been considered in stock risks even though they were yet not reflected in stock returns.

Table 5-10 shows that during the first sub-period pure country effects explain 97% of the variation in country conditional standard deviations, which is much higher than the percent explained by pure industry effects. However about 40% of the variation in industry conditional standard deviations can be attributed to the sum of the country effects, which is only slightly higher than the amount explained by the pure industry effects (34.5%). Therefore country effects are dominant in explaining variation in country conditional standard deviations but not in explaining variation in industry conditional standard deviations.

As for the conditional variance, during the second sub-period country effects are more obviously dominant. The average standard deviation of the pure country effects is much higher than that of the pure industry effects. Almost all the variation in country conditional standard deviation is explained by pure country effects furthermore, 93.1% of the variation in excess industry conditional standard deviation is explained by the sum of country effects.

Similar to the *F*-test results, the dominant country effects during the second sub-period are even more obvious in the conditional standard deviation decomposition than in the case of $US nominal returns. On average about 93% of the variation in excess country returns is explained by pure country effects, increasing to 100% in the case of the conditional standard deviation decomposition.

During the third sub-period country effects are still more important but, compared with the second sub-period, the importance of the industry effects has undeniably increased. On average, the amount of variation in industry conditional standard deviation explained by pure industry effects increases from 23.5% to 50.4%. On average, the amount of variation in country conditional standard deviations explained by the sum of industry effects has increased 11.4%. What has been revealed in the conditional standard deviation decomposition is in line with *F*-test *(CSD)* results but the 'catch-up' of industry effects is not as obvious as in the *F*-tests.

The catching-up of industry effects in the conditional standard deviation case does not appear as strong as in the conditional variance case. On average, the variation in industry conditional variance explained by pure industry effects (77.4%) decreases to 50.4% in the conditional standard deviation case. At the same time, the variation of industry conditional variance explained by the sum of country effects is higher than in the conditional standard deviation case. When *F*-test *($)* is compared with *F*-test *(CSD)*, the industry effects appear to be much stronger in the latter, however the opposite result appears in the decomposition results.

In general, there are some slight differences in the increasing importance of industry effects but the dominant country effects and the general increase in the importance of industry effects have been confirmed again from the point of view of the conditional standard deviation.

5.5.7. Mean Absolute Deviation estimation for the conditional standard deviation model

The Mean Absolute Deviation (MAD) estimation is applied to the pure industry effect $\theta_{j,t}$ and to the pure country effect $\vartheta_{k,t}$ from the decomposition of conditional standard deviation to measure the size of the pure industry and country effects. It is presented in the same way as the MADs in Chapters 3 and 4.

Chart 5-4 plots the industry and country MADs for value-weighted risks. The chart contains four figures – for the sample period as a whole and the three sub-sample periods. In general the MAD results support the *F*-test results by measuring the sizes of country and industry effects. The main conclusion is that country MAD is much higher than the industry MAD, especially after early 1986.

The top left figure shows the MAD of the full sample period. On the whole, country effects still play the dominant role in explaining the variation of conditional standard deviation because the sizes of country effects (the MADs) are larger than that of industry effects (the MADs). However the sizes of country and industry effects in the conditional standard deviation case are much smaller than those of the conditional variance.

Similar to other MAD calculations, one plot does not show the details of variations very well, so industry and country MADs in the three sub-sample periods have also been plotted separately.

In top right figure, before February 1986, country effects MADs are mostly higher but gradually the two MADs approach each other (at the very end of the first sub-period the industry MAD becomes slightly higher than the country MAD). Therefore it is again shown that both effects influence the variation in stock risk but that country effects generally dominate in terms of size as well.

Table 5-10 Decomposition of excess conditional standard deviation into country and industry effects in three sub-periods

Country effects are dominant in explaining variation in country conditional standard deviations. The dominant country effects during the second sub-period are even more obvious. During the third sub-sample period country effects are still more important but the importance of the industry effects has undeniably increased.

	08.84-02.86				*03.86-03.96*				*04.96-07.04*			
	Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects		Pure country effect		Sum of 11 industry effects	
Country	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Brazil	-	-	-	-	0.110	1.044	0.006	0.055	0.017	0.950	0.006	0.304
Chile	-	-	-	-	0.112	1.179	0.004	0.043	0.014	0.814	0.006	0.323
China	-	-	-	-	0.110	1.414	0.004	0.049	0.023	0.897	0.004	0.167
India	-	-	-	-	0.112	1.174	0.003	0.032	0.015	0.927	0.003	0.197
Israel	-	-	-	-	0.465	0.894	0.057	0.109	0.027	0.912	0.006	0.218
Malaysia	0.013	0.912	0.003	0.183	0.572	0.902	0.064	0.101	0.049	0.986	0.004	0.079
Mexico	-	-	-	-	0.105	1.094	0.004	0.040	0.012	0.935	0.004	0.283
Pakistan	-	-	-	-	0.129	1.367	0.003	0.029	0.017	0.992	0.004	0.247
S. Africa	0.025	0.987	0.002	0.063	0.541	0.842	0.103	0.161	0.015	0.967	0.003	0.195
S. Korea	0.010	1.011	0.002	0.218	0.570	0.915	0.055	0.088	0.049	1.020	0.003	0.065
Taiwan	-	-	-	-	0.086	1.081	0.004	0.045	0.021	0.954	0.005	0.245
Thailand	-	-	-	-	0.910	0.989	0.084	0.091	0.233	1.001	0.002	0.009
Turkey	-	-	-	-	0.106	1.076	0.003	0.031	0.299	0.999	0.005	0.017
Average	0.016	0.970	0.002	0.155	0.302	1.075	0.030	0.067	0.061	0.950	0.004	0.181
	Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect	
Industry	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
IGS	0.010	0.928	0.002	0.592	0.356	0.717	0.144	0.290	0.012	0.861	0.005	0.393
CG	0.004	0.577	0.002	0.632	0.557	0.868	0.085	0.133	0.017	0.925	0.006	0.301
CS	0.004	0.491	0.004	1.112	0.252	0.774	0.077	0.236	0.012	0.848	0.006	0.441
BM	0.018	0.850	0.002	0.290	0.229	1.792	0.126	0.984	0.015	0.836	0.007	0.376
UT	0.013	1.110	0.001	0.715	0.578	0.900	0.068	0.106	0.013	0.801	0.009	0.532
HC	0.010	0.028	0.002	0.019	0.575	0.894	0.070	0.110	0.013	0.708	0.009	0.478
TEC	0.010	0.018	0.002	0.017	0.574	0.877	0.083	0.126	0.015	0.936	0.010	0.619
TEL	-	-	-	-	0.575	0.885	0.079	0.121	0.010	0.802	0.009	0.739
FI	0.003	0.013	0.003	0.030	0.598	0.816	0.144	0.197	0.022	0.891	0.014	0.563
PHG	0.010	0.044	0.002	0.026	0.566	0.873	0.085	0.132	0.014	0.876	0.011	0.684
BI	0.004	0.007	0.005	0.015	0.530	0.852	0.094	0.151	0.023	1.062	0.009	0.420
Average	0.009	0.407	0.003	0.345	0.490	0.931	0.096	0.235	0.015	0.868	0.009	0.504

During the first sub-period, the MADs of conditional variance are very similar to the MADs of $US nominal returns. In both cases the relative sizes of the country and industry MADs change throughout the first sub-period and neither is dominant. On the other hand, country effects appear to be relatively more important than industry effects in the conditional standard deviation case. According to the scale, it appears that the MADs of conditional standard deviation are similar to those of $US nominal returns but much larger than those of conditional variance.

From March 1986 to March 1996, the country effects are clearly dominant. The country MAD has much higher values during this period. Similar to the MAD for the whole sample, the sizes of country and industry MADs of conditional standard deviation are much smaller than those of conditional variance. However the dominant position of country effects is still the same.

From April 1996 to July 2004 the difference between the two MADs increases from late 1997 until late 1999 but then decreases again (almost disappearing by the end of the sample period). The country MAD value gets smaller while the industry MAD value increases. This shows that industry effects are catching up in terms of size and even occasionally overlap with country effects. However the country MADs still have higher values most of the time, which still shows the dominant country effect.

The sizes of country and industry effects (MADs) in ascending order are: conditional variance, conditional standard deviation and $US nominal returns.

So far all the methods that have been used confirm that from August 1984 to July 2004 country effects are the dominant source of variation in risk. Since the late 1990s, industry factors have been catching up with country factors, becoming more and more important. These results support those found for stock returns.

5.5.8. Traded goods industry vs. non-traded goods industry

The mean (median) standard deviations of the excess risk (standard deviation) components of traded-goods and non-traded goods industries and their respective ratios are reported in Table 5-11 for the three sub-periods and the overall sample. As in Chapter 3, those results that are in line with the expectations are shown in bold font.

Generally speaking, most of the results in Table 5-11 confirm that pure industry effects have contributed more to the variation in the traded-goods group and the sum of country effects have explained more variation in the non-traded goods group both in terms of the absolute and relative measures.

From August 1984 to February 1986, most of the results are in line with expectations. For instance, the mean (median) ratio of the pure industry effects for non-traded goods industries is 0.158 (0.143), which is lower than the mean (median) ratio of the pure industry effects for traded goods industries, 0.310 (0.290). The only exception is the mean (median) standard deviation of pure industry effects.

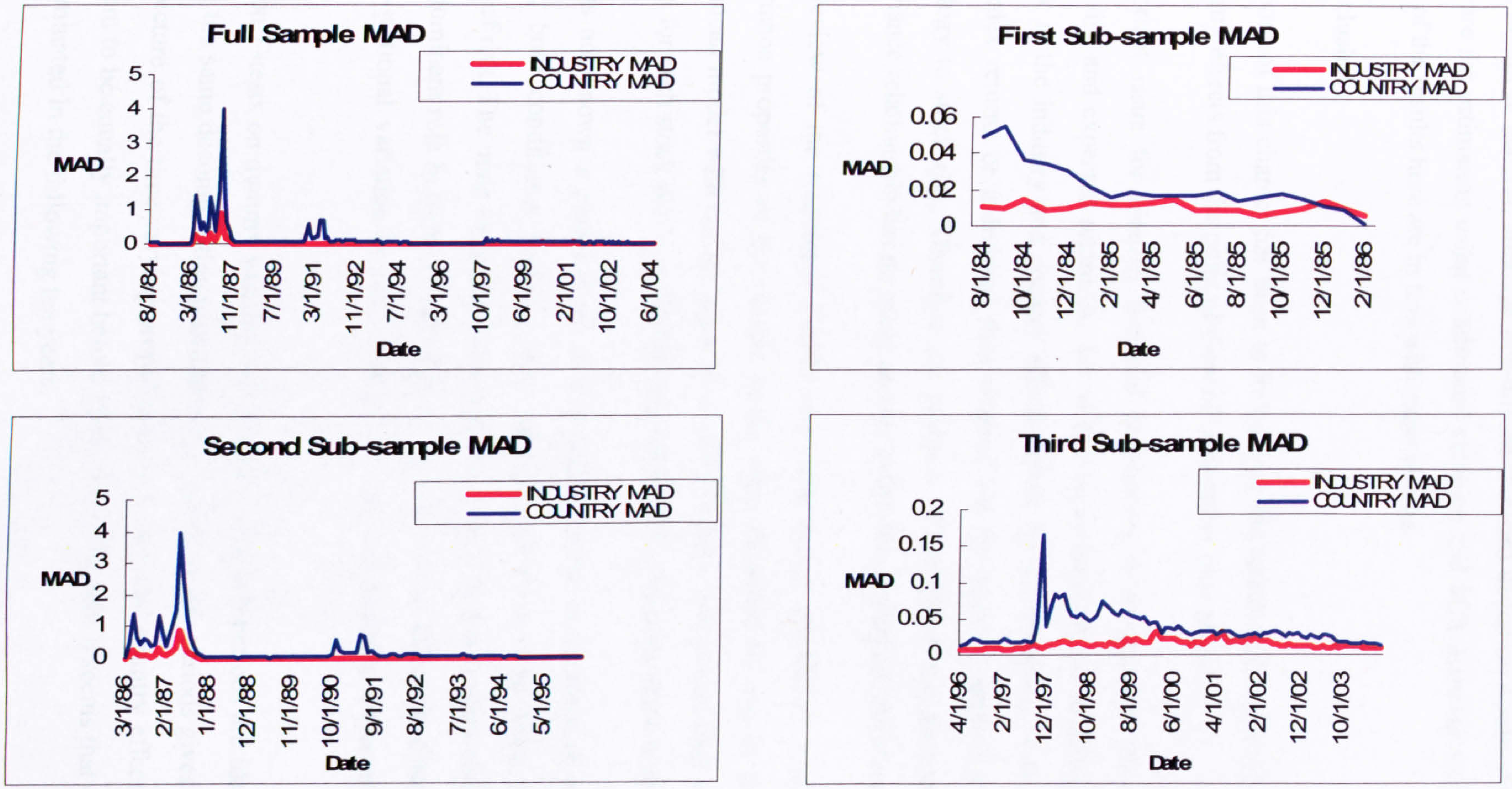
The results in the second sub-period are less promising than in the first. As expected, the mean (median) standard deviation of the sum of country effects in non-traded goods industries is 0.517 (0.570), which is higher than that in traded goods industries, 0.458 (0.557). The two exceptions are the mean (median) ratio of the sum of country effects and the median ratio of the pure industry effects.

From April 1996 to July 2004 the results are mixed. The mean (median) ratio of the sum of country effects for non-traded goods industries is 0.880 (0.862), which as predicted is higher than the mean (median) ratio of the sum of country effects for traded goods industries, 0.853 (0.861). However, most other results do not support the predictions.

Most results of the whole sample period are in line with predictions. For example, the mean (median) standard deviation of pure industry effects in non-traded goods industries is 0.067 (0.061), which is lower than that in traded goods industries, 0.075 (0.064). Similar to the second sub-sample, there are two exceptions: the mean (median) ratio of the sum of country effects and median ratio of the pure industry effects.

Chart 5-4 Mean Absolute Deviation estimation for conditional standard deviation

Chart 5-4 plots the industry and country MADs for stock risk. The chart contains four figures – for the sample period as a whole and the three sub-sample periods. In general the MAD results support the *F*-test results by measuring the sizes of country and industry effects. The main conclusion is that country MAD is much higher than the industry MAD especially after early 1986.



To summarize, hypotheses are generally supported in the first and second sub-samples and the whole sample, though differences between the traded and non-traded groups are fairly small. In general, although conditional standard deviation results are mixed (as they are for estimation using conditional variance and $US nominal returns) the majority of the results here are in line with expectations.

5.6. Conclusion

The purpose of this chapter has been to investigate the relative influence of country and industry effects from the point of view of risks rather than returns.

An important issue for modern financial economists is to quantify the tradeoff between risk and expected return. As far as can be ascertained, the existing studies only look at the industry and country effects debate by decomposing stock returns (either index returns or individual firm returns) but no one has applied a similar methodology to stock risk. Therefore the problem of modelling and measuring the mean-variance relationship has no ready answer in the decomposition literature.

After a review of the traditional CAPM and more recent (G)ARCH models, the mean-variance properties of the sample stocks were modelled by one of the three types of mean model with certain types of (G)ARCH error. The conditional variance calculated for each stock was used for the next stage of the decomposition analysis.

Since it is not known *a priori* if the relationship is linear in variance or standard deviation, both conditional variance and standard deviation have been used as measures of risk. The main empirical finding in this chapter is that country effects still play the dominant role in terms of significance and the size of effects in determining the cross-sectional variation in stock risk in the last two decades, especially after 1986.

Based upon *F*-tests on dummy variable risk models, three sub-periods are identified. Repeating the same decomposition procedure over the three sub-periods gives a more detailed picture of the time-varying properties of industry and country effects. Both effects seem to be equally important before 1986. After that date it seems that country effects dominated in the following ten years.

Table 5-11 Examination of industry effects for traded and non-traded goods industries (conditional standard deviation decomposition)

Mean (Median)	08.84—02.86				03.86-03.96				04.96-07.04				08.84—07.04			
	Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect		Sum of 13 country effects		Pure industry effect	
	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio	St. Dev.	Ratio
Non-traded goods	**0.375 (0 .416)**	**0.850 (0 .861)**	0.008 (0.008)	**0.158 (0.143)**	**0.517 (0.570)**	0.850 (0.862)	**0.091 (0.082)**	0.157 (0.142)	**0.016** (0.014)	**0.880 (0.862)**	0.010 (.009)	0.563 (0.547)	**0.375 (0 .416)**	0.850 (0 .861)	**0.067 (0.061)**	**0.158** (0.143)
Traded goods	**0.010 (0. 010)**	**0.480 (0.577)**	0.007 (0 .006)	**0.310 (0.290)**	**0.458 (0.557)**	1.029 (0.877)	**0.102 (0.085)**	0.329 (0.133)	**0.014** (0.015)	**0.853 (0.861)**	0.007 (0.007)	0.433 (0.393)	**0.335 (0.406)**	1.030 (0.873)	**0.075** (0 .064)	**0.331** (0.134)

Note: 'Mean (Median)' across industries is calculated by taking the average (median) of the cumulative country effects, pure industry effects, or their respective ratio across the industries during three sub-periods and the whole sample period (as reported in Table 5-8) separately for traded and non-traded goods industries. See Table 3-6 in the returns decomposition for the classification scheme. Those results that are in line with the assumptions are shown in bold font.

Table 5-12 Sub-sample periods in different decompositions.

Table 5-12 shows the comparisons of the sub-periods identified by all the *F*-tests that have been examined in both Chapters 3, 4 and 5. The first dividing point March 1986 is the same in all the *F*-tests. The second dividing point varies between April 1996, April 1997 and November 1997 but all the sub-periods are rather similar. Considering that the dataset in this study was generated from the original stock returns, it is reasonable to believe that the same explanation may apply to the results.

Time periods	**Nominal Return in U.S. dollars**	**Real return in local currencies**	**Risk premiums**	**Conditional Variance**	**Conditional standard deviation**
The first sub-period	Aug.1984-Feb.1986	Aug.1984 - Feb.1986	Aug.1984-Feb.1986	Aug.1984 - Feb.1986	Aug.1984 - Feb.1986
The second sub-period	Mar. 1986-Mar.1997	Mar. 1986 - Mar. 1996	Mar. 1986-Mar.1997	Mar. 1986 - Oct.1997	Mar. 1986 - Mar. 1996
The third sub-period	Apr. 1997-Jul. 2004	Apl.1997-Jul. 2004	Apr. 1997-Jul. 2004	Nov. 1997-Jul. 2004	Apl.1997-Jul. 2004

However, in line with the results from the returns decomposition, the importance of the industry effects in explaining the variation of stock risks seems to have increased since late 1996. Table 5-12 shows the comparisons of the sub-periods identified by all the *F*-tests that have been examined in Chapter 3, 4 and 5.

The major difference between the returns decomposition and the conditional variance decomposition is that in *F*-test *(CV)* the number of months with insignificant country dummies during the second sub-period is far more than in *F*-test *($)*.However, the phenomenon disappears when the stock risk is measured as conditional standard deviation. In the case of conditional standard deviation, country effects are highly significant after the late 1980s. In addition, *F*-test *(CSD)* reveals more months with significant industry effects during the third sub-period than any of the other *F*-tests. However the strong industry effects during the third sub-period do not show in the decomposition and MAD results.

In general, the results of both conditional variance and conditional standard deviation have shown that from August 1984 to July 2004 country factors are the dominant source of risk variation. Since the late 1990s, industry factors started catching up with country factors, becoming more and more important. These results support the findings of Chapter 3.

The expectation concerning the inter-industry relative importance of country and industry effects is that a larger amount of variation in the measured risk in traded-goods industries will be explained by pure industry effects than in non-traded goods industries (where more variation should arise from the sum of the country effects). In general, although mixed results have been found in both conditional variance and conditional standard deviation cases, most of the differences are not very large. Of the analyses of traded *vs*. non-traded goods industries using returns, conditional variance and conditional standard deviation, results of the conditional standard deviation analysis are most in line with the expectation.

CHAPTER 6:

DETERMINANTS OF COUNTRY AND INDUSTRY FACTORS

6.1. Introduction

In Chapter 3 the standard Heston and Rouwenhorst (1994) dummy variable decomposition methodology was applied to a large sample of firms from 13 emerging markets and 11 industry sectors from 1984 to 2004, generating time series of pure country and industry effects. The results in Chapter 3 stay robust in Chapter 4 after adjusting the dummy variable specification. Chapter 5 re-examined the debate from the point of view of stock risks. The conclusion can be drawn that diversifying across countries in emerging markets is more effective than diversifying across industries in terms of achieving improvements in the risk-return tradeoff in investment, i.e. country factors are dominant in determining the cross-sectional variation of stock returns and risks. However as suggested by Heston and Rouwenhorst (1994), it can be argued that this type of study is purely descriptive and gives no insight into the underlying reasons as to the sources of the country and industry factors or why one or other factor should be more important at any point in time. In Chapter 4, after the removal of exchange rate, inflation rate and risk-free interest rate, dominant country effects did not become smaller as expected but even stronger. Chapter 6 further investigates their links with stock returns from different perspectives.

Therefore in this chapter the determinants of pure country and industry effects are studied. The two-step approach of Campa and Fernandes (2006) is followed: first, the country and industry effects (this is done in Chapter 3) are generated; second, the determinants of these effects are studied using regressors that include macroeconomic, institutional, legal and industry-specific variables.

Campa and Fernandes (2006) explained country and industry effects by openness, financial integration, trading activity, concentration and development. They found that financial market globalization is the main driving force behind the changes in the relative magnitude of the different shocks. Country factors are bigger for countries that are less integrated into world financial markets but they have declined in importance as the degree of financial integration has progressed. Likewise, higher international financial integration within an industry increases the importance of industry factors in explaining returns. Campa and Fernandes (2006) used the modulus of the country and industry effects as the dependent variables. The country and industry factors are normalized at zero on the country or industry average by construction, and therefore it is the size of the country or industry factor that is relevant. In this study, both the modulus and the original country and industry effects are studied (the original country and industry effects are stock returns, in essence). The study focuses not only on the size of the country/industry factors but also more importantly on the direction of their influence on stock returns. As an investor, it is important to know what variables may have influence on stock returns but more important to know the direction of impact that these variables may have.

Campa and Fernandes (2006) argued that industry and country effects changed slowly over time. They therefore time-averaged the monthly country and industry effects over a year to give a set of annual average data

$$\gamma_t^k = \frac{1}{12}\sum_{M=ym1}^{ym12}\left|\gamma_M^k\right| \text{ and } \beta_t^i = \frac{1}{12}\sum_{M=ym1}^{ym12}\left|\beta_M^i\right|$$

by which to explain the evolution of country/industry effects. Most studies (for example, Phylaktis and Xia, 2006) show that the relative importance of the total country and industry effects changes slowly over time. However, it is equally the case that the dummy variable coefficients themselves often change substantially from month to month. It could be argued that these changes are due to market noise, and that fundamentals such as country development and industry size only change slowly over time in line with the gradual changes in total country and industry effects. However, it is well established that macroeconomic news tends to produce common movements in exchange rates, interest rates and national stock markets. It is therefore to be expected that month-to-month changes in national exchange rates and interest rates will affect stock markets on a month-to-month basis. This suggests that we can equally well study the impact of exchange rates, inflation, and the risk-free interest rate using the Campa-Fernandes model, but also using higher-frequency data. Because some of the macroeconomic data such as GDP are available quarterly at the best, in this study, the data frequency is quarterly.

Some recent studies (for example, Chinn and Ito, 2005 and Rigobon and Rodrik, 2004) have investigated the relationships between legal regime, openness, financial system structure, institutional regulations and economic growth (especially financial market development). However it appears that no systematic study has been done on the links between stock returns and combinations of legal, institutional and economic variables.

The main contributions of this chapter are the following: first, extending the country and industry effect debate by exploring the underlying sources of country and industry factors in emerging markets over the last two decades; second, extending Campa and Fernandes (2006) by (i) including more potential variables in the model and (ii) using higher frequency data (the additional variables are found to add important explanatory power to the size of the country and industry effects); third, examining the links between stock return and various legal, institutional, economic and firm characteristics variables. Many fundamental variables are found to have power in explaining the direction of variations in stock returns. Finally, another innovation of this work is to classify variables by the legal origins of the countries and bring all of them in the regressions. This provides the chance to observe whether variables from different legal origins have different impacts on stock returns.

The empirical evidence shows that some institutional variables and legal variables are significant in explaining country effects but macroeconomic variables including exchange rate changes and the risk-free interest rate contribute 92.8% in explaining the modules country effects. In general it is shown that high financing costs, high economic risk and smaller demand for stocks make it less attractive for international investors to finance their projects in emerging stock markets. With environments that are less receptive to international investment makes the emerging markets more isolated from the rest of world and more subjected to domestic shocks. In terms of the legal environment, the better shareholders' rights are protected, the more attractive it is for foreign investors to enter the emerging markets. This further leads to the markets being less isolated from the rest of the world and less subjected to domestic shocks. The evidence shows that inflation and exchange rate changes can explain about 55% of the variation in stock returns. In general it shows that better developed financial sectors (including banking and stock markets) can promote trading, improve information transparency and reduce risks. Therefore lower risk premiums are required. Empirical evidence that can support the Fisher hypothesis is also documented in this work. Although there is a positive relation between inflation and nominal stock returns, only a portion of the inflation risk is hedged by stock returns. This suggests that investors cannot fully rely on stocks to hedge inflation risk. Variables from countries with different legal origins show different interactions with stock returns. Countries with English and German legal origins have better protection for investors, more promoted private property rights and lower risks for investment, leading to lower required risk premiums. Therefore unlike the results in Chapter 4, the strong links between these macroeconomic variables and stock returns are shown in the Chapter 6 results. Possible explanations will be discussed in the conclusion.

Among the five firm characteristics variables, most of the variables play roles in determining stock returns and industry effects but none can explain a substantial amount of stock returns.

The remainder of the chapter is organized as follows. Section 6.2 is the literature review. Section 6.3 describes the data and the variables. Section 6.4 discusses models of country and industry determinants and panel regression methodologies. Section 6.5

shows the corresponding empirical results and Section 6 concludes.

6.2. Literature review

6.2.1. Two pioneering works on the sources behind country and industry effects

In the country and industry effects literature, Campa and Fernandes, (2004) and Phylaktis and Xia (2006b) are two among very few that have tried to explain the fundamental forces behind the country and industry effects. Campa and Fernandes (2006) address the underlying sources of country and industry factors by applying a two-step procedure to a sample of 48 developed and emerging markets and 39 industries over the last three decades. First, they calculate the time series of pure country and industry effects by the dummy variable decomposition method ($\gamma_{k,t}$ and $\beta_{j,t}$ respectively), then they explain the magnitude of country effects by the following model:

$$\gamma_t^k = \delta + \theta Z_t^k$$

where γ_t^k is the pure effect of country k in year t and Z_t^k is the vector of country characteristics, including economic and financial integration, development measures and the trading activities of the country's equities. At the industry level a similar model is used:

$$\beta_t^i = \delta + \theta Z_t^k$$

where β_t^i is the pure effect of industry i in year t and Z_t^i is the vector of industry characteristics, including openness, financial integration, trading activity and the size of the industry.

Campa and Fernandes adopt a pooled time-series cross-sectional estimation as well as panel regression methods in their study. They argue that pooled OLS captures some of the cross-sectional impact of the explanatory variables, although fixed-effect panel regression can remove the mean of every variable from consideration and focus on the time series relation. Therefore their estimations are built upon the time-series variability of the independent and dependent variables. All the exogenous variables in Campa and Fernandes (2006) have annual observations, so they aggregate the monthly pure country and industry effects to obtain annual values.

Campa and Fernandes find that financial market globalization is the main driving force behind changes in the relative magnitude of the different shocks. Country factors are smaller for countries integrated into world financial markets and they further decline in importance as the degree of financial integration process increases. On the other hand, the country specific element of returns is large relative to the world market portfolio when economic and financial activities in that country are isolated from the rest of the world so that returns are more influenced by specific domestic shocks. Real integration also impacts on the size of industry effects – higher international financial integration within an industry increases the importance of industry factors in explaining returns.

Phylaktis and Xia (2006b) also explore the underlying forces driving shifts in the relative importance of country and industry effects. They examine individual firms that constitute the MSCI global index (2179 firms from 23 developed markets and 27 emerging markets) from 1990 to 2002. The model is the following:

$$R_{nt} = \beta_n^G f_t^G + \beta_{nc}^C f_t^C + \beta_{ni}^I f_t^I + e_{nt}$$

where f_t^G is the return on a global factor, f_t^C and f_t^I are the returns on country factor C and industry factor I, respectively, and e_{nt} represents the idiosyncratic shock to the return on stock n at time t. β_n^G, β_{nc}^C and β_{ni}^I represent loadings on the global, country and industry factors respectively.

An important difference between Campa and Fernandes (2006) and Phylaktis and Xia (2006b) is that the latter remove the standard restrictions that all β s are unity in their estimation. The unconstrained betas indicate the sensitivities of a firm's returns to the respective pure global, country and industry factors. The model is as follows:

$$Var(R_{nt}) = (\hat{\beta}_n^G)^2 + (\hat{\beta}_n^C)^2 + (\hat{\beta}_n^I)^2 + \sigma_n^2$$

where $\hat{\beta}_n^G$, $\hat{\beta}_n^C$ and $\hat{\beta}_n^I$ are the unconstrained betas for the global, country and industry factors respectively. From this model the relative importance of those factors can be measured by determining how much of a firm's total variance can be explained by the respective global, country, industry and firm-specific factors. The next step is to regress firms' factor betas on individual globalization variables as following:

$$P_n = \alpha_{10} + \alpha_{11} FS_n + \alpha_{12} FS_n^2 + \eta_{1n}$$

$$P_n = \alpha_{20} + \alpha_{21} ADR + \eta_{2n}$$

$$P_n = \alpha_{30} + \alpha_{31} TMT + \eta_{3n}$$

where P_n is the general term for respective global, country and industry effects (the unconstrained betas) obtained from the model above. Phylaktis and Xia argue that there are two advantages of including globalization variables separately in individual equations: first, the globalization variables may be correlated. Therefore there is the risk of distorting the results by including the variables in one equation. Second, the sample coverage of different variables varies. FS represents the variables of the firms' foreign sale ratios. ADR is the dummy variable indicating whether the firm is listed. TMT (Technology, Telecommunication and Media industry sectors) is the dummy variable indicating whether the firm belongs to the TMT sector.

Phylaktis and Xia (2006b) find that the dynamics of firms' global, country and industry effects are linked to the degree of their business globalization and firms' listing of ADRs. The growing foreign activities of firms lead to an increase in global and industry effects and a decrease in country effects. Although the globalization process also appears in the emerging markets the scale is not as large as in developed markets, since emerging markets are found to have larger country effects and smaller global and industry effects than developed markets.

6.2.2. Literature on potential driving forces behind country effects

Various studies have investigated the relationship of economic growth (especially financial market development) to legal regime, openness, financial system structure and institutional regulations. In the following review, potential explanatory theories are summarized from the existing literature.

6.2.2.1. Openness and economic development

The relationship between trade and economic growth has been an important topic among economists dating back at least to Adam Smith's analysis of market specialization. In 1960, 15.6% of the countries in the world, representing 19% of the population, were open to international trade, according to Sachs and Warner (1995). In 2000, 73% of countries representing 47% of the world population had open trade policies (Wacziarg and Welch, 2003). An increasing number of studies have found evidence that a policy of trade openness has a positive impact on growth, even after controlling for other growth determinants. For example, Wacziarg and Welch (2003) examine 23 Eastern European and newly independent states of the former Soviet Union and find that, from 1950 to 1998, countries liberalizing their trade policy experienced an average 1.5% increase in annual rates of growth.

More recently, a new group of studies has looked at the link between openness (international goods trading) and financial development and suggests that the evolution of equity market cross-country linkages is associated with the development of international trade and some other macroeconomic factors. Darrat and Zhong (2005) study the influence of multinational trade accords on the degree of stock market connection by using NAFTA (North American Free Trade Agreement) as an example. Their cointegration test shows that NAFTA has promoted a significant and a more stable long-run connection among the three North American stock markets. Li, *et al.* (2004) also show that trade openness generally increases co-movement across stock markets.

The connection between openness and financial development can also be confirmed by the link between goods and capital openness. From a political economy point of view, Rajan and Zingales (2003) argue that different political groups represent different business interests and that forcing through their policies leads to the uneven development of financial markets. They show that both goods and capital openness promote competition, check the power of political and economic elites and support competitive markets. Therefore they suggest a simultaneous liberalization policy on goods and capital openness. Law and Demetriades (2006) also examine the influence of both openness and institutions as channels of financial development using a new dataset. They find evidence supporting the finding in Rajan and Zingales (2003). They also find that institutional quality is a robust and statistically significant factor determining financial development.

Some other studies show the importance of a balance of both openness and institutional quality in financial development. If market or institutional regulations are imperfect, openness can lead to both sub-utilization of human and capital resources, and concentration on technologically less developed industries that are human capital intensive (Grossman and Helpman, 1991; Matsuyama, 1992). Chang, *et al.* (2005) find that trade has positive and economically significant impact on growth given that certain complementary reforms are undertaken.

Despite the great effort devoted to studying the influence of trade liberalization on economic development, mixed conclusions have been drawn. Frankel and Romer (1999) summarize the difficulties in measuring openness. Those studies that measure openness as the ratio of exports + imports to GDP normally find a moderate positive relationship. The problem with this proxy choice is that trade share may be endogenous. To avoid potential problems in interpreting the results, other studies use trade policies instead of trade share in the models, but this does not solve the problem. Frankel and Romer (1999) chose an alternative variable to measure trade indirectly:

geography – how far a country is from other countries. They found a moderately statistically significant positive effect on income.

To conclude, a large number of papers study the link between financial development and openness (international goods trading) from various perspectives but as far as we know there is no work studying the direct link between stock returns and openness (international goods trading).

6.2.2.2. Change of exchange rate and stock returns

Emerging markets are known to be different (or segmented) from developed markets by having higher volatility of returns. Therefore a number of studies focus on local rather than world risk factors as the primary source of variation in equity returns in these markets. The exchange rate change is one of these local risk factors. It is generally accepted that exchange rate movements are an important source of macroeconomic uncertainty affecting the profitability and stock returns of multinational firms. Furthermore, as international investors increasingly move their investment focus to emerging markets, the fluctuation of exchange rates has more impact on real returns to international investment. The estimate of a firm's exchange exposure has obvious impact on the risk management decisions of both investors and corporate managers.

Muller and Verschoor (2007) use monthly export and import data at the industry level to examine whether the sensitivities of these industry returns may be related to foreign trade characteristics. They find that the average exposure of the net exporting (importing) industry portfolios is positive (negative). This confirms that the depreciation of domestic currencies makes exporting goods cheaper and therefore more competitive in international markets. At the same time, the depreciation makes imports more expensive for domestic companies. Phylaktis and Ravazzolo (2005) is another study looking at the link between stock prices and exchange rate dynamics. They find that there is positive link between the stock market and the real exchange rate. Ajayi, *et al.* (1998) examine the causal relationship between stock returns and exchange rate changes by applying a Granger causality test. They find strong support for contemporaneous determination of stock returns and changes of exchange rates in developed economies whereas no consistent causal relations are observed in a sample of emerging markets. However, some other studies using data from emerging markets have found links between changes in exchange rates and stock returns. For example, Abugri (2008) applies a six-vector autoregressive (VAR) model to examine total monthly returns on stock indices for four Latin American countries: Argentina, Brazil, Chile and Mexico from 1986 to 2001. He finds that exchange rates are significantly negative in three out of four markets in the sample. This is in line with the argument that exchange rate depreciation leads to a decline in stock returns from the international investors' point of view. In another study on emerging markets, Bilson *et al.* (2001) apply Principal Components Analysis (PCA) to 20 emerging markets from 1985 to 1997. They find that the exchange rate is the most influential macroeconomic variable, with the returns for twelve markets significantly related to this variable. Their results also show that the relationship between returns and exchange rate changes in these markets is robust to the currency denomination of returns. The signs of the exchange rate coefficients are mainly negative, which is in line with the point of view of international investors.

6.2.2.3. Inflation rate and stock returns

The well-known 'Fisher Effect' in the economic literature claims that the nominal interest rate fully reflects the available information concerning possible future values of the rate of inflation. Therefore it is expected that nominal rates of stock return should move one-to-one with expected inflation. However a large number of empirical studies show a significant negative correlation between stock returns and inflation, which is a puzzle in the financial economics literature.

Fama (1981) examines the hypothesis that the negative relations between real stock returns and inflation observed before 1953 using proxy effects. He finds that real stock returns are positively related to measures of real activity such as capital expenditures, output and the average real rate of return on capital. Consistent evidence of negative relations between inflation and real activity are also found, which can be explained by money demand theory. Finally, stock returns and inflation are found to be strongly linked to measure of future real activity but with opposite signs. Therefore Fama's proxy hypothesis suggests that stock returns are determined by forecasts of relevant real variables and that the negative relation between stock returns and inflation is caused by the negative relation between inflation and real activity. Kim (2003) shows empirical evidence in support of Fama's proxy hypothesis by applying symmetric and asymmetric Granger-causality methods to the value-weighted German stock index (DAX) portfolio and inflation (constructed from the gross domestic product deflator from 1970 to 1999).

Reilly (1997) investigates the returns-inflation puzzle by using a constant growth dividend discount model (DDM) to examine the effect of inflation on the factors that affect equity returns (and ultimately the growth of earnings and dividends). Reilly confirms that stocks are not good hedges against inflation. The analysis shows that during a low inflation period, the implied growth rate of earnings generally is higher than inflation rate, whereas during high inflation the implied growth rate of earnings is equal to, or lower than, the inflation rate. It suggests that the negative relation between inflation and the implied growth rate explains the empirical evidence of common stocks as poor inflation hedges.

However the returns-inflation puzzle is far from solved despite the number of studies on it. Choudhry (1999) investigates it by looking at four high-inflation Latin American countries (Argentina, Chile, Mexico and Venezuela) and finds evidence supporting the Fisher hypothesis for Argentina and Chile, suggesting that a positive link between stock return and inflation was possible during short horizons under conditions of high inflation. Choudhry also finds negative links between current inflation and one-period lagged inflation to real returns, which implies that a negative link between real stock returns and expected (and unexpected) inflation is possible.

6.2.2.4. Risk-free interest rate and stock returns

In general, it is believed that expected nominal rates of interest on financial assets should move one-to-one with expected inflation so there is a negative relationship between interest rate and asset returns. In the paper cited earlier, Abugri (2008) also examines the influence of the interest rate, finding a significant and negative relation between nominal interest rates and stock returns in Brazil, Argentina and Chile. He argues that the appreciation of local currency leads to a decrease in nominal interest rates. The implied declining cost of capital and cheaper imported inputs may lead to an increase in local returns. Similar evidence is reported by Najand and Noronha (1998). They apply a state-space model to a Japanese sample from 1977 to 1994 with four variables, including the real interest rate (the nominal interest rates are measured by the monthly yield to maturity on one-year government bonds). They find a negative impact of interest rates on the stock returns at lag one.

6.2.2.5. Financial system structure and stock performance

It is generally believed that the development of financial intermediation plays an important role in economic growth. Recent research has focused on how a sound structure for the financial system can contribute to economic growth and especially on the role played by stock markets. Normally, developed financial systems include two main financial institutions: commercial banks and stock markets. Although both have the same fundamental role (channeling funds from lenders to borrowers) they function through different channels and play different roles in promoting economic and financial system development.

Numerous studies have examined the basic functions and activities of financial intermediaries. Commercial banks and other financial intermediaries have some traditional comparative advantages in channeling funds and reallocating resources. First, banks have an information advantage, because they collect and produce a large quantity of information. This reduces the information asymmetry between ultimate lenders and borrowers and hence improves the efficient allocation of resources (Llewellyn, 1999). Second, monitoring can be delegated to banks. Since moral hazard is unavoidable (because contracts are necessarily incomplete) borrowers need to be monitored in order to ensure that their decisions and behavior maximize the possibility that loans will be repaid on time. Monitoring does not come without cost, and banks take on the monitoring role (delegated monitoring) because they can exploit economies of scale in monitoring and can reduce the cost of monitoring by diversification (Llwewllyn, 1999). Third, banks have some degree of control over the behavior of firms. Along with their monitoring function, banks build long-term relationships with firms. This enables them to further reduce moral hazard, asymmetric information and monitoring costs. Finally, banks can transform the maturity of investment. One of the problems with direct lending/borrowing between individuals is that borrowers normally require long-term funding whereas lenders normally prefer short-term investment. By pooling large numbers of deposits and loans, banks are able to match different maturity requirements.

However, with the development of technology, information disclosure requirements and capital markets, the traditional advantages of banks are gradually diminishing. For example, Deidda and Fattouh (2008) show that if a market has established disclosure laws so that firms are motivated to disclose their information to attract finance, this may undermine banks' incentives to monitor, even if done efficiently.

Stock markets support resource allocation and promote economic growth through different channels. First, by reducing transaction costs and liquidity costs. Investors' preference for short-term investment makes it difficult for long-term projects to attract funding. Stock markets have comparative advantages in increasing liquidity of assets by breaking down long-term projects into stocks and allowing the trading of all or part of project's ownership at any time. By doing so, stock markets can decrease liquidity costs and risk, pooling financial resources to fund big long-term projects. Hence the development of stock markets can promote economic growth (Capasso, 2006). Second, stock markets have their own way of relieving the asymmetric information problem. One of the advantages of stock markets is that they allow for efficient risk sharing by providing incentives for investors to search for information, allowing stock prices to reflect effectively the true valuation of underlying investment projects and sending accurate signals for asset return valuation (Diamond and Verrecchia, 1982). Hence the development of stock markets helps efficient resource allocation. Third, with the increasing complexity of company operations and project management, continuous monitoring becomes essential for the efficient allocation of resources. Stock markets become the best candidates for optimal investment control and risk diversification, especially in highly developed economies when production systems become too complex for banks to monitor. The danger of takeover faced by poor-performing companies creates incentives for managers to maximize the value of firms to prevent potential takeover (which normally leads to changes in management). Stock markets provide opportunity for risk diversification through international financially integrated markets. It is generally believed that international diversification can lead the portfolio frontier to shift to higher-return projects for given risk or to lower risk for given return (Heston and Rouwenhorst, 1994).

There is a long-term debate among economists as to whether bank-oriented or capital market-oriented financial markets are better for economic growth. Beck and Levine (2001) look at the influences of stock markets and banks on economic growth by applying generalized method of moments (GMM) methodology to a panel data set. They find that market and bank developments are always jointly significant regardless of changes in the panel methodology or the measures of stock market and bank development. Davis (2001) shows that most successful financial systems are based upon a balance of capital market and bank financing, since these tend to be complements rather than substitutes.

Levine (1998 and 1999) and Allen and Gale (2000) suggest that the key issue is not the choice of bank or equity market financing but the institutional factors behind the financial systems. The main functions of bank and equity markets are rather similar. Therefore the key is to create an environment in which different financial institutions can function efficiently and maximize their comparative advantages. For example, Levine (2002) finds that it means little to identify financial systems as bank- or market-based. Overall financial development is linked to economic growth. There is no evidence to support either a bank- or market-based view in particular.

In a more recent study, Ergungor (2003) combines the market- *vs.* bank-based debate with a consideration of different legal systems. He shows that civil law countries, with inflexible judicial systems, are normally bank-oriented because the role of banks in these countries is to solve conflicts with their market power and enforce contracts without court intervention. On the other hand, in common law countries such as the UK, a flexible judicial system along with a market-oriented financial system leads to more capital-intensive investment. Therefore the financial system structure does matter to economic growth. A market-based financial system is better than a bank-based system in promoting economic growth when combined with a flexible judicial system. Chinn and Ito (2005) study different institutional and capital control variables, and their interactions. They find that development in the banking system is a precondition for capital market development and that developments in these two types of financial market have synergistic effects.

Compared with the large number of studies on the relationship between financial developments and economic growth, the number of studies on the link between financial development and stock returns is very small. Dellas and Hess (2005) is one of the few. They examine quarterly stock returns in 49 emerging and developed markets from 1980 to 1999. Three common indicators of financial intermediary development have been used in this study: liquid liabilities, commercial assets divided by assets of banks (commercial and central) and private credit. Although their results vary according to the indicator of financial development used and the currency of denomination of returns, in general Dellas and Hess find that stock returns are significantly linked to the degree of financial development. One of the characteristics of emerging markets is inelastic liquidity supply and demand. Allen and Gale (2003) show that small demand shocks for liquidity may lead to large asset price fluctuations if liquidity supply and demand are inelastic. A sufficiently liquid banking system allows stock market traders to smooth their trades, minimizing price volatility. A thin trading stock market is more likely to exhibit larger fluctuation in prices. Therefore, as argued by Dellas and Hess (2005), it will be less attractive to international capital, which means it tends to have lower correlation with the rest of the world and is under more influences of domestic shocks.

Dellas and Hess (2005) also find that domestic returns are negatively related to all measures of financial development. Low transactions costs and a low degree of political uncertainty increase international price co-movements by promoting international capital flows and therefore reducing specific domestic influences. Trade openness has a similar effect to capital market integration in terms of enhancing international stock price co-movements.

Although there is some existing literature on the link between financial development and financial system structure, the lack of a theoretical framework and the small number of empirical studies on the direct link between financial development and stock returns calls for more work on this issue.

6.2.2.6. Characteristics of stock markets and stock returns

Various studies look at the links between different characteristics of stock markets and stock returns. Literature on two characteristics is reviewed here: liquidity and stock market size.

It is generally accepted that liquidity is the ability to trade large quantities quickly at low cost with little price impact. Therefore there are four liquidity elements that are important in making investment decisions: trading quantity, trading speed, trading cost and price impact. With regard to trading cost, as long as investors are concerned about the holding period return net of trading cost, less liquid assets are expected to provide a higher risk premium compared to more liquid assets. The seminal work of Amihud and Mendelson (1986) tested the hypothesis that investors required a risk premium for holding illiquid assets (stock). Measuring illiquidity as the bid-ask spread (the dollar spread divided by average of bid and ask prices), they found a positive return-illiquidity relationship. Therefore returns should increase with spread.

More recent studies have been done with different choices and measurements of stock market characteristics. Datar, *et al.* (1998) suggested an alternative test of Amihud and Mendelson (1986) by using turnover ratio (number of shares traded as a ratio of the number of shares outstanding) as the proxy for liquidity. They argue that firstly the data on bid-ask spread is hard to obtain as monthly frequency over a long sample period. Secondly, Peterson and Fialkowski (1994) documented that quoted spread was a poor proxy for the actual transaction cost. Datar, *et al.* did find evidence to support Amihud and Mendelson (1986) hypothesis by using turnover ratio.

Given the general belief that emerging markets differ from developed markets, investors will have concerns about liquidity before they venture their capital into emerging markets. For example, if value stocks are on average less liquid than growth stocks, the value premium may be partially a compensation for the lower liquidity of value stocks. Studies on the relation between stock return and liquidity using emerging market data are rather recent. Dey (2004) studies the turnover ratio, which is computed as value of shares traded over market capitalization. The panel studied here includes both developed and emerging markets but Dey find that in emerging markets exclusively there is a positive relationship between turnover ratio and stock returns, which means that investors will have higher returns if they invest in quick turnover stocks in emerging markets. Sang-Gyung *et al.* (2003) report same results for emerging markets. This suggests that an active management of an index and its composition may lead to a high turnover (i.e. high liquidity) and an increase in its value.

However it is not clear whether there is a positive or negative relation between stock returns and liquidity. Rouwenhorst (1999) studies 1705 firms in 20 emerging markets from 1982 to 1997 and finds no relation between turnover and cross-sectional differences in average returns but finds a positive relationship between turnover and beta, size, momentum and value in emerging markets. This suggests that the return premium does not just reflect a compensation for illiquidity as suggested by other studies. It implies that investors can increase their exposure to these common factors without increasing their holding of value stocks (illiquid stocks).

There is little published work on capturing the trading speed dimension of liquidity. Liu (2006) defines liquidity as the standardized turnover-adjusted number of zero daily trading volumes over the prior 12 months. Liu argues that the new measurement can capture trading quantity and trading cost, with emphasis on trading speed, i.e. the continuity of trading and the potential delay or difficulty in executing an order. In order to compare, the traditional measures of turnover ratio (similar to Datar *et al.*, 1998), return-to-volume (similar to Amihud, 2002) and bid-ask spread (average daily relative bid-ask spread over the prior 12 months) are also examined. Liu documents a significant positive and robust liquidity premium over the sample period from 1963 to 2003, using the new measure.

To summarize, the evidence on the relationship between liquidity and stock returns is far from conclusive. In particular, it seems to vary with different turnover measures and across emerging and developed markets.

There are only a few published papers focusing on the relation between stock returns and the size of stock markets. Some empirical evidence shows that market size matters for asset trading. Demand and size both play an important role in international stock markets. It has been observed that when a stock is included in the FTSE 100 index its share price goes up. When a firm from a small country lists its stocks in a big stock market, its share prices also go up. Stocks in emerging markets tend to move to large international financial centers. The effects of market size have been generally ignored in the international macroeconomic and finance literature.

Martin and Rey (2003) regard security trading as goods trading and apply trade theories to model international trade in assets. They assume four basic conditions: (i) agents are risk-averse, (ii) assets are not perfect substitutes (so that financial markets are imperfectly competitive), (iii) the number of financial assets is endogenous and (iv) cross-border asset trade involves some transaction costs. Due to imperfect substitution of assets and transaction costs, the degree of demand affects asset prices, the number of assets and diversification. Martin and Rey apply a supply-demand model, which generates downward-sloping demand curves and upward sloping supply curves, through the assumptions of risk aversion and imperfect substitution. Therefore, assets with higher demand have higher prices. In an international framework with segmented markets, this translates into a market size effect: larger financial areas exhibit higher asset prices.

This can be also explained in the context of financial integration. International financial integration can be regarded as an increase in market size that brings an increase in total demand for assets (with lower transaction costs), leading to higher prices. The market size effect can also be considered as a demand side effect. If country A is larger than country B then aggregate saving is larger in A than in B. The presence of transaction costs induces a home bias. If the assets in demand are substitutable, then the total demand for an asset for the large country is larger than the demand for an asset in the smaller country for a given price. Therefore higher demand induces an increase in asset prices in the bigger country. Portes and Rey (2005) suggest that equity market capitalization is a better measure of market size than population of the country where the market is located.

6.2.2.7. Political and Bureaucratic quality

It is not uncommon for research on long-term economic development to include democracy and institutional variables. Although research on the relationship between politics and economic growth uses different indicators to measure institutional and political quality, in general policies that are more democratic, more stable and more openness-promoting are found to have a positive impact on economic growth. For example, Persson (2004) has empirically uncovered that the form of democracy has a crucial influence on the form of trade and regulatory regimes. In Bai and Wei (2000) bureaucratic quality is interpreted as a reduced ability by the government to collect tax revenue. They find that a more corrupt government is indeed more likely to impose capital controls.

One of the major concerns of international investors is high volatility in emerging markets. There are many studies on emerging market liberalization and market volatility, especially after the financial crisis in East Asia. The quality of institutions is indicated by the risk of repudiation of contracts by the government, the risk of expropriation, corruption, rule of law and bureaucratic quality. Jayasuriya (2005) examines the effect of stock market liberalization on stock return volatility in a sample of 18 emerging markets and finds that more efficient markets with better-performing liberalization policy are less likely to create undue volatility effects. Among studies on other institutional qualities, Diamonte *et al.* (1996) showed that in emerging markets a lower level of political risk implies lower required stock returns. Therefore political risk is a priced factor for which investors are rewarded and it has strong influences on equity cost.

Similar to Rigobon and Rodrik (2004), Chinn and Ito (2005) find that rule of law and democracy generally enhance each other and that both make direct significant contributions to the development of capital markets. A reasonable level of legal and institutional development is a precondition for them to contribute effectively to financial development. Especially, general legal or institutional variables show stronger effects than the finance-related legal or institutional variables in raising stock market volumes and strengthening the impact of financial openness.

6.2.2.8. Legal regimes and financial development

A rapidly growing body of research examines the role of the legal system in explaining financial development. Beck and Levine (2003) provide an excellent survey of research on the role of legal institutions in determining international differences between financial systems. The early view of law and finance was naturally influenced by the evolution of corporate finance theory during the last half century, in which equity and debt were seen as legal claims on the cash flows of firms (Modigliani and Miller, 1958). This research suggests that savers and investors are more willing to finance firms in countries where legal regimes enforce private property rights, protect private contractual arrangements, and support the legal rights of investors.

Later research goes further. A large body of research suggests that the legal origin of a country explains financial development (La Porta, *et al.* 1998, 2002a; and Himmelberg, *et al.*, 2002) but this has not been empirically explained. A group of related papers in law and finance uses two mechanisms to explore this issue: the political and adaptability mechanisms. In the political mechanism it is assumed that traditional differences among legal regimes may explain current differences in financial development (La Porta *et al.*, 1998). This mechanism supports the idea that common law provides greater support to private property rights than civil law (La Porta *et al.*, 2003). British common law therefore supports financial development to a greater degree than a Civil law system. Demirguc-Kunt and Maksimovic (1998) examine how differences in legal and financial systems affect firms' use of external financing to fund growth. They argue that conflicts of interest and asymmetric information between investors and insiders of the company restrict firms' ability to finance projects. The degree of difficulty partially depends on the effectiveness of the legal and financial system. They find that the reported return on capital is lower in countries with active stock markets and well-functioning legal systems. Therefore well-functioning institutions can also indirectly increase dependence on external financing by reducing firms' profits.

The adaptability mechanism explains the relationship between legal origin and financial development. The theory behind it is that legal systems are different in terms of their ability to adjust to changing circumstances. If a country's legal system adjusts to changes of circumstance less flexibly, a large gap will open between the financial needs of its economy and the required ability of the legal system to support these needs. The adaptability mechanism predicts that countries with a French legal origin (not necessarily France itself) are less likely to develop efficient financial systems than those with legal origins in common law or German civil law. Common law is traditionally more flexible as it responds case-by-case to the changing needs of the society and may not leave a large gap between the legal framework and actual needs (La Porta *et al.*, 2003). Djankov *et al.* (2003) also find that, compared with French law countries, common law countries tend to set less rigid procedures throughout the judicial process and have less legal formalism, which helps to speed up the process of filling the gap between the legal system and the changing demand.

Although the political and adaptability mechanisms are related in law and finance theory, they draw conflicting conclusions when comparing French and German civil law countries. They also have different implications concerning the channels through which the legal systems influence the development of financial markets. (Beck and Levine, 2003).

Some studies investigate the link between legal systems and financial development empirically. La Porta, *et al.* (1997) use a sample of 49 countries to evaluate the ability of firms in different legal environments to raise external finance through either debt or equity. They find that a good legal environment, in terms of the quality and enforcement of legal rules, has positive links to the size and depth of a country's capital market. In particular, compared with common law countries, civil law countries such as those with French legal origins are weaker in investor protection and financial market development. Beck et al. (2003) empirically assess these two mechanisms. They proxy financial development by private credit, which measures the amount of savings channeled to private borrowers through debt-issuing financial intermediaries. Beck *et al.* show that legal origin matters, because different legal traditions vary in their ability to adapt to evolving financial circumstances. Compared with French civil law, German civil law and British common law countries have significantly more advanced financial markets and better private property protection.

Some researchers examine financial development as two separate issues: shareholder protection and creditor rights. Shareholders and creditors have different interests in a company, according to the terms and rights attached to their contracts. Shareholders impose their influence on companies by voting for directors and on major corporate issues. Investors are better protected if dividend rights are closely linked to voting rights. On the other hand, creditor rights are more complicated than shareholder rights, for two reasons. First, there are different kinds of creditors with various interests. Second, in the case of a defaulting firm, there are two creditor procedures of dealing with the situation: liquidation and reorganization.

Pagano and Volpin (2006) study the link between shareholder protection and financial market development by applying a political economy model using panel data for 47 countries from 1993 to 2002. According to the 'political economy' theory, various political groups have different interests and try to shape the regulations so as to protect their interests. Regulation may therefore cause socially inefficient and yet persistent outcomes. Pagano and Volpin (2006) find that there is a two-way causal relation between investor protection and stock market development. When better investor protection is expected firms are more likely to finance projects by issuing equity, which creates deeper and broader stock markets. In turn, this expands the shareholder base and increases political support for shareholder protection. Therefore there is a positive two-way link between investor protection and stock market development.

Djankov *et al.* (2005) investigate the determinants of cross-country variation of private credit. They measure private credit by claims on the private sector by commercial banks and other financial institutions as a percentage of GDP and find that stronger legal rights of creditors are associated with a higher level of private credit market development. However the result is only significant in developed countries, which have more advanced legal systems. Furthermore, they also find empirical evidence to support the previous literature conclusion on legal origins. Common law systems stress *ex post* private dispute resolution, whereas civil law systems, especially French law, emphasize public ownership and *ex ante* regulation. The general conclusion is that common law systems provide better protection to creditors.

6.2.3. Literature review of firm characteristics that may explain industry effects

6.2.3.1. Country level vs. industry level

Traditionally, the issue of economic integration has been studied at the country level. With the progress of globalization and regional integration (such as the expansion of the European Union), cross-country differences are less clearly defined. Some researchers and practitioners realize the importance of allowing for international integration at the industry level in their research and investment decisions. Country level integration (or segmentation) does not necessarily imply industry level segmentation (or integration) (Carrieri, *et al.*, 2004). Studies such as Roll (1992) on the importance of industry structure for international portfolio diversification decisions are also linked to the question of industry integration. Although many studies in this area have reached the conclusion that country effects play a dominant role in determining variation in stock returns, some also find evidence of the increasing importance of industry factors (for example, Griffin and Karolyi, 1998 and

Phylaktis and Xia, 2006). If industry risk is priced, a portfolio manager can achieve greater portfolio efficiency by complementing geographical diversification with industrial diversification. Given the apparent importance of industry integration (or segmentation), the current lack of research on industry level stock returns provides motivation for the investigation reported here. Examining the forces that drive industries to deviate from an 'average' industry (industry effects) also addresses the main theme of this dissertation – the affects of both country and industry factors on the cross-sectional variation of stock returns.

Fama and French (1992) estimated the CAPM for the U.S. stock market from 1963 to 1990 comparing the cross-sectional explanatory power of beta with the explanatory power of an alternative set of variables such as size, leverage and book-to-market value. They find that beta cannot explain excess return, instead, book-to-market ratio generates higher average returns than are predicted by the CAPM. The seminal study by Fama and French (1992) seriously challenged the standard CAPM model and triggered research aimed at investigating the explanatory power of firm characteristics. The following section will review the relevant literature on this topic to inspire the choice of possible explanatory variables for an examination of industry effects.

6.2.3.2. Book-to-market-value

Several studies examine the information contained in firm characteristics. Fama and French (1992) suggest that book-to-market equity is one of three factors that can explain cross-sectional variation in stock returns. He and Ng (1994) use average cross-sectional returns on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX) and the National Association of Security Dealers Automated Quotation (NASDAQ) from 1958 to 1989 to find that once they include size and/or book-to-market value, the previously significant variables such as term and default factors lose their explanatory power. In Datar *et al.* (1998), the book-to-market value variable was constructed as the natural logarithm of book value to market value while size was the natural logarithm of total market capitalization of the individual firm.

They find that the slope coefficients are significantly negative on size and significantly positive on book-to-market value, in line with several other research findings. Asness *et al.* (2000) have documented the explanatory power of book-to-market-value in U.S. markets as well. Some other studies such as Chan *et al.* (1991), Daniel *et al.* (1997), and Chan *et al.* (1998) have also revealed the significant role that book-to-market value plays in the Japanese equity market.

Compared to the large number of studies on the U.S. and other developed markets, research into emerging markets is still fairly scarce. Among these, Chui and Wei (1998) investigate the relationship between average stock returns and market beta, book-to-market equity and size, in five emerging markets of the Pacific-Basin region: Hong Kong, Korea, Malaysia, Taiwan and Thailand from 1977 to 1993. They find that, except for Taiwan and Thailand, average excess returns are positively linked to book-to-market value but negatively related to size in all countries. The results are very much in line with results on developed stock market returns. Rouwenhorst (1999) finds similar results, showing that factors documented for the U.S. market also drive cross-sectional differences in expected stock returns in emerging stock markets. By applying a Bayesian analysis to monthly data of 1750 firms from 20 emerging markets from 1982 to 1997, he finds that small stocks outperform large stocks (i.e. a negative relationship between size and stock returns) and that value stocks outperform growth stocks (i.e. a positive relationship between book-to-market value and stock returns). A more recent study by Hou *et al.* (2006) extended previous studies by broadening the investigation to 26,000 stocks from 49 countries (including 27 emerging markets) over the period 1981 to 2003. Using the same methodology as Fama and French (1993) and Chan *et al.* (1998), they find that the positive link between average returns and book-to-market is stronger in developed markets than emerging markets, especially during the period 1993 to 2003.

6.2.3.3. Dividend Yield

An extensive literature documents the predictive power of accounting-based characteristics for future returns (Chan *et al.*, 1991; Fama and French, 1992; Lakonishok *et al.*, 1994). The Gordon growth model estimates expected returns as the current dividend yields plus the expected growth rate in dividends. Murphy and Sahu (2001) apply data on the S&P 500 to the Gordon growth model. The regression results show that the model forecasts a certain amount of the long-term stock returns. Campbell and Yogo (2002) show that dividend yield shows some predictive power for stock returns even after considering potential statistical biases. Chan *et al.* (1998) find that dividend yield helps explain out-of-sample co-movement in returns in a dataset from the U.S., the U.K. and Japan, even when they include macroeconomic factors, statistical factors and the market factor. Bilson *et al.* (2001) investigate the links between some microeconomic variables and cross-sectional variations in emerging stock markets. They find that when a large number of microeconomic variables are included, especially price-to-earning ratio and dividend yield, the explanatory power of the model is significantly improved.

Dividend yield is often cited as one of the most informative variables in studies on conditional asset pricing but its forecasting potential is somewhat problematic because it shows close-to-unity correlation with other variables. Ferson *et al.* (1993), Goyal and Welch (2003) and Valkanov (2003), among others, argue that the predictive power of dividend yield and other highly persistent time-series is spurious or inflated at best. Carrieri *et al.* (2004) find that although the level of persistence for dividend yield is very similar for all 18 industries in their sample, its predictive power is limited to industries sharing several common characteristics. Therefore evidence on the power of dividend yield to predict or explain cross-sectional variation in stock returns is far from conclusive.

6.2.3.4. Price/Earnings ratio

The Price/Earnings (P/E) ratio is another accounting information variable that frequently appears in stock return research. The well-known differences in P/E ratios across industry sectors make this a good candidate for explaining the cross-sectional variation in stock return. For example, consumer product companies have very different P/E ratios than banks or computer companies; value firms normally have lower P/E ratios than growth companies (Fama and French, 1992). Fama and French (1992, 1996b) and Lakonishok et al. (1994) suggest that value stocks with lower P/E do better than growth stocks with high P/E ratios. Carrieri *et al.* (2004) measure the global industry P/E ratios for the corresponding local industries in the G-7 countries in conditional asset-pricing framework. They find that P/E ratio and other accounting variables show significant negative relationship with industry returns.

With emerging markets data, Rouwenhorst (1999) found similar results, by applying a Bayesian analysis to monthly data from 1750 firms from 20 emerging markets from 1982 to 1997. He found that similar to developed markets, small stocks outperformed large stock (i.e. negative relationship between size and stock returns) and value stocks outperform growth stocks (i.e. negative relationship between P/E ratio and stock returns). A more recent study, Bilson *et al.* (2001) find evidence to support the conclusion as well.

However it is not unusual to find conflicting results. Suret and L'Her (1997) analyze the factors driving stock returns in hyper-return periods from 1976 to 1994, for 20 emerging markets (the same as those in Bilson *et al.*, 2001). The hyper-return periods are defined as calendar years when a cumulative geometric return in excess of 70% is observed. In their sample, according this definition, hyper-return periods represent 23% of the 279 country-year observations. Suret and L'Her fail to find strong evidence to support the explanatory power of P/E ratio. They cast doubts on how accurately macroeconomic variables, stock return on equity, price-to-earnings and price-to-book ratios were measured. The accounting variables are calculated from detailed data for individual stocks from emerging markets, where data accuracy could be questionable. At the same time, hyper-returns in emerging markets could be influenced significantly by capital flows, which may be driven more by speculative and short-term interests than by rational investment decisions based on fundamental factors. This might account for the low power of fundamentals in explaining hyper-returns in emerging markets.

In general, with different data sample periods and methodologies, studies on emerging market stock returns normally show that the earning-to-price ratio plays an important role as an accounting variable in explaining stock returns. Empirical evidence shows a negative relationship between P/E ratio and stock returns.

The industry-related variables and firm characteristics reviewed above change relatively frequently and can be identified for each chosen industry. However other industry variables (such as size) change more slowly over time. Some recent studies, for example Campa and Fernandes (2006), use size, trade activity (openness) and geographical concentration of industry. They find evidence showing that all of these slowly changing variables are significant in explaining variations in industry stock returns.

6.2.3.5. Industrial concentration (Herfindahl index)

Roll (1992) extends the country and industry effects debate by examining industry effects defined as the industry composition/density of stock markets. Several concentration measures are adopted in his work, including the Herfindahl index (which estimates industry concentration within the index). This Herfindahl measure is based on three-digit industry codes provided by the FT Actuaries/Goldman Sachs database. His results for the Herfindahl concentration measures are more statistically significant than results using the number of stocks as a concentration measure. Roll argues that this further motivates the use of industry composition to explain cross-sectional variation in stock returns. Empirical evidence shows that return volatility is positively related across countries to the Herfindahl measurement of three-digit industry concentration within the index. This means that a country index is more volatile when it is less well diversified.

The Herfindahl index is also known as the Herfindahl-Hirschman Index or HHI. It is a measure of the size of firms relative to their industry and is an indicator of competition. It is defined as the sum of the squares of the market shares of individual firms, ranging from 0 to 1 (from a very large number of very small firms to a single monopolistic firm). An increase in the Herfindahl index generally implies a growth of market power and a decrease in competition.

$$HERF_t^j = \sum_{i=1}^{n} (MV_i^2)$$

$HERF_t^j$: Herfindahl index of industry j at time t

MV : Market share of firm i in industry j at time t

n : Number of firms in industry i at time t

6.2.3.6. Industry openness

As reviewed and summarized in section 2.2.1, openness is employed as an explanatory variable in various empirical studies. However the measurement of openness is not widely agreed. In Campa and Fernandes (2006), the openness of industry j is measured as the ratio of trade to production (value added). They collect their OECD industry trading data from STAN, an OECD database of industrial performance. Various databases were checked including Datastream, ESDS (Economic and Social Data Service), which includes data from the IMF, the UN and the World Bank but none of them keep the trading data of various industries in the emerging markets sampled. Some annual data are available in WTO trading data statistics under the category 'Merchandise trade by commodity' but they only cover a small number of the industry groups required. Therefore, due to the lack of data, industry openness was not included in this part of the study.

6.2.3.7. Geographical Concentration index

Campa and Fernandes (2006) explore the relationship between size and concentration variables and geographically diversified industry portfolio returns (pure industry effects). They find that the geographical concentration of the industry appears to have a significant negative relationship with industry effects, suggesting that as an industry becomes more concentrated in particular countries, it is more affected by country-level idiosyncratic shocks. Conversely, global industry shocks should be more important as industries become more geographically dispersed. Concentration is measured for each industry as the difference between the shares of each country in that industry ($w_{ik,iw}$) and the country weight in the entire sample ($w_{k,world}$).

$$GEOG_t^k = \sum_{j=1}^{Jk} (w_{jk,jw} - w_{k,world})^2 = \sum_{j=1}^{Cj} (\frac{MCAP_t^{j,k}}{MCAP_t^{j,w}} - \frac{MCAP_t^k}{MCAP_t^w})^2$$

C_j : Number of countries in which industry j exists

$MCAP_t^{j,k}$: Market capitalization of industry j in country k

$MCAP_t^{j,w}$: World market capitalization of industry j

$MCAP_t^k$: Market capitalization of country k

$MCAP_t^w$: Total world market capitalization.

6.3. The Data and variables

The literature review has summarized the history of potential explanatory variables and their recent applications in research on economic growth, financial development and determinants of stock return. The selection of variables here is based on the results of these studies. Each of these variables captures a different aspect of stock returns and each has its own strengths and weaknesses. The next three sections show the variable definitions, hypotheses and possible explanations of the results. The last section gives a description of the data including the sources and coverage of the data.

6.3.1. Dependent variables

In the top panels of Tables 6-1 and 6-2, the different dependent variables are listed. In this study, not only are the modulus of pure country and industry effects ($|\gamma_{k,t}|$ and $|\beta_{j,t}|$ respectively) examined, but also the original pure country and industry effects ($\gamma_{k,t}$ and $\beta_{j,t}$ respectively) are studied. The original country and industry effects are in effect stock returns.

6.3.2. Country effect determinants

Tables 6-1 and 6-2 show the abbreviated names, descriptions and definitions of both country and industry determinants. In Table 6-1, the country determinants are divided into four general groups: macroeconomic variables, institutional variables, general law indicators and financial law indicators.

6.3.2.1. Macroeconomic variables

The macroeconomic variables included are openness of goods trading, exchange rate changes, inflation rate and risk free interest rate.

The link between goods trading openness (OPEN) and country effects is expected to be negative, i.e. a more open goods markets leads to smaller domestic shocks on stock markets. This hypothesis can be explained by the relationship between international trade and stock markets in terms of cross-border security pricing and international diversification strategies. If countries become more closely connected due to a decrease in trade barriers, a higher degree of market co-movement will lead to faster adjustment of equity prices to information flows among related countries, promoting more efficient markets. This quick adjustment to information makes markets more sensitive to changes in their global environment than in their domestic environment. At the same time, more efficient stock markets will attract more investors including foreign investors. Therefore their participation will make the markets even more exposed to global shocks. There is as yet no theory or empirical evidence about the link between stock returns and goods trading openness so the link could be either direction.

Table 6-1 Pure country effect determinants

Table 6-1 shows the names, descriptions and definitions of country effect determinants, divided into four groups: macroeconomic variables, institutional variables, general law indicators and financial law indicators (the financial law group is sub-divided into creditor rights and shareholder rights). For the last two groups, due to the limited space, only variables appearing in the final model are shown in this table. The complete set of law variables is included in Table A6-3 in the appendix.

Dependent Variable				
Variables	*Descriptions*	*Definitions*	*Hypo. ACE*	*Hypo. CE*
ACE	Modulus Pure Country Effects	$\lvert\lambda_{k,t}\rvert$		
CE	Pure Country Effects	$\lambda_{k,t}$		
Independent Variables				
1. Macroeconomic variables				
OPEN	Openness	(import + export)/GDP	-	+/-
EX	Exchange rates changes	$Ln(EX_t)-Ln(EX_{t-1})$	+	+/-
INFL	Inflation rate		+/-	+
INTEREST	Domestic Risk free rates	Refer to Table A4-1 and A4-2 in the appendix.	+	+/-
2. Institutional Variables				
LIQID	Size (liabilities)	Liquid liability[1]/GDP	-	-
DG	Absolute size	Deposit bank asset/GDP	-	-
DT	Relative size	Deposit bank asset/total financial institution assets[2]	-	-
PG	Activities of financial intermediaries	Money deposit banks' claim on private sector/GDP	-	-
MG	The size of the stock market	Stock market value/GDP	-	+
TG	The activity of the stock market	Stock market trading value/GDP	-	+/-
TO	The efficiency of stock market	Turnover ratio=TG/MG	-	+/-
LIBERTY	Civil liberties	Refer to Table A6-2 Freedom in the World Country Ratings	+	+
RIGHTS	Political rights	Refer to Table A6-2 Freedom in the World Country Ratings	+	+
3. General Law Indicators---refer to Tables A6-3 and A6-4 in the appendix.				
EJ	Efficiency of judicial system		+	+
CORR	Corruption		-	-
4. Financial Law indicators---refer to Tables A6-3, A6-5 and A6-6 in the appendix.				
4.1 Creditor rights				
CR	Creditor rights		+	+
LRR	Legal reserve required as a % of capital		+	+
4.2 Shareholder rights				
ADR	Anti-director rights		+	+

Notes:

1. Liquid liabilities = currency + demand + interest bearing liabilities of banks and other financial institutions.
2. Total financial assets are defined as the sum of assets from the central bank, deposit money banks and other financial institutions. In the IFS database some of the sampled countries (China, India, Israel, Malaysia and Pakistan) have no data on 'other financial institutions'. Therefore, alternative DTs (deposit money banks/central bank assets) have been used in these countries to measure the relative size of financial intermediaries.
3. 'Hypo. ACE' column shows the expected signs of the links between the independent variables and ACE. 'Hypo. CE' column shows the expected signs of the links between the independent variables and CE.

Table 6-2 Pure industry effect determinants

Table 6-2 shows the names, descriptions and definitions of industry effect determinants.

Dependent Variable		
Variables	***Descriptions***	***Definitions***
AIE	Modulus pure industry effects	$\lvert\beta_{j,t}\rvert$
IE	Pure industry Effects	$\beta_{j,t}$
Independent Variables		
DY_t^j	Dividend yield of industry *j* at time *t*	$DY_{j,t} = \sum_{t=1}^{i}(dy_{i,t} * \frac{MV_{i,t}}{totalMV_t})$
$MTBV_t^j$	Market-to-book value of industry *j* at time *t*	$MTBV_{j,t} = \sum_{t=1}^{i}(mtbv_{i,t} * \frac{MV_{i,t}}{totalMV_t})$
PE_t^j	Price-earning ratio of industry *j* at time *t*	$PE_{j,t} = \sum_{t=1}^{i}(pe_{i,t} * \frac{MV_{i,t}}{totalMV_t})$
$HERF_t^j$	Herfindahl index of industry *j* at time *t*	$HERF_t^j = \sum_{i-1}^{n}(MV_i^2)$
$GEOG_t^j$	Geographical concentration for industry *j* at time *t*	$GEOG_t^k = \sum_{i=1}^{JK}(w_{jk,jw} - w_{k,world})^2 = \sum_{j=1}^{CJ}(\frac{MCAP_t^{j,k}}{MCAP_t^{j,w}} - \frac{MCAP_t^k}{MCAP_t^w})^2$

The exchange rate is expressed as the local currency per one U.S. dollar (price of the dollar in terms of the local currency). Changes in the exchange rate (EX) are defined as the difference in natural logarithm of exchange rates on consecutive days ($Ln(EX_t) - Ln(EX_{t-1})$). The link between EX and country effect size (i.e. modulus country effects, ACE) is expected to be positive. If EX has positive changes (local currency depreciates), positive changes in ACE are expected. This suggests when local currency is depreciating (U.S. dollar appreciating), it is bad news to international investors. So that the ESMs become less attractive to international investment, more isolated from the international capital markets and more subjected to domestic shocks. The above assumes that foreign investors base their investment decisions on the belief that the appreciation of U.S. dollar is a long-term trend. If they regard the change to be temporary only, there is still possibility of the depreciation of U.S. dollar in the near future. The risk that international investors will face a changeable exchange rate requires a risk premium to cover. The high financing cost and high exchange rate risk make it less attractive for international investors to finance their projects in ESMs. Being less attractive to global investment makes the market more isolated from the rest of world and more subject to domestic shocks. Hence force, no matter with long term or short term expectations, the positive link between EX and modulus country effects are expected.

The link between EX and stock returns (i.e. original country effects, CE) is expected to be negative. Exchange rates are the local currency per one U.S. dollar. If EX has negative changes i.e. local currency appreciates, positive changes in stock returns (in U.S. dollar) are expected and when EX has positive changes i.e. local currency depreciates, there should be negative changes in stock return (in U.S. dollar). Since the pure country effects are generated in Chapter 3, all the stock prices have been converted to U.S. dollar so that the stock return here are in U.S. dollars. When the local currency appreciates, foreign investors who consume in U.S. dollars will gain more profit with the higher stock return. Therefore according this theory it is expected to see a negative relationship between stock returns (in U.S. dollar) and the exchange rate changes. However Phylaktis and Ravazzolo (2005) argue that the overall effect of the exchange rate will depend on the relative strength of the various competing events therefore the link can be either positive or negative.

The third macroeconomic variable is the inflation rate (INFL). This is expected to be positively linked to stock returns – the higher is the inflation rate, the higher are stock returns. According to the Fisher effect it is expected that nominal stock returns should move one-to-one with expected inflation. However numerous studies on this link show that the relationship between inflation rate and stock return is unclear. There is no existing theory for the link between the inflation rate and the size of country effects.

The last economic variable is the risk free rate (INTEREST), expected to be positively linked to country effects. The higher the interest rates are, the more attractive it is for investors to deposit their money in banks, so stock markets become less active and less attractive to international investors. This therefore leads to less diversified and more isolated emerging markets, which are more subjected to domestic shocks.

A positive relation between interest rate and stock return is expected – higher nominal interest rates lead to a rise in market returns. If Fisher hypothesis stands i.e. nominal interest rate moves together with inflation rate and inflation is also positively linked to stock returns, then stock returns should be positively linked to INTEREST.

6.3.2.2. Institutional variables

There are two types of size measures for financial intermediaries included in this work: relative size and absolute size indicators. The relative size measure (DT in Table 6-1) is the ratio of the assets of deposit money banks to total financial assets.

The absolute size measure (DG in Table 6-1) is the ratio of deposit money banks assets to GDP. This measure gives evidence of the importance of financial services performed by the deposit money banks relative to the size of the economy. The assets include claims on the whole non-financial real sector, government, public enterprises and the private sector.

Since one of the most important functions of financial intermediaries is to finance investment projects efficiently through the transfer of savings, many studies on the development of financial intermediaries have concentrated on the liability side of the balance sheet. Therefore liquid liabilities relative to GDP, denoted by LG, is also included in the variables. Liquid liabilities is the broadest available measure of financial intermediation. When it is not available in IFS for some of the countries, M2 has been used instead (Chile, China, India and Israel). Liquid liabilities is a typical measure of financial 'depth' and thus of the overall size of the financial sector, without distinguishing between parts of the financial sector or between the uses of liabilities.

Although it is important to measure the size and depth of banking sector development, there is no way to distinguish whether the claims of financial intermediaries are in the public or the private sector. Savings may not fund new or existing projects of firms but may be borrowed by the government. Thus it is important to know how active financial intermediaries are in financing the private sector. Therefore the fourth variable (PG in Table 6-1) is used as a measure of financial intermediary activity and is defined by private credit of deposit money banks relative to GDP. This measure isolates credit issued to the private sector as opposed to credit issued to government and public enterprises. Furthermore, it concentrates on credit issued by commercial intermediaries other than the central bank. It is a measure of the activity of financial intermediaries in one of its main functions: reallocating savings to borrowers.

It is hypothesized that there is a negative relationship between the size of pure country effects (modulus of country effects) and the development of financial intermediaries. According to the existing literature a thin trading stock market is more likely to exhibit larger fluctuation in prices. A sufficiently active banking system therefore allows stock market traders to smooth their trades, minimizing price volatility. Low transaction costs and a low degree of uncertainty increase the degree of co-movement with world markets because it promotes international capital flows and leads to smaller specific domestic influences. Another explanation comes from international trade theory. It is believed that countries with deeper and more efficient banking systems tend to trade more. A larger degree of openness increases sensitivity to foreign shocks. Therefore the combination induces an indirect positive association between financial development and international stock price co-movement via international trade. According to the last two theories, a negative relationship should be expected between the size of pure country effects and the development of financial intermediaries.

In terms of stock returns (original country effects), it is expected that there is negative link between the development of financial intermediaries and stock returns. It is expected that the more liquid is the banking system, the easier it is for stock market traders to smooth their trades. Low transaction costs and a low degree of political uncertainty decrease the country-specific risk associated with the stocks. Therefore the risk premium should also decrease.

A survey by Beck *et al.* (1998) provides a database including various popular and commonly available financial development and structure indicators. The choices of the financial development variables in this work are significantly inspired by this database. Three stock market development measures are used in this work: stock market size, stock market activity or liquidity and stock market efficiency.

Stock capitalization over GDP (MG in Table 6-1) shows the size of a stock market. More importantly it shows the extent to which companies access the stock market, relative to size of their country's economy. It also shows how many opportunities company managers have to diversify their investments.

The hypothesis of the link between the size of stock markets and stock prices is that larger financial markets exhibit higher asset prices. There are two theories behind this: supply and demand theory and international integration theory. (i) The classical supply-demand model with downward-sloping demand curves and upward sloping supply curves can also be applied to security pricing, because of the risk aversion imperfect substitution assumption. Therefore, assets with larger demand have a higher price (assume that the supply of assets in ESMs is relatively fixed in the short-term or the increase of supply is not sufficient to meet the increasing demand). (ii) In an international framework with segmented markets, this translates into a market size effect: larger financial markets exhibit higher asset prices. As summarized in the literature review, international financial integration can be regarded as an increase in market size, which brings an increase in total demand for assets (with lower transaction costs) leading to higher prices.

At the same time, international integration not only leads to higher demand, but also to closer links between domestic and global markets. Therefore there should be a negative relationship between the modulus country effect and market size, i.e. the bigger the stock markets the less closely they are linked to their domestic economic conditions. On the other hand, they may be more affected by global economic shocks and more closely linked to other stock exchanges.

The value of traded stock as a proportion of GDP (TG in Table 6-1) is a measure of stock market liquidity, capturing the willingness of investors to take part in the stock market and the ease/difficulty for listed companies to finance their projects through capital markets. The larger TG is, the more liquid the market.

However, as argued by Baltagi *et al.* (2007), high TG may be due to measurement error rather than more financial opportunities for firms/investors, because of varying international definitions of stock market transactions. The activity or liquidity of a stock market relative to its size is therefore defined as the stock turnover ratio, an indicator of stock market efficiency (TO in Table 6-1). Stock prices appear in both numerator and denominator of the turnover ratio, making it less susceptible to excess volatility and measurement error than stock trading value (Baltagi *et al.*, 2007). A big but inactive stock market will have a low turnover ratio whereas a small, but a more liquid market will have a high turnover ratio.

Overall, the relationship between liquidity and stock returns is far from being clear. In particular it seems to vary both with different measures and across emerging and developed markets. Turnover ratio has also been used as an indicator of liquidity in some studies. Therefore the hypotheses for TG and TO are the same.

When considering the relationship between stock market efficiency/liquidity and stock return there are two theories: 'Holding risk premium' and 'Added value from liquidity'. According to the 'holding period risk premium' theory, if investors are concerned about the holding period return net of trading cost, less liquid assets (smaller TG or TO) are expected to require higher risk premiums compared to more liquid assets. Therefore there should be negative relationship between stock returns and the liquidity measure of stock markets.

However previous studies show that according to the 'added value from liquidity' theory there is a positive relationship between turnover ratio and stock returns in emerging markets, which means investors will have higher returns if they invest in quick turnover stocks in emerging markets. This suggests that an active management of an index and its composition may lead to a high turnover (higher value of TG or TO) and an increase in its value. According to this theory, the more liquid the market, the more reward it provides to investors. So that according to this theory there is a positive relationship between turnover ratio and stock returns.

Considering the relationship between stock market efficiency/liquidity and modulus country effects, the negative link is expected. Less liquid markets (smaller TG or TO) are less attractive for foreign firms to list their securities due to the increased transaction costs and holding time. So that markets are less diversified in terms of cross-border listings becoming more isolated from global stock markets and more subject to domestic economic shocks. Therefore a negative association between the modulus country effects and the liquidity measure is expected.

Table A6-2 in the appendix includes the data for political quality (represented by the 'Freedom In The World Rating', a survey by Freedom House). The rating presents an annual evaluation of the state of global freedom as experienced by individuals. 'Freedom' is the chance to act spontaneously in a variety of fields outside the control of the government and other centers of potential domination. 'Freedom' is measured in two broad categories, 'political rights' and 'civil liberties', which are included as two institutional variables. Political rights enable people to partake freely in the political process, including the right to vote, to compete for public office, and to elect representatives who have a decisive impact on public policies and are accountable to the electorate. Civil liberties allow for the freedoms of expression and belief, associational and organizational rights, rule of law and personal autonomy without intervention from the state. In the survey, each country and territory is allocated a numerical rating on a scale of 1 to 7. A rating of 1 indicates the highest degree of freedom and 7 the least amount of freedom.

One of the major concerns of international investors is high volatility in emerging markets. Volatility makes investors require higher risk premiums to cover higher uncertainty, leading to increase of capital cost. Increasing financing cost may lead to decreasing incentives for firms to finance through stock markets. For international portfolio investors, political risk is associated with the uncertainty of future capital controls and risk in financial transfers (including local currency non-convertibility and inability to transfer foreign currency out of the country). It is generally believed that a market characterized as transparent and more protective to investors will be more attractive to international investors. Market transparency will allow investors access to market information and minimize the inconsistency in information available to different traders. Under exogenous shocks, the more transparent the markets the less likely it is that uninformed investors will increase market volatility. Thus it is hypothesized that a lower level of political risk leads to lower required stock returns. The less attractive environment will attract fewer foreign investors and lead to greater isolation of the emerging markets from the rest of the world, so that it will be more subject to domestic shocks. Therefore the higher the political risk, the higher the country effects.

6.3.2.3. Legal variables

The indicators of financial environment can be the quality of institutions, bureaucratic quality and rule of law (which can be divided into shareholder and creditor legal rights). Creditors have rights to claim collateral if debt nonpayment occurs and dividends are paid to shareholders because the securities they hold give them the right to vote out the managers. These property rights are not automatic but largely depend upon the legal rules of the jurisdictions where the securities are issued. Theoretically, a strong legal enforcement system could substitute for weak rules, given that effective and efficient courts can intervene and support investors who are abused by management. Therefore a legal environment with good quality legal rules and enforcement, especially better protection of shareholder rights should be positively linked to the size and depth of a country's capital market. The better the financial environment, the more attractive it is to international investors, making emerging markets more closely related to the rest of world and less subject to domestic shocks. At the same time, lower institutional risk would require a smaller risk premium.

La Porta *et al.* (1998) include the Corruption Index composed by International Country Risk Guide (ICR) as one of their general legal indicators. All the corruption risks assessed by ICR impact directly on the investment environment of an emerging market. Foreign investors are not only discouraged by strict government controls on license, currency exchange and loans but also by higher probability of being forced to bribe for bureaucratic procedures. One of the risks for international portfolio investors is associated with risk of financial transfers, local currency non-convertibility and transfer of foreign currency out of the country. More corrupt governments are more likely to impose capital controls. The less accommodating environment will attract fewer foreign investors and lead to greater isolation of an emerging markets from the rest of the world and greater sensitivity to domestic shocks. Since a lower score means a higher level of corruption, the relationship between the corruption index and country effects should be negative.

Modigliani and Miller (1958) regarded equity and debt as legal claims on the cash flows of firms. In corporate finance, financing through issuing equity or debt can have different impact on the rights attached to shares and debts. Holders of common shares have the right to take part in company management and to vote for important decisions but they cannot claim property rights ahead of creditors when firms go bankrupt. On the other hand, creditors do not take part in decision-making or firm management but they have prior claim on property when firms go bankrupt. The better creditor rights are protected, the less appealing will be shareholders' interests. In this kind of emerging market foreign investors find it less appealing to invest. Therefore such a market will be more isolated from other markets and more subject to domestic shocks, implying a positive link between the Creditor Rights index and modulus country effects.

According to existing studies, common law countries (countries whose legal origins are in common law) place more emphasis on private property rights and provide better protection to investors than civil law countries. Therefore stock markets in common law countries should attract more investors, with a positive impact on the performance of stocks. Recent studies show that an investor in a common law country may be more privileged and better protected by legal rules than investors in civil law countries (e.g. La Porta *et al.*, 1998).

The details of the data for law variables are shown in Tables A6-3 to A6-6 in the appendix.

6.3.3. Industry effect determinants

Tables 6-2 shows the five firm characteristic variables that are found to have explanatory power in explaining stock returns in different studies. They are market-to-book-value (MTBV), dividend yield (DY), price-earning ratio (PE), geographical concentration ratio (GEOG) and the Industrial concentration ratio (Herfindahl index--HERF). It is commonly believed that small firms have higher stock returns than bigger firms, and that value stocks (lower MTBV, higher DY or lower PE) have higher stock returns than growth stocks (higher MTBV, low DY, high PE). Therefore there are negative relationships between size, MTBV, PE and stock returns. Only DY is positively correlated with stock returns. However there is no empirical evidence or theory to provide predictions about the links between these accounting variables and (modulus) industry effects.

PE is measured as the price per share divided by the earnings per share (the net income of the company for the most recent 12 month period divided by number of shares outstanding). A higher PE means that investors are paying more for each unit of income. By relating price and earnings per share for a firm, one can analyze the market's valuation of a company's shares relative to the income the company is actually generating. Investors use the PE to compare the value of stocks. Growth stocks tend to have higher PE than value stocks. Investors not only define different investment strategies as 'growth' and 'value' but also a way investors make a cut at stocks for investment purposes. The idea of growth investing is to focus on a stock that is growing with potential for continued growth while the idea of value investing is to seek stocks that are under-priced and have the potential for an increase when a market correction occurs. A low PE (value stock) often is considered a signal that a stock is under-priced. A high PE (growth stock) often is considered a signal that a stock has potential for continued growth.

DY is defined as the most recent full-year dividend divided by the current share price. A higher dividend yield is considered to be desirable among investors. A high dividend yield may be evidence that a stock is under-priced or that the company has fallen on hard times so that future dividends will not be as high as previous ones. Similarly, a low dividend yield may be evidence that the stock is overpriced or that future dividends might be higher. The link between DY and stock return is positive.

According to conclusions in Campa and Fernandes (2006), a negative relationship between industry effect and geographic concentration is expected, suggesting that as an industry becomes more concentrated in particular countries, it is more affected by country-level idiosyncratic shocks and less subject to global industry shocks. Thus, global industry shocks should be more important as industries become more geographically dispersed.

6.3.4. Data description

In the appendix Tables A6-1 to A6-6 show the sources and available time periods of data for country effect determinants while Table A6-7 covers the data sources and available time periods of data for industry effect determinants.

No further processing of the political quality and law data was necessary but further transformation was done for the economic and finance data to suit the needs of this study. First, most of the raw data are denominated in their national currencies. The monthly exchange rates used in Chapter 3 were also used here to convert all values into U.S. dollars. Second, it was necessary to convert all the data frequencies to quarterly. While some of the GDP data are available quarterly, in some countries they are only available annually. Therefore the frequency conversion option in Eviews: 'low frequency to high frequency – quadratic: match sum' is used. The dependent variables and some macroeconomic variables such as risk-free interest rate, inflation rate and exchange rate are converted by using option: 'high frequency to low frequency – average observations'. Firm characteristics variables are available monthly. Therefore their frequencies were converted to quarterly data by using the option: 'high frequency to low frequency – average observations'

A large set of cross-country data is collected and converted for the purpose of the study. All data are time varying except for the law variables. Therefore an unbalanced panel across 13 countries over 20 years (from quarter 3/1984 to quarter 3/2004) is used in the country effect determinants regressions and an unbalanced panel across 11 industries over 20 years (from quarter 3/1984 to quarter 3/2004) is used in the industry effect determinants regressions.

6.4. Methodology

Campa and Fernandes (2006) is one of the few studies in the country and industry effects literature that attempts to explain the fundamental forces behind the country and industry effects. They address the underlying sources of country and industry effects by a two-step procedure: first, they calculate time series of pure country and industry effects by using a dummy variable decomposition method ($\gamma_{k,t}$ and $\beta_{j,t}$ respectively) and then they explain the variation in these factors by regressing the modulus pure country and industry effects ($|\gamma_{k,t}|$ and $|\beta_{j,t}|$ respectively) on different variables of the underlying characteristics of countries and industries. The methodology applied in this chapter is developed from the two-step procedure. Software STATA 9 has been used for all the panel tests and regressions in Chapter 6.

6.4.1. Country effect determinant model

The first step of the procedure has already discussed in Chapter 3. The pure country coefficients in Chapter 3 are used as dependent variables in this chapter. The second step of the procedure is to seek to explain what drives the time-series and cross-sectional variation of the country effects. To examine the issue pure country effects $\hat{\gamma}_k$ are modelled as a function of country k basic characteristics:

$$ACE = \theta_0 + \theta_1 M_{i,t}^k + \theta_2 I_{i,t}^k + \theta_3 G_i^k + \theta_4 F_i^k + e_{i,t} \qquad (6.1)$$

ACE: Modulus pure country effects for country k at time t

$M_{i,t}^k$: Macroeconomic variable vector including macroeconomic variable i for country k at time t

$I_{i,t}^k$: Institutional variable vector including institutional variables i for country k at time t

G_i^k: General law variables vector, including general law variables i for country k

F_i^k: Financial law variables vector, including financial law variables i for country k

$e_{i,t}$: The error term

In equation (6.1), following Campa and Fernandes (2006), the country factors are normalized at zero on the country average by construction, and therefore it is the size of the country factor that is relevant. Equation (6.1) focuses on the size of the impact of different determinants on country effects.

However to investors, it is not only important to know what variables drive the cross-sectional stock return variations but more important to know how these variables drive the cross-sectional stock return variations. The original country effects are essentially stock returns as well but they are part of the returns that reflect the geographical locations of the stocks. Therefore in equation (6.2) the original pure country effects are studied, focusing on the direction of influences of fundamental determinants on stock returns.

$$CE = \vartheta_0 + \vartheta_1 M_{i,t}^k + \vartheta_2 I_{i,t}^k + \vartheta_3 G_i^k + \vartheta_4 F_i^k + e_{i,t} \tag{6.2}$$

CE: Pure country effects for country *k* at time *t*

Recently a body of research has focused on the role of legal regimes in determining international differences in financial systems. However no studies have examined the link between legal regimes and stock returns. The purpose of equation (6.3) is to see whether the macroeconomic, institutional and legal regime variables have a different impact on country effects when the countries are classified by their legal origins. Equation (6.4) includes the same independent variables but examines their impact on nominal stock returns (i.e. the original country effects). Existing studies suggest the hypothesis that common law countries (or countries whose legal origins lie in common law) emphasize private property rights more and provide better protection to investors than do civil law countries. Therefore stock markets in common law countries should attract more investors, with a positive impact on the performance of stocks.

$$ACE = v_0 + v_1 M_{i,t}^E + v_2 I_{i,t}{}^E + v_3 G_i{}^E + v_4 F_i^E + v_5 M_{i,t}^F + v_6 I_{i,t}{}^F + v_7 G_i{}^F + v_8 F_i^F +$$

$$v_9 M_{i,t}^G + v_{10} I_{i,t}{}^G + v_{11} G_i{}^G + v_{12} F_i^G + e_{i,t} \tag{6.3}$$

$$CE = o_0 + o_1 M_{i,t}^E + o_2 I_{i,t}{}^E + o_3 G_i{}^E + o_4 F_i^E + o_5 M_{i,t}^F + o_6 I_{i,t}{}^F + o_7 G_i{}^F + o_8 F_i^F +$$

$$o_9 M_{i,t}^G + o_{10} I_{i,t}^{\ G} + o_{11} G_i^G + o_{12} F_i^G + e_{i,t} \qquad (6.4)$$

In equations (6.3) and (6.4), the modulus and original country effects are regressed on variable vectors partitioned according to the legal origins of the sample countries. Superscripts '*E*', '*F*' and '*G*' represent countries with English, French and German legal origins respectively.

6.4.2. Industry effect determinant model

The first step of the methodology has already been discussed in Chapter 3. The pure industry coefficients in Chapter 3 are used as dependent variables in this chapter. The second step is to explain what drives the time-series and cross-sectional variation of the industry effects. To examine the issue we model the pure industry effects (AIE) as a function of firm characteristics:

$$AIE = \zeta_0 + \zeta_1 PE_t^j + \zeta_2 DY_t^j + \zeta_3 MTBV_t^j + \zeta_4 HERF_t^j + \zeta_5 GEOG_t^j + e_t \qquad (6.5)$$

AIE: Modulus pure industry effects for industry *j* at time *t*

$MTBV_t^j$: Value-weighted Market-to-Book Value for industry *j* at time *t*

PE_t^j : Value-weighted price-earnings ratio for industry *j* at time *t*

DY_t^j: Value-weighted dividend yield for industry *j* at time *t*

$HERF_t^j$: Herfindahl index for industry *j* at time *t*

$GEOG_t^j$: Geographical concentration index for industry *j* at time *t*

In equation (6.5), following Campa and Fernandes (2006), the modulus pure industry effects are regressed on five firm characteristics variables: price-earning ratio, dividend yield, market-to-book-value, geographical concentration and industrial concentration (Herfindahl index).

As equation (6.2), in equation (6.6) the original pure industry effects are studied by focusing on the direction of influences of fundamental determinants on stock returns.

$$IE = \xi_0 + \xi_1 PE_t^j + \xi_2 DY_t^j + \xi_3 MTBV_t^j + \xi_4 HERF_t^j + \xi_5 GEOG_t^j + e_t \tag{6.6}$$

IE: Pure industry effects for industry *j* at time *t*

6.4.3. Regression methodologies

6.4.3.1. Panel data regression

Panel data regression has certain advantages compared with OLS. Panel data are suitable for studying data, which vary over time and cross-sectionally. Therefore it is appealing for this work where the stock return performance across different countries is studied over time. Second, a panel data set includes more data information, more degrees of freedom and reduced collinearity among variables, and therefore provides more efficient estimation than pure cross-sectional or time-series estimations. Third, panel data methodology gives researchers greater flexibility in controlling for the effects of individual-specific variables (i.e. country or industry heterogeneity) and time-specific variables. Omitting them may lead to biased estimations as in pure cross-sectional or time-series studies.

Country effect determinant models (equations (6.1) to (6.4)) are applied to the panel data set. However it is not self-evident whether pooled OLS, fixed-effects or random-effects regression should be used. Most panel data applications use a one-way error components model for the disturbances, with

$$e_{i,t} = \mu_i + v_{i,t}$$

where μ_i denotes the unobservable individual-specific effect and $v_{i,t}$ represents the remainder disturbance. μ_i is time-invariant and accounts for any individual-specific effect (in this case a country-specific effect) that is not included in the regression. The remainder disturbance, $v_{i,t}$, varies with individuals and time and can be regarded as the usual disturbance of a regression.

In the case of a fixed-effect model, μ_i is assumed to be a fixed parameter to be estimated while the remainder disturbances are stochastic with $v_{i,t}$ independently and identically distributed: $v_{i,t} \sim iid\left(0,\sigma_v^2\right)$. The explanatory variables of the model are assumed to be independent of $v_{i,t}$ for all i and t. It is appropriate to use a fixed-effect model if the focus is on a specific set of N firms and inference is restricted to the behavior of these firms. The fixed-effect least squares are also known as least squares dummy variables (LSDV). They suffer from a large loss of degrees of freedom.

The loss of degrees of freedom can be avoided if the μ_i can instead be assumed to be random. In this case

$$\mu_i \sim iid\left(0,\sigma_\mu^2\right)$$

$$v_{i,t} \sim iid\left(0,\sigma_v^2\right)$$

$$Cov(\mu_t, v_{i,t}) = 0$$

$$Cov(\theta_{i,t}, \mu_i, v_{i,t}) = 0$$

The random effects model is an appropriate specification when drawing N individuals randomly from a large population. The individual effect is characterized as random and inference relates to the population from which the sample is randomly drawn. In the random-effects framework, there are two fundamental assumptions. One is that the unobserved individual effects are random draws from a common population. The other is that the explanatory variables are strictly exogenous, i.e. the error terms are uncorrelated with (or orthogonal to) the past, current and future values of the regressors. And also when time-invariant observations are included in the model, it is more appropriate to use a random effects model. The fixed-effects model has been criticized for wasting useful information by dropping these time-invariant variables through the demeaning procedure.

Campa and Fernandes (2006) applied both time-series cross-sectional pooled regression and fixed-effect estimation to their country (industry) determinants model. They argue that the fixed-effect equation estimates a country (industry) specific coefficient (the constant term). This coefficient may be explained as the average absolute country effect over the sample. The constant term captures the fixed part of the pure effect of the particular country. Because a panel regression regards all variables as deviations from their means, the rest of the variation can be attributed to time-series variation in the independent variables. If some variation in the pure country effects can be explained by unobservable country fundaments, it will be more appropriate to use a fixed-effect model with country fixed effects. This procedure assumes that the unobserved heterogeneity is constant over time. Campa and Fernandes argue that it is reasonable to use fixed-effect regression because they believe that the main driving force in the time-varying country effects is time-series variation of independent variables and that significant unobservable differences may exist between the levels of country effects across countries.

6.5. Empirical results

6.5.1. Country determinants models with general variables results

6.5.1.1. Model selections for country effect determinants model

Table 6-3 shows the country determinants panel diagnostic test results, which provide guidance for selecting the panel regression method that should be used in this work. To choose between pooled OLS and fixed-effects models, *F*-tests on fixed-effects (within) regression are used. The null hypothesis is that all $\mu_i = 0$. If the *F*-test results are significant, then the null is rejected (pooled OLS is rejected in favor of the fixed-effects model). In the 'Firm effects (*F*-test)' row of Table 6-3, all the *F*-tests are insignificant except for equation (1). The *F*-test for equation (1) is significant at the 5% level, which means that pooled OLS is rejected in favor of fixed-effects. On the other hand, in equations (6.2) to (6.4) the *F*-tests are all insignificant, which means that pooled OLS cannot be rejected and that fixed-effects is not favored.

Table 6-3 Country determinants panel diagnostic test results

Table 6-3 shows the country determinants panel diagnostic test results, which provide guidance for selecting the panel regression method that should be used in this work. In general, for equation (6.1) a fixed-effects model with time effects and robust standard errors is adopted. For equations (6.2) to (6.4) a random-effects model with time effects and robust standard errors is adopted.

	Models with general variables		Models with variables classified by legal origins	
Test	Equation (6.1)	Equation (6.2)	Equation (6.3)	Equation (6.4)
Heteroskedasticity (Breusch-Pagan/ Cook-Weisberg test)	293.47***	6.16***	93.91***	39.52***
Firm effects (*F*-test)	1.87***	0.19	0.06	0.35
Time effects (*F*-test on time dummies)	49.53***	1.4e+07***	1.83***	1.51***
Breusch-Pagan LM Test	0.79	4.98***	5.83***	4.78***
Hausman Test	19.23#***	1.87	0.68	3.37

*** Significant at 5%
** Significant at 10%
# *V_b-V_B* is not positive definite. (*V_b-V_B* is a condition in STATA to guarantee a positive test statistic when STATA runs Hausman test to choose between fixed- and random-effects model. *V_b-V_B* is not positive definite means the difference between the error variance of the fixed effects estimate and the random effects estimate is not positive definite.)

Model specifications:

(6.1) $$ACE = \theta_0 + \theta_1 M_{i,t}^k + \theta_2 I_{i,t}^k + \theta_3 G_i^k + \theta_4 F_i^k + e_{i,t}$$

(6.2) $$CE = \vartheta_0 + \vartheta_1 M_{i,t}^k + \vartheta_2 I_{i,t}^k + \vartheta_3 G_i^k + \vartheta_4 F_i^k + e_{i,t}$$

(6.3)
$$ACE = v_0 + v_1 M_{i,t}^E + v_2 I_{i,t}^E + v_3 G_i^E + v_4 F_i^E + v_5 M_{i,t}^F + v_6 I_{i,t}^F + v_7 G_i^F + v_8 F_i^F + v_9 M_{i,t}^G + v_{10} I_{i,t}^G + v_{11} G_i^G + v_{12} F_i^G + e_{i,t}$$

(6.4) $$CE = o_0 + o_1 M_{i,t}^E + o_2 I_{i,t}^E + o_3 G_i^E + o_4 F_i^E + o_5 M_{i,t}^F + o_6 I_{i,t}^F + o_7 G_i^F + o_8 F_i^F + o_9 M_{i,t}^G + o_{10} I_{i,t}^G + o_{11} G_i^G + o_{12} F_i^G + e_{i,t}$$

To choose between pooled OLS and random-effects models, a Breusch-Pagan Lagrangian multiplier test is applied. This is used to test for heteroskedasticity in a linear regression model. The null hypothesis is that the variance of μ_i is equal to zero. If the test result is significant, then the null is rejected. In this case the random-effects model is favored. The Breusch-Pagan LM test row in Table 6-3 shows the test results for equations (6.1) to (6.4). Except for equation (6.1) all are significant at the 5% level. This means that for Equation (6.1) the hypothesis that μ_i has zero variance cannot be rejected and pooled OLS is favored. For equations (6.2) to (6.4), the nulls are rejected and a random-effects model is favoured.

To choose between fixed-effects and random-effects models, a Hausman test is used. Given a model and data in which fixed effects estimation would be appropriate, a Hausman test examines whether random-effects estimation would be almost as good. The hypothesis of the Hausman test is that random-effects estimation is consistent and efficient and that fixed-effects estimation is consistent but inefficient. The alternative is that random-effects estimation is inconsistent and fixed-effects estimation is consistent. The Hausman test row in Table 6-3 shows that only equation (6.1) has significant results. This means that the null is rejected and that it may be more appropriate to choose the consistent fixed-effects model. However this is not certain because $V\_b\text{-}V\_B$ is not positive definite, which does not meet the condition. For equations (6.2) to (6.4), all the Hausman test results are insignificant so that the null hypotheses cannot be rejected. It is reasonable to choose the consistent and efficient random-effects model in each case.

To summarize, for Equation (6.1), the *F*-tests favour fixed-effects over OLS, the Breusch-Pagan test favours pooled OLS over random-effects and the Hausman test seems to favour fixed-effects over random-effects. Overall these results suggest that a fixed-effects model should be used for equation (6.1). For equations (6.2) to (6.4) a random- effects model is appropriate.

The Breusch-Pagan/Cook-Weisberg tests for heteroskedasticity show results that are significant at the 5% level for all the equations. Therefore heteroskedasticity should be considered in building the model. Using *F*-tests for the joint significance of time dummies, shows results that are all significant at the 5% level, implying that there are time effects in all equations.

According to the above results, for equation (6.1) a fixed-effects model with time effects and robust standard error option is adopted. For equations (6.2) to (6.4) a random-effects model with time effects and robust standard error is adopted.

6.5.1.2. Regressions on modulus country effects

Table 6-4 shows the results from estimating equations (6.1) and (6.2). The third column shows the results of fixed-effects estimation with time dummies (robust standard errors). There are two significant macroeconomic variables: the exchange rate and the risk-free interest rate. Changes in the exchange rate are positively and significantly linked to the modulus country effects (a one-unit (positive/negative) change in the exchange rate leads to 38.8% (positive/negative) change in country shocks). This result is in line with the hypothesis in section 6.3.2.1. The risk-free interest rate is also positively significantly related to the modulus country effects (a one-unit change in the risk-free interest rate leads to 64.5% increase in country shocks), which provides support for the hypothesis in section 6.3.2.1. This shows that higher interest rates make banks more attractive than stock markets to investors (including overseas investors). This leads to less diversified and more isolated emerging markets, which are more subject to domestic shocks.

Openness, civil liberties and a creditor rights variable: LRR (Legal reserve required as a percentage of capital) appear with the expected sign but are not significant. The time-invariant corruption and creditor rights index are dropped from the fixed-effects regression with time dummies. The only financial intermediary development variable (PG) to appear in the equation is neither significant nor has the expected sign.

As indicated by the diagnostic test, fixed-effects is not necessarily the best model for equation (6.1). The Hausman test result does not give a clear indication as to whether fixed-effects or random-effects should be chosen. Results of fixed-effects show that fixed-effects have the disadvantage of wasting valuable information. On the other hand, all the legal variables are time-invariant and they play an important role. Hence, to use all the information, a random-effects model is also applied to same variables.

Table 6-4 Country determinants models with general variables—equation (6.1)-(6.2)

The appropriate models for country determinants with general variables have been chosen according to the country effects determinants panel diagnostic test results: Table 6-3.

Test	Equation (6.1)				Equation (6.2)	
Dependent variable	ACE				CE	
	Fixed-effects (robust st. error)		Random-effects (robust st. error)		Random-effects (robust st. error)	
Independent Variables	Without time dummies	With time dummies	Without time dummies	With time dummies	Without time dummies	With time dummies
OPEN	-0.292 (-1.58)	-0.058 (-1.37)	-0.024 (-0.63)	0.012 (0.78)	-	
EX	0.261*** (2.03)	0.388*** (5.85)	0.241** (1.84)	0.396*** (3.72)	-0.499*** (-5.86)	-0.528*** (-4.75)
INFL					0.016*** (3.47)	0.018*** (2.94)
INTEREST	0.336 (0.52)	0.645*** (2.07)	0.481*** (1.95)	0.532*** (2.83)		
PG	-0.007 (-0.80)	0.002 (0.65)	-0.009*** (-1.97)	-0.008*** (-3.94)	-0.004** (-1.22)	-0.006*** (-2.61)
TG					0.018*** (1.41)	0.022*** (2.63)
LIBERTY	0.022 (0.82)	0.002 (0.30)	0.015 (1.08)	0.006 (1.29)	0.004 (0.45)	0.001 (0.21)
EJ					-0.004 (-0.56)	-0.004 (-0.98)
CORR	(Dropped)	(Dropped)	0.029*** (3.22)	0.011*** (3.24)	-0.004 (-0.45)	-0.0003 (-0.05)
CR	(Dropped)	(Dropped)	0.037*** (4.46)	0.022*** (5.15)	0.001 (0.13)	0.001 (0.19)
LRR	0.185*** (2.11)	-0.030 (-0.12)	0.079*** (2.63)	0.097*** (5.31)		
ADR					0.008 (0.94)	0.007 (1.43)
Constant	0.217*** (1.98)	-0.047 (-0.44)	-0.144*** (-1.98)	-0.204*** (-3.32)	0.031 (0.54)	-1.372*** (-36.58)
R-squared	0.0025	.0.8330	0.0503	0.8489	0.0580	0.6332

*** significant at 5% ** significant at 10% *t*-stat ratio (fixed-effects) is in brackets, *z*-stat ratio (random-effects) is in brackets.

Note: The testing down procedure for Table 6.4 is shown in Tables A6-9a, b and c in the appendix. The correlation matrix of the pooled non-categorical variables table is added in the appendix as Table A6-8.

The fifth column in Table 6-4 shows the results of random-effects estimation with time dummies and robust standard error. The two significant macroeconomic variables: exchange rate and risk-free interest rate are still highly significant and there is little change in their coefficients. However, previously insignificant legal variables are now significant. First, the corruption index appears to be positively linked to the modulus country effects. The hypothesis in section 6.3.2.3. states that more corrupt governments are more likely to impose capital controls. The less accommodating investment environment will attract fewer foreign investors and lead to the emerging markets being more isolated from the rest of the world and more subject to domestic shocks. Since lower scores mean higher levels of corruption, the relationship between the corruption index and country effects should be negative. However the highly significant corruption index is positive in the random-effects regression. CORR appears to be significant but sign anomalies.

Another significant legal indicator is Creditor Rights (CR). Details of the index components are given in Table A6-3 in the appendix. In Table 6-4 the results show that creditor rights are positively linked to modulus country effects (every one-unit increase of creditor rights leads to 2.2% increase in domestic shocks on stock returns). This result is in line with the hypothesis in section 6.3.2.3.. The last significant legal variable is LRR (legal reserves required as a percentage of capital). Since LRR is also a creditor rights indicator, it has the same explanation as CR so it is expected to be positively linked to modulus country effects. Table 6-4 shows that LRR is indeed positively related to modulus country effects (every one-unit increase of LRR leads to 9.7% increase in domestic shocks on stock returns).

The only significant institutional variable is the measure of the activities of financial intermediaries: 'claims of money deposit banks on the private sector as a ratio of GDP' (PG). According to the analysis in section 6.3.2.2. a negative relationship should be expected between the size of pure country effects and the development of financial intermediaries (PG). Results in Table 6-4 support the hypothesis. Every one-unit change in PG leads to 0.8% decrease in domestic shocks on stock returns.

To summarize, more variables are significant with the expected signs in the random-effects estimation than in the fixed-effects estimation and the R^2 value of 0.84890 is slightly better compared to the fixed-effects estimation (0.8330). Results of the modulus country effect regressions show that the impact of domestic shocks on stock returns is influenced by various macroeconomic and legal variables and by the degree of development of financial intermediaries.

The only difference between the second and third columns is whether time dummies are considered. The same is applies to the fourth and fifth columns. In general the results are very similar with time dummies or without, although a few variables change in significance and/or sign. For example, the risk free interest rate becomes significant in fixed-effect estimation after including time dummies and its coefficient becomes twice as large. LRR appears highly significant and positive in the fixed-effects model but becomes insignificant and negative once time dummies are included. However the same phenomenon does not appear in the LRR results for the random-effects model. The only variable that changes sign in the random-effects regression is openness but neither coefficient is significant and both are fairly small in magnitude.

6.5.1.3. Regressions on nominal country effects

According to the diagnostic test results in section 6.5.1.1., the appropriate model for identifying the determinants of nominal country effects (stock returns) is the random-effects model with time dummies and robust standard errors. The last column in Table 6-4 shows the results.

Table 6-4 shows that four variables are highly significant. One of the two significant macroeconomic variables is EX. The hypothesis on the link between exchange rate changes and stock return in section 6.3.2.1 states that there should be a negative relationship between stock returns and changes of exchange rates. The results are in line with this expectation. Every one-unit increase in the exchange rate changes leads to 52.8% decrease in stock returns. Roll (1992) also found that exchange rates could explain a significant amount of national index returns denominated in a common currency. The results here have provided some support to Roll's finding.

The other significant macroeconomic variable is inflation (INFL), which is positively linked to stock returns. The coefficient shows that every unit increase in inflation rate leads to 1.8% increase in stock returns. This shows that, in the emerging markets sampled, stocks are a partial hedge against inflation rate (not at a one-to-one level).

The only measure of the activities of financial intermediaries to be significant is PG, which is negatively related to stock returns. This means that stock returns will become smaller as more companies in the private sector are financed through banks. The coefficient shows that every one-unit increase in PG leads to 0.6% decrease in stock returns. The negative link between the development of financial intermediaries and stock returns is in line with the expectation in section 6.3.2.2.

The only significant stock market development variable is the measure of stock market activity (TG) where a higher ratio implies a more active/liquid market. It appears to be positively related to stock returns. The coefficient shows that every one-unit increase in the TG ratio leads to 2.2% increase in stock returns. According to the 'Added value from liquidity' theory listed in section 6.3.2.2., active management of an index and its composition may lead to high turnover and an increase in the index value. According to this theory, a liquid market is more attractive to investors because of reduced holding time. Because assets can be thought of as traded financial goods, the classical supply-demand theory can also be applied to security pricing. Assets with larger demand have a higher price. Therefore the results here support the hypothesis.

The political quality variable 'Civil Liberties' (LIBERTY) appears in the regression with the correct sign, although it is not significant. It is positively related to stock returns in the regression, meaning that a higher score (less freedom) implies higher stock returns. Its coefficient shows that every one-unit decrease in freedom leads to 0.1% increase in stock returns. There seems to be no existing theory or empirical analysis of the link between civil liberties and stock returns. A possible explanation of the result is that lower civil liberties leads to higher political risk and more uncertainty, so that a higher risk premium is required to compensate for the risks.

There are four legal variables that appear in the regression although none is significant. The first is a general legal variable, 'efficiency of the judicial system' (EJ), which is negatively linked to stock returns (higher scores, indicating higher legal judicial efficiency, lead to lower stock returns). The coefficient means that every one-unit increase in efficiency level leads to 0.4% decrease in stock returns. A good legal environment (in terms of the quality and enforcement of legal rules) is positively linked to investor confidence so smaller risk premiums should be required. The second is the corruption index (CORR), which appears with a negative sign (a lower score, indicating a higher corruption level, leads to higher stock returns). This is in line with expectations. The risk of being forced to bribe, a hostile business environment and inefficient bureaucratic governance make emerging markets less attractive to investors, so that a higher risk premium is required to compensate for the risks.

Another insignificant legal variable is a financial legal variable 'Creditor Rights' (CR), which is positively linked to stock returns. Every one-unit increase in CR leads to 0.1% increase in stock returns. As discussed in section 6.3.2.3., conflicting interests between shareholders and creditors mean that better-protected creditor rights implies greater risk to shareholders and therefore a higher risk premium.

The last variable to appear is a shareholder rights variable, 'anti-director rights'

(ADR), which has a positive coefficient in the results (a higher score implies better protection of shareholder rights). The coefficient 0.007 says that every one-unit increase in ADR leads to 0.7% increase in stock returns. Compared with creditors, shareholders have the right to take part in the decision-making and operation of the firms. If the shareholder rights are well protected, it means that shareholders can make decisions to benefit their own interests (i.e. to maximize shareholder value). At the same time, it is believed that better protection of shareholder rights is positively linked to the size and depth of a country's capital market, thereby increasing demand for assets and leading to higher asset prices (assuming in a segmented markets with relatively stable supply of assets). The better shareholder rights are protected, the more the add-in value that shareholders obtain, so there should be positive relationship between protection of shareholder rights and stock returns.

Including time dummies in the random-effects model does not change the results to any great extent – signs are still the same for all the variables, coefficients sizes are similar and the significance levels of the variables are the same. However, the R^2 value increases from 0.0580 to 0.6332, implying that the model fitness is considerably improved by including the time dummies.

6.5.2. Country effect determinants with variables classified by country of legal origin

6.5.2.1. Modulus of country effects with variables specified by country of legal origins

Table 6-5-1 shows the regression results for *ACE* with variables specified by country of legal origins. In order to examine whether cross-sectional variations in stock returns can be explained by legal origins, the same variables are adopted in the regression but are identified separately according to the origins of the legal system of the country in which the market is located. The regression results for equation (6.3) are similar to those of equation (6.1). In this section (random effects model without time dummies), the differences are the focus of discussions.

Table 6-5-1 Country determinants models (ACE) with variables specified by country of law origin – equation (6.3)

Models with variables identified by country of legal origin--- Equation (6.3)						
Dependant variable	ACE					
	Random-effects without time dummies (robust st. error)			Random-effects with time dummies (robust st. error)		
Independent Variables	**English** law	**French** law	**German** law	**English** law	**French** law	**German** law
OPEN	0.056*** (2.45)	-0.208*** (-1.45)	0.394*** (3.09)	0.025 (1.09)	-0.020 (-0.12)	0.238** (1.60)
EX	0.190 (1.12)	0.366*** (2.90)	0.398 (1.12)	0.155 (0.94)	0.398*** (2.96)	0.424 (1.39)
INFL	0.178 (0.58)	-0.003 (-0.97)	-0.011 (-0.01)	0.115 (0.38)	-0.002 (-0.74)	-0.566 (-0.67)
INTEREST	2.287** (1.87)	0.776*** (2.85)	1.540 (1.18)	0.832 (0.63)	0.614*** (2.17)	0.702 (0.46)
PG	-0.0004 (-0.14)	0.009 (0.99)	-0.009*** (-2.31)	-0.00007 (-0.02)	-0.002 (-0.17)	-0.006 (-1.09)
MG	-0.006*** (-4.13)	-0.0008 (-0.17)	-0.017*** (-2.43)	-0.005*** (-3.28)	-0.0003 (-0.06)	-0.011 (-1.48)
TG	0.057*** (3.18)	0.165*** (2.37)	0.019** (1.86)	0.062*** (3.18)	0.129*** (1.94)	0.009 (0.91)
CORR	0.0008 (0.15)	-0.036 (-1.81)	0.007 (0.42)	0.002 (0.45)	-0.009 (-0.42)	-0.0004 (0.03)
CR	-0.016*** (-1.89)	0.013 (0.65)	-0.061** (-1.69)	-0.009 (-0.99)	0.002 (0.07)	-0.020 (-0.56)
LRR	-1.258*** (-6.27)	0.628 (1.14)		-1.162*** (-5.44)	-0.067 (-0.11)	
Constant	0.133*** (6.28)			0.174*** (2.30)		
R-squared	0.2806			0.4113		

Notes: *** Significant at 5%, ** significant at 10%, t-stat ratio (fixed-effects) in brackets, z-stat ratio (random-effects) in brackets

Table 6-5-2 F-test on the coefficients (from Table 6-5-1) of variables classified by countries of law origins

OPEN	E	F	G	*EX*	E	F	G	*INFL*	E	F	G	*INTEREST*	E	F	G	*PG*	E	F	G
E	-			E	-			E	-			E	-			E	-		
F	✓	-		F		-		F		-		F		-		F		-	
G	✓	✓	-	G			-	G			-	G			-	G	✓	✓	-
MG	E	F	G	*TG*	E	F	G	*CORR*	E	F	G	*CR*	E	F	G	*LRR*	E	F	G
E	-			E	-		✓	E	-			E	-			E	-		
F		-		F		-	✓	F	✓	-		F		-		F		-	
G	✓	✓	-	G	✓	✓	-	G		✓	-	G		✓	-	G			-

Notes:

1. 'E': country of English law origin; 'F': country of French law origin and 'G': country of German law origin
2. Table 6-5-2 shows the F-test results on the null that the coefficients of variables classified by countries of different law origins are equal to each other, for example, $OPEN^E = OPEN^F$ and/or $OPEN^E = OPEN^G$ and/or $OPEN^F = OPEN^G$
3. Models with time dummies are shown above the diagonal (in gray shade) and those without time dummies are shown below the diagonal.
4. A box with '✓' means the null is rejected, a box without '✓' means the null is accepted.

Openness variables in countries of both English and French origin capture time effects before time dummies are included. Another important result is that the signs of the openness coefficients differ across the three origins. Openness in countries with English and German origins appears to be positively linked to modulus country effects but the link is negative for countries with French origins. The *F*-test results in Table 6-5-2 show that neither variables classified by countries of English and French origins nor variables classified by countries of German and French origins are equal to each other when time dummies are not included in the model. However it shows that coefficients of OPEN are equal statistically for countries classified by English and German law origin.

There is as yet no theory or empirical evidence on the link between the modulus country effects and goods trading openness. There are some potential explanations. It can be explained by the relationship between international trade and stock markets in terms of cross-border security pricing and international diversification strategies. A higher degree of market co-movement will lead to faster price adjustment of equity prices to information flows among related countries, promoting more information-transparent markets. The more transparent the markets are, the less likely they are to have uninformed investors who increase the volatility of the markets. With the weakest investor protection (especially shareholder rights) countries with French legal origins should benefit more from openness than countries with other legal systems. The more transparent and efficient capital markets attract more foreign investors, which in turn widen the markets and create more diversification opportunities. It leads to the French legal origin countries more integrated with the rest of the world and less subjected to domestic shocks. In English and German origin countries, where the legal environments are friendlier to investment and private property, openness may not bring as much benefit as it does to countries with French origins. Because these markets are more competent and complete than others, integration with less efficient or less investor-friendly countries may not be beneficial.

Three macroeconomic variables appear in the regression: exchange rate, inflation and risk-free interest rate. The first macroeconomic variable is changes in the exchange rate. This is positively linked to modulus country effects for all legal origins. The explanation of equation (6.1) can be applied here as well.

The coefficients on changes in the exchange rate have the same sign in the three origins but only the coefficient for French legal origins is significant. The coefficient is of similar magnitude for markets with French and German origin but is much smaller for English origins. It seems that stock returns in the civil law countries are more sensitive to the exchange rate changes (especially for French origins, where protection for investors and property rights are weakest). The more competent and flexible common law system provides better protection to investors, promotes property rights and seems to strengthen investor confidence. Furthermore, the more complete and powerful capital markets in common law countries provide more financial tools and greater diversification opportunities to investors and so mitigate the impact of exchange rate changes. However, the differences in the coefficients across law origins are not supported by the F-test in Table 6-5-2.

Although the inflation rate is insignificant in all the legal origins there are differences in signs. For English legal origins, the inflation rate is positively linked to the modulus country effect. A one-unit increase in inflation rate leads to 11.5% increase in country shocks (the higher the inflation rate, the larger the country effect for this legal origin). In contrast, the links are negative for French and German legal origins (civil law origins). Table 6-5-2 shows the results of F-test of the null hypothesis that the coefficients of variables classified by countries of different law origins are equal to each other. However, similar to EX, the differences in the inflation variables are not supported in Table 6-5-2. There seems to be no published theory or empirical study explaining the link between the legal origins of markets and the impact of macroeconomic variables on stock returns.

One possible explanation is that legal origin has a different impact on macroeconomic policy by indirectly influencing the structure of the financial system. Recent research has illustrated how a sound structure can contribute to the development of the financial system. More recent studies show that with their inflexible judicial systems, civil law countries are normally bank-oriented because the role of banks in such countries is to use their power to solve conflicts and enforce contracts without court intervention. A flexible judicial system along with a market-oriented financial system leads to more capital-intensive investment. According to this theory, capital markets are more developed in countries with common law origins. In a high inflation period, if the 'Fisher hypothesis' does not stand (or at least investors do not believe it stands) then stocks are not good hedges against inflation (in section 6.5.2.2., the inflation rate is indeed negatively linked to nominal stock returns). This is why higher inflation in emerging market countries of common law origin makes investors more reluctant to invest. This leads to less investment in these common law origin countries. On the other hand, in civil law countries, where banking systems are more developed or more powerful in the financial system, it is more attractive for investors to deposit their money in the banks rather than invest in stocks. If monetary policy works as theory suggests then during high inflation periods interest rates increase to cool down the economy. Therefore more investors (including foreign investors) would invest in civil law rather than common law countries. This leads to wider and more integrated markets (which are less subject to domestic shocks) in civil law countries than in common law countries. This may explain the positive relation between inflation and modulus country effects in common law countries and the negative relation in civil law countries.

The third macroeconomic variable, the risk-free interest rate, has similar results to EX. It appears with the same sign for all three legal origins, the coefficients have similar sizes and it is significant only for French law origin. It seems that stock returns are more sensitive to changes in interest rates in markets with French law origins, where investor and private property protection are weakest.

Another result worth noticing is that for English origins the marginally significant risk-free interest rate becomes insignificant after including time dummies. The same phenomenon appears in German law origin for three variables: TG (trading value over GDP), MG (market capitalization over GDP) and PG (activities of money deposit banks). It seems that these three variables may capture time effects, since they become in significant when time effects are included in the regression.

The same phenomenon as OPEN appears in the corruption index and creditor rights variables, which are supported by the *F*-test results in Table 6-5-2. Although none are significant, they appear with different signs. The corruption index is positively linked to the modulus country effects in countries with English and German origins but negatively linked in countries of French origin. As discussed in section 6.3.2.3, the relationship between the corruption index and country effects should be negative.

In Table A6-4, the average corruption score is 5.39 for countries of French legal origin and 6.23 and 6.08 for countries with English and German origins respectively. The explanation given for openness can be applied here. With the weakest investor protection, countries with French origins should benefit more than countries with other legal systems. On the other hand, in countries with English and German origins, where the legal environments are stricter and more protective of property rights, corruption may be of less concern. As it is shown in Table 6-5-1, the corruption index coefficients are much larger for French legal origins than either English or German legal origins.

Another significant legal indicator is Creditor Rights (where a higher score is less appealing to shareholders). CR is positively linked to modulus country effects for French legal origins but negatively linked for both English and German origins. The explanation in section 6.3.2.3 can be applied here. With the weakest legal protection for investors and more powerful banking systems, countries with French origins attract even less investment when CR is higher. This makes French legal origin countries more isolated from the rest of the world and more subject to domestic shocks.

According to the existing literature, the key issue of financial market structure is not the choice of bank financing or equity market financing but the institutional factors behind the financial systems. The key is to create an environment in which financial institutions can function efficiently and maximize their comparative advantages. In countries with English and German origins, where legal environments already offer more protection to shareholders and private property, better creditor protection will complement the development of powerful capital markets and create more balanced financial systems. Hence higher CR scores (better creditor protection) are likely to mean more attractive investment, especially to foreign investors, leading to more integrated markets and smaller domestic shocks.

To summarize, different legal origins appear to contribute in various ways to explanations of cross-country variation in country effects. The different effects are in line with the theory of legal and financial development. The results in Table 6-5-2 to some extent support the theory that there is difference cross-countries with various legal origins, especially variables classified by the country of French law origin behave differently with variables classified by the country of English and German law origins.

6.5.2.2. Regression on nominal stock returns with variables specified by country of legal origins

Table 6-6-1 shows the results of regression of nominal stock returns (the original country effects) on variables specified by country of legal origin. Although the regression with time dummies has a slightly higher R^2, there is little difference in general whether including time dummies. The following discussion focuses on regressions with time dummies. Different patterns of significance across legal origins are evident in the table, although there are some similarities. Stock returns are sensitive to inflation, the changes of exchange rate, openness and creditor rights in markets with English legal origins and sensitive to inflation, changes of exchange rate, stock market activity (TG) and stock market size (MG) in countries with French legal origins. In countries with German origins stock returns are sensitive only to the exchange rate. Some variables (EX, TG, MG and OPEN) have the same sign as predicted in section 6.3.2., with no difference across legal origins, so the explanations of section 6.3.2. still apply.

Two other variables are of particular interest. First, inflation is positively related to stock returns in countries with French origins. This is in line with the finding in section 6.5.1.3, so it also provides empirical evidence to support the Fisher hypothesis. The coefficient of 0.015 means that every one-unit increase in inflation leads to 1.5% increase in stock return.

However, inflation in countries of English and German origin is negatively related to stock returns, suggesting that stocks are not a good hedge against inflation in such countries. As discussed earlier, the relationship between inflation and stock returns has been a long-term unsolved puzzle. The literature review of section 6.3.2. has summarized potential explanations and empirical findings of the negative relationship but none of these has investigated legal origins. The difference between French, English and German legal origins is that countries with French origins are weakest in protecting private property and promoting capital markets. In countries with English and German origins, where the relationship between inflation and stock returns is negative, maybe the better institutional and legal environments add extra value so that less of a premium is needed. The increased risk premium for covering inflation risk is less than the decreased premium for good legal environment. Therefore it looks like stocks do not move one-to-one with inflation in countries with English and German legal origin. Table 6-6-2 shows the *F*-test results on the null that the coefficients of variables classified by countries of different law origins are equal to each other. Results of 'INFL' show that, with or without time dummies, the coefficients classified by countries of English and French legal origins are not equal. On the other hand, the null that coefficients classified by countries of English and German legal origins are equal cannot be rejected.

Second, CR (Creditor Rights) has a positive relationship with stock returns in countries with English and German origins. This is in line with the results for CR in section 6.5.1.3. Therefore the same explanation can be applied. However, in countries with French origins CR has a negative relationship with stock returns. Table 6-6-2 shows that, with or without time dummies, the coefficients classified by countries of English and French legal origins are not equal. On the other hand, the null that coefficients classified by countries of English and German legal origins are equal cannot be rejected. There are two potential explanations for this phenomenon. One is that countries with French legal origins have the weakest protection of creditor rights. In Table A6-6, the average CR for French origin is 1.25 but the averages for English and German origins are 4.17 and 2.5 respectively. Therefore an improvement in the CR score in countries of French origin can be regarded as an improvement in private property and investment protection, reducing the required risk premium and leading to lower stock returns in these countries. Second, French origin countries are also found to have stronger or more dominant banking systems. The better protection of creditor rights may attract investors to save money in banks rather than invest in capital markets. As with other commercial goods, decreasing demand may lead to a reduction in stock prices. On the other hand, firms would predominantly use bank credit to finance new projects in such a system. This means that there would be fewer shares issued and hence a reduction in supply as well as a reduction in demand. Therefore the share price will only reduce if supply decreases by less than demand.

To summarize, although the *F*-tests in Table 6-6-2 do not always reject the nulls, different legal origins appear to contribute differentially to the explanation of cross-country variation in stock returns. The different effects are in line with theories of legal and financial development. Countries with English and German legal origins

Table 6-6-1 Country determinants models (CE) with variables classified by country of law origin – equation (6.4)

In order to examine whether cross-sectional variations in stock returns can be explained by legal system origins of the markets, same variables as equation (6.2) are adopted in the regression but all of them identified separately according to the legal origin of the market.

Models with variables specified by country of different law origins --- Equation (6.4)						
Dependant variable	**CE**					
	Random-effects without time dummies (robust st. error)			Random-effects with time dummies (robust st. error)		
Independent Variables	**English** law	**French** law	**German** law	**English** law	**French** law	**German** law
OPEN	-0.057*** (-2.48)	-0.106 (-0.89)	-0.140 (-0.84)	-0.062*** (-2.63)	-0.090 (-0.75)	-0.111 (-0.50)
EX	-0.578*** (-1.97)	-0.399*** (-3.58)	-1.086*** (-2.67)	-0.761*** (-2.14)	-0.452*** (-4.02)	-1.354*** (-2.32)
INFL	-0.713*** (-2.14)	0.012*** (2.07)	-0.664 (-0.60)	-0.786*** (-2.41)	0.015*** (2.68)	-0.323 (-0.29)
MG	0.002 (1.13)	0.007** (1.66)	0.001 (0.14)	0.001 (1.07)	0.006 (1.52)	0.0003 (0.03)
TG	0.014 (0.58)	0.329*** (3.45)	0.014 (1.03)	0.017 (0.68)	0.318*** (3.21)	0.017 (1.09)
CR	0.013** (1.69)	-0.036 (-1.33)	0.017 (0.46)	0.016** (1.94)	-0.036 (-1.36)	0.006 (0.15)
Constant	0.019 (1.08)			-0.096 (0.61)		
R-squared	0.1646			0.2874		

Note: *** significant at 5% ** significant at 10% t-stat ratio (fixed-effects) is in the brackets, z-stat ratio (random-effects) is in the bracket

Table 6-6-2 *F*-test on the coefficients (from Table 6-6-1) of variables classified by countries of law origins

OPEN	E	F	G	*EX*	E	F	G	*INFL*	E	F	G
E	-			E	-			E	-	✓	
F		-		F		-		F	✓	-	
G			-	G		✓	-	G			-
MG	E	F	G	*TG*	E	F	G	*CR*	E	F	G
E	-			E	-	✓		E	-	✓	
F		-		F	✓	-	✓	F	✓	-	
G			-	G		✓	-	G			-

Notes:

1. 'E': country of English law origin; 'F': country of French law origin and 'G': country of German law origin
2. Table 6-6-2 shows the *F*-test results on the null that the coefficients of variables classified by countries of different law origins are equal to each other, for example, $OPEN^E = OPEN^F$ and/or $OPEN^E = OPEN^G$ and/or $OPEN^F = OPEN^G$
3. Models with time dummies are shown above the diagonal (in gray shade) and those without time dummies are shown below the diagonal.
4. A box with '✓' means the null is rejected, a box without '✓' means the null is accepted.

are more similar to each other. Countries with French legal origins seem to have their own influence on stock returns.

6.5.3. Industry determinants models results

6.5.3.1. Model selections for industry effect determinants model

Table 6-7 shows the diagnostic test results that provide a guide for selecting the panel regression methods to be used in examining the determinants of industry effects. First, to choose between pooled OLS and fixed-effects models, *F*-test on fixed-effects (within) regression is used. The null hypothesis is that all $\mu_i = 0$. Table 6-7 shows that the *F*-test is significant for equation (6.5) at the 5% level, rejecting pooled OLS in favour of fixed-effects. On the other hand, the *F*-test for Equation (6.6) is insignificant, which means that pooled OLS cannot be rejected. Second, a Breusch-Pagan Lagrange multiplier test is applied to choose between pooled OLS and random-effects models. The null hypothesis of the Breusch-Pagan LM test is that the variance of is μ_i equal to zero. Table 6-7 shows that for equations (6.5) and (6.6) the results are significant at the 5% level, which means that a random-effects model is favoured. Third, a Hausman test is used to choose between fixed-effects and random-effects models. Table 6-7 shows that only equation (6.5) has a significant Hausman test result, which means that it may be more appropriate to choose the consistent fixed-effects model. However, this is not certain because *V_b-V_B* is not positive definite, which does not meet the required condition. For equation (6.6) the Hausman test result is insignificant, meaning that it is reasonable to choose the consistent and efficient random-effects model.

For equation (6.5) the null hypothesis of no heteroskedasticity is rejected at the 5% level of significance by the Breusch-Pagan/Cook-Weisberg test, so that heteroskedasticity should be considered in building the model. On the other hand, the test result is insignificant for equation (6.6), which means that the null is not rejected and heteroskedasticity does not need to be considered in building the model.

Table 6-7 Industry determinants panel diagnostic test results

Table 6-7 shows the industry determinants panel diagnostic test results. To summarize, for equation (6.5) fixed-effects model with time effects and robust standard error option is adopted. For equation (6.6) random-effects model with time effects without robust standard error option is adopted.

Test	Equation (6.5)	Equation (6.6)
Heteroskedasticity (Breusch-Pagan/ Cook-Weisberg test)	239.51***	0.04
Firm effects (*F*-test)	3.37***	0.26
Time effects (*F*-test on time dummies)	65.89***	9.66***
Breusch-Pagan LM Test	11.59***	3.25**
Hausman Test	25.33[1]***	1.02

*** Significant at 5%

** Significant at 10%

[1]. *V_b-V_B* is not positive definite.

Model specifications:

$$(6.5)\ AIE = \varsigma_0 + \varsigma_1 PE_{i,t}^j + \varsigma_2 DY_{i,t}^j + \varsigma_3 MTBV_{i,t}^j + \varsigma_4 HERF_{i,t}^j + \varsigma_5 GEOG_{i,t}^j + e_t$$

$$(6.6)\ IE = \xi_0 + \xi_1 PE_{i,t}^j + \xi_2 DY_{i,t}^j + \xi_3 MTBV_{i,t}^j + \xi_4 HERF_{i,t}^j + \xi_5 GEOG_{i,t}^j + e_t$$

F-tests are used to test the joint significance of time dummies. The null is that time dummies are jointly equal to zero and that there is no time effect. Table 6-7 shows that, for both equations, the *F*-test results on time dummies are all significant at the 5% level, implying that there are time effects in both equations.

For equation (6.5) a fixed-effects model with time effects and robust standard error is adopted. For equation (6.6) a random-effects model with time effects is adopted.

6.5.3.2. Regressions on modulus industry effects determinants

The second and third columns of Table 6-8 show the regression results for the determinants of modulus industry effects. Two out of five variables are highly significant (with time dummies). First, price-to-earning (PE) ratio is positively related to modulus industry effects (the higher the PE ratio, indicating that stocks are less valuable, the higher the impact of global industry effects on stock returns). The coefficient 0.0003 means that every one-unit increase in PE ratio leads to 0.03% increase in industry effects size. This coefficient was -0.003 before the time dummies were included. However from the definition of 'growth' and 'value', it is clear that time is essential in these two investment strategies, especially for overpriced stocks it is more important for stocks to grow in the longer term. With an increase in PE, stocks can change from 'value' to 'growth' over time. It seems that a higher potential for growth makes stock returns less subject to domestic shocks but more subject to global industry effects. It is not very clear why this is the case.

Table 6-8 Industry effect determinants model results — equation (6.5) and (6.6)

Table 6-8 shows the regression results of modulus industry effects determinants. Equation (6.5) is the regression for modulus industry effects (AIE). Equation (6.6) is the regression for original industry effects (IE).

Test	Equation (6.5)		Equation (6.6)	
	Fixed-effects (robust st. error)		Random-effects	
Dependent variable	AIE		IE	
Independent Variables	Without time dummies	With time dummies	Without time dummies	With time dummies
DY	-0.003 (-1.22)	0.001 (0.76)	0.002 (0.28)	0.002 (0.46)
MTBV	-0.007** (-1.84)	-0.0003 (-0.18)	-0.0009 (-0.10)	0.0007 (0.09)
PE	-0.003*** (-3.30)	0.0003*** (2.58)	-0.00005 (-0.04)	0.0001 (0.11)
HERF	0.047*** (2.07)	-0.002 (-0.24)	-0.009 (-0.92)	-0.008 (-0.92)
GEOG	0.033** (1.61)	-0.022*** (-3.04)	0.012 (1.22)	0.006 (0.69)
Constant	0.018*** (7.40)	0.035*** (6.20)	0.0007 (0.25)	0.015 (1.29)
R-squared	0.0512	0.8499	0.0018	0.4939

Note: *** Significant at 5% ** significant at 10%

t-stat ratio (fixed-effects) is in the brackets, z-stat ratio (random-effects) is in the bracket

The other significant variable is the geographical concentration of industry (GEOG). It also changes sign before and after including time dummies. GEOG is positively linked to the size of industry effects but after adding in time dummies, the relationship becomes negative. The finding of the negative link supports the results of Campa and Fernandes (2006). The detailed discussion refers to section 6.3.3.

Industrial concentration is measured by the Herfindahl index (HERF), which is significant and positively related to industry effects before adding in time dummies. However, similar to GEOG, HERF becomes negatively but insignificantly linked to modulus industry effects after time dummies are included. It means that with higher HERF (i.e. bigger firms), the global industry impacts become smaller. On the one hand, it can be argued when firms become bigger, they become more resilient to normal size exogenous shocks. On the other hand, it can be argued that if the firm is multinational, then the bigger it is (or the less specified in production) the larger will be the impact on it of global industry effects. The negative relationship between global industry impact and firm size is significant but sign anomalies in this work. The significance of time effects may imply that the time effects are a proxy for excluded variables that have strong time patterns. The same phenomenon also appears in MTBV. It is also significant before considering time dummies but becomes insignificant when time dummies are included.

6.5.3.3. Regression on original industry effects determinants

The fourth and fifth columns of Table 6-8 show the regression results for the determinants of the original industry effects. None of the variables are significant in explaining stock returns, with or without time dummies. Almost all the variables have the expected signs when time dummies are not included. For example, MTBV and PE are negatively related to stock returns. DY is positively related to stock returns.

HERF is a measure of firm size and this has a negative coefficient with or without time dummies. The higher the index, (the less competitive is the industry and the bigger are the firms), the smaller the stock returns are. Although the coefficients are not significant, the negative relationship between stock returns and firm size is the same as expected.

Geographical concentration of the industry is positively linked to stock returns whether or not time dummies are included. A higher concentration ratio implies that an industry is more concentrated in particular countries. There appears to be no theory explaining the positive relationship. A potential explanation is that when an industry becomes more concentrated in particular countries, it is more affected by country-level idiosyncratic shocks. Therefore a less diversified geographical location of industry may lead to a higher level of risk for the industry, so that a higher risk premium will be required for investment.

When time dummies are included MTBV and PE become positively linked to stock returns while all other signs remain the same. This relationship may be affected by the omission of important time varying variables and therefore may not be a true reflection of the links between MTBV, PE and stock returns.

To sum up, firm characteristics do have some power to explain industry effects but the explanation is far from complete. Other variables, especially time varying industry/firm level variables may be required to explain stock returns.

6.6. Conclusions

Inspired by the pioneer studies of Campa and Fernandes, (2004) and Phylaktis and Xia (2006b), this study tries to use some well-studied macroeconomic, institutional and legal variables to explain stock return performance in terms of the size and direction of these variables' impacts.

Based on Campa and Fernandes, (2004), the time series of pure country and industry effects reported in Chapter 3 are used in the second stage of their two-stage procedure. Using an unbalance panel across 13 countries and 20 years of quarterly data, various panel regression methods are chosen according to diagnostic tests. Random-effects estimation with time dummies and robust standard errors is most commonly used. Two different dependent variables are first regressed on the same set of general variables. Then, in order to test whether stock returns are affected by the legal origins of the different countries, the same dependent variables are regressed on independent variables that are classified according to the legal origins of the countries.

The results show that macroeconomic variables, in particular 'changes in exchange rate' and 'risk-free interest rate' explain 92.8% of the modulus country effects. The banking sector variable 'activity of commercial banks' has negative links to country effects. Legal variables, especially finance-related legal variables, are also significant in explaining country effects.

In general the results suggest that high financing costs, high economic risk and smaller demand for stocks make it less attractive for international investors to finance their projects in emerging stock markets. Being less attractive to international investment makes emerging markets more isolated from the rest of world and more subject to domestic shocks. In terms of the legal environment, those emerging markets which have better protection of shareholder rights, are more attractive to foreign investors. This further leads the markets to be less isolated from the rest of the world and less subject to domestic shocks.

The results also show that inflation and exchange rate changes can explain about 55% of stock returns. The directions of their influences on stock returns are as expected. Although there is a positive relation between inflation and nominal stock returns, only a small portion of the inflation risk is hedged by stock returns. It seems that investors cannot fully rely on stocks to act as a hedge against inflation.

At the same time, banking and stock market development variables (PG and TG) contribute only 2.8% in explaining stock returns, with the expected signs. In general this shows that more efficient and developed financial sectors (including both banking and stock markets) can smooth trading, improve information transparency and reduce risks. The improved financial environment boosts investor confidence and therefore lowers the required risk premium.

In general, countries with different legal origins show different interactions between explanatory variables and stock returns. Both English and German legal origins provide better protection to investors, greater private property rights and lower risks, leading to lower risk required premiums. Regressions using variables classified by different legal origins reveal some interesting and detailed interactions between those variables and stock returns. The results suggest that the legal origin of a market has an influence on stock returns. In particular, this gives support to the 'adaptability mechanism', which explains the relationship between legal origin and financial development through the adaptability of different legal systems (see section 6.2.2.8.). The adaptability mechanism predicts that countries with French legal origins (not necessarily France itself) are less likely to develop efficient financial systems than countries with legal origins in German civil law or, especially, common law. The empirical results for variables classified by legal origin suggest that in most cases variables have different impact on stock returns in countries with French legal origins compared to countries with English and German legal origins. This is explained by the weakness of the French legal system in protecting private property and promoting investment.

Some variables have been found that can explain country effects in stock returns but the inclusion of time dummies sometimes causes coefficients to change in sign. This implies that there may be important time varying variables that were not included in this study. Therefore their time varying properties are captured by the time dummies.

There is a possibility that the predominant country effects identified in Chapter 3 and existing studies are not due to their underlying importance but to imperfections in the basic methodologies that are widely used in the related literature. An overestimation of the importance of country effects may arise when using single currency nominal returns that include the effects of exchange rates, inflation rates and risk free rates in the decomposition exercise. After removing the three potential biases, none of the test results show that the dominated country effects disappear or become weaker. On the contrary, to some extent, the country effects are stronger than before. Chapter 6 investigates the links between stock returns and these three macroeconomic variables from different perspectives. The results show that a significant amount of stock returns can be explained by two of these three variables. The possible explanations for the different outcomes in Chapters 4 and 6 are the following:

1) In Chapter 4, one possible explanation has been discussed: the removal of the exchange rate seems to expose all the differences between local currency values across countries, which are shown on the even stronger country effects.

2) Exchange rate, inflation rates and risk-free interest rates vary less across countries than do stock returns within and across countries. Furthermore, according to the results in Chapter 6 the strong form of the Fisher hypothesis cannot be supported: the link is not one-to-one and only a very marginal amount of inflation risk is hedged by stock returns. Therefore the removal of these variables does not have a very obvious impact on stock returns.

3) The panel regression uses lower frequency data, which helps to remove the possible noise from the high frequency data used in Chapter 4. The lower frequency data helps to expose the long-term trend, which makes the links between macroeconomic variables and stock returns more obvious in the panel regression results.

4) Another possible explanation is that, in the panel regression, country effects are directly regressed on these variables – rather than being removed, they are explicitly included in the models. Furthermore, in the return decompositions the risk sensitivity is set at unity or zero whereas the panel regressions (modulus or original country effects) relax the unity restriction. The coefficients in the panel regressions move freely, which may help to expose the actual link between the macroeconomic variables and stock returns.

In Chapter 4 section 4.4.6., it is found that the removal of the risk-free interest rate from local returns has a smaller impact on country effects than the removal of inflation rate from local returns. Results in both Table 6-4 and Table 6-6 show that inflation can explain a certain amount of stock returns but that the risk-free interest rate cannot. Therefore the removal of a significant variable (inflation rate) from returns has larger impact on country effects than the removal of an insignificant variable (risk-free rate), so that the results in Chapters 4 and 6 are consistent.

Regressions on either modulus industry effects or original industry effects are not as promising as the empirical results of the country effects regressions. Among five firm characteristics variables, only the geographical concentration of industries is statistically and theoretically significant in determining industry effects but its coefficient is not substantial. PE is significant but has an unexpected sign in industry effects regression results. None of the firm characteristics variables are significant in explaining stock returns, though they generally appear with the expected signs.

CHAPTER 7:

CONCLUSION

This thesis presents a series of original findings from various tests of hypotheses on the determinants of stock returns. This concluding chapter focuses on the motivation behind the research undertaken and summarizes the main empirical findings. It also discusses the main contributions of this work to the existing academic literature and to investment practice. Finally, the findings are evaluated within the context of the limitations of the data and methodologies, and the directions of future work are identified.

7.1. Motivation behind the Research

It is well established that a "top-down" portfolio selection approach is commonly applied by portfolio managers to national equity markets (L'Her *et al.* 2002). The first decision to be made is how much to allocate to each equity market. The second decision is then the optimal allocation within each market to different industries and firms. With the development of global economic and financial integration in developed countries, the importance of emerging stock markets (ESMs) in portfolio diversification becomes particularly interesting to portfolio managers. However there are far fewer academic studies of country and industry effects that focus on ESMs than there are for developed markets.

Second, the relatively few studies concerned with emerging markets mainly employ stock index data, which normally do not include all the listed firms in ESMs. At the same time, the construction of the stock index limits the industry sectors included and the level of industry classification, which may have an important influence on the empirical findings.

Third, as far can be ascertained, all existing published work looks at the debate only from the perspective of stock returns. Volatility is directly linked to returns and to risks, and one important issue for international portfolio diversification is to reduce the risk of portfolios. The issue of whether cross-sectional variation in stock risks is determined by the geographical location combination of portfolios or their industrial structures is crucial to the selection decisions of portfolio managers.

Fourth, as argued by Heston and Rouwenhorst (1994), studies on country and industry effects do not provide any further information on the fundamental forces behind the dominant country effects or the increasingly important industry effects.

Last but not least, the few pioneer studies on the factors driving country and industry effects only address the size of these effects rather than also considering their directions. For an investor, the sign is at least as important as the magnitude.

The above issues motivate this thesis. All these issues are addressed in this work in different empirical chapters.

7.2. Summary of Main Empirical Findings and Conclusions

7.2.1. The Industry and Country Factors in Stock Returns: Are Emerging Markets Different?

The first empirical chapter has tried to shed some light on the debate by using data on individual securities in emerging stock markets to re-examine the time-varying roles of country and industry effects on the variation of stock market returns. The main finding is that in ESM country effects also play the dominant role and that their importance has remained stable, especially in the last 10 years. At the same time, the importance of industry effects has increased since the late 1990s.

F-tests applied to the cross-sectional dummy variable regression, have revealed a general picture of the time-varying roles of country and industry effects. From 1984 to

February 1986, both industry factors and country factors have significant influence on stock returns but industry factors play the more important role. From March 1986 to March 1997 country factors evidently play a dominant role. From April 1997 to July 2004, industry dummies become more consistently significant, although still less so than the country dummies. These results have been further supported by the standard dummy variable decomposition method.

It is argued that the second dividing date, March 1997, may reflect the fact that about half of the sampled countries were affected by the 1997 East Asian Financial Crisis. It is possible that the resulting economic turbulence has led to an upward shift in the importance of industry effects. The literature on contagion has found that when markets are hit by unexpected negative shocks, and when the advantage of diversification is most needed, the cross-country correlation between stock returns in the affected countries actually increases (for example, Bekaert *et al.*, 2003). The increased correlation may explain the increased importance of global industry effects after 1997 in the sample used here.

When investigating the relative importance of the country and industry effects at inter-industry level, it is expected (i) that a larger amount of variation in traded-goods industries can be explained by pure industry effects than is the case for non-traded goods industries, and (ii) that variation in non-traded goods industries is more due to the sum of the country effects. However there are mixed results found in this chapter that may have been caused by the more coarsely defined industry groups.

7.2.2. Country Factors in Stock Returns: Factors or Fantasies?

Whilst Chapter 3 shows empirical evidence to support the dominant role of country effects in emerging markets, it is possible that the dominant country effects are not due to the underlying importance of country effects *per se* but to possible deficiencies in the basic analytics of the methodology.

The main aim of Chapter 4 is to examine whether and to what extent these biases (exchange rate, inflation rate and risk-free interest rate) amplify the importance of the country effects. Regressions are set up to eliminate identified national factors while retaining cross-sectional consistency. The results after removing the three potential biases show that instead of becoming weakened, the country effects become stronger and more dominant in all the tests and estimations. Therefore the three potential biases cannot be used to argue against the dominance of country effects in an analysis of nominal returns denominated in U.S. dollars.

One of the possible explanations for this phenomenon is that the removal of the exchange rate seems to expose all the differences between different local currency values. When the returns are in local currencies, they are much larger than when in U.S. dollars. Since the exchange rates vary across countries, but not across industries, the large values lead to the large country effect coefficients, which in turn lead to large country MADs (measures of the magnitude of country effects). Further explanations are discussed in the conclusion of Chapter 6.

7.2.3. Industry and Country Factors in Stock Risks

One of the important questions for modern financial economists is the quantification of the tradeoff between risk and expected return. Previous chapters have addressed the debate on industry and country factors by decomposing stock returns. Chapter 5 focuses on the risks of returns. Since it is not known *a priori* if the relationship is linear in variance or standard deviation, both conditional variance and standard deviation have been used as measurements of risk. Based upon *F*-tests of dummy variable risk models, three sub-sample periods are identified. Repeating the same decomposition procedure over the three sub-periods gives a more detailed picture of the time-varying properties of industry and country effects that is consistent with the results from the returns decomposition. In particular, the importance of the industry effects in explaining the variation of stock risks seems to have increased since late 1996.

7.2.4. Determinants of Country and Industry factors

The findings of the last three empirical chapters, allow the conclusion that, in emerging markets, diversifying across countries is more effective than diversifying across industries in terms of achieving improvements in investors' risk-return tradeoffs. However, the analysis does not answer questions about why this is so or identify the fundamental factors behind the country and industry effects.

The main aim of the last empirical chapter is to use some well-studied macroeconomic, institutional and legal variables to explain stock return performance (in terms of both magnitude and direction of impact). Using an unbalanced panel of quarterly data from 13 countries over 20 years, various panel regression methods are chosen according to diagnostic tests.

One of the main findings is that macroeconomic variables, in particular changes in exchange rates and risk-free interest rates, contribute 92.8% in explaining country effects. Other variables have smaller but theoretically significant influence on country effects. In general it shows that high financing cost, high economic risk and lower demand for stocks make it less attractive for international investors to finance their projects in ESMs. On the other hand, a more efficient legal environment and better protection of shareholder rights make ESMs more attractive to foreign investors. This can lead to the markets being less isolated from the rest of the world and less subject to domestic shocks.

Second, the empirical evidence shows that inflation and changes in the exchange rate can explain about 55% of the variation in stock returns. Although empirical evidence supports the 'Fisher hypothesis', only a marginal portion of inflation risk is hedged by stock returns. This suggests that investors cannot fully rely on stocks to hedge against inflation risk.

There are several possible explanations for the different findings in Chapters 4 and 6 on the links between exchange rate, inflation rate and risk-free interest rate and stock returns. 1) The removal of exchange rates seems to expose all the differences between local currency values across countries, which are shown on the even stronger country effects. 2) These three macroeconomic variables vary less across countries than stock returns vary within and across countries. 3) The lower frequency data used in Chapter 6 helps to expose long-term trends, which makes the links between macroeconomic variables and stock returns more obvious in the panel regression results. 4) In the panel regressions, country effects are regressed directly on these variables (which are explicitly included in the models). Furthermore, while the decomposition of returns imposes a restriction of unit risk sensitivity, the coefficients in the panel regressions move freely. This may help to expose the actual links between these macroeconomic variables and stock returns.

At the same time, empirical findings on banking and stock market development show that more efficient and developed financial sectors can smooth stock market trading, improve information transparency and reduce risks. An improved financial environment boosts investor confidence so that lower risk premiums are required.

Regression results show that the origin of a legal regime influences cross-sectional variation in stock returns. Countries of English and German legal origin provide better protection to investors, promote private property and have lower risks for investment, leading to lower required risk premiums.

Regression results for modulus industry effects and original industry effects are less well determined than for country effects. Only the geographical concentration of industries is statistically and theoretically significant in determining industry effects and its coefficient is fairly small. None of the firm characteristics variables is significant in explaining stock returns, although their coefficients generally have the expected signs.

Overall, this work finds some useful variables that can explain country effects and stock returns. However, the regressions are run both with and without time dummies with the result that some coefficients change their signs. This implies that there may be some important time-varying variables that are omitted in this study. Therefore their time varying properties are captured by the time dummies instead.

7.3. Contributions to the Existing Literature

Each of the empirical studies attempts to shed some light on the variation of stock returns.

The whole empirical investigation focuses on ESMs, which has enriched the small amount of existing studies on the country and industry effects debate in the context of ESMs. The dataset in this study covers 1,537 individual firms from 13 emerging markets, from August 1984 to July 2004. In terms of the dataset, this study contributes to the existing literature in the following ways: first, the work of earlier studies on emerging markets is extended by increasing the number of emerging markets covered; second, by using individual stocks this work provide firm-specific evidence, giving more flexibility in selecting the type and level of industry sectors; third, a longer sample period than that used in previous studies allows different explanations to be developed.

In terms of methodology, the application of F-tests to the cross-sectional dummy variable regressions has revealed the time-varying properties of country and industry effects by focusing on the significance of country and industry dummies. The observations in the significance of F-test results time series lead to the sub-period investigation in the decomposition analysis.

It was argued that the predominant country effects identified in this and existing studies are not due to their underlying importance but to imperfections in the basic methodologies that are widely used in the related literature. The biases may arise when using single currency nominal returns include the effects of exchange rates, inflation rates and risk free rates and lead to an overestimation of the importance of country effects in the decomposition exercise. This work re-considers the dummy variable model specification and provides a robust check on the conclusions of the existing literature.

In segmented equity markets, risk premiums may be directly linked to the volatility of equity returns in any given market. Higher volatility implies higher capital costs. Higher volatility may also increase the value of the 'option to wait', thereby delaying investment. One of the main benefits from portfolio diversification across countries and industries is risk reduction. Directly examining the relative importance of country and industry effects in the cross-sectional variation of stock risks, rather than in the cross-sectional variation of stock returns, can address the debate from a different angle. Existing studies have only focused on industry and country factors by decomposing stock returns (either index returns or individual firm returns). This work examines the relative importance of country and industry effects in the cross-sectional variation of stock risks in emerging equity markets. It provides empirical evidence to support the findings in return decompositions that country effects have remained dominant over the last 20 years but that, since late 1990s, industry effects have become more and more important.

Few studies have explored the underlying factors that drive country and industry effects. These studies focus on how the magnitudes of country and industry effects are affected by the underlying factors. However, none of them look at the direction of these influences. It is important for investors to know how these factors influence the effects. Essentially, country and industry effects generated by standard return decompositions are themselves stock returns. This study not only follows Campa and Fernandes (2006) two-step procedure to explain the size of the country/industry effects but also seeks to explain the sign of these effects.

7.4. Practical Implications of the Findings

The relevance of the findings in this work is not confined to academic interest, but extends to market practitioners, especially portfolio managers. This investigation focuses particularly on diversification within ESMs rather than for example as between ESMs and the industrial countries. Therefore the dominant country effects found in the empirical analysis suggests that in the portfolio selection process, investors should stick to a top-down approach when considering including securities from ESMs. A portfolio managers' first decision is about the proportion of investment to allocate to each equity market. The second is then the optimal allocation within each industry sector. Although it is suggested in this work that the increasing importance of industry effects may reflect the late 1990s Asian Crisis rather than reflecting a more permanent global integration progress, it cannot be fully confirmed before more data become available. One thing shown by the empirical evidence is the increasing importance of industry effects, which is in line with other existing findings. Therefore portfolio managers need to put more weight on selecting portfolios in industry sectors across countries in ESMs. It is not only the geographical locations of equities that matter but also the industrial composition of portfolios.

The empirical evidence on the fundamental factors behind country effects has implications for policy-makers as well as investors. This evidence shows that there is a negative relationship between stock returns and changes in exchange rates. In order to compensate a loss on exchange rates, a higher risk premium will be expected by foreign investors. Therefore from an investor's perspective, exchange rate variation is one of the most important macroeconomic factors to consider when considering an investment in emerging markets. From a policy maker's perspective, it is essential to create a healthy macroeconomic environment, keeping relatively stable exchange rates so as to attract foreign investors.

Another macroeconomic variable, inflation, is found to be positively related to stock returns. However, although a small part of the inflation risk can be hedged by stock returns, there is not a one-to-one relationship. Therefore, from an investor's perspective, stocks cannot be used to hedge against inflation in general.

A measure of the activities of financial intermediaries (PG) is found to have a negative link with stock returns. This means that if the banking system is more liquid it is easier for stock market traders to smooth their trades. Low transaction costs and a low degree of political uncertainty decrease the country specific risk associated with the stocks, leading to lower risk premiums.

The stock market development variable, TG, is a measure of stock market activity or liquidity. It is found to be positively related to stock returns. According to the theory, active management of an index and its composition may lead to high turnover and an increase in the value of the index. Therefore the implication for listed companies and portfolio managers in emerging markets is to keep the stocks liquid.

In terms of legal regimes, developing strong regulatory systems and effective protection for shareholders in developing markets strengthens the efficiency of market signals and information processing, which may in turn relieve the high volatility situation in emerging markets. Volatility makes investors reluctant to hold stocks because of uncertainty. In return, investors require a higher risk premium to cover higher uncertainty. Under exogenous shocks to the markets, greater market transparency makes it less likely that the behavior of uninformed investors will increase market volatility. A good legal environment in terms of the quality and enforcement of legal rules increases the confidence of investors. Therefore smaller risk premiums would be required, reducing the capital financing costs.

7.5. Limitations of the Research

The limitations of the above investigations should be kept in mind in interpreting the results. One limitation, which is common to most empirical work on ESMs is the data availability problem. There are fewer country dummies than industry dummies in the early part of the sample because the available firms are limited. Before February 1986 there were only three countries in the sample: Malaysia, South Africa and South Korea. The finding that before February 1986 country factors were not as dominant as they were subsequently needs to be interpreted with the limited data issue in mind.

Another limitation is the weak theoretical link between the risk and return decompositions. The risks decomposed in Chapter 5 are the conditional variances of each stock, modeled and calculated independently from a returns model with ARCH type errors. In the Ordinary Least Square estimator of the conditional variance (or conditional standard deviation) of the overall value-weighted average of all stocks in the entire world (sample), the averages in the decomposition models are not portfolio averages because they neglect the covariances among securities. Therefore it is impossible to include the return and risk in one asset-pricing (e.g. CAPM) model to repeat the decomposition procedure and compare the results in an unified model.

Most of the studies on the country and industry effects debate, including this work, have adopted the standard dummy variable decomposition model of Heston and Rouwenhorst (1994). This model uses a zero or one dummy to separate the industry and country effects, thereby assuming that all firms in the same country and all firms in the same industry have the same risk sensitivity. This is a strong assumption in practice. For example, if two firms are the same in every respect except that one has more debt than the other, then these two must have different sensitivities to the country and industry factors. Korea Electric Power Corporation accounts for 35.9% of all South Korean market capitalization and 72.5% of the total utility sector in Korea. It is hard to be convinced that firms like this have the same sensitivity to country and industry factors as other smaller firms in South Korea. As argued in Marsh and Pfleiderer (1997), constraining the factor loadings in this way may result in an unnecessary loss of information. Since this work adopts the standard dummy variable model of Heston and Rouwenhorst (1994), the results to some extent suffer from the unit risk sensitivity assumption.

In Chapter 6, many variables are included in the regression. However different ESMs started keeping their records at different times. Most started in the beginning or middle of the 1990s (especially for stock market development variables). Some variables are available from 1984 but normally at annual frequency. In order to work with the available data it is necessary to make adjustments, which may involve losing the accuracy of some of the information. Therefore, when interpreting the results in Chapter 6, data limitations need to be kept in mind.

7.6. Future Research Plans

The above empirical research and its limitations point to various possible directions for future research.

Although one of the advantages in this work is its focus on ESMs, there are important innovations in terms of methodologies in this work as well. There is potential in applying the risk decomposition and panel regression on country and industry effects to data for developed markets. First, since more data are available in developed markets, this would be a robustness check on the methodologies. Second, it is interesting to compare the differences and similarities in the emerging market and developed market results.

The limitation on the theoretical link between the return and risk decompositions may offer potential for further investigations in looking for econometric models to include them in one system in order to compare the results from one regression. The potential method includes Seemingly Unrelated Regression (SUR).

It is argued by a few studies, such as Marsh and Pfleiderer (1997), Brooks and Del Negro (2003) and Phylaktis and Xia (2006b), that the restrictions applied on the factor loadings as presented above implicitly make the dummy variable model a fixed-effect model. These strong restrictions may lead to an unnecessary loss of information. In order to address the non-unit sensitivities issue, an iterative approach has been suggested by Marsh and Pfleiderer (1997) and used by Cavaglia *et al.* (2001) and Phylaktis and Xia (2006b) that does not require the sample to have balanced panels[12]. In the future a similar methodology may be applied to the present sample to relax the unity risk sensitivity restriction and allow its impact on the results to be assessed (see method A7-1 in the appendix).

There are several advantages of Marsh and Pfleiderer (1997) iterative approach. First, it allows the use of an unbalanced panel dataset, which is useful in retaining as much information as possible. Second, because the non-unit sensitivities approach has weaker assumptions it may be a little closer to reality and produce results with more implications for practitioners. Furthermore, the sensitivities are extracted from the pure country and industry factor returns. Since the pure country and industry returns are orthogonal by construction, the estimation of the sensitivities would expect to be little biased by the interaction among the factor returns.

Overall, the investigations undertaken in this dissertation not only contribute to academic research and finance practice, but also point to future research in asset pricing.

[12] Unlike Brooks and Del Negro (2003), who requires a balanced panel. Brooks and Del Negro have adopted the Lehman and Modest (1985) EM algorithm to obtain maximum likelihood estimates of the factor coefficients in the following equation.

$$R_i^{\$} = \alpha + \sum_{j=1}^{11} \beta_j D_{i,j} + \sum_{k=1}^{13} \gamma_k C_{i,k} + e_i$$

APPENDIX

Table A3-1 Available industry sectors in each country.

Industries / Countries	IGS	CG	CS	BM	UT	HC	TEC	TEL	FI	PHG	BI
Brazil	√	√	√	√	√	√		√	√	√	√
Chile	√	√	√	√	√	√		√			√
China	√	√	√	√	√	√	√	√		√	√
India	√	√	√	√	√	√	√	√		√	√
Israel	√	√	√	√		√	√	√	√		√
Malaysia	√	√	√	√	√	√	√	√	√		√
Mexico	√	√	√	√				√		√	√
Pakistan	√	√		√	√	√		√	√		√
South Africa	√	√	√	√		√	√	√	√		√
South Korea	√	√	√	√	√	√	√	√	√	√	√
Taiwan	√	√	√	√	√		√	√			√
Thailand	√	√	√	√	√	√	√	√	√	√	√
Turkey	√	√	√	√	√	√	√		√	√	√

Note: IGS=Industrial goods + services, CG=Consumer goods, CS=Consumer services, BM=Basic material, UT=Utility, HC=Health care, TEC=Technology, TEL=Telecom, FI=Financials, PHG=Personal & household goods, BI=Basic Industrials

Table A4-1 Short-term risk free interest rates

This shows the periods covered by Treasury Bill Rates and by various alternative short-term interest rates in different countries.

Country	Short-term rates	Period	Short-term rates	Period
Brazil	Treasury bill rate	01/1995-07/2004	Deposit rate	01/1984-12/1994
Chile	*CD 30 days#	01/1994-07/2004	Deposit rate	01/1984-12/1993
China	*Time deposit rate# (3 months)	06/1993-07/2004	Deposit rate (one year rate)	01/1984-05/1993
India	*India Bank deposit 30 days	02/1991-07/2004	Money market rates	01/1984-01/1991
Israel	Treasury bill rate	06/1984-07/2004		
Malaysia	Treasury bill rate	01/1984-07/2004		
Mexico	Treasury bill rate	01/1984-07/2004		
Pakistan	Treasury bill rate	03/1991-07/2004	Money market rates	01/1984-02/1991
South Africa	Treasury bill rate	01/1984-07/2004		
South Korea	*NCD 91 days#	02/1992-07/2004	Money market rates	01/1984-01/1992
Taiwan	*Money market 30 days#	08/1984-07/2004		
Thailand	Treasury bill rate	01/1984-09/1989	Thai Deposit rate	10/1989-07/2004
Turkey	Treasury bill rate	09/1985-07/2004 (97,98 and 99 are missing)	Deposit rate (3 months rate)	08/1984-08/1985, 01/1997-12/1999
United States	Treasury bill rate	06/1984-07/2004		

*: Data are collected from Datastream. The rest are collected from IFS

#: The definitions of these four short-term interest rates are not provided by Datastream. Therefore they are not included in Table A4-2.

Table A4-2 Definition of the risk free interest rates

This table shows the definitions of different types of short-term interest rates that are used as the risk-free interest rates in this work. The primary choice was Treasury Bill Rates but these are not available on every date in every country in the sample. Therefore other short-term interest rates were chosen as substitutes.

Brazil	*Treasury Bill Rate*	Effective yield on Letras do Tesouro Nacional (LTN) of 31 days or longer, calculated from the discount. The yield is that of the last issue of the month, is calculated on a daily basis, and applies only to business days.
	Deposit Rate:	Average rate offered by banks on 60-day time deposits. Beginning in January 1989, average rate offered by banks on certificates of deposit of 30 days or longer.
Chile	*Deposit Rate*	Weighted average rate offered by banks on 30- to 89-day deposits in national currency. Beginning in January 1985, weighted average rate offered by financial institutions on 30- to 89-day deposits in national currency. The rate is weighted by deposit amounts. The rate is converted to percent per annum by compounding monthly rates of interest.
China	*Deposit Rate*	Interest rates on institutional and individual deposits of one-year maturity.
India	*Bank Rate (End of Period)*	Standard rate at which the Reserve Bank makes advances to scheduled banks against commercial paper and government securities.
	Money Market Rate	Rate offered in Bombay interbank market. Quarterly and annual data are weighted averages of weekly series.
Israel	*Treasury Bill Rate*	Yield to maturity on short-term treasury bills.
Malaysia	*Treasury Bill Rate*	Average discount rate on three-month treasury bills.
Mexico	*Treasury Bill Rate*	Average yield on 90-day treasury bills. Beginning in January 1988, average yield on 28-day treasury bills, calculated from the weighted average rate of discount on daily transactions among dealers on the Mexican Securities Exchange. For periods during which no auctions of treasury bills were held, no data are published.
Pakistan	*Treasury Bill Rate*	Weighted average yield on six-month treasury securities (prior to July 1996, rate on six-month Federal Treasury Bill). Since July 1996, rate on six-month Federal Treasury Bond (STFB) replaced the six-month Federal Treasury Bill.
	Money Market Rate	Rate offered in Karachi interbank market. Quarterly and annual data are weighted averages of weekly series.
South Africa	*Treasury Bill Rate*	Tender rate on 91-day treasury bills in national currency. Monthly data are averages of each Friday of the month.
South Korea	*Money Market Rate*	Rate offered in Seoul interbank market. Quarterly and annual data are weighted averages of weekly series.
Thailand	*Treasury Bill Rate*	Average rate on the total of accepted treasury bills sold at tender.
	Deposit Rate	Maximum rate offered by commercial banks on three- to six-month savings deposits.
Turkey	*Treasury Bill Rate*	Weighted average auction rate on 3-month Treasury bills.
	Deposit Rate	Data refer to the rate on three-month time deposits denominated in Turkish lira.
United States	*Treasury Bill Rate*	Average yield on 13-week treasury bills, calculated from the average rate of discount on weekly auctions.

Tables A6-1 to Table A6-6 in the appendix includes the sources and available time periods of data for country effect determinants. They cover data for macroeconomic, institutional, general law and financial law variables. Due to problems with the length and depth of data availability in emerging markets it is impossible to collect all the data over two decades from a single source, even for the same variable. Macroeconomic, banking and stock market development data are from a number of sources. They are mainly collected from the International Financial Statistics (IFS) of the IMF, Datastream (DS), The Economic and Social Data Service (ESDS), various central banks, offices of national statistics, domestic stock exchanges and World Federation of Exchanges. Political quality data are published by Freedom House. All the legal rule and finance-related law data are from La Porta *et al.* (1998).

Table A6-1 Sources of pure country effect determinant variable data

Variables	Sources	Available time periods
	Dependent Variable--- Pure country effects	
Brazil	Chapter 3	01/08/1990-01/07/2004
Chile	Chapter 3	01/08/1989-01/07/2004
China	Chapter 3	01/03/1991-01/07/2004
India	Chapter 3	01/02/1990-01/07/2004
Israel	Chapter 3	01/03/1986-01/07/2004
Malaysia	Chapter 3	01/08/1984-01/07/2004
Mexico	Chapter 3	01/03/1988-01/07/2004
Pakistan	Chapter 3	01/02/1991-01/07/2004
South Africa	Chapter 3	01/08/1984-01/07/2004
South Korea	Chapter 3	01/08/1984-01/07/2004
Taiwan	Chapter 3	01/11/1987-01/07/2004
Thailand	Chapter 3	01/03/1987-01/07/2004
Turkey	Chapter 3	01/03/1988-01/07/2004
	Data for building independent variables	
Import		
Brazil	www.ipeadata.gov.br (U.S.$ in millions)	01/06/1984-01/07/2004
Chile	DS---CL IMPORTS FOB CURN (U.S.$ in millions)	01/06/1984-01/07/2004
China	DS---CH IMPORTS CURN (U$ hundreds of millions)	01/06/1984-01/07/2004
India	DS---IN IMPORTS CIF CURN (IR billion)	01/06/1984-01/07/2004
Israel	Ds---IS IMPORTS ($ Million)	01/06/1984-01/07/2004
Malaysia	DS---MY IMPORTS CURN (M$ Million)	01/06/1984-01/07/2004
Mexico	DS---MX IMPORTS (U.S.$ in millions)	01/06/1984-01/07/2004
Pakistan	DS--- Import (PR million)	01/01/1989-01/07/2004
South Africa	DS---SA IMPORTS CIF (R Million)	01/06/1984-01/07/2004
South Korea	Korea National Statistical Office (in $ Million)	01/01/1988-01/07/2004
Taiwan	DS---TW IMPORTS EXCL. RE-IMPORTS (U$ thousands)	01/01/1988-01/07/2004
Thailand	DS---Import (Tb Million)	01/06/1984-01/07/2004
Turkey	DS---TK IMPORTS CURN ($ million)	01/06/1984-01/07/2004
Export		
Brazil	www.ipeadata.gov.br (U.S.$ in millions)	01/06/1984-01/07/2004
Chile	DS---CL EXPORTS FOB CURN (U.S.$ in millions)	01/06/1984-01/07/2004
China	DS---CH EXPORTS CURN (U.S.$ hundreds of millions)	01/06/1984-01/07/2004
India	DS---IN EXPORTS FOB CURN (IR billion)	01/06/1984-01/07/2004
Israel	DS---IS EXPORTS (U.S.$ in millions)	01/05/1986-01/07/2004

Malaysia	DS---MY EXPORTS CURN (M$ million)	01/06/1984-01/07/2004
Mexico	DS---MX EXPORTS (U.S.$ in millions)	01/06/1984-01/07/2004
Pakistan	DS---Export (PR million)	01/01/1989-01/07/2004
South Africa	DS---SA EXPORTS FOB (R million)	01/06/1984-01/07/2004
South Korea	Korea National Statistical Office (U.S.$ in millions)	01/01/1988-01/07/2004
Taiwan	DS---TW EXPORTS EXCL. RE-EXPORTS (U.S.$ thousands)	01/01/1988-01/07/2004
Thailand	DS---Export (Tb million)	01/06/1984-01/07/2004
Turkey	DS---TK EXPORTS CURN ($ million)	01/06/1984-01/07/2004
GROSS DOMESTIC PRODUCT (GDP)		
Brazil	IFS---99B..ZF GDP (Units: National Currency, Millions)	01/12/1985-01/07/2004
Chile	IFS---99B..ZF GDP (Units: National Currency, Millions)	01/02/1986-01/07/2004
China	IFS ---99B..ZF GDP (Units: National Currency, Millions)	01/08/1986-01/07/2004
India	IFS---99B..ZF GDP (Units: National Currency, Billions)	01/04/1986-01/07/2004
Israel	IFS---99B..ZF GDP (Units: National Currency, Millions)	01/12/1984-01/07/2004
Malaysia	IFS---99B..ZF GDP (Units: National Currency, Millions)	01/04/1986-01/07/2004
Mexico	IFS---99B.CZF GDP SA (Units: National Currency, Millions)	01/08/1985-01/07/2004
Pakistan	IFS---99B..ZF GDP (Units: National Currency, Billions)	01/08/1986-01/07/2004
South Africa	IFS---99B.CZF GDP SA (Units: National Currency, Millions)	01/07/1984-01/07/2004
South Korea	IFS---99B..ZF GDP (Units: National Currency, Millions)	01/07/1984-01/07/2004
Taiwan	Taiwan ministry of finance R.O.C. (million NT$)	01/08/1985-01/07/2004
Thailand	IFS---99B..ZF GDP (Units: National Currency, Billions)	01/04/1985-01/07/2004
Turkey	IFS---99B..ZF GDP (Units: National Currency, Millions)	01/08/1985-01/07/2004
Exchange rate		
Brazil	DS---BR BRAZILIAN REAL TO US DOLLAR (AVG)	01/02/1989-01/07/2004
Chile	DS ---CH US DOLLAR CONVERTS TO RMB (AVG)	01/07/1984-01/07/2004
China	DS ---CL EXCHANGE RATE - PESOS PER US DOLLAR	01/07/1984-01/07/2004
India	DS ---IN INDIAN RUPEES PER US DOLLAR	01/07/1984-01/07/2004
Israel	DS ---IS ISRAEL SHEKEL TO $ (EP)	01/06/1984-01/07/2004
Malaysia	DS ---MY MALAYSIA $ TO 1 US$ - MARKET RATE (EP)	01/06/1984-01/07/2004
Mexico	DS ---MX MEXICAN PESOS TO US $-CENTRAL BANK SETTLEMENT RATE (AVG)	01/06/1984-01/07/2004
Pakistan	DS ---PK PAKISTAN RUPEES TO US $ (EP)	01/06/1984-01/07/2004
South Africa	DS ---SA SOUTH AFRICAN RANDTO US $ (EP)	01/06/1984-01/07/2004
South Korea	DS ---KO KOREAN WON TO 1 TO US $ (EP)	01/06/1984-01/07/2004
Taiwan	DS ---TW SPOT EXCHANGE RATE- NT$ PER US$ (AVG)	01/07/1984-01/07/2004
Thailand	DS ---TH THAI BAHTS TO US $ (EP) NADJ	01/06/1984-01/07/2004
Turkey	DS ---TK TURKISH LIRA TO US $ (EP)	01/06/1984-01/07/2004
Inflation rate		
Brazil	IFS---Consumer Price Index	01/07/1984-01/07/2004
Chile	IFS---Consumer Price Index	01/07/1984-01/07/2004
China	IFS---Consumer Price Index	01/01/1987-01/07/2004
India	IFS---Consumer Price Index	01/07/1984-01/07/2004
Israel	IFS---Consumer Price Index	01/07/1984-01/07/2004
Malaysia	IFS---Consumer Price Index	01/07/1984-01/07/2004
Mexico	IFS---Consumer Price Index	01/07/1984-01/07/2004
Pakistan	IFS---Consumer Price Index	01/07/1984-01/07/2004
South Africa	IFS---Consumer Price Index	01/07/1984-01/07/2004
South Korea	IFS---Consumer Price Index	01/07/1984-01/07/2004
Taiwan	DS---Consumer Price Index	01/07/1984-01/07/2004

Thailand	IFS---Consumer Price Index	01/07/1984-01/07/2004
Turkey	IFS---Consumer Price Index	01/07/1984-01/07/2004
Risk free rates-Details refer to Table A4-1 and A4-2 in the appendix.		
Brazil	IFS	01/01/1995-01/07/2004
Chile	DS	01/01/1994-01/07/2004
China	DS	01/01/1984-01/07/2004
India	DS	01/01/1984-01/07/2004
Israel	IFS	01/06/1984-01/07/2004
Malaysia	IFS	01/01/1984-01/07/2004
Mexico	IFS	01/01/1984-01/07/2004
Pakistan	IFS	01/08/1984-01/07/2004
South Africa	IFS	01/01/1984-01/07/2004
South Korea	DS	01/01/1984-01/07/2004
Taiwan	http://www.cbc.gov.tw (central bank of China)	01/01/1984-01/07/2004
Thailand	IFS	01/08/1984-01/07/2004
Turkey	IFS	01/08/1984-01/07/2004
Liquid liability		
Brazil	IFS---55L..ZF LIQUID LIABILITIES (Units: national currency, Millions)	01/02/1989-01/07/2004
Chile	IFS ---35...ZF QUASI-MONEY (Units: national currency, Billions)	01/06/1984-01/07/2004
China	IFS ---35L..ZF MONEY PLUS QUASI-MONEY (Units: national currency, Millions)	01/12/1984-01/07/2004
India	IFS---35L..ZF MONEY PLUS QUASI-MONEY (Units: national currency, Billions)	01/06/1984-01/07/2004
Israel	IFS---35L..ZF MONEY PLUS QUASI-MONEY (Units: national currency, Millions)	01/06/1984-01/07/2004
Malaysia	IFS ---55L..ZF LIQUID LIABILITIES (Units: national currency, Millions)	01/06/1984-01/07/2004
Mexico	Bank of Mexico (unit: Thousands of Pesos)	01/12/1985-01/07/2004
Pakistan	IFS ---55L..ZF LIQUID LIABILITIES (Units: national currency, Millions)	01/06/1984-01/07/2004
South Africa	IFS ---35L..ZF MONEY PLUS QUASI-MONEY (Units: national currency, Millions)	01/09/1984-01/07/2004
South Korea	IFS---35L..ZF MONEY PLUS QUASI-MONEY (Units: national currency, Millions)	01/06/1984-01/07/2004
Taiwan	DS---TW MONEY SUPPLY - M2 (EP) (TW, million)	01/07/1984-01/07/2004
Thailand	IFS---55L..ZF LIQUID LIABILITIES (Units: national currency, Millions)	01/06/1984-01/07/2004
Turkey	IFS---55L..ZF LIQUID LIABILITIES (Units: national currency, Millions)	01/06/1984-01/07/2004
Deposit bank asset		
Brazil	IFS---.7A.DZF DEPOSIT MONEY BANKS: ASSETS (Units: national currency, Millions)	01/06/1984-01/07/2004
Chile	IFS---7A.DZF DEPOSIT MONEY BANKS: ASSETS (Units: national currency, Billions)	01/12/1989-01/07/2004
China	IFS---total money deposit bank assets U.S.$ millions	01/12/1985-01/07/2004
India	IFS---money deposit bank assets	01/06/1984-01/07/2004
Israel	IFS---7A.DZF DEPOSIT MONEY BANKS: ASSETS (Units: national currency, Millions)	01/06/1984-01/07/2004
Malaysia	IFS---7A.DZF BANKING INSTITUTIONS: ASSETS (Units: national currency, Millions)	01/06/1984-01/07/2004
Mexico	IFS---7A.DZF DEP AND SAVGS.BANKS: ASSETS (Units:	01/06/1984-01/07/2004

	national currency, Millions)	
Pakistan	IFS---7A.DZF SCHEDULED BANKS: ASSETS (Units: national currency, Millions)	01/06/1984-01/07/2004
South Africa	IFS---7A.DZF DEPOSIT MONEY BANKS: ASSETS (Units: national currency, Millions)	01/06/1984-01/07/2004
South Korea	The bank of Korea---deposit bank assets in $ Billions	01/06/1984-01/07/2004
Taiwan	http://www.cbc.gov.tw (central bank of China) deposit bank asset (100 Millions of N.T. Dollars)	01/07/1984-01/07/2004
Thailand	IFS---7A.DZF EXTERNAL ASSETS (Units: national currency, Billions)	01/06/1984-01/07/2004
Turkey	IFS---7A.DZF DEPOSIT BANKS: FOREIGN ASSETS (Units: national currency, Millions)	01/06/1984-01/07/2004
Total financial institution assets		
Brazil	IFS---.total financial assets (Scale: national currency)	01/02/1989-01/07/2004
Chile	IFS---.total financial assets (Scale: national currency, Billion)	01/06/1984-01/07/2004
China	IFS---Total financial assets $ million	01/06/1985-01/07/2004
India	IFS---total financial assets	01/06/1984-01/07/2004
Israel	IFS---total financial institution assets (U.S.$ in million)	01/06/1984-01/07/2004
Malaysia	IFS---total financial institution assets (Units: $, Millions)	01/06/1984-01/07/2004
Mexico	IFS---total financial institution assets (Units: $, Millions)	01/06/1984-01/07/2004
Pakistan	IFS---total financial asset in local currency million	01/06/1984-01/07/2004
South Africa	IFS---total financial asset in local currency million	01/06/1984-01/07/2004
South Korea	IFS---total financial asset in $ Billion	01/06/1984-01/07/2004
Taiwan	http://www.cbc.gov.tw (central bank of China) (Millions of N.T.$)	01/11/1987-01/07/2004
Thailand	IFS---total financial asset in local currency Billion	01/06/1984-01/07/2004
Turkey	IFS---total financial asset in local currency million	01/06/1984-01/07/2004
Money deposit banks' claim on private sector		
Brazil	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/02/1989-01/07/2004
Chile	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
China	IFS---.12D..ZF CLAIMS ON OTHER SECTORS (Units: national currency, Millions)	01/06/1985-01/07/2004
India	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
Israel	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
Malaysia	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
Mexico	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
Pakistan	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
South Africa	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
South Korea	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
Taiwan	http://www.cbc.gov.tw (central bank of China) (100 Millions of N.T. $)	01/07/1984-01/07/2004
Thailand	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Billions)	01/06/1984-01/07/2004
Turkey	IFS---.22D..ZF CLAIMS ON PRIVATE SECTOR (Units: national currency, Millions)	01/06/1984-01/07/2004
Stock market value		
Brazil	Bovespa's stock market (U.S.$ Million)	01/01/1988-01/07/2004

Chile	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S. $ /local currency, Million)	01/07/1991-01/07/2004
China	Bombay stock exchange (local currency, Million)	01/01/1998-01/07/2004
India	Bombay stock exchange (local currency, Million)	01/04/1993-01/07/2004
Israel	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
Malaysia	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
Mexico	Bank of Mexico (unit: Thousands of Pesos)	01/02/1986-01/07/2004
Pakistan	Bombay stock exchange (local currency, Million)	01/06/1984-01/07/2004
South Africa	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
South Korea	Korea National Statistical Office (Million $)	01/06/1984-01/07/2004
Taiwan	Taiwan Stock Exchange Corporation: http://www.tse.com.tw (Million $) and world federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S. $ /local currency, Million)	01/07/1984-01/07/2004
Thailand	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
Turkey	ESDS---World Development Indicators (Million $)	01/01/1986-01/07/2004
Stock market trading value		
Brazil	Bovespa's stock market ---.trading value (U.S.$ Million)	01/06/1984-01/07/2004
Chile	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/07/1991-01/07/2004
China	Bombay stock exchange (local currency, Million)	01/01/1998-01/07/2004
India	Bombay stock exchange (local currency, 10 Million)	01/01/1999-01/07/2004
Israel	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
Malaysia	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
Mexico	Bank of Mexico---trading value, (unit: Thousands of Pesos)	01/07/1984-01/07/2004
Pakistan	Bombay stock exchange (local currency, Million)	01/01/2000-01/07/2004
South Africa	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
South Korea	Korea stock exchange, source:http://sm.krx.co.kr trading value (us$ million)	01/06/1984-01/07/2004
Taiwan	Taiwan Stock Exchange Corporation: http://www.tse.com.tw (million $) and World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/07/1984-01/07/2004
Thailand	World federation of exchanges source: http://www.world-exchanges.org/WFE/home.Asp (U.S.$ Million)	01/01/1991-01/07/2004
Turkey	ESDS---World Development Indicators, (U.S.$ million)	01/01/1986-01/07/2004
Civil rights	Freedom House ---refer to Table A6-2	01/11/1983-01/11/2003
Political rights	Freedom House--- refer to Table A6-2	01/11/1983-01/11/2003
General Law Indicators---refer to Table A6-3 and A6-6		
General Law Indicators	La Porta, *et al.* (1998)	Time-invariant indicators
Financial Law indicators---refer to Table A6-3 to A6-5		
Financial Law indicators	La Porta, *et al.* (1998)	Time-invariant indicators

Table A6-2 Political quality variables – Freedom in the World Country Ratings

Year(s) covered	Nov.1983-Nov.1984		Nov.1984-Nov.1985		Nov.1985-Nov.1986		Nov.1986-Nov.1987	
	PR	CL	PR	CL	PR	CL	PR	CL
Brazil	3	3	3	2	2	2	2	2
Chile	6	5	6	5	6	5	6	5
China	6	6	6	6	6	6	6	6
India	2	3	2	3	2	3	2	3
Israel	2	2	2	2	2	2	2	2
Malaysia	3	5	3	5	3	5	3	5
Mexico	3	4	4	4	4	4	4	4
Pakistan	7	5	4	5	4	5	4	5
South Africa	5	6	5	6	5	6	5	6
South Korea	5	5	4	5	4	5	4	4
Taiwan	5	5	5	5	5	5	5	4
Thailand	3	4	3	4	3	3	3	3
Turkey	3	5	3	5	3	4	2	4
Year(s) covered	Nov.1987-Nov.1988		Nov.1988-Dec.1989		1990		1991	
Brazil	2	3	2	2	2	3	2	3
Chile	5	4	4	3	2	2	2	2
China	6	6	7	7	7	7	7	7
India	2	3	2	3	2	3	3	4
Israel	2	2	2	2	2	2	2	2
Malaysia	4	5	5	4	5	4	5	4
Mexico	3	4	4	3	4	4	4	4
Pakistan	3	3	3	3	4	4	4	5
South Africa	5	6	6	5	5	4	5	4
South Korea	2	3	2	3	2	3	2	3
Taiwan	5	3	4	3	3	3	5	5
Thailand	3	3	2	3	2	3	6	4
Turkey	2	4	3	3	2	4	2	4
Year(s) covered	1992		1993		1994		1995	
Brazil	2	3	3	4	2	4	2	4
Chile	2	2	2	2	2	2	2	2
China	7	7	7	7	7	7	7	7
India	3	4	4	4	4	4	4	4
Israel	2	2	1	3	1	3	1	3
Malaysia	5	4	4	5	4	5	4	5
Mexico	4	3	4	4	4	4	4	4
Pakistan	4	5	3	5	3	5	3	5
South Africa	5	4	5	4	2	3	1	2
South Korea	2	3	2	2	2	2	2	2
Taiwan	3	3	4	4	3	3	3	3
Thailand	3	4	3	5	3	5	3	4
Turkey	2	4	4	4	5	5	5	5

Continue of the Table A6-2

Year(s) covered	1996		1997		1998		1999	
	PR	CL	PR	CL	PR	CL	PR	CL
Brazil	2	4	3	4	3	4	3	4
Chile	2	2	2	2	3	2	2	2
China	7	7	7	7	7	6	7	6
India	2	4	2	4	2	3	2	3
Israel	1	3	1	3	1	3	1	2
Malaysia	4	5	4	5	5	5	5	5
Mexico	4	3	3	4	3	4	3	4
Pakistan	4	5	4	5	4	5	7	5
South Africa	1	2	1	2	1	2	1	2
South Korea	2	2	2	2	2	2	2	2
Taiwan	2	2	2	2	2	2	2	2
Thailand	3	3	3	3	2	3	2	3
Turkey	4	5	4	5	4	5	4	5
Year(s) covered	**2000**		**2001**		**2002**		**Jan. 2003-Nov. 2003**	
Brazil	3	3	3	3	2	3	2	3
Chile	2	2	2	2	2	1	1	1
China	7	6	7	6	7	6	7	6
India	2	3	2	3	2	3	2	3
Israel	1	3	1	3	1	3	1	3
Malaysia	5	5	5	5	5	5	5	4
Mexico	2	3	2	3	2	2	2	2
Pakistan	6	5	6	5	6	5	6	5
South Africa	1	2	1	2	1	2	1	2
South Korea	2	2	2	2	2	2	2	2
Taiwan	1	2	1	2	2	2	2	2
Thailand	2	3	2	3	2	3	2	3
Turkey	4	5	4	5	3	4	3	4

Notes and Clarifications:

Source: Freedom in the World, 2006, published by Freedom House.

http://www.freedomhouse.org/template.cfm?page=15 .

This table lists all country scores since the annual Freedom in the World survey was first compiled for the year 1972. Methodological changes have been effected periodically. For discussions of these changes, and for a full explanation of the current methodology, please consult the most recent edition of the survey. "PR" stands for "Political Rights," and "CL" stands for "Civil Liberties". Political Rights and Civil Liberties are measured on a one-to-seven scale, with one representing the highest degree of Freedom and seven the lowest. Several countries became independent, split into two or more countries, or merged with a neighbouring state. Scores for these countries are given only for the period of their existence as independent states. Turkish Cyprus, which declared its independence in 1983, has been listed as a territory of Turkey since the 1992-93 edition of the survey. For 1972, South Africa was rated as "White" (2,3 Free) and "Black" (5,6 Not Free).

Table A6-3 The general rule and law and finance-related law variables

This table describes the variables collected for the 13 countries from La Porta, *et al.* (1998). The first column gives the name of the variable. The second column describes the variable and gives the range of possible values. The third column provides the sources.

Variable	Description	Sources
Origin	Identifies the legal origin of the Company Law or Commercial Code of each country. Equals 1 if the origin is English Common Law; 2 if the origin is the French Commercial Code; and 3 if the origin is the German Commercial Code.	Foreign Law Encyclopedia Commercial Laws of the World.
General law variables		
Efficiency of judicial System (EJ)	Assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms" produced by the country-risk rating agency Business International Corporation. It "may be taken to represent investors' assessments of conditions in the country in question" Average between 1980-1983. Scale from 0 to 10, with lower scores lower efficiency levels.	Business International Corporation
Rule of law (RL)	Assessment of the law and order tradition in the country produced by the country-risk rating agency International Country Risk (ICR). Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for less tradition for law and order.(La Porta et al. (1998) changed the scale from its original range going from 0 to 6).	International Country Risk Guide
Corruption (CORR)	ICR's assessment of the corruption in government. Lower scores indicate "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans? Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for higher levels of corruption. (La Porta, *et al.* changed the scale from its original range going from 0 to 6).	International Country Risk Guide
Risk of expropriation (ROE)	ICR's assessment of the risk of a "outright confiscation" or forced nationalization. Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for higher risks	International Country Risk Guide
Repudiation of contracts by government (RCG)	ICR's assessment of the "risk of a modification in a contract taking the form of a repudiation, postponement, or scaling down" due to "budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social priorities" Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for higher risks.	International Country Risk Guide
Rating on accounting standards (RAS)	Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. These items fall into 7 categories (general information, income statements, balance sheets, funds flow statement, accounting standards, stock data and special items). A minimum of 3 companies in each country were studied. The companies represent a cross-section of various industry groups where industrial companies numbered 70 percent while financial companies represented the remaining 30 percent.	International Accounting and Auditing Trends, Center for International Financial Analysis & Research, Inc.

Financial law variables—Shareholder rights		
One share - one vote (OSOV)	Equals one if the Company Law or Commercial Code of the country requires that ordinary shares carry one vote per share, and zero otherwise. Equivalently, this variable equals one when the law prohibits the existence of both multiple-voting and non-voting ordinary shares and does not allow firms to set a maximum number of votes per shareholder irrespective of the number of shares she owns, and zero otherwise.	Company Law or Commercial Code
Proxy by mail allowed (PMA)	Equals one if the Company Law or Commercial Code allows shareholders to mail their proxy vote to the firm, and zero otherwise.	Company Law or Commercial Code
Shares not blocked before meeting (SOB)	Equals one if the Company Law or Commercial Code does not allow firms to require that shareholders deposit their shares prior to a General Shareholders Meeting thus preventing them from selling those shares for a number of days, and zero otherwise.	Company Law or Commercial Code
Cumulative voting or proportional representation (CVPR)	Equals one if the Company Law or Commercial Code allows shareholders to cast all of their votes for one candidate standing for election to the board of directors (cumulative voting) or if the Company Law or Commercial Code allows a mechanism of proportional representation in the board by which minority interests may name a proportional number of directors to the board, and zero otherwise.	Company Law or Commercial Code
Oppressed minorities mechanism (OMM)	Equals one if the Company Law or Commercial Code grants minority shareholders either a judicial venue to challenge the decisions of management or of the assembly or the right to step out of the company by requiring the company to purchase their shares when they object to certain fundamental changes, such as mergers, assets dispositions and changes in the articles of incorporation. The variable equals zero otherwise. Minority shareholders are defined as those shareholders who own 10 percent of share capital or less.	Company Law or Commercial Code
Preemptive rights to new issues (PRNI)	Equals one when the Company Law or Commercial Code grants shareholders the first opportunity to buy new issues of stock and this right can only be waved by a shareholders' vote, and zero otherwise.	Company Law or Commercial Code
Percentage of share capital to call an extraordinary shareholders' meeting (PSC)	It is the minimum percentage of ownership of share capital that entitles a shareholder to call for an Extraordinary Shareholders' Meeting. It ranges from one to 33 percent.	Company Law or Commercial Code
Anti-director rights (ADR)	An index aggregating the shareholder rights which we labeled as anti-director rights." The index is formed by adding 1 when: (1) the country allows shareholders to mail their proxy vote to the firm; (2) shareholders are not required to deposit their shares prior to the General Shareholders' Meeting; (3) cumulative voting or proportional representation of minorities in the board of directors is allowed; (4) an oppressed minorities mechanism is in place; (5) the minimum percentage of share capital that entitles a shareholder to call for an Extraordinary Shareholders' Meeting is less than or equal to 10 percent (the sample median); or (6) shareholders have preemptive rights that can only be waved by a shareholders' vote. The index ranges from 0 to 6.	Company Law or Commercial Code
Mandatory dividend (MD)	Equals the percentage of net income that the Company Law or Commercial Code requires firms to distribute as dividends among ordinary stockholders. It takes a value of zero for countries without such restriction.	Company Law or Commercial Code

Financial law variables—Creditor rights		
No automatic stay on secured assets (NASO)	Equals one if the reorganization procedure does not impose an automatic stay on the assets of the firm upon filing the reorganization petition. Automatic stay prevents secured creditors to gain possession of their security. It equals zero if such restriction does exist in the law.	Bankruptcy and Reorganization Laws
Secured creditors first paid (SCFP)	Equals one if secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm. Equals zero if non-secured creditors, such as the Government and workers, are given absolute priority.	Bankruptcy and Reorganization Laws
Restrictions for going into reorganization (RGR)	Equals one if the reorganization procedure imposes restrictions, such as creditors' consent, to file for reorganization. It equals zero if there are no such restrictions.	Bankruptcy and Reorganization Laws
Management does not stay in reorganization (MSR)	Equals one when an official appointed by the court, or by the creditors, is responsible for the operation of the business during reorganization. Equivalently, this variable equals one if the debtor does not keep the administration of its property pending the resolution of the reorganization process, and zero otherwise.	Bankruptcy and Reorganization Laws
Creditor Rights (CR)	An index aggregating different creditor rights. The index is formed by adding 1 when: (1) the country imposes restrictions, such as creditors consent or minimum dividends to file for reorganization; (2) secured creditors are able to gain possession of their security once the reorganization petition has been approved (no automatic stay); (3) secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of its property pending the resolution of the reorganization. The index ranges from 0 to 4.	Bankruptcy and Reorganization Laws
Legal reserve required as a % of capital (LRR)	It is the minimum percentage of total share capital mandated by Corporate Law to avoid the dissolution of an existing firm. It takes a value of zero for countries without such restriction.	Company Law or Commercial Code

Data in Table A6-3 to A6-6 are from La Porta, *et al.* (1998). In Table A6-4, there are six measures chosen as proxies for the quality of law enforcement in different countries, compiled by private credit risk agencies for prospective foreign investors. In Tables A6-5 and Table A6-6 the values of all variables are listed by country and countries are arranged according to their legal origins. Values in the tables are dummies, which are equal to 1 if the country protects shareholder or creditor in that particular issues.

Table A6-4 General law variables

Country	EJ	RL	CORR	ROE	RCG	RAS
India	8.00	4.17	4.58	7.75	6.11	57
Israel	10.00	4.82	8.33	8.25	7.54	64
Malaysia	9.00	6.78	7.38	7.95	7.43	76
Pakistan	5.00	3.03	2.98	5.62	4.87	na
South Africa	6.00	4.42	8.92	6.88	7.27	70
Thailand	3.25	6.25	5.18	7.42	7.57	64
glish origin avg.	*6.88*	*4.91*	*6.23*	*7.31*	*6.80*	*66.2*
Brazil	5.75	6.32	6.32	7.62	6.30	54
Chile	7.25	7.02	5.30	7.50	6.80	52
Mexico	6.00	5.35	4.77	7.29	6.55	60
Turkey	4.00	5.18	5.18	7.00	5.95	51
French origin avg.	*5.75*	*5.97*	*5.39*	*7.35*	*6.4*	*54.25*
South Korea	6.00	5.35	5.30	8.31	8.59	62
Taiwan	6.75	8.52	6.85	9.12	9.16	65
German origin avg.	*6.38*	*6.94*	*6.08*	*8.72*	*8.88*	*63.5*

Table A6-5 Shareholder rights around the world

Shareholder rights (1=investor protection is in the law)									
Country	OSOV	PMA	SOB	CVPR	OMM	PRNI	PSC	ADR	MD
India	0	0	1	1	1	1	0.10	5	0.00
Israel	0	0	1	0	1	0	0.10	3	0.00
Malaysia	1	0	1	0	1	1	0.10	4	0.00
Pakistan	1	0	1	1	1	1	0.10	5	0.00
South Africa	0	1	1	0	1	1	0.05	5	0.00
Thailand	0	0	1	1	0	0	0.20	2	0.00
English origin avg.	*0.33*	*0.17*	*1.00*	*0.50*	*0.83*	*0.67*	*0.11*	*4*	*0.00*
Brazil	1	0	1	0	1	0	0.05	3	0.50
Chile	1	0	1	1	1	1	0.10	5	0.30
Mexico	0	0	0	0	0	1	0.33	1	0.00
Turkey	0	0	1	0	0	0	0.10	2	0.00
French origin avg.	*0.5*	*0*	*0.75*	*0.25*	*0.5*	*0.5*	*0.15*	*2.75*	*0.40*
South Korea	1	0	0	0	1	0	0.05	2	0.00
Taiwan	0	0	0	1	1	0	0.03	3	0.00
German origin avg.	*0.5*	*0*	*0*	*0.5*	*1*	*0*	*0.04*	*2.5*	*0.00*

Table A6-6 Creditor rights around the world

Creditor rights (1 = creditor protection is in the law)						
Country	NASO	SCFP	RGR	MSR	CR	LRR
India	1	1	1	1	4	0.00
Israel	1	1	1	1	4	0.00
Malaysia	1	1	1	1	4	0.00
Pakistan	1	1	1	1	4	0.00
South Africa	0	1	1	1	3	0.00
Thailand	1	1	0	1	3	0.10
English origin avg.	*0.83*	*1*	*0.83*	*1*	*4.17*	*0.02*
Brazil	0	0	1	0	1	0.20
Chile	0	1	1	0	2	0.20
Mexico	0	0	0	0	0	0.20
Turkey	0	1	1	0	2	0.20
French origin avg.	*0*	*0.5*	*0.75*	*0*	*1.25*	*0.20*
South Korea	1	1	0	1	3	0.50
Taiwan	1	1	0	0	2	1.00
German origin avg.	*1*	*1*	*0*	*0.5*	*2.5*	*0.75*

Note: Definition for each variable in Table A6-3 to A6-5 can be found in Table 6-2.

Table A6-7 Sources of pure industry effect determinant variable data

Table A6-7 covers the sources and available time periods of data in each industry. It covers data for the dependent variable and five firm characteristics variables: Industrial concentration, dividend yield, price-earning ratio, market-to-book-value and geographical concentration.

Dependent Variable			**Independent Variables**					
Pure industry effects			**Herfindahl index (HERF)**			**Dividend yield (DY)**		
Industries	*Sources*	*Available time periods*	*Industries*	*Sources*	*Available time periods*	*Industries*	*Sources*	*Available time periods*
IGS	Chapter 3	01/08/1984-01/07/2004	IGS	DS	01/01/1984-01/07/2004	IGS	DS	01/04/1986-01/07/2004
CG	Chapter 3	01/08/1984-01/07/2004	CG	DS	01/01/1973-01/07/2004	CG	DS	01/01/1973-01/07/2004
CS	Chapter 3	01/08/1984-01/07/2004	CS	DS	01/01/1973-01/07/2004	CS	DS	01/01/1973-01/07/2004
BM	Chapter 3	01/08/1984-01/07/2004	BM	DS	01/01/1973-01/07/2004	BM	DS	01/01/1973-01/07/2004
UT	Chapter 3	01/08/1984-01/07/2004	UT	DS	01/01/1983-01/07/2004	UT	DS	01/01/1983-01/07/2004
HC	Chapter 3	01/08/1984-01/07/2004	HC	DS	01/07/1984-01/07/2004	HC	DS	01/01/1987-01/07/2004
TEC	Chapter 3	01/08/1984-01/07/2004	TEC	DS	01/07/1984-01/07/2004	TEC	DS	01/01/1987-01/07/2004
TEL	Chapter 3	01/01/1986-01/07/2004	TEL	DS	01/02/1986-01/07/2004	TEL	DS	01/12/1986-01/07/2004
FI	Chapter 3	01/08/1984-01/07/2004	FI	DS	01/06/1973-01/07/2004	FI	DS	01/06/1973-01/07/2004
PHG	Chapter 3	01/08/1984-01/07/2004	PHG	DS	01/07/1984-01/07/2004	PHG	DS	01/02/1987-01/07/2004
BI	Chapter 3	01/08/1984-01/07/2004	BI	DS	01/01/1973-01/07/2004	BI	DS	01/01/1973-01/07/2004
Independent Variables								
Price-earning ratio (PE)			**Market-to-book value (MTBV)**			**Geographical concentration (GEOG) (market capitalization)**		
Industries	*Sources*	*Available time periods*	*Industries*	*Sources*	*Available time periods*	*Industries*	*Sources*	*Available time periods*
IGS	DS	01/03/1987-01/07/2004	IGS	DS	01/01/1986-01/07/2004	IGS	DS	01/01/1984-01/07/2004
CG	DS	01/01/1973-01/07/2004	CG	DS	01/02/1980-01/07/2004	CG	DS	01/01/1973-01/07/2004
CS	DS	01/01/1973-01/07/2004	CS	DS	01/08/1980-01/07/2004	CS	DS	01/01/1973-01/07/2004
BM	DS	01/01/1973-01/07/2004	BM	DS	01/02/1980-01/07/2004	BM	DS	01/01/1973-01/07/2004
UT	DS	01/01/1983-01/07/2004	UT	DS	01/07/1989-01/07/2004	UT	DS	01/08/1984-01/07/2004
HC	DS	01/01/1987-01/07/2004	HC	DS	01/07/1984-01/07/2004	HC	DS	01/01/1983-01/07/2004
TEC	DS	01/03/1985-01/07/2004	TEC	DS	01/07/1984-01/07/2004	TEC	DS	01/07/1984-01/07/2004
TEL	DS	01/01/1987-01/07/2004	TEL	DS	01/02/1987-01/07/2004	TEL	DS	01/02/1986-01/07/2004
FI	DS	01/06/1973-01/07/2004	FI	DS	01/07/1984-01/07/2004	FI	DS	01/06/1973-01/07/2004
PHG	DS	01/02/1987-01/07/2004	PHG	DS	01/07/1984-01/07/2004	PHG	DS	01/07/1984-01/07/2004
BI	DS	01/01/1973-01/07/2004	BI	DS	01/02/1986-01/07/2004	BI	DS	01/01/1973-01/07/2004

Table A6-8 Correlation matrix of the non-categorical variables

This table presents the correlation matrix of the non-categorical variables included in Chapter 6 panel regressions. The correlation matrix is checked by pooling across all the sample countries. The correlations in bold font are those above 0.60.

	OPEN	EX	INFL	INTEREST	LIQUID	DG	DT	PG	MG	TG	TO
OPEN	1										
EX	-0.16655	1									
INFL	-0.13451	**0.791376**	1								
INTEREST	-0.33352	0.536883	0.327989	1							
LIQUID	0.219509	-0.15441	-0.12712	-0.17508	1						
DG	0.139769	-0.11164	-0.0791	-0.2582	0.5047	1					
DT	0.271314	-0.1448	-0.12675	-0.09835	0.570623	0.263087	1				
PG	**0.664037**	-0.14879	-0.10358	-0.38224	0.517551	0.44534	0.31411	1			
MG	**0.615423**	-0.14387	-0.10253	-0.30275	-0.01467	0.041557	0.106092	0.57819	1		
TG	0.316288	-0.11659	-0.07766	-0.19599	0.459177	**0.634954**	0.312027	0.546792	0.329854	1	
TO	-0.27342	-0.04664	-0.03319	0.066606	0.089083	-0.13074	0.236059	-0.32168	-0.26292	-0.12109	1

Note: The correlation matrix shows that most of the correlations among the non-categorical variables included in Chapter 6 study are rather low.

Table A6-9a Testing down procedure for equation (6.1)

This table presents the preliminary and testing down fixed-effects results of equation (6.1) to show the intermediary procedure before the final results shown in the 2nd and 3rd columns of Table 6-4.

Test	Equation (6.1)			
Dependent variable	ACE			
	FE—without time dummies		FE—with time dummies	
Independent Variables	Preliminary	Testing down	Preliminary	Testing down
OPEN	0.032 (0.86)		-0.007 (-0.14)	
EX	0.325*** (3.17)	0.272*** (2.32)	0.324*** (2.96)	0.322*** (2.92)
INFL	-0.002 (-0.78)	-0.001 (-0.50)	-0.001 (-0.39)	-0.001 (-0.44)
INTEREST	0.884*** (2.91)	0.422 (1.02)	0.778*** (2.47)	0.800*** (2.52)
DG	0.0004 (0.13)		0.003 (0.94)	
PG	-0.003 (-0.96)	-0.002 (-0.85)	-0.007** (-1.94)	-0.004 (-1.49)
MG	-0.004*** (-2.61)	-0.005*** (-2.82)	-0.002 (-1.06)	-0.002 (-1.04)
TG	0.011** (1.74)	-0.0003 (-0.03)	0.009 (1.35)	0.010 (1.48)
LIBERTY	0.010 (1.43)	0.046*** (1.97)	0.004 (0.55)	0.003 (0.40)
EJ	dropped	dropped	dropped	dropped
CORR	dropped	dropped	dropped	dropped
RL	dropped	dropped	dropped	dropped
OSOV	dropped	dropped	dropped	dropped
CVPR	dropped	dropped	dropped	dropped
PRNI	dropped	dropped	dropped	dropped
PSC	dropped	dropped	dropped	dropped
CR	dropped	dropped	dropped	dropped
LRR	0.003 (0.04)	0.029 (0.66)	-0.206*** (-2.52)	-0.151*** (-2.34)
ADR	dropped	dropped	dropped	dropped
Constant	0.071** (1.89)	-0.001 (-0.02)	0.207*** (2.88)	4.403 (89.98)
R-squared	0.1682	0.0422	0.1927	0.7372

Note: *** significant at 5% ** significant at 10%, *t*-stat ratio (fixed-effects) is in brackets

These categorical variables are dropped in the fixed-effect regressions due to their time invariability.

Table A6-9b Testing down procedure for equation (6.1)

This table presents the preliminary and testing down random-effects results of equation (6.1) to show the intermediary procedure before the final results shown in the 4th and 5th columns of Table 6-4.

Test	Equation (6.1)			
Dependent variable	ACE			
	RE---without time dummies		RE---with time dummies	
Independent Variables	Preliminary	Testing down	Preliminary	Testing down
OPEN	0.026 (0.74)	0.015 (0.76)	0.008 (0.16)	0.006 (0.29)
EX	0.325*** (3.20)	0.327*** (3.17)	0.323*** (2.99)	0.324*** (2.95)
INFL	-0.002 (-0.91)	-0.003 (-1.28)	-0.002 (-0.63)	-0.002 (-0.76)
INTEREST	0.941*** (3.20)	0.887*** (4.31)	0.868*** (2.88)	0.857*** (4.13)
DG	-0.001 (-0.35)		0.001 (0.52)	
PG	-0.002 (-0.71)	-0.003 (-1.14)	-0.005 (-1.56)	-0.004 (-1.58)
MG	-0.003*** (-2.44)	-0.002*** (-2.16)	-0.002 (-1.01)	-0.001 (-0.71)
TG	0.010 (1.59)	0.009 (1.50)	0.010 (1.43)	0.010 (1.46)
LIBERTY	0.006 (1.24)	0.006 (1.42)	0.004 (0.68)	0.004 (0.95)
EJ	0.007 (1.05)	0.008*** (2.76)	0.005 (0.65)	0.009*** (3.01)
CORR	0.008 (0.55)	0.005 (0.76)	0.004 (0.28)	0.004 (0.61)
RL	-0.005 (-0.26)		0.003 (0.13)	
OSOV	-0.003 (-0.10)		0.001 (0.02)	
CVPR	-0.017 (-0.22)	-0.019 (-1.13)	-0.038 (-0.46)	-0.011 (-0.70)
PRNI	0.018 (0.38)		-0.011 (-0.22)	
PSC	0.028 (0.06)		0.231 (0.45)	
CR	0.012 (0.66)	0.011*** (1.98)	0.021 (0.83)	0.014*** (2.45)
LRR	0.097** (1.69)	0.057*** (2.39)	0.083 (1.14)	0.060*** (2.42)
ADR	0.010 (0.28)	0.09 (1.58)	0.020 (0.50)	0.004 (0.55)
Constant	-0.073 (-0.42)	-0.056** (-1.64)	-0.191 (-0.87)	-0.119*** (-2.84)
R-squared	0.2466	0.2431	0.3884	0.3870

*** significant at 5% ** significant at 10%, z-stat ratio (random-effects) is in brackets

Table A6-9c Testing down procedure for equation (6.2)

This table presents the preliminary and testing down results of equation (6.2) to show the intermediary procedure before the final results shown in the last two columns of Table 6.4.

Test	Equation (6.2)			
Dependent variable	CE			
	RE---without time dummies		RE---with time dummies	
Independent Variables	Preliminary	Testing down	Preliminary	Testing down
OPEN	0.012 (0.26)		-0.058 (-0.84)	
EX	-0.856*** (-7.02)	-0.504*** (-4.38)	-1.001*** (-6.76)	-0.537*** (-4.83)
INFL	0.020*** (6.94)	0.016*** (2.43)	0.024*** (6.18)	0.019*** (3.21)
INTEREST	-0.251 (-0.50)		-0.078 (-0.15)	
DG	-0.002 (-0.51)	-0.002 (-0.38)	-0.003 (-0.80)	-0.002 (-0.57)
DT	0.015 (0.35)	-0.016 (-0.26)	-0.009 (-0.21)	0.001 (0.02)
PG	-0.0004 (-0.10)	-0.002 (-0.36)	-0.004 (-0.92)	-0.005 (-1.14)
MG	0.002 (0.97)	0.002 (0.94)	0.001 (0.53)	0.002 (0.88)
TG	0.023*** (2.68)	0.023 (1.61)	0.021*** (2.07)	0.028*** (2.70)
TO	-0.005** (-1.81)	-0.004 (-1.47)	-0.005** (-1.75)	-0.005** (-1.69)
LIBERTY	0.008 (0.93)	0.009 (0.69)	0.012 (1.24)	0.005 (0.54)
EJ	0.004 (0.38)	0.007 (0.52)	-0.007 (-0.59)	0.003 (0.36)
CORR	-0.027 (-1.16)	-0.0003 (-0.02)	-0.025 (-1.06)	0.002 (0.11)
RL	-0.011 (-0.41)	-0.023 (-1.17)	0.027 (0.86)	-0.014 (-0.96)
OSOV	-0.052 (-1.12)	0.015 (0.40)	-0.056 (-1.22)	0.003 (0.09)
CVPR	-0.028 (-0.23)	0.041 (0.72)	-0.130 (-0.98)	0.040 (0.73)
PRNI	-0.019 (-0.24)		-0.053 (-0.71)	
PSC	-0.191 (-0.25)		0.645 (0.85)	
CR	-0.029 (-1.19)	-0.019 (-1.41)	0.026 (0.78)	-0.015 (-1.17)
LRR	-0.060 (-0.51)	0.007 (0.05)	0.116 (0.92)	-0.008 (-0.10)
ADR	0.010 (0.16)	-0.008 (-0.43)	0.057 (0.94)	-0.006 (-0.39)
Constant	0.286 (1.08)	0.126** (1.64)	-0.091 (-0.28)	4.463*** (51.14)
R-squared	0.1780	0.0638	0.3466	0.6541

*** significant at 5% ** significant at 10%, *z*-stat ratio (random-effects) is in brackets

Method A7-1 The non-unit sensitivity methodology adopted in Phylaktis and Xia (2006b).

The first step of the approach is very much similar to Heston and Rouwenhorst (1994).

$$R_i^{\$} = \alpha + \sum_{j=1}^{11} \beta_j D_{i,j} + \sum_{k=1}^{13} \gamma_k C_{i,k} + e_i \qquad (7.1)$$

where $d_{i,j} = (D_{i,j} - (w_j / w_J) D_{i,J})$ and $c_{i,k} = (C_{i,k} - (v_k / v_K) C_{i,K})$

w_j is the market value share of industry j in the world market and v_k is the market value share of country k in the world market, and

$$\sum_J w_j = \sum_k v_k = 1 \ .$$

In the second step of the approach, the time series of the pure factor returns ($\beta_{j,t}$ and $\gamma_{k,t}$) are standardized (unity variance) and used in Ordinary Least Squares (OLS) estimates of equation (7.1) to obtain the new set of factor loadings (unrestricted betas: $d_{i,j}$ and $c_{i,k}$) for EACH firm. The unrestricted factor loadings represent the sensitivities of a firm's return to the respective pure country and industry factors. Cavaglia *et al.* (2001) and Phylaktis and Xia (2006b) both stop after the second step. Then they compute the percent of the fitted variance of EACH stock's return that was explained by the country effect as

$$v_{i,j,k}^{d} = \hat{d}_{i,j}^{2} / (\hat{d}_{i,j}^{2} + \hat{c}_{i,k}^{2}) \qquad (7.2)$$

and the percent of the fitted variance of EACH stock's return that was explained by the industry effect as

$$v_{i,j,k}^{c} = \hat{c}_{i,k}^{2} / (\hat{d}_{i,j}^{2} + \hat{c}_{i,k}^{2}) \qquad (7.3)$$

This is an unambiguous measure of the portion explained by country/industry if the country and industry factors are orthogonal. Equations (7.2) to (7.3) provide the means to measure the relative importance of the country and industry factors by gauging how much of the total variance of a firm can be explained by the respective country, industry and firm specific factors.

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