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FINANCIAL MARKETS AND INTERNATIONAL RISK SHARING IN EMERGING MARKET ECONOMIES

by Martin Schmitz

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Abstract

In light of rapidly increasing foreign equity liability positions of emerging market economies, we test for a necessary condition of international risk sharing, namely for systematic patterns between idiosyncratic output fluctuations and financial market developments. Panel analysis of 22 emerging market economies shows strong evidence for pro-cyclicality of capital gains on domestic stock markets both over short and medium term horizons. This implies that domestic output fluctuations can be hedged through cross-border ownership of financial markets.

Keywords: International risk sharing, capital gains, cross-border investment, financial globalisation, emerging market economies

JEL Classification: F21, F30, G15

Non-technical summary

In light of rapidly increasing foreign equity liability positions of emerging market economies (EMEs), we test for a necessary condition of international risk sharing, namely for systematic patterns between idiosyncratic output fluctuations and financial market developments. With a focus on stock market developments in EMEs, we analyse the potential for hedging against domestic output and wealth fluctuations by means of cross-country ownership of financial assets.

In times of increasing international financial integration, both investment income flows and capital gains are channels that can potentially provide international risk sharing. Emerging markets have experienced a shift in their external liability position both in terms of quantity and composition toward equity investments. Consequently, as capital markets are partly owned by foreign investors, a pro-cyclical co-movement of stock markets with GDP growth brings about wealth stabilisation. This implies that the performance of domestic stock markets should improve in times of faster domestic GDP growth; that is delivering higher capital gains for domestic and foreign investors. The benefit for foreign investors from an economic up-swing is in the form of capital gains and dividend payments which represents a "benign loss" for the domestic economy. This decreases domestic income and wealth commensurately, thus providing a smoothing or "hedging" of the economic performance. Pro-cyclicality implies that this smoothing mechanism also functions when the economy performs poorly, since now there should be capital losses (due to falling share prices) and lower dividend payments.

To determine the cyclicality of stock markets, we analyse the co-movement of domestic output innovations (GDP growth rates) and the performance of domestic stock markets as measured by real rates of capital gains. In line with previous studies on co-movements of stock markets and in the fiscal policy literature, we employ regression-based measures of cyclicality. Panel analysis of 22 emerging market economies over the period 1996 to 2010 shows strong evidence for pro-cyclicality of capital gains on domestic stock markets both over short and medium term horizons. In particular, the results reveal that the idiosyncratic part of domestic GDP growth is also reflected in domestic stock market capital gains. This implies that EMEs can share part of their country-specific macroeconomic risks with foreign investors through cross-border ownership of financial markets.

A country by country analysis reveals pro-cyclicality of capital gains for the majority of countries. Consequently, given the growing foreign liability positions of EMEs in terms of portfolio equity and FDI, international risk sharing is likely to act increasingly as an important stabilising mechanism for these countries. For EMEs this finding is particularly relevant, as these often face higher country specific productivity and growth risks than industrial countries. Moreover, they tend to exhibit a higher volatility in their growth performance. Our results also indicate that countries with higher financial development tend to have a more positive cyclicality coefficient implying better hedging capacity vis-a-vis foreign investors.

1 Introduction

This paper provides a financial market approach on the topic of international risk sharing in emerging market economies (EMEs). Most of the research on international risk sharing has focused on indirect tests of the degree of risk sharing by analysing the co-movement of domestic and foreign consumption growth rates.[1]

From a theoretical perspective this paper builds on Deveureux and Sutherland (2009) who develop a DSGE model in order to compute equilibrium portfolios in a framework of alternative international financial structures. They find a considerable degree of international risk sharing in a setting where EMEs hold nominal bonds as foreign assets and issue claims on equity investments (portfolio equity and FDI). This scenario is consistent with the present structure of two-way capital flows between emerging and advanced economies (Figure 1 and Figure 4). While accumulating large reserve assets since the late 1990s, emerging market economies have received substantial portfolio equity and FDI inflows.

The empirical analysis of this paper follows the methods used by Schmitz (2010) who focuses on a sample of industrial countries. In employing a capital market approach, we analyse the potential for hedging against domestic output and wealth fluctuations by means of cross-country ownership of financial assets. We test if a necessary condition for the sharing of macroeconomic risks is fulfilled, namely that there are systematic patterns between macroeconomic fluctuations and capital gains on financial markets. If domestic capital markets are partly owned by foreign investors, a pro-cyclical co-movement of capital gains with GDP growth brings about wealth stabilisation.[2]

Obstfeld (2004) shows that in an ideal world with complete Arrow-Debreu securities, a country is fully insured against domestic output shocks. Hence, fluctuations in consumption are decoupled from idiosyncratic fluctuations in output, with consumption growth rates across countries being perfectly correlated. Securities that could in theory deliver international risk sharing are bilateral GDP income swaps as proposed by Merton (1990) or GDP linked securities (Shiller, 1993).

Due to the lack of these instruments we use the following application as in Schmitz (2010): when domestic GDP grows faster, the domestic stock market performance should improve accordingly; that is delivering higher capital gains for domestic and foreign investors. The benefit for foreign investors from this economic up-swing is in the form of capital gains and dividend payments which represents a "benign loss" for the domestic economy. This decreases domestic

[1] Backus, Kehoe and Kydland (1995) and Lewis (1996) show that output growth is more highly correlated across countries than consumption growth (the consumption correlations puzzle). Recent work reports that the degree of risk sharing has increased over time, which can be linked to the internationalisation of portfolios, that is the declining home bias of financial investors (e.g. Sørensen et al., 2007).

[2] This is also a key assumption in the model of Devereux and Sutherland (2009), where equity returns in the foreign (emerging) economy co-vary positively with GDP in this country. Obstfeld (2006) argues that evaluating the potential for international risk sharing through the capital gains channel empirically is 'essential' in order to evaluate the stabilising effects of international investments.

income and wealth commensurately, thus providing a smoothing or "hedging" of the economic performance across the different states of the world.[3] Obviously, this smoothing mechanism also functions when the economy performs poorly, since now there should be capital losses (due to falling share prices) and lower income outflows.

Along with the model of Deveureux and Sutherland (2009), our application is related to Davis, Nalewaik and Willen (2001) who develop a procedure to assess the gains to international financial trade in risky assets depending on the correlations of domestic and international equity returns and domestic output innovations.[4] Another theoretical perspective is provided by factor pricing models (for example Chen, Roll and Ross, 1986) where asset prices reflect innovations in macroeconomic variables such as industrial production.

The international sharing of idiosyncratic macroeconomic risks is particularly relevant for EMEs, as they often face higher country specific productivity and growth risk than industrial countries. Moreover, they exhibit a higher volatility in their growth performance. Emerging markets have experienced a shift in their external liability position both in terms of quantity and composition toward equity investments. This can be partly attributed to a liberalisation of the capital account in EMEs as well as further developed financial systems and policies favouring equity investments. Faria et al. (2007) indeed find higher equity shares in the composition of foreign liabilities in the last decade.

In times of increasing international financial integration, both investment income flows and capital gains are channels that can potentially provide international risk sharing.[5] For industrial countries, Lane (2001) analysed the former channel using data on international investment positions, whereas Schmitz (2010) investigated the latter (without finding evidence for income smoothing or hedging through these channels at business cycle frequencies). The capital gains channel is of growing relevance to EMEs with large equity shares in their portfolios which make most of their returns in the form of capital gains (thus not affecting investment income flows).[6] We focus in our analysis on capital gains on domestic stock markets (as a proxy for the foreign equity liability side).[7],[8]

For industrial countries, Schmitz (2010) finds evidence that this channel is functioning over the medium-term by means of pro-cyclicality of capital gains on domestic stock markets. For emerging markets the channel is largely unexplored. Kose, Prasad and Terrones (2009) find that emerging market economies have not benefited from improved international (consumption)

[3] If firms choose not to pay out dividends, but instead to keep retained earnings, the mechanism works as well, since this should be reflected in higher stock prices and thus capital gains.

[4] See their paper for a model of international trade in risky financial assets under incomplete markets.

[5] See Lane and Milesi-Ferretti (2007) for a documentation of the rapid growth in cross-border financial holdings.

[6] The realisation of capital gains and losses involves liquidation costs however, which increase with the extent of illiquidity. This applies to FDI in particular, but less to portfolio investments.

[7] One could also use international investment positions and balance of payments data in order to approximate capital gains on international investments, however these are usually similar to market rates, but often less accurate and poorer in terms of data availability - see Lane and Milesi-Ferretti (2009).

[8] Capital gains on foreign assets, on the other hand, are influenced by a broad range of global factors such that a satisfying analysis is beyond the scope of this paper.

risk sharing over the last decades, in contrast to industrial countries (Sørensen et al., 2007). In particular they find that the issuance of debt liabilities (which were the dominant part of the external liabilities of EMEs for a long period of time) are not conducive to risk sharing.[9] Bracke and Schmitz (2011) show that for industrial countries net capital gains on international portfolio equity positions tend to be countercyclical and that countries with more countercyclical capital gains tend to obtain better consumption risk sharing. Balli, Kalemli-Ozcan and Sørensen (2011) analyse that capital gains have been as important as factor income flows in smoothing income over the last decade, especially for countries in the European Monetary Union.[10]

Two main contributions are made in this paper: first the cyclicality of capital gains on equity markets in EMEs is analysed in panel data and on the country level; second, cross-country variation in cyclicality patterns is examined formally in order to find the fundamental reasons for differing degrees of international risk sharing.[11]

Accordingly, the rest of this paper is organised as follows: section two presents the data, while section three shows stylised facts on the external capital structure of EMEs. The empirical strategy is presented in section four, while the empirical analysis starts in the fifth section by investigating co-movements of domestic stock markets and GDP growth rates. Subsequently determinants of country heterogeneity will be approached in section six; finally some concluding remarks will be made.

2 Data

In order to study the cyclical properties of stock markets, we collected data on 21 emerging market economies.[12] This choice of the sample is very much determined by data availability both in terms of length and scope. We are able to capture the time series from 1996 to 2010.

We employ the Morgan Stanley Capital International (MSCI) domestic and global equity price indices in order to calculate annual rates of capital gains. These are available both in terms of domestic currency and US dollars and have the advantage of including only pure equity prices (thus without dividend payments). Hence these indices are appropriate in order to analyse the capital gains channel of international investments. Furthermore we employ data provided by the World Bank Financial Structure Dataset (Beck and Demirguc-Kunt, 2009) on domestic stock market capitalisation.

[9] On the asset side, EMEs have accumulated large amounts of foreign reserves, which might not facilitate international risk sharing.

[10] Forster, Vasardani and Ca' Zorzi (2011) mention as benefits of increased international financial integration (along with international risk sharing) the positive impact on domestic investment and growth as well as greater depth of domestic financial systems, while costs may arise for example from misallocation of resources as well as pro-cyclicality and volatility of cross-border flows.

[11] This two-step approach is adapted from Lane's (2003) cyclicality analysis on fiscal policy and has been applied to industrial countries by Schmitz (2010).

[12] Argentina, Brazil, China, Colombia, Czech Republic, Hong Kong, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Africa, Taiwan, Thailand, and Turkey.

GDP (at constant prices) and CPI data for individual countries and the world economy are retrieved from Haver Analytics. Conventionally, GDP growth rates measure the average growth rate in a given year; however, this is not appropriate for our analysis. As we are dealing with stock market rates of capital gains - which are essentially year-end to year-end rates - one has to apply the same logic to real rates of GDP growth. Consequently we construct a year-end to year-end rate of GDP growth by considering real GDP in the last quarter of a given year relative to the last quarter of the year before. Thus we obtain a real GDP growth rate which is consistent with the other variables in our analysis. In an equivalent way we construct appropriate inflation rates in order to calculate real rates of capital gains. Output per capita data are taken from the World Bank's World Development Indicators.

Given the data availability and the empirical focus on cyclical factors, the data used are at annual frequency.

3 Stylised Facts on the External Capital Structure of EMEs

EMEs have seen a substantial increase in portfolio equity liabilities over the last decade. Figure 1 shows that for the big majority of countries in the sample the ratio of foreign portfolio equity liabilities to GDP has grown from 1996 to 2007.[13] The biggest increase can be observed for Russia (by a factor of 19), Brazil, China, and Korea, while the ratio is the highest for Hong Kong and Singapore (209% and 92% of GDP, respectively, not shown in Figure 1), followed by Taiwan (53% of GDP).

It is a reasonable assumption that most of these holdings by foreign investors are invested in market portfolios (as proxied by the respective MSCI indices) or in portfolios closely following these. Moreover, capital gains on foreign direct investments also move very closely with domestic stock market indices (as shown by Lane and Milesi-Feretti, 2003).[14]

Accordingly, the cyclicality analysis in this paper captures the hedging potential for EMEs through both their portfolio equity and FDI liabilities. These constitute a large share of overall foreign liabilities as visible in Figure 2: the equity share was between 60% to 70% of total liabilities in 2007 for most EMEs, whereas it only amounted to around 20% to 30% in 1996.

Figure 3 shows that there was not only a shift in the composition of the external balance sheet of EMEs, but also, financial development in terms of stock market capitalisation has increased tremendously in most EMEs, thus offering more investment opportunities to domestic and foreign investors.

In line with the model of Deveureux and Sutherland (2009), we find that not only the liability side of EMEs is consistent with their model, but also the foreign asset side, where EMEs have

[13] The exceptions being Argentina, Chile, and Venezuela.

[14] The authors find that domestic stock market returns explain returns on FDI measured at market value in the international investment positions data much better than returns based on FDI measured at book-value (which is still common practice for most countries). FDI, however, is often a considerably less liquid investment than portfolio investments.

accumulated large reserve assets since 1996 (Figure 4).[15]

4 Empirical strategy

As outlined above we use the approach of Schmitz (2010) to analyse the co-movement of domestic output innovations (that is GDP growth rates) and the performance of domestic stock markets as measured by real rates of capital gains. The main focus of the paper lies on panel analyis; however, we also estimate variants of the regression specifications on a country-by-country basis. This allows for establishing potential country heterogeneity in cyclicality patterns which we seek to explain in the second step of our analysis. Moreover, it offers a robustness check by observing which countries drive the overall panel results.

It is crucial to stress that the aim of this paper is not to provide an econometric model that explains capital gains. But the emphasis rather is on the co-movement of capital gains on equity investments and GDP growth in order to establish conclusions about cyclicality and the associated international risk sharing properties.

4.1 Panel Analysis

For our panel of countries we run the specification

$$kg_{it} = \alpha_i + \delta_t + \beta g_{it} + e_{it} \tag{1}$$

where e_{it} is first-order autoregressive with an error term z_{it} which is assumed to be independent and identically distributed with $N(0, \sigma_z^2)$. kg is the annual real rate of capital gains on the respective domestic stock market and g is the real annual rate of domestic GDP growth.[16]The potential for international risk sharing and thus hedging is facilitated by $\beta > 0$.[17]

The regression estimation is by least squares. We employ a within-group fixed effects estimator with first-order autoregressive disturbances (in order to adjust for persistence and autocorrelation in the error term) as well as heteroskedasticity robust standard errors. The choice of employing this simple, contemporaneous specification is determined by our goal to establish the direction and magnitude of the co-movement between output growth and rates of capital gains.

We report panel estimations including country fixed effects (α_i) and both country and time fixed effects (δ_t). Time fixed effects have the property of controlling for common global shocks. Consequently, the domestic GDP growth rate reflects solely the idiosyncratic part of domestic

[15]See for example IMF (2011).

[16]In order to ensure that the results are not driven by extreme outliers, we drop all observations where kg is larger than 100% or smaller than -100% in a given year. Also when these observations (13 in total) are included, all the main findings hold nevertheless.

[17]If β is < 0, thus counter-cyclical, risk sharing would be in theory possible if foreign investors take short positions in the domestic markets. However, this possibility is not very feasible on a large scale on current financial markets.

growth and likewise for the rates of capital gains, whereas in the country fixed effects estimation also global factors could drive the results.

Previous studies regarding co-movement of stock markets and in the fiscal policy literature use a similar set-up. Forbes and Rigobon (1998) demonstrate that regression-based measures of cyclicality are superior to unadjusted correlation coefficients when samples have different levels of volatility. This is very applicable to an emerging market country sample.

Lane (2001) and Schmitz (2010) study the cyclicality of international investment income flows and capital gains, respectively, in an equivalent set-up. In the fiscal policy literature Sørensen et al. (2001), Lane (2003) and Alesina et al. (2008) measure cyclicality of government spending in this particular specification. Moreover, the empirical risk sharing literature (for example Sørensen et al., 2007) focusing on growth rates of GDP and consumption employs simple co-movement estimations in a similar fashion.

We consider regression specifications with both all variables expressed in domestic currency (thus taking the perspective of a domestic investor in one of the sample's countries) and all variables expressed in terms of US dollars in order to have a common currency among all countries. The latter can be understood as approaching the question from a foreign or international investor's point of view.

In addition to focusing on annual data, it is very crucial to know if extended periods of economic growth are reflected in higher cumulative capital gains on financial markets. Or in other words: are permanent output shocks reflected in financial markets such that they can be 'shared' internationally? Baxter (2011) points out that depending on the temporal dimension, the nature of the shocks and the associated risk sharing patterns might be different.[18]

For this purpose we construct non-overlapping three-year GDP growth rates and cumulative three-year rates of stock market capital gains. We run the estimation

$$kg3_{it} = \alpha_i + \beta g3_{it} + u_{it} \tag{2}$$

where $kg3$ is the cumulative three year real rate of capital gains on the domestic stock market index and $g3$ is the cumulative real rate of domestic GDP growth over three years.

While Schmitz (2010) uses a five-year horizon, a three-year window is chosen as to maximise the number of observations in the estimation.[19] Nevertheless, robustness tests using five-year periods confirm the results obtained at three-year horizons. In addition, three-year periods might be more suitable for emerging market economies as their business cycles tend to be more dynamic and volatile.

As persistence is much less of an issue over a three-year horizon, we do not employ an AR(1) correction term in this estimation. u_{it} is independent and identically distributed with $N(0, \sigma_u^2)$.

[18] High-frequency shocks might be seasonal fluctuations in crop yields, whereas low frequency shocks could refer to differences in potential growth rates.

[19] The stock market indices for our sample of countries start in 1995 (see Section 2).

We estimate a simple pooled specification, with country fixed effects, and with both country and time fixed effects.

4.2 Country Analysis

In the individual country specification (3), we estimate similarly to the panel specification by general least squares with a correction for first-order serial correlation in the error term. Moreover, heteroskedasticity robust standard errors are employed.

$$kg_{it} = \alpha_i + \beta_i g_{it} + e_{it} \tag{3}$$

where e_{it} is first-order autoregressive with an error term z_{it} which is assumed to be independent and identically distributed with $N(0, \sigma_z^2)$.

This estimation is the country-by-country equivalent to the country-fixed effects panel estimation. Thus we do not isolate the idiosyncratic components of GDP growth and capital gains on the stock market. In order to focus on the idiosyncratic components, we consider the comovement of the deviation of domestic GDP growth from global GDP growth and the deviation of domestic rates of capital gains from global rates. Hence the question if the idiosyncratic part of domestic growth is reflected in the idiosyncratic part of the financial market performance is now also approached on an individual country level. Thus, we run

$$(kg_{it} - kg^*_{it}) = \alpha_i + \beta_i \left(g_{it} - g^*_{it}\right) + e_{it} \tag{4}$$

where e_{it} is first-order autoregressive with an error term z_{it} which is assumed to be independent and identically distributed with $N(0, \sigma_z^2)$. kg^* is the annual real rate of capital gains on the respective world financial index and g^* is the annual real rate of world GDP growth.

The estimation strategy is analogous to (3), that is including a correction for first-order serial correlation in the error term and heteroskedasticity robust standard errors.

We do not estimate cumulative three year specifications on a country-by-country basis, as we do not have a sufficient amount of data points available for individual countries.

Once the individual cyclicality coefficients are obtained from the country level estimates, we seek to explain the observed patterns across countries. For this we follow Schmitz (2010) by employing the cross-sectional specification

$$\widehat{\beta}_i = \alpha + \lambda Z_i + \nu_i \tag{5}$$

where $\widehat{\beta}_i$ are the set of estimated parameters from the country regressions above. ν_i is independent and identically distributed with $N(0, \sigma_\nu^2)$. Z_i is a set of control variables. It includes the domestic stock market capitalisation (as a share of GDP), the number of listed companies (per capita) (both from the World Bank's Financial Structure dataset), and output per capita in

natural log form (in PPP terms, taken from the World Bank's World Development Indicators).[20] In line with Schmitz (2010), these control variables are chosen as indicators for the economic and financial development of the countries included in the sample. The stock market development variables are included as a higher market capitalisation and a larger number of listed firms might imply that business cycle fluctuations of an economy are better reflected in the performance of the stock market.

Weighted least squares estimation is used in order to take varying levels of accuracy for the (in the previous step) obtained dependent variable into account.[21]

This two-step approach is akin to Lane (2003) and Alesina et al. (2008) in the fiscal policy analysis. In the risk sharing literature (for example Sørensen et al., 2007)), a similar analysis is carried out, however with an imposed structure on the risk sharing coefficient β and thus employing annual data of the structural variables in order to explain their role for the risk sharing coefficient. Our approach has the advantage of not being affected by short-run fluctuations and thus reflecting the impact of heterogeneous structural factors more appropriately.

5 The Cyclical Properties of Domestic Stock Markets

5.1 Panel Analysis

Panel analysis employing regression specification (1) shows that both in terms of domestic currency and in US dollars there is pro-cyclicality of rates of capital gains on domestic stock markets (significant at the 1% level (Table 1)). This implies that in our sample of emerging economies a one percentage point increase in the domestic GDP growth rate co-moves with a 3.4 percentage points increase in the rate of capital gains (3.7 percentage points when estimated in US dollars).[22]

In terms of international risk sharing, it is crucial to isolate the idiosyncratic component of GDP growth, hence we include time fixed effects: again we obtain highly significant β-coefficients of 1.1 (1.7 when estimated in US dollars). This result is very important as it shows the potential for a significant contemporaneous risk sharing mechanism via domestic stock market capital gains for the period of 1996 to 2010. This means that in the short-run of one year, the specific state of a national economy is reflected in the idiosyncratic part of stock market capital gains. This finding is in contrast to Schmitz (2010) where global factors explained most of the pro-cyclicality of capital gains for industrial countries. This points towards domestic equity being 'a claim on GDP' in the short-run (that is one year).

With regard to EMEs this finding is important as these countries face a considerable country specific productivity and output risk which can accordingly be shared with foreign investors. To

[20] We use average values by country for the explanatory variables.

[21] We weight by the (in the previous step) obtained t-statistics.

[22] The magnitude of the coefficient is substantially higher than found by Schmitz (2010) for industrial countries (1.1)

illustrate one can consider the hedging implications of the idiosyncratic coefficient of 1.1 from above: if excess domestic GDP growth (relative to global growth) increases by one percentage point, this implies a commensurate increase in excess stock market returns of one percentage point. Based on an unweighted average portfolio equity position of 30% of GDP in our sample, this implies that there is a wealth transfer via financial markets to foreign investors of roughly one third of the increase in GDP. On average this increases to even 80% when we also include FDI in the considerations.

Moving from business cycle frequencies to a longer term horizon it is crucial to know if permanent shocks to an economy can potentially be hedged via the stock market. Employing specification (2), as outlined above, we find the following (Table 2): in terms of domestic currency the cyclicality coefficient is 5.5, in US dollar terms 6.8 (both significant at the 1% level). The result also holds (with coefficients being significant at the 1% level and 5% level, respectively, but smaller in magnitude), when time effects are added or neither country nor time effects are included.[23]

As for the short-run the outlined risk sharing mechanism also works over medium-term horizons. This result is in line with Baxter (2011) who finds substantial international risk sharing at medium and low frequencies.

5.2 Country Analysis

The country by country analysis (estimation (3)) shows a rather homogenous picture in terms of direction of the cyclicality coefficients (Table 3). In terms of domestic currency, we find significant pro-cyclical co-movements between GDP growth and the stock market for Argentina, Brazil, China, Columbia, Czech Republic, Hong Kong, India, Indonesia, Malaysia, Peru, Singapore, South Africa, Taiwan, Thailand and Turkey. China shows the highest coefficient (20.4), implying that a percentage point increase of the GDP growth rates moves along with a more than 20 percentage point increase in stock market capital gain rates. Hence, for the majority of EMEs in our sample, an economic expansion is also reflected in higher share prices.[24]

The remaining countries in the sample do not show any significant co-movements in terms of domestic currency. When the data are denominated in US dollars (column (3)) coefficients and significance levels obtained are very similar (South Africa's and Thailand's coefficient turn insignificant, whereas Mexiko's coefficient is significant). These results are again very different from Schmitz's (2010) analysis of industrial countries, where substantial country heterogeneity is established with many countries exhibiting countercyclical or acyclical stock markets.

Estimation (4) answers the question if the idiosyncratic part of domestic growth is reflected

[23]We find similar results when five-year horizons are employed (where 60 observations are available): the coefficients are larger in magnitude, but slightly less significant. The findings are in line with Schmitz (2010) who employs five-year horizons for industrial countries.

[24]In Table 3 we focus on reporting the estimated β-coefficients and associated standard errors in order to present the key results as clearly and concisely as possible. More diagnostic statistics are available upon request.

in the idiosyncratic part of the stock market performance. Strikingly this holds for the majority of countries that showed a significant coefficient in estimation (3).[25] Hence for these countries the idiosyncratic part of GDP growth is also reflected in the idiosyncratic component of the stock market performance. As this also holds in terms of US dollars, it implies that an international investor is able to reap exceptional economic expansions by means of excess stock market returns in theses countries. Thus, for this group of countries international risk sharing via foreign equity liabilities is feasible.

Overall, the potential for international risk sharing at business cycle frequencies is very high, in particular considering idiosyncratic components. Consequently, given the growing importance of equity and FDI in the foreign liabilities of EMEs, international risk sharing is likely to act increasingly as an important stabilising mechanism for these countries.

6 Explaining Country Heterogeneity

The first-step analysis revealed some heterogeneity in cyclicality patterns across countries. In contrast to Schmitz (2010), where substantial differences in cyclicality patterns were found for industrial countries, we find stock markets in EMEs to be by and large procyclical (even though to differing degrees, Table 4). However, in this second step - we want to identify the sources of the differences in the size of the cyclicality coefficients across countries obtained in the estimations run so far. For this we employ the cross-sectional specification (5).

When considering the simple $\widehat{\beta}_i$s obtained from specification (3), we obtain a negative coefficient for GDP per capita. This is in contrast to Schmitz (2010), where a country's pro-cyclicality indicator is increasing with higher economic development. Looking at the $\widehat{\beta}_i$s obtained from specification (4) (these are the "idiosyncratic" β-coefficients), we do not find any significance among the explanatory variables proposed.

As there is a substantial variation in the level of stock market capitalisation (Figure 3), we exclude countries that have a stock market to GDP ratio of more than 150% (on average over the period 1996 - 2010) in the next set of regressions.[26] One might suspect that for these countries the impact of stock market size on the cyclicality coefficients differs due to the substantially higher level of stock market capitalisation compared to the rest of the sample.

In these estimations we still obtain a negative coefficient on GDP per capita. However, while the coefficient on stock market capitalisation is not significant, we find a significant positive coefficient on the number of listed companies (per capita) for the "idiosyncratic" β-coefficients. Our interpretation of this result is that the number of listed firms represents a (partial) mirror of how the overall economic performance is reflected in stock market performance. This result implies that a broader public listing of companies enhances the risk sharing potential of open

[25] The exceptions are Columbia, Malaysia, South Africa and Thailand

[26] Accordingly we drop Hong Kong, Malaysia, Singapore and South Africa.

economies.[27]

7 Conclusion

In this paper the potential of emerging market economies to hedge their economic performance across different states of the world is examined. When looking at capital gains on domestic stock markets, hedging is feasible both at short and medium term horizons which consequently allows to insure against shocks of a different nature (see Baxter, 2011). Country specific analysis reveals pro-cyclicality of capital gains for a majority of countries.

This suggests that hedging through the capital gains channel is working for these countries. This is in line with the theoretical model of Devereux and Sutherland (2009), thus hinting at a considerable potential for international risk sharing of EMEs in the current configuration of the international financial structure. For EMEs this finding is in particular relevant, as they often face higher country specific productivity and growth risk than industrial countries. Moreover, they exhibit a higher volatility in their growth performance.

Hence a necessary condition for the sharing of macroeconomic risks is fulfilled, namely that there are systematic patterns between macroeconomic fluctuations and capital gains on stock markets. Consequently, given the growing equity and FDI foreign liability positions of EMEs, international risk sharing is likely to act increasingly as an important stabilising mechanism for these countries. Countries with more financial development (in terms of listed companies) tend to have a higher cyclicality coefficient implying better hedging capacity vis-a-vis foreign investors.

It is crucial to stress that we focus merely on the foreign liability side of international investments in this paper. Moreover, the complete picture of international portfolios also incorporates foreign assets, exchange rate and bilateral considerations.

[27] We also test if capital account openness as measured by Chinn and Ito (2008) affects the cyclicality coefficients. However, while it has a negative (and significant) coefficient on the simple $\widehat{\beta}_i$s coefficients, it fails to be significant when included in the estimations for the "idiosyncratic" β-coefficients. Moreover, the findings reported in Table 4 are robust to the inclusion of this variable.

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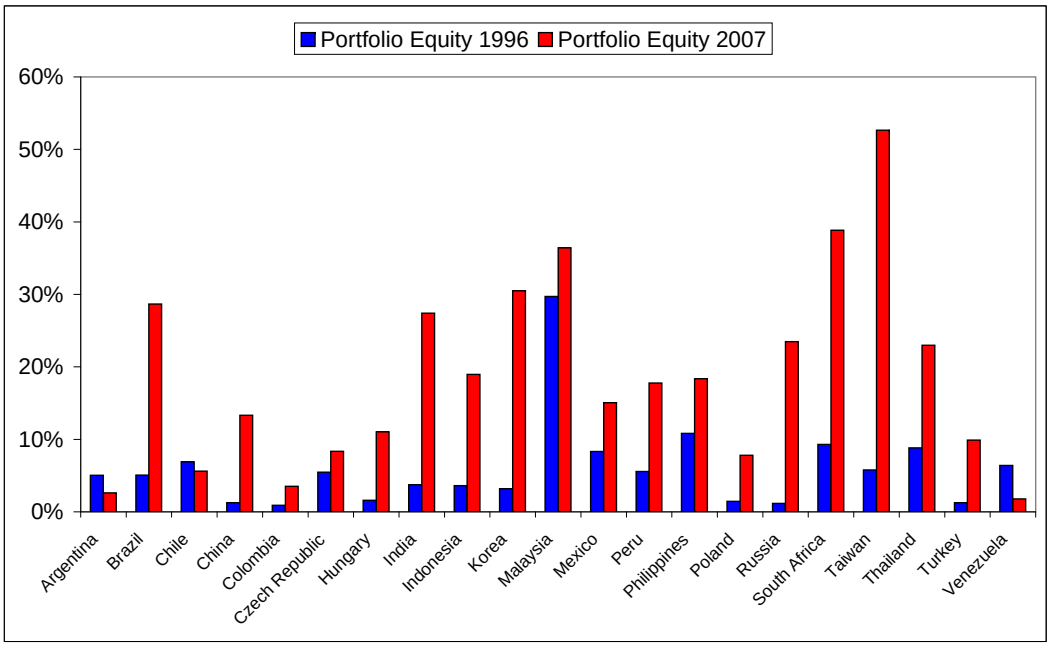
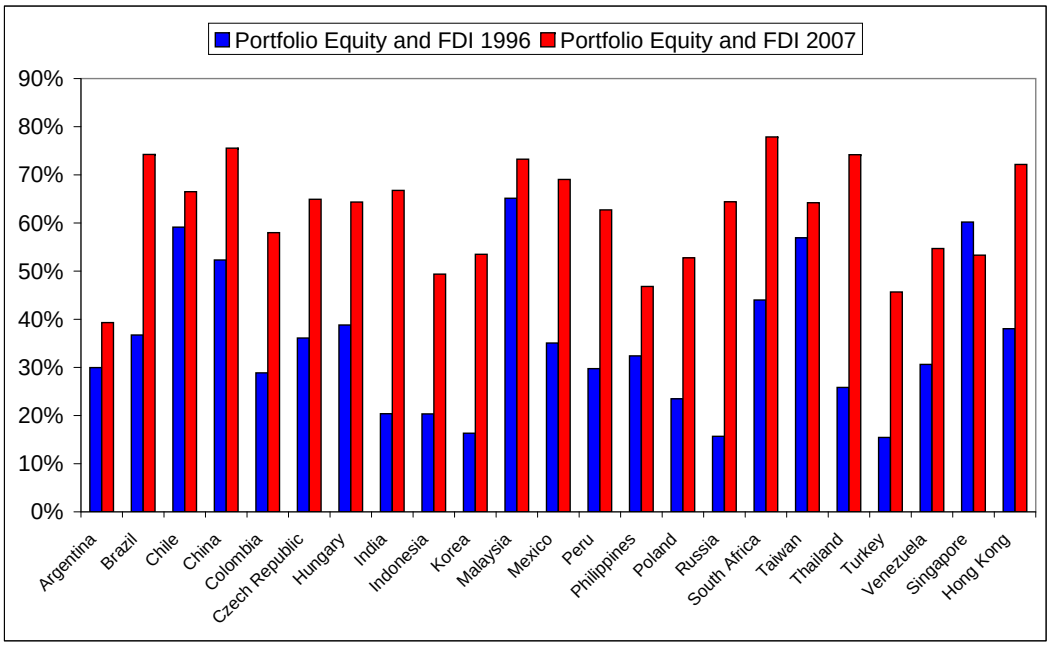
Figure 1: Foreign Portfolio Equity Liabilities (% of GDP)



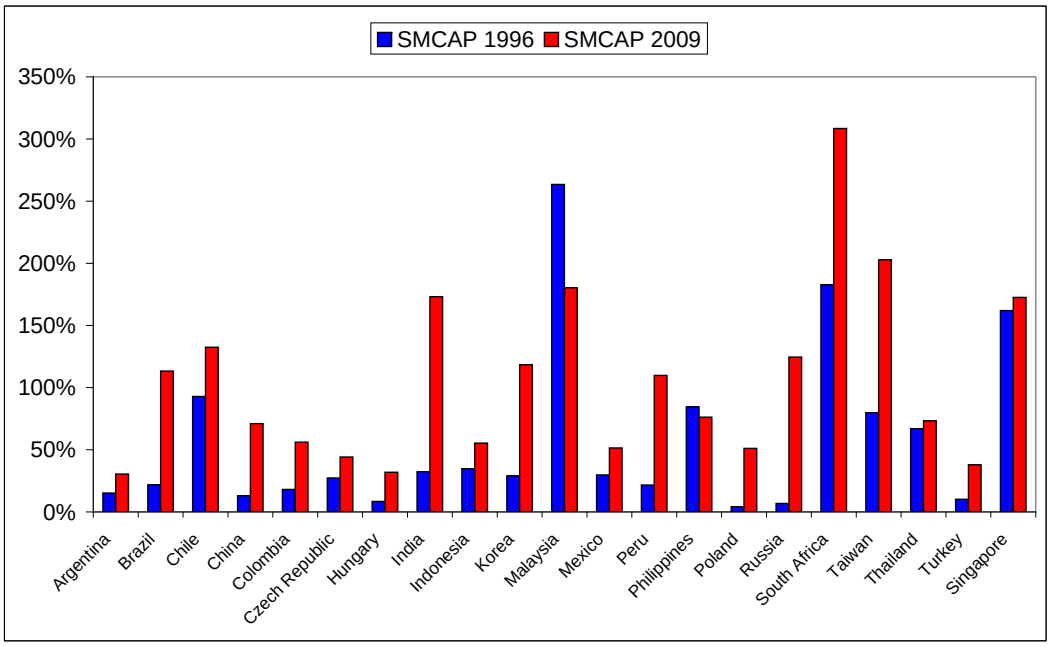
Notes: Calculations are based on an updated and extended version of the dataset constructed by Lane and Milesi-Ferretti (2007). Hong Kong (24% in 1996 and 209% in 2007) and Singapore (20% in 1996 and 92% in 2007) are not shown in the figure.

Figure 2: Foreign Portfolio Equity and FDI Liabilities (% of Total Foreign Liabilities)



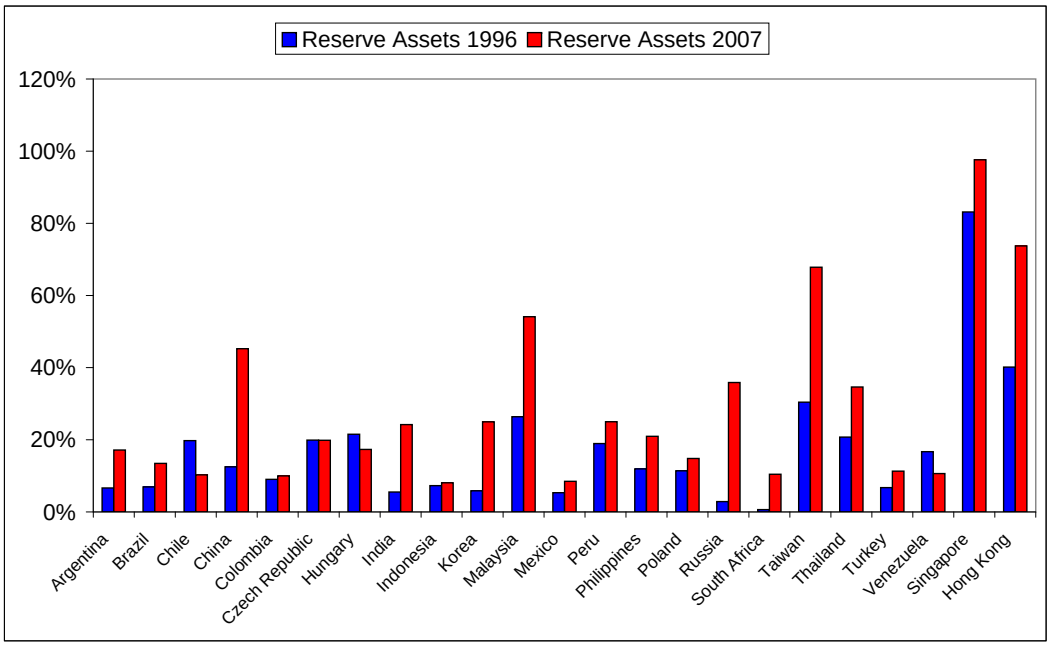
Notes: Calculations are based on an updated and extended version of the dataset constructed by Lane and Milesi-Ferretti (2007).

Figure 3: Stock Market Capitalisation (% of GDP)



Notes: Calculations are based on an updated version of the dataset constructed by Beck and Demirguc-Kunt (2009). Hong Kong (237% in 1996 and 603% in 2009) is not shown in the figure.

Figure 4: Reserve Assets (% of GDP)



Notes: Calculations are based on an updated and extended version of the dataset constructed by Lane and Milesi-Ferretti (2007).

Table 1: Cyclicality of capital gains on domestic stock market

	Domestic Currency		**US Dollar**	
	FE	**FE + TE**	**FE**	**FE + TE**
	(1)	**(2)**	**(3)**	**(4)**
Full Sample	3.41	1.1	3.7	1.73
	[0.57]***	[0.45]**	[0.65]***	[0.80]**
Observations	295	295	295	295
Countries	22	22	22	22
R2	0.12	0.68	0.11	0.20

Notes: The dependent variable is the real rate of capital gains on the domestic stock market; the explanatory variable is the real GDP growth rate. The real rate of capital gains is calculated as the annual rate of return on the domestic stock market price index, deflated by the CPI inflation rate. We construct GDP growth by considering real GDP in the last quarter of a given year relative to the last quarter of the year before (accordingly for inflation rates). Estimation by generalised least squares with AR(1) correlated disturbances, heteroskedasticity robust standard errors (in parentheses) and involving country fixed effects (FE) ((1) and (3)) and country and time fixed effects (TE) ((2) and (4)). R2 refers to the within-group measure. Time period: 1996-2010. Full regression outputs are available upon request. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 2: 3-year cyclicality of capital gains on domestic stock market

	Domestic Currency			**US Dollar**		
	FE	**FE +TE**		**FE**	**FE +TE**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Stock	5.52	2.02	3.82	6.75	2.40	4.44
Market	[0.79]***	[0.81]**	[0.68]***	[0.97]***	[0.95]**	[0.85]***
Observations	102	102	102	102	102	102
Countries	22	22	22	22	22	22
R2	0.38	0.63	0.24	0.38	0.65	0.22

Notes: The explanatory variable is the cumulative real GDP growth rate over three years; the dependent variable is the cumulative real rate of capital gains over three years. The real rate of capital gains is calculated as the three year rate of return on the domestic stock market price index, deflated by the CPI inflation rate. We also construct cumulative three year GDP growth rates. Estimation by ordinary least squares with heteroskedasticity robust standard errors (in parentheses) and involving country fixed effects (FE) ((1) and (4)) and involving country and time fixed effects (TE) ((2) and (5)). R2 refers to the within-group measure (except for columns (3) and (6)). Time period: 1996-2010. Full regression outputs are available upon request. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 3: Cyclicality of capital gains on domestic stock market

	Dependent Variable							
	Domestic Currency				US Dollar			
	(1)		(2)		(3)		(4)	
	Simple		Relative to Global		Simple		Relative to Global	
Argentina	2.85	[0.95]**	4.00	[1.78]**	4.48	[1.04]***	3.11	[1.05]**
Brazil	6.76	[2.12]***	5.52	[2.36]**	14.01	[2.55]***	7.22	[2.50]**
Chile	1.61	[2.84]	1.98	[2.15]	2.45	[3.49]	2.04	[2.54]
China, P.R.	20.43	[2.87]***	7.96	[2.94]**	21.38	[2.76]***	8.04	[2.83]**
Colombia	5.48	[2.89]*	3.74	[2.70]	5.61	[2.67]*	3.52	[2.42]
Czech Republic	6.27	[1.73]***	9.96	[1.80]***	7.21	[2.15]***	9.15	[1.74]***
Hong Kong	4.05	[1.16]***	2.61	[0.79]***	3.88	[1.24]***	2.60	[0.79]***
Hungary	0.74	[4.85]	1.82	[2.73]	1.15	[4.77]	2.07	[2.92]
India	7.87	[1.73]***	6.20	[1.76]***	10.42	[2.07]***	6.77	[1.79]***
Indonesia	4.57	[0.81]***	5.43	[1.44]***	3.28	[0.85]***	3.51	[1.05]***
Korea, Republic of	1.29	[3.59]	1.61	[3.60]	-0.18	[6.18]	-0.32	[5.02]
Malaysia	2.39	[0.91]**	0.93	[0.71]	4.15	[1.19]***	3.09	[1.27]**
Mexico	2.28	[1.81]	0.26	[1.53]	4.19	[1.84]**	0.53	[1.44]
Peru	5.08	[1.95]**	1.30	[6.89]	5.62	[1.99]**	4.72	[1.74]**
Philippines	3.38	[2.73]	6.38	[2.94]**	2.70	[3.37]	3.71	[3.22]
Poland	2.27	[2.81]	-3.48	[2.21]	1.64	[3.23]	-3.10	[2.09]
Russian Federation	2.09	[3.16]	5.00	[2.95]	1.31	[3.02]	2.27	[3.40]
Singapore	3.76	[1.12]***	1.67	[0.74]**	4.01	[1.13]***	1.72	[0.70]**
South Africa	4.55	[1.67]**	5.15	[3.56]	1.98	[3.82]	5.85	[5.33]
Taiwan	5.08	[1.11]***	2.41	[1.27]*	5.28	[1.05]***	2.64	[1.34]*
Thailand	5.16	[1.70]**	7.00	[4.27]	5.02	[2.86]	4.36	[2.72]
Turkey	5.37	[0.96]***	4.45	[1.11]***	6.11	[1.22]***	3.76	[1.11]***

Notes: The dependent variables are the real rate of capital gains on the domestic stock market ((1) and (3)) and the deviation of the rate of capital gains on the domestic stock market from the global stock market ((2) and (4)), respectively. The explanatory variables are the real GDP growth rate ((1) and (3)) and the deviation of the real domestic GDP growth rate from global GDP growth ((2) and (4)), respectively. The real rate of capital gains is calculated as the annual rate of return on the domestic stock market price index, deflated by the CPI inflation rate. We construct GDP growth by considering real GDP in the last quarter of a given year relative to the last quarter of the year before (accordingly for inflation rates). For the respective global rates, we use the same method using global stock market price indices and world GDP. Estimation by generalised least squares with AR(1) correlated disturbances and semi-robust standard errors (in parentheses). Time period: 1996-2010. Full regression outputs are available upon request. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 4: Determinants of variation in country cyclicality

	Domestic Currency		**US Dollar**	
Full Sample	**Simple**	**Relative to global**	**Simple**	**Relative to global**
	(1)	**(2)**	**(4)**	**(5)**
GDP-PC	-3.67	-0.80	-3.87	-0.61
	[1.08]***	[0.74]	[1.24]***	[0.73]
Stock Market Capitalisation	-1.39	-1.34	-1.13	-0.67
	[1.39]	[1.04]	[2.03]	[1.04]
No. of listed companies	5.35	1.64	3.19	0.30
	[4.20]	[3.17]	[5.70]	[3.14]
R2	0.23	0.15	0.24	0.10
Stock Market Capitalisation <150%				
	(5)	**(6)**	**(7)**	**(8)**
GDP-PC	-3.83	-2.07	-2.69	-1.83
	[1.70]**	[0.89]**	[1.79]	[0.90]**
Stock Market Capitalisation	-5.24	-2.96	2.63	-0.62
	[6.08]	[2.86]	[6.64]	[2.99]
No. of listed companies	-4.4	27.9	-22.19	30.96
	[18.57]	[8.80]***	[20.84]	[8.95]***
R2	0.19	0.26	0.17	0.28

Notes: The dependent variables are the estimated beta-coefficients from the individual country analysis; the explanatory variables are country averages of GDP per capita in natural log form and domestic stock market capitalisation (as ratio to GDP) as well as the number of companies listed on the stock market (relative to population size). Estimation by weighted least squares (weighting by t-statistics of 'first-step' estimation). Stock market capitalisation to GDP ratio is higher than 150% on average over the sample period for Hong Kong, Malaysia, Singapore and South Africa. Standard errors in parentheses. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.