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MODELLING THE TIME VARYING DETERMINANTS OF PORTFOLIO FLOWS TO EMERGING MARKETS

Marco Lo Duca

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Abstract

This paper studies how the drivers of portfolio flows change across periods with a model where regression coefficients endogenously change over time in a continuous fashion. The empirical analysis of daily equity portfolio flows to emerging markets shows that the regression coefficients display substantial time variation. Major changes in the importance of the drivers of the flows coincide with important market events/shocks. Overall, investors pay more attention to regional developments in emerging markets in periods when market tensions are elevated. However, extreme tensions generate panics, i.e. periods when changes in uncertainty and risk aversion drive flows, while regional developments play only a marginal role.

JEL Codes: F32, F34, G01, G11.

Keywords: capital flows, emerging markets, financial crisis, push factors, pull factors.

Non-technical summary

While under normal circumstances capital flows have beneficial effects for emerging market economies, in some occasions, waves of strong portfolio inflows preceded episodes of financial instability, such as, for example, the Mexican crisis in 1994 and the Asian crisis in 1997. The potential negative financial stability consequences of strong and volatile portfolio flows call for appropriate policy actions to safeguard financial and macroeconomic stability in recipient economies. The analysis of the drivers of capital flows is a crucial step in designing these policies.

A complication when assessing the relative importance of the drivers of capital flows is that their importance changes over time. While the time varying importance of the determinants of capital flows has been documented in the literature, there are essentially no studies modelling it. This paper contributes to the literature by studying how the drivers of the flows change across periods. It does so by using a model with regression coefficients that endogenously change over time in a continuous fashion.

The model with time varying coefficients contributes to the analysis of the determinants of capital flows mainly in four ways. First, it endogenously detect periods when the relative importance of the drivers of the flows changes. Second, it has regression coefficients that change in a continuous fashion, in contrast to other models where the parameter space is limited. Third, it allows a more precise calculation of the contribution of different factors to the flows. Fourth, it can detect risks and anomalies related to the drivers of the flows.

The empirical part of the paper studies the determinants of daily portfolio equity flows to emerging market economies over the period April 2007 - March 2012. The main findings of the empirical analysis are as follows. The model with time varying regression coefficients outperforms a standard regression model in fitting equity portfolio flows to emerging markets. The analysis shows that the regression coefficients display substantial time variation. Major changes in the importance of the drivers of the flows coincide with important market events/shocks. Overall, investors pay more attention to regional developments in emerging markets in periods when market tensions are elevated. However, extreme tensions generate panics, i.e. periods when changes in uncertainty and risk aversion drive flows, while regional developments play only a marginal role.

1. Introduction

The surge in portfolio flows to emerging markets in 2009 and 2010 renewed the debate on the drivers of these flows, on their potential macro-financial implications in recipient economies and on the optimal policy responses[3].

While under normal circumstances capital flows have beneficial effects for emerging market economies[4], in some occasions, waves of strong portfolio inflows preceded episodes of financial instability, such as, for example, the Mexican crisis in 1994 and the Asian crisis in 1997 (Eichengreen and Mody, 1998). The potential negative financial stability consequences of strong and volatile portfolio flows call for appropriate policy actions to safeguard financial and macroeconomic stability in recipient economies. The analysis of the drivers of capital flows and in particular disentangling between push and pull factors is a crucial step in designing these policies.

If country specific characteristics (pull factors) attract capital flows, the adoption of appropriate policies in emerging markets could affect the flows and smooth their consequences on the macro-financial conditions of the recipient economy. Conversely, if external common conditions (push factors) drive the flows, domestic macro policies in recipient countries have little impact on them. As a consequence, other forms of defence, such as, for example, the introduction of capital controls, become attractive for policy makers in emerging markets[5].

A complication when assessing the relative importance of the drivers of capital flows is that their importance changes over time. To illustrate this, figure 1 shows the correlation between improvements in business conditions, as measured by a leading indicator of economic activity, and portfolio equity inflows in 2002 (figure on the left), and between mid 2006 and mid 2007 (figure on the right), for a set of large emerging market economies. In 2002, a period characterised by elevated economic uncertainty and low risk appetite due to weak growth in the US and a series of corporate scandals, portfolio equity inflows were correlated with improvements of macro conditions in the recipient country, suggesting that investors were closely monitoring local macro developments when taking allocation decisions. Conversely, between mid 2006 and mid 2007, the period of exceptionally low risk *premia* that anticipated the Great Financial Crisis, there was no correlation between equity portfolio inflows and improvements in macro conditions in the recipient countries, suggesting that investors focused on other factors when allocating international portfolios.

In addition to the stylised fact presented in figure 1, a number of studies document that the drivers of capital flows change across periods (for example, Mody and Taylor, 2003 and Felices and Orskaug, 2008). Fratzscher (2011) analyses the role of global and country specific factors in driving portfolio flows, differentiating between tranquil/non-crisis times and crisis periods. In 2009 and 2010, after the

[3] Since 2009 the IMF has been active in the debate on capital flows (IMF 2010a, 2010b, 2011a, 2011b, 2011c, 2012; Ostry et al. 2010 and 2011, Ghosh et al. 2012).

[4] The literature on the benefits (but also on the risks) of capital flows and capital account openness is large. See for example Dell'Ariccia et al. (2008) and Obstfeld (2009) for a review of the literature.

[5] See G20 (2011).

acute phase of the Great Financial Crisis, portfolio flows were more related to pull factors in the form of macroeconomic fundamentals, institutions and policies of recipient countries than during the crisis. Moreover, while an increase in risk aversion before the crisis was associated with capital flows out of advanced economies and into emerging markets, this effect reversed during the crisis inducing a substantial reallocation of capital from many emerging markets into few advanced economies.

There are several reasons why the determinants of capital flows change across periods. First, information asymmetries could prevent the market to clear at a given price (Stiglitz and Weiss, 1981). In such disequilibrium context, the drivers of flows change across periods depending on whether the quantities are determined by the demand or by the supply, as discussed by Mody and Taylor (2003). Second, heterogeneous investors have different allocation strategies, therefore the determinant of flows change across periods reflecting the mix of active investors. For example, Forbes and Warnock (2012) document that the drivers of extreme capital movements depend on whether one looks at the activity by foreign or domestic investors. Third, during periods of market turbulence, investors might face binding constraints as, for example, margin calls or the need to sell certain assets to preserve the risk profile of their portfolios. In this context, investment decisions become increasingly related to the dynamic of certain variables, as for example the price or the volatility of certain benchmark assets. As pointed by Adrian and Shin (2010), this can generate self enforcing de-leveraging cycles that can increase the dependence of prices and flows on common factors. Fourth, the attention that investors pay to different risk factors could change over time. For example, the sudden increase in the spreads between unsecured and secured money market rates in August 2007 suggests that certain events induce a change in the information set that investors use to price risks[6].

While the time varying importance of the determinants of capital flows has been documented in the literature, there are essentially no studies modelling it. This paper contributes to the literature on the determinants of international capital movements by studying how the drivers of the flows change across periods. It does so by using a model with regression coefficients that endogenously change over time in a continuous fashion. The time dependent loading coefficients are meant to capture the changes in the relative importance of the drivers of portfolio flows over time. While models with time varying coefficients have been used in several fields in economics and finance[7], to my knowledge this is the first time that they are applied to the analysis of the determinants of capital flows.

The model with time varying coefficients contributes to the analysis of the determinants of capital flows mainly in four ways. First, it endogenously detect periods when the relative importance of the drivers of the flows changes. This is in contrast to the common approach where the change in the relative importance of the drivers is captured by time dummy variables that are arbitrarily set. Second, the model has regression coefficients that change in a continuous fashion. This is in contrast to switching regime models (or models with dummies) where the parameter space is limited to a number

[6] In August 2007 the event leading to a re-pricing of credit and liquidity risks in the money market was the liquidation of a number of investment funds that suffered losses on US sub-prime assets. This event led to a re-assessment of the risks related to banks' off balance sheet exposures to structured finance products.

[7] See Kim and Nelson (1998) and Durbin and Koopman (2004).

of values that depends on the regimes of the model or on the number of dummy variables. Third, the model addresses problems related to the calculation of the contribution of different factors to the flows when regression coefficients are constant and the time varying importance of the determinants is neglected. Fourth, the model can detect risks and anomalies related to the drivers of the flows, therefore providing useful information to assess financial stability risks. For example, it could identify periods when investors do no pay sufficient attention to fundamentals, suggesting that some risks are mispriced.

The empirical part of the paper studies the determinants of daily portfolio equity flows to emerging market economies over the period April 2007 - March 2012[8]. The main findings of the empirical analysis are as follows. The model with time varying regression coefficients outperforms a standard regression model in fitting equity portfolio flows to emerging markets. The analysis shows that the regression coefficients display substantial time variation. Major changes in the importance of the drivers of the flows coincide with important market events/shocks. Overall, investors pay more attention to regional developments in emerging markets in periods when market tensions are elevated. However, extreme tensions generate panics, i.e. periods when changes in uncertainty and risk aversion drive flows, while regional developments play only a marginal role. For example, in the period before the Lehman bankruptcy, investors were engaged in a close scrutiny of the evolution of macro/financial conditions while the business environment progressively deteriorated. Conversely, in the aftermath of the Lehman bankruptcy, the withdrawal of equity portfolio investment from emerging markets reflected panic, i.e. a general loss of confidence, rather than being a consequence of a careful assessment of macro/financial conditions in recipient countries. Recent shocks, as for example, the escalation of sovereign problems in Europe and the US downgrade in August 2011, did not generate panic, although they increased investors' scrutiny.

The paper is organised in the following way: section 2 describes the data and the model, section 3 presents the empirical findings, section 4 discusses an extension of the model and conducts robustness tests, section 5 concludes.

2. Data on capital flows and empirical model

2.1 Data on capital flows

The dataset on capital flows consists of daily data on portfolio equity investment flows by country/region of destination from April 2007 to March 2012. The data are compiled by Emerging

[8] There is only a limited number of studies looking at high frequency data on capital flows. See for example Chuhan, Claessens and Mamingi (1998).

Portfolio Fund Research (EPFR) who aggregates proprietary information on the activity of around 16,000 individual equity funds[9].

An important feature of the dataset is that US domiciled funds account for more than 80% of the number of funds. Moreover, due to legal restrictions most of the investors in the funds are located in the same domicile as the fund itself. This means that the analysis is mainly from a foreign/US investor perspective (i.e. a balance-of-payments perspective), while it can say little about the portfolio decisions of investors located in emerging markets.

2.2 Empirical model

Portfolio equity flows into emerging markets are modelled according to the following equation 1:

$$y_t = \beta_t X_{t-1} + \varepsilon_t \quad (1)$$

Where y_t is the net equity portfolio inflows in emerging markets[10] (shown in figure 2) and X_{t-1} a set of explanatory variables, including global and regional factors, that are described below. The explanatory variables are lagged by one period as it is assumed that flows reflect the portfolio allocation decision taken by investors after observing the evolution of the relevant variables. The peculiarity of the model is that each loading coefficient β_{it} in the vector β_t changes over time and follows a random walk process:

$$\beta_{i,t} = \beta_{i,t-1} + \mu_{i,t} \quad (2)$$

The random walk specification for the βs implies that the sensitivity of portfolio flows to the different determinants changes over time as a result of shocks. These shocks that affect the βs reflect changes in equilibrium conditions in the market (i.e. demand driven versus supply driven flows as in Mody and Taylor, 2003), changes in the population of active investors, changes in investors' focus, or periods when investors' face binding constraints, as discussed in section 1.

The set of explanatory variables X_{t-1} includes:

Liquidity shock: the liquidity shock is computed as the change in the differential between the fixed interest rate offered in the Overnight Swap Index (OIS) over the three month maturity and the Treasury Bill over the same maturity. The OIS rate can be considered (almost) free of credit risk because the swap contract does not involve the exchange of the principal amount, it only involves netting out the net gain/loss at the end of the contract. As a consequence, the OIS rate reflects the expected path of the risk free rate (i.e. the monetary policy rate) over the three month time horizon of

[9] Although EPFR data captures only about 5-20% of the market capitalization in equity and in bonds for most countries, it is a fairly representative sample. Fratzscher (2011) discusses this issue and shows a close match between EPFR portfolio flows and portfolio flows stemming from total balance-of-payments data.

[10] Portfolio flows are expressed in percentage of equity assets under management in emerging markets and are cumulated over 3 days (from t to t+2), as investors might react with delay to market developments. In the robustness tests, we also estimate the model without cumulating the flows. The results are robust.

the contract[11]. Also Treasury Bills are risk free assets, however, in periods of liquidity shortage they can become close substitute of cash for the following reasons: first, there exists a very liquid market for them; second, they have short term maturity; third, they can be used as collateral in repos and to access central bank liquidity. As a consequence, when market conditions tighten and funding liquidity dries up, the high demand for Treasury bills pushes their yield below the expected path of the risk free rate, as measured by the OIS rate, leading to an increase in the spread (see figure 5). We use, therefore, the average change of this spread in the US and the euro area[12] to measure (global) liquidity shocks (figure 6).

Credit shock: the credit shock is computed as the change in the differential between the three month interbank rate and the OIS rate. While, as discussed above, the OIS rate represents the expected path of the risk free rate, the interbank rate is affected by the credit quality of banks. As a consequence, the spread between the interbank rate and the OIS rate can be considered a measure of credit risk (figure 7), in the banking sector. We use, therefore, the average change of this spread in the US and the euro area to measure (global) credit shocks (figure 8).

Confidence shock: the shock is computed as the change in the average option implied volatility in the US (VIX index) and in the euro area (VDAX index). As discussed in Bekaert, Hoerova and Lo Duca (2011), while option implied volatility reflects expected stock market uncertainty, its link to option prices means that it also contains information about risk aversion. Indeed, financial markets often view the VIX (and similar indicators as the VDAX, for example) as measures of risk aversion and fear in the market place (figure 9). We use changes in the average of VIX and VDAX to measure (global) confidence shocks, reflecting changes in risk aversion and uncertainty (figure 10).

Global/US factor: it is calculated as the part of US equity returns which is orthogonal to the liquidity, credit and confidence shocks[13]. This factor captures all the developments that affect equity markets in the US and are unrelated to the three shocks above. The Global/US factor is meant to capture mainly changes in the economic outlook at the global level.

EME regional factor: it is calculated as the part of equity returns in emerging market economies (EME)[14] which is orthogonal to the three shocks and to the US equity market returns. This variable

[11] The expected path of the policy rate can be also calculated using Fed future contracts for the US (Kuttner, 2001; Bernanke and Kuttner, 2005; Gürkaynak, Sack and Swanson, 2005). Unfortunately, the use of future contracts is not possible here as comparable data for the euro area are missing. Nevertheless, the fixed rate of the OIS contract used here is highly correlated (0.999) with the expected path of monetary policy calculated with future contracts.

[12] For the euro area the French T-bill has been used.

[13] The orthogonal component is simply the residual of a regression where US equity returns are explained by the credit, liquidity and confidence shocks described above. By proceeding in this way, we implicitly assume (with all the caveats) that the three (almost) uncorrelated shocks drive stock market returns.

[14] The Datastream total market index for emerging markets was used.

captures all the developments that are unrelated to the three shocks and the US equity markets returns. The EME regional factor is meant to capture mainly changes in the economic outlook in emerging markets. However, it might also capture herding, i.e. investors increasing portfolio allocation in markets where returns have been higher[15].

Summary statistics for the key variables are reported in table 1 panel A, while the correlation between the three shocks (liquidity, credit and confidence) is reported in table 1 panel B. While disentangling between credit and liquidity shocks is indeed complicated and it is the subject of a large literature, the correlation between the liquidity, credit and confidence shocks, as they are defined in this paper, is low over the entire sample, suggesting that there is little contemporaneous feedback between them.[16]

The model is estimated with a Kalman Filter approach, as described in Kim and Nelson (1998) and the results are presented in the next section.

3. Results

Table 2 shows the estimated coefficients and summary statistics for a standard regression model with static regression coefficients, where equity inflows in emerging markets are explained with the variables described in section 2.2. This standard model (SD model) would serve as a benchmark for the model with time varying parameters. All variables that enter in the model are standardised so that the relative contributions to portfolio flows can be assessed by looking at the regression coefficients.

Overall, the SD model fits the data well as indicated by the adjusted R^2 at 0.25. All the explanatory variables are statistically significant and have the expected sign. Positive developments in the global and regional factors anticipate portfolio equity inflows in emerging markets, while the three global shocks, i.e. liquidity risk, credit risk and confidence, are negatively associated with equity inflows. The regional factor is the single most important explanatory variable, followed by the confidence shock, the US/global factor and the credit risk shock. While the liquidity shock is significant from the statistical point of view, it is less important from an economic point of view, given the small magnitude of the estimated coefficient. Taken together, push factors (the US/Global factor ad the three shocks) have more explanatory power than pull factors (captured by the regional factor).

Turning to the time varying coefficient model (TVP model), it outperforms the SD model in terms of fitting of the data. The R^2 of the TVP model is 0.64 while the R^2 of the SD model is 0.25. The TVP model achieves also a better score in terms of root mean squared error (0.60 versus 0.87 of the SD model). Finally, the better performance of the TVP model is evident in the scatter plots in figure 3 A and B that show the closer match between actual and fitted values for the TVP model, and in figure 4

[15] Caveat: the calculation of global and regional factors as regression residuals could create a "generated" regression bias when the model for equity portfolio flows is estimated.

[16] The confidence and the credit shock display the highest level of correlation (0.2), reflecting that changes in uncertainty could be partly related to changes in the level of credit risk and vice versa.

where the outperformance of the TVP model in terms of R^2 is evident in all sub periods. The better performance of TVP model confirms that the determinants of portfolio flows change over time and it is important to take this into account in the model.

Figure 11 A to E displays the estimated time varying βs with 90% confidence intervals (grey lines)[17]. The first feature that emerges from figure 11 A to E is that all the βs display time variation and substantial changes in the βs coincide with important market events/shocks that occurred in the period under review.

In the pre-Lehman bankruptcy phase (August 2007 to mid-September 2008), a period characterised by the progressive worsening of the global economic outlook and increasing tensions in financial markets, regional developments in emerging markets were the most important drivers of flows and the correspondent β coefficient was on average at the highest level in the period under review (figure 11 A). US/Global developments and the confidence shock (figure 11 B and E) were also important drivers of the flows with the correspondent β coefficient also at the highest level (in absolute terms). This dynamic of the βs suggests that investors were engaged in a close scrutiny of the evolution of macro/financial conditions while the business environment progressively deteriorated. Interestingly, the liquidity shock (figure 11 C) played an important role in driving flows from August to October 2007, before the confidence shock gained importance. This shows that the liquidity problems that emerged in August 2007, when money market spreads increased to record levels, had an initial impact on portfolio flows to emerging markets. The progressive loss of importance of the liquidity shock might be explained by central bank interventions that alleviated the liquidity tensions. However, the central bank interventions did not address the progressive loss of confidence (i.e. increase in uncertainty and risk aversion), that ultimately gained importance as a determinant of the flows in the course of 2008.

In the aftermath of the Lehman bankruptcy, the confidence shock became the main driver of portfolio flows, while regional developments in emerging markets and global/US developments progressively lost importance. These findings suggest that the withdrawal of equity portfolio investment from emerging markets mostly reflected market panic, i.e. a general loss of confidence due to elevated market uncertainty and risk aversion, rather than being a consequence of a careful assessment of macro/financial conditions. Finally, the credit risk shock (Figure 11 D) progressively gained importance in the aftermath of the Lehman bankruptcy, reaching a peak in the first half of 2009.

From the second half of 2009 to the end of the sample in March 2012, the βs display less time variation than in the time period around the Lehman bankruptcy. However, there are some changes in the βs that deserve attention. First, investors pay more attention to regional developments in emerging markets in periods when market tensions intensify, for example, when sovereign problems in Europe escalated in 2010 and when the US were downgraded in August 2011. Second, during the latter two episodes, the role of confidence shocks and credit risk shocks in driving flows became stronger.

[17] Error bands are calculated using the Kalman Filter uncertainty (Durbin and Koopman, 2004).

Finally, during the escalation of the European debt crisis in October and November 2011, the credit risk shock became the main driver of the flows, reflecting market concerns over the stability of the banking system in Europe.

4 Extensions of the model and robustness tests

This section first discusses a panel version of the model, then it addresses the robustness of the results.

4.1 Extension: a panel version of the model

The model in equation 1 is modified as follows:

$$y_{j,t} = \beta_t X_{j,t-1} + \varepsilon_{j,t} \quad (1A)$$

Where $y_{j,t}$ is net equity portfolio inflows in country j in day t. The set of explanatory variables $X_{j,t}$ includes the same global variables used in the "univariate" specification in section 2.2 (i.e. the liquidity shock, the credit risk shock, the confidence shock and US/Global factor), while the emerging market factor is replaced by a domestic factor[18]. Finally, the loading coefficients (βs) are assumed to be the same across countries, therefore the specification of equation 2 in Section 2.2 is still valid.

The dynamic of the βs estimated with the panel version of the model over the period April 2007 – March 2012 for Brazil, Russia, India and China (BRIC countries) confirm the results of the time series model (Figure 12 A to E).

4.2 Robustness tests

We assessed the robustness of the results of the TVP model described in section 2.1 in the following way.

First, we changed/extended the set of explanatory variables. In this regard, to address the criticism that in the model there are no variables directly capturing macro-economic developments, we added an economic surprise index for emerging markets[19] that captures unexpected improvements in macro conditions by comparing macro data releases with market expectations. The inclusion of the index does not change the results. The index does not turn out to be significant in the regression, suggesting that local equity prices development already incorporate the reaction to macro developments. We also added an economic surprise index for the G10 and for the US alternatively, obtaining the same results.

Second, we replaced the US factor with a truly global factor. The latter is calculated as the part of equity return in G10 countries that is orthogonal to the confidence, liquidity and credit shocks. The results are unchanged when this alternative global factor is used.

[18] The domestic factor is calculated as the part of local equity return that is orthogonal to all the other explanatory variables.

[19] The source for the economic surprise index is Citigroup. The index is available on a daily basis.

Third, we used daily equity inflows (expressed in percentage of equity asset under management in emerging markets) without cumulating them over a period of three days as in the benchmark specification. The results are basically unaffected.

Fourth, we changed the definition of the liquidity, credit and confidence shocks by calculating them as innovations of AR(1) processes for the underlying variables (see section 2.2) instead of using the first differences. The results do not change.

Fifth, we included lagged flows in the benchmark model. In this case the fit of the model improves, however the dynamic of the βs is unchanged.

Finally, we assessed the robustness of the estimation strategy by using different starting values for the Kalman filter and different sample periods. The results turn out to be robust.

5 Conclusions

While under normal circumstances capital flows have beneficial effects for emerging market economies, in some occasions, waves of strong portfolio inflows preceded episodes of financial instability, such as, for example, the Mexican crisis in 1994 and the Asian crisis in 1997 (Eichengreen and Mody, 1998). The potential negative financial stability consequences of strong and volatile portfolio flows call for appropriate policy actions to safeguard financial and macroeconomic stability in recipient economies. The analysis of the drivers of capital flows and in particular disentangling between push and pull factors is a crucial step in designing these policies.

A complication when assessing the relative importance of the drivers of capital flows is that such importance changes over time. This paper contributes to the literature by studying how the drivers of the flows change across periods with a model where regression coefficients change over time in a continuous fashion. The time dependent loading coefficients are meant to capture the changes in the relative importance of the drivers of portfolio flows over time.

The empirical part of the paper studies the determinants of daily portfolio equity flows to emerging market economies over the period April 2007 - March 2012. The main findings of the empirical analysis are as follows. The model with time varying regression coefficients outperforms a standard regression model in fitting equity portfolio flows to emerging markets. The analysis shows that the regression coefficients display substantial time variation. Major changes in the importance of the drivers of the flows coincide with important market events/shocks. Overall, investors pay more attention to regional developments in emerging markets in periods when market tensions are elevated. However, extreme tensions generate panics, i.e. periods when changes in uncertainty and risk aversion drive flows, while regional developments play only a marginal role. For example, in the period before the Lehman bankruptcy, investors were engaged in a close scrutiny of the evolution of macro/financial conditions while the business environment progressively deteriorated. Conversely, in the aftermath of the Lehman bankruptcy, the withdrawal of equity portfolio investment from emerging markets reflected panic, i.e. a general loss of confidence, rather than being a consequence of a careful

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Table 1

A. Summary statistics for key variables

	Unit	Mean	Std. Dev	Min	Max
Portfolio equity inflows	%	0.05	0.30	-1.56	1.23
EME Regional Factor	%	0.00	1.19	-5.76	7.79
US/Global Factor	%	-0.01	1.12	-5.88	10.74
Liquidity Shock	basis points	-0.01	5.23	-55.60	78.05
Credit Shock	basis points	0.03	4.14	-42.00	65.73
Confidence Shock	percentage points	0.00	1.91	-16.21	11.13

Note: See section 2.2 for the description of the variables.

B. Correlation among the liquidity, credit and confidence shocks

	Liquidity Shock	Credit Shock	Confidence Shock
Liquidity Shock	1.00		
Credit Shock	0.14	1.00	
Confidence Shock	0.12	0.20	1.00

Note: the correlation between the EME and US/Global factors and the other variables is not reported as the two factors are orthogonal to the shocks in the above table by construction (see section 2.2).

Table 2

Estimated coefficients for a standard regression model without time varying parameters

Dependent variable: *Equity Portfolio inflows in emerging markets (expressed in % of equity assets invested in emerging markets and cumulated over a period of three days i.e. between t and t+2)*

EME Regional Factor	0.3701 ***
	(0.0248)
US/Global Factor	0.1454 ***
	(0.0266)
Liquidity Shock	-0.0684 **
	(0.0281)
Credit Shock	-0.1044 ***
	(0.0283)
Confidence Shock	-0.2379 ***
	(0.0256)
RMSE	0.87
Adjusted R - Squared	0.25
Observations	1276

Note: The table reports the estimated β for the following equation:

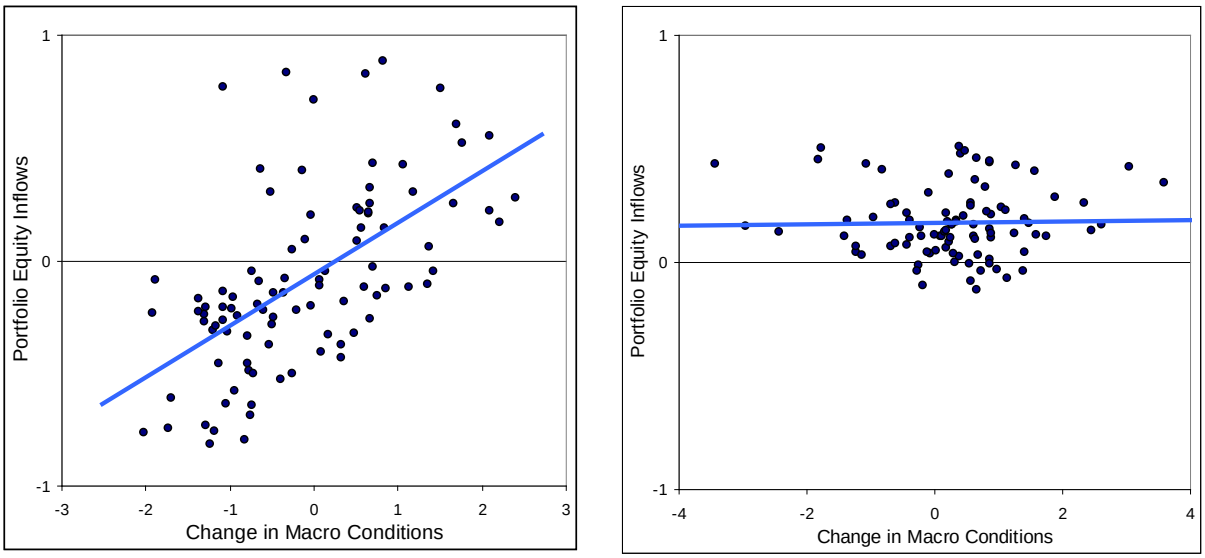
$$y_t = \beta X_{t-1} + \varepsilon_t$$

Where y_t is the equity portfolio inflows in emerging markets (expressed in % of equity assets invested in emerging markets and cumulated over a period of three days, i.e. between t and t+2) and the explanatory variables in X_{t-1} are those described in section 2.2. Sample period: 24 April 2007 – 21 March 2012. ***, **, * indicates statistical significance at the 1%, 5% and 10% confidence level respectively. Robust standard errors are reported in parenthesis below the coefficients.

Figure 1

Improvement in business conditions (x-axis) and net portfolio equity investment (y axis)

January to December 2002 **July 2006 to June 2007**



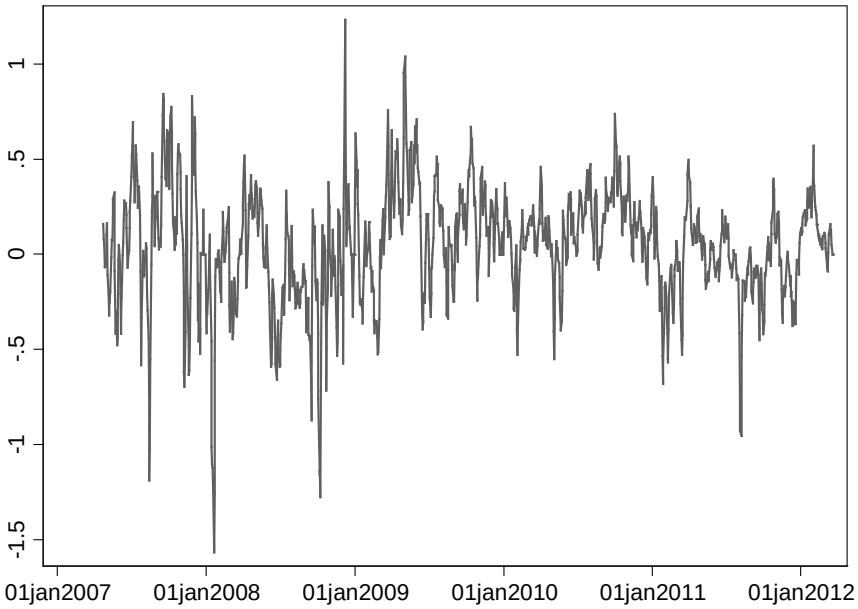
Source: EPFR and OECD.

Note: portfolio equity inflows in country i in month t are expressed in percentage of asset under management in country i. Change in macro conditions in month t is measured by the orthogonalised (with respect to the G10) percentage change in the OECD composite leading indicator of country i. Countries included: India, China, Brazil, Russia, South Korea, Mexico, South Africa and Turkey.

Figure 2

Portfolio Equity inflows in emerging markets

(in % of asset equity invested in emerging markets)



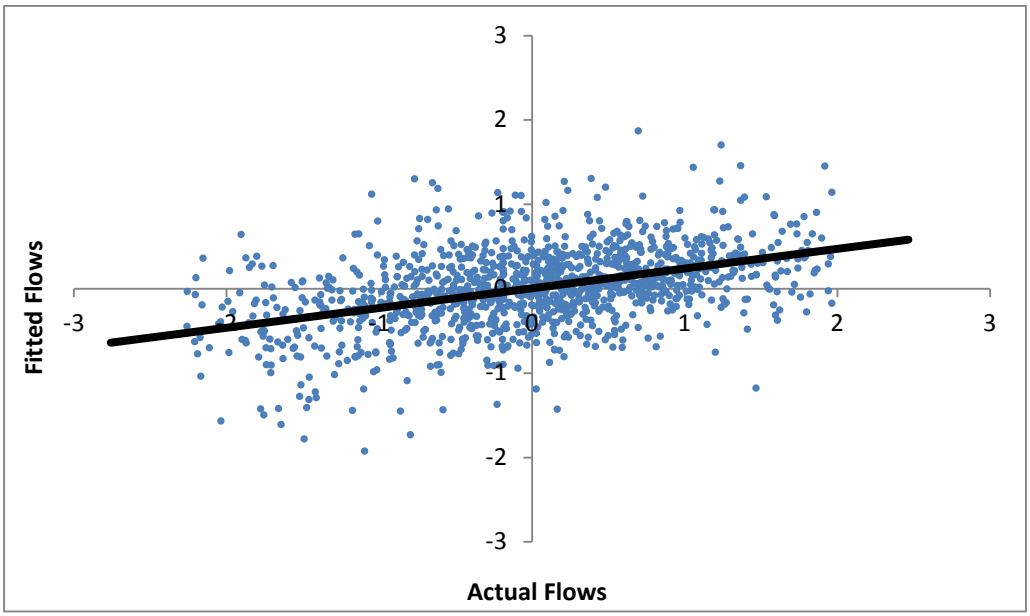
Source: EPFR

Note: cumulated over a period of three days.

Figure 3

Actual and fitted portfolio equity flows

A - Standard regression model



B – Time varying parameter regression model

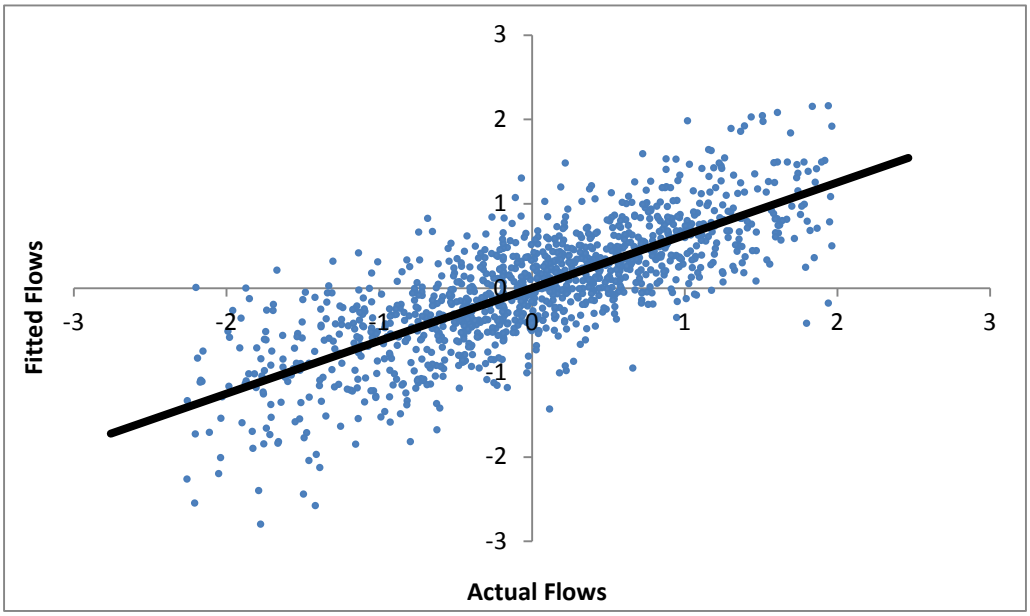
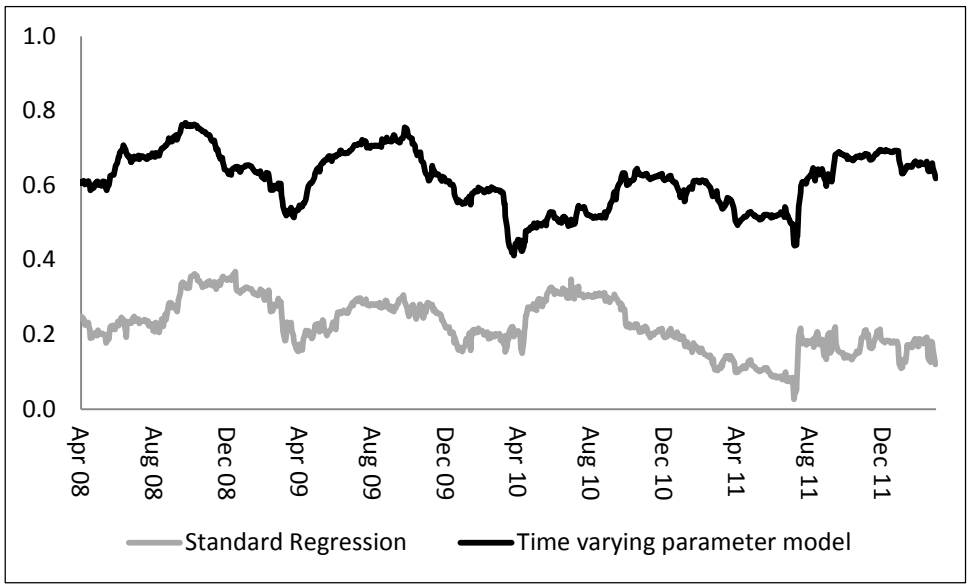


Figure 4

Rolling window R^2



Note: R^2 is calculated over a 120 day rolling window.

Figure 5: Spread between the 3 month Overnight Swap Index and the 3 month Treasury Bill *(average of the US and EA, basis points)*

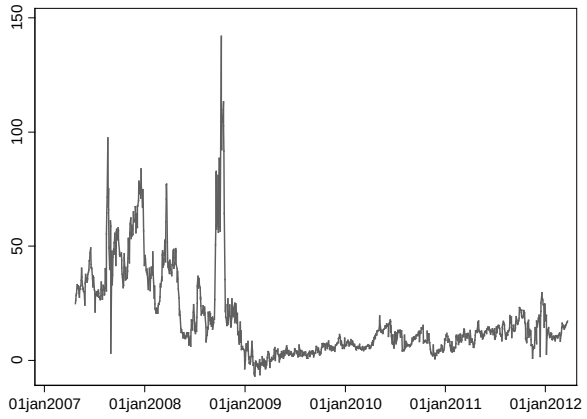


Figure 6: The liquidity risk shock *(basis points)*

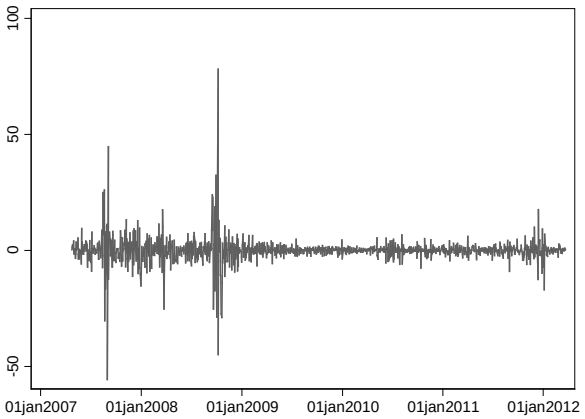


Figure 7: Spread between the 3 month Interbank rate and 3 month Overnight Swap Index *(average of the US and EA, basis points)*

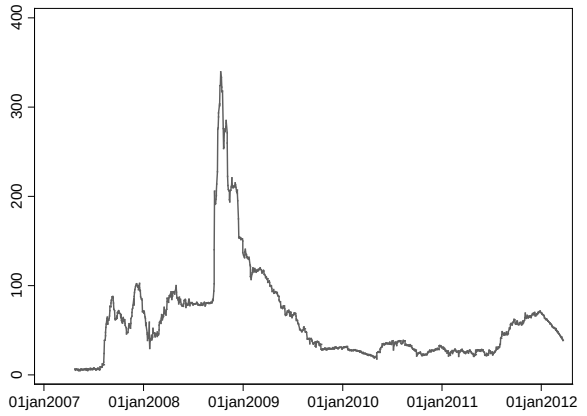


Figure 8: The credit risk shock *(basis points)*

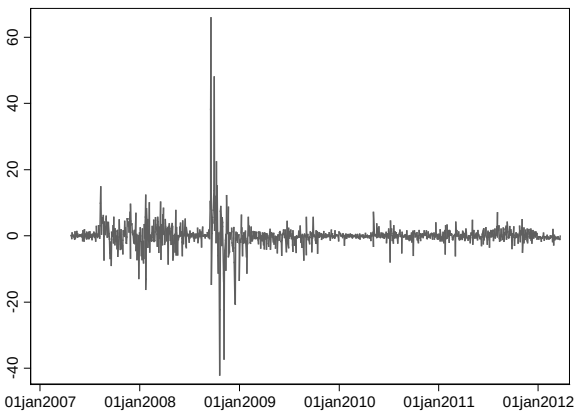


Figure 9: Average of the VDAXX and VIX indexes *(percent)*

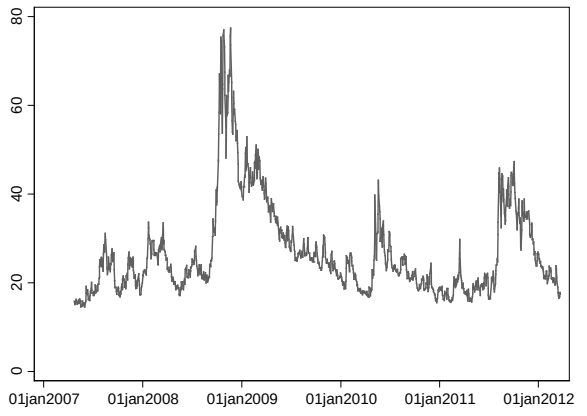


Figure 10: The confidence shock *(% points)*

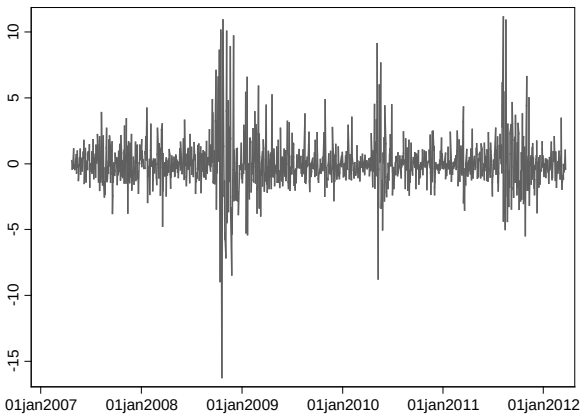
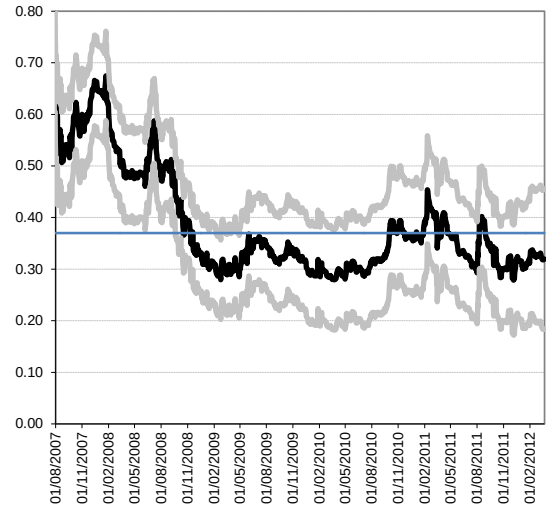
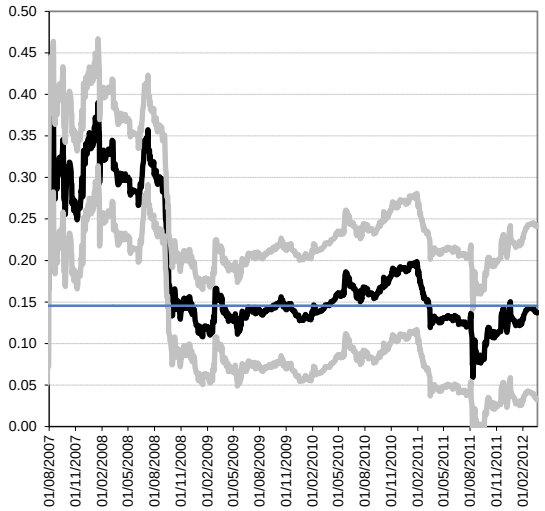


Figure 11: Time varying βs of the determinants of portfolio equity flows (time series model)

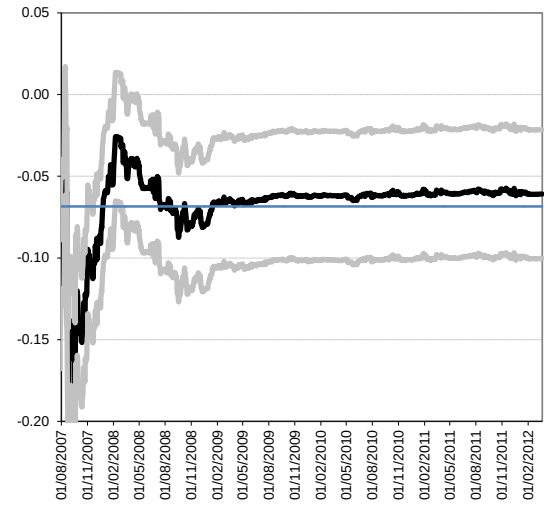
A. EME Regional Factor



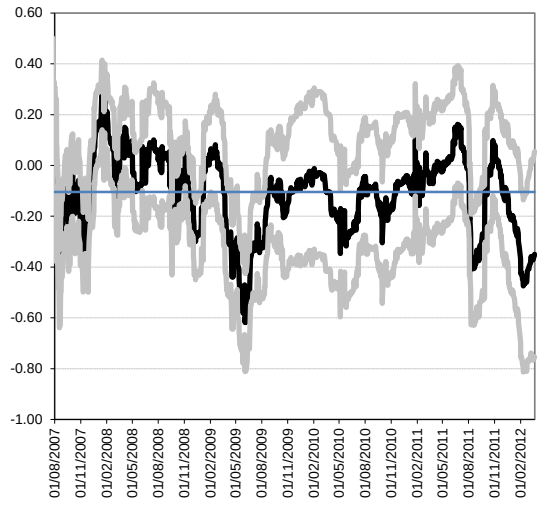
B. US/Global Factor



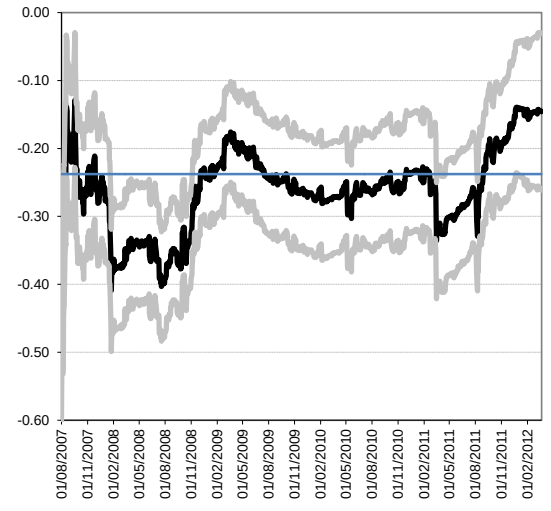
C. Liquidity shock



D. Credit Shock



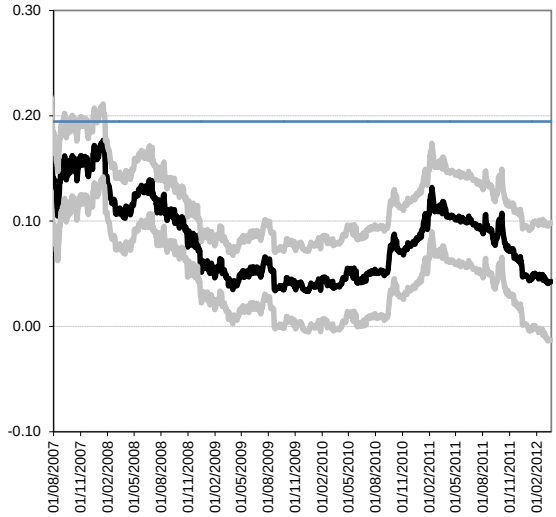
E. Confidence Shock



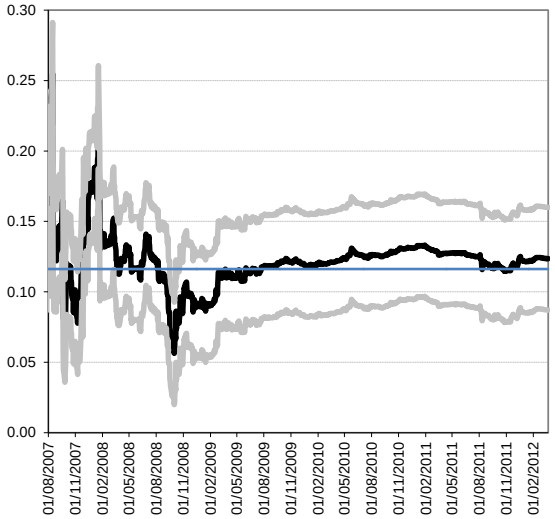
Note: The figures report (i) the time varying filtered βs for each of the explanatory variables included in the model described in section 2.2 (black line), (ii) the 90 per cent confidence bands for the time varying βs (grey lines) and (iii) the βs of a fixed parameter model for comparison (blue horizontal lines)

Figure 12: Time varying βs of the determinants of portfolio equity flows (panel model)

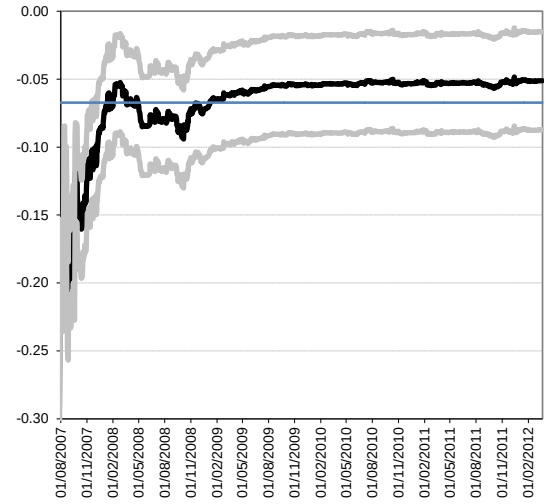
A. EME Regional Factor



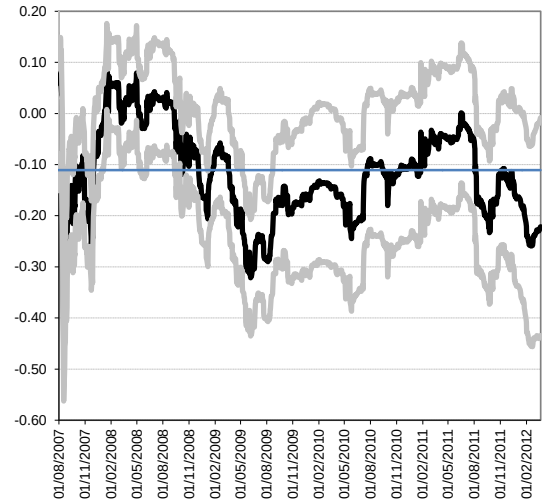
B. US/Global Factor



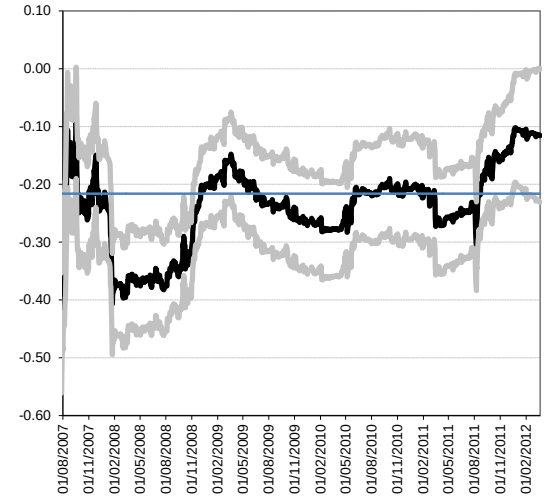
C. Liquidity shock



D. Credit Shock



E. Confidence Shock



Note: The figures report (i) the time varying filtered βs for each of the explanatory variables included in the panel model described in section 4.1 (black line), (ii) the 90 per cent confidence bands for the time varying βs (grey lines) and (iii) the βs of a fixed parameter panel model for comparison (blue horizontal lines)