DETERMINANTS OF CROSS-SECTIONAL STOCK RETURN VARIATIONS IN EMERGING MARKETS

by

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ABSTRACT

This paper extends the studies on the relative importance of country and industry effects in explaining cross-sectional stock return variations by exploring the fundamental sources of the country effects. The standard dummy variable decomposition method is applied to data from 13 emerging stock markets (ESMs) from 1984 to 2004 to generate pure country effects. These are then regressed on fundamental characteristics of the countries concerned to identify their determinants. The findings show that the change in the exchange rate and inflation rate together can explain about 55% of the pure country effects, whereas banking and stock market development contribute much less: about 2.8%. The regressions also find evidence to support that argument that the legal origin of the market does matter to stock returns.

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1. Introduction

A substantial body of literature has sought to identify the sources of low co-movements among stock returns in international equity markets by decomposing returns into "country" and "industry" factors. A key aim of this research is to identify whether the potential gains from international portfolio diversification are more likely to be achieved by diversifying across countries or across industries. The results are likely to have important implications for investors and portfolio managers, especially given that a common practise is to select portfolios in a two-step decision-process, first choosing the country or industry in which to specialise, and then selecting individual shares. Beginning with the contribution of Heston and Rouwenhorst (1994), many papers written in the 1990s identified country factors as being the dominant force determining the cross-sectional variation of stock returns. More recently, evidence has accumulated that the importance of industry factors has been increasing, due perhaps to the increasing globalisation of the world economy (L'Her, Sy, and Tnani, 2002; Philaktis and Xia, 2006; Baele and Inghelbrecht, 2005). However, Serra (2000) and Bai, Green and Leger (2006) argue that the increasing importance of industry effects is not a phenomenon that is shared by emerging markets where country effects still largely appear to dominate returns over the last 20 years.

Following Heston and Rouwenhorst (1994), the standard methodology for identifying country and industry effects is a set of cross-section regressions of stock returns on dummy variables which can be interpreted as unit factor loadings associated with each country or industry. However, as Heston and Rouwenhorst (1994) argued at the outset, the resulting decomposition

of country and industry effects is purely descriptive, and gives no direct insight into the underlying reasons for the sources of the country and industry factors, or why one or other factor should be more important at any point in time. Campa and Fernandes (2004) investigated the determinants of industry and country effects and concluded that country factors were smaller for countries integrated in world financial markets and declined as the degree of international integration increased. In addition, greater integration within an industry increased the importance of industry factors in explaining returns, but countries with a more specialized production structure had higher country shocks. These results are limited in three ways. First, they are based on index returns rather than individual stocks and therefore understate the true cross-sectional variation in returns because of the averaging involved in index construction. Second, they investigated a limited range of determinants of country and industry effects[1]. Finally, Campa and Fernandes focus on the magnitude of the country and industry effects only without considering the directions of the stock return cross-sectional variations.

In this paper we study the determinants of the pure country effects derived using the Heston-Rouwenhorst decomposition. However, we aim to develop previous research in four ways. First our dataset consists of returns on individual stocks (1,537) from 13 emerging stock markets (ESMs), thus enabling us to gain maximum benefit from sample size and cross-sectional variation in returns. Second, in contrast to previous studies which concentrated on the modulus country effects, we study the original country effects which are essentially

[1] Country determinants: openness, financial integration, trading activity, industrial concentration, and development; industry determinants: industry openness, financial integration, concentration, and size

stock returns. Therefore this study provides empirical evidences on the determinants of the magnitude as well as the direction of these stock return cross-sectional variations. Third, we investigate a wider range of determinants of country effects than has previously been studied. It would be hard to dispute that liberalization is likely to reduce the country effects in stock returns relative to international (including industry) effects. However the financial markets in countries such as the USA, UK and other OECD countries are mostly highly liberalised, and yet the evidence suggests that country effects are still as strong as industry effects in these countries, especially for smaller companies (Steliaros and Thomas, 2006), although industry effects are undoubtedly increasing in importance. A more interesting question therefore is whether country effects will gradually disappear when liberalisation has been completed as far as is possible; or whether there are other fundamental factors which underlie the importance of country effects, and which may be more slow-moving or ambiguous in direction than the impact of liberalisation. In our analysis we distinguish among "pure economic determinants" of country effects (such as openness and the exchange rate) and institutional factors related to the underlying politico-economic structure of the country. An important innnovation here and our fourth contribution to the literature is that we explore the influence of the legal system on country factors. In a series of papers, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998, 2002) have argued that a country's legal system has an important impact on its corporate governance and investor protection and thus on company valuation. It is therefore natural to investigate how far differences in legal systems are reflected in cross-sectional differences in the country factors underlying share returns. If legal systems are important, then clearly, no amount of liberalisation is likely to lead to a complete dissipation of country factors as a

driving force in the cross-sectional distribution of returns.

The remainder of the paper is organized as follows. In section 2 we provide an overview of the literature review; section 3 describes the data and variables; section 4 discusses models of country determinants including the appropriate panel estimators; section 5 shows the empirical results; some concluding remarks are contained in section 6. In this paper we concentrate on the determinants of the country effects that we calculated using the Heston-Rouwenhorst (1994) procedure[2]. Full details of this calculation and the key properties of the country effects are given in Bai, *et al*. (2006). However, we include a brief summary of the Heston-Rouwenhorst procedure in the appendix.

2. Literature review

2.1 Basic Determinants of Country Effects

Most of the literature on country and industry effects has concentrated on different methods of carrying out and interpreting the decomposition or on investigating different datasets. Exceptionally, Campa and Fernandes (2004) and Phylaktis and Xia (2006b) sought to uncover the fundamental forces underlying the country and industry effects. Campa and Fernandes (2004) investigated 48 developed and emerging markets and 39 industries over the last three decades, using the Heston-Rouwenhorst procedure to calculate country and industry effects. They concluded that financial market globalization has been the main force driving changes in country and industry effects: country factors decline as the degree of financial integration increases. Phylaktis and Xia (2006b) examine individual company constituents of the MSCI

[2] The determinants of industry effects are studied in separate work (Bai, 2007)

global index from 1990 to 2002, and find that the growing foreign activities of firms (measured by their foreign sales ratio) lead to an increase in global and industry effects and a decrease in country effects.

2.2 Economic Variables and Country Effects

Campa-Fernandes and Phylaktis-Xia employ relatively slow-moving variables to capture trends in country effects. However, it is well established that macroeconomic news can produce common movements in a country's exchange rate, interest rate, inflation and the national stock market. It might be expected therefore that changes in macroeconomic variables may be responsible for at least part of any country effect. As far as we are aware there is no published work linking country effects directly with these variables, but there is a vast literature studying more specifically the links among national stock market indices and other macroeconomic variables.

Some studies suggest that the evolution of equity market cross-country linkages is associated with the development of international trade and other macroeconomic factors. Bracker, Docking and Koch (1999) suggest the importance of interlink among international goods markets when they discuss equity market linkages. Darrat and Zhong (2005) and Li, Morck, Yang and Yeung (2004) show that trade openness generally increases co-movements across stock markets. Chang, Kaltani and Loayza (2005) find that trade has a positive and economically significant impact on growth given that certain complementary reforms are undertaken. Other papers have studied the link between financial development and openness

but there is little or no work on the direct link between stock returns and goods trading openness.

ESMs are known to be different (or segmented) from the developed markets especially by having higher volatility of returns. Therefore several studies focus on local rather than world risk factors as the primary source of variation in ESMs equity returns. Exchange rate movements are an important source of macroeconomic uncertainty affecting company profitability and stock returns. Furthermore, as international investors increasingly move their investment focus to emerging markets, exchange rate fluctuations have 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 investors and corporate managers. Two classical economic theories suggest a relationship between stock market performance and exchange rates movements. They are "Flow-oriented hypothesis" and "Stock-oriented models" of exchange rate. "Flow-oriented" models of exchange rate determination (Dornburch and Fisher, 1980) suggest that the currency movements affect international competitiveness and balance of trade and thus affecting the real income and output. Consequently the stock price considered as the present value of future cash flows of firms, can also be affected. "stock-oriented models" of exchange rates determination or portfolio-balance model (Branson,1983 and Frankel, 1983) suggest that the value of financial assets is determined by the present values of their future cash flows. Their expectations of relative currency values and the price movement especially for the internationally held financial assets is an important factor to consider. Therefore, stock returns may be affected by exchange rates and vice versa. Ajayi, Friedman and Mehdian (1998) examined the causal relationship between stock returns and exchange rate changes and found

strong support for contemporaneous determination of stock returns and exchange rates in the developed economies whereas no consistent causal relations were observed in ESMs. Abugri (2006) applied a VAR model to examine stock indices for four Latin American countries 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. Bilson, Brailsford and Hooper (2001) find that the exchange rate is the most influential macroeconomic variable with the returns for twelve markets significantly and negatively 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 of denomination of returns. Phylaktis and Ravazzolo (2005) focus on the long-term and short-term dynamics between stock prices and exchange rates in a group of Pacific Basin countries. Their results show that stock and foreign exchange markets are positively related.

The 'Fisher Effect' claims that the nominal interest rate fully reflects the available information concerning possible future inflation rates (Fisher, 1930). 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 them, forming a puzzle in the financial economic literature. The proxy hypothesis in Fama (1981) suggests that stock returns are determined by forecasts of relevant real variables and that the negative stock return-inflation relation is caused by the negative relation between inflation and real activity. Kim (2003) also finds empirical evidence in support of Fama's hypothesis. However, the puzzle is far from being solved. Choudhry (2001) investigated it by looking at four

high-inflation Latin American countries and found results varying according to the sample countries. Abugri (2006) also finds a significant negative relationship between the nominal interest rate and stock returns in Brazil, Argentina and Chile. Since countries like Chile have kept a relatively low inflation rate, it is argued that this negative link is due to the discount rate effect rather than an inflationary effect. Abugri argues that the appreciation of local currency is normally accompanied by a decrease in nominal interest rates and an increase in reserves and money supply. The implied declining cost of capital and cheaper imported inputs may lead to an increase in local returns.

2.3 Financial system structure and stock performance

Some recent studies have investigated the relationship between institutional and legal variables and economic growth especially financial market development. Normally, developed financial systems include two main financial institutions: commercial banks and stock markets. Although both have the same fundamental role, which is channelling funds from lenders to borrowers, they function through different channels and play different roles in promoting economic and financial system development. 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) find that market and bank developments are always jointly significant regardless the changes of the panel methodology or the measurements 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 each other. Chinn and Ito (2005) 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. Other research argues that the main functions of banks and equity markets are rather similar; therefore the key is creating an environment in which different financial institutions can function efficiently and maximize their comparative advantages, such as improving the institutional factors behind the financial systems and the judicial system (Levine, 1998, 1999, Allen and Gale, 2000and Ergungor, 2003).

There are few studies on the linkage between financial development and stock returns. Dellas and Hess (2005) find that stock returns are significantly linked to the degree of financial development. One of the characteristics of ESMs is inelastic liquidity supply and demand of asset prices. 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 Dellas and Hess (2005) argue that it will be less attractive to international capital, which means it tends to have lower correlation with the rest of the world. They also find that domestic returns are negatively related to all measures of financial development.

Various studies look at the links between different characteristics of stock markets and stock returns. Literatures on two characteristics are reviewed here: liquidity and stock market size. 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. 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) found a positive return-illiquidity relationship. Therefore returns should increase with spread. The conclusion is supported by Datar, Naik and Radcliffe (1998).

However it is not conclusive whether it is positive or negative relation between stock return and liquidity. Stock turn-over ratio has also been used as a liquidity measurement by some researchers. Dey (2005) finds that in emerging markets exclusively there is a positive relationship between turnover ratio and stock returns. Sang-Gyung, Marathe and Shawky (2003) report the same results. It suggests that an active management of an index and its composition may lead to a high turnover (i.e. low illiquidity) and increasing in its value. Rouwenhorst (1999) studies 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. 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 illiquid stocks. Liu (2006) shows a significant positive and robust liquidity premium using trading speed as the liquidity measurement. 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 measurements and across emerging and developed markets.

The effects of market size have been generally ignored in the international macroeconomic and finance literature. Few published papers shows that market size matters for asset trading. Martin and Rey (2000) regard security trading as goods trading and apply trade theories to model international trade in assets. Assets with larger demand have a higher price. In an international framework with segmented markets, this translates into a market size effect: larger financial areas exhibit higher asset prices.

2.4 Political and Bureaucratic quality

One of the major concerns of international investors is political risk in emerging markets. 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. Diamonte, Liew and Stevens (1996) show that in ESMs the lower the level of political risk, the lower is required stock returns. Therefore political risk is a priced factor for which investors are rewarded and it has strong influences on equity cost. Jayasuriya (2005) finds that more efficient markets with better performance of liberalization policy are less likely to create undue volatility effects. Rigobon and Rodrik (2004) and Chinn and Ito (2005) find that rule of law and democracy generally enhance each other and that both make significant direct 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.

2.5 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. Theoretically, legal origin helps explain financial development (La Porta, *et al*. 1998, 2002a; Himmelberg, Hubbard and Love, 2002). Empirically, La Porta *et al.* (1997) 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, Demirgüç-Kunt and Levine (2002) show that legal region 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 more flexible legal systems.

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. 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, McLiesh and Shleifer (2005) find that stronger legal rights of creditors are associated with a higher level of private credit market development but the result is only significant in developed countries, where have more advanced legal systems. Furthermore, they also find that better protection to creditors is from common law system. However as far as aware, there is no published study

looking at the direct link between legal origin of the country and the stock performance of its market.

3. Data and Variables

The selection of variables in this paper is based on the results of the existing literature. The first section discusses the variable definitions, hypotheses and potential explanatory theories. The second section shows data description. Table 1 presents the variables included in this study.

[Insert Table 1 here]

3.1 Country effect determinants

There are four economic variables in the model: openness of goods trading, the change in the exchange rate, the local inflation rate and the local risk-free interest rate. There is as yet no theory or empirical evidence about the link between stock returns and goods trading openness (OPEN) so the link could be either direction. Changes in the exchange rate (EX) are defined as the difference in natural logarithm of exchange rates on consecutive days. According to the existing literature, the link between EX and CE can be either sign. According to the Fisher effect, the inflation rate (INFL) is expected to be positively linked to CE: the higher the inflation rate, the higher are nominal stock returns. The risk free rate (INTEREST) is expected to be positively linked with CE – 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.

The size of financial intermediaries is measured by both the relative and absolute size indicators. The relative size measure is the ratio of deposit money banks' assets to total financial assets (DT). The absolute size measure is the ratio of deposit money banks assets to GDP (DG). This 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 (LIQID) is also included. This is the broadest available measure of financial intermediation.

Although it is important to measure the size and the depth of banking sector development, it is difficult 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. The ratio of private credit by deposit money banks to GDP (PG) is a measure of the activity of financial intermediaries in one of its main functions: reallocating savings to borrowers. 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 hypothesized that there is a negative relationship between CE 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 at lower transaction costs, minimizing price volatility. 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 the liquidity of the markets. According to the these two theories, it is expected that the increased liquidity, lower transaction costs and uncertainty reduce the country specific risk associated with the stocks. Therefore the risk premium should also decrease.

The financial development variables in this work draw on Beck, Demirgüç-Kunt and Levine (1999). Three stock market development indicators are used: size, market activity or liquidity and market efficiency. The ratio of market capitalization to GDP (MG) measures the relative size of the stock market. The hypothesis of the link between MG 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 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.

The value of traded stock as a proportion of GDP (TG) is a measure of liquidity, which captures the willingness of investors to take part in the stock market and how easy or difficult it

is for listed companies to finance their projects through capital markets. However as argued by Baltagi, Demitriades and Law, (2007), high TG may be due to measurement error rather than more financial opportunities for firms and investors because of varying international definitions of stock market transactions. Stock turnover ratio, an indicator of stock market efficiency (TO) is an alternative measure of the liquidity of a stock market. 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.

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.

Political quality is indicated by the "freedom in the world" survey by Freedom House. This presents an annual evaluation of the state of global freedom as experienced by individuals. "Freedom" is measured in two broad groups: political rights and civil liberties, which are included as two institutional variables. According to the literature review in section 2.4, it is generally believed that a market characterized as transparent and more protective to investors will have less uncertainty to international investors. Therefore the higher the political risks, the higher level of required risk premiums are.

Indicators of financial environment can also be the general law and financial law, which are divided into shareholder and creditor rights law. Corruption Index (CORR) composed by International Country Risk Guide (ICR) is included as one of the general legal indicators. 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 lower institutional risk it has to international investors. Therefore a smaller risk premium is required.

3.2 Data

Further transformation was done for the economic and financial development data to suit the needs of this study. First, most of the raw data are denominated in their national currencies. The monthly exchange rates were used here to convert all values into U.S. dollars. Second, all the data frequencies were converted to quarterly. Campa and Fernandes (2004) 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 to seek to

explain the evolution of country/industry effects. Most studies (for example, Phylaktis and Xia, 2006a) 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, there are well-established links between macroeconomic data and stock returns at higher frequencies than annual. Because some of the macroeconomic data such as GDP are available quarterly at the best, in this study, we use a quarterly data frequency[3]. Certain variables such as the legal system are of course time-invariant. The data consist of an unbalanced panel across 13 countries over 20 years (from quarter 3/1984 to quarter 3/2004).

4. Methodology

The methodology applied in this paper is further developed from the two-step procedure in Campa and Fernandes (2004).

4.1 Country effect determinant model

The first step is to construct time-series of country effects using the Heston-Rouwenhorst decomposition outlined in the appendix. The time-series of pure country coefficients generated in Bai *et al.* (2006) are used as the dependent variable in this paper. The second step is to seek to explain what drives the time-series and cross-sectional variation of CE. Eq. (1) models the

[3] Where only annual GDP data were available, these were interpolated to quarterly.

CE, $\hat{\gamma}_k$ as a function of country basic characteristics: economic, institutional and various legal variables.

$$CE = \theta_0 + \theta_1 M_{i,t}^k + \theta_2 I_{i,t}^k + \theta_3 G_i^k + \theta_4 F_i^k + e_{i,t} \qquad (1)$$

CE: Pure country effects for country *k* at time *t*

$M_{i,t}^k$: economic variable vector including economic 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

The purpose of equation (2) is to see whether the economic, institutional and legal regime variables have a different impact on CE when the variables are classified by legal origins of the countries. The superscripts 'E' represents countries with English legal origin, 'F' represents countries with French origin and 'G' is for countries with German origin. According to existing studies, the hypothesis is that common law origin countries emphasize more of private property rights and provide better protection to investors than civil law countries do. Therefore variables classified by the law origin of the countries should have different impact on the dependent variables.

$$CE = o_0 + o_1 M_{i,t}^E + o_2 I_{i,t}{}^E + o_3 G_i^E + o_4 F_i^E + o_5 M_{i,t}^F + o_6 I_{i,t}{}^F + o_7 G_i^F + o_8 F_i^F +$$

$$o_9 M_{i,t}^G + o_{10} I_{i,t}{}^G + o_{11} G_i^G + o_{12} F_i^G + e_{i,t} \qquad (2)$$

4.2 Panel data regression

Panel data regression has certain advantages compared with the OLS. Panel data are suitable for studying data, which vary over time and cross-sectionally. Therefore it is appealing to our work where the stock return performance of different countries studied over time. Second, panel data set includes more data information, more degrees of freedom, reduce collinearity[4] among variables, and therefore provide 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 heterogeneity) and time-specific variables. Omitting them may lead to biased estimations as in pure cross-sectional or time-series studies.

5. Empirical results

5.1 Panel model selections for country effect determinants model

Country effect determinant models (eq. (1) and (2)) are applied to panel data set. However it is not self-explanatory whether pooled OLS, fixed-effects or random-effects regression should be used. This section discusses the panel model selections. Table 2 shows the panel diagnostic test results, which give implications to the selection of the appropriate panel regression methods. Overall these results suggest that for both models the random-effects (RE) model with time effects is adopted.

[Insert Tables 2 and 3 here]

[4] The correlation matrix of the pooled non-categorical variables table is added in the appendix as Table A1. It shows that multicollinearity is not a concern in this study.

5.2 Pooled Models

Table 3 shows that four variables are highly significant in explaining the country effects. One of them is EX, which is negatively linked to the country effects. Every one-unit increase in EX leads to 52.8% decrease in stock returns. EX increase means domestic currency is depreciating. The result is in line with one the of these two classical exchange rate theories: "stock-oriented models" of exchange rates determination or portfolio-balance model. Investors' expectations of relative currency values and their movements are especially important for the internationally held financial assets. When international investors convert their investment returns from their domestic currencies to U.S. dollars, the change in exchange rate reduces the returns of their investments. Roll (1992) also found that exchange rates could explain a significant amount of common currency denominated national index returns. The result in this work has also provided some support to Roll's finding.

INFL is positively significantly linked to stock returns. The coefficient shows that every unit increase in INFL leads to 1.8% increase in stock returns. The results here show that in the ESMs sample, to a small degree, nominal stock return is a hedge against inflation rate but not at one-to-one level.

The only significant financial intermediaries activities measurement 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 commercial intermediaries . The coefficient shows that every one-unit increase in PG leads to 0.6% decrease in stock returns. The only significant stock market development variable is TG. 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. Both results here support the hypotheses in Table 2.

Although some political quality and legal variables appear to be insignificant, they do have the correct signs, such as RIGHTS, CR, EJ and ADR. Including time dummies in RE does not change the results to any great extent. 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.

5.3 Models with variables classified by country of law origin

[Insert Table 4-1 and Table 4-2 here]

Table 4-1 shows the results of regression on CE with variables specified by country of different law origins. Different patterns of significance across legal origins are evident in the table, though there are some similarities as well. Stock returns are sensitive to INFL, EX, OPEN and CR in countries with English legal origins and sensitive to INFL, EX, TG and MG in countries with French legal origins. In countries with German origins stock returns are only sensitive to EX.

Some variables (EX, TG, MG and OPEN) have the same sign as predicted, with no difference across legal origins. Two variables are of particular interest. First, INFL is positively related to stock returns in countries with French origin, which provides empirical evidence to support the Fisher hypothesis. However, inflation in countries of English and German origin is negatively related to stock returns. The relationship between inflation and stock returns has been a long-term unsolved puzzle. The literature review has summarized potential explanations and

empirical findings of the negative relationship but none of these has investigated legal origins. The possible explanation for the negative link in countries with English and German origins is that the good institution and legal environments add in extra value so that less of a premium is needed. The increasing risk premium for covering inflation risk is still less than the decreasing premium for good legal environment. Therefore it looks like stocks do not move one-to-one with inflations in countries of English and German legal origins. Table 4-2 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 no matter adding in time dummies or not, 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 has a positive relationship with stock returns in countries with English and German origins while the link is negative in countries with French origin. This is in line with the results for CR in section 5.2. Therefore the same explanation can be applied. Table 4-2 shows that no matter adding in time dummies or not, the coefficients of 'CR' 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. In the CR index[5] data, 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 the improvement on the CR score in French origin can be regarded as improvement on their legal system towards promoting private properties and

[5] The CR index data is not shown here due to the limited space. It is available upon request.

investments. It may reduce the required risk premium in the French law origin countries. Second, French origin countries normally 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, the decreasing demand may lead to the drop of stock prices. On the other hand, firms may predominantly use bank credit to finance new projects in such a system. This means that there may be fewer shares issued and hence a reduction in supply as well along with a decrease in demand. Therefore the share price will drop given the decreasing supply is slower than the decreasing demand.

To summarize, although the *F*-test in Table 4-2 does not always reject the nulls, different legal origins appear to contribute to the explanation of cross-country variation in stock returns differently. The different effects are in line with theories of legal and financial development. Compared with countries with French legal origin, countries with English and German legal origins are more similar to each other.

6. Conclusions

This study uses economic, institutional and legal variables to explain the country component of stock return performance in 13 emerging stock markets. The results show that inflation and exchange rate changes can explain about 55% of country 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. At the same time, PG and TG contribute 2.8% in explaining stock returns, with the expected signs. In general this shows that more efficient and developed financial sectors

including 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, variables classified by countries with different legal origins show different interactions with both dependent variables. Both English and German legal origins provide better protection to investors and greater private property rights so their results tend to be similar while the results of variables of French origin countries tend to behave differently. However, the inclusion of time dummies sometimes causes changes in coefficients' significances or signs. This implies that there may be important time varying variables not included in this study, but whose time varying properties are captured by the dummies.

Table 1 Pure country effect determinants

Table 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 available upon request.

Dependent Variable			
Variables	***Descriptions***	***Definitions***	***Hypo. CE***
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	Available upon request	+/-
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	Available upon request	+
RIGHTS	Political rights	Available upon request	+
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		+
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 2 Country determinants panel diagnostic test results

Table 2 shows the country determinants panel diagnostic test results, which give benchmarks to select the panel regression method that should be used for equations (1) and (2). Random-effects model with time effects and robust standard error option is adopted in both models.

Test	Equation (1)	Equation (2)
Heteroskedasticity (Breusch-Pagan/ Cook-Weisberg test)	6.16***	39.52***
Firm effects (F-test)	0.19	0.35
Time effects (*F*-test on time dummies)	1.4e+07***	1.51***
Breusch-Pagan LM Test	4.98***	4.78***
Hausman Test	1.87	3.37

*** Significant at 5%

Model specifications:

(1) $CE = \vartheta_0 + \vartheta_1 M_{i,t}^k + \vartheta_2 I_{i,t}^k + \vartheta_3 G_i^k + \vartheta_4 F_i^k + e_{i,t}$

(2) $CE = \theta_0 + \theta_1 M_{i,t}^E + \theta_2 I_{i,t}^E + \theta_3 G_i^E + \theta_4 F_i^E + \theta_5 M_{i,t}^F + \theta_6 I_{i,t}^F + \theta_7 G_i^F + \theta_8 F_i^F +$

$$\theta_9 M_{i,t}^G + \theta_{10} I_{i,t}^G + \theta_{11} G_i^G + \theta_{12} F_i^G + e_{i,t}$$

Table 3 Country determinants models with general variables

Table 3 presents the regression results of equation 1 separately according to whether time dummies are included to show their impacts on the results.

Test	**Equation (1)**	
Dependent variable	**CE**	
	Random-effects (robust st. error)	
Independent Variables	**Without time dummies**	**With time dummies**
EX	-0.499*** (-5.86)	-0.528*** (-4.75)
IL	0.016*** (3.47)	0.018*** (2.94)
PG	-0.004** (-1.22)	-0.006*** (-2.61)
TG	0.018*** (1.41)	0.022*** (2.63)
RIGHTS	0.004 (0.45)	0.001 (0.21)
EJ	-0.004 (-0.56)	-0.004 (-0.98)
CORR	-0.004 (-0.45)	-0.0003 (-0.05)
CR	0.001 (0.13)	0.001 (0.19)
ADR	0.008 (0.94)	0.007 (1.43)
Constant	0.031 (0.54)	-1.372*** (-36.58)
R-squared	0.0580	0.6332

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 testing down procedure for Table 1 is presented in the appendix as Table A2.

Table 4-1 Country determinants models with variables classified by country of different law origins –eq. (2)

In order to exam whether cross-sectional variations in stock returns can be explained by legal system origins of the markets, same variables as eq. (1) 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 (2)						
	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)
ILFL	-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 4-2 *F*-test on the coefficients (from Table 4-1) 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			-

Note: 1. 'E': country of English law origin; 'F': country of French law origin and 'G': country of German law origin

2. Table 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 line and those without time dummies are shown below the diagonal line.

4. Boxes with '✓' means the nulls are rejected, i.e. the coefficients of variables classified by countries of different law origins are NOT equal to each other. Boxes without '✓' means the null is accepted.

Appendix

Table A1 Correlation matrix of the non-categorical variables

	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. Few correlations that are above 0.60 are presented in bold font. It shows that multicollinearity is not a concern here.

Table A2 Testing down procedure for equation (1)

This table presents the preliminary and testing down results of equation (1) to show the intermediary procedure before the final results shown in Table 3.

	RE---without time dummies		RE---with time dummies	
Independent Variables	Preliminary	Testing down	Preliminary	Testing down
OPEN	-0.016 (-0.32)		-0.067 (-0.97)	
EX	-0.850*** (-7.01)	-0.522*** (-4.40)	-0.994*** (-6.75)	-0.551*** (-4.81)
INFL	0.022*** (6.78)	0.016*** (2.37)	0.025*** (5.92)	0.019*** (3.05)
INTEREST	-0.289 (-0.56)		-0.217 (-0.41)	
DG	-0.004 (-0.89)		-0.004 (-0.84)	
DT	-0.045 (-0.89)	-0.074 (-1.42)	-0.062 (-1.19)	-0.079 (-1.45)
PG	-0.002 (-0.45)	-0.003 (-0.50)	-0.005 (-1.08)	-0.007** (-1.71)
LIQUID	0.005** (1.76)	0.002 (0.39)	0.004 (1.31)	0.004 (1.49)
MG	0.003 (1.32)		0.002 (0.96)	
TG	0.024*** (2.66)	0.026** (1.95)	0.021*** (2.05)	0.032*** (3.41)
TO	-0.006** (-1.93)	-0.004 (-1.23)	-0.005** (-1.88)	-0.004 (-1.49)
RIGHTS	0.018** (1.74)	0.012 (0.94)	0.028*** (2.98)	0.007 (0.91)
LIBERTY	-0.014 (-1.07)		-0.019** (-1.69)	
EJ	0.013 (1.16)	0.008 (0.99)	0.004 (0.32)	0.005 (0.69)
CORR	-0.046** (-1.84)	-0.014 (-0.75)	-0.047** (-1.90)	-0.015 (-0.81)
RL	0.016 (0.53)	-0.003 (-0.11)	0.045 (1.34)	0.012 (0.72)
OSOV	-0.090** (-1.84)	-0.008 (-0.23)	-0.104*** (-2.16)	-0.018 (-0.51)
CVPR	-0.095 (-0.73)	-0.079 (-0.92)	-0.201 (-1.46)	-0.101 (-1.11)
PRNI	-0.040 (-0.46)	-0.099 (-1.24)	-0.106 (-1.24)	-0.099 (-1.36)
PSC	-0.163 (-0.20)	0.766 (1.12)	0.709 (0.85)	0.850 (1.25)
CR	-0.021 (-0.84)	-0.008 (-0.50)	0.023 (0.67)	-0.003 (-0.18)
LRR	-0.102 (-0.82)	0.056 (0.31)	0.050 (0.39)	0.035 (0.27)
ADR	0.026 (0.41)	0.066 (1.38)	0.080 (1.25)	0.077 (1.52)
Constant	0.211 (0.76)	-0.152 (-0.76)	-0.246 (-0.74)	4.145*** (16.28)
R-squared	0.1868	0.0656	0.3612	0.6619

Notes:*** significant at 5% ** significant at 10% , *z*-stat ratio (random-effects) is in brackets.

After the preliminary regression, OPEN has been dropped from the regression due to its relatively high correlation with PG and MG. INTEREST is insignificant and is known to have close links with EX and INFL. DG is insignificant and closely linked to TG according to Table A1. MG is insignificant and closely linked to PG according to Table A1. LIBERTY is insignificant in the regression without time dummies and also it provides similar information as RIGHTS. In order to avoid potential collinearity, these variables have been dropped in the intermediary regression. In the intermediary regressions, some significant variables such as TO and CORR in preliminary regressions become insignificant but some other variables such as PG becomes significant.

Heston and Rouwenhorst (1994) dummy variable model

In order to separate country and industry influences, Bai *et al.* (2006) follow other studies in this area adopt the dummy variable model of Heston and Rouwenhorst (1994). They employ the following dummy variable model:

$$R_i^{\$} = \alpha + \sum_{j=1}^{11} \beta_j D_{i,j} + \sum_{k=1}^{13} \gamma_k C_{i,k} + e_i \tag{A1}$$

Eq. (A1) states that each return observation ($R_i^{\$}$) is explained as the sum of a constant (α), an industry component (β_j), a country component ($\gamma_{k:}$), and an error term (e_i).

$D_{i,j}$ and $C_{i,k}$ are the industry and country dummies.

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

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

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, which makes direct cross-sectional regression estimation impossible. Heston and Rouwenhorst (1994) 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 (A1) for each period *t*:

$$\sum_{k=1}^{13} v_k \gamma_k = 0, \quad \sum_{j=1}^{11} w_j \beta_j = 0 \quad \text{and} \sum_j w_j = \sum_k v_k = 1$$

where v_k = The market value share of country *k* in the world market and

w_j = The market value share of industry *j* in the world market

Hence: $$R_i^{\$} = \alpha + \sum_{j=1}^{10} \beta_j d_{i,j} + \sum_{k=1}^{12} \gamma_k c_{i,k} + e_i \tag{A2}$$

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

The application of OLS to Eq. (A2) is equivalent to Weighted Least Squares (WLS) estimation with weights equal to the shares of each firm in the world (sample) market capitalization. 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

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

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

WLS gives:

$$R_k^{\$} = \hat{\alpha} + \sum_{j=1}^{J-1} p_{k.j} \hat{\beta}_j d_{i,j} + \hat{\gamma}_k \qquad \text{(A3)}$$

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

The above estimation yields a time series of the coefficient $\hat{\gamma}_k$, which are pure country effects with industry effects excluded. These pure country effects are studied in this paper as the dependent variable to look for the fundamental forces behind the country effects.

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