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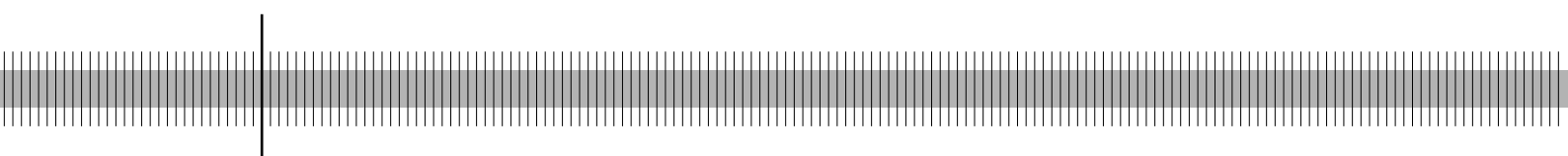
What drives portfolio investments of German banks in emerging capital markets?

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Abstract

After decades of steady liberalisation and financial market development, emerging capital markets experienced unparalleled capital inflows in the aftermath of the emerging markets crisis in the 1990s. This paper studies portfolio investment decisions of German banks in 30 emerging capital markets using monthly data from 2002 to 2007. The use of a dynamic Time-Series Cross-Section framework and the micro database External Position Report provided by Deutsche Bundesbank, which covers German banks assets and liability positions vis-à-vis foreign countries, allows insights into the various determinants: indicators of financial market development, the portfolio-calculus of investors, investor-specific characteristics, as well as the macroeconomic environment.

There is evidence for German banks taking into account the various dimensions of financial market development in their portfolio investment decisions and anticipating the special risks inherent in emerging markets. The implication for policymakers would be to foster financial market development in order to attract and sustain international portfolio investors. However, there is additional evidence for the investor's domestic market environment and global risk aversion exerting a significant influence in times of financial turmoil.

Non-technical summary

The question of whether financial market development and country-specific characteristics of emerging capital markets are important for international investors is a fundamental topic for policymakers. Sustainable financial and macroeconomic development is important not only in times of financial crisis, but also in times when international capital should be attracted and sustained. Short-term capital investments, and especially international portfolio investments, play a crucial role in emerging capital markets. For that reason, this paper presents empirical evidence on the determinants of German portfolio investments in emerging capital markets.

Emerging capital markets experienced unparalleled private capital inflows in the aftermath of the emerging markets crises in the 1990s and prior to the global financial crises of 2008/2009. There are two major reasons for this development: one is the improved financial market development in terms of the efficiency, integration and stability of emerging capital markets over the past decades. The second reason is the change, during the recent decades, in investor's and especially (German) banks' behaviour towards greater capital market orientation and more value-based management. This led to a growing demand for assets that diversify their portfolios, combined with the need to access new markets in order to be globally competitive.

The major determinants of international portfolio investments may be classified as follows: indicators of the financial market development; the portfolio-calculus of international investors; investor-specific characteristics; as well as drivers rooted in the global and national macroeconomic environment. Based on this categories, the results of this paper show that several indicators describing the financial market development across emerging capital markets have a crucial influence on German banks investment decisions. The basis for this analysis is a panel database of 30 emerging capital markets in the period from March 2002-December 2007 from the External Position Report provided by Deutsche Bundesbank.

Proxies for overall development and the efficiency of capital markets showed statistical significance and the highest economical significance of all variables. Additionally, the introduction of depositary receipts programs drive stock market investments positively. While most long-run variables for the real sector did not prove to be very important for international portfolio investment decisions, the short-termed vulnerability indicators included in macroeconomic early warning models had a significant influence on stock and bond market investments. However, there is also evidence for a significant influence of the investor's domestic and global market environment as well as the risk attitude of the investor, particularly in times of financial turmoil.

International investors anticipate the heterogeneity of emerging capital markets. Policymakers should therefore take into account the determinants of attracting and sustaining portfolio investments by improving financial markets and stability in emerging capital markets in order to better handle their short-term character and reduce the risk of capital flights in times of financial turmoil.

Nichttechnische Zusammenfassung

Die Fragestellung, welche Bedeutung Finanzmarktentwicklung und länderspezifische Faktoren in Schwellenländern für internationale Investoren haben, ist zentral für die Wirtschaftspolitik. Die nachhaltige Entwicklung der Volkswirtschaft und der Finanzmärkte ist nicht nur während Finanzkrisen entscheidend, sondern ebenfalls in Zeiten, in denen internationales Kapital angezogen und nachhaltig investiert werden soll. Dabei spielen für Kapitalmärkte in Schwellenländern kurzfristige Kapitalzuflüsse, insbesondere internationale Portfolioinvestitionen, eine entscheidende Rolle. Aus diesem Grund analysiert die vorliegende Arbeit die Determinanten deutscher Portfolioinvestitionen in aufstrebenden Kapitalmärkten.

Nach den Finanzkrisen in den Neunzigerjahren und vor der globalen Finanzkrise 2008/2009 erhielten Schwellenländer hohe private Kapitalzuflüsse. Für diese Entwicklungen können zwei Gründe angeführt werden: Zum einen entwickelten sich die Kapitalmärkte in Schwellenländern bezüglich ihrer Effizienz, dem Integrationsgrad und ihrer Stabilität in den vergangenen Jahrzehnten kontinuierlich weiter. Zum anderen hat sich das Verhalten internationaler Investoren und insbesondere das (deutscher) Banken in den vergangenen Jahrzehnten hin zu mehr Kapitalmarkt- und Wertorientierung gewandelt. Dies führte zu einer steigenden Nachfrage nach Anlagemöglichkeiten, welche den Diversifikationsgrad der Portfolios erhöhen und ebenso zu der Notwendigkeit, neue Märkte zu erschließen, um international wettbewerbsfähig zu bleiben.

Die zentralen Determinanten internationaler Portfolioinvestitionen können wie folgt systematisiert werden: Indikatoren für Finanzmarktentwicklung, das Portfolio-Kalkül internationaler Investoren im engeren Sinne, individuelle Charakteristika der Investoren sowie das globale und nationale makroökonomische Umfeld. In dem vorliegenden Papier kann, basierend auf diesen Erklärungsansätzen, gezeigt werden, dass Finanzmarktentwicklung das Investitionsverhalten deutscher Banken entscheidend beeinflusst. Dabei basiert die Analyse auf Panel-Daten aus der Datenbank „*Auslandsstatus der Banken*" der Deutschen Bundesbank und den Portfolioinvestitionen deutscher Banken in 30 aufstrebenden Kapitalmärkten im Zeitraum von März 2002 bis Dezember 2007.

Länderspezifische Faktoren erwiesen sich als bedeutend: Der Entwicklungsstand und die Liquidität der Kapitalmärkte zeigen einen statistisch signifikanten und den größten ökonomischen Einfluss aller Erklärungsvariablen. Die Auflage von Programmen für Hinterlegungsscheine (Depositary Receipts) erweist sich als positiver Einflussfaktor für Aktieninvestitionen. Vornehmlich kurzfristige makroökonomische Indikatoren, welche Berücksichtigung in Frühwarnmodellen finden, haben messbaren Einfluss auf Investitionen in Aktien und Anleihen. Letztlich liefert die vorliegende Untersuchung zudem Hinweise auf einen signifikanten Einfluss des heimischen und globalen Marktumfeldes in dem sich ein Investor bewegt und der damit verbundenen Risikoeinstellung, insbesondere in Zeiten von Unruhen auf den Finanzmärkten.

Folglich berücksichtigen internationale Investoren die Heterogenität aufstrebender Kapitalmärkte. Um dem kurzfristigen Charakter von Portfolioinvestitionen zu begegnen und das Risiko einer Kapitalflucht in Zeiten von Unruhen auf den Finanzmärkten zu verringern, sollte die Wirtschaftspolitik dieses Investitionsverhalten antizipieren und die nachhaltige Entwicklung der Finanzmärkte und deren Stabilität vorantreiben.

Contents

What Drives Portfolio Investments of German Banks in Emerging Capital Markets?*

I   Introduction

The question of whether financial market development and country-specific characteristics of emerging capital markets (ECMs) are important for international investors is a fundamental topic for policymakers. Sustainable financial and macroeconomic development is important not only in times of financial crisis, but also in times when international capital should be attracted and sustained. Short-term capital investments, and especially international portfolio investments, play a crucial role in ECMs. For that reason, this paper presents empirical evidence on the determinants of international portfolio investments in ECMs.

ECMs experienced huge private capital inflows in the wake of the emerging markets crises in the 1990s and prior to the global financial crises in the period of 2008/2009. According to the IIF[1], total net capital flows to emerging market economies from private sector sources rose to the all-time record of USD 887.8 billion in 2007. Net short-term private debt inflows reached USD 252.8 billion in 2007, compared with an average of no more than USD 25.7 billion p.a. from 1997 to 2006. Private equity portfolio investments had already reached their record high in 2005, at USD 52.99 billion, but experienced unparalleled constant net inflows in the four-years period of 2003-2006, with an average net inflow of USD 45.13 billion per year. As a result, private portfolio equity capital grew in importance, relative to the total amount of capital inflows, to an average of 10.94 percent, a larger share than at any time since the early 1990s. Finally, Foreign Direct Investment (FDI) proved to be a less volatile source of finance, but also reached a maximum of USD 304.84 billion net inflows in 2007.

There are two major reasons for this development: one is the improved financial market development in terms of the efficiency, integration and stability of ECMs in the past decades.[2]

[1] The Institute of International Finance, IIF (2009). "*Capital Flows to Emerging Market Economies.*"
[2] Cf. Odonnat/Rahmouni (2006), IMF (2007) and Lane/Milesi-Feretti (2007).

Assets from ECMs have already been attractive to international investors in the 1990s, but had not gained full attention due to financial vulnerabilities and underdeveloped or even closed markets. Recent liberalisations, new financial products, more efficient trading environments, improved supervision and regulation as well as transparency in ECMs have stabilised domestic capital markets and reduced the home bias of international investors towards ECMs. This study discusses descriptive statistics to characterise this development and identifies the drivers attracting international investors. The second reason is the change, during the recent decades, in investor's and especially (German) banks' behaviour towards greater value-based and capital market orientation. This has led to a growing demand for assets that diversify their portfolios, combined with the need to access new markets in order to be globally competitive. For German banks, this is evident in their investment behaviour towards foreign assets.[3]

This paper studies German banks as representative portfolio investors and analyses their portfolio investment decisions in 30 emerging stock markets and 24 emerging bond markets, with monthly data from March 2002 to December 2007. The use of a dynamic time-series cross-section framework and the micro database External Position Report of the Deutsche Bundesbank, which covers German banks' assets and liability positions vis-à-vis foreign countries, allows insights into various determinants: financial market development, the portfolio-calculus of international investors, investor-specific characteristics concerning risk exposure and business model, as well as the domestic and global macroeconomic environment. The results deliver insights into sustainable financial market development and implications for both, investors and policymakers in ECMs.

The paper proceeds as follows. Section II provides an overview of recent theory and evidence on (portfolio) capital flows to and financial market development in ECMs. In Section III the major determinants of portfolio investments are discussed and research questions are identified. Section IV describes the database and presents descriptive statistics. Section V summarises the methods of Time-Series Cross-Section analyses. The empirical results are discussed in Section VI. Section VII concludes.

II   Literature Review

In the literature, there are various sources which identify the determinants of portfolio investments in ECMs in both equity and debt securities. Fundamentally, Bekaert/Harvey (2003) summarize the state of the art in theory and evidence concerning questions of finance in emerging markets. The relevant literature deals, first, with the importance of financial market

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[3] See chapter IV of this paper.

development and international capital flows for real sector growth, especially in emerging capital markets.[4] Second, there exist several studies on the behaviour of (short-term) capital flows. Third, there is the standard theory of international portfolio investment decisions and the behaviour of institutional investors, especially investment funds. Finally, the specific characteristics of German banks need to be derived from earlier work on different forms of capital flows from German banks to ECMs, in particular German bank lending and FDI.

The interaction of **financial market development and private capital flows** is of relevance for policymakers dealing with the positive and negative effects of financial integration. One view asks whether financial integration leads to financial market development and economic growth through improvements in efficiency of the financial markets concerning information efficiency and the allocation of capital in the economy. This strand of literature focuses, in particular, on analysing the timing and sequencing of opening up for international capital in-flows and their optimal volume. Furthermore, there is an animated debate on the preferable composition of capital flows in foreign direct investment (FDI), equity and debt portfolio flows and bank lending through credit markets.[5] Generally, short-term flows (portfolio flows and short-termed lending) are found to be crucial for external vulnerability as well as financial instability and, therefore, economic policy in emerging economies. Long-term lending and FDI are said to be a saver form of finance for ECMs and encourage economic growth.

The theory of sudden stops in international capital flows goes back to Calvo (1998).[6] After the financial crisis in ECMs of the 1990s a great deal of attention was drawn to the development of "*early warning systems*" for analysing the determinants of sudden stops in capital flows and for predicting future vulnerabilities to financial, currency and banking crises. Berg/Borensztein/Pattillo (2005) evaluate these models and assess the predictive power of models from both, policymakers and private investors. Some of these early warning indica-tors, such as M2/reserves, exchange rate volatility, the current account balance, credit growth, sovereign ratings and others, can help to explain the behaviour of portfolio capital investors in their short-term horizon and response to instabilities.

Conversely, the interdependencies on the other side of the medal of capital inflows, namely **current account deficits and financial market development**, is of more recent interest. Herrmann/Winkler (2009) study current account balances in Asia, characterised by current account surpluses, and Emerging Europe with large current account deficits. They prove the associated capital in- and outflows to be the result of different degrees of financial integration towards the two convergence clubs of US and EMU respectively. However, this view is the

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[4] The *"Finance and Growth-Nexus"* is discussed by Levine (2004).
[5] Cf. Singh/Weisse (1998), Montiel/Reinhart (1999), Fernández-Arias/Hausmann (2001), Buch/Lusinyan (2002), Durham (2003) and Kaminsky (2005).

subject of debate: Gruber/Kamin (2009) find little evidence that highly developed financial markets can explain the current account pattern and financial inflows towards the US.

Another strand of the literature takes the opposite view: Does financial market development improve the attractiveness of ECMs for **international portfolio investors**? Edison/Warnock (2004, 2008) prove the positive impact of financial integration on portfolio capital investments and especially the importance of cross-listings to overcome the underdeveloped national capital markets. Bekaert/Harvey (2000) show how different forms of financial integration have effects on the cost of capital, correlation and volatility in the ECMs. The impact of liberalisation on interest-rate-sensitive portfolio inflows is addressed for by Árvai (2005), who analyses the pull factors of some eight ECMs from Eastern Europe after their capital account liberalisation. She finds the speed of disinflation and the level of public debt to be the main drivers.

Empirical analyses taking the investor-view show that improved regulatory standards, better corporate governance, improved information disclosure and transparency through the adoption of international accounting standards lead to a higher degree of information efficiency and, as a result, attract international investors.[7] Evidence for information asymmetries between domestic and foreign investors is given by Brennan/Cao (1997) and Lane/Milesi-Feretti (2008). Lusinyan (2002) links these information efficiencies with the development of domestic financial markets and portfolio investments in developing countries. Kim/Wei (2002) as well as Gelos/Wei (2005) argue that herding behaviour and capital flight of investors is greater in countries which lack transparency. Additionally, Jayasuriya (2005) shows that greater market transparency and investor protection, better quality of institutions, such as a higher regard for the rule of law as well as lower levels of corruption, reduce the volatility of stock market returns after liberalisation.

"Home bias" is a frequently studied phenomenon in the field of international investment decisions. A commonly used approach to measuring the degree of international investor's home bias calculates efficient - theoretically optimal - portfolios and compares these optimal exposures to foreign markets with the empirically observed ones. Tesar/Werner (1995a) document a US equity portfolio strongly biased towards the domestic market. However, they find investments in ECMs starting to increase since the period of early liberalisations between 1978 and 1991. Tesar/Werner (1995b) confirm the findings of US home bias analogously for bond market investments. However, they as well as Warnock (2002) argue that transaction costs cannot explain the home bias phenomenon. Aggarwal/Klapper/Wysocki (2005) provide important insights to explain the difference in US fund investors' home bias towards ECMs in

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[6] The determinants and risk of short-term capital are further analysed by Claessens/Dooley/Warner (1995) and Rodrick/Velasco (1999).

2001/2002. They demonstrate that US funds invest more in open ECMs with stronger accounting standards, shareholder rights, and legal frameworks. Distinguishing between different companies' characteristics, they find a higher participation of US funds in companies adopting higher accounting transparency, initiated, for example, through the issuance of depositary receipts. The results of Edison/Warnock (2004, 2008) confirm these findings for US equity investors by stating that preference is given to larger companies with lower restrictions on foreign investors and cross-listings in the USA. Moreover, Demirgüç-Kunt/Huizinga (1995) cite taxes and other investment costs as main barriers to portfolio investment in ECMs and show that reducing these market frictions lowers excess returns needed to attract international investors. Surveys of individual manager's opinions further confirm the theoretical and empirical findings of analysis using aggregated capital flow and investment positions data: Köke (2000) casts light on the behaviour of western European portfolio investors and asset manager towards portfolio investment in Eastern European ECMs using questionnaire techniques. He finds the stability of the "*legal, financial and political system*" as well as "*liquidity*" and the "*enforcement of law*" to be among the most important criteria for portfolio investment decisions. Portfolio managers also cited "*controls on capital flow*" and "*listing at a foreign exchange*" as having a high average degree of importance.

In an earlier work, Harvey (1994) stated that the main advantage of ECMs for portfolio investors are the low correlation to developed markets and the predictability of asset prices due to low information efficiency. More recently, Gilmore/McManus (2003) find low short-term correlations and diversification benefits for US investors in three Central Eastern European Markets. However, these aspects are said to disappear with improvements in financial market integration, and country-specific characteristics are supposed to become more important. The calculus of portfolio investors whether to analyse country-specific determinants or to regard "*emerging markets as a homogeneous asset class*" is discussed by Odonnat/Rahmouni (2006) in a descriptive way. Furthermore, Kortas/L'Her/Roberge (2005) recommend and establish multivariate scoring models which use country-specific attributes for return predictions and asset allocations decisions in ECMs assets. Fiess (2003) separates the relative weight of country-specific and global factors in determining capital flows. He utilizes the commonly used terminology of *"push and pull factors"* influencing capital flows. Push factors are usually determinants resulting in the home or global market conditions and the investors characteristics; the pull factors are originated in the market receiving the capital.

The influence of portfolio investors and their behaviour during **times of financial vulnerability** proved to be crucial: An overview of mutual funds behaviour, especially during financial crises in the 1990s, is given by Kaminsky/Lyons/Schmukler (2001). Froot/O'Con-

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[7] Cf. Aggarwal/Klapper/Wysocki (2005) and Chipalkatti/Le/Rishi (2007).

nell/Seasholes (2001) deliver insights into the interdependencies of international investments flows and local asset prices in ECMs as well as positive feedback trading. Schinasi/Smith (2000) argue that the portfolio rebalancing of investors due to portfolio diversification and leverage can lead to a rational reduction in all risky investments in the portfolio in case of a purely local shock, such as a financial crisis in only one asset or country. Additionally, Fung/Hsieh/Tsatsaronis (2000) as well as Borensztein/Gelos (2003) discuss herd behaviour of hedge and emerging market funds during financial crises.

In empirical analysis, little attention is drawn to the determinants of **bond investments** when compared with the extensive literature on equity investments. Burger/Warnock (2003) and Xiao (2007) stress the importance of portfolio investors for emerging bond markets. They find strong evidence for bond investors preferring markets with strong institutions, a stable macroeconomic and political setting as well as more integrated financial and real markets. This applies, in particular, to local-currency-denominated bond markets, because investors prove to react more sensitively there. Additionally the standard determinants of risk aversion and search for diversification benefits can also be found in bond portfolios.

Buch/Koch/Koetter (2009) study the determinants of **German banks' international activities**. They provide evidence that both productivity and risk aversion are important determinants of German banks' internationalisation. With regard to German bank's activities in emerging markets, the work of Heid/Nestmann/Weder/von Westernhagen (2007) analyse their lending patterns during the Asian and Russian financial crises of 1997/98. Concerning portfolio reallocation, they find evidence for an individual and selective behaviour during the crisis and across German banking sectors. While the Asian crises did not lead to a "*wake up call*" effect, the Russian crisis did, and, as a result, led to a reallocation away from emerging markets in general. Differences in lending behaviour across large private and land banks are found and might result from different forms of shareholder base, since public sector banks enjoyed a government guarantee for a long time, which might have influenced their lending and investment decisions.[8] Additionally, Liebig/Porath/Weder/Wedow (2007) evaluate the potential impact of new regulatory standards through the new Basel II Accord on German bank lending towards emerging markets. They prove economic capital to be a major determinant of German banks' exposure towards emerging markets. The changes under Basel II had a limited impact on lending behaviour because, even though regulatory capital proved to be a crucial factor for international capital flows, it had been in line with economic capital before the Basel II Accord. The domestic macroeconomic environment, low political risk and sound governance of the target country play a further crucial role for international investors. Wezel

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[8] This government guarantee was rescinded in 2005 with the abolition of "*Anstaltslast*" and "*Gewährträgerhaftung*" for public banks, following a decision by the European Commission and the agreement of Brussels from 17. July 2001.

(2004) studies the determinants of German banks' FDI decisions in ECMs. He states that non-bank FDI, country risks and financial market development play an important part in long-term decision making. The linkages to the real sector are hypothetically more important for FDI than for portfolio investments because these investments also have the aim of gaining strategic positions in the emerging economies through benefits from expanding credit markets and new distribution channels.

III   Determinants of Portfolio Investments

The following analysis closes a gap in characterising different components of German banks' capital flows to ECMs by investigating the determinants of German banks short- and long-term portfolio investments in both equity and debt securities of different issuers. The analysis therefore takes the investors-view and involves push and pull factors. The main focus is on assessing what drives portfolio investments in ECMs and, especially, on delivering evidence on the role of the various dimensions of financial market development. Most of the explanatory variables used below will therefore be defined as country-specific factors. To provide answers to the question of whether ECMs are still perceived as a homogeneous asset class, or whether international investors use country-specific investment criteria, global factors and factors influencing the decision from the investor's home country must also be captured in the analysis. The risk-free interest rate will therefore be included in the calculation of a Sharpe Ratio for each market, and the importance of commodity prices will be discussed. Moreover, hindsight for the global risk aversion that influences portfolio investments in times of financial turmoil will be given in chapter VI. Finally, suitable investor's characteristics resulting from the home and global environment have to be defined and analysed.

First of all, the various possible determinants of portfolio investments discussed in the literature can be classified as follows: (i.) indicators of the financial market development, (ii.) determinants based on the portfolio calculus of international investors (iii.) individual characteristics of the investor, such as bank-specific characteristics concerning risk exposure and the business model of the bank, as well as (iv.) the global and national macroeconomic environment. These four different aspects will be used in the following empirical analysis and therefore defined and substantiated in this chapter.[9]

(i.) Variables describing the degree of **financial market development** can be broken down into sub-indicators of financial market size, efficiency and integration with global markets. The ratio of stock markets' capitalization and amount outstanding in the bond market to GDP

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[9] A systematised overview of the variables, their definitions and sources is given in appendix I.

are frequently used as proxies to measure the size and overall development of the capital market.[10]

The efficiency of a capital market, in particular, has different dimensions itself: The liquidity of the market, market frictions, and the impact of its information efficiency on asset pricing and the distribution of asset returns. The liquidity of the market, which can be measured by the turnover ratio (*TR*), is the most important aspect. The turnover ratio is calculated following international standards by annualising the monthly total trading volume in the stock and bond markets, respectively, and dividing it by the average of the market capitalisation/amount outstanding in the current and the previous months. However, greater efficiency should imply higher liquidity, whereas high liquidity alone can also be driven by a high degree of speculation in the market. Therefore, in addition to the turnover ratio, its squared term is included to account for the overheating aspect:

(1) $$...+ \beta_j TR_{it} + \beta_{j+1} TR_{it}^2 +...$$

The coefficient for the turnover ratio is expected to have a positive sign, while the squared coefficient is likely to have a negative impact on investment, modelling the overheating-aspects and probably resulting in disinvestments.[11]

To come close to the ideal of an information-efficient market, market frictions should be (close to) zero. These frictions are measured by total transaction costs (composed of commissions, fees and market impact) and taxes on dividends, interests and long-term capital gains in each country.

ECM returns are often characterized by a leptokurtic kurtosis, i.e. they are peaked with fat tails when compared with the normal distribution. This has the implication for investors that they might face trading days and events with highly positive or negative returns. Apart from the special risk characteristics in emerging market economies, the lack of information efficiency in the capital markets can be responsible for the heavy skewness and kurtosis of asset returns in these markets.[12] The hypotheses are: investors prefer positively skewed distributions to negatively skewed ones, and more mature markets tend to create asset return distributions which have less fat-tailed distributions and are therefore closer to the normal distribution. Apart from the measures of skewness and kurtosis themselves, the Studentized Range

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[10] The variable "*domestic credit to GDP*" is used as well, to account for different development paths of the financial markets.

[11] The implicitly estimated hurdle rate at which the investor discriminates between the positive effect of high turnover and the negative effect of overheating is then given endogenously by the maximum *TR** of the hyperbola function:

(2) $$TR^* = -\frac{\beta_j}{2\beta_{j+1}}, \text{ with } \beta_j > 0 \text{ and } \beta_{j+1} < 0.$$

(StR) is used to measure the degree of "distance" from normal distribution. The Studentized Range is defined as range over the standard deviation of daily returns for market index i:

$$(3) \qquad StR_{it} = \frac{Max(r_{it'}) - Min(r_{it'})}{\sigma_{it}}.$$

The degree of financial markets' international liberalisation and integration can be divided into measures of *de jure* and *de facto* integration. The "*Annual Report on Exchange Arrangements and Exchange Restrictions, (AREAER)*" of the IMF is used to measure the long-term *de jure* liberalisation trends. An indicator [1=open ;10=closed] is calculated by weighting seven major 0/1 sub-indicators for controls on capital transaction in each country.[13] On the subject of *de facto* integration, openness of the real sector and financial markets are linked.[14] Therefore, trade openness is included and measured by the foreign trade ratio, which is defined as exports plus imports over GDP. For financial market openness, a ratio is calculated in line with the "net foreign asset position" described by Lane/Milesi-Feretti (2001). The ratio is calculated in stock measures, using the international investment positions database in IFS for portfolio investments:

$$(4) \qquad (PI / GDP)_{it} = \frac{PI_{it}^{assets} + PI_{it}^{liabilities}}{GDP_{it}}.$$

The definition is the sum of portfolio holdings (assets plus liabilities from portfolio investment (PI) in equity and debt securities) as a percentage of GDP for each country and over time. To capture different degrees of financial openness, the indicator was calculated separately for equity and debt markets. The correlation of asset prices to the world market is used to measure the degree of *de facto* financial integration as well. In this study, the correlation can also be interpreted as a measure of the diversification potential for the investors derived from standard portfolio theory. The sign of the coefficient will give evidence on the trade-off between diversification and integration.[15] Finally, the number of depositary receipt (*DR*) programs is used to measure financial integration and substitution possibilities analogous to cross-listings discussed in Edison/Warnock (2004, 2008). All in all, a positive relationship between a high degree of financial market development, efficiency as well as integration and portfolio investment positions in ECMs is expected.

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[12] Cf. Bekaert/Erb/Harvey/Viskanta (1998) and Adcock/Shutes (2005). Special risks in ECMs resulting in non-normal asset return distributions are, among others, shocks from changes in the regulatory or legal framework, high exchange rate volatility and political risk.

[13] The indicator is calculated in a manner similar to that for indicators discussed in Miniane (2004). The indicator includes seven sub-indicators [0;1] of capital transaction controls (in the order of declining weighting factors), on capital market securities (stocks and bonds), provisions specific to institutional investors, collective investment securities, derivatives and other instruments, direct investment and the liquidation of direct investments, as well as money market instruments. Further information can be provided by the author upon request.

[14] Lane/Milesi-Feretti (2008) find bilateral portfolio equity investments to be influenced by trade patterns.

(ii.) The determinants based on **the portfolio calculus of international investors** are taken from the classical theory of international asset allocation decisions: risk, return and correlation. One of the main factors is diversification measured by the correlation coefficient of domestic asset index returns to world index returns, which was already described above. The correlations of each domestic stock market index to the German DAX and from each domestic bond market index to the US Government Bond Index by JP Morgan are used as proxies for the diversification potential.

Indicators of financial stability and risk are important for investment decisions. The variables are classified by using proxies for macroeconomic, political risk and creditability as well as foreign exchange (*FX*) risk. The macroeconomic factors are discussed separately in the following section. Political risk is measured by the sovereign risk ratings provided by Fitch Ratings, which are upper limits for corporate rating in the given country. Exchange rate risk is measured by two variables, first a 60-day mean of the daily exchange rate change to describe the appreciation and depreciation of the currency and, further, the volatility of the exchange rate in standard deviation in this period. Investors are assumed to be risk-averse and react negatively to higher risk, no matter what type of risk.

To better capture the risk-return decision, the performance measure Sharpe Ratio (*ShR*) is calculated for each market and over time. The Excess Return (*ER*) for each stock and bond market index (*i*) is calculated over a risk-free government bond yield (r_f) and divided by the standard deviation of excess returns (σ_{ER}):

(5) $$ShR_i = \frac{\overline{ER_i}}{\sigma_{ER,i}},$$

with: $ER_{i,t} = R_{i,t} - r_{f,t}$, $\overline{ER_i} = \sqrt[T]{\prod_{t=1}^{T}(1+ER_{i,t})}$, and $\sigma_{ER,i} = \sqrt{\dfrac{\sum_{t=1}^{T}(ER_{i,t} - \overline{ER_i})^2}{T-1}}$.

All variables based on index prices and exchange rates are calculated using a 60-day rolling average window.

Indicators typically used by international investors to assess the asset valuation are the Price-Earning-Ratio (*P/E*) and the Price-to-Book-Ratio (*P/B*). They are taken on a market index level to asses the performance and overvaluation or undervaluation tendencies in each market.

(iii.) The use of micro-economic data of German banks allows us to control for some **investor specific characteristics** concerning their business model and risk exposure and also to analyse the major banking sectors (large commercial banks and land banks). All investor-specific variables were calculated using the micro data on individual banks invested in country *c* at

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[15] A high correlation is supposed to have negative effect on portfolio investments in ECMs if the diversification aspect dominates, given the *de facto* integration is measured correctly by the other variables.

time t and weighted and averaged using the value invested in the ECM as weighting factors. This gives an estimation of the average business and risk characteristics of the German banks that hold portfolio investment in a particular ECM.

First of all, to control for the heterogeneous business models of the Germany banks, the ratio of commercial credit to total assets is used. The question arises of how dependent on the development of regulated capital markets the investor is in his trading book business. To measure the importance of regulated exchanges compared to over-the-counter (*OTC*) business for the representative portfolio investor in its total trading book business, the ratio of securities held that are traded on an exchange relative to total securities held for the average bank invested in an ECM is calculated.[16] To capture the risk aversion and risk capacity of German banks, the equity provisions for risk weighted assets (*RWA*) are used as proxy.[17] The "solvency ratio", defined as liable equity capital to RWA, is based on the regulations in sections 10 and 10a of the German Banking Act (Kreditwesengesetz, KWG) and reported by the banks. The variable accounts for the prudential possibility of the banks to take risk, as it is close to the regulatory indicators of Basel I and II. However, it also measures the motivation of German banks to take risks and will therefore be used as a measure of the risk aversion of German banks originated from their business model and regulatory framework. Furthermore, the liquidity available for a bank plays a crucial role: therefore, the impact of short-term liquidity on the portfolio investment positions is analysed. The results for the definition of the ratio of cash plus overnight interbank loans to total assets are reported.

Ultimately, German banks that are more active in trading book business, with a lower dependence on securities traded on regulated exchanges, with equity provisions for their risky assets close to the regulatory minimum required - indicating a low aversion to risk - and high liquidity are supposed to have larger portfolio investments in ECMs.

(iv.) **Macroeconomic variables** are used to control for the macroeconomic environment and risk, as well as for the dependence on the real sector. The ratio of domestic credit to GDP serves to control for the importance of the banking system in the given country and to account for the potential risk of overheating, arising through a credit boom. For that reason, this variable is often used in the "*early warning*" literature. Furthermore, the ratio of the lending interest rate to the deposit interest rate is used to measure the degree of development and competition in the banking sector. A high ratio is associated with less developed banking systems accompanied by low competition. The current account balance to GDP (*CAB/GDP*),

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[16] Note that all variables based on market indices are defined for the equivalent position analysed: "*correlation*" is therefore the stock market correlation in the stock investment model, while it is bond market correlation for the bond investment models. The same applies to "*taxes*", which are taxes on dividends and interest, respectively, the "*financial openness*" variable and for the preference of exchange traded securities.

[17] Buch/Koch/Koetter (2009), p.13 use variables taken from the CAMEL analysis to approximate the risk aversion and liquidity of German banks.

M2/reserves and inflation derived from the consumer price index (*CPI*) are included as standard indicators of financial and macroeconomic vulnerability. Especially the M2/reserves ratio is also a frequently used variable in early warning models. A commodity-energy-price index for developing countries will control for global risks and opportunities for the commodity-dependent ECMs. The ECM's domestic gross fixed capital formation and GDP growth are used to measure real sector growth. Finally, the distance (in km) of the financial centre to Frankfurt/Main can be used in the between effects estimation as a proxy for cultural and language differences as well as other informational problems discussed in the home bias literature.[18]

If appropriate, variables have been seasonally adjusted using the Census X11 or X12 method or transformed using the logarithm function.

IV   Data and Descriptive Statistics

This paper studies portfolio investment decisions of German banks in 30 emerging stock markets and 24 emerging bond markets using monthly data from March 2002 to December 2007. The External Position Report provided by Deutsche Bundesbank is used to analyse the short-term calculus of international portfolio investments. This micro database covers German banks assets and liability positions vis-à-vis foreign countries. The data availability is of monthly frequency and reporting is accomplished according to the regulations of the monthly bank statistics.[19]

At first, some stylised facts about the **internationalisation of German banks** based on the exposure to foreign capital markets will be given. Appendix II shows the sum of all securities held by German banks in euro billions and the share of foreign assets held by security type and issuer for the 1990 – 2008 period. The total amount invested in securities quintupled to €1542 billion in December 2008. The degree of international orientation is measured by the share of foreign securities to total securities held and to total assets. The dependent variable in the following models will also be approximated by the share of securities in ECMs to total assets of the banks.[20] During 1990 and 2008, foreign securities as a share of German bank's portfolios increased from no more than six percent in 1990 to 46 percent in 2007. The share of assets from emerging capital markets mirrored this development proportionally. Without es-

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[18] Lane/Milesi-Feretti (2008) state that these informational linkages, like a common language are important. See also Buch/Koch/Koetter (2009), p.14.

[19] For more information and aggregated data see:
http://www.bundesbank.de/meldewesen/mw_bankenstatistik_auslandsstatus.php
Individual data about German banks are confidential and can be used on the premises of the Deutsche Bundesbank only.

[20] Taking shares of total assets allows the interpretation of a share in the portfolio of German banks, correcting for an increasing trend in both security prices and total assets and results in a stationary time series.

timating the discrepancy from the theoretically optimal exposure, this can be taken as evidence of a decreasing home bias. The development is only temporarily slowed down by financial crises during that time. Describing the allocation over security types, the average proportion of bonds is 82 percent, while stocks only account for an average of eight percent. The share of stocks in the portfolios is generally more volatile and is between four and ten percent, while the share of bonds rather seems to shift between the types of issuers. First, the proportion of bonds from banks in the portfolios decreased from 38 to 20 percent up to the end of 1990s. It more than doubled again in the second half of the sample period with inverse effects to bonds from others issuers, such as governments and non-financial companies. This is a first hindsight for different investors' calculus in the two asset classes.

A very heterogeneous exposure to foreign capital markets across **banking sectors** can be stated (not reported). The largest absolute exposure to foreign securities from all issuing countries can be found in the banking sectors of credit banks (large commercial banks and regional banks) and land banks, each with more than €160 billion in December 2007.[21] International business for savings banks and credit cooperatives is performed by land banks and the regional institutions of credit cooperatives, which show a large share of foreign securities to total assets of 20 percent for regional institutions of credit cooperatives and more than ten percent for land banks in December 2007. Both banking sectors have more than half of their securities invested internationally. However, only large commercial and land banks, as well as regional institutions of credit cooperatives tend to invest in emerging capital markets. In the following sample of portfolio investments in ECMs, large commercial banks and land banks account for roughly 90 percent of all securities held. Only these two banking groups will be analysed individually.

The selection of countries according to the definition **"emerging capital markets"** resulted in 45 candidate countries for the study. However, omitting Middle Eastern and other markets which are vastly dependent on commodity markets, as well as checking the available data for the dependent and independent variables, leaves 30 ECMs in the sample.

Monthly time series data on individual bank-country investment positions in the External Position Report are available in Euro since March 2002 and the sample is defined until December 2007. The upper limit is due to data availability and the global financial crises of 2008/2009 changing investors behaviour. Hence, longer periods of financial crisis are not included in the sample, but several individual ECMs experienced times of local or global turmoil in the sample period.

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[21] The credit bank sector can be subdivided into the large commercial banks and the smaller regional banks, because large commercial banks account for €116 billion in this sector and have a larger share of foreign securities in their portfolio (eight percent compared with six percent of total assets in smaller regional banks).

The following **investment positions** are included in the sample: stocks, bonds and notes (by different issuers), direct investments, and foreign bills of exchange.[22] The position of direct investments of German banks has no portfolio character, because it is defined as participation with a longer investment horizon. However, these investments can be executed through activity in capital markets. Owing to this fact, direct investments will be used to check for differences in the dependence on financial market development across different investment horizons. The instrument of foreign bills of exchange is one of the oldest and one of the most cosmopolitan financial contracts in history. As these positions of German banks towards ECMs prove to be fairly stable over the sample period and these contracts by construction deserve a sound law enforcement in and across countries, it will be interesting to analyse the dependence of these investment positions on financial market development and trade openness.

The **German capital** is of major importance for emerging markets: According to the BIS Quarterly Review of International Banking & Financial Market Developments, approximately ten percent of all foreign claims in emerging markets could be retraced directly to German investors, which is position number three in the world. In a ranking of major sources of portfolio investments in emerging markets for 2007, Germany occupied fifth position in the world.[23] The Coordinated Portfolio Investment Survey, CPIS (July 2009) of the IMF reports €68.38 billion of total German portfolio investments in the surveyed ECMs for 2006 (see appendix IV). This is equal to 3.79 percent of German portfolio investments in all countries (€1803 billion). Statistics for the segmentation of sources by branches are available for 2004: The share of securities held by banks accounts for 37.3 percent of total securities. German bank's investments in the surveyed ECMs account for €19.68 billion. Therefore, the role of German banks in total portfolio investments in ECMs is even greater than in the total sample: 45.6 percent of invested capital can be retraced to them.

Cross-checks of the data sample proved the appropriate estimate of the data used.[24] According to the External Position Report, the average monthly ECM securities held by German banks in the sample period account for €17.5 billion (see appendix IIIa). This is equal to 3.76

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[22] Bonds are denominated in both, local and international currencies. The data do not allow a distinct to be made between them. Small volumes are reported in money market instruments and treasury bills, showing the low degree of development and openness of these markets for foreign investors. Furthermore, the invested capital in foreign branches was left out of the analysis of direct investments.

[23] See International Financial Services London, IFSL (April 2009). *"External Finance for Emerging Markets."* estimation based on CPIS by IMF. Note that the top four are major financial centres or offshore markets: USA, UK and Luxemburg as well as Hong Kong SAR, which is categorised as ECMs in this study.

[24] Note that the sample is limited to immediate portfolio investments in ECMs. Indirect participation through investments in investment funds, financial offshore centres or the exposure through investments in domestic multinational companies cannot be included. However, this allows the interpretation of direct dependence on financial market development.

percent of total foreign securities.[25] The actual exposure of German banks to each ECM will not be printed here on grounds of privacy and confidentiality. It can nevertheless be stated that the distribution in the sample is highly similar to the proportions publicly available in the CPIS (July 2009), reprinted in appendix IV.[26] The portfolio capital invested in the 30 markets studied is among the 87 markets most invested in by German investors.

To sum up, the amounts and quotas used in the following sample represent the amounts published by BIS (2008) and CPIS (2009) and prove that German banks have a substantial share of total German portfolio investments.[27]

Moreover, the distribution across investment positions proves reasonable: The positions in sovereign bonds are highest in both absolute as well as relative terms (average of 58.9 percent), increasing by 50 percent in relative importance and doubling their absolute values. While bonds of financial issuers gain importance (from 24.5 percent up to 38.9 percent), non-financial companies bonds lose (from 5.2 percent to 2.4 percent). Stock positions held are 3.5 percent on average, but gain relative importance up to 6.4 percent at the end of 2007. Compared with the total foreign portfolio investments surveyed in appendix II, they seem underrepresented, but this proportion is reasonable taking into account the higher sovereign debt issued by emerging market sovereigns. Direct investments at €5.2 billion prove to be an important position. Finally, the positions show the expected volatility patterns over time: stock investments prove to be highly volatile (variation coefficient of 0.778), while bond investments in general tend to be less volatile. Sovereign bonds show slightly less volatility than financial bonds and corporate bonds, respectively (see appendix IIIb). Direct investments and foreign bills of exchange show lowest volatility over time.

Descriptive statistics for explanatory variables are available in appendices Va-b.[28] Mean statistics over countries are given and the time series variability is shown by box-plots for the most interesting variables over time in appendices VIa-f. In terms of market capitalisation the markets of Chile, Hong Kong, Israel, Malaysia, Singapore and South Africa are the most developed. The markets of Latvia and Slovakia prove to be very undercapitalized. The turnover ratio is found to be highest in China , Hong Kong, India, Pakistan, South Korea and Turkey. Hong Kong serves as a financial centre, while the others tended to experience times of overheating during the sample period. Stock market development is best described in the rising median (from around 0.2 to circa 0.7) and quartile of the stock market capitalisation over

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[25] In comparison Heid/Nestmann/Weder/von Westernhagen (2007) state that (not publicly guaranteed) credits to emerging markets account for roughly 11 percent of total credits by German banks.

[26] For December 2004, for example, the Bravais-Pearson correlation coefficient of the amounts invested between the reported CPIS data and the data in the present sample is 0.9994, and Spearman's rank correlation coefficient of the countries rank among ECMs is 0.968.

[27] Another cross-check was performed using the *"Zahlungsbilanz nach Regionen"* (2008), of the Deutsche Bundesbank, i.e. the German balance of payments by region.

GDP ratio. Additionally, the lower 25 percent quartile improved over time, while the range enlarged, indicating the increased heterogeneity among ECMs.

The indicator of *de jure* financial integration based on the AREAER is, on average, highest for Argentina, India, Indonesia, Malaysia, Mexico, South Africa, Thailand and Ukraine, showing that these markets still have a lot of exchange restrictions, partly because of negative experience in the 1990s. Estonia, Hong Kong, Israel and Peru show relative few restrictions. The *de facto* financial openness indicator and the average number of substitution possibilities through depositary receipts shows a slightly different picture: Securities from the BRIC countries (Brazil, Russia, India and China), as well as Hong Kong, Mexico and South Africa are most frequently tradable for international investors through the investment vehicle of DRs. Looking at the time series characteristics of the financial openness measure, a rise in median and quartile can be stated, with median improving from around 19 percent to 28 percent and the quartile rising and widening up especially at the upper end. The economies that are integrated into the EU and those that are further developed or bigger show the expected higher average correlation (Czech Rep., Hungary, Poland, Russia as well as Chile, Singapore, Israel and Turkey). The median and quartile of the correlation to the DAX across countries rose steadily over time, verifying the decreasing diversification effects from ECM investments. The small economies (Estonia, Slovenia, Slovakia, Malaysia and Thailand), as well as Hungary, Czech Rep., Singapore and Hong Kong show a high trade openness.

During the sample period, the median total transaction costs fell from more than 65 percent to values under 55 percent (not reported), which confirms declining market frictions in ECMs. In half of the markets (14/30), it is possible to observe positive average skewness of daily returns and with some others being heavily skewed to the left side of the return distribution. As theory leads us to expect, the better developed markets show an average kurtosis of daily returns closer to three: Hungary, Mexico, Poland, Singapore, South Africa and South Korea.

It can further be stated that exchange rate volatility decreased across countries over time, which is mainly a result of Eastern European countries in the sample adopting the euro or entering the Exchange Rate Mechanism II (ERM II) during the sample period.[29] As a matter of fact, Latin American exchange rates tend to be more volatile towards the euro than the rest. CAB/GDP ratio proved to be negative on average especially for Eastern European economies. The modus of sovereign ratings is in the range of BB- to AA- with Singapore (AAA) and Argentina (DDD) being outliers to the better and worse, respectively.

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[28] Further descriptive statistics are available from the author upon request.
[29] Slovakia and Slovenia adopted the Euro, Estonia, Latvia and Lithuania are in the ERM II, and the Bulgarian lev is pegged to the Euro.

V   Empirical Model and Methods

In the following analysis, portfolio investment positions of German banks in ECMs will be explained across ECMs and over time. The use of a Time-Series Cross-Sectional (TSCS) framework allows insights into the various determinants of the investment decision over time, controlling for unobserved time-invariant heterogeneity in cross-sectional models.[30] Given the economic theory about portfolio investments, a dynamic model specification is appropriate.[31] The hypothesis is that investors react with certain time lags to developments in explanatory variables. The investment position in one period also depends on the amount invested in earlier periods, as is known under "*habit-persistence*" behaviour of individuals. Both of the dynamics arise because market frictions, different frequencies of data availability, expectation building and volatility of the variables might prevent investors from adjusting their positions immediately. Investment behaviour will therefore be characterised rather by successive investment and disinvestment. This behaviour can generally be modelled using an Autoregressive-Distributed-Lag (*p,q*)-Model in panel version:

$$(6) \qquad\qquad y_{it} = w_i + \sum_{k=1}^{p} \rho_{ik} y_{i,t-k} + \sum_{k=0}^{q} \beta'_{ik} x_{i,t-k} + u_{it},$$

where $i = 1, 2, \dots, N$ indexes individuals, here ECMs and $t = 1, 2, \dots, T_i$ indexes time periods, here months. y_{it} denotes the dependent variable with coefficients ρ_{ik} on its lagged values. x_{it} and β_{ik} represent ($m \times 1$) vectors of explanatory variables and their coefficients, respectively.[32] The component ω_i is the unobserved ECM-specific fixed effect and u_{it} the residual error term. The first term is time-invariant, while the second varies over time and ECMs. The further assumptions in modelling ω_i differentiate between fixed and random effects models.[33] In the fixed effects model, these are fixed parameters to be estimated, while the residual error term is stochastic and independent identically distributed IID ($0, \sigma^2_u$). The x_{it} are assumed to be independent of u_{it} for all i and t. The fixed-effects model is also often referred to as the "*Least-Squares-Dummy-Variable*" (LSDV) regression, because the regression model can be estimated using dummy variables for each individual. Therefore, individual effects are controlled and only the variation within the individual is analysed. By controlling for these time-invariant differences in individuals, the results of a fixed-effects regression are unbiased esti-

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[30] For an introduction and discussion of the general advantages of panel data econometrics see Greene (2009).

[31] See Lusinyan (2002) for a similar application of dynamic panel models to portfolio investment decisions.

[32] This is a simplified notation, were lag orders are denoted by p and q, respectively. The lags will be allowed to differ across explanatory variables in the empirical implementation later on.

[33] The modelling of a pooled OLS framework against fixed effects was tested with a F-Test under the null-hypothesis of equal constant terms and the results are reported for each estimation. The Breusch-Pagan Test was used to test for random effects. Finally, the Hausman test of a restricted model against unrestricted model justified the decision on fixed or random effects specification are appropriate. However, there is usually only a small difference between fixed and random effects estimators in TSCS data, which means that the random effects are not relevant in general and in the following TSCS case.

mators compared with ordinary regressions. Alternative specifications for this model specification were applied using deterministic trends and time dummies (see chapter IV).

Because the endogenous variable depends on the w_i in model (6), the lag of the endogenous variable will also depend on this error term. This correlation between lag and error term will lead to inconsistent and biased OLS-estimations. This problem is commonly known as the *"Nickel Bias"* or the *"Dynamic Panel Bias"*. It can be shown, however, that this bias becomes insignificant for sufficiently large time dimensions (*T*), which is available in the following sample on a monthly (*T*=70) basis.[34] Therefore, the use of a fixed-effects estimator is more straightforward and avoids the problem of too many instruments in dynamic panel data GMM.[35]

The time structure of the distributed lag model was specified individually for each model, taking into account the different investment and expectation horizons, reporting frequency and volatility of the predictors. The optimal lag for each variable was chosen by using a step-wise iteration procedure based on the minimum of Akaike's information criterion of each model for all possible combinations of explanatory variables lags.[36] The lag for the endogenous variable proved to be sufficiently modelled at a one-month lag, so there is positive auto-correlation in the investment position.[37] The maximum lag for each explanatory variables was limited to up to three months. Thus, the fundamental regression equation for portfolio investments used in this paper has the following form:

$$(7) \qquad y_{it} \;=\; w_i + \rho y_{i,t-1} + \sum_{j=0}^{J}\sum_{a=0}^{q_j} \beta_{ja} FMD_{j,i,t-a} + \sum_{k=0}^{K}\sum_{b=0}^{q_k} \beta_{kb} PF_{k,i,t-b}$$

$$+ \sum_{l=0}^{L}\sum_{c=0}^{q_l} \beta_{lc} INV_{l,i,t-c} + \sum_{m=0}^{M}\sum_{d=0}^{q_m} \beta_{md} MAC_{m,i,t-d} + u_{it}.$$

with *FMD* containing a vector of up to *J* indicators for financial market development with q_j individual lag-length [0;3] for each variable and β_{ja}, the coefficient for lag *a* of variable *j*, *PF* comprising up to *K* variables measuring the portfolio investors calculus and q_k the individual lag-length [0;3] for each variable and β_{kb}, the coefficient for lag *b* of variable *k*, *INV* comprising up to *L* variables measuring the investor-specific characteristics and q_l the individual lag-length [0;3] for each variable and β_{lc}, the coefficient for lag *c* of variable *l*, and the *MAC* vector pertaining to as many as *M* variables measuring the macroeconomic envi-

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[34] Mehrhoff (2009) shows that the dynamic panel bias decreases for the LSDV estimator if *T*>30.

[35] However, regressions using dynamic panel-data estimators like a two-step difference GMM with robust Windmeijer finite-sample correction and limited lag number were applied for robustness checks.

[36] A second criterion checked was based on the individual significance of each variable's lags and led to a similar optimal term structure.

[37] The estimated coefficients for the endogenous lag variables are not reported in further tables. Their estimated values are about 0.62 for stock investments and 0.89 for sovereign bond investments. With their values being significantly different from zero and from one at the one percent significance level.

ronment and q_m the individual lag-length [0;3] for each variable and β_{md}, the coefficient for lag d of variable m.

Only the bank's business model, the variable trade openness, the predictors for depositary receipts and financial openness proved to influence investment decisions over several periods. The modelling of the majority of variables was optimal with just contemporaneous influence. This econometrical optimal time structure seems plausible and consistent with standard theory of each variables influence in the short-term investment decisions.

Special issues arise due to the TSCS data in this study. The length in both groups ($N=30$) as well as time ($T=70$) is relatively high. Therefore, grouped unit root tests must be applied. Literature and tests on unit roots of the time series in panel data are discussed in Breitung/Pesaran (2005). Tests with the assumption of cross-sectional independence were used[38] and cross-sectional dependence was taken into account with the CADF test by Pesaran. If the null hypotheses of the unit root is rejected, this can be interpreted as a significant fraction of the cross-section units being stationary. The dependent variables did prove to be stationary under the independent tests (appendix VIIa), as well as under the test allowing cross-sectional dependence (appendix VIIb).[39]

Furthermore, *panel error assumptions* are inherent in using fixed effects in TSCS data which are discussed under "*serial correlation*", "*temporary cross sectional dependence*" and "*groupwise heteroskedasticity*".[40] They were tested using a test for serial correlation in the idiosyncratic errors, the Breusch-Pagan LM test for cross-sectional correlation in fixed-effects models and the latter using a modified Wald statistic for groupwise heteroskedasticity in fixed-effects models. In each test, the null hypotheses of no serial correlation, cross-sectional independence and homoskedasticity in the residuals across the groups were rejected. Thus, the obligatory corrections for these panel errors need to be applied.

The solutions for these panel errors in TSCS data are seemingly unrelated regressions (SUR) estimated using feasible Generalised Least Squares (FGLS) or corrections in the variance-covariance-matrix using Panel Corrected Standard Errors (PCSE), as demanded by Beck/Katz (1995). Cameron/Trivedi (2009, pp.267-270) discuss these different approaches. Given the data underlying the following study, the use of FGLS proved appropriate. The time horizon is

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[38] The idea of these tests can be shown by the simplest form, known as "Fisher-test". The p-value (π_i) of the individual-specific Augmented Dickey-Fuller or Phillips-Perron test applied to cross-sectional unit (i) are used to apply a combined test on the stationarity of the variable. The combined test statistic is given by:

$$(8) \qquad \bar{\pi} = -2\sum_{t=1}^{N} \log(\bar{\pi}_i),$$

under the null hypotheses, $\bar{\pi}$ is χ^2 distributed with $2*N$ degrees of freedom.

[39] Most predictors are defined as returns or growth-rates. Unit-root test results for explanatory variables are not reported but are available upon request. From a theoretical and empirical point of view, cointegration modelling did not prove to be indispensable and will be left for future research.

[40] A formal description of the panel error assumptions is given in Beck/Katz (1995), pp.645-646.

long and the dimension relative to the panel groups sufficient.[41] In reference to the implementation in STATA, Cameron/Trivedi (2009, p.268) state that *"The estimators [of xtgls] are more efficient asymptotically than those from xtpcse, if the model is correctly specified."* The above-mentioned tests on panel errors suggest that this efficiency gain of FGLS is reasonable.[42] Beck/Katz (1995) further argue about a finite-sample bias in the estimators and standard errors, when using panel-specific AR(1) correction of serial correlation. However, the regression results of the following study proved robust to different specifications of non-specific or panel-specific corrections.

Hence, the following analysis uses an estimator taking into account groupwise heteroskedasticity and cross-sectional dependence by using FGLS. Furthermore, after testing, panel-group specific serial correlation of the residuals is modelled. The full variance-covariance matrix of the system's disturbance vector is estimated. This requires the panel to be balanced. The variance-covariance structure is given by:

$$
(9) \qquad \Omega = \begin{bmatrix} \sigma_1^2 I & \sigma_{1,2} I & \cdots & \sigma_{1,r} I \\ \sigma_{2,1} I & \sigma_2^2 I & \cdots & \sigma_{2,r} I \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{r,1} I & \sigma_{r,2} I & \cdots & \sigma_r^2 I \end{bmatrix},
$$

with group-specific variances and covariances different from zero.[43]

Regression results are reported only with long-run coefficients, which were calculated according to Greene (2008, pp.681-686). Using long-run multipliers has the advantage of reducing the reported information to one coefficient, giving a better interpretation of the net impact of a change in the explanatory variable on the investment position and reducing the impact of possible multicollinearity among regressors of different lags.[44] In addition, the standard errors of these long-run coefficients are estimated using the *"delta method"* to enable significance tests. The measure for goodness-of-fit is a Wald test statistic.

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[41] Cf. Beck/Katz (1995), p.637. The discussed study has a ratio of $T/N = 2.333$, thus the elements of the matrix are estimated with 4.667 observations on average. This is sufficient to assume a small impact of the bias, if it is apparent at all.

[42] If T is more than twice N, the problem of the severe impact of contemporaneously correlated errors and heteroskedasticity across panel groups can lead to efficiency gains of FGLS over OLS of 20 percent, Beck/Katz (1995), p.642.

[43] $T \geq r$ is necessary for valid results and assured in this study. Another prerequisite is that T must be greater than N, otherwise the FGLS estimator cannot be calculated.

[44] Obtaining precise estimates of the individual lag's coefficients can be difficult due to multicollinearity problems, while good estimates of the long-run multipliers can be obtained.

VI Results

The results for **between effects models** are not remarkable in most applications. Nevertheless, there are some insights in this paper for the investors' decision-making across ECMs. Appendix VIII reports the results for between effects estimations for variables with most explanatory power across panel groups.

First of all, controlling for the development paths of capital market-based compared with banking system-based economies proved important over all further model specifications and for all investment positions. An increase in the ratio of domestic credit to GDP and, therefore, the more bank-based the economy is, the lower portfolio investment is in general.

However, it was solely for sovereign bond investments that a high ratio of lending-to-deposit interest rates and therefore low competition and development of the banking system proved to have a significant negative influence in the cross-sectional decision. The size of the stock market measured by stock market capitalisation to GDP has already a slight positive influence on stock market investments in cross-sectional decision making and this measure will prove to play the major role in time series analysis later on. The coefficients for stock market liquidity tend to give evidence of a dislike of illiquid markets and preference of markets with high turnover ratios in equation (2).

For stock investments, it can be stated that German banks invest more in ECMs with a higher correlation to the DAX, corresponding to a higher *de facto* integration with Germany. Investors also prefer ECMs with a large number of depositary receipt programs, a form of substitution for domestic stock markets with international financial centres. For sovereign bond investments it is possible to find the expected positive influence of higher *de facto* integration indicated by the financial openness indicator. Market frictions are relevant across countries: the higher the tax on interest in ECMs, the lower the sovereign bond investment. Sovereign bond investments seem to be higher in countries closer to Germany and therefore with the same cultural background or closer political ties, a result consistent with the huge investment positions of German banks in Eastern European sovereign bond markets.

Additionally, macroeconomics seem to matter across countries. The tendency is for stock market investments in ECMs to be high in countries with high capital formation and GDP growth. They seem to be very attracted by low M2/reserves ratios, indicating sound preparation for financial vulnerabilities. The higher the sovereign default risk measured by the sovereign risk rating is, the lower is the stock market investment, as expected. Unexpectedly, this is not observable for sovereign bond investments, but this might be because of the missing controlling for bond market size owing to insufficient data availability in this specification. Finally, markets with high devaluations of the currency are disfavoured by the investors, while,

holding devaluation constant, exchange rate volatility seems to be more an opportunity for stock market investors. For sovereign bond investments, high inflation is disliked by investors. However, it has to be stated that there is only an insignificant positive influence of the liberalisation predictor on investments and no impact of foreign trade openness and the current account balance (not reported).

The following results present **estimations with feasible GLS including fixed effects**. In all estimations, there were two phenomena of county-fixed effects observable which were not explainable by other predicators. The first is a preference for stock market investments in the BRIC countries plus Mexico and the other phenomena is a strong positive influence of the country dummies for investments in sovereign bonds from the Czech Rep., Hungary and Poland. The first phenomena is explainable by the economic and political potential of these countries in the next decades and to a certain extend by "marketing effects" of the BRIC-acronym. The second phenomena might result from the relatively large size of these Central and Eastern European economies, combined with the comparably good development of their domestic bond markets and foreign exchange markets as well as close cultural and political ties, like the EU membership.

The main focus of this paper is on the analysis of the impact of **financial market development** on international portfolio investments. The results from the models including solely indicators for financial market development are reported in appendices IXa-b. Stock market capitalisation has the most significant positive and (in terms of standardised beta coefficients) economically strongest impact on stock market investments. Its economic significance shows that an increase in capitalisation/GDP by one standard deviation increases the stock market investments by about 15 percent of standard deviation. Controversially, the variable of bond market amount outstanding per GDP for sovereign bond investments does show the only minor impact on investment positions. This result shows the difference between equity and debt investments: increased sovereign debt might also be associated with higher default risk, not solely increased financial market development.[45] Improvements in the turnover ratio and liquidity of the stock markets result in increased stock investment positions of German banks. In terms of economical significance, these variables show the second-strongest impact on stock market investments: Increasing the turnover-ratio by one standard deviation results in an average increase in investment positions in the stock markets of up to nine percent standard deviations. However, there is a measurable limit of trading volume per market capitalisation that is anticipated by the investors, resulting in reduced investments possibly due to fears of overheating. The measured implicit hurdle rate for this trade-off is between 160 and 185 per-

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[45] The result remains robust when controlling for the sovereign debt rating (not reported).

cent turnover ratio in different specifications, proving that the trade-off between improvements in liquidity and overheating of the market is anticipated by German banks.[46] The liquidity ratios in sovereign bond markets show significant coefficients, but inverse signs. The interpretation of this result is that high liquidity is more important for bond investments, with only improvements in high turnover ratios influencing bond investments positively. In fact, times of overheating in bond markets are very rare and high liquidity in sovereign debt securities may also be an indicator of the creditability of the issuer.

The indicators of international financial integration show a varied impact among investment positions: The indicators of financial market openness show the expected positive sign only for sovereign bonds, while stock market investments seem to favour domestic markets with limited international participation. Including the correlation of the stock market with the DAX results in a significant positive influence, indicating that the financial openness indicator might not be able to capture the *de facto* integration for stock markets completely. The *de jure* openness of the financial sector has an unexpected significant positive influence on stock market investments, while sovereign bond investments show the expected negative reactions to a high predictor corresponding to low liberalisation. The reason for limited investments in vastly liberalised stock markets might be that arbitrage opportunities shrink or indirect investment possibilities, for example, through investment funds increase. Furthermore, stock markets have the best international substitution possibilities: The role of depositary receipts is highly significant and positive for stock investments. However, this might result in a flight by international investors to international financial centres, rather than trading in domestic markets. An explanation for the negative effect of DRs on bond investments might be that investors gain indirect access to stocks from the ECMs, which might limit their need for bond market investments and further risk exposure in the respective markets. Finally, trade openness has the expected positive impact on sovereign bond investments, while stock investments do not show this linkage to the openness of the real economy.

Investors avoid heavily non-normal distributions measured by the studentized range of stock market returns in ECMs. The results for skewness and kurtosis of stock market returns confirm the finding of the negative behaviour of investors towards skewed and fat-tailed distributions of returns in emerging stock markets.[47] The results for bond market investments are not convincing in this respect. Finally, the influence of market frictions on investment behaviour gives two insights. First of all, higher taxes on dividend and interests prove to have a negative

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[46] For these calculations, Pakistan, with times of extremely high turnover ratios, was omitted from the sample. Using another specification with an *a priori* hurdle rate of 120 percent resulted in the same significant coefficients and signs for the turnover ratio and the dummy for higher turnover ratios.
[47] Conversely, Bekaert/Erb/Harvey/Viskanta (1998) find that a representative investor could theoretically prefer higher kurtosis of ECM returns, holding skewness positive and constant.

influence on stock and bond market investments. Additionally, a significant negative coefficient of transaction costs for the stock market investments proves the importance of market frictions. But the reduced sample size (16/30 countries available) as well as the lower dependence on regulated exchanges might have caused the insignificant effect of transaction costs on sovereign bond investments (not reported).[48] With reference to Tesar/Werner (1995b) and Warnock (2002), the impact of transaction costs on sovereign bond investments remains unclear, while a positive influence on stock market investments can be stated for improvements in sustainable liquidity and transaction costs.

The results for the classical determinants of **portfolio investments calculus** are reported in appendix X. As in the financial market development setting, stock and sovereign bond investments tend to increase when the correlation to the world market increases and therefore diversification potentials shrink, while financial integration increases. The same applies to substitution possibilities approximated by the number of depositary receipts from each country. They once again prove their importance for stock market investments. Exchange rate devaluation risk and the exchange rate volatility prove to be important determinants for sovereign bond investments. Both devaluation and the volatility of the exchange rate proved to be anticipated as risks for sovereign bond investments. However, stock investment reaction to devaluation proved to be positive. This can be interpreted to mean, that devaluations make stocks from ECMs cheaper and resulting in a positive impact of devaluations to stock market investments. Moreover, the average valuation of securities measured by the p/e-ratio gives evidence for a herding behaviour rather than a search for undervalued assets. Stock market investments tend to be attracted if the p/e-ratio is higher.[49] The finding of a negative impact from poor sovereign ratings on portfolio investment positions proves stable and an important determinant (standardised beta of up to ten percent) in all specifications if the risk-adjusted performance of the market was controlled for. But the evidence for the Sharpe Ratio of ECM investments of German banks is not at the heart of this analysis.[50]

Basically, portfolio investments in equity and debt securities seem to be influenced in similar ways by the **macroeconomic environment** (see appendix XI). The often-stated dependence of ECMs on commodity prices as well as current account deficits being associated with port-

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[48] The small sample size gives the two financial centres Hong Kong and Singapore, with very small transaction costs, but close to zero sovereign bond markets and therefore investment positions, far too large an influence.
[49] Similar results were found when using the price-to-book-ratio, not reported.
[50] The performance measure used is solely a control variable for the performance of the market. The Sharpe Ratio is too simple a measure to analyse the performance of German bank's investment in detail and the results should not be overstated.

folio capital inflows proves true.[51] Financial vulnerability, either indicated through a high M2/reserves ratio (standardised beta of six percent) or overheating tendencies of the domestic credit market, are reflected in portfolio investor's behaviour. This confirms the importance of these variables in short-termed early warning systems.

Again, both exchange rate risks show significant influence and the predicted negative signs for sovereign bond investment. However, exchange rate risks rather seem to attract stock investments in the macroeconomic setting. While sovereign bonds suffer from devaluations through the negative impact on the real economy and the government debt (financed in foreign exchange), stock investments basically inhabit the exchange rate risk when disinvesting. Moreover, this exposure can be hedged or avoided by investing in depositary receipts, traded in euro or US dollar. Finally, the volatility in exchange rates might be interpreted as a "chance" for future appreciations and lead to the resulting positive impact on stock investments.

The variable of foreign trade openness shows similar coefficients to those of openness discussed in the financial development setting. The cross-fixed capital formation and GDP growth have contradictory influences. Only the positive influence of an increase in GFCF gives the intuition that domestic capital formation might attract international portfolio capital. Two further standard real sector variables did not improve the model's fit. Inflation shows an unexplainable wrong sign for stock markets investments and the lending-to-deposit ratio shows the expected negative signs, but no significant influence on German banks' investment decision-making. The domestic interest rates might be outside the scope of international investors and their inclusion in the model too long a shot. Summing up the contradictory findings of the real sector variables leads to the conclusion that merely short-term macroeconomics variables significantly influence portfolio investments.

These results amend the results of Buch/Koch/Koetter (2009), who state that overall macroeconomic risks have no apparent impact on German banks' international activities. This disparity further proves the importance of country-specific characteristics and risks for portfolio investments in ECMs. Supplementary, the benefit of the absent exchange rate risk in the euro area for the internationalisation of German banks is proved in both studies.

The overall model is a combination of the variables with explanatory power and severe influence in the different model setting. Most of the individual results discussed above proved to be robust in these specifications (see appendix XII). Overall, financial market development plays a major role in explaining investment behaviour in the studied investments, but the im-

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[51] Nevertheless, the current account deficit could also be in the focus of investors as an indicator of openness and vulnerability of the ECM, as was evident not only in the recent developments in Eastern European countries during the financial crises, but also by Latin American and Emerging Asian crisis in the 1990s.

pact and importance for each investment position proved quiet heterogeneous. Market capitalisation, turnover ratio and the deviation from the normal distribution of asset returns show the expected significant influence for stock investments, while giving contradictory results or minor effects for the sovereign bond markets. This dissimilarity arises from the different characteristics of equity and debt securities, as described above. While financial integration through the depositary receipts market and a higher correlation coefficient to the investor's home market have significantly positive influence on stock market investments, further financial opening tends to result in reduced investments. However, the financial openness indicator shows the expected and significant positive influence on sovereign bond investments. Foreign exchange risks proved to have a distinct influence on each investment position. The negative reaction of portfolio investments to sovereign risk indicates the remaining importance of credit risks in ECMs. When it comes to macroeconomics, the role of early warnings indicators such as M2/reserves for portfolio investments is confirmed in the overall model, and high financial vulnerability through this channel leads to lower portfolio investments. Furthermore, the increase in commodity prices attracting portfolio investments in ECMs is confirmed.

The results on equations including the weighted average **investor characteristics** in each country (appendix XIII) show highly significant results. Essentially, a business model of the bank with a larger share in credit business has a negative effect on ECM portfolio holdings. Banks with higher capital provisions for their risk weighted assets, which might be due to high risk aversion, tend to have significantly lower portfolio investments in the underdeveloped markets with a standardised beta coefficient of three percent. In times of high liquidity, investors are said to invest in risky asset rather than bonds. As expected, the higher liquidity ratios proved to benefit stock market investments in ECMs significantly. Conversely, if the investor has little liquidity, the investors seem to seek a safer form of investment in the bond markets. Talking about the dependence on regulated exchanges in contrast to over-the-counter trading delivers the following conclusion: If the average investor present in ECMs has a greater dependence on regulated exchanges in his total trading book business, lower investments in underdeveloped markets are found, likewise confirming the relevance of stock and bond market development. A final remark. These results are limited in their explanatory power. The definitions of the variables are only "weighted average of the representative investor" arguments *per se*. Further research modelling this microeconomic impact is needed.

The investment holdings in bond markets for **corporate and financial issuers** are observable rather irregularly over the 30 countries and time span studied.[52] The high percentage of null-investment positions makes an analysis in a binary or discrete choice framework seem more appropriate. Additionally, data problems for explanatory variables arise from the low development of corporate bond markets. Deeper analysis must be left for future research. However, the results from the feasible GLS regressions with fixed effects basically show behaviour by bond investors in these securities similar to that reported for sovereign debt. The financial bond holding additionally showed a stronger dependence on the development of the local banking system, while corporate bonds revealed a major dependence on financial market integration and a negative reaction to higher asset return correlation, as expected under the theory of diversification effects.

Direct investments confirmed their long-term character compared with the short-term portfolio investments studied. They proved less volatile and more dependent on real-sector and macroeconomic variables, as well as the openness of the real economy. An interesting insight is, that the more developed the capital markets are, the less attractive direct investments appear. Portfolio investments seem to become more attractive, which can be explained by benefits from diversification effects from portfolio investments. Consequently, solely for direct investments, a higher exchange dependence of the investor did not prove relevant. The positions of **foreign bills of exchange** held by German banks proved to be negatively influenced by financial market development, as expected. Their inverse reaction to the development of the economy can also be shown by their strong dependence on macroeconomic determinants, especially foreign exchange risk, indicators of financial vulnerability, and the negative reaction to higher trade openness. All this explains the low relevance of this instrument in developed international markets with low legal risks and improved financial markets.

Including full monthly time-dummies in the fixed effects model discussed above delivers insights into periods of systematic effects over time. Every effect not explained by the explanatory variables might simply be explainable by phenomena in the specific month. These dummies did not prove to be significant or show a major impact in most months. But, interestingly, these dummies proved to be highly relevant to stock market investments at the turn of the year 2004/2005 and in the first half of 2006 (appendix XIV).[53] Likewise, times of negative coefficients of time dummies and higher volatility in both the positive and negative directions

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[52] The results for corporate and financial bond investments, as well as for direct investments (excluding investments in foreign branches) and foreign bills of exchange are not reported in detail. Regression results are available from the author upon request.

[53] The coefficients of the monthly time dummies are significant at the 1% significance level and < -3.0 in M12/04 and M3/05 as well as in M12/05 and M4/06. However, there are quick recoveries after these negative events with a strong positive influence in M2 and M6/06. The remaining monthly time dummies have hardly ever significant coefficients with point estimates in almost all cases < |2|.

indicate times of market turmoil.[54] Two explanations seem to fit this phenomenon: First, there might be an overall increase in risk aversion among investors, or their might be some change in the investment behaviour of German banks originating in a modification of the legal framework or their shareholder base.

Times of market turmoil and an increase in overall risk aversion to risky assets and ECMs among international investors can be indentified during the first quarter of 2005 and the first half of 2006.[55] Preceding the first period, narrowing credit default spreads were reported in emerging markets, when, unexpectedly - initiated by two quarters of negative profit reports and forecasts of General Motors and others - a reassessment of credit default spreads and therefore of the price of risk took place.[56] A similar event was observable in the second period: After successive reported capital inflows to emerging markets at the turn of the year 2005/2006, international investors suddenly became more risk-averse, resulting in massive short-termed disinvestments in commodities and assets from ECMs. Both phenomena seem appropriate explanations for the significant negative peaks of time-dummies estimated coefficients, which can than be retraced to an increased risk aversion to risky assets during these periods and the anticipation by German banks. Subsequently, the time-dummy variable "financial turmoil" for these periods was included in all estimations for stock market investments and proved to have a significant negative influence with standardised beta coefficient of about five percent.

Additionally, the time phenomenon at the turn of the year 2004/2005 might also be explainable by the **changing legal framework** and the risk aversion of German land banks' shareholders in 2005. Heid/Nestmann/Weder/von Westernhagen (2007) found differences between land banks' and large commercial banks' lending behaviour towards emerging markets and it should be remembered that the government guarantee of the maintenance obligation "*Anstaltslast*" and the guarantee obligation "*Gewährträgerhaftung*" for land banks was rescinded in 2005, following a decision of the EU commission. This decreased governmental guarantee might have resulted in lands banks disinvesting in risky assets, such as portfolio investments in ECMs, and explain the highly important significantly negative coefficients for the time dummies during the first half of 2005. However, no compelling evidence was found using structural break point analysis for the behaviour of land banks in comparison to large commercial banks after the legal change. The change in land banks' investment behaviour might rather be a longer period of adjustment, starting prior to the legal change and lasting for sev-

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[54] Note that the period of M1-M6/06 is accompanied by a negative Sharpe Ratio, increased stock market volatility and correlation to the DAX, negative skewness of returns as well as a high turnover ratio in the explanatory variables.

[55] The two phenomena are described in the *"BIS Quarterly Review International banking and financial market developments"* of December 2004, pp.1-9, March 2005, pp.6-9, June 2005, pp.1-13, March 2006, pp.1-4, and June 2006, pp.8-10.

eral years afterwards. First hindsight for a change in land banks' attitude towards risky assets can be stated, while deeper analysis is left for future work. Ultimately, presenting the above-discussed models for both land banks and large commercial banks separately goes beyond the scope of this paper.

VII Conclusion

In the course of steady financial market development concerning the financial integration and improvements in the size and efficiency of capital markets, private investments in ECMs gained overwhelming attention in the aftermath of the emerging markets crisis in the 1990s. Especially portfolio investments improved in volume and the variety of products used. There-fore, this paper presented new empirical evidence on the theory of portfolio investments in ECMs and the role of financial market development.

ECMs tend to become increasingly heterogeneous, especially with respect to financial market development. However, the investment determinants influencing the decision of German banks over time proved to be equal across ECMs. It was shown that several indicators de-scribing capital market integration and efficiency influence German banks' investment deci-sion across ECMs and over time. Proxies for the overall development and the liquidity of emerging stock markets showed the highest economical and statistical significance of all predicators. Additionally, the instrument of depositary receipts drives stock market invest-ments, though this might not benefit domestic markets, but result in a flight of liquidity to global financial centres. Only limited evidence was found for an impact of long-run macro-economic and real sector variables on international portfolio investments. It was rather the short-termed vulnerability indicators included in early warning models and exchange rate dy-namics that had a measurable influence on stock and bond market investments. Concerning the German banking sectors it was found that only large commercial and land banks, as well as regional institutions of credit cooperatives tend to operate in ECMs. There is supplemen-tary evidence that can be interpreted as ECM assets still being a target for risk-seeking and specialised investors: When banks specialise in trading-book business and have business models with lower risk aversion, they tend to improve their investments in ECMs, while greater dependence on exchange traded securities hinders ECM investments. Additionally, there are also determinants rooted in the investors' domestic and global environment that mat-ter. A significant impact of the global financial turmoil with regard to ECMs in 2004/2005 and first half of 2006 was found. Both times of capital flights are explainable by the increased overall global risk aversion of investors during these periods.

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[56] Schinasi/Smith (2000) discuss the theory of *"contagious selling"* across markets or assets.

International investors anticipate the heterogeneity of ECMs, and the development of financial markets proved to be the main determinants among country-specific variables. Policymakers should therefore take due account of the determinants of attracting as well as sustaining portfolio investments and foster financial market development and stability in ECMs in order to better handle portfolio investors' short-term character and reduce the risk of capital flights in times of financial turmoil.

Further research is needed to explain other German portfolio investors' behaviour, such as research on investment funds, in order to complete the investor view of portfolio capital flows from Germany to ECMs. The individual investor characteristics and dependence on the home country's legal and regulatory framework also deserve further attention. As this paper was limited to the period prior to the financial crises 2008/2009, supplementary studies analysing the behaviour of portfolio investors in ECMs during this crises, especially in the highly involved Eastern European markets, are necessary.

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Appendix

Appendix I. Systematisation of variables, definition and data source.

	Variable	Definition	Source
	Portfolio investments	Portfolio investments of German banks, as a percentage of total assets by security-type	External Position Report, Deutsche Bundesbank
Financial market development	**Size**	Stock market capitalisation and bond market amount outstanding, as a percentage of GDP	WFE; FESE; BIS; Security Exchanges
	Integration, *de jure*	AREAER indicator of *de jure* financial market integration [1 = open;10 = closed]	Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), IMF
	Integration, *de facto*	Financial openness ratio for portfolio investments (equity and debt)	IFS, BoP, Coordinated Portfolio Investment Survey (CPIS): IMF
		Number of Depositary Receipts by ECM issuers	Citibank; BONY; JPMorgan
	Efficiency	Turnover ratio, annualized monthly turnover divided by average domestic market capitalisation	WFE; FESE; BIS; Security Exchanges
		Stock market and bond market indices' daily returns (Skewness, Kurtosis, Studentized Range)	Datastream: MSCI; JP Morgan EMBI; Citigroup ESBI; Merrill Lynch Emerging SOV
		Taxes on dividends, interest and long-term capital gains; overall Transaction costs and fess	Ernst & Young/PKF: Worldwide Tax Guide; IFC/S&P: Emerging/Global Stock Market Fact Book
Portfolio calculus	**Performance**	Sharpe Ratio of stock and bond market indices, including risk-free Government bond yield	Datastream: MSCI; JP Morgan EMBI; Citigroup ESBI; Merrill Lynch Emerging SOV
	Valuation	Price-Earning (P/E) ratio, Price-to Book (P/B) ratio	IFC/S&P: Emerging/Global Stock Market Fact book
	Diversification	Correlation coefficient of daily local market indices returns to German stock market index DAX and global bond market index	Datastream: MSCI; JP Morgan EMBI; Citigroup ESBI; Merrill Lynch Emerging SOV
	Political risk	Long-term Sovereign risk rating [1=AAA; 34=D-]	Fitch Ratings
Investor characteristics	**Capital ratios**	Solvency ratio (liable equity to RWA)	Banking statistics, Deutsche Bundesbank
	Liquidity provisions	Cash plus overnight interbank loans to total assets	Banking statistics, Deutsche Bundesbank
	Business model	Ratio of costumer credit to total assets	Banking statistics, Deutsche Bundesbank
		Exchange traded securities to total securities held	Banking statistics, Deutsche Bundesbank
Macro-economics	**Real sector**	GDP(-growth), GFCF, CAB, M2, reserves, foreign trade ratio, bank loans and deposit rate, domestic credit to private sector, CPI, commodity-price index	IFS, BoP: IFM
	FX risk	Foreign exchange rate to Euro	ECB, Datastream
	Geographic	Distance of ECM's financial centre to Frankfurt/Main, Germany	timeanddate.com

Appendix II. Securities held by German banks in € billion, share of domestic versus foreign issuers and by type, as a percentage. December 1990 to December 2008.

Year	Sum (€ billion)	Domestic Issuers (%)	Foreign Issuers (%)	of which are:		
				Stocks & other non-fixed income (%)	Bonds from banks (%)	Bonds from non-banks (%)
1990	310.4	94	06	07	38	55
1991	332.2	92	08	05	36	59
1992	378.0	91	09	07	32	61
1993	464.4	90	10	10	26	65
1994	530.5	91	09	08	25	67
1995	559.6	90	10	06	24	70
1996	628.8	89	11	07	23	70
1997	723.8	87	13	08	23	69
1998	861.6	84	16	08	20	72
1999	987.6	80	20	08	21	71
2000	1108.8	78	22	10	25	65
2001	1184.5	75	25	10	24	65
2002	1164.4	75	25	08	25	67
2003	1198.3	73	27	08	29	64
2004	1326.4	71	29	07	33	61
2005	1426.3	66	34	09	35	56
2006	1508.0	60	40	09	41	50
2007	1530.8	54	46	08	44	48
2008	1541.8	57	43	04	45	51

Source: External Position Report, Deutsche Bundesbank.

Appendix IIIa. Investment positions of all German banks in 30 ECMs by type of investment, annual averages, 2002/03 – 2007/12, in € million.

	Stocks	Sovereign bonds	Financial bonds	Corporate bonds	FDI	Bills	total securities	total
2002	553.4	8590.8	2612.3	1097.7	6660.2	298.1	12854.2	19812.5
2003	366.7	10023.2	2135.5	1014.3	5746.6	265.8	13539.8	19552.2
2004	299.2	12526.9	2366.5	747.6	4953.5	266.3	15940.2	21160.1
2005	288.8	15394.1	2908.1	635.5	4784.9	200.9	19226.5	24212.4
2006	876.1	15635.6	2916.4	661.2	4001.1	193.6	20089.2	24283.9
2007	1445.1	16426.7	4039.9	709.7	5428.3	217.3	22621.5	28267.1

Source: External Position Report, Deutsche Bundesbank, author.

Appendix IIIb. Descriptive statistics of investment positions of all German banks in 30 ECMs by type of investment, monthly, 2002/03 – 2007/12, in € million.

	Mean	Std.Dev.	Range	Variation coefficient
Stocks	640.6	498.5	2679.8	0.778
Sovereign bonds	13228.4	2976.8	9482.4	0.225
Financial bonds	2836.0	657.9	2573.3	0.232
Corporate bonds	802.8	200.9	858.3	0.250
total securities	17507.8	3596.1	12191.7	0.205
Direct investments	5222.5	857.3	3283.7	0.164
Bills	238.7	43.2	191.8	0.181
total	22969.0	3152.0	11094.1	0.137

Source: External Position Report, Deutsche Bundesbank, author.

Appendix IV. German total portfolio investments in most important developed countries, financial offshore centres and 30 ECMs in 2001, 2004, 2006 and 2007 in € million. German banks portfolio investment for 2004.

Rank in '07	Investment in	2001 (1)	2004 (2-1)	banks in '04 (2-2)	banks as % of total in '04 (2-2)/(2-1)	2006 (3)	2007 (4)
1	Luxembourg	115269	180890	23415	12.94%	286523	347341
2	United States	120777	107943	25849	23.95%	214131	207367
6	UK	81466	80935	23646	29.22%	131385	148402
8	Ireland	22801	57397	23543	41.02%	91685	102007
10	Cayman Islands	13755	17933	13528	75.44%	28661	31986
11	Switzerland	25408	22303	1770	7.93%	30289	28717
23	Poland	1905	6074	3758	61.87%	9408	11387
24	Hungary	5191	7452	5683	76.27%	8901	9819
26	Brazil	2320	3886	1880	48.38%	10831	5569
27	Russian Fed.	2452	1864	307	16.45%	3894	5094
29	Korea, Rep.	1834	1814	-272		4007	4030
31	South Africa	1160	2208	687	31.10%	1822	3109
32	Hong Kong	995	999	2	0.22%	2351	3066
33	Turkey	4491	3566	1009	28.28%	2609	3036
35	Czech Rep.	421	1671	1097	65.66%	1928	2440
36	Mexico	2655	2456	736	29.96%	3468	2234
37	Singapore	460	625	14	2.28%	1759	2196
38	China	176	599	102	17.0%	2578	2170
39	Slovak Rep.	872	1552	1292	83.27%	1523	1822
42	India	157	244	101	41.26%	993	1457
43	Lithuania	482	933	643	68.90%	1310	1396
45	Croatia	955	1384	465	33.62%	1118	970
46	Argentina	1246	944	336	35.61%	1093	941
48	Slovenia	713	630	507	80.52%	3959	837
49	Malaysia	363	598	260	43.41%	492	805
52	Romania	327	632	122	19.24%	588	661
53	Israel	382	293	66	22.39%	560	647
54	Indonesia	41	152	8	5.04%	518	613
55	Thailand	429	488	136	27.80%	544	582
58	Latvia	205	439	284	64.59%	499	493
59	Ukraine	260	209	11	5.24%	480	450
60	Bulgaria	240	543	66	12.10%	355	422
62	Peru	103	295	2	0.74%	326	406
65	Estonia	68	437	332	75.94%	331	327
74	Chile	106	208	54	25.79%	112	107
87	Pakistan	0	8	0	0%	21	33
	Sum 30 ECMs	31011	43203	19685	45.55%	68378	67116
	total	883895	1218327	454937	37.34%	1802717	1924000
30 ECM	in % of total	3.51%	3.55%	4.33%		3.79%	3.49%

Source: IMF, Coordinated Portfolio Investment Survey, CPIS (July 2009).

Appendix Va. Arithmetic means of explanatory variables for financial markets, by country, monthly data from 2002/03 – 2007/12.

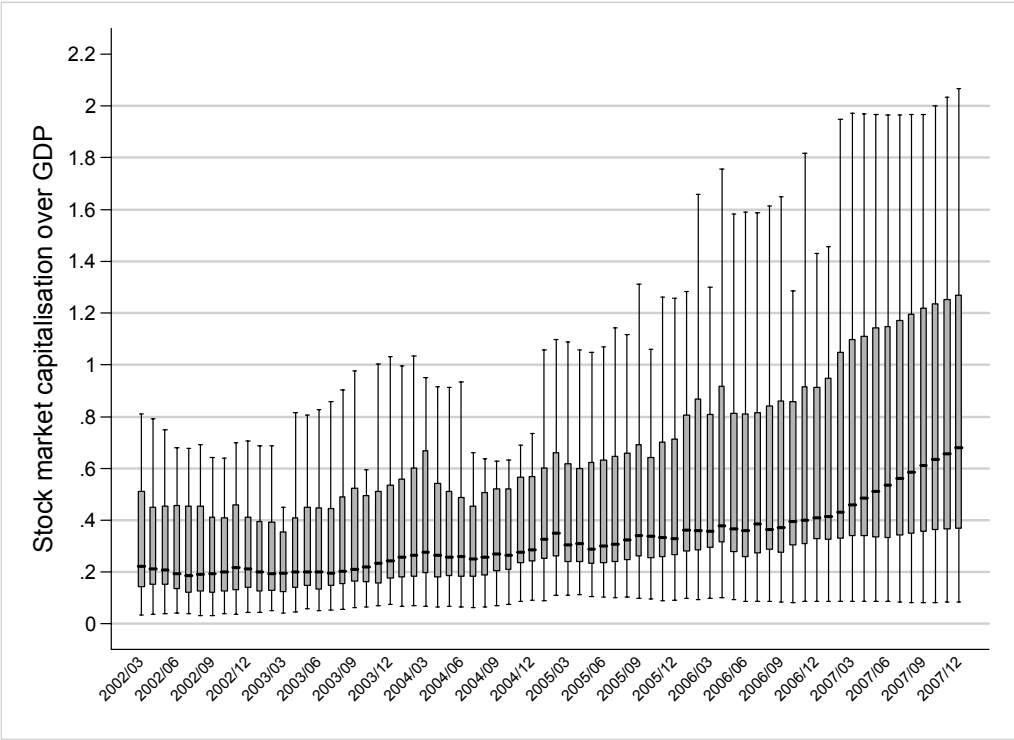|	Market Capitalisation / GDP	Turnover Ratio	Liberalisation [1=open; 10=closed]	Financial Openness (equity plus debt)	Number of DRs	annualized Sharpe Ratio	Correlation to DAX	Skewness	Kurtosis
Argentina	0.426	0.088	9.09	0.227	22	1.342	0.157	-0.031	3.88
Brazil	0.462	0.447	7.20	0.280	72	1.016	0.183	0.279	5.54
Bulgaria	0.171	0.267	3.10	0.202	3	2.674	0.005	0.102	4.77
Chile	0.997	0.151	3.66	0.451	17	1.071	0.297	-0.152	3.68
China	0.565	0.882	8.13	0.120	56	1.349	0.189	-0.113	3.85
Croatia	0.395	0.064	8.58	0.225	2	1.425	0.135	-0.010	6.00
Czech Rep.	0.244	0.823	7.26	0.283	6	1.266	0.334	-0.355	4.57
Estonia	0.316	0.244	2.74	0.400	3	1.795	0.163	0.028	5.70
Hong Kong	3.862	0.927	2.75	3.633	106	1.165	0.181	-0.018	3.73
Hungary	0.253	0.737	4.23	0.438	14	0.834	0.310	0.010	3.63
India	0.562	1.258	10.00	0.074	157	1.672	0.176	-0.260	3.76
Indonesia	0.259	0.487	9.00	0.118	8	1.637	0.140	-0.071	3.79
Israel	0.807	0.399	1.81	0.583	12	1.047	0.357	-0.052	4.10
Latvia	0.103	0.095	3.50	0.162	1	1.587	0.000	0.090	5.01
Lithuania	0.226	0.119	3.50	0.155	5	2.627	0.065	0.067	4.61
Malaysia	1.389	0.367	9.00	0.341	14	1.188	0.045	0.096	4.04
Mexico	0.274	0.299	9.00	0.258	52	1.689	0.295	0.002	3.31
Pakistan	0.302	3.242	8.57	0.023	6	1.463	-0.046	-0.234	3.86
Peru	0.414	0.102	2.50	0.239	9	1.227	0.128	-0.269	3.96
Poland	0.257	0.384	8.32	0.211	40	0.580	0.330	0.066	3.48
Romania	0.162	0.105	3.18	0.059	0	1.971	-0.003	0.105	4.07
Russia	0.645	0.594	6.73	0.239	98	1.243	0.308	-0.407	4.39
Singapore	1.561	0.769	5.00	1.633	23	1.022	0.242	-0.013	3.56
Slovakia	0.080	0.171	4.48	0.190	3	1.149	0.040	-0.181	6.90
Slovenia	0.283	0.220	5.48	0.179	2	1.902	0.071	-0.015	6.29
South Africa	2.067	0.491	9.00	0.593	53	0.623	0.209	0.043	3.47
South Korea	0.691	1.832	7.13	0.365	34	0.722	0.214	-0.135	3.31
Thailand	0.600	0.931	9.00	0.203	14	0.753	0.174	0.025	4.18
Turkey	0.236	1.752	8.42	0.125	37	0.874	0.240	0.094	3.55
Ukraine	0.221	0.039	9.00	0.093	35	1.969	-0.059	0.161	5.50

Source: Various sources, see appendix I.

Appendix Vb. Arithmetic means (modus for sovereign ratings) for macroeconomic variables, by country, monthly data from 2002/03 – 2007/12.

	real GDP growth (%)	Inflation (%)	GFCF / GDP	Domestic Credit/GDP	M2/Reserves	CAB/GDP	Foreign Trade Ratio	Sovereign Rating (Modus)
Argentina	5.5	12.72	0.767	0.413	0.140	0.045	0.363	DDD
Brazil	3.7	7.42	0.163	0.763	0.327	0.007	0.220	BB-
Bulgaria	5.9	5.79	0.228	0.340	0.179	-0.108	0.996	BBB
Chile	4.5	2.88	0.202	0.700	0.314	0.018	0.590	A-
China	10.7	2.13	0.442	1.453	0.553	0.055	0.576	A-
Croatia	4.8	2.47	0.274	0.655	0.241	-0.071	0.680	BBB-
Czech Rep.	4.8	1.96	0.256	0.447	0.250	-0.042	1.191	A
Estonia	8.1	3.83	0.316	0.596	0.313	-0.128	1.184	A
Hong Kong	5.6	-0.09	0.213	1.422	0.445	0.108	3.120	AA-
Hungary	3.8	5.29	0.221	0.582	0.284	-0.068	1.165	A-
India	8.1	4.72	0.299	0.595	0.372	0.005	0.255	BB+
Indonesia	5.3	8.99	0.221	0.441	0.332	0.022	0.482	BB-
Israel	3.6	1.61	0.172	0.793	0.323	0.026	0.603	A-
Latvia	9.2	5.80	0.283	0.556	0.272	-0.142	0.803	A-
Lithuania	8.2	2.06	0.229	0.320	0.226	-0.085	0.986	A-
Malaysia	5.9	2.18	0.217	1.248	0.247	0.129	1.745	A-
Mexico	2.9	4.30	0.890	0.378	0.554	-0.010	0.577	BBB-
Pakistan	5.9	6.49	0.182	0.397	0.460	-0.010	0.328	
Peru	6.2	2.00	0.186	0.176	0.333	0.003	0.349	BB-
Poland	4.5	1.93	0.189	0.379	0.302	-0.027	0.636	BBB+
Romania	6.1	11.28	0.232	0.180	0.158	-0.082	0.684	BBB
Russia	6.9	11.78	0.200	0.220	0.127	0.098	0.516	BB+
Singapore	6.8	0.93	0.237	0.726	0.121	0.236	3.209	AAA
Slovakia	6.7	4.89	0.257	0.442	0.195	-0.061	1.376	A
Slovenia	4.7	4.08	0.255	0.579	0.232	0.204	1.069	AA-
South Africa	4.5	5.27	0.731	0.792	0.999	-0.037	0.519	BBB+
South Korea	4.8	2.91	0.292	0.968	0.518	0.017	0.670	A
Thailand	5.6	2.83	0.261	1.108	0.325	0.018	1.103	BBB+
Turkey	6.8	17.25	0.198	0.413	0.241	-0.038	0.404	BB-
Ukraine	7.4	8.52	0.226	0.323	0.244	0.037	0.868	BB-

Source: Various sources, see appendix I.

Appendix VIa. Box plot for Stock Market Capitalisation over GDP, 30 ECMs, March 2002 – December 2007.[57]

Appendix VIb. Box plot for Stock Market Turnover Ratio (trading volume as a percentage of stock market capitalisation), 30 ECMs, March 2002 – December 2007.

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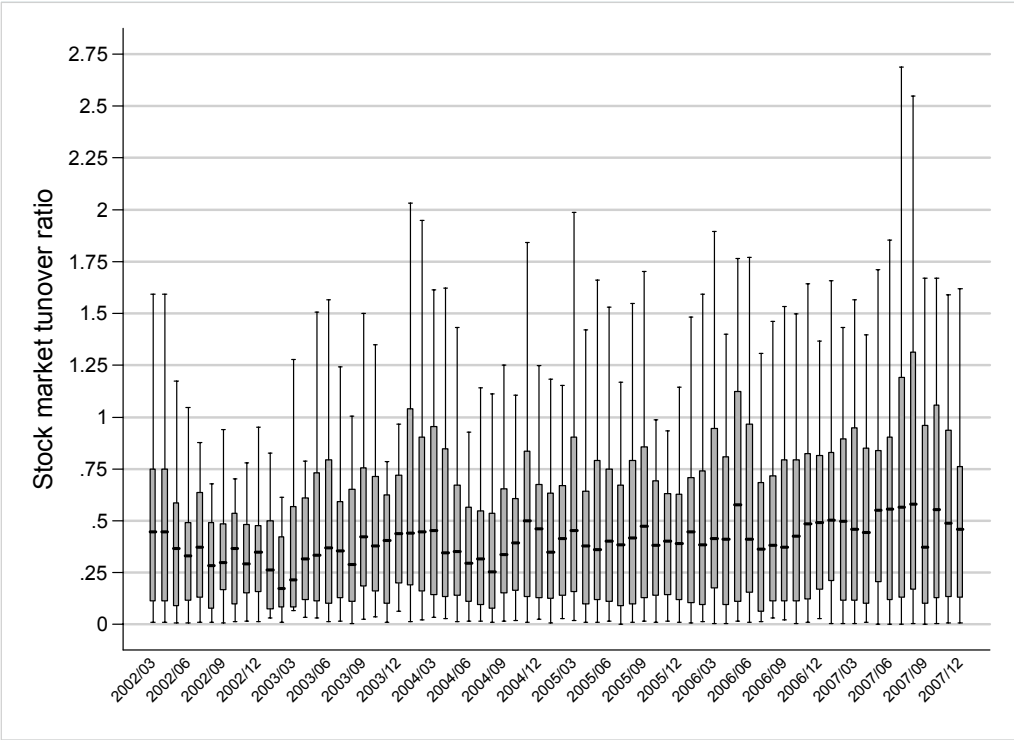
[57] The middle line in the box plots represent the Median across countries. The height of the box itself gives the 25 and 75 percent quartiles. With the interquartile range (*iqr*) defined as the difference of the 75 and 25 percent quartiles: *iqr = p(75) – p(25)*, the outer adjacent values account for the highest value not greater than *p(75) +* 3/2*iqr and the lowest value not less than *p(25) - 3/2*iqr*. Outside values are excluded.

Appendix VIc. Box plot for the Financial Openness Indicator (total portfolio investment assets plus liabilities over GDP), 30 ECMs, March 2002 – December 2007.
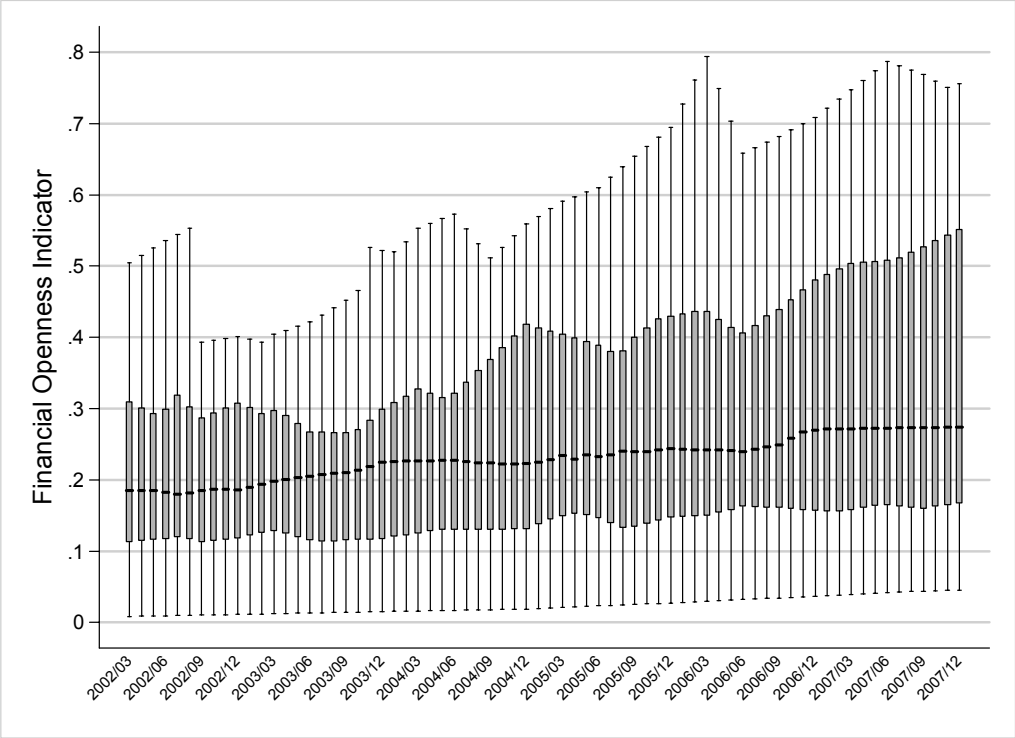
Appendix VId. Box plot for the Stock Markets Correlation to DAX, 30 ECMs, March 2002 – December 2007.
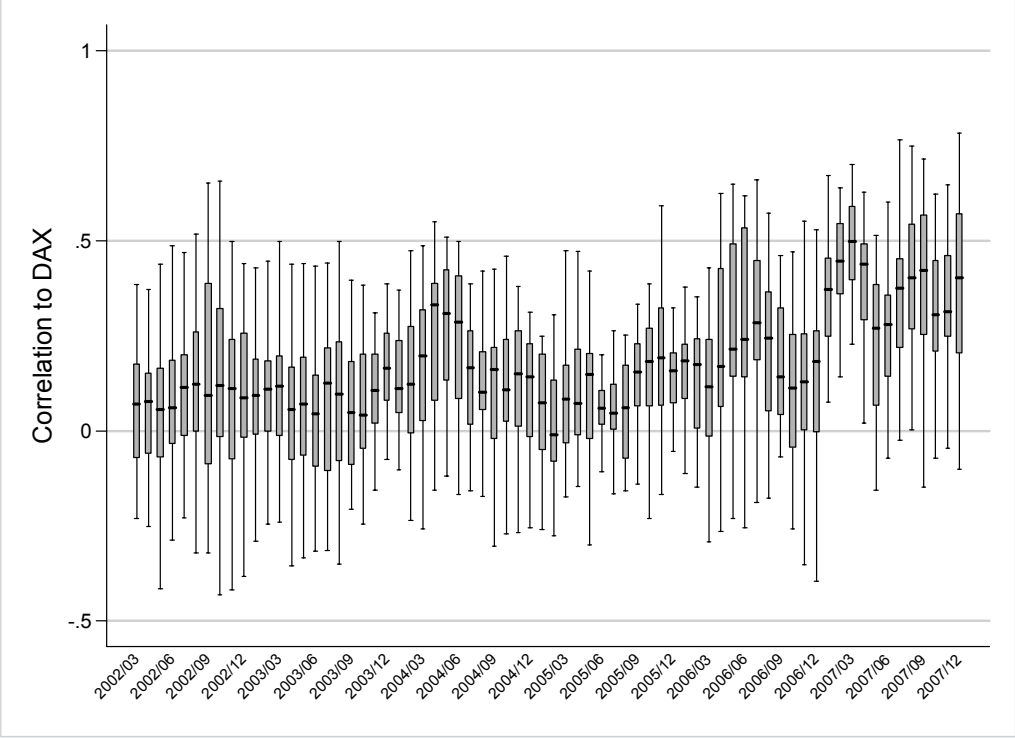
Appendix VIe. Box plot for Exchange Rate Volatility (in standard deviations), 30 ECMs, March 2002 – December 2007.
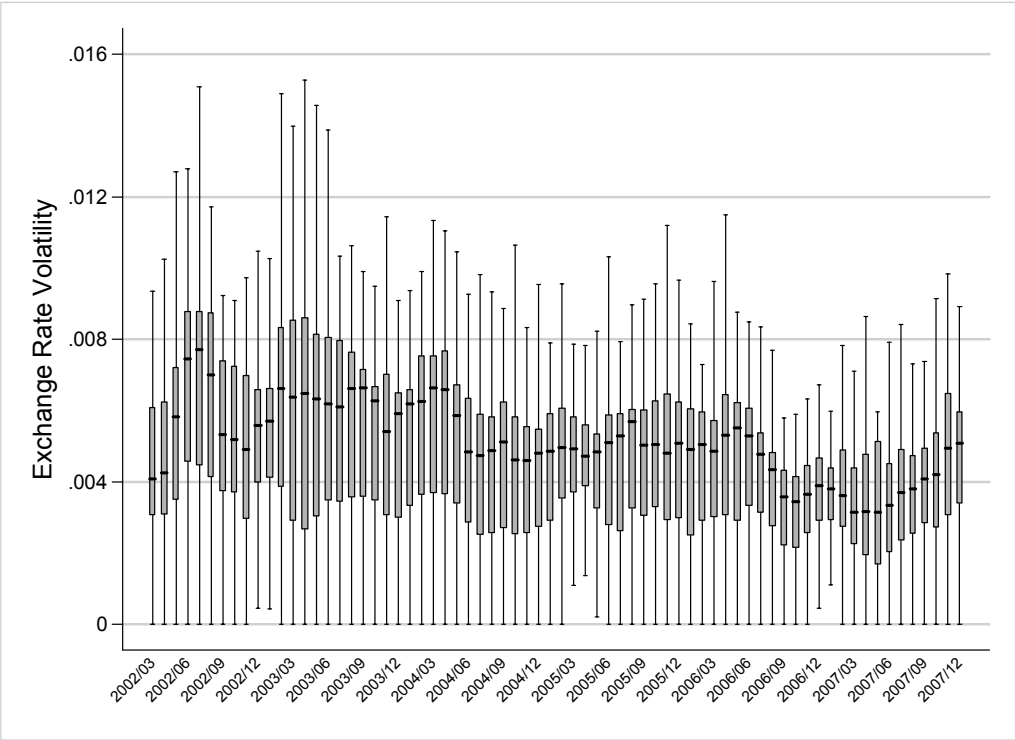
Appendix VIf. Box plot for Exchange Rate Volatility (in standard deviations), 30 ECMs, by country.
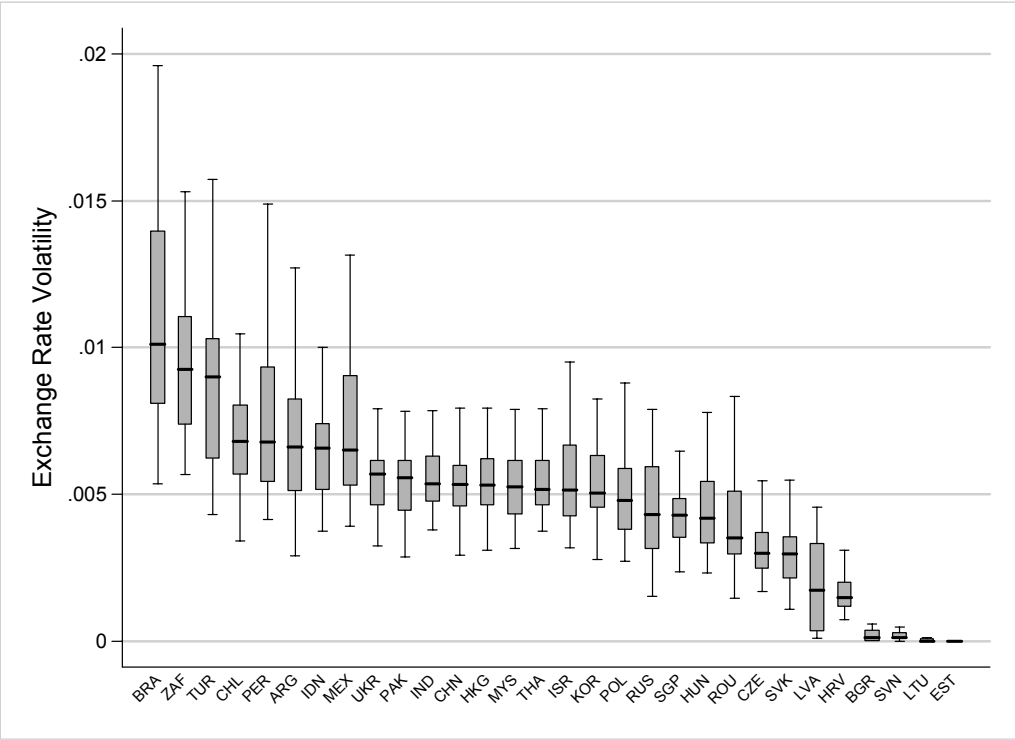
Appendix VIIa. Results of Panel Unit Root tests assuming cross-sectional independence and common or individual unit root processes. 25/28 ECMs, March 2002 - December 2007.

Method	Stocks / total assets				Sovereign bonds / total assets			
	Statistic	Prob.*	N	Obs.	Statistic	Prob.*	N	Obs.
Null: Unit root *(assumes common unit root process)*								
Levin, Lin & Chu t*	-7.07214	0.000	25	1722	-4.8977	0.000	28	1930
Null: Unit root *(assumes individual unit root process)*								
Im, Pesaran & Shin W-stat	-10.3378	0.000	25	1722	-6.57488	0.000	28	1930
ADF - Fisher Chi-square	259.374	0.000	25	1722	175.945	0.000	28	1930
PP - Fisher Chi-square	257.928	0.000	25	1725	178.356	0.000	28	1932

Exogenous variables: individual effects, individual linear trends.
Automatic selection of maximum lags based on SIC and Bartlett kernel.
* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Appendix VIIb. Results of Pesaran (2007) simple panel unit root test in heterogeneous panels with cross section dependence (CADF). 30 ECMs, March 2002 - December 2007.

Variable Deterministics chosen	Observations	P-value
Stocks / total assets		
constant	2040	0.034
constant & trend	2040	0.051
Sovereign bonds / total assets		
constant	2040	0.000
constant & trend	2040	0.001

Cross-sectional average in first period extracted and extreme t-values truncated
t-bar test, N,T (30,70), one average lag.

Appendix VIII. Estimation with between effects estimator. Stock market and sovereign bond investments in 30/24 ECMs, March 2002–December 2007.

	(1) Stocks	(2) Stocks	(3) Sovereign bonds	(4) Sovereign bonds
capitalisation / gdp	8.0545*	1.5203		
	(4.1268)	(5.9253)		
turnover ratio	4.0879	-9.1705		
	(4.7410)	(6.5291)		
turnover ratio²	-0.1136	2.4944		
	(1.1853)	(1.7299)		
DRs	0.0217	0.1105**		
	(0.0379)	(0.0494)		
financial openness	-2.4790	-3.8435	932.854	1363.99**
	(8.7614)	(13.1660)	(629.961)	(504.766)
liberalisation	0.4811	0.5791	19.8598	26.5142
	(0.4834)	(0.7150)	(21.9409)	(16.7049)
correlation	26.9137**	35.0861**	219.055	-74.2710
	(10.9247)	(13.8150)	(547.834)	(487.838)
trade openness	-3.1739	3.2557	-69.3932	-157.6241
	(4.1847)	(5.0505)	(118.836)	(121.236)
domestic credit / gdp	-11.5289***	-5.1569	-46.1968	-89.5168
	(3.5593)	(5.4134)	(144.133)	(117.239)
rating	-1.0949**	-0.3599	1.5735	2.4772
	(0.4445)	(0.4306)	(17.7031)	(17.1129)
gfcf / gdp	28.8263***		-138.549	-258.089
	(8.5488)		(310.438)	(234.565)
gdp growth		51.4432		
		(31.9743)		
m2 / reserves	-48.8393***	-2.9360	137.240	-281.751
	(13.1067)	(11.5296)	(353.342)	(311.516)
devaluation	-29509.99***			
	(6272.793)			
fx volatility	1059.48**			
	(423.053)			
inflation			-5.9245	-24.8054
			(13.2964)	(15.6603)
lending/deposit			-8.3974	-72.0626**
			(6.5231)	(30.4426)
distance			-63.0822	
			(44.6660)	
taxes				-16.2724**
				(6.4730)
Observations	2100	2100	1680	1540
Number of countries	30	30	24	22
R² between	0.837	0.594	0.430	0.710
overall R²	0.6840	0.3066	0.0428	0.327

Note: Between effects estimator. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively.

Appendix IXa. Financial Market Development Setting. Stock market investments in 30 ECMs, March 2002-December 2007.

	(1) **Stocks**	(2) **Stocks**	(3) **Stocks**	(4) **Stocks**
capitalisation / gdp	6.5524*** (0.4734)	5.7937*** (0.4867)	6.0842*** (0.4687)	1.1597*** (0.1723)
turnover ratio	2.3217*** (0.2485)	2.5628*** (0.2682)	2.3214*** (0.2480)	0.0429 (0.3399)
turnover ratio²	-0.2252*** (0.0307)	-0.2440*** (0.0323)	-0.2190*** (0.0302)	0.0294 (0.1264)
financial openness	-120.5985*** (15.3940)	-117.1298*** (16.4619)	-117.2340*** (15.2737)	-18.9200** (9.5921)
liberalisation	0.3811*** (0.0411)	0.3527*** (0.0438)	0.3377*** (0.0417)	0.6133*** (0.0784)
DRs	1.8809*** (0.2724)	1.5978*** (0.2738)	1.7548*** (0.2712)	0.8440*** (0.2017)
studentized range		-0.2403*** (0.0483)	-0.2225*** (0.0464)	0.0414 (0.0390)
skewness	-0.2582*** (0.0548)			
kurtosis	-0.0303** (0.0142)			
correlation		2.4962*** (0.3071)		
taxes			-0.0392*** (0.0131)	
transaction costs				-0.0086*** (0.0029)
domestic credit / gdp	-0.7856 (2.1501)	-2.0569 (2.1907)	-1.7617 (2.1798)	-3.2249* (1.8501)
financial turmoil	-6.9503*** (0.4659)	-6.4669*** (0.4572)	-6.6855*** (0.4611)	-8.3576*** (0.5963)
Observations	2070	2070	2070	1104
Number of times	69	69	69	69
Number of countries	30	30	30	16
ECM-FE (Prob>F)	0.00	0.00	0.00	0.00
Wald Test (Prob>χ^2)	0.00	0.00	0.00	0.00

Note: Feasible GLS estimation with country-fixed effects and corrections for heteroskedasticity, contemporaneous cross-section correlation and group-specific autocorrelation within the panels. Long-run coefficients of the ARDL(1,q)-model are reported. The long-run standard errors are constructed using the delta method. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively. The estimated coefficients of the endogenous lag variable and the constant are omitted.

Appendix IXb. Financial Market Development Setting. Sovereign bond investments in 24 ECMs, March 2002-December 2007.

	(1) Sovereign bonds	(2) Sovereign bonds	(3) Sovereign bonds	(4) Sovereign bonds
financial openness	945.137*** (239.772)	194.402* (110.857)	1321.08*** (377.845)	401.282 (366.146)
liberalisation	-2.6887*** (1.0329)	-0.0052 (0.7012)	-1.9599* (1.1251)	-0.3328 (2.8663)
DRs	-0.6096** (0.2983)	-0.2265 (0.1813)	-0.5583* (0.2957)	-1.6500 (2.0185)
trade openness	16.9115*** (4.2240)	-0.4511 (1.4222)	60.0434*** (9.3838)	12.3265 (12.2336)
studentized range	2.1958*** (0.7049)	-0.7538** (0.2996)	2.2265*** (0.7082)	2.5611 (1.8212)
amount outst. / gdp		0.8966* (0.4720)		
taxes			-0.5444*** (0.1580)	
turnover ratio				-28.5130** (11.5874)
turnover ratio²				7.1968*** (2.5979)
domestic credit / gdp	-129.814*** (29.4004)	-4.7778 (9.1633)	-140.321*** (34.5607)	-139.131** (62.5586)
Observations	1656	1518	1242	897
Number of times	69	69	69	69
Number of countries	24	22	18	13
ECM-FE (Prob>F)	0.00	0.00	0.00	0.00
Wald Test (Prob>χ^2)	0.00	0.00	0.00	0.00

Note: Feasible GLS estimation with country-fixed effects and corrections for heteroskedasticity, contemporaneous cross-section correlation and group-specific autocorrelation within the panels. Long-run coefficients of the ARDL(1,q)-model are reported. The long-run standard errors are constructed using the delta method. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively. The estimated coefficients of the endogenous lag variable and the constant are omitted.

Appendix X. Portfolio calculus setting. Stock market and sovereign bond investments in 30/24 ECMs, March 2002-December 2007.

	(1) Stocks	(2) Sovereign bonds	(3) Sovereign bonds
sharpe ratio	-0.0395**	-1.4258***	-0.8063
	(0.0160)	(0.4681)	(0.5349)
correlation	2.2063***	12.6464***	18.3666***
	(0.2886)	(2.8044)	(3.6823)
fx devaluation	526.2165***	-1748.99***	-655.439
	(124.7032)	(432.546)	(489.408)
fx volatility	16.5497	71.6486	-471.819**
	(29.1119)	(178.659)	(190.608)
rating	-1.1265***	-2.5370***	-2.2760***
	(0.1008)	(0.6287)	(0.6647)
p/e	0.0023**		0.0137
	(0.0011)		(0.0209)
DRs	1.9935***		-2.4226***
	(0.2991)		(0.5635)
financial turmoil	-6.7252***		
	(0.5167)		
Observations	2070	1656	1656
Number of times	69	69	69
Number of countries	30	24	24
ECM-FE (Prob>F)	0.00	0.00	0.00
Wald Test (Prob>χ^2)	0.00	0.00	0.00

Note: Feasible GLS estimation with country-fixed effects and corrections for heteroskedasticity, contemporaneous cross-section correlation and group-specific autocorrelation within the panels. Long-run coefficients of the ARDL(1,q)-model are reported. The long-run standard errors are constructed using the delta method. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively. The estimated coefficients of the endogenous lag variable and the constant are omitted.

Appendix XI. Macroeconomic Setting. Stock market and sovereign bond investments in 30/24 ECMs, March 2002-December 2007.

	(1) Stocks	(2) Stocks	(3) Sovereign bonds	(4) Sovereign bonds
domestic credit / gdp	-0.4627	-1.0223***	-121.697***	-119.054***
	(0.2965)	(0.2655)	(27.6549)	(27.3111)
lending-deposit	-0.0152	-0.0169	-0.0073	-0.0090
	(0.0144)	(0.0144)	(0.0349)	(0.0356)
gfcf / gdp	12.2916***		148.885*	
	(3.3129)		(82.8738)	
gdp growth		-1.4660***		-8.2461
		(0.3120)		(6.2630)
trade openness	0.0909	0.0492	104.366***	98.2787***
	(0.2451)	(0.2372)	(28.8725)	(28.8735)
inflation	0.1586***	0.1360***	-0.4347	-0.5286
	(0.0256)	(0.0227)	(0.3638)	(0.3701)
fx devaluation	61.4076**	47.4939*	-1092.13**	-1023.21**
	(27.8653)	(25.3098)	(488.747)	(487.246)
fx volatility	16.9112	15.2397	-649.395**	-653.628**
	(10.4032)	(10.5539)	(263.855)	(265.846)
m2/reserves	-10.8131***	-10.6466***	-233.752***	-237.609***
	(1.0061)	(0.8938)	(39.9889)	(40.2967)
cab/gdp	-5.6681***	-6.2063***	-40.5229***	-41.3068***
	(0.7401)	(0.6907)	(12.3948)	(12.2407)
commodity prices	0.1783***	0.1741***	0.8659***	0.8867***
	(0.0339)	(0.0310)	(0.3002)	(0.3012)
financial turmoil	-6.9350***	-6.7402***		
	(0.4629)	(0.4322)		
Observations	2070	2070	2070	2070
Number of times	69	69	69	69
Number of countries	30	30	30	30
ECM-FE (Prob>F)	0.00	0.00	0.00	0.00
Wald Test (Prob>χ^2)	0.00	0.00	0.00	0.00

Note: Feasible GLS estimation with country-fixed effects and corrections for heteroskedasticity, contemporaneous cross-section correlation and group-specific autocorrelation within the panels. Long-run coefficients of the ARDL(1,q)-model are reported. The long-run standard errors are constructed using the delta method. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively. The estimated coefficients of the endogenous lag variable and the constant are omitted.

Appendix XII. Overall model including explanatory variables of different theories. Stock market and sovereign bond investments in 30/22 ECMs, March 2002-December 2007.

|	(1) Stocks	(2) Sovereign bonds	(3) Sovereign bonds
capitalisation / gdp	3.9235***		
	(0.4248)		
turnover ratio	2.7593***		-41.4995***
	(0.2785)		(12.4345)
turnover ratio²	-0.2646***		10.0821***
	(0.0338)		(2.9330)
liberalisation	0.4199***	-2.3868**	0.2622
	(0.0611)	(1.1873)	(2.6069)
financial openness	-100.464***	845.976***	222.384
	(14.5657)	(220.904)	(347.452)
DRs	1.5589***	-1.1159***	-2.0393
	(0.2592)	(0.3818)	(2.0005)
studentized range	-0.2220***	2.9773***	1.8567
	(0.0517)	(0.9911)	(2.4238)
sharpe ratio	-0.0638***	0.8178***	1.7390**
	(0.0199)	(0.2785)	(0.7712)
correlation	2.0654***		
	(0.3324)		
rating	-1.0563***	-1.5942*	2.7447
	(0.1038)	(0.9028)	(2.4617)
m2/reserves	-7.3779***	-170.507***	-440.156***
	(1.0207)	(51.3419)	(130.406)
commodity prices	0.0856**	0.4461	0.1350
	(0.0386)	(0.2884)	(0.7017)
fx devaluation	78.0525	-236.862	607.017
	(52.5880)	(723.103)	(1469.81)
fx volatility	12.4544	-642.619**	-422.287
	(32.3018)	(286.977)	(438.602)
domestic credit / gdp	-5.5946***	-57.0662*	-41.8035
	(0.7229)	(29.4516)	(61.4341)
financial turmoil	-7.0350***		
	(0.4952)		
Observations	2070	1656	897
Number of times	69	69	69
Number of countries	30	24	13
ECM-FE (Prob>F)	0.00	0.00	0.00
Wald Test (Prob>χ^2)	0.00	0.00	0.00

Note: Feasible GLS estimation with country-fixed effects and corrections for heteroskedasticity, contemporaneous cross-section correlation and group-specific autocorrelation within the panels. Long-run coefficients of the ARDL(1,q)-model are reported. The long-run standard errors are constructed using the delta method. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively. The estimated coefficients of the endogenous lag variable and the constant are omitted.

Appendix XIII. Investor characteristics setting. Stock market and sovereign bond investments in 30/24 ECMs, March 2002-December 2007.

	(1)	(2)
	Stocks	**Sovereign bonds**
business model		
costumer credit / total assets	-0.0687***	-0.7448***
	(0.0167)	(0.1036)
capital ratio		
liable equity / rwa	-0.4930***	-0.9314***
	(0.0468)	(0.1542)
liquidity ratio		
Cash + overnight interbank loans / total assets	0.1118***	-0.3170***
	(0.0377)	(0.1001)
exchange dependence		
exchange traded securities / total securities held	-0.1014***	-0.1549**
	(0.0115)	(0.0655)
financial turmoil	-6.8935***	
	(0.5666)	
Observations	2070	2070
Number of times	69	69
Number of countries	30	30
ECM-FE (Prob>F)	0.00	0.00
Wald Test (Prob>χ^2)	0.00	0.00

Note: Feasible GLS estimation with country-fixed effects and corrections for heteroskedasticity, contemporaneous cross-section correlation and group-specific autocorrelation within the panels. Long-run coefficients of the ARDL(1,q)-model are reported. The long-run standard errors are constructed using the delta method. Standard errors in parentheses. ***, **, * indicate significance at the 1, 5 and 10 percent significance level, respectively. The estimated coefficients of the endogenous lag variable and the constant are omitted.

Appendix XIV. Estimates for the coefficients of monthly time dummies in a full two-way fixed effects model. Overall model (blue line), financial market development (red line), and portfolio calculus (green line) setting. Stock market investments in 30 ECMs, September 2002-December 2007.
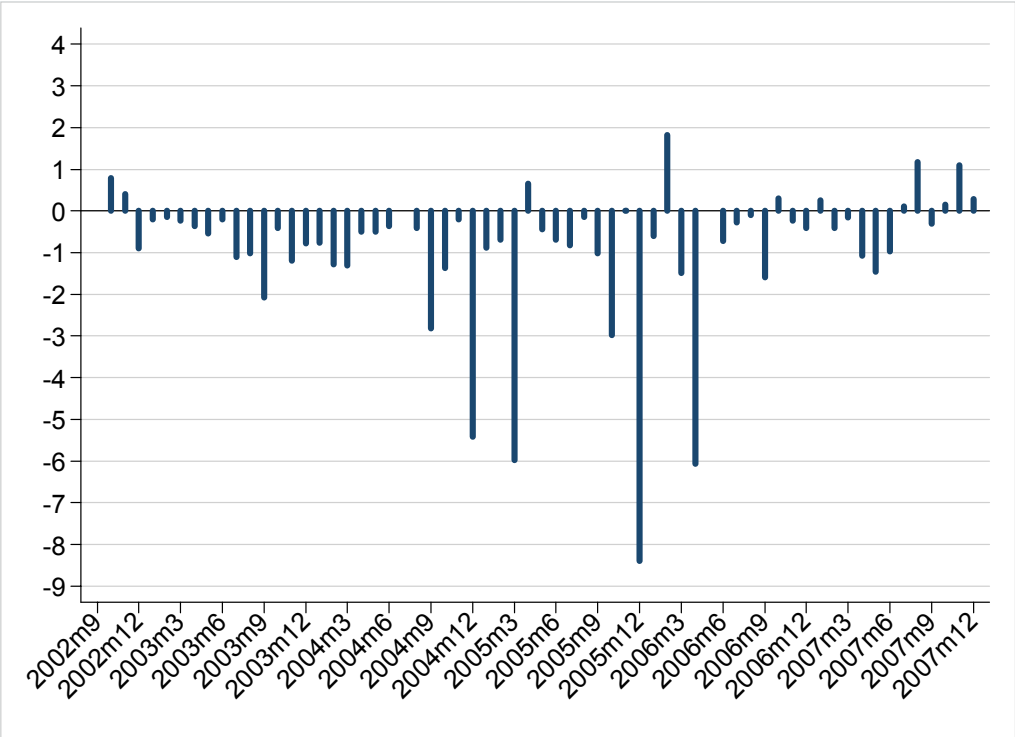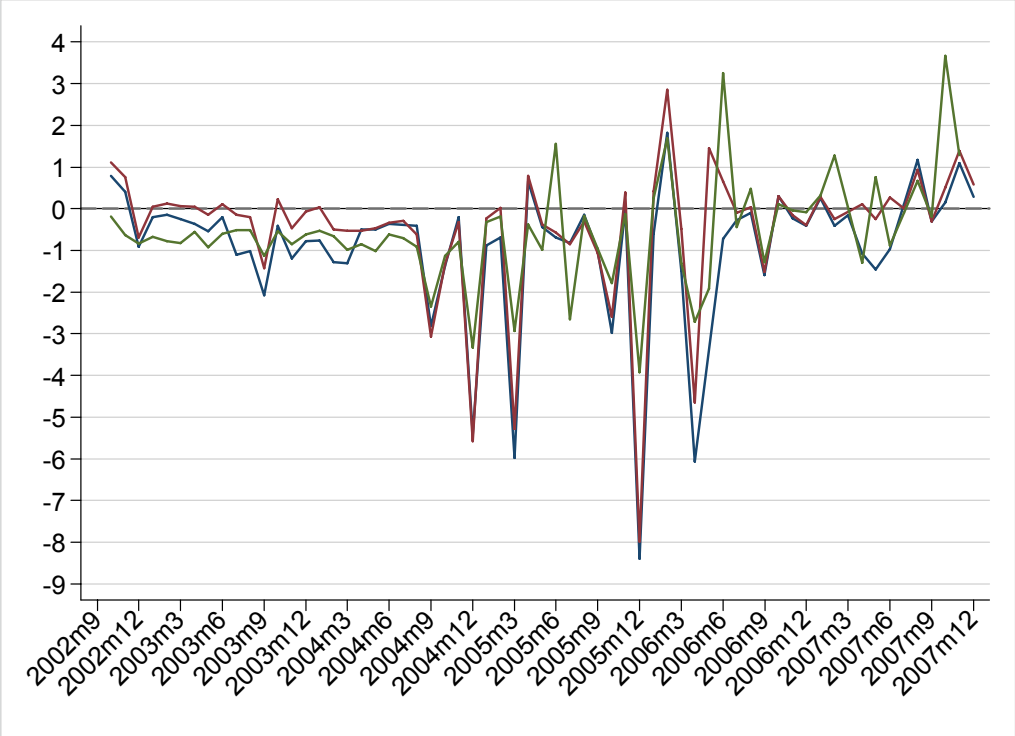
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