

The development of money markets in Asia¹

The depth and breadth of money markets in Asia have improved significantly over the past decade, yet many are still characterised by segmentation and a low degree of cross-border integration. Admittedly, the underdevelopment of Asia's money markets worked to the region's advantage during the recent turmoil by insulating it to some degree from the shocks that disrupted more developed money markets. Nonetheless, the turmoil provides authorities and market participants in Asia with an opportunity to learn from experiences elsewhere in their efforts to realise the full benefits offered by well functioning money markets.

JEL classification: E44, E52, E58, F42.

Money markets in much of Asia were not significantly affected by the events that disrupted US dollar and euro money markets beginning in mid-2007. In contrast to the situation in North America and Europe, money markets in Asia functioned normally in the second half of 2007 and first half of 2008, and monetary authorities in Asia had no cause to take special actions to stabilise them.²

Although the relative stability of the region's markets was clearly welcome, it stemmed in part from structural weaknesses. The depth and breadth of money markets in Asia have improved significantly over the past decade, yet many of the region's money markets remain characterised by segmentation and a low degree of cross-border integration. These weaknesses helped to insulate the markets from the recent global market turbulence. Nonetheless, the turmoil provides authorities and market participants in Asia with an opportunity to learn from experiences elsewhere in their efforts to realise the full benefits offered by well functioning money markets.

Money markets – conventionally defined as the markets for short-term debt funding of financial and non-financial corporations – perform a number of

¹ The authors are grateful to Claudio Borio, Stephen Cecchetti, Corrinne Ho, Frank Packer, Eli Remolona and Ilhyock Shim for useful discussions and comments. We thank Jhuvesh Sobrun for excellent research assistance. The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS.

² See Borio (2008), Cecchetti (2008) and Chapter VI of BIS (2008) for overviews of the turbulence in global money markets since mid-2007. Borio and Nelson (2008) and the Committee on the Global Financial System (2008) discuss the impact of the turmoil on the conduct of central bank operations.

vital economic functions. They help banks to match short-term assets and liabilities, securities dealers to finance their positions and non-financial corporations to smooth fluctuations in their working capital needs. Furthermore, the availability of benchmark money market rates is required for the functioning of a wide range of derivatives markets, including interest rate swap markets. Well developed money markets also facilitate central banks' task of implementing their monetary policy objectives, regardless of whether they have formal interest rate targets. Therefore, money markets are integral to the maintenance of macroeconomic and financial stability.

In this special feature, we first provide an overview of money markets in the Asia-Pacific region and then describe how central banks and monetary authorities in the region utilise money markets in the implementation of their policies. We go on to consider why Asian money markets were less disrupted than US and European markets during the global market turmoil of 2007–08. The concluding section outlines possible ways for central banks to help strengthen the resilience of Asian money markets even as these markets become more integrated into the global financial system.

Overview of Asia-Pacific money markets

There is significant heterogeneity in the structures of money markets across the Asia-Pacific region. With only a few exceptions, they are smaller relative to the size of their economies than those in the United States and Europe. Broadly speaking, cash markets for short-term debt securities tend to be the most developed in the region, followed by interbank markets. Repo and foreign exchange (FX) swap markets are, in most economies, the least developed.

Some money markets, including those of Australia and Japan, are closely integrated both with the domestic economy and with international financial markets. Others, such as the Chinese market, are integrated much less. The Australian and New Zealand onshore money markets are among the most internationalised, with significant participation by foreign borrowers and investors; this partly reflects strong demand among foreign investors for securities denominated in higher-yielding currencies. Borrowing in most other markets in the region is dominated by local entities; however, where their participation is not prohibited, foreigners are often important investors.

Markets for short-term securities

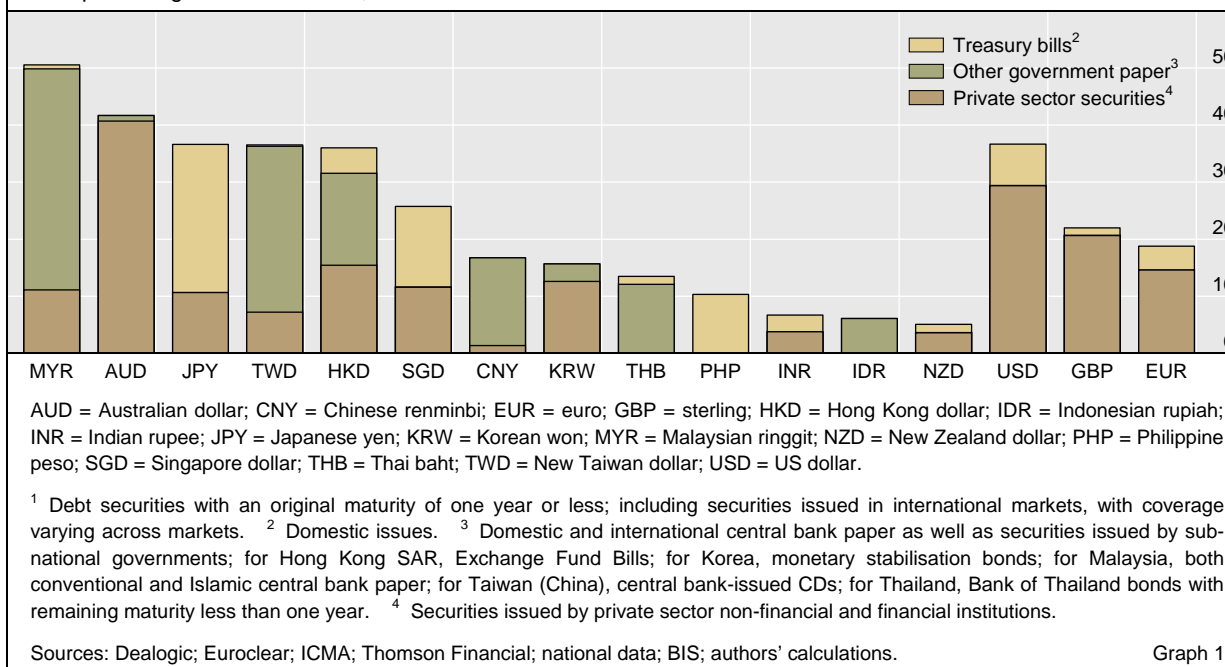
Treasury bill markets in the region are, with the exception of Japan and the Philippines, comparatively small (Graph 1). Governments in a number of Asia-Pacific economies have posted fiscal surpluses for several years and only maintain treasury bill programmes to assist with cash management. Some governments, including that of Singapore, deliberately overfund to support the functioning of other financial markets.

Issuance by the monetary authorities themselves, however, has been increasing rapidly. In particular, the monetary authorities of China, Hong Kong SAR, Indonesia, Korea, Malaysia, Taiwan (China) and Thailand have issued large amounts of bills in recent years. In several of these economies,

Treasury bill
markets are
generally small ...

Outstanding short-term debt securities¹

As a percentage of nominal GDP, at end-2007



the central bank bill market now exceeds in size other segments of the money markets, or even long-term government bond markets. Except for in Hong Kong, the main driver of this growth in recent years has been the sterilisation of foreign exchange operations.

... and private sector CP issuance is widespread

Markets for private sector commercial paper (CP), including asset-backed commercial paper, negotiable certificates of deposit (CDs), and other short-term debt securities such as bills of exchange and various promissory notes, have existed for many years in almost all Asia-Pacific economies. Banks as well as non-financial corporations are active participants in these markets. In Australia, Hong Kong, Singapore and New Zealand, the amounts outstanding in this segment of the money market are as large or larger than those for government or central bank bills, and issuance is dominated by banks and other financial institutions. In Japan, issuance of short-term paper is dominated by non-financial issuers. In China and India, this segment is still small but is growing rapidly, driven mainly by issuance by non-financial corporations. In Korea, the CP market has struggled to recover from the turmoil of 2003, when demand for paper issued by credit card companies collapsed.³ In Malaysia, the quantity of outstanding Islamic (sharia-compliant) money market paper is about as large as that of conventional (interest-bearing) short-term securities.

Interbank markets

Interbank activity is significant in Hong Kong SAR and Singapore ...

Active markets for uncollateralised interbank funding exist across the Asia-Pacific region. These are well developed in Hong Kong and Singapore, where claims against financial institutions exceed 30% of banks' total assets

³ See Kang and Ma (2007) for an examination of the credit card crisis in Korea.

(Graph 2, left-hand panel). In these two centres, a large foreign currency denominated money market coexists with the local currency market.

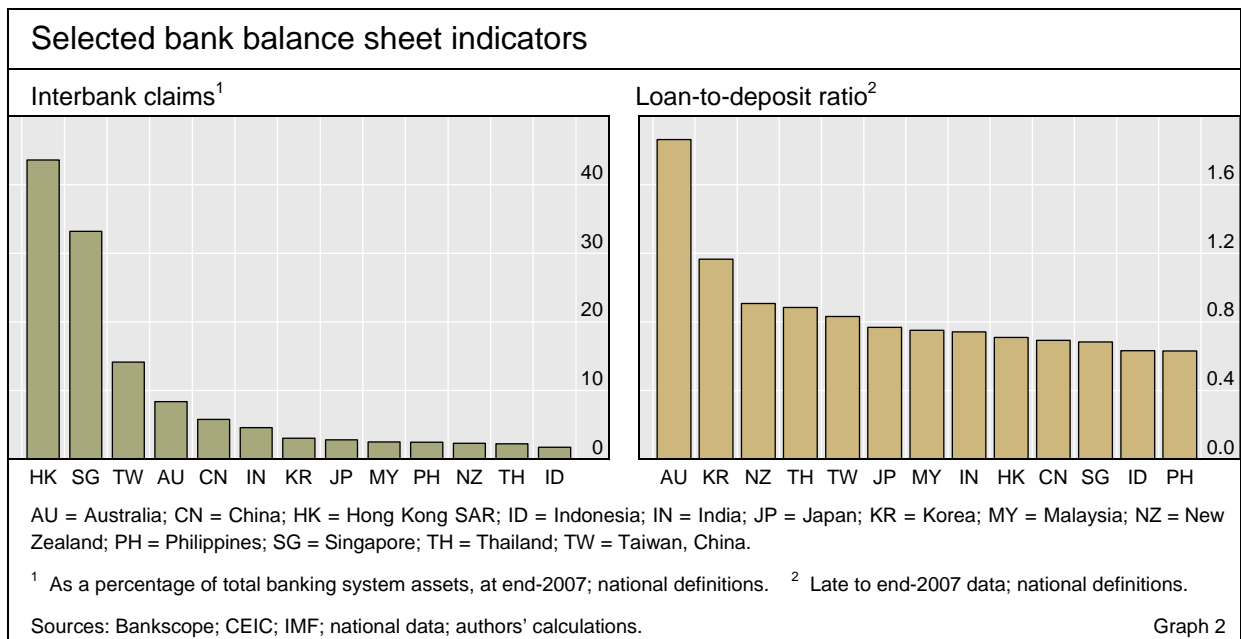
In other Asian banking systems, interbank claims account for a substantially smaller proportion of assets. Moreover, interbank borrowing and lending are concentrated in the overnight segment to a far greater extent than is the case in more developed interbank markets. Interbank rates are often quoted for maturities as long as 12 months, but in most markets hardly any transactions take place beyond a few weeks.

An indication of the lack of depth in some of the term interbank markets in the region is the use of very short-term or even swap-implied interest rates as the reference floating rate leg in interest rate swap (IRS) contracts, instead of the three- or six-month interbank rates typically employed in the US dollar, euro and yen markets. For instance, the floating rate leg of renminbi IRS is linked to the seven-day repo rate because repo markets are more active than term interbank markets in China. For a similar reason, Philippine peso IRS are referenced to interest rates implied by FX swaps.

... while term interbank lending in many economies is limited

One explanation for why term interbank markets have failed to develop in many Asia-Pacific economies is that, in recent years, their banking systems have been well supplied overall with liquid local currency assets. An indicator of this feature is that, with the exception of Australia and Korea, deposits exceed outstanding loans in banking systems across the region (Graph 2, right-hand panel).

Despite ample liquidity in the aggregate, banks facing a funding gap often report difficulties obtaining sufficient funds in the uncollateralised interbank market. Banks with surplus cash frequently prefer to deposit it with the central bank or buy government securities rather than lend it out in the interbank market. Such credit rationing is, in some circumstances, appropriate. Even in the most developed markets for short-term credit, rationing rather than repricing is the common response to uncertainty regarding credit quality, perhaps because of the heightened importance of adverse selection during



periods of uncertainty. However, in Asian interbank markets, creditworthiness is not necessarily the main constraint on banks' access to funding. Foreign banks, many of which have higher credit ratings than locally headquartered ones, are prominent among those that report having difficulty accessing local interbank markets.

Institutional impediments make some money market participants either unwilling or unable to transact with other participants at prevailing interest rates. These impediments include controls on lending to or borrowing from offshore entities and rules governing the use of the central bank's standing facilities. In some cases, segmentation also arises from anticompetitive practices: for example, established banks might seek to undermine the growth of rivals by declining to place surplus funds with them.

Repo and FX swap markets

The growth of collateralised markets in Asia and the Pacific lags well behind improvements in uncollateralised money markets. Repo markets, where loans are secured against securities, are among the most important markets for collateralised short-term financing, particularly for securities dealers, which tend to hold large stocks of eligible collateral.⁴ Australia and Japan have large, active repo markets. In several other economies in the region, participation in repo markets by private financial institutions is limited to transacting with the central bank.

Repo activity is impeded by the lack of an appropriate legal framework

One impediment to the development of repo markets in the region may be the lack of an appropriate legal framework. To the extent that private financial institutions conduct repos with each other, lenders at times behave as if such transactions were not truly secured, as they reportedly impose unusually strict credit limits on their counterparties. This may be due in part to settlement risk, but may also stem from untested legal frameworks or master agreements that fail to provide certainty about which counterparty owns the collateral in the event of default.

Restrictions on short selling of securities also inhibit repo market activity. In well developed markets, it is common for financial institutions to position for changes in interest rates by first borrowing certain securities in the repo market and then short selling them. Corporate bond dealers commonly hedge their inventories of newly issued bonds through short sales of government securities with comparable duration characteristics. Restrictions on short selling are gradually being eased, but in many Asia-Pacific economies there are still limits on the types of institutions that are allowed to short sell securities, as well as outright prohibitions on the short selling of securities which the institution has not yet borrowed.

Another obstacle to the development of repo markets in some economies in the region is a lack of arrangements that would allow the use of a wider

⁴ The term "repo" is used in this article in a broad sense, to denote "ordinary" reverse purchase transactions as well as reverse repos, matched sale-purchases and reverse matched sale-purchases, where collateral is denominated in domestic currency and frequently (though not necessarily) made up of government or sub-government securities.

range of assets that could serve as collateral. For now, securities issued by the central government typically constitute the preferred base of suitable collateral. This is in part because such securities are often seen as being virtually free of credit risk, and so disagreements over the required haircut are minimised. The fact that such securities also tend to be held in custody at the central bank as book entry securities facilitates the settlement of repo transactions. In some Asia-Pacific economies, the availability of such low-risk collateral is declining because of fiscal surpluses. To the extent that the central bank itself has been running out of such assets on its balance sheet, it has often issued its own paper, which may in turn serve as collateral in repo transactions.

FX swap markets are an alternative source of secured financing. FX swaps can be thought of as loans secured with foreign currency. They tend to be an especially important source of short-term financing for foreign financial institutions with limited access to retail deposits or the interbank market.

The use of FX swap contracts as money market instruments varies widely across the region. In Australia, Hong Kong, Japan, New Zealand and Singapore, they are an integral part of the domestic money markets, and the turnover of FX swaps referencing these four currencies is large (Table 1). In other Asia-Pacific economies, activity in FX swap markets is quite limited, reflecting both controls on capital flows and restrictions on the participation of non-resident investors in the local money markets.

FX swaps are actively traded in only a few economies in the region

Turnover in derivatives markets				
Average daily trading volume in April 2007, in millions of US dollars				
	FX swaps ¹	Interest rate derivatives		
		Money market futures ²	Forward rate agreements ¹	Options ¹
AUD	131,998	123,613	3,195	1,480
CNY	1,078	0	0	34
HKD	63,895	128	49	366
IDR	560	0	0	1
INR	6,303	0	0	165
JPY	242,319	135,873	3,882	23,121
KRW	8,812	0	253	602
MYR	1,190	235	0	101
NZD	34,828	5,700	1,046	43
PHP	1,053	0	0	0
SGD	26,209	12	346	1,056
THB	4,325	0	14	38
TWD	1,438	0	0	391
<i>Memo:</i>				
<i>USD</i>	<i>1,580,594</i>	<i>2,097,927</i>	<i>97,903</i>	<i>112,857</i>
<i>EUR</i>	<i>581,977</i>	<i>952,718</i>	<i>66,492</i>	<i>61,795</i>
<i>GBP</i>	<i>264,593</i>	<i>373,099</i>	<i>41,606</i>	<i>6,184</i>

Refer to Graph 1 for an explanation of the currency abbreviations.

¹ Turnover in over-the-counter derivatives markets, adjusted for local and cross-border inter-dealer double-counting. ² Turnover on organised exchanges worldwide of contracts on short-term interest rates.

Sources: FOW TRADEdata; Futures Industry Association; national data; BIS.

Table 1

Interest rate derivatives

Money market futures and forwards are in their infancy

Interest rate derivatives markets in much of the Asia-Pacific region are in their infancy, constrained by some of the same impediments affecting repo markets. Futures contracts on short-term interest rates are listed on exchanges in several of the region's economies. However, aside from yen, Australian dollar and New Zealand dollar contracts, they are not widely traded (Table 1). Among the other Asia-Pacific currencies, the only money market futures contracts for which turnover has increased in recent years are those on the Malaysian ringgit. In contrast to most other interest rate futures contracts in the region, ringgit futures reference the same rate as ringgit IRS – the onshore three-month interbank rate – and thus futures market activity is boosted by the ability to hedge or position in either instrument.

Forward rate agreements (FRAs) are the over-the-counter equivalent of money market futures. There is significant activity in yen and Australian dollar FRAs (Table 1). Singapore dollar interest rate derivatives are also relatively widely traded, especially options contracts. In other Asia-Pacific currencies, OTC interest rate derivatives activity is negligible.

Central bank operations in money markets

The development and functioning of money markets are influenced in part by central banks' monetary policy operations. The very fact that a central bank chooses to operate in one segment of money markets rather than another – or indeed chooses to operate in money markets rather than rely on non-market instruments such as credit controls – gives rise to trading activity and thereby influences the depth and overall development of money markets.

Central banks in the region rely increasingly on money markets ...

In recent years, central banks in the Asia-Pacific region have increasingly come to conduct the operations that implement their policy objectives in money markets. Many have also begun to specify their policy targets in terms of money market rates. In the 10 economies in the region where the monetary authority at present has a short-term interest rate target, there is considerable diversity in the ways these targets are specified and how monetary operations are conducted (Table 2).⁵ Many specify their target in terms of an unsecured interbank rate, yet operate in a different market. In New Zealand, for example, the official cash rate is set in the interbank market while operations are conducted largely in the FX swap market. One exception is Malaysia, where both the policy target and the central bank's main operations are in the interbank market.

... especially repo markets

Central banks in the region are making greater use of repo markets. In India and the Philippines, the central bank announces a corridor or target range

⁵ The three monetary authorities in the region that do not implement policy primarily through money market targets and operations are those of China, Hong Kong and Singapore. The Chinese authorities announce targets for one-year deposit and lending reference rates and also influence banks' minimum required reserve ratios. Hong Kong has a currency board system based on a target for the nominal HKD/USD spot rate. The Monetary Authority of Singapore announces targets and rates of adjustment for the nominal effective exchange rate of the Singapore dollar.

Key policy rates and main operating instruments			
	Key policy rate	Type	Main operating instruments
Australia	Target cash rate	Interbank	RPs
India	Repo and reverse repo rates	Repo	RPs
Indonesia	Overnight rate	Interbank	SBI auctions, RPs
Japan	Call money rate	Interbank	RPs
Korea	Repo rate	Repo	MSB sales
Malaysia	Overnight policy rate	Interbank	Interbank transactions
New Zealand	Official cash rate	Interbank	FX swaps
Philippines	Overnight repo rates	Repo	RPs
Taiwan, China	Discount rate	Interbank	CDs and NCDs
Thailand	Repo rate	Repo	RPs

CDs = certificates of deposit; MSBs = monetary stabilisation bonds; NCDs = negotiable certificates of deposit; RPs = repos and reverse repos; SBI = Sertifikat Bank Indonesia (one- to six-month Bank Indonesia bills).

Sources: Ho (2008); authors' updates. Table 2

for repo rates and also conducts its operations in the repo market. In June 2008, Bank Indonesia switched to targeting the overnight call rate and conducting repo operations. Balance sheet considerations may limit the ability of a monetary authority to achieve its operational targets by means of reverse repos and outright sales of securities, if such actions are deemed necessary to drain a sufficient amount of reserves from the financial system. However, it is possible to circumvent this obstacle by letting the central bank issue its own debt securities – a path that has been taken by several of the central banks in the region, including those of China, Malaysia and Thailand.

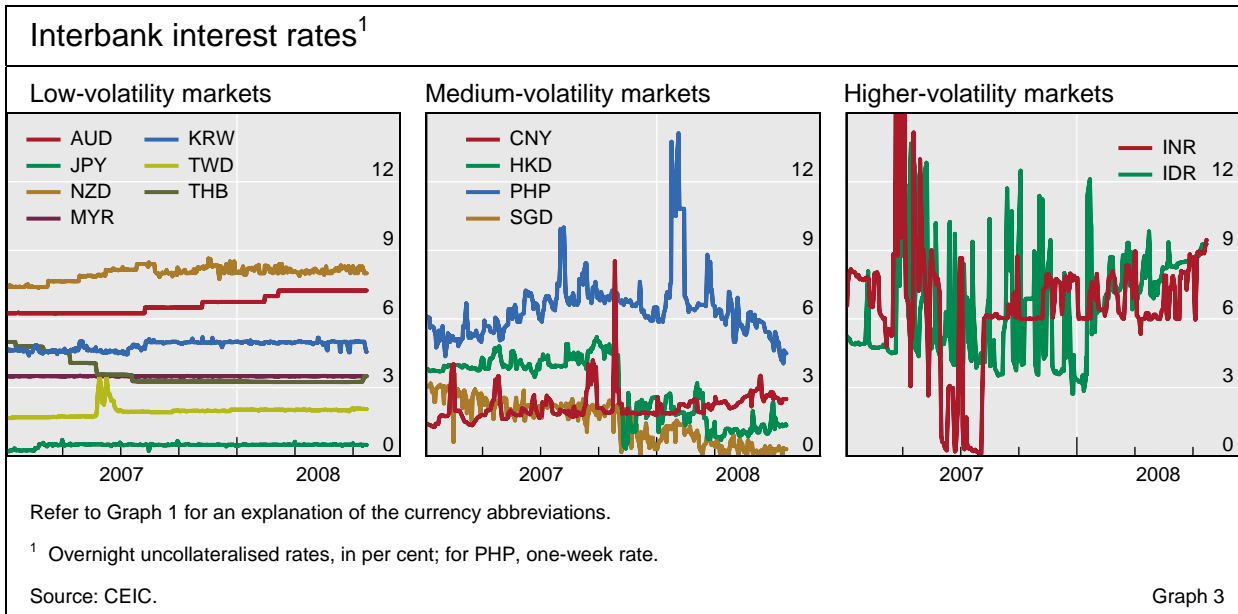
Many central banks in the region also operate in the FX swap market. Often these operations are designed to offset changes in aggregate reserves that would result from foreign exchange intervention operations (which are generally carried out in the spot FX markets). In some cases, they are a key operating instrument. The Reserve Bank of Australia used to operate primarily in the domestic repo market to achieve its target for the interbank rate but since the early 2000s has made greater use of FX swaps.

Although the participation of the central bank in a given market segment tends to boost activity, there can be costs. If the central bank is the dominant participant in the market, its presence may actually stifle transactions between private financial institutions. For instance, in Thailand the active role of the central bank in the repo market was perceived as contributing to a crowding out of other participants. To counteract this problem, in November 2007 the Bank of Thailand announced measures intended to reduce its own role in the repo market and to encourage increased activity among private sector participants.

Central banks' presence can stifle activity among private sector participants

Differences in monetary regimes and operations contribute to significant differences in the volatility of overnight interbank rates in the region (Graph 3).⁶ The monetary authorities of Hong Kong SAR and Singapore do not

⁶ We focus here on the volatility of overnight interbank rates because activity in the term interbank markets is limited in most economies in the region.



have interest rates as their operating targets and so accept greater volatility in overnight rates. In contrast, where the central bank targets a money market rate, overnight rates tend to be less volatile. Structural weaknesses in liquidity management practices in the Indian and Indonesian money markets have, at times, exacerbated volatility in rupee and rupiah overnight rates.⁷ Since June 2008, when Bank Indonesia switched to targeting the overnight call rate, the volatility of the overnight rupiah rate has declined markedly.

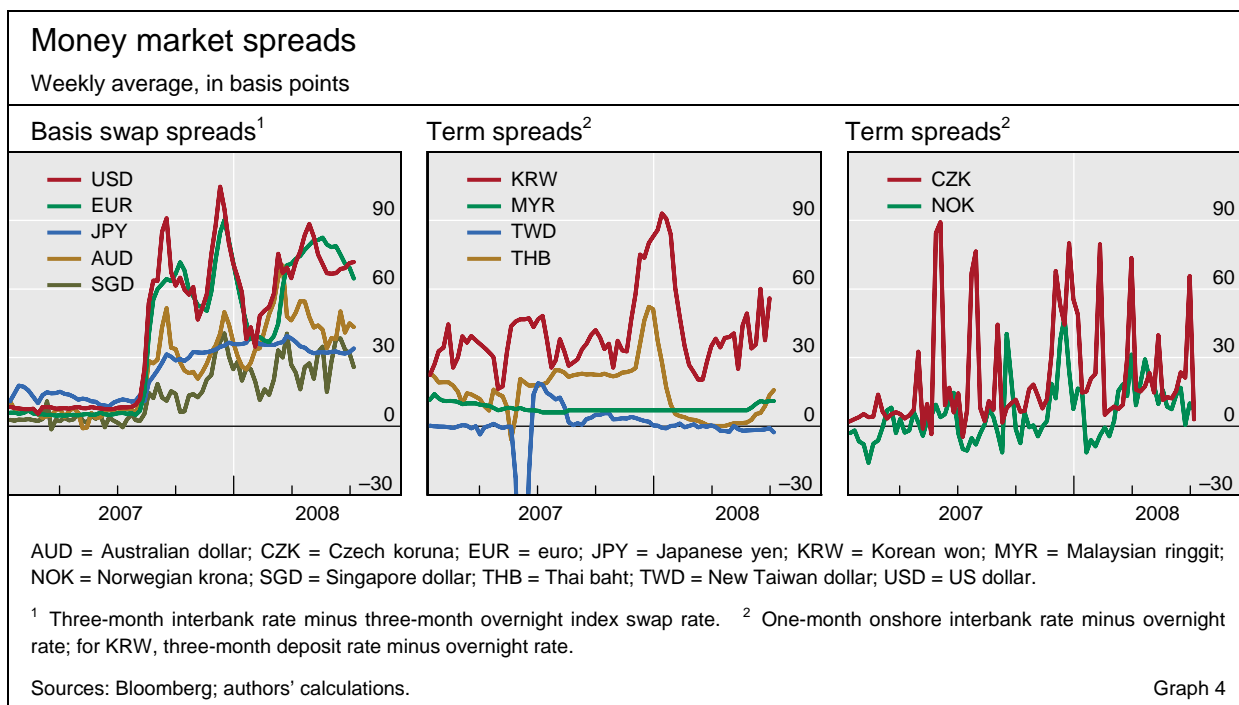
Resilience of Asian money markets to the global turmoil

Problems in credit markets led to severe strains in some of the most developed money markets in the world in the second half of 2007 and the first half of 2008. The spread between interbank rates and overnight index swap (OIS) rates – a measure of credit and liquidity premia in interbank markets – illustrates the severity of the situation: in US dollar, euro and sterling money markets, this spread widened sharply in August 2007 and was both unusually high and volatile for many months afterwards (Graph 4, left-hand panel).

In contrast to developments in US and European money markets, Asia-Pacific money markets remained relatively stable. In the few places where there was both a three-month interbank market and a market for overnight index swaps, the interbank-OIS spread widened modestly (Graph 4, left-hand panel). In many others, there was little or no change in the relationship between different short-term interest rates. For example, the term spread

Asian money markets remained relatively stable despite disruptions elsewhere ...

⁷ For instance, in late March 2007 a calendar-related temporary increase in demand for central bank reserves in India coincided with a dip in the supply of reserves, and as a result the overnight rupee rate spiked up briefly to about 60%. The overnight rate subsequently fell back to within the interest rate corridor maintained by the Reserve Bank of India. In the second quarter of 2007, the Reserve Bank temporarily suspended its reverse repo operations. As a result – and because of continued heavy capital inflows – the overnight rupee interbank rate fell to near zero. Overnight rates rose again after reverse repos resumed early in the third quarter of 2007.



between one-month and overnight interbank rates in the Thai baht and Taiwanese dollar markets was relatively stable until December 2007 and deteriorated only moderately, if at all, in the first half of 2008 (Graph 4, centre panel). Term spreads in the Korean won market widened towards the end of 2007. However, this move was driven by the Korean authorities' efforts to slow the growth of short-term foreign currency borrowing rather than by spillovers from abroad.

Restrictions on cross-border financial activity in some Asian emerging economies were one reason for the resilience of their money markets to shocks in the major markets. Capital mobility is lower in Asia than in most other emerging markets (García-Herrero and Wooldridge (2007)). Those Asia-Pacific markets that were most disrupted tended to be the ones most closely integrated with international markets, in particular the Australian dollar, yen, New Zealand dollar and Singapore dollar markets.

However, weak cross-border ties do not fully explain the relative lack of contagion to Asia-Pacific money markets. Some highly integrated and open financial systems, such as those of the Czech Republic and Norway, were also not affected strongly by the recent turmoil in major markets (Graph 4, right-hand panel).⁸ This indicates that other features of the financial system may have been as important as capital controls in insulating Asian markets from the turmoil.

⁸ In both the Czech Republic and Norway, capital accounts are liberalised and foreign entities are active in the domestic financial markets. Even though foreign banks tapped the koruna and krone markets for funding and local banks refinanced maturing foreign currency obligations in the local market, these activities did not cause serious disruptions. Norwegian krone and Czech koruna term spreads were relatively stable in August and September 2007 during the early phases of the turmoil; they widened on a prolonged basis only towards the end of 2007, and fell back after the turn of the calendar year. So far in 2008, they have also shown little sign of marked widening.

... thanks to features of Asian financial systems ...

One such feature is the greater reliance of Asian banking systems on deposits rather than interbank or capital markets for funds. Banks in Malaysia, the Philippines and Thailand, for example, are net creditors in the international banking system (McCauley and Zukunft (2008)). Consequently, the structure of their liabilities was less vulnerable to the global repricing of risk than those banks dependent on wholesale funding.

Furthermore, Asia-Pacific banks had limited exposure to structured credit products and other assets which were behind large losses at international banks. Admittedly, some Asian banks announced larger than expected losses or writedowns. Nevertheless, unlike in the case of some US and European banks, the size of these exposures was not large.⁹ For example, in June 2007, the notional principal of synthetic collateralised debt obligations held by banks headquartered in non-Japan Asia equalled a mere 0.1% of these banks' total assets, compared to about 40% of assets for G10 banks collectively.¹⁰

Similarly, the vast majority of Asian banks did not sponsor CP conduits or follow the originate-to-distribute business model of many international banks. Therefore, Asian banks did not face the risk of being called upon to refinance the conduits' maturing short-term obligations that could no longer be rolled over after asset-backed CP markets seized up, and they were not left holding assets that they had expected to securitise and move off their balance sheets. Securing financing for an unexpected expansion of assets was correspondingly less of a worry among Asian banks.

... and the shallowness of Asian money markets

Finally, the shallowness of many Asian money markets limited their attractiveness as a source of financing for foreign financial institutions. The FX swap market was an important channel through which shocks in the US dollar market were transmitted to other markets (Baba et al (2008)). However, as discussed earlier, foreign banks tend to have difficulty borrowing in Asian interbank markets, so tapping local markets to fund assets denominated in US dollars was unlikely to be a viable alternative. For most economies in non-Japan Asia, BIS data on foreign banks' local currency positions give no indication that these banks either scaled back their local assets or shifted financing from foreign markets to local ones in the second half of 2007 or the first part of 2008.

Conclusions

The underdevelopment of money markets arguably worked to Asia's advantage during the recent turmoil by insulating Asian financial systems and economies to some degree. That said, well functioning money markets bring many

⁹ Even though international banks announced far larger losses and writedowns than Asian banks, CDS spreads for Asian banks widened by as much as those of international banks. Changes in the risk appetite of global investors appear to explain this high degree of co-movement (Remolona and Shim (2008)).

¹⁰ Exposures arising from multi-name CDS portfolios are substantially smaller than the notional outstanding value of such portfolios. Such exposures are better approximated by market values. For G10 banks, gross market values at end-June 2007 equalled 1.7% of notional amounts outstanding.

economic and financial benefits, so it is in Asia's long-term self-interest to promote further development of these markets. Closer integration with foreign markets is an important part of this process.

If accompanied by appropriate policy and market reforms, integration need not increase Asian money markets' vulnerability to external shocks. The continued development of repo and FX swap markets is especially important, considering that activity in collateralised funding markets is usually the most resilient in the face of disruptions to other segments of the financial system. The turmoil has, however, demonstrated that even collateralised markets can be vulnerable to disruptions when trading conditions in related markets deteriorate. This highlights the dependence of money markets on the proper functioning of other segments of financial markets, including bond, equity and foreign exchange markets.

A recent report from the Committee on the Global Financial System (2008) recommends ways in which central banks could modify their monetary policy operations to cope flexibly and effectively with episodes of impaired money market functioning. These include having systems in place that allow central banks to conduct operations with an extensive set of counterparties and against a broad range of collateral, redesigning standing facilities in ways that reduce any stigma associated with borrowing directly from a central bank, establishing swap lines among central banks and other mechanisms that facilitate the international distribution of funds, and enhancing communications with market participants and the media. The resilience of money markets everywhere, Asia included, would be enhanced through the implementation of these recommendations.

Asia could learn from the experiences of central banks faced with impaired markets

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