## What can BIS statistics tell us about the risks of crises in emerging markets?

Ramon Moreno and Karsten von Kleist\*

#### Abstract

We discuss how creditor- and market-sourced BIS banking and securities statistics improve stability analysis by providing globally standardised financial data not readily available elsewhere. BIS data help to systematically quantify risk exposures that develop from financing positions, including low external liquidity, currency mismatches or common creditor linkages.

#### 1. Introduction

Initiatives to compile (BIS) data originate in the Committee on the Global Financial System (CGFS) or Markets Committee, when senior central bank representatives consider that new data need to be collected. These compilation initiatives have provided data important to analysing financial stability concepts not available elsewhere.

Two main sets of BIS statistics that are particularly relevant to emerging markets are reviewed in this note. 1 The first set, the banking statistics, is obtained from a group of BIS reporting countries. These statistics are aggregated from banks' balance sheets, so, unlike traditional flow data, they enable analysts to measure the impact of valuation changes on outstanding stocks. Other statistical initiatives, such as the compilation of international investment position (IIP) data, which complement traditional balance of payments (BoP) data, seem to validate the BIS approach.<sup>2</sup>

The second set of statistics pertains to international debt securities. In response to the shift from bank finance to bond finance in the aftermath of the international banking crisis of 1982, the CGFS suggested that the BIS compile a database of individual international securities that can be analysed in at least 12 dimensions. Experience with this database has informed more recent securities databases, such as at the European Central Bank (ECB). In particular, the information from this BIS database has helped in building and checking the new Centralised Securities Database (CSDB) at the ECB, which is intended to provide better quality data on issues (and later holdings) of securities in the Euro area.

Bank for International Settlements. The views expressed in this paper are those of the authors and do not necessarily reflect the official position of the BIS. We would like to thank Philip Turner for useful comments. Michael Chui for contributing to the analysis of common lender effects, and San Sau Fung and Pablo Garcia-Luna for research assistance.

The BIS triennial survey on foreign exchange and derivatives turnover and amounts outstanding also provides data relevant to financial stability in emerging markets.

For example, see Lane and Milesi-Ferretti (2006). At the IMF, in line with the increased emphasis on key balance sheet risks and financial vulnerabilities, recent issues of the World Economic Outlook and Global Financial Stability Report, and other studies (eg Rosenberg et al (2005)) have applied balance sheet analysis.

Some ways in which these BIS statistics have been used for financial stability analysis are summarised below.

### 2. Uses of BIS statistics for financial stability

#### 2.1 Exposures of BIS reporting banks

BIS statistics reveal aspects of the exposures of BIS reporting banks and their debtors that are not available from other sources.

#### 2.1.1 Measurement of external debt

BIS statistics provide an alternative reliable source of estimates of external debt to private creditors based on data provided by market and creditor sources, as opposed to (official) debtor information. As a result, they have helped improve measurement of external debt. To illustrate, Figure 1, left-hand panel shows debtor data (in columns, based on data published in the World Bank's "Global Development Finance" (GDF) reports available up to 1998) and BIS data (stacked so that the line segments sum to the total) available around the time of the Asian crisis. They reveal that in 1997, Thailand's external debt to private creditors was estimated at \$75 billion; in fact the BIS statistics suggest that it was at least 40% higher. Indeed, Thailand's external data were subsequently revised upward,<sup>3</sup> changing perceptions of Thailand's external debt vulnerability. Under the original estimates, the ratio of external debt to exports of goods and services in 1996 was 106%; under revised estimates it turned out to be considerably higher. The fact that BIS banking statistics have contributed to a much better understanding of external debt data is particularly noteworthy because not all countries report to the BIS, so BIS data normally will cover a substantial fraction, but not the totality of credit to a given country. Apart from signalling higher debt, BIS data were more timely than publicly available external debt data.

New data collection mechanisms such as the IMF's Special Data Dissemination Standard (SDDS) statistics today provide more comprehensive and more timely data than in the past. Partly as a result, the coverage of GDF statistics has improved, providing a more complete picture of overall debt burdens (Figure 1, right-hand panel). But BIS statistics still offer an additional perspective.

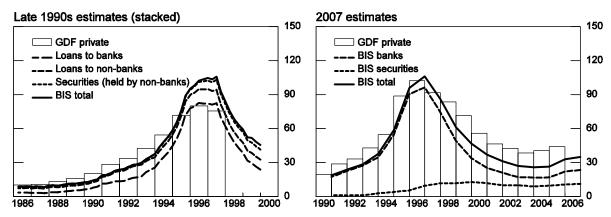
\_

The Bank of Thailand suggested a number of explanations for the substantial upward revision of external debt data based on a comprehensive survey. See Bank of Thailand Press Release no 78, 30 June 2000, http://www.bot.or.th/BOThomepage/General/PressReleasesAndSpeeches/PressReleases/News%202543/Eng /n7843e.htm.

Comparisons between BIS creditor data and national external debt data are discussed in von Kleist (2002). The BIS statistics do not cover the following: (i) trade credit not extended by banks; (ii) loans from banks not included in the reporting for BIS statistics; (iii) any other non-bank private sector loans; (iv) some private placement bonds.

# Figure 1 Thailand's external debt to private creditors

In billions of US dollars



Sources: World Bank GDF, BIS locational banking and securities data.

#### 2.1.2 Lending to banks and non-banks

BIS statistics break down cross-border bank credit according to whether the recipient is a bank or non-bank. This can be of use for a number of reasons. First, the data on external borrowing of non-banks are sometimes of poor quality; BIS data offer an independent perspective on this. A case in point is credit extended to the Indonesian corporate sector prior to the Asian crisis. Because a lot of these transactions occurred offshore, the data available from debtor sources were incomplete; indeed market commentary well before the Asian crisis of 1997 expressed concerns about the quality of this kind of data (see Union Bank of Switzerland (1995)). BIS information from creditors shows the importance of crossborder lending to non-banks in Indonesia (Figure 2, left-hand panel). The implications can also be seen by noting that according to BIS data, total cross-border bank lending to Indonesia totalled around \$66 billion at its peak in Q3 1997. This was about \$28 billion (74%) higher than the nearly \$38 billion Indonesian publicly-guaranteed and non-guaranteed commercial bank debt outstanding estimated from debtor-reported data (see World Bank (1999)). Second, cross-border interbank lending can be associated with risks to financial stability as it is short term and directly affects liquidity in the financial system (for example, a sudden interruption could affect the ability of market participants to settle payments). An example is the experience of Thailand on the eve of the Asian crisis (Figure 2, right-hand panel). As can be seen, the rapid growth in total cross-border bank credit in BIS statistics was driven by interbank lending; cross-border loans to the corporate sector were relatively stable. Furthermore, the crisis was associated with a sharp reduction in cross-border interbank lending.

#### 2.1.3 Cross-border to local shift

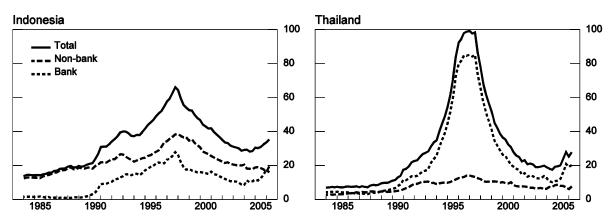
BIS consolidated statistics give information on cross-border bank lending and on local claims of BIS reporting banks, reflecting activity through branches and subsidiaries. The breakdown is useful in assessing overall exposure of BIS reporting banks and its characteristics. To illustrate, after the Asian crisis, the amount of cross border bank lending (as proxied for by BIS reporting banks' international claims) to emerging market economies fell sharply in Asia.<sup>5</sup> Such lending fell from \$740 billion in 1995 to \$488 billion in 2000, but has since

\_

<sup>&</sup>lt;sup>5</sup> The proxy is an approximation to pure cross-border lending in part because the BIS international claims include onshore claims in foreign currency by foreign bank branches or subsidiaries. These onshore claims would be small in countries that are not dollarised. While pure cross-border data are available from the locational statistics, the latter do not provide information on local claims.

exceeded its previous peak, to total \$774 billion in 2006 (Table 1). Taken together with BIS statistics on local claims the data reveal two things. First, during the period when cross-border bank lending declined, there was a significant increase in local claims, that is, the reduction in reporting bank activity was not as severe as suggested by cross-border data alone, which are the focus of balance of payments statistics. Second, in spite of the recent rebound in cross-border lending, there has been a shift in favour of local claims since 1995. In 2006, in the Asia Pacific region the ratio of local claims to foreign claims was about 80%, down from a peak of 85% in 2003 but well above 24% in 1995. On balance, experience and some research suggest that foreign bank activity can be beneficial (CGFS (2005) and Moreno and Villar (2005)), so the increase in onshore foreign bank activity indicates that conditions under which emerging markets receive financing from BIS reporting banks may have improved since 1995. Financial stability is enhanced further to the extent that onshore banking involves credit in local rather than foreign currency, which could reduce currency mismatches (see Section 2.3.3 below).

Figure 2
Cross-border bank lending
In billions of US dollars



Source: BIS locational banking statistics.

#### 2.2 Maturity structure of external debts and financing requirements

Apart from having good estimates of total external debt for crisis prevention, it is important to have estimates of its maturity structure. BIS statistics allow us to do this, and have the desirable characteristic of defining debt structure by remaining maturity.

These statistics have at least two applications. First, they can tell us what the proportion of short-term and long-term debt is as an indicator of possible vulnerability. As can be seen in Figure 3, prior to the Asian crisis of 1997, the share of short-term bank debt had become quite large in Thailand. It subsequently declined but has since risen again. There was also an increase in the share of short-term debt in Turkey prior to its November 2000–February 2001 crises.

Second, the statistics can allow us to estimate financing requirements. These are reported for Thailand and Turkey in Figure 4. It is apparent that financing requirements increased in the periods before crises. For example, in Thailand, financing requirements up to a one-year horizon rose sharply in the 1990s, from \$9 billion in December 1990 to \$48 billion in 1996, on the eve of the Asian crisis. For Turkey, the financing requirement rose from around \$20 billion in 1999 to \$27 billion in September 2000.

Table 1

Claims of BIS reporting banks

	International claims <sup>1</sup>			Local cu	rrency loc	al claims	Local/International claims %			
	1995	2000	2006	1995	2000	2006	1995	2000	2006	
China	48	58	127	0	3	21	1	6	16	
India	16	22	66	8	17	42	54	76	64	
Indonesia	45	40	38	4	5	14	8	11	37	
South Korea	78	59	124	8	18	144	11	31	116	
Malaysia	17	21	39	4	29	49	25	139	126	
Philippines	8	17	22	1	5	5	17	32	25	
Taiwan, China	23	18	39	10	16	41	44	90	105	
Thailand	63	27	23	5	17	26	9	62	115	
Asia	740	488	774	174	315	618	24	64	80	
Argentina	38	69	17	4	23	14	10	34	81	
Brazil	57	68	69	21	72	112	36	107	163	
Chile	14	22	26	8	28	37	58	124	142	
Colombia	11	12	8	1	5	9	8	46	112	
Mexico	57	64	71	4	80	202	8	126	286	
Peru	6	13	10	1	3	3	10	24	31	
Venezuela	12	13	12	0	10	13	3	76	112	
Latin America & Caribbean	212	285	249	44	231	397	21	81	160	

<sup>&</sup>lt;sup>1</sup> Cross-border claims in all currencies and local claims in non-local currency.

Source: BIS Consolidated banking statistics.

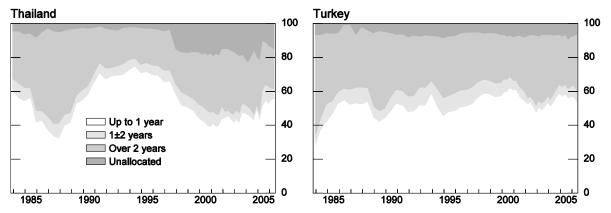
#### 2.3 Quantifying risk exposures

#### 2.3.1 Refinancing (ie liquidity) risk and reserves to short-term external debt

One reason a high share of short-term debt is a concern is because it poses "refinancing" risk; during periods of uncertainty creditors may be unwilling to provide additional financing because they do not know if there will be enough hard currency resources to service the debt (this was the problem faced by Korea in late 1997-early 1998). This can be addressed if enough foreign reserves are available to cover short-term debt obligations. A by now conventional rule of thumb, known as the Guidotti-Greenspan rule, is that foreign reserves should cover at least 100% of short-term external debt; about a year of external debt obligations. The Guidotti-Greenspan ratio was found to be a key vulnerability indicator in a recent early warning system model of financial crises (Bussiere and Fratzscher (2006)).

Figure 3
Share of debt at various maturities in total debt

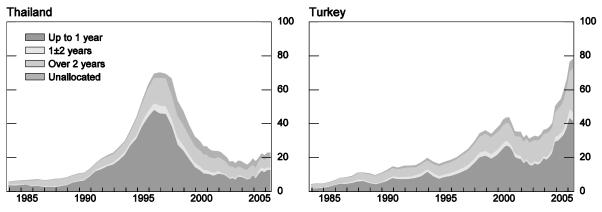
Scaled to total 100%



Source: BIS consolidated statistics, quarterly data as from December 1999.

Figure 4
Financing requirements

In billions of US dollars



Source: BIS consolidated statistics, quarterly data as from December 1999.

The BIS statistics provide the only source of standard data on the remaining maturity of bank loans and international bond issues. In combination with IMF statistics on foreign reserves, they allow us to see how well countries or regions satisfy the Guidotti-Greenspan criterion. As can be seen in Figure 5, four countries hit by the Asian crisis failed to satisfy this criterion between 1994 and 1997. Latin America also fell below this benchmark around 2000, while Russia was below it until that year. The situation has changed considerably, foreign reserves now substantially exceed external debt in most emerging market economies. Turkey's foreign reserve cover has recently hovered near 100%.

Asian countries vulnerable in 19972 Latin America 400 250 Latin America<sup>3</sup> \_ Brazil 300 200 200 150 100 100 50 2001 2003 2005 2001 2003 2005 Three large Asian economies<sup>4</sup> Russia and Turkey 1,250 600 Russia Turkey 1,000 400 750 200 500

Figure 5
Foreign exchange reserves as a percentage of short-term external debt<sup>1</sup>

<sup>1</sup> Short-term external debt defined as short-term liabilities to BIS reporting banks: consolidated cross-border claims to all BIS reporting banks on countries outside the reporting area with a maturity up to and including one year plus international debt securities outstanding with a maturity of up to one year. <sup>2</sup> Asian countries whose reserves were less than short-term external debt in 1997, ie Indonesia, Korea the Philippines and Thailand. <sup>3</sup> Brazil, Chile, Colombia, Mexico, Peru and Venezuela. <sup>4</sup> China, India and Taiwan (China). Sources: IMF; national data; BIS.

250

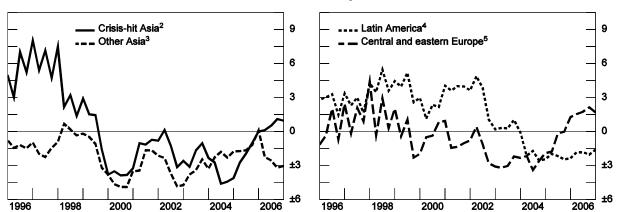
#### 2.3.2 CGFS vulnerability indicators

The CGFS has selected a series of indicators to track potential vulnerabilities in emerging market economies, focusing on exchange market pressure, external sector vulnerability and banking sector vulnerability (see Hawkins and Klau (2000)). The external vulnerability index includes 3 indicators pertaining to external debt (international bond and bank debt as a percentage of GDP, level and percentage change over 2 years) and short-term debt as a percentage of foreign reserves, the ratio discussed under Section 2.3.1 above. BIS data on liabilities to international banks and on international bonds outstanding are available more frequently, are more timely, and are more internationally comparable than data on other forms of external debt, at least for many countries which do not report SDDS data.

Moreover, changes in such positions can be important in year-to-year movements in the financial account of the balance of payments, and especially during episodes of financial stress (eg the Asian crisis). Figure 6 reveals recent trends in indices of external vulnerability, of which BIS data on external debt form a part.

<sup>6</sup> The other indicators are the real effective exchange rate, the current account balance and export growth.

Figure 6
External vulnerability indices<sup>1</sup>



<sup>&</sup>lt;sup>1</sup> An increase in the index (expressed as a weighted average, based on 2000 GDP and PPP exchange rates of the economies in each group) implies an increase in risk. <sup>2</sup> Indonesia, Korea, Malaysia, the Philippines and Thailand. <sup>3</sup> China, Hong Kong SAR, India, Singapore and Taiwan (China). <sup>4</sup> Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. <sup>5</sup> The Czech Republic, Hungary, Poland, Russia and Turkey.

Sources: IMF; national data; BIS calculations.

#### 2.3.3 Currency mismatch

An important source of vulnerability in emerging markets is that some borrowers whose earnings are in local currency engage in unhedged foreign currency borrowing. The resulting currency mismatch implies that a sharp depreciation of the currency can raise the debt burden considerably. For example, around the time of the Asian crisis, the Indonesian corporate sector had borrowed heavily in foreign currency. When the rupiah crawling peg collapsed, many of these firms went bankrupt, weakening their creditors (domestic banks). Goldstein and Turner (2004) use BIS statistics to construct a measure for currency mismatches and to quantify a country's exposure to an exchange rate shock. One potential limitation is that a mismatch on the balance sheet can be identified but not the extent to which the position has been hedged. In spite of this, the information can be useful. The presence of large mismatches would highlight the need to see the extent to which hedging does in fact take place. In a number of cases (eg Indonesia in 1997), it was apparent that hedging was too costly and did not occur; many Indonesian firms that borrowed from abroad could not service their debts. Also, when a systemic crisis occurs, the financial position of the providers of hedges may also be impaired. Large mismatches would point to the need to examine these issues with some care.

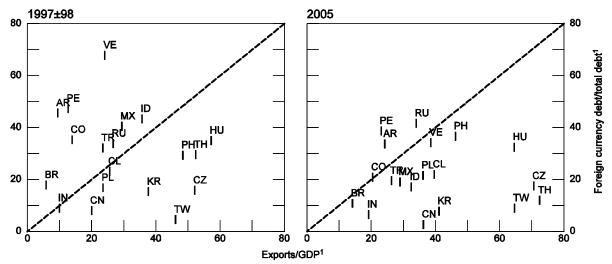
A key ratio is the ratio between the currency denomination of debt and the share of tradables in GDP. More precisely, the currency mismatch (CURMISM) equals the ratio of the foreign currency share of total debt (FC%TD) to the ratio of exports to GDP (X/Y).<sup>8</sup> That is,

$$CURMISM = \frac{FC\%TD}{X/Y}.$$

In line with this, Allayanis, Brown and Klapper (2000) find that firms in East Asia tended to use foreign earnings as a substitute for hedging with derivatives and that during the Asian crisis firms that hedged with derivatives did no better than firms that did not hedge. For further discussion see Moreno (2007).

The formula is  $FC\%TD = \frac{NBKL\$ + BKL\$ + DCP\$ + IB\$ + DB\$}{NBKL + BKL + DCP + IB + DB}$  where \$ refers to debt denominated in foreign currency and NBKL is liabilities of non-banks (cross-border) to BIS reporting banks, in all currencies, BKL is liabilities of banks (cross-border) to BIS reporting banks in all currencies; DCP is domestic credit to the private sector (line 32 of monetary survey of IMF IFS); IB is international debt securities (bonds) outstanding in all

Figure 7
Indicator of currency mismatch



<sup>1</sup> In per cent. Data for Malaysia (not shown) for exports/GDP and foreign currency debt/total debt are 105% and 16% for 1997-98 and 123% and 15% for 2005, respectively.

Sources: IMF: BIS.

If this ratio is large – that is, there is relatively more foreign currency debt than foreign currency earnings to finance it – then a country could have a problem. In Figure 7, a threshold of unity (the 45° line) is used to separate the more vulnerable countries. As can be seen, there has been a broad improvement in currency mismatch positions as countries have generally moved to the right of the 45° line between 1997-98 and 2005.

#### 2.3.4 Credit linkages

Many emerging market financial crises in the 1990s quickly spread to other countries. By contrast, spillovers from the Argentina crisis in 2001-02 appear to have been much more limited. Trade and financial linkages are often found to be important determinants of spillovers. The BIS consolidated banking statistics, which contain information of bilateral flows between the reporting countries and the rest of the world, are naturally an important data source for gauging financial linkages. One interesting issue is the impact of countries sharing a "common bank lender" on the spread of a financial crisis. Assessment of emerging market economies' financial obligations has often been based on the consolidated crossborder bank lending data compiled by the BIS. A simple measure is to compare the shares of total claims to emerging market economies by major creditors. Table 2 shows that, for example, Spanish banks are important lenders to most Latin American countries, while UK banks have significant claims on a number of Asian economies. In the event of a crisis in one emerging market economy, the spillover depends on how major creditors respond. It may be that losses in emerging markets lead to withdrawals of lending predominantly to their large debtors; to all debtors proportionately; to those who appear similar in risk characteristics; or

currencies; and DB is domestic debt securities (bonds) outstanding in all currencies. In all baseline calculations, all domestic bonds and domestic bank loans (domestic credit) are assumed to be denominated in domestic currency (DB\$/DB = DCP\$/DCP = 0).

<sup>&</sup>lt;sup>9</sup> The preceding measure can be multiplied by a measure of the net foreign currency asset position for the economy, to construct a measure of the aggregate effective currency mismatch. This is a different concept from the net foreign asset position as it focuses on debt (equities and FDI are excluded) and where data are available, would take into account the balance sheet position in foreign currency onshore.

<sup>&</sup>lt;sup>10</sup> See Forbes and Rigobon (1999) for a review of the literature.

to none at all. Those most vulnerable to changes are likely to be the economies with high financial dependence on the same developed economy creditor.

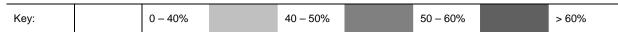
Table 2

Developed countries' claims on selected EMEs<sup>1</sup>

	Sweden	UK	Euro area <sup>2</sup>	Austria	France	Germany	Spain	Japan	US
Asia									
China	0.6	18.2	21.9	0.6	6.4	8.2	0.2	15.8	13.4
Hong Kong SAR	0.1	47.4	15.9	0.1	6.8	3.3	0.2	8.6	8.2
India	0.4	20.6	28.6	0.7	4.7	9.3	0.1	6.6	20.7
Indonesia	0.4	12.1	29.5	1.4	3.4	16.4	0.1	13.7	9.3
Korea	0.1	30.4	17.4	0.5	6.7	4.7	0.1	6.7	25.2
Malaysia	0.1	27.4	12.8	0.5	3.2	5.7	0.0	7.1	14.3
Philippines	1.1	13.9	28.8	1.1	11.2	9.1	0.2	9.0	17.2
Singapore	1.4	24.4	26.8	0.8	6.1	11.2	0.4	12.0	14.1
Taiwan, China	0.1	17.9	23.9	0.0	6.7	4.0	0.1	7.6	21.6
Thailand	0.1	15.8	14.6	0.4	4.4	6.6	0.0	27.2	16.7
Latin America									
Argentina	0.0	6.8	57.5	0.1	8.5	10.9	31.5	1.6	22.0
Brazil	0.2	12.6	56.0	0.2	4.0	4.2	23.0	2.7	16.0
Chile	0.6	3.3	66.9	0.1	3.3	4.8	53.1	1.8	19.2
Colombia	0.3	2.6	57.3	0.0	2.7	5.2	44.2	1.9	22.3
Mexico	0.2	10.0	49.3	0.2	1.4	2.2	42.0	1.2	29.8
Peru	0.2	2.6	63.0	0.0	1.9	5.9	52.0	2.3	17.0
Uruguay	0.6	6.7	49.6	0.7	2.2	6.2	17.1	1.7	22.7
Venezuela	0.3	4.4	78.1	0.1	7.6	11.6	53.2	2.1	7.9

<sup>&</sup>lt;sup>1</sup> Percentage of total foreign claims of each EME in 2006 Q1. <sup>2</sup> Includes Austria, Belgium, France, Germany, Ireland, Italy, the Netherlands, Portugal and Spain.

Source: BIS.



Van Rijckeghem and Weder (1999) estimate the similarity in the dependence of emerging market economies on common creditors for financing (see Chui, Hall and Taylor (2004)). One such measure is an index of relative fund competition (B) in third markets (subscript K) by two emerging market economies (subscripts i and j). This index has two terms. The first term captures the overall importance of the common lender (say UK banks) for the two emerging market economies, while the second term measures the extent to which the two emerging markets compete for bank loans from the common creditor. The index is designed to lie between 0 and 1 with a maximum value of 1 indicating countries that share the same set of common creditors. Table 3 shows index values for a number of emerging market

<sup>&</sup>lt;sup>11</sup> They do this by extending the approach used by Glick and Rose (1999) to measure trade linkages.

economies which share common creditors in 2006 Q1 in the form of a heat map. It is interesting to note that regional patterns can be observed in this fund competition index.<sup>12</sup>

Table 3
Index of international bank credit linkage (2006 Q1)

			Asia			Latin America						Other		
		China	Korea	Thailand	Argentina	Brazil	Chile	Mexico	Uruguay	Venezuela	Russia	South Africa	Turkey	
Asia	China													
	Korea	0.78												
	Thailand	0.82	0.73											
Latin	Argentina	0.59	0.62	0.54										
America	Brazil	0.54	0.56	0.48	0.67									
	Chile	0.41	0.47	0.39	0.75	0.61								
	Mexico	0.37	0.50	0.40	0.80	0.66	0.79							
	Uruguay	0.53	0.62	0.51	0.75	0.81	0.62	0.71						
	Venezuela	0.49	0.43	0.38	0.76	0.55	0.84	0.68	0.55					
Other	Russia	0.55	0.50	0.45	0.54	0.46	0.34	0.28	0.49	0.52				
	South Africa	0.53	0.59	0.51	0.35	0.38	0.27	0.27	0.33	0.34	0.36			
	Turkey	0.69	0.63	0.58	0.60	0.55	0.37	0.36	0.51	0.50	0.67	0.45		

K: Creditor countries: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, United Kingdom and United States. i and j: Emerging market economies.

Source: BIS consolidated banking statistics.

While the heat map creates a snapshot of potential vulnerability at a point in time, the development of the index for a given country pair over time provides information on the ebb and flow of credit concentrations. This has been plotted for Argentina and Uruguay in Figure 8. 13

Following very high creditor linkage during the Latin American debt crisis of the early 1980s, when both countries depended on US banks for almost all their credit, there is clear diversification of creditor origin during the early 1990s, followed by a return of US banks.

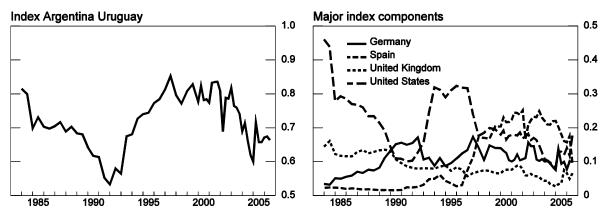
 $Index = \sum_{K} \left( \frac{B_{iK} + B_{jK}}{B_i + B_j} \right) \times \left\{ 1 - \left[ \frac{\left| \frac{B_{iK}}{B_i} - \frac{B_{jK}}{B_j} \right|}{\frac{B_{iK}}{B_i} + \frac{B_{jK}}{B_j}} \right] \right\}, i \neq j.$ 

<sup>&</sup>lt;sup>12</sup> The index formula is:

The index formula for the left-hand panel of Figure 8 is calculated taking *i* for Argentina and *j* for Uruguay, the *K* countries are in the note of Table 1. In the right-hand panel of Figure 8, the four lines are the 4 largest of the *K* components which sum to the index. For example, *K* is fixed at, say, country 5 and then the index is calculated through *i* and *j* for all periods.

These withdrew during the Asian crisis, resulting in a credit concentration from Spanish banks in both countries. Spanish banks retreated partially during the Argentine crisis, when the crisis spillover hit Uruguay, causing a temporary concentration of credit on German banks. In the most recent past, the index indicates that both countries have stabilised their credit source concentration at a fairly low level.

Figure 8
Credit linkages



Source: BIS consolidated statistics, quarterly data as from December 1999.

#### 3. Conclusions

BIS statistics have a wide range of applications. They made up for gaps in other data or indicators at the time that they were introduced. This has resulted in cooperative efforts to improve national debt reporting systems (eg non-bank BoP flows) that now systematically rely on or are cross-checked with BIS statistics. We have provided examples of certain types of analysis that can only be done systematically and in a timely fashion using BIS statistics.

Looking ahead two issues arise. First, whether some of the BIS data will be superseded by data compilations elsewhere. Second, the possibilities for enhancing BIS data. For example, before the introduction of the Euro, the CGFS examined whether the currency breakdown in the banking statistics could be streamlined. The resulting distortions in the data were, however, regarded as unacceptable. Instead, today one might consider expanding the currency breakdown with currencies used in important emerging economies, in cases where these data are available without additional reporting burden. Apart from this, policy makers may identify new information needs (eg on hedge funds) that warrant the compilation of new types of BIS statistics to address new types of risks.

#### References

Allayannis, G, G W Brown and L F Klapper (2000). "Exchange rate risk management evidence from East Asia," The World Bank, Policy Research Working Paper Series: 2606.

Bussiere, M and M Fratzscher (2006). "Towards a new early warning system of financial crises," *Journal of International Money and Finance*, Vol 25, pp 953–73.

Committee on the Global Financial System. (2005). Foreign direct investment in the financial sector - experiences in Asia, central and eastern Europe and Latin America, CGFS Publications no 25, June.

Chui, M, S Hall and A Taylor (2004). "Crisis spillovers in emerging market economies. interlinkages, vulnerabilities and investor behaviour," Bank of England Working Paper no 212.

Forbes, K and R Rigobon (1999). "Measuring contagion. conceptual and empirical issues," paper for UNU-WIDER conference on Financial Contagion, 19–20 November.

Glick, R and A Rose (1999). "Contagion and trade. Why are currency crises regional?" *Journal of International Money and Finance*, Vol 18, pp 603–18.

Goldstein, M and P Turner (2004). *Controlling currency mismatches in emerging markets*, Institute for International Economics, Washington DC.

Hawkins, J and M Klau (2000). "Measuring potential vulnerabilities in emerging market economies," BIS Working Papers no 91.

Lane, P and G M Milesi-Ferretti, 2006. "Europe and global imbalances," mimeo.

Moreno, R and A Villar (2005). "The increased role of foreign bank entry in emerging markets." In *Globalisation and monetary policy in emerging markets*. BIS Papers no 23, May.

Moreno, R, (2007). "Experiences with current account deficits in Southeast Asia," paper presented at the Tenth Annual Conference of the Central Bank of Chile on "Current account and external financing", Santiago, Chile, 9–10 November 2006. To be published in volume of proceedings (*forthcoming*).

Rosenberg, C, L Halikias, B House, C Keller, J Nystedt, A Pitt and B Setser (2005). "Debtrelated vulnerabilities and financial crises: An application of the balance sheet approach to emerging market countries," IMF Occasional Paper 240, Washington DC. International Monetary Fund.

Union Bank of Switzerland (1995). "Union Bank of Switzerland country report: Indonesia. No policy ease in sight," December.

Van Rijckeghem, C and B Weder (1999). "Sources of contagion. finance or trade?," IMF Working Paper, no 99/147, October.

Von Kleist, K (2002). "Comparison of creditor and debtor data on short-term external debt," BIS Papers, no 13, pp 5–45.

The World Bank (1999). Global development finance country tables, World Bank, Washington, DC.