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on selected emerging economies’
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Government debt holdings of non-residents – an analysis of the impact on selected emerging economies' sovereign risk^{*}

Michał Konopczak^{}**

December 2015

Abstract

This paper adds to the literature on the impact of non-residents' activity in the markets for sovereign debt issued by emerging economies. The conducted study indicates that there exists a statistically significant long-run relationship between the amount of emerging countries' debt held by foreign investors and the level of yields on that debt. An inflow of non-residents equivalent to a 1-percent increase of the value of their sovereign emerging countries' debt portfolio induces a decline in yields on bonds issued by those countries by slightly more than 3 basis points. The cointegration analysis has been additionally performed separately for each of the following sub-categories of foreign investors: foreign official sector, foreign banks, and other foreign investors, taking advantage of the dataset made available by Arslanalp and Tsuda (2014). The obtained results indicate that the above mentioned relationship exists with respect to the latter two sub-categories only.

Keywords: international capital flows, emerging markets, sovereign debt, cointegration analysis

JEL: C23, F21, F34, H63

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1. Introduction

The past two and a half decades saw a massive inflow of capital to a number of developing economies. According to the estimates of the Institute of International Finance, annual private capital inflows to emerging market surged from around USD 50 billion in 1990 to almost USD 1 160 billion in 2014. Although the increase was far from monotonic, with financial crises adversely affecting international capital movements, the amount of funds flowing to the developing countries experienced much shorter-lived retrenchments than in the case of the developed economies – even after the dramatic collapse in the aftermath of the 2008’s shock after the bankruptcy of Lehman Brothers (Milesi-Ferretti and Tille 2011).

Studies confirm that aggregate inflows to emerging economies generally exhibit considerable co-movement (Cerutti, Claessens and Puy 2015), which may be due to, *inter alia*, the role global benchmarks play in allocating capital internationally (Arslanalp and Tsuda 2015). Less differentiated capital flows to emerging markets were particularly pronounced during the recent prolonged period of near-zero interest rates in advanced economies (Arslanalp and Tsuda 2014). Nevertheless, there is strong evidence that global investors, at least after 2008, have indeed become aware of certain structural differences between individual developing countries (Ahmed, Brahim and Andrei 2015).

This heterogeneity makes it all the more challenging to analyse the determinants of capital flows to emerging economies (Koepke 2015 provides a comprehensive review of empirical studies on this issue). One particularly useful line of distinction is between push (often associated with global) and pull (local) factors. Some pre-crisis studies tend to attach similar weight to both types (Chuhan, Claessens and Mamingi 1998). Other emphasise the different functions each of them has been observed to perform: recurrently occurring surges in capital inflows arise due to global factors, but it is the local characteristics of individual recipient economies that determine the actual destinations of those flows (Fratzscher 2011, Ghosh et al. 2014). It should be mentioned, however, that some studies take the opposing view, by highlighting the relevance of global factors during market stress (Forbes and Warnock 2012).

By determining the amount of capital flows to emerging economies, both global and local factors also affect the costs of borrowing funds in the international markets by those countries. Some studies indicate that the extent to which local (e.g. fiscal) variables exert influence on

domestic bond yields depends on the level of global risk aversion: in “normal” times pull factors seem to be less important, but in times of elevated market stress global investors tend to pay more attention to country-specific fundamentals (Jaramillo and Weber 2012). The local fundamentals that determine emerging economies’ borrowing costs are not confined to standard macroeconomic and fiscal variables. As evidenced by Jaramillo and Zhang (2013), the ownership structure of government securities may be equally, or even more important. They argue that while bond yields tend to rise along with an increase in the debt to GDP ratio, this may be offset if the additional debt is financed by domestic real money investors.

The issue of the investor structure in the emerging countries’ sovereign debt markets has recently become addressed in the literature because of its relevance for the analysis of bond markets and, more generally, country credit risk, with the credit default premium embedded in bond yields. There are at least two good reasons why studying the role of one particular group of investors in the emerging economies’ debt markets, namely non-residents, seems increasingly important:

- over the past decade or so a growing number of sovereign borrowers continued to increase their reliance on foreign investors (Arslanalp and Tsuda 2012), and an increasing number of emerging countries structurally shifted to issuing debt denominated in domestic currencies (Daniel 2008), bought by both domestic and foreign investors,
- the typically evoked, and broadly agreed upon in the literature (see e.g. Peiris 2010, Pradhan et al. 2011, Andritzky 2012, Carvalho and Fidora 2014, Ebeke and Lu 2014, Lee 2014, Ebeke and Kyobe 2015), benefit of foreign investors’ increased presence in the emerging economies’ debt markets, i.e. an overall decline in bond yields, may be masking significant risk of a reversal in international capital flows, cumulating in the global financial system.

The above mentioned risk may be exacerbated due to extraordinary circumstances the global economy is currently in, as well as some specific features of the emerging economies’ sovereign bond markets. Firstly, the abundance of capital in the global financial markets, fuelled by near-zero interest rates and unconventional monetary policy pursued by a number of major central banks, leads to a search for yield by numerous international institutional investors. Their investment in emerging countries’ bond markets, as exhibited in the literature cited above, contributes to a decline in yields on sovereign bonds issued by those countries, which may lead to asset bubbles with inflated prices hiding the true credit, market and

liquidity risk (Carvalho and Fidora 2014). Secondly, even a fairly small investment in the local sovereign bond markets of some emerging economies may have a disproportionately strong impact on yields due to relatively low secondary market liquidity (Pradhan et al. 2011, Mishra et al. 2014). It should be mentioned, however, that some studies take the opposing view, arguing that relatively high bond market liquidity may be an incentive for some foreign investors to withdraw from the market in reaction to elevated global risk aversion at little or no costs (Aizenmann, Binici and Hutchison 2014, Eichengreen and Gupta 2014), and highlighting the need for robust fundamentals to prevent bond yields from an abrupt surge in stress times (Ahmed, Brahim and Andrei 2015). Thirdly, the results of some studies indicate that the set of policy measures to be effectively taken by relevant authorities in order to prevent the outflow of capital from the local bond market is rather limited (Calvo, Leiderman and Reinhart 1993, 1996).

This paper seeks to extend the existing literature on the potential impact of non-residents' activity in the markets for sovereign debt issued by emerging economies. Using panel econometric techniques, the conducted analysis aims to examine, whether there is a long-run causal relationship between the amount of emerging countries' debt held by foreign investors and the level of yields on that debt. Bond yields can be interpreted in this context in terms of both costs of borrowing in financial markets, and sovereign risk. Against the background of the existing studies, in which a number of different modelling approaches are applied, this paper takes advantage of cointegration analysis. The quarterly data used for the purpose of this analysis pertain to a set of 18 emerging economies and cover the period of 2004-2014.

One further area of investigation pursued in this paper consists in the disaggregation of emerging markets' debt holdings by non-residents into three types of foreign investors: foreign official sector, foreign banks, and other foreign investors. The potential relationship between the amount of debt held by each of those sub-categories of foreign investors and the level of yields on that debt is examined separately, in order to pick up any possible significant differences in the way their activity exerts influence on individual domestic bond markets of the developing countries. Such level of data disaggregation is possible owing to the dataset compiled and made publicly available by Arslanalp and Tsuda (2012, 2014). Because of the uniqueness of this dataset, the existing literature studying the impact of individual groups of non-residents on the emerging economies' debt markets is extremely scarce. This avenue of

research with the aim to assess the potential impact on bond yields, but with different methodology applied, so far has been pursued by Lee (2014).

For the purpose of this study the term “emerging economies” shall be used interchangeably with “developing economies”, “developing countries”, “emerging countries”, as well as “emerging markets”, with the latter emphasising the significance of financial system development. All of the above refer to a number of countries sharing one common feature: they are somewhat (in some aspects) similar to the developed economies, but are not yet (or not anymore) developed economies. Which country is, and which is not “developed” (sometimes also labelled “advanced” or “high-income”), may be determined in many ways. Some of the most frequently referred to definitions or classifications are those used by the IMF, the World Bank or the United Nations. But irrespective of the definition applied, one remarkable characteristic of almost any set of “emerging economies” is the strong heterogeneity of such a group of countries, with respect to, *inter alia*, their size, wealth, geographical location, institutional framework, political regime, as well as a number of strictly economic features, such as the stage of financial development, currency regime or financial stability. Also, for the sake of simplicity, the term “government debt” shall be used interchangeably with “sovereign debt”, mostly consisting of actively traded government debt securities (i.e. Treasury bonds and bills). Unless indicated otherwise, the term “sovereign risk” can be associated for the purpose of this study with “country risk”, and in particular with “country credit risk”.

The structure of the remainder of this paper is as follows: section 2 presents some key features of government debt markets in the set of emerging economies under analysis; section 3 elaborates on the empirical analysis of a long-run relationship between the amount of emerging countries’ debt held by foreign investors and the level of yields on that debt; section 4 summarises and concludes.

2. Key features of government debt markets in selected emerging economies

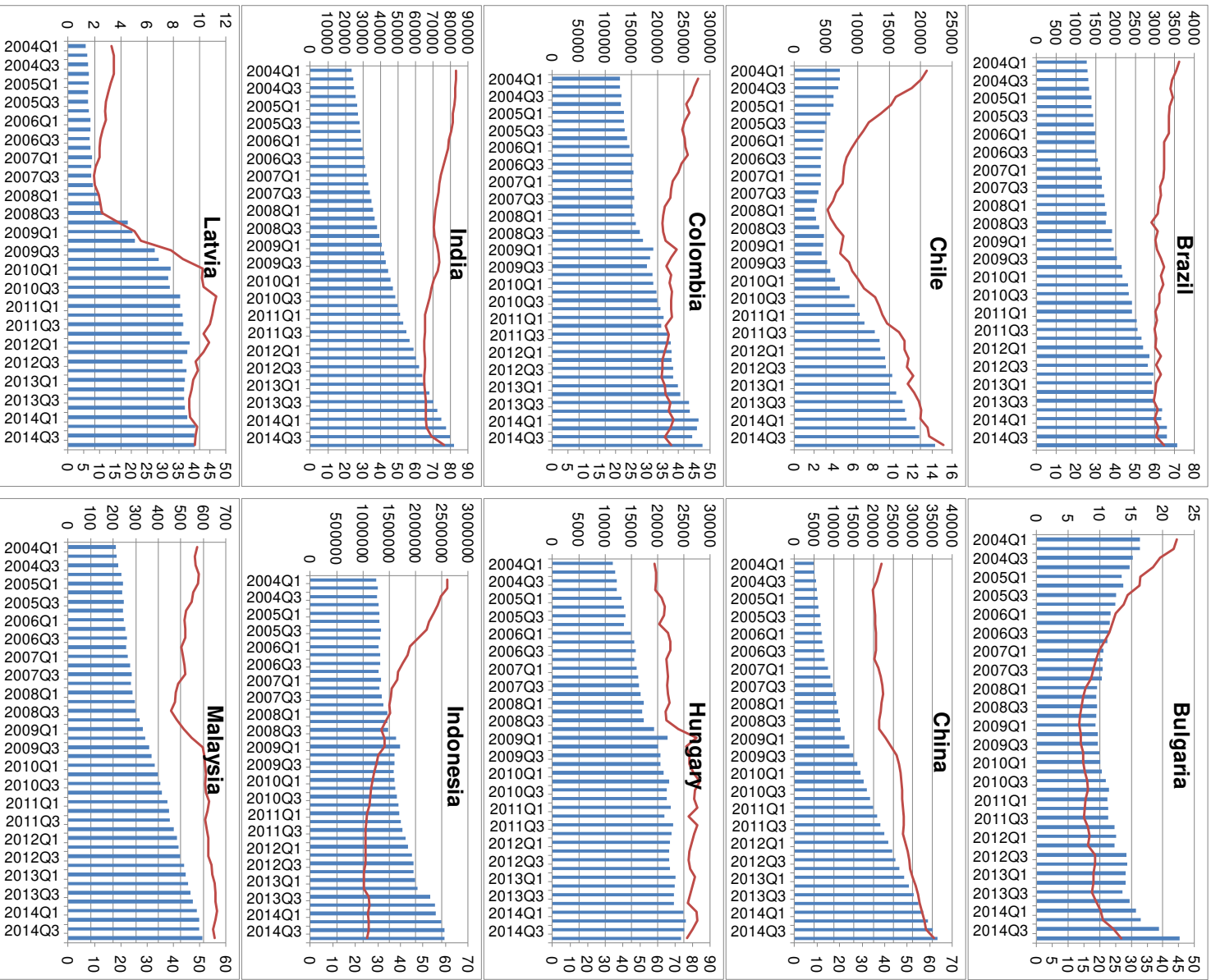
For the purpose of this study three features of the sovereign debt markets in the analysed countries are considered particularly important: market size (absolute and relative to the size of the economy), investor structure (including the share of non-residents) and the evolution of bond yields. In the remainder of this section each of those aspects is discussed in more detail.

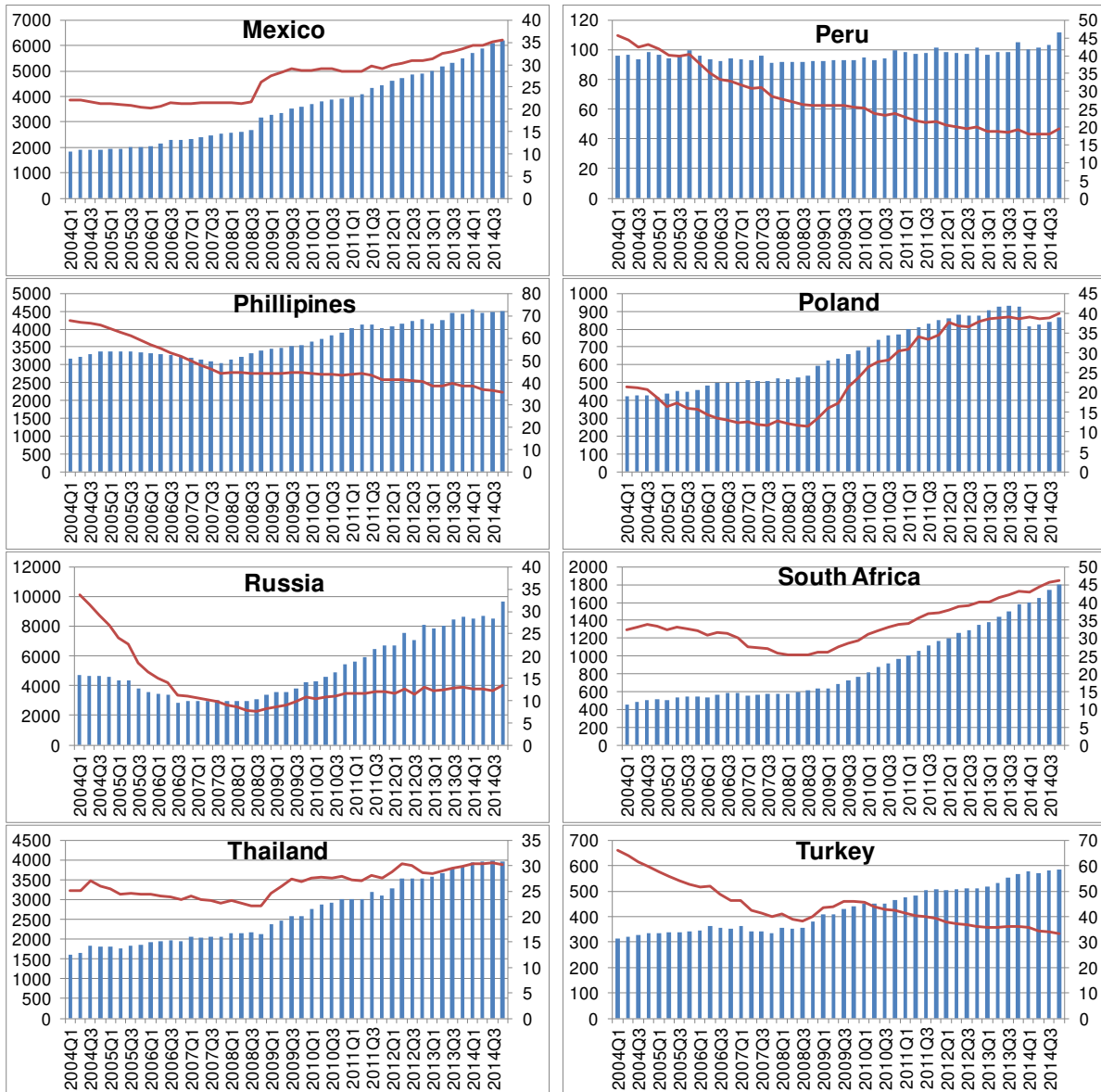
2.1. Market size

A country's indebtedness and costs of debt servicing, together with the net budget position, are one of the major determinants of sovereign credit risk. The significance of those factors has long been identified in the literature, beginning with the seminal paper by Edwards (1984), whose analysis indicated that foreign debt and the costs of servicing thereof are the key drivers of sovereign risk (current account balance, foreign reserves and investment rate being some of the other significant factors). The size of a country's debt determines the extent to which an economy is leveraged: along with an increase in the debt to GDP ratio, surges the likelihood that the government will be unable to meet its commitments, leading to a sovereign default. This said, it is important to look at both the absolute and the relative value of debt in order to evaluate, whether an economy is capable of generating sufficient revenues to cover the current expenses (including for the purpose of servicing debt). Indebtedness, as well as other "fiscal" variables, may also be perceived as a proxy of a country's proneness to financial, including fiscal, shocks (Baldacci et al. 2008).

The analysed countries vastly differ in terms of the size of their respective government debt markets, both in absolute values, and relative to their GDP (Chart 1). One feature most of them share is that in the long run the markets for emerging countries' sovereign bonds, which constitute the majority of total government debt, tend to develop, some of them exhibiting a rather high-paced growth.

Chart 1. Total general government gross debt (blue bars, in local currency billion, left-hand axis) and debt to GDP ratio (red lines, in percent, right-hand axis) of selected emerging markets, 2004-2014





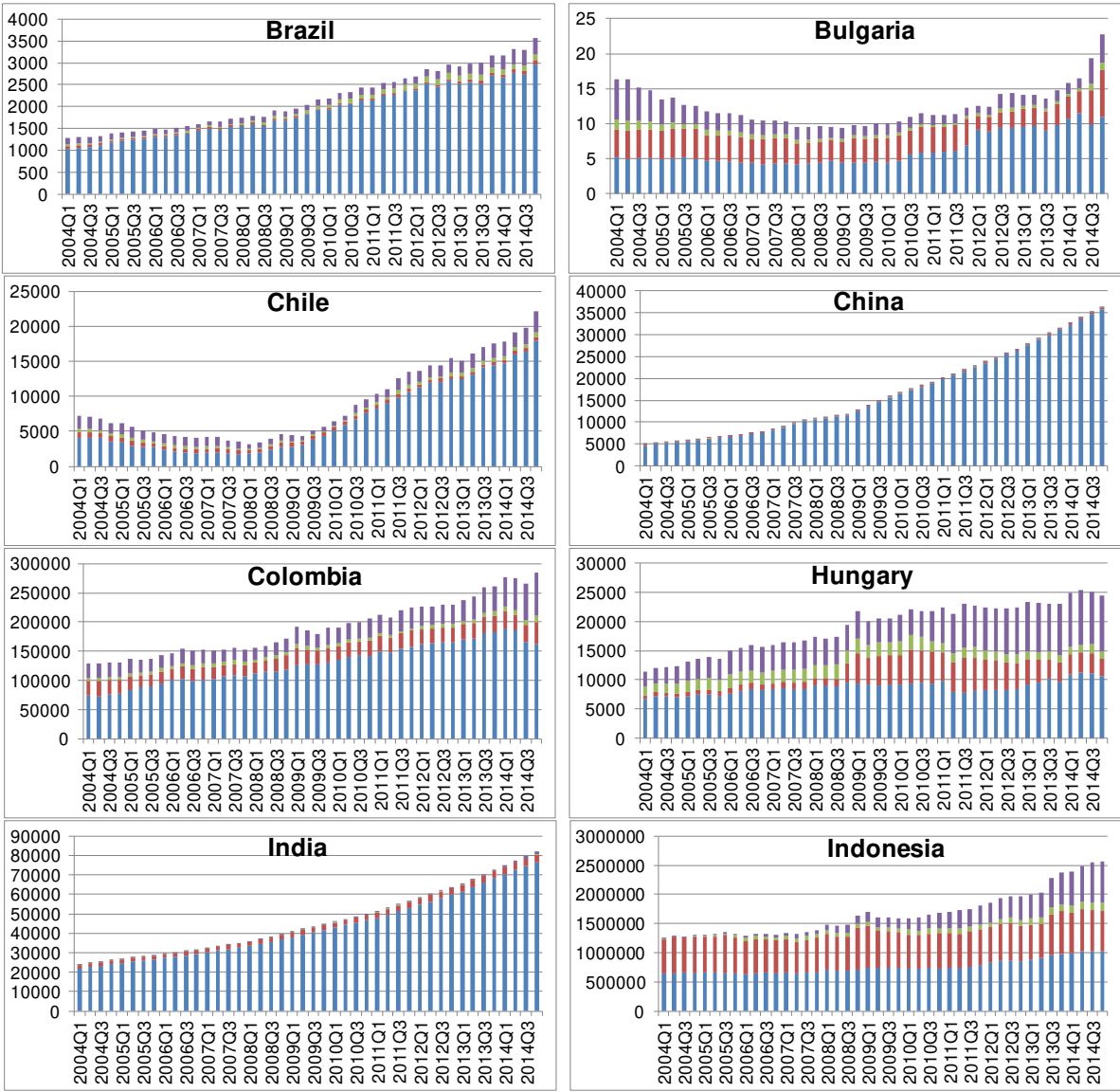
Source: own calculations based on an online dataset made available by Arslanalp and Tsuda (2014), <http://www.imf.org/external/pubs/ft/wp/2014/Data/wp1439.zip>.

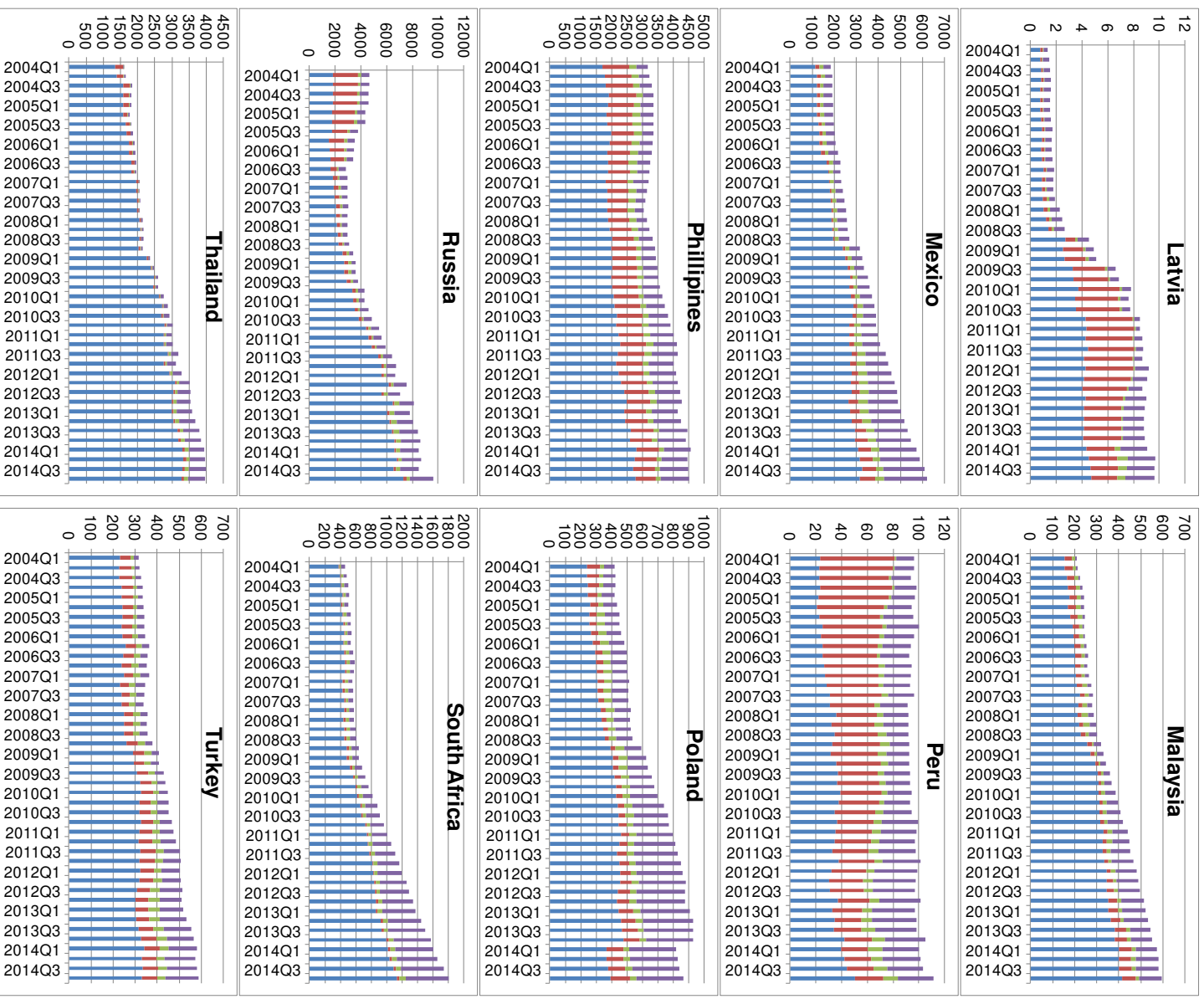
2.2. Market structure

Sovereign debt markets of individual countries can be analysed in many different aspects, including, but not limited to: currency structure, term structure, interest rate sensitivity and the structure of creditors – most notably bondholders. The latter breakdown, in particular the activity of foreign investors, is particularly important for the analysis of emerging economies’ government debt markets, as it holds the key to a better understanding of at least some of the other aspects of those markets’ structure. For example, foreign-currency-denominated emerging markets’ debt is typically held by non-residents. Also, foreign investors, especially

banks and some groups of financial institutions (such as hedge funds) tend to prefer short- to medium-term debt instruments, due to greater secondary market liquidity and relatively lower responsiveness to interest rate changes, whereas some groups of both foreign, and domestic investors, such as investment or pension funds, are more likely to choose long-term bonds. With respect to the debt issued by countries with high inflation, non-residents typically prioritise floating-rate and inflation-indexed bonds to fixed-rate instruments. On top of that, in many emerging economies the sovereign bond portfolios held by non-residents are simply too large to ignore (Chart 2).

Chart 2. Total general government gross debt of selected emerging markets by type of investors, 2004-2014 (in local currency billion)





Note: (bottom-up) blue bars – domestic investors, red bars – foreign official sector, green bars – foreign banks, violet bars – other foreign investors.

Source: own calculations based on an online dataset made available by Arslanalp and Tsuda (2014), <http://www.imf.org/external/pubs/ft/wp/2014/Data/wp1439.zip>.

The above mentioned size of foreign investors' portfolios of sovereign bonds issued by emerging economies, as well as their activity in the secondary market for those instruments, is of particular importance for the purpose of the analysis conducted in this study. This is not only because of the impact that an inflow of non-residents may have on bond yields (and, thereby, on the costs of sovereign debt financing), which is empirically examined in the

subsequent section of this paper, but also because of the implications of this influence on financial stability of the emerging markets. Beyond a certain threshold the inflow of non-residents to the local sovereign debt market may be detrimental to financial stability. Countries overly dependent on external financing may experience severe turbulences with respect to their local bond and FX markets, should capital flows abruptly reverse (Calvo, Leiderman and Reinhart 1993, 1996). This may be triggered, *inter alia*, by a sudden shift in the expected profitability of investment alternatives (a recent example of the expected monetary policy tightening by the Federal Reserve seems relevant) or an unexpected rise in global risk aversion, especially in times of elevated tensions in global financial markets.

Therefore there is much potential value added in a more granular analysis of foreign investors' involvement in emerging economies' government debt markets. Traditionally, non-residents are grouped together and analysed as a whole. Meanwhile, they constitute a heterogeneous set of investors, consisting of, *inter alia*: central banks, commercial banks (including investment banks), hedge funds, mutual and investment funds, pension funds, sovereign wealth funds, insurance companies, and even non-financial corporations. Each type of institutions can display different investment preferences, for example regarding the time horizon of an investment, different risk tolerance, and, subsequently, different patterns of behaviour – especially under stress scenarios. Even though the literature on this topic is rather scarce, most likely due to the paucity of data of sufficient granularity, there is some evidence in the related literature that certain groups of investors may be preferable to others from the emerging markets' stability perspective, due to their individual investment profiles (Jaramillo and Zhang 2013, Lee 2014). This study aims to make the most of the dataset made available courtesy of Arslanalp and Tsuda (2014), revealing significant discrepancies in the structure of foreign investors in the emerging economies' government debt markets (Chart 2).

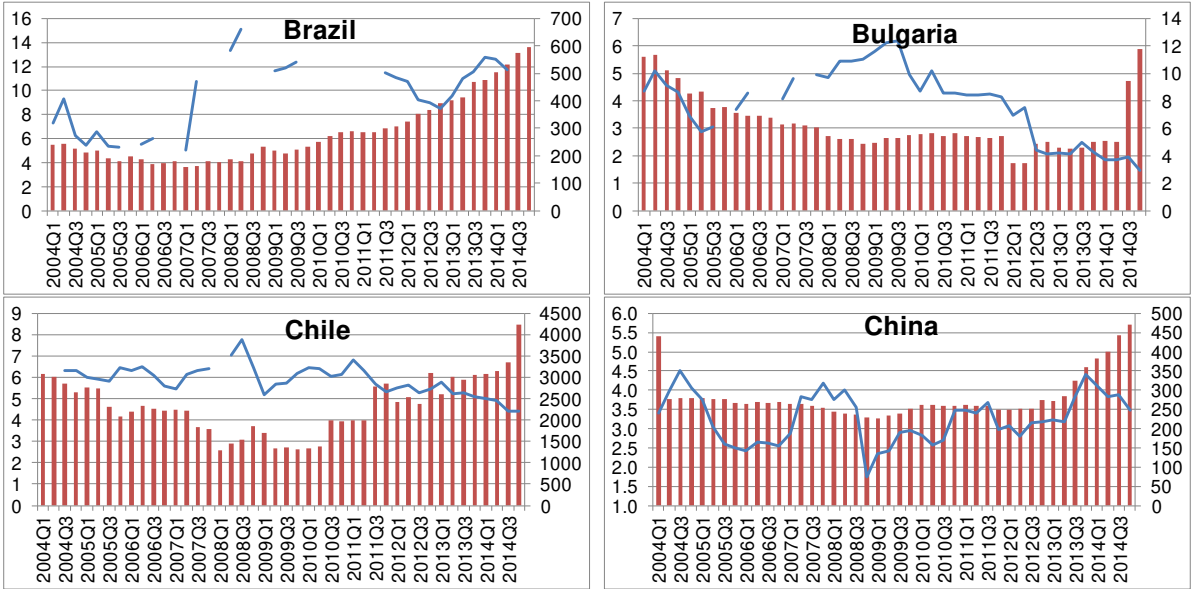
2.3. The evolution of bond yields

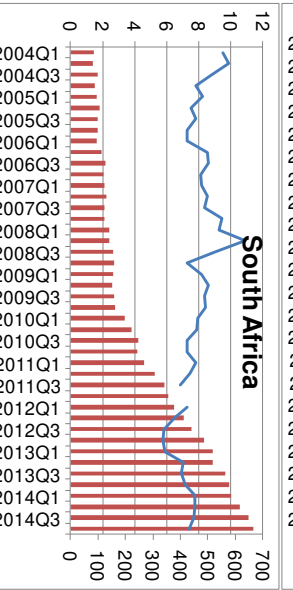
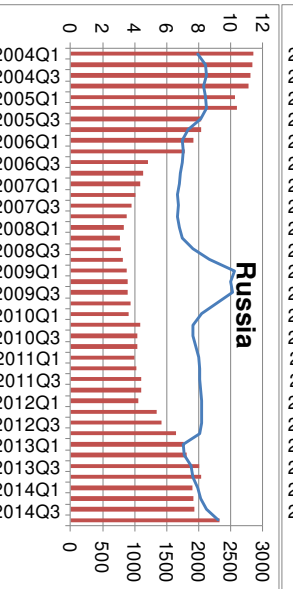
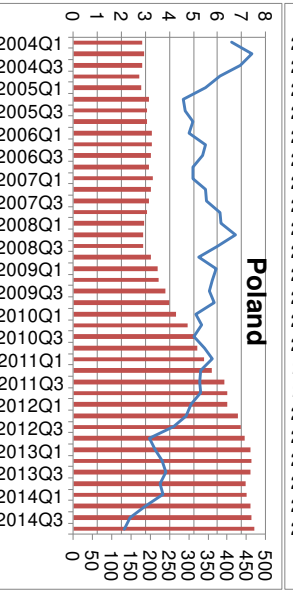
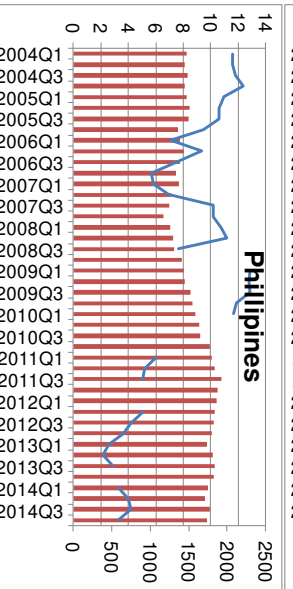
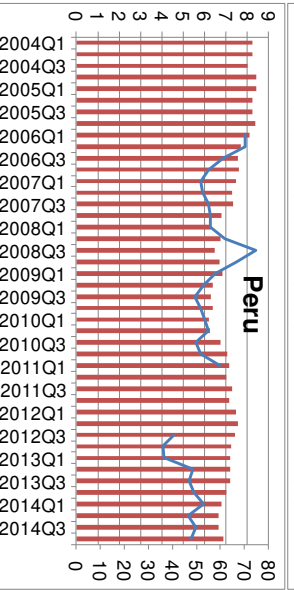
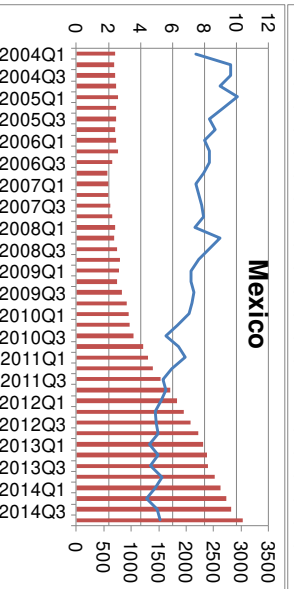
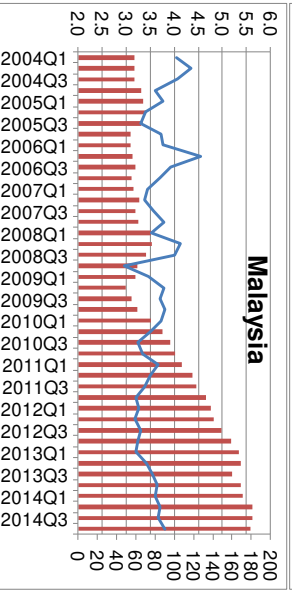
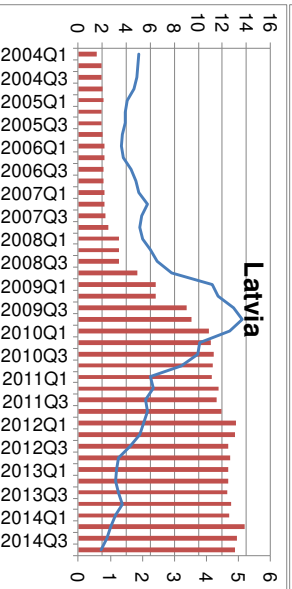
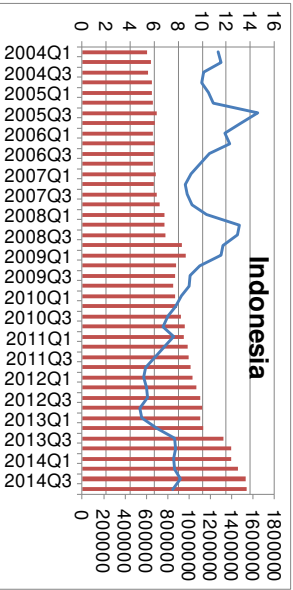
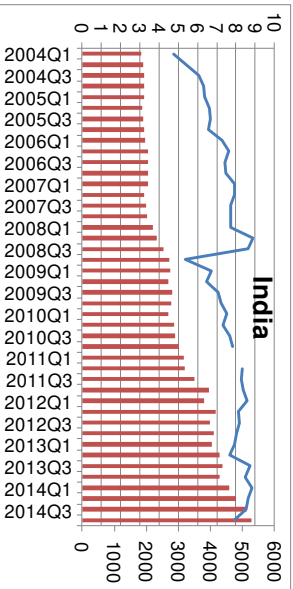
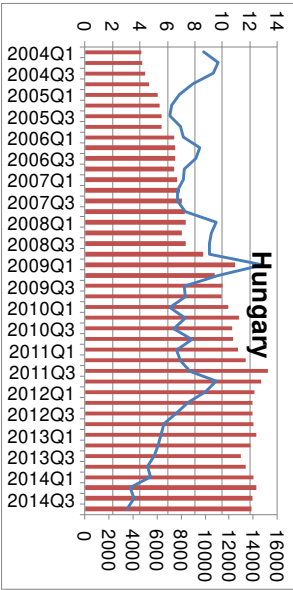
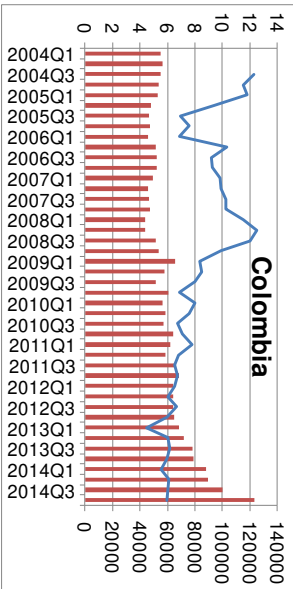
The overview of emerging economies' government bond markets would be incomplete without an analysis of changes in market prices of those instruments, reflecting to some extent the evolution of those economies' perceived creditworthiness. For the sake of better comparability, yields on the most liquid local-currency-denominated government benchmark bonds shall be used. Bond yields encompass a wide variety of market-based information, but first and foremost they reflect the credit risk of the issuer, and in this study shall be used as

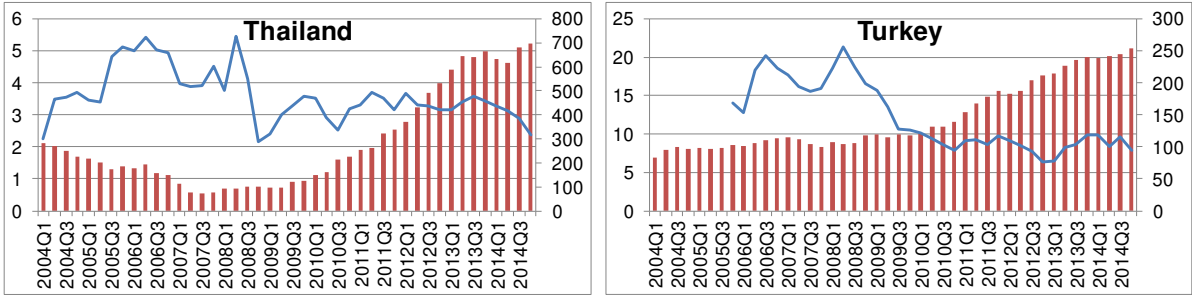
a proxy for sovereign credit risk. They are essentially influenced by a number of other factors, including, but not limited to, market liquidity and exchange rate volatility (Gadanecz, Miyajima and Shu 2014), which may at times cloud the assessment of the pure credit risk premium using bond yields alone (see Hull et al. 2005). However, there seems to be little room for manoeuvre due to limited availability of complete (or near-complete) data series on alternative measures, such as the CDS premia, with respect to a number of emerging economies.

A glance at the evolution of emerging economies’ government bond yields reveals that there seems to be much heterogeneity among the group of analysed emerging markets in terms of their creditworthiness, as well as their sensitivity to the developments in the global financial markets (Chart 3). Furthermore, yields on bonds issued by some of the economies under consideration exhibit an overall decreasing trend, which reflects an overall improvement in their financial condition and the ongoing process of gradual “maturing” of those countries. Market prices of bonds issued by some other economies, Russia being a noteworthy example, clearly respond to certain idiosyncratic shocks.

Chart 3. Yields on local-currency-denominated government 5-year benchmark bonds issued by selected emerging economies (blue lines, in percent, left-hand axis) and total general government gross debt held by non-residents (red bars, in local currency billion, right-hand axis), 2004-2014







Source: own calculations based on an online dataset made available by Arslanalp and Tsuda (2014), <http://www.imf.org/external/pubs/ft/wp/2014/Data/wp1439.zip>, as well as Thomson Reuters, Bloomberg and OECD data.

3. Empirical analysis

The empirical analysis conducted for the purpose of this study aims to examine, whether there exists a long-run causal relationship between the amount of emerging countries' debt held by foreign investors and the level of yields on that debt. This is performed both at the aggregate level (i.e. for the total non-residents' portfolio), and separately for each of the following sub-categories of foreign investors: foreign official sector, foreign banks, and other foreign investors.

3.1. Data

Quarterly data covering the period of 2004-2014 have been used to analyse the above mentioned relationship for the following set of emerging economies: Brazil, Bulgaria, Chile, China, Colombia, Hungary, India, Indonesia, Latvia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, South Africa, Thailand and Turkey. The set of countries for the analysis has been restricted to those developing countries only due to limited availability of data on bond yields. Therefore the panel consists of 18 emerging markets (cross-sectional dimension) and 44 quarterly observations (time dimension).

The complete data on emerging economies' total general government gross debt held by foreign investors have been acquired from the dataset compiled and made publicly available by Arslanalp and Tsuda (2014). This holds for both the aggregate, and its components, namely the debt held by: foreign official sector, foreign banks and other foreign investors.

Yields on local-currency-denominated government 5-year benchmark bonds (10-year bonds for Peru) issued by the emerging economies under examination have been obtained predominantly from Thomson Reuters, though some gaps were filled by comparable data from Bloomberg and OECD. The data on yields are complete for 9 out of 18 countries in the sample; for further 3 countries there is a single observation missing in each case; three to seven quarterly observations are missing with respect to 4 countries; the largest gaps are for Peru and Brazil, with thirteen and fifteen data points missing, respectively.

The data on non-residents' debt holdings are in billions of local currency, and data on bond yields in percent.

3.2. Estimation results

The objective of the analysis is to establish, whether there exists a long-run causal relationship between the amount of emerging countries' debt held by foreign investors and the level of yields on that debt (Y). This has been performed separately for the total non-residents' portfolio (FI_tot), and for each of the following sub-categories of foreign investors: foreign official sector (FI_fos), foreign banks (FI_fb), and other foreign investors (FI_ofi). The variables FI_ were converted to logs, which allows for a more convenient interpretation of the long-run coefficients in terms of semi-elasticities.

An investigation of dynamic properties of the analysed series has been performed using a battery of standard panel unit root tests, namely the Levin, Lin and Chu (2002, LLC) test, the Im, Pesaran and Shin (2003, IPS) test and the Fisher-type Augmented Dickey-Fuller (ADF) test (Maddala and Wu 1999). The tests strongly suggest non-stationarity of all variables (Table 1). Furthermore, in all cases the results indicate integration of order one (Table 2), which allows for the application of the long-run analysis.

Table 1. Panel unit root tests – variables in levels

Variable	LLC	IPS	ADF
Y	0.705	-0.430	36.21
FI_tot	9.838	11.927	7.632
FI_fos	2.231	3.226	21.407
FI_fb	2.671	2.958	26.754
FI_ofi	11.09	12.386	4.975

Notes: one, two and three asterisks indicate statistical significance at the level of 10%, 5% and 1%, respectively.
Source: own calculations.

Table 2. Panel unit root tests – variables in first differences

Variable	LLC	IPS	ADF
Y	-19.324***	-19.521***	373.327***
FI_tot	-20.056***	-19.117***	346.439***
FI_fos	-2.302**	-6.223***	146.389***
FI_fb	-15.102***	-12.111***	269.895***
FI_ofi	-6.827***	-6.511***	156.629***

Notes: one, two and three asterisks indicate statistical significance at the level of 10%, 5% and 1%, respectively.
Source: own calculations.

Panel cointegration tests developed by Pedroni (1999, 2004) have been employed (Table 3). In all cases, except for the relationship between Y and FI_fos, the results unequivocally support the existence of cointegration between variables in the system. Out of seven Pedroni test statistics, only group rho and group PP indicate no cointegration between Y and FI_fos. However, Monte Carlo experiments performed by Pedroni (2004) show that those two

statistics are characterised by the lowest power and, as such, are more prone to fail to reject false null hypothesis of no cointegration. Therefore it has been assumed that the obtained results confirm the existence of the long-run equilibrium with respect to all pairs of examined variables.

Table 3. Panel cointegration tests between yields on bonds issued by the emerging countries (Y) and the amount of debt held by foreign investors

Test statistics	FI_tot	FI_fos	FI_fb	FI_ofi
Panel v statistic	2.931***	1.699**	1.757**	3.644***
Panel rho statistic	-3.281***	-1.698**	-2.043**	-4.414***
Panel PP statistic	-2.597***	-1.440*	-1.753**	-3.525***
Panel ADF statistic	-3.296***	-2.499***	-2.173**	-3.545***
Group rho statistic	-1.691**	-1.110	-1.671**	-2.498***
Group PP statistic	-1.670**	-1.235	-1.566*	-2.499***
Group ADF statistic	-2.264***	-2.593***	-2.306***	-2.665***

Notes: one, two and three asterisks indicate statistical significance at the level of 10%, 5% and 1%, respectively. Source: own calculations.

The parameters of the cointegrating vector have been estimated by means of the group-mean FMOLS estimator (*fully-modified ordinary least squares*, Phillips and Moon 1999). In all cases, except for FI_fos, the long-run semi-elasticity is significantly negative (Table 4). Insignificant long-run parameter in the case of the relation between Y and FI_fos points to no cointegration, as was suggested by mixed results of panel cointegration tests for this pair of variables (Table 3).

Table 4. Estimated long-run semi-elasticity of yields on bonds issued by the emerging countries (Y) with respect to the amount of debt held by foreign investors

Debt held by foreign investors	Estimated long-run semi-elasticity of Y
FI_tot	-3.090***
FI_fos	-0.191
FI_fb	-1.700*
FI_ofi	-2.114***

Notes: one, two and three asterisks indicate statistical significance at the level of 10%, 5% and 1%, respectively. Source: own calculations.

The direction of long-run causality has been established within the Engle-Granger framework:

$$\Delta Y_{j,t} = \beta_0 + \beta_1 \Delta FI_tot_{j,t} + \gamma (Y_{j,t-1} - \hat{\delta}_0 - \hat{\delta}_1 FI_tot_{j,t-1}) + u_j + \varepsilon_{jt}$$

$$\Delta FI_tot_{j,t} = \beta'_0 + \beta'_1 \Delta Y_{j,t} + \gamma' (Y_{j,t-1} - \hat{\delta}_0 - \hat{\delta}_1 FI_tot_{j,t-1}) + u_j + \nu_{jt},$$

where:

Y – yields on local-currency-denominated government 5-year benchmark bonds issued by selected emerging economies,

FI_tot – log of total general government gross debt held by foreign investors,

γ and γ' – error correction terms,

$\hat{\delta}_1$ – estimate of long-run semi-elasticity.

Analogous equations have been estimated with FI_tot replaced with FI_fb and FI_ofi. FI_fos has been excluded from the analysis due to lack of cointegration with Y. In all cases the results of weak exogeneity tests (Table 5) clearly indicate that the amount of debt held by foreign investors (total, as well as individual sub-categories of non-residents) causes yields on bonds issued by the emerging countries in the long run.

Table 5. Weak exogeneity tests

Debt held by foreign investors	γ	γ'
FI_tot	-0.147***	0.001
FI_fb	-0.136**	0.001
FI_ofi	-0.137**	-0.001

Notes: one, two and three asterisks indicate statistical significance at the level of 10%, 5% and 1%, respectively.

Source: own calculations.

3.3. Discussion

The conducted analysis indicates that there exists a statistically significant long-run relationship between the amount of emerging countries' debt held by foreign investors (as a broad category) and the level of yields on that debt, with the former being the cause of the latter. The negative sign of the coefficient implies that an inflow of non-residents to the government debt markets of the examined emerging economies equivalent to a 1-percent increase of the value of their portfolio induces a decline in yields on bonds issued by those countries by slightly more than 3 basis points.

At the disaggregated level, the analysis indicates a statistically significant long-run relationship between the amount of emerging countries' debt held by private non-bank foreign investors and the level of yields on that debt, as well as between the amount of emerging countries' debt held by foreign banks and the level of yields on that debt. In both cases the former is the cause of the latter. The impact of changes in the amount of debt held by "other foreign investors" (consisting of a variety of different groups: from hedge and mutual funds on one end, through pension funds, insurance companies, to individual investors on the other)

on emerging economies' bond yields seems to be somewhat stronger than in the case of foreign banks (Table 4). In both cases an inflow to the government debt markets equivalent to a 1-percent increase of the value of the portfolio held by each of the two sub-categories induces a decline in yields on bonds issued by the examined emerging markets: on average by 2.1 and 1.7 basis points, respectively. The insignificant long-run parameter in the case of the relation between the amount of emerging countries' debt held by the foreign official sector and the level of yields on that debt points to no cointegration.

With respect to the relationship between the amount of emerging countries' debt held by foreign investors (as a broad category) and the level of yields on that debt, the results obtained in this study and the results of other empirical studies in the literature are not fully comparable. This is due to differences in samples, both in terms of the analysed countries and time periods, and even more importantly – in the way the impact of an inflow of non-residents to the sovereign debt market is measured. The existing literature typically examines the impact of an increase in the share of foreign investors in the structure of debt holders, e.g. by 1 percentage point. In this study a different approach has been assumed, analysing the impact of an increase in the value of foreign investors' sovereign debt portfolio, e.g. by 1 percent. The actual amount of funds (in billions of local currency) necessary to induce a 1-percent change in the value of non-residents' portfolio is significantly lower (in the analysed sample, over 7 times lower on average) than the amount of funds necessary to induce a change in the share of non-residents in the structure of debt holders by a single percentage point. Therefore somewhat smaller estimated long-run semi-elasticity of yields on bonds issued by the emerging countries have been expected than the comparable coefficients obtained in other empirical studies.

The results of those other empirical studies indicate the same direction of the relationship between the above mentioned variables, and a broadly similar, though somewhat greater, order of its magnitude:

- Peiris (2010): a 1 percentage point increase in the share of foreign investors in the government bond market lowers yields by about 6 basis points on average;
- Pradhan et al. (2011): each percentage point increase in non-resident participation reduces long-term bond yields by about 5 basis points on average;
- Andritzky (2012): a 10 percentage point increase in the share of holdings by non-resident investors is associated with 32 to 43 basis points lower yields;

- Carvalho and Fidora (2014): a one percentage point increase in foreign holdings of debt securities lowers the long-term interest rate by about 13 basis points;
- Ebeke and Lu (2014): a 10 percentage point increase in the share of foreign investors in the government bond market is associated with a reduction in yields of 70 to 90 basis points;
- Lee (2014): a 1 percentage point increase in the share of holdings by foreign investors is associated with about 3 basis points lower yields;
- Ebeke and Kyobe (2015): in the case of local currency-denominated government bonds, a 1 percentage point increase in foreign participation decreases the level of the yield by 6 to 8 basis points, depending on the specification of the model.

As regards the relationship between the amount of emerging countries' debt held by individual sub-categories of foreign investors and the level of yields on that debt, the only comparable study has been conducted by Lee (2014). The results thereof are broadly in line with this study, indicating a statistically significant relationship for private non-bank foreign investors and foreign banks only. However, even though the direction of the relationship for the above mentioned variables is the same as in this study, Lee (2014) suggests that the order of magnitude of the estimated impact is significantly greater.

Another way to interpret the results obtained in this study is that the inflow of foreign investors tends to reduce the costs of debt financing for emerging markets. This is in line with expectations and rather unsurprising, considering that the analysed timeframe includes several years of very low risk aversion (before the global financial crisis), as well as the recent period of unconventional monetary policy pursued by a number of major central banks, resulting in record low interest rate in the base markets.

However, even though bond yields are one of the most commonly used proxies for sovereign credit risk (and employed for this very purpose in this study as well), their decline in response to the inflow of non-residents to the domestic debt market should not at all times and under all circumstances be perceived in terms of decreasing probability of default. The above mentioned low interest rates environment, facilitating the access to abundant liquidity for global investors, induces large-scale search for yield, which may distort the true risk-return profile of investment in some emerging countries' government debt instruments. In reality, artificially enhanced global demand for risky assets may be causing asset price bubbles with

respect to the local bond markets of some developing economies. This, in turn, may lead to the mispricing of credit risk, masking behind extraordinarily low yields.

The obtained negative sign of the coefficient also implies that a potential outflow of non-residents (in general, or of certain groups of foreign investors) from the government debt markets of the emerging economies induces an increase in yields on bonds issued by those countries. In those markets where non-residents hold a significant share of sovereign debt their abrupt withdrawal may lead to panic and fire sales by other investors, especially if there is not sufficient structural demand on behalf of the domestic investors. Also, the set of policy measures which could be undertaken by relevant authorities, e.g. central banks, in order to prevent the outflow of capital from the local bond market is rather limited.

Therefore it seems important from an economic policy point of view to have a detailed insight into the structure of sovereign debt holders, as different groups of investors can display different investment preferences or risk tolerance, and in consequence also different patterns of behaviour – especially during periods of elevated global risk aversion.

4. Summary and conclusions

This paper adds to the literature on the impact of non-residents' activity in the markets for sovereign debt issued by emerging economies. Against the background of the existing studies, in which a number of different modelling approaches are applied, this paper takes advantage of cointegration analysis. The conducted study indicates that there exists a statistically significant long-run relationship between the amount of emerging countries' debt held by foreign investors (at the aggregate level, i.e. for the total non-residents' portfolio) and the level of yields on that debt, with the former being the cause of the latter. The negative sign of the coefficient implies that an inflow of non-residents to the government debt markets of the examined emerging economies equivalent to a 1-percent increase of the value of their portfolio induces a decline in yields on bonds issued by those countries by slightly more than 3 basis points. This result is somewhat lower than in other empirical studies on this topic, which can be traced back to the fact that the impact of an increase in the value of foreign investors' sovereign debt portfolio has been analysed, rather than the impact of an increase in the share of foreign investors in the structure of debt holders.

In order to obtain a better understanding of the relationship between the amount of emerging countries' debt held by foreign investors and the level of yields on that debt, the cointegration analysis has been additionally performed separately for each of the following sub-categories of foreign investors: foreign official sector, foreign banks, and other foreign investors. The results thereof indicate that the above mentioned relationship exists with respect to the latter two sub-categories only. The long-run semi-elasticity exhibits somewhat lower magnitude in the case of individual groups of non-residents, as compared to the one estimated at the aggregate level, with the impact of changes in the amount of debt held by private non-bank foreign investors on emerging economies' bond yields being slightly stronger than in the case of foreign banks.

The obtained results indicate that an inflow of foreign investors tends to reduce the costs of debt financing for emerging markets. However, even though bond yields are one of the most commonly used proxies for sovereign credit risk, their decline in response to the inflow of non-residents to the domestic debt market should not be at all times perceived in terms of decreasing probability of default. It may be the case that with respect to the local bond

markets of some developing economies their sovereign credit risk may be mispriced, masking behind extraordinarily low yields.

What is more, the negative sign of the coefficient also implies that a potential outflow of non-residents from the government debt markets of the emerging economies induces an increase in yields on bonds issued by those countries. In those markets where non-residents hold a significant share of sovereign debt their abrupt withdrawal may lead to panic and fire sales by other investors. This may be more pronounced in cases where there is not sufficient structural demand on behalf of the domestic investors, especially that the set of policy measures to be effectively taken by relevant authorities in order to prevent the outflow of capital from the local bond market is rather limited (even if a central bank has both the necessary resources and the proper legal framework in place, interventions in the local bond market may trigger adverse side effects).

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