

Norbert Kiss M. and István Mák: Developments in sovereign bond issuance in the Central and Eastern European region after the Lehman collapse*

This paper focuses on the impact of the financial and economic crisis of 2008–2009 on the issuance of sovereign debt in the Central and Eastern European region and other developing countries. As a result of the fiscal rescue packages, the financing requirement of both developed and emerging countries has increased significantly since 2007, giving rise to substantial changes in risk appetite as well as considerable shifts in demand for the securities of various issuers operating in the global bond markets. During the most severe period of the crisis, only countries with the best credit ratings were able to obtain substantial amounts of funds, while less developed or emerging economies had limited options. In particular, shrinking borrowing opportunities translated into rising yields, weak auction demand and hence unsuccessful auctions. While the market turmoil did not spare less developed euro area countries either; these developments had a particularly negative impact on the government securities markets in the Central and Eastern European region. Although improving risk appetite prompted a parallel rebound in emerging sovereign bond markets, heightened competition for the shrinking financing resources raised the cost of funds in higher-risk economies considerably. Our findings show that – besides developments in risk appetite – demand for the sovereign bonds of emerging countries was also influenced by the crowding-out effect generated by the increased issuance of government papers in developed markets.

INTRODUCTION

Our paper examines the impact of the financial and economic crisis of 2008–2009 on the issuance of sovereign government securities in the markets of Hungary and other emerging countries. The financial and economic crisis which developed in the wake of the default of Lehman Brothers resulted, with an almost immediate impact, in a steep decline in investors' risk appetite and drastically tightening liquidity in financial markets. The subsequent spillover of the crisis into the real economy not only set off an easing in monetary conditions in most countries, but also led to the adoption of major fiscal stimulus measures. As a result, a large number of developed and emerging countries have been forced in recent months to issue government securities in large quantities.

From the demand side, two factors should be highlighted given the crucial impact they had on investors' government paper purchases in the period following September 2008. The *dramatic decline in risk appetite* prompted investors

worldwide to shift preferences from higher-risk instruments (shares, corporate bonds, government bonds of emerging markets) to the government securities issued by developed countries. This process was intensified by the crowding-out effect¹ stemming from the *increased issuance of government securities in developed markets* in the wake of the fiscal stimulus measures which were adopted. While the financial market developments observed in the past six months suggest that the extremely low levels of risk appetite are not likely to persist, the financing requirement of developed-country governments of may in fact divert funds from higher-risk issuers. Accordingly, it would be worthwhile to explore the extent to which demand for high-risk government papers has been influenced in recent months by the high level of risk aversion and by the crowding-out effect of bond issuances in the developed markets.

In our paper we first present global bond issuance processes, in particular, the supply of various issuer types. Secondly, we analyse the sovereign bond issuance² of emerging countries in

* The views expressed in this article are those of the author(s) and do not necessarily reflect the official view of the Magyar Nemzeti Bank.

¹ In the classical economic interpretation, the crowding-out effect means that an increase in government spending tends to divert savings – through a higher rate of return – from the financing of firms' investment projects. In our paper, however, the crowding-out effect is interpreted somewhat differently in that we set out to examine whether American, British, Japanese, etc. government bonds – which are deemed lower risk and are issued in large quantities – crowd out the government bonds or corporate bonds of developing markets from the market.

² Sovereign bonds are government paper, which are issued in international bond markets rather than the issuer country's domestic market and are denominated in the foreign currency of a developed country (US dollar, euro, Swiss franc, etc.) rather than the domestic currency.

global markets, and then compare the yield spreads of these issues before and after the bankruptcy of Lehman Brothers as well as the factors affecting those spreads. Lastly, we summarise our conclusions with respect to the characteristics of sovereign bond issuance following the collapse of Lehman Brothers. In addition, we provide a brief overview of the tensions prevailing, particularly in the third quarter of 2008 and the first quarter of 2009, in the markets of government bonds issued in domestic currency, and demonstrate how issuer behaviours changed in response to the tensions. The analysis focuses mainly on developments in the primary market without attempting to identify the factors shaping yields in the secondary markets.

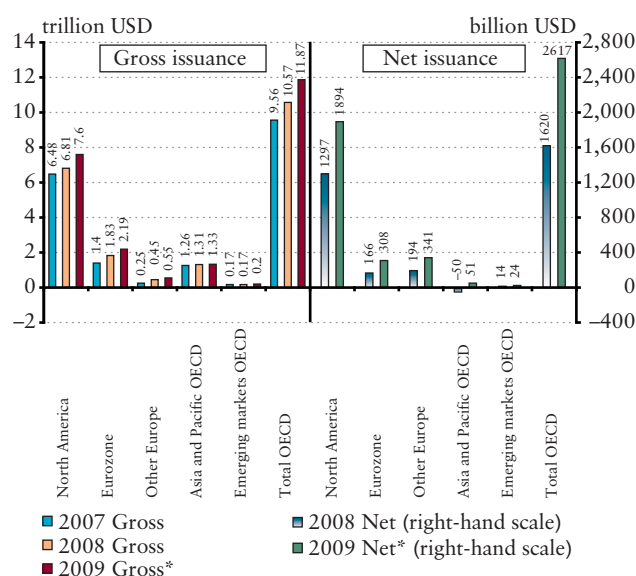
RECENT TRENDS IN BOND ISSUANCE IN GLOBAL MARKETS

The global bond market is essentially comprised of government bonds, bonds issued by financial and non-financial corporations, as well as MBS and ABS securities.³ According to IMF estimates, at the end of 2008 the total bond portfolio amounted to USD 80-85 trillion. 40 per cent of the portfolio consists of government bonds denominated in domestic currency and foreign currencies, while 60 per cent is comprised of corporate bonds. Securities issued by financial corporations represent 80 per cent of the latter. Only rough estimates are available regarding the MBS and ABS segment: as of the end of 2007 the stock of these securities amounted to USD 13 trillion. As regards risk composition, 80 per cent of the government bond portfolio is comprised of bonds rated AAA and AA, 17 per cent is comprised of bonds rated A and BBB, while speculative-grade bonds account for the remaining 3 per cent.

The fiscal stimulus and bank rescue packages introduced in response to the intensification of the financial market crisis and its spillover into the real economy resulted in a steep rise

Chart 1

Gross and net financing requirements of OECD countries



Source: OECD.

* OECD forecast.

in central government financing requirements in several developed and emerging countries. According to OECD estimates, the gross bond issuance of member states increased by around USD 1 trillion in 2008 and, subject to further growth, the gross financing requirement may be close to USD 12 trillion in 2009 with the net financing requirement rising to USD 2.6 trillion (Chart 1). The issuance of North American and euro-area countries accounts for the largest part of this growth.

Turning to emerging markets, the growth rate of gross issuance can be considered relatively moderate in their case, but their net financing requirement is expected to increase

Table 1

Composition of sovereign issues by region

	2007 Gross (%)	2008 Gross (%)	2009 Gross* (%)	2008 Net (%)	2009 Net* (%)
North America	67.78	64.43	64.03	80.06	72.37
Eurozone	14.64	17.31	18.45	10.25	11.77
Other Europe	2.62	4.26	4.63	11.98	13.03
Asia and Pacific OECD	13.18	12.39	11.20	-3.15	1.91
Emerging markets OECD	1.78	1.61	1.68	0.86	0.92
Total	100	100	100	100	100

Source: OECD.

* OECD forecast.

³ I.e. mortgage-backed securities and asset-backed securities.

faster than the OECD average (71.2% vs. 61.5%), thus the affected countries will have to reach a proportionately higher level of borrowing (Table 1).

As the financing requirement has increased in all regions and the issuance of several member states is expected to soar to a historical high in the coming period, issuers will continue to face fierce competition and rising cost of funds as they attempt to obtain borrowing. At the same time, the yield-increasing effect of a supply boost may be offset or delayed – at least partly and temporarily – by the following factors:

- sustained low inflation expectations resulting from the real economic downturn;
- increasing demand for safe, liquid assets (including government papers) in the context of high risk aversion;
- low central bank base rates;
- yield-suppressing effect of the asset purchase programmes and quantitative easing;
- enhanced central bank liquidity-providing operations, which drive up demand for government papers as they are eligible collaterals.

However, this seemingly positive picture should be refined further. First, the items identified above as factors putting downward pressure on yields, affect different sovereign issuers to widely varying degrees. Obviously, they exert the strongest impact on the most developed countries, while emerging economies fall significantly behind in several aspects. The central banks that were able to achieve a base rate close to zero (Fed, ECB, Bank of England, Bank of Japan) are mainly found in developed countries, while a high level of external vulnerability and the threat of potential speculative attacks inhibited the execution of substantial interest rate cuts in many emerging countries (including Hungary, Romania and Russia).

Investors' flight to safe, liquid assets primarily increased demand for US and German government paper, while in this regard the government bonds of emerging countries were broadly perceived as being on par with any other high-risk assets. The government securities of Central and Eastern European emerging markets suffered a further disadvantage vis-à-vis those of euro-area countries, as they are not included

in the ECB's list of eligible collaterals. The highest volumes of asset purchase programmes relative to market size were recorded in the USA, Japan and the United Kingdom, whilst the central banks of emerging countries had less opportunity to take advantage of this option.

On the other hand, more subdued risk aversion and the recovery in economic growth erode the yield-suppressing effects described above both in developed and emerging countries. Indeed, effects pointing to yield increases are expected to dominate over the long run, in particular, mounting inflation expectations.

Strong reliance on scarce financing resources called for pronounced changes in financing strategies as well. Issuance is now characterised by a more flexible and opportunistic approach worldwide. Instead of anchoring borrowing to long-term financing plans, debt managers now often disclose issuance plans on very short notice, and decide on announced quantities, maturities etc. on the basis of current market developments.⁴ The high level of uncertainty about financing requirements also justifies this approach, as upside risks continue to surround both growth prospects and the robustness of private sector demand and thereby the necessity of maintaining the economic stimulus packages.

In terms of maturity, short-term securities have typically gained importance.⁵ With a view to approaching broader investor segments and large, non-resident institutional investors, road shows have sprung up. At the same time, while developed countries were typically able to (or forced to) rely more strongly on non-resident investors, emerging countries – which are broadly perceived as being higher-risk – were practically driven out of international capital markets during the most severe period of the crisis (see below). With respect to financing, the contribution of domestic institutional investors (pension funds, insurance corporations and investment funds) has increased, most notably on account of their stable demand for long-term securities (Dalla-Hesse, 2009; Blommestein-Gok, 2009).

In the months following the intensification of the crisis, competition between sovereign issuers was further fuelled by a substantially increased supply of bank bonds backed by state guarantees.⁶ It should be noted that these instruments were previously popular forms of investment and financing until the turnaround in investor sentiment following the London summit of the G20 in the spring of 2009, whereas subsequent

⁴ A typical example of this was the gradual resumption of bond issuance in Hungary.

⁵ Pre-crisis experiences suggest that countries with higher financing requirements tend to rely more strongly on the issuance of short-term securities even under normal market conditions, than those with a more stable fiscal position.

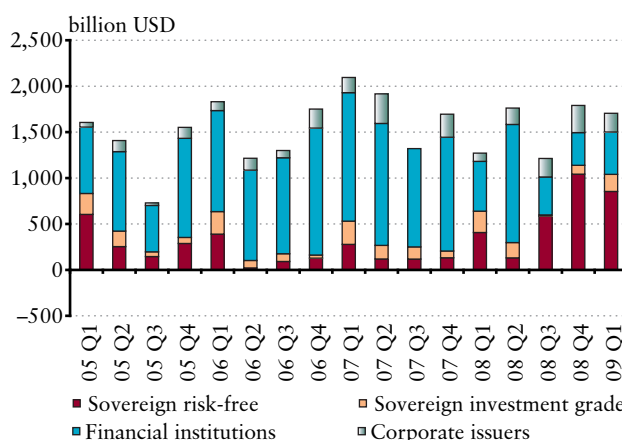
⁶ In April 2009, the total value of government guarantees in OECD countries was close to USD 1 trillion (Blommestein-Gok, 2009).

months saw declining issuance volumes, and this trend is expected to continue in the coming period. Factors both on the demand side and the supply side contributed to this decline: from the spring of 2009, in the context of improved global market sentiment, investors shifted to high-risk, high-return assets, thereby raising demand for bank bonds. In addition, against the backdrop of significantly deteriorating CDS spreads⁷ and the recovery in unsecured bond markets and unsecured senior bond issuance, banks reduced their recourse to expensive state guarantees in response to the lower financing costs available in these markets.

Examining bond issuance from the aspect of issuer types clearly reveals the marked changes generated by the crisis. While these changes have been apparent since mid-2008, the most spectacular turn took place, “obviously”, in the last quarter of 2008. At that point, the previously stable net issuance volumes of financial institutions fell sharply (looking at issuances in the domestic market alone, they turned negative during the last quarter of 2008, and even in the first quarter of 2009 they barely climbed back into the positive range). By contrast, sovereign issuers – whose supply had been relatively low until then – clearly dominated bond issuances after the second half of 2008. As we apply a breakdown by credit rating it is also evident that primarily the most developed, “risk-free” countries were capable of obtaining substantial borrowing, i.e. countries with AAA or AA credit ratings, while less risk-free, yet investment-grade countries – mainly emerging countries – had rather limited possibilities (Chart 2). Developments in net issuance confirm that in the last quarter of 2008 and the first

Chart 2

Developments in net bond issues broken down by issuer type



Source: BIS Quarterly Review, September 2009.

Note: the sovereign risk-free category is comprised of countries with AAA and AA credit ratings, while countries rated A and BBB are classified in the sovereign investment grade category. The chart indicates the consolidated value of domestic and international market issuance.

quarter of 2009 the sovereign issuance of less developed economies was strongly constrained by a climate of high risk aversion as well as the crowding-out effect of bonds issued by developed countries.

Although, due to lags between the availability of data, it is not reflected in the previous data series, as risk appetite

Table 2

Net capital inflows to emerging economies by region

(billion USD)

	2007	2008	2009*	2010*
Private flows	1,252.2	649.1	348.6	671.8
Latin America	228.9	132.4	99.8	150.9
Emerging Europa	445.7	270.1	20.4	179.3
Africa/Middle East	155.4	75.3	37.4	68.7
Emerging Asia	422.2	171.2	191.1	272.9
Official flows	42.9	55.5	63.6	43.4
Latin America	6.3	14.5	22.2	14.7
Emerging Europa	4.2	20.9	39.4	16.8
Africa/Middle East	3.7	1.5	1.9	5.6
Emerging Asia	28.6	18.5	0	6.3

Source: IIF.

* IIF estimate.

⁷ The fee payable by the buyer of the protection under a credit default swap contract.

improved, investors turned to emerging markets with renewed interest. While capital inflow to emerging markets is expected to fall significantly behind the values recorded in previous years, following substantial outflows in the period between October 2008 and March 2009, notable capital inflows were observed in the second quarter of 2009, and the earlier levels may be reached as early as 2010 (IIF, 2009).⁸

Investment in debt securities has largely contributed to the turnaround in capital flows, which partly reflects the fact that the low interest rate environment of developed markets is expected to persist, and hence carry-trade activities,⁹ which

take advantage of interest rate differences, have picked up once again. Given that emerging countries are considered to be net capital exporters at the aggregate level (in this context China plays an increasingly important role), capital flows between emerging economies have gained significance as well. However, there are notable differences between specific regions: the largest growth in capital inflows was observed mainly in the South-East Asian region, while the Central and Eastern European region – which suffered the largest downturn in the fourth quarter of 2008 and the first quarter of 2009 – has recorded a significantly smaller share in this growth thus far (Table2).

Box: Turmoil in the domestic government securities markets of peripheral euro-area and CEE countries

The increasingly difficult borrowing conditions in autumn 2008 were reflected in weak auction demand for domestic market issuance, as well as failed, postponed or suspended auctions and rising yields. In particular, the Central and Eastern European region faced severe liquidity problems, while the market turmoil did not spare less developed euro-area countries either.

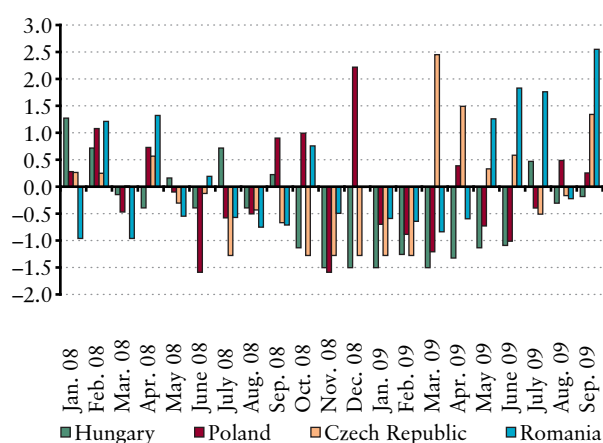
Yields soared in the Czech, Polish, Hungarian and Romanian government securities markets, while auction demand fell steeply and secondary market turnover deteriorated. In October, a large number of

auctions had to be postponed or executed with reduced amounts. The third quarter of 2008 saw a significant decline in bond issuance in Central and Eastern European countries (Chart 3). In the period following the bankruptcy of Lehman Brothers, Hungary's total issuance amounted to merely the equivalent of EUR 100 million, while this value was EUR 1.7 billion in Turkey, EUR 0.3 billion in Romania and EUR 2.3 billion in Poland. In the third quarter of 2008, the countries in the region¹¹ issued government bonds in the amount of EUR 4.4 billion in total compared to the EUR 8.5 billion gross issuance recorded in the previous quarter for the same countries.

Chart 3

Developments in the issuance of long-term government securities in the region¹⁰

(relative difference from the average)



Debt managers typically adjusted to the downturn in demand in two different ways: in response to rising yields and falling demand, they either reduced or suspended issuance in most countries. By contrast, despite high yield levels, they proceeded with auctions in Romania and Turkey, but the amount allocated was significantly lower than before. As a result, auctions in those countries were executed with substantial overquotes. Implementation of this strategy was facilitated by strong domestic demand for government securities on the one hand, and the relatively inexpensive foreign currency funds made available under the IMF programmes.

In the first quarter of 2009, long-term government securities issuance reached a record low in the region: total borrowing amounted to merely EUR 3.8 billion. Against declining turnover, bid-ask spreads have widened considerably in the secondary market. The Polish market was the only exception where, thanks to a more competitive primary dealer system and application of the MTS trading platform,¹² spreads remained

⁸ Capital inflow to emerging economies reached USD 1.25 trillion in 2007 and USD 650 billion in 2008 and, according to the IIF's October 2009 estimates, a net private capital inflow of around USD 350 billion and USD 670 billion is expected for 2009 and 2010, respectively.

⁹ A foreign currency speculative strategy taking advantage of the interest rate differences between foreign currencies.

¹⁰ For better comparison, rather than taking the average value of the government securities issuance of specific states, we presented, for the period between January 2007 and September 2009, the relative differences from the monthly average values in proportion to the deviation.

¹¹ The Czech Republic, Hungary, Poland, Romania and Turkey.

¹² MTS (Multilateral Trading System) is the most widely used electronic trading platform, which records the largest turnover in the international government securities market.

narrow.¹³ The supply pressure exerted on the bond markets of emerging countries in the region – which translated into multiple jumps in long-term yields (Chart 4) – was heightened by investors' efforts to reduce their holdings of risky assets, and by the fact that these securities are not listed as eligible collaterals in the liquidity-providing operations of the ECB; in other words, they are practically unsuitable for obtaining foreign currency financing.

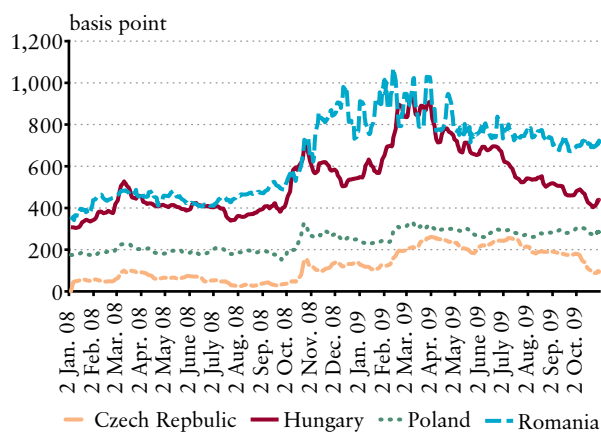
In line with the turnaround in global investor sentiment, yields declined substantially in the second and third quarters, while an increase was observed both in the issuance amounts and the proportions of overquoting. In most countries in the region, issuance volumes nearly returned to the levels recorded before the default of Lehman Brothers.

Rising yields and falling auction demand mainly characterised those countries in the euro area where major bank rescue packages were announced by the government. A general trend of steeply rising long-term government bond yields was observed in the peripheral euro-area countries¹⁴ as well. In these countries, ten-year bond spreads relative to German government papers have multiplied compared to their typical pre-crisis level of under 50 basis points.

In the first quarter of 2009, differentiation occurred between euro-area countries with a riskier reputation. Overall, yield spreads in Italy and Spain remained unchanged, albeit with notable fluctuations, while they continued to rise in Portugal and Greece. The latter two countries

Chart 4

Developments in the 10-year yield spreads in countries in the region vs. the German government bond



discontinued the issuance of long-term bonds altogether, while broadly the same volumes were offered in Spanish and Italian bond auctions as in the previous period. From the second quarter of the year, primary government securities markets gradually stabilised as yield spreads dropped further. In the second quarter of 2009 Greece became the most active sovereign issuer, followed by Spain, the United Kingdom and France (Baba et al., 2009).

SOVEREIGN BOND ISSUANCE IN THE CENTRAL AND EASTERN EUROPEAN REGION

The impact of the financial crisis was evident in the foreign currency bond market of emerging economies as well. While more and more governments decided to introduce rescue packages, which translated into an increase in financing requirement, from September 2008 the sovereign bond market of emerging countries practically froze up, with CDS spreads and secondary market foreign currency bond yield spreads soaring to record heights. In the context of extremely unfavourable market conditions, activities related to foreign currency-denominated bond issuance in the region were reduced to a minimum in the period between September 2008 and March 2009 (Chart 5).

During this period only Poland and Slovakia carried out foreign currency bond issuance in the region. The former issued a new, five-year foreign currency-denominated bond

in January 2009 with a value of EUR 1 billion, while following its accession to the euro area – and partly taking advantage of the yield-reducing effect of its membership – Slovakia implemented a smaller, secondary offering of two previously issued series – one maturing in 2017 and the other in 2011 – with a value of EUR 215 million and EUR 200 million, respectively.

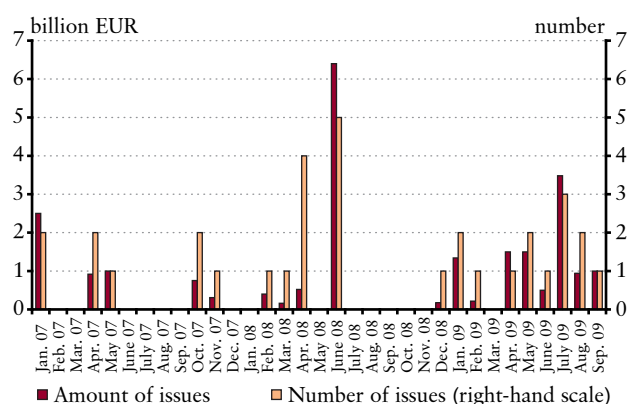
Considering that by purchasing a sovereign government paper and a CDS for the same country it is essentially possible to generate a “synthetic, risk-free government bond”, foreign currency bond spreads and CDS spreads of corresponding maturities typically cointegrate under normal market conditions. However, in November 2008 the two spreads departed from one another in Central European countries: in the periods of temporarily improved risk perception, foreign currency spreads did not follow the decline in CDS spreads. The underlying reason for this phenomenon may have been the significantly increased liquidity premia observed in the sovereign foreign currency bond market.

¹³ Being more transparent and offering more efficient trading practices, the MTS system has undoubtedly contributed to this.

¹⁴ Greece, Portugal, Spain, Italy and Ireland.

Chart 5

Foreign currency-denominated bond issuance in the Central and Eastern European region



Source: Thomson Reuters, Bloomberg.

Parallel to the improvement of global investor sentiment, from the spring of 2009 several emerging countries entered the international capital markets with sovereign bond issuance once again. It was a positive development in the perception of the Central and Eastern European countries – those particularly devastated by the crisis – that investors typically quoted foreign currency bonds against sufficiently high demand, which allowed issuers to raise the originally planned issuance volume in several cases.¹⁵ During this period nearly all countries in the region were able to obtain financing from the international capital markets once again.¹⁶ Following the negative net issuance recorded in the previous two quarters, in the second quarter of 2009 the total volume of international sovereign issuance in emerging markets reached net USD 21 billion (Baba et al., 2009).

Hungary issued a new, five-year foreign currency bond in mid-July, the value of which amounted to EUR 1 billion. The fundraising was not carried out for financing purposes, as it was much rather intended to gauge the level of global

demand for Hungarian government paper, and to demonstrate that the return to market financing was a possibility. Accordingly, the successful issuance conveyed a particularly important message and represented a milestone in the normalisation of the government securities market. The success of the auction demonstrated that Hungary was capable of obtaining funds from the international capital markets.

The high – nearly sextuple – level of overquoting and the possibility to raise the original issuance volume from EUR 500 million to EUR 1 billion also supported the positive assessment. The Eurobond was sold mainly to prime institutional investors who looked at Hungarian government bonds as long-term investments. 75 per cent of the allocation was taken by asset managers, 13 per cent went to banks, and the remaining 12 per cent was divided practically evenly between insurance corporations, hedge funds¹⁷ and other investors. The issuance exceeded the yield of the German government bond of the corresponding maturity by 432 basis points, which implied an effective euro interest of around 6.8 per cent. Although this funding cost exceeded the interest on the credit facilities provided by international institutions, the basis of comparison should be primarily the cost of funds available to other emerging countries in the market.

In addition to a general revival in risk appetite and timing the issuance to a period broadly characterised by favourable market sentiment, offering relatively high yield spreads also contributed to the success of bonds issued in the period since March. We may conclude with reasonable certainty that re-entering the market was motivated not as much by the possibility of achieving a favourable price, but rather by the pressure of a heightened financing requirement and the desire to generate a favourable psychological effect, i.e. convey a positive message by a successful issuance. It has happened numerous times that the yield of the issued bond – measured in foreign currency – exceeded the yield of a corresponding-maturity government paper denominated in the domestic currency.¹⁸

¹⁵ Since exact details about the size of the order book, and hence the extent of overquoting, are mostly unavailable, we can only offer a few examples based on the available anecdotal market information: following an overquoting of EUR 1.2 billion, the originally planned EUR 250 million Polish Eurobond secondary offering was raised to EUR 750 million. According to market information, the USD 2 billion Polish issuance implemented in June received bids in the amount of USD 8 billion. According to market information, the USD 1.5 billion USD-bond issuance of Lithuania in October attracted bids in the amount of USD 1.6 billion even before the opening of the order book.

¹⁶ As regards the broader region, the Czech Republic, Poland, Romania, Croatia, Slovakia, Slovenia and Lithuania have all issued foreign currency bonds since March 2009.

¹⁷ Investment funds that typically use high leverage.

¹⁸ The yield on the five-year Eurobond issued by the Czech Republic on 29 April 2009 was 4.67 per cent, while the five-year koruna benchmark yield was around 4.5 per cent. The yield on the ten-year USD-bond issued by Poland on 7 July 2009 – 6.4 per cent – exceeded that of the corresponding zloty-denominated government paper by around 20 basis points.

DEVELOPMENTS IN THE SOVEREIGN BOND SPREAD AT ISSUE IN INTERNATIONAL COMPARISON

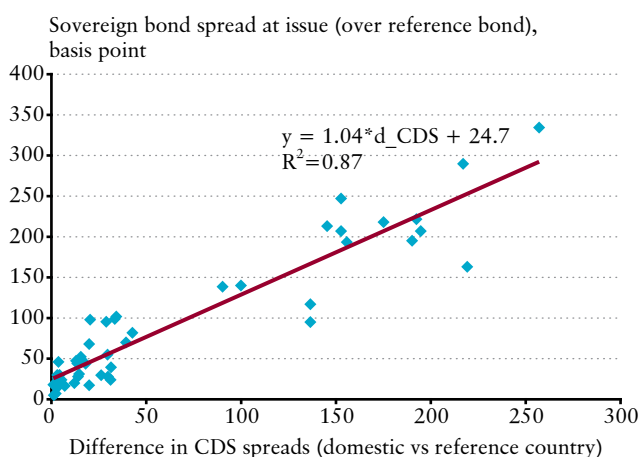
As noted above, following the escalation of the financial crisis in autumn 2008, as a general trend less developed countries faced substantially increased cost of funds. According to our calculations,¹⁹ before the collapse of Lehman Brothers the spread of FX bonds corresponded to the CDS spread of the issuer country in magnitude; and was comprised of, as shown below, a constant term and the credit risk of the country as expressed by the CDS spread:

$$\text{Spread}_{\text{over benchmark government paper}} = 24.7 \text{ bp} + 1.04 * (\text{CDS spread}_{\text{issuer}} - \text{CDS spread}_{\text{benchmark country}})$$

The coefficient of the CDS spread differential does not deviate from 1 significantly. While the value of the constant term is not too high, it is significant. Issuance costs as well as the volume effect may account for the excess cost. Indeed, the bond spread at issue should include issuance costs as well as the fees charged by banks providing bid bond coverage. Moreover, in the CDS market – as well as in the secondary market of FX bonds – quotes are typically related to transactions worth EUR 5-10 million, while primary issuance is typically carried out in the amount of EUR 0.5-2 billion. Accordingly, in the latter case the markedly higher capital requirement may justify excess cost of funds relative to subsequent secondary market yields.

Chart 6

Correspondence between the CDS spread and the FX bond spread at issue before the default of Lehman Brothers

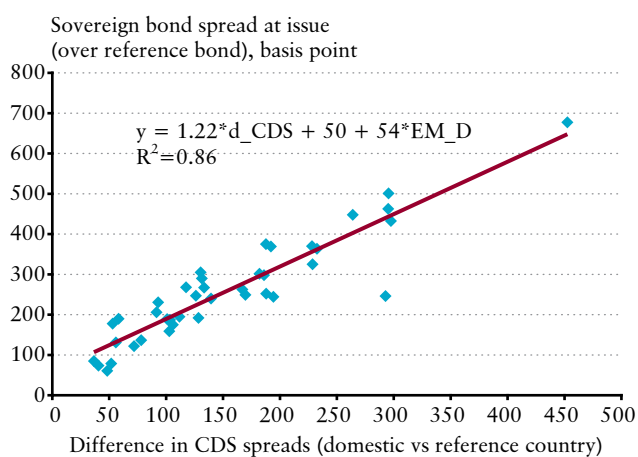


Examining international bond issuance following the bankruptcy of Lehman Brothers we found that in order to obtain substantial financing, a sovereign issuer from a less developed market faced significantly higher costs of funds in the international capital markets than before. In the period between September 2008 and October 2009, the regression equation estimating the bond spread at issue was the following:

$$\text{Spread}_{\text{over benchmark government paper}} = 50 \text{ bp} + 1.22 * (\text{CDS spread}_{\text{issuer}} - \text{CDS spread}_{\text{benchmark country}}) * + 54 * \text{dummy(EM)}$$

Chart 7

Correspondence between the CDS spread and the FX bond spread at issue after the default of Lehman Brothers



While the high explanatory power of the estimate is preserved, we can see that the factors explaining the bond spread at issue were subject to remarkable changes during the past one year. The main differences can be identified as follows:

- The value of the constant term doubled; as a default, non-developed countries had to pay a higher spread at issue in international markets.
- The coefficient of the variable expressing the differential of the CDS spread is significantly above 1, thus the increase in the bond spread expected at issue exceeded that of the CDS spread, i.e. the credit risk of the issuer country.
- The emerging market dummy variable became significant, while its coefficient can be considered significant even from

¹⁹ For a detailed description of estimate, please refer to the Annex. We adjusted for global risk appetite by means of the VIX index and the EMBI Global bond spread, and used the USD and EUR TED spreads to adjust for the liquidity tensions of financial markets; these variables, however, did not prove significant. We applied dummy variables to demonstrate the difference between Central and Eastern European countries, broad emerging markets and peripheral euro area countries; however, these variables did not prove significant, either.

an economic perspective. The spread payable by an emerging market issuer is higher by 54 basis points than that expected of a peripheral euro-area country with a similar CDS spread, thus for these countries the constant term, which is independent of the CDS spread, increased by a total of 105 basis points as a result of the crisis.

In light of the changed relationship, the spread on the Hungarian Eurobond issued in July 2009 relative to the German government paper of corresponding maturity was consistent with the level justified by Hungary's CDS spread; in fact, it was slightly below the value estimated on the basis of the regression equation.

Changes in the impact of the explanatory factors, hence the general increase in the spread at issue, may be justified by several factors. First, investors' risk sensitivity may have been a contributing factor. The stronger differentiation between different risk categories may have triggered a higher "jump" in the spread both in terms of the practically "risk-free", developed market bonds relative to risky bonds, and in terms of the government bonds of less developed countries relative to those of emerging countries. The former assumption is supported by the higher constant term, and the latter by the changing significance of the emerging market dummy variable. In addition, the increase in the CDS spread differential parameter indicates that the significance of individual differences has increased even within the same risk categories.

Secondly, the more pronounced appearance of a certain liquidity premium may also have contributed to the rise in expected bond spreads. As we have shown above, the period under review was characterised by heightened competition for financing resources. Since the capital requirement involved in bond purchases is significantly higher than in the case of opening up a similar position through an interest derivative or CDS transactions, we may assume that investors are not willing to use the bond purchase option unless a higher spread is paid. The higher coefficient of the CDS spread may reflect the relative disadvantage compared to opening up a position in a CDS transaction. In addition, this kind of liquidity premium may also appear in the parameters of both the constant term and the dummy variable.

The significance of the dummy variable of emerging markets may be explained by the fact, that peripheral euro-area countries – which do not belong to the former group – can keep their cost of funds low also because their euro-denominated bond issues in international markets are executed practically in their "domestic currency", which is

typically perceived by investors as a lower-risk exercise. In addition, the spread at issue payable by these countries may also be lower because of the fact that under the terms of a CDS transaction, in case of a default the buyer may deliver to the seller the specific country's government bonds denominated in any standard currency and the seller will pay the bonds' nominal value.²⁰ In other words, in case of a default on a USD-denominated bond, the protection provided by the CDS will cover the "domestic currency" Eurobonds as well.

In addition, it should be noted that neither the VIX index variable parameter, nor that of the EMBI Global bond spread proved to be significant, and that the expected spread at issue increased despite the fact that the majority of the bond issues included in the sample (25 issues out of 40) was implemented after the turnaround in risk appetite following March 2009. All of the above suggest that in the most drastic periods of risk aversion the issuance of FX bonds had to be limited to the minimum, and when risk appetite was restored to the extent that emerging markets were able to obtain external funds once again, the crowding-out effect of developed market government bonds contributed more to the increase in the spread at issue than changes in the level of risk aversion. Overall, in the period following the default of Lehman Brothers the spread at issue of emerging market sovereign bonds increased by around 80 basis points as a constant, while it increased, depending on credit risk, by 20 per cent of the CDS spread differential as measured relative to the benchmark country.

CONCLUSIONS

In our analysis we focused on bond market developments in the period following the bankruptcy of Lehman Brothers, primarily from the perspective of emerging sovereign issuers. From September 2008 the biggest impact on investors' government securities purchases was the drastically falling risk appetite on the one hand, and – resulting from fiscal stimulus packages – an increased supply of developed market government bonds, on the other hand. These two factors generated spectacular changes in global bond markets in terms of the composition of issuers. In the most severe months of the crisis bond issuance was significantly dominated by developed countries, while those financial institutions, which had had the largest share in issuance before, were forced to limit their net issuance substantially. While the financing requirement of both developed and emerging countries rose considerably, the government bond issuance of Central and Eastern European countries was unable to attract significant demand on the part of investors until the turnaround in risk appetite observed in the spring of 2009.

²⁰ For more details about CDS transactions and the CDS market, see Varga (2009).

Developments both in domestic currency government paper and foreign currency bonds reflected the drastic decline in the financing opportunities of emerging countries. In domestic markets, the market turmoil translated into rising yields, weak auction demand, failed auctions, low issuance volumes and a shift to short-term government paper. Negative trends were even more evident in the case of international issuance: in the most severe period of the crisis emerging countries were practically driven out of this market. The turmoil did not spare less developed euro-area countries either: they were also hit by similar market turbulences, albeit to a much lesser degree and less severely.

The recovering risk appetite observed from March 2009 led to a significant improvement even in emerging government securities markets, with a rebound in the Central and Eastern European sovereign bond market as well. At the same time, the cost of funds for emerging countries has clearly increased relative to both their own earlier spreads and to developed market bonds, despite the substantial demand for the government paper issued by them, which may suggest that the current fierce competition for financing resources will continue over the long term.

REFERENCES

BABA, NAOHIKO, GADANECZ, BLAISE AND MCGUIRE, PATRICK (2009): Highlights of international banking and financial market activity, *BIS Quarterly Review*, September 2009.

BIS QUARTERLY REVIEW (2009): *International banking and financial developments*, BIS, September 2009.

BLOMMESTEIN, HANS J. AND GOK, ARZU (2009): OECD Sovereign Borrowing Outlook 2009, *OECD Financial Market Trends* No. 96. Volume 2009/1.

DALLA, ISMAIL AND HESSE, HEIKO (2009): Rapidly growing local-currency bond markets offer a viable alternative funding source for emerging-market issuers, link: <http://www.voxeu.org/index.php?q=node/4081>.

IIF (2009): *Capital Flows to Emerging Market Economies*, October 2009.

VARGA, LÓRÁNT (2009): Hungarian sovereign credit risk premium in international comparison during the financial crisis, *MNB Bulletin*, July 2009.

ANNEX: REGRESSION ESTIMATE OF FOREIGN CURRENCY BOND SPREADS AT ISSUE

We applied the OLS method to perform a regression estimate for the sovereign foreign currency bond spread at issue. In the regression equation we used the difference between the issuer country's CDS spread and that of the benchmark country to estimate the yield over benchmark government bonds of corresponding maturity. We adjusted for global risk appetite by means of the VIX index and the EMBI Global bond spread, and used the USD and EUR TED spreads to adjust for the liquidity tensions of financial markets. We applied dummy variables to demonstrate the difference between Central and Eastern European countries, broad emerging markets and peripheral euro area countries. We estimated the following regression equation:

$$Spread_i = \alpha + \beta_1 * CDS_i + \beta_2 * VIX + \beta_3 * EMBI + \beta_4 * TED + \beta_5 * Dummy_{CEE/EM} + \varepsilon_i$$

where $spread_i$ indicates the yield spread of the i^{th} FX issue compared to the benchmark government paper of the corresponding maturity (the German *Bund*, the US *T-bond*, etc.); CDS_i is the difference between the CDS spread of the issuer country and that of the benchmark country; VIX is the implied volatility of the S&P 500 index; $EMBI$ is the value of the EMBI Global bond spread; TED is the difference between the 3-month developed interbank market and government securities market yields. If the issuer is a Central or Eastern European country or an emerging country, the value of $Dummy_{CEE/EM}$ is 1, otherwise it is 0.

The analysis covered the issues of 17 countries, including the countries of the Central and Eastern European region (the Czech Republic, Croatia, Poland, Lithuania, Latvia, Hungary, Romania, Slovakia and Slovenia), and the international issues of other emerging markets (Brazil, South Africa, Israel, Turkey) and peripheral euro-area countries (Greece, Ireland, Portugal, Spain).

As we examined the international bond issuance of the above countries before the default of Lehman Brothers, we focused on the period between 1 January 2006 and 15 September 2008. The sample included 47 issues; the results are summarised in Table 3.

Table 3**Estimate results for the period preceding the default of Lehman Brothers**

Constant	Difference in CDS spreads	VIX	EMBI	TED	dummy(EM)	dummy(CEE)	R ² (adj)
24.7*	1.04*	-1.74	-0.11	0.44	12.96	-8.93	0.87
(4.24)	(17.73)	<i>(-1.13)</i>	<i>(-0.72)</i>	<i>(-0.30)</i>	<i>(1.19)</i>	<i>(-0.96)</i>	

* indicates significant parameters at 95 per cent significance level.

Table 4**Estimate results for the period following the default of Lehman Brothers**

Constant	Difference in CDS spreads	VIX	EMBI	TED	dummy(EM)	dummy(CEE)	R ² (adj)
50*	1.22*	-0.32	0.15	-0.1	54*	34	0.86
(2.98)	(14.38)	<i>(-0.09)</i>	<i>(0.7)</i>	<i>(-0.30)</i>	(2.58)	<i>(1.66)</i>	

* indicates significant parameters at 95 per cent significance level.

The value of the constant term and the CDS spread differential is highly significant (even at 99 per cent significance level), but we have to reject the significance of the coefficient of the other variables. The explanatory power of the estimate is remarkably high; the bond spread at issue was essentially determined by the value of the CDS spread in this period.

As we examined the bond issuance of the 17 countries specified above after the default of Lehman Brothers, we focused on the period between 16 September 2008 and 10 October 2009. The sample included 40 elements; the results are summarised in Table 4.

In addition to the constant term and the CDS spread differential, the coefficient of the emerging market dummy variable has also become significant. The dummy variable for the CEE region was significant in itself, as well, but the value of its coefficient was identical in magnitude with that of the emerging market dummy variable.

In the period following the collapse of Lehman Brothers, several countries from the Central and Eastern European

region had to rely on the assistance of the IMF or other supranational institutions. International rescue packages allowed these countries to reduce the size of their market financing. The relatively solid financing background and the lack of a reliance on bond issuance may have affected the bond spread at issue as well, thus we also performed the estimate adjusted for the international rescue packages. We applied two dummy variables. The value of dummy(IMF1) is 1 if a stand-by arrangement exists (Hungary, Romania); and the value of dummy(IMF2) is 1 if a stand-by arrangement or a flexible credit line exists (Hungary, Romania, Poland); otherwise their value is 0. The estimate results are summarised by Table 5.

It is evident that the availability of an IMF rescue package did not significantly change the bond spread at issue; incorporating the variables did not alter the previous results.

Although we estimated several estimate specifications in analysing the relationships, this did not change our findings significantly, thus it did not essentially affect our conclusions.

Table 5**Estimate results for the period following the default of Lehman Brothers with IMF dummy**

Constant	Difference in CDS spreads	VIX	EMBI	TED	dummy(EM)	dummy(CEE)	dummy(IMF1)	dummy(IMF2)	R ² (adj)
47.7	1.20*	-4.91	0.31	0.23	54	29	-58.7	-18.6	0.86
(2.98)	(14.37)	<i>(-1.50)</i>	<i>(1.35)</i>	<i>(0.67)</i>	(2.78)	<i>(1.57)</i>	<i>(-1.14)</i>	<i>(-0.56)</i>	

* indicates significant parameters at 95 per cent significance level.