Central bank instruments to deal with the effects of the crisis on emerging market economies

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The bankruptcy of Lehman Brothers on 15 September 2008 was accompanied by disruptions in financing to emerging market economies (EMEs), as reflected in the sharp declines in cross-border financing, the increases in sovereign spreads and the pressures in the foreign exchange and domestic financial markets.[2] Policymakers in EMEs responded to these developments by increasing foreign and domestic currency financing or liquidity.[3] They used a variety of tools, including central bank operations in the foreign exchange and domestic money markets, the establishment of financing facilities, guarantees, and changes in regulations, reserve requirements and policy rates. This paper discusses some of these tools, as well as their characteristics and effectiveness. It concludes by briefly reviewing what central banks have learned about the instruments at their disposal in dealing with a crisis.

I. Foreign currency financing

In response to the crisis, central banks sought to provide foreign currency financing or liquidity to the private sector in order to: ensure the continued operation of foreign exchange (FX) markets (eg by lowering the cost of foreign currency financing as reflected in the increases in FX swap-implied foreign currency rates); compensate for interruptions in the availability of external private financing (eg by compensating for the withdrawal of foreign loans and supporting FX liquidity management by domestic institutions, or by facilitating the rollover of external debt through guarantees or regulatory changes); and prevent disorderly exchange rate movements, particularly a downward spiral in the exchange rate.

EME central banks supplied foreign currency financing through intervention or operations in FX markets, as described below. These operations were scaled back in 2009 as FX markets stabilised. At least two aspects can be highlighted: (i) the specific measures used to improve foreign currency financing and the issues they raised; and (ii) whether the crisis altered the views of central banks on the role of FX reserves and exchange market intervention.

A. Measures to improve foreign currency financing

Some of the more important measures to improve foreign currency financing during the peak periods of turbulence may be summarised as follows.

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[2] See Moreno and Villar (2010).

[3] In this paper, "financing" will refer to operations by the central bank to supply foreign or domestic currency to markets (eg via FX market intervention or open market operations) as well as special lending facilities. An alternative term is "liquidity" provision.

- *Spot market transactions.* A number of central banks (eg in Chile, Colombia, Peru and Turkey) discontinued foreign reserve accumulation programmes and some sold foreign currency in the spot market (eg in Brazil, India and Mexico).[4] Data on spot FX market operations or intervention in some countries, notably in Asia, are not available. However, indirect data from forward positions suggest that, in some Southeast Asian countries, spot market purchases of foreign currency declined with reduced capital inflows.

- *Swap markets.* Swap market auctions were widely used to provide financing or liquidity in FX markets (eg in Brazil, Chile, Hungary, India, Korea and Poland). For example, in the case of Brazil, the central bank had accumulated a large long forward position in foreign currency and unwound it by selling traditional swaps (where the central bank commits to sell dollars in the future), making up to US$ 50 billion available, although a much smaller amount was used.

- *Foreign currency repo facilities.* Some central banks (eg in Argentina, Brazil and the Philippines) set up foreign currency repo facilities to provide trade finance and to help companies roll over their foreign debt. In contrast to swap transactions, which provided foreign currency in exchange for domestic assets in the short term, central banks provided foreign currency in exchange for foreign currency receivables or (eligible) foreign currency securities. However, the use of such facilities varied across countries.

- *Loan facilities.* Some central banks established dollar loan facilities. For example, the Central Bank of Brazil drew on its foreign reserves to auction collateralised loans to FX dealers. The Bank of Korea set up a facility to extend foreign currency loans secured by export bills, while the Bank of Mexico lent dollars to commercial and development banks, drawing on a foreign currency swap line with the US Federal Reserve.

- *Implicit or explicit guarantees on external borrowing or bank deposits*. A number of countries offered guarantees on foreign currency (and also domestic currency) deposits, including Hong Kong SAR, Malaysia and Singapore. In Korea, the authorities announced a guarantee of up to US$ 100 billion for external debts. In some cases, commitments were broader: for example, immediately after the collapse of Lehman Brothers, the Reserve Bank of India (RBI) committed to meet any demand–supply FX gaps in the domestic FX market. In other cases, the central bank stepped in directly as a counterparty: for example, the Central Bank of the Republic of Turkey (CBRT) resumed its intermediation role in its FX deposit market to ensure the continued operation of that market.

- *Changes in regulations to facilitate foreign borrowing*. Examples include: (i) the RBI eased restrictions on foreign currency borrowing and raised the ceiling on the interest rates that could be paid; and (ii) the Bank of Korea allowed domestic export firms to take out foreign currency loans for the settlement of currency option (including knock-in/knock-out (KIKO) derivatives) transactions and later abolished the restriction on the rollover of foreign currency loans for use as working capital. In some cases (eg Colombia and Peru), reserve requirements on foreign currency denominated deposits were lowered. In Chile, the central bank also authorised some financial institutions to meet their reserve requirements in different international reserve currencies (eg the euro and the yen) and not just in US dollars.

[4] The contributions to this volume by Mesquita and Toros (2010) and by Sidaoui, Cuadra and Ramos Francia (2010) provide further details on central bank operations in FX markets in Brazil and Mexico respectively.

Three issues pertaining to these foreign currency financing measures may be highlighted: (i) choice of instruments; (ii) alternative uses of FX swaps; and (iii) discretionary versus non-discretionary intervention.[5]

Choice of instruments. The choice of instruments or measures adopted would depend in part on the goals and perceived constraints faced by the authorities. For example, a central bank seeking to limit exposure to the private sector or counterparty risk might avoid providing guarantees and limit the overall value of its transactions in the FX market. The central bank might also limit the size of transactions if it wants to show that it does not intend to target the exchange rate or otherwise influence perceptions of future monetary policy in a way that might be inconsistent with the existing monetary framework. This may be particularly important in monetary regimes with highly developed procedures for communicating with the public, such as inflation targeting regimes. A central bank wishing to economise on the use of foreign reserves might prefer alternatives to drawing on them, such as serving as an intermediary between financial institutions (eg as was done by the CBRT) or liberalising access to external financing (eg as in India and Korea). As for FX market intervention, outright spot sales of foreign reserves would deplete foreign reserves more than alternative transactions, which can be a concern if the duration of the turmoil is very uncertain. In contrast, collateralised foreign currency lending, foreign currency repos and sales of foreign currency via FX swaps imply future repayment or reversal of the transaction, so that any depletion in foreign reserves would be temporary. The collateral in such transactions (in the case of the swap, the collateral would be in domestic currency), would also limit central bank exposure. In practice, the choice would also depend on the perceived scope for replenishing reserves from other sources, such as export revenues or capital inflows.

Uses of FX swaps. A complication in interpreting FX market intervention is that central bank FX swap transactions are not always intended to simply increase or decrease the supply of foreign currency in the spot market in a way that is reversed at some future date. For example, during the crisis, the Central Bank of Brazil sold FX swaps that delivered US dollars in the future in order to provide hedges to firms that needed to unwind dollar short derivatives positions. The swap transactions also had the effect of unwinding the Central Bank of Brazil's long foreign currency position.[6] Another example is that some central banks in Asia that buy foreign currency in the spot market *sterilise* via an offsetting swap transaction in which they sell foreign currency spot and buy it forward. In particular, the evolution of official net (positive) foreign currency positions in a number of EMEs during the period of exchange rate appreciation from around 2005 to 2008 was consistent with increased spot purchases of foreign currency that were sterilised via FX swaps. A subsequent decline in net forward positions during the most recent period of exchange rate depreciation suggests that central banks reduced their foreign currency purchases as foreign currency inflows fell. In those cases where net forward positions turned negative, the central bank may have sold foreign currency in the spot market, at least partly sterilising via swap transactions. However, in some countries, the connection between forward positions and the exchange rate is much looser; this could be because the sterilisation is incomplete, other sterilisation instruments are available or because there is little connection between operations in the FX market and the exchange rate. A question of interest is what determines how swaps are used in the FX market (eg to provide foreign currency in the spot market, to sterilise, to provide hedges for the private sector, etc). For example, one might expect that swaps would be used to sterilise spot transactions if alternative sterilisation instruments were unavailable or particularly costly

[5] In a later section, the effectiveness of the various measures will be discussed.

[6] See Mesquita and Toros (2010). Losses from derivatives positions in Mexico are also described by Sidaoui, Cuadra and Ramos Francia (2010).

(eg when the supply of government securities is limited or domestic interest rates are much higher than FX rates so the carry cost of foreign reserve holdings is higher).

Discretionary versus non-discretionary intervention. In some countries, FX market intervention was non-discretionary. This was to underscore that central banks were not targeting an exchange rate level, which, as past experience has shown, can trigger speculative attacks. For this reason, auctions were widely used. For example, Colombia followed a rule whereby large exchange rate movements triggered auctions of so-called volatility "call" options (giving market participants the option to buy foreign currency from the central bank). This mechanism was triggered in October 2008 and in the first two months of 2009. Mexico adopted a rule to set the daily amount to be auctioned (initially US$ 400 million, lowered to US$ 250 million by May 2009) with a minimum price floor. However, non-discretionary intervention posed some difficulties. Some commentary suggests that in Mexico, the floor set a basis for speculation. Also, the amounts of foreign currency supplied by the rules could sometimes fall short of demand. The central bank introduced two measures with different features: (i) daily auctions with no price floor; and (ii) direct sales in FX market operations.[7]

B. Role of foreign reserves

A key issue in central bank operations in the FX markets was the availability of foreign currency. Most central banks drew on their foreign reserve holdings, which in some cases fell significantly compared to mid-2008 levels before recovering – in Asia by as much as 15–30%, in Latin America by 7–15% and in other EMEs by as much as 25–35%. Central banks replenished their reserves as soon as the opportunity arose, particularly as capital flows recovered sometime after March 2009 (Graph 1). In some cases, current account surpluses have supported recent foreign reserve accumulation. The crisis brought two issues into sharp relief: (i) foreign reserve adequacy; and (ii) alternatives to foreign reserve accumulation.

1. Foreign reserve adequacy

Some conventional indicators suggest that reserve holdings have remained ample (Table 1). For example, foreign reserve cover of short-term external debt, an approximate indicator of the ability to meet financing requirements should external funding be interrupted, was generally well in excess of the Guidotti-Greenspan threshold of 100%, even in countries where foreign reserves fell significantly.[8] In some countries where the decline in foreign reserves has persisted, the foreign reserve to short-term external debt ratio has not fallen (in the case of Malaysia, for example, it has risen sharply), suggesting that the declines in foreign reserves were associated with declines in short-term external debt. An interesting question is: under what conditions should foreign reserves be used to retire short-term external debt as opposed to encouraging rollovers of such debt?

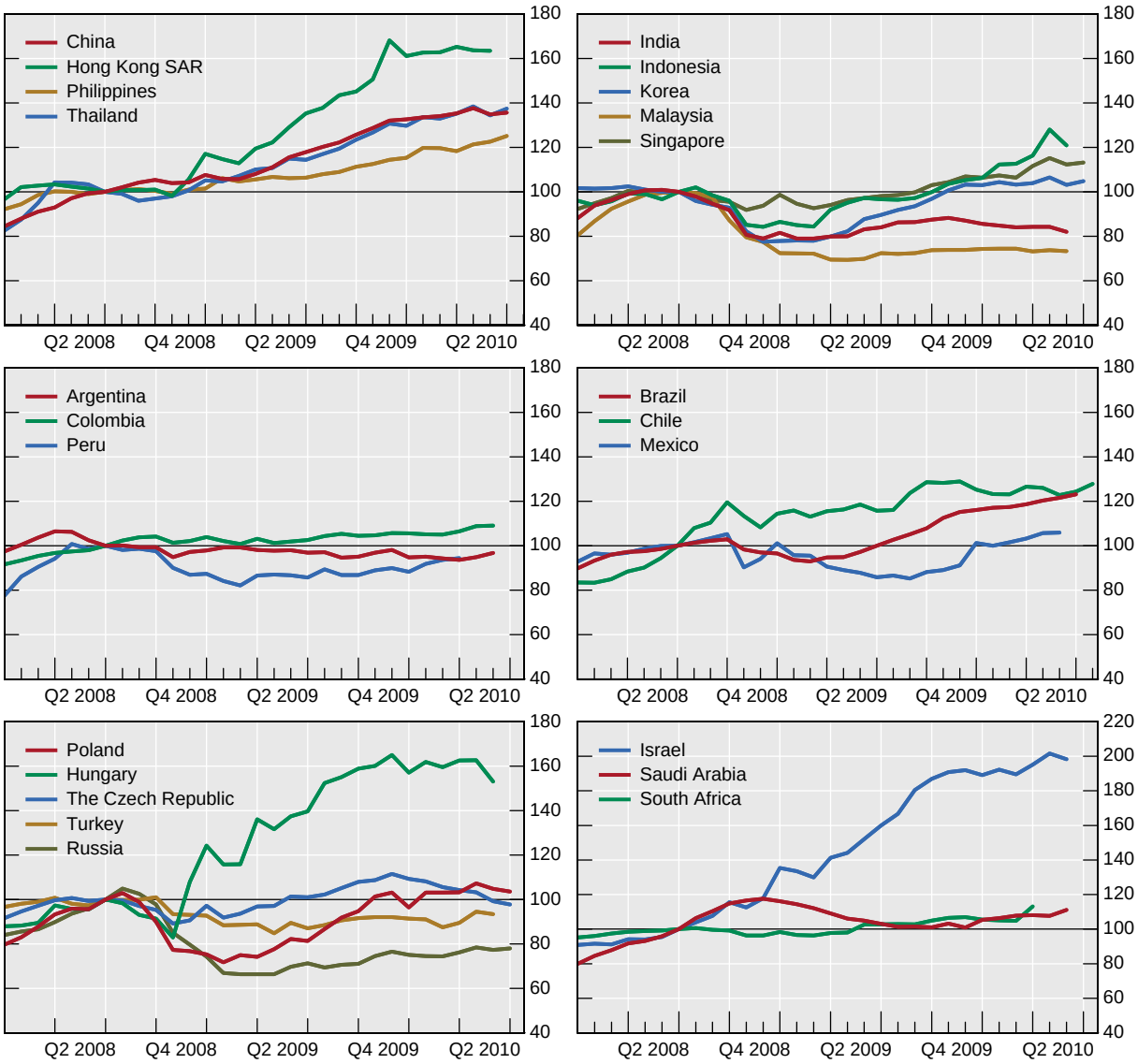
[7] For further discussion of foreign exchange market intervention in Latin America in response to the crisis see Jara, Moreno and Tovar (2010).

[8] In Malaysia, the ratio did not fall, suggesting that the declines in foreign reserves were associated with declines in short-term external debt.

Graph 1

Foreign reserves

June 2008 = 100



Sources: IMF, national data.

Reserve adequacy concerns nevertheless appear to have arisen. Some have argued that, rather than focusing on the ratio of foreign reserves to short-term external debt, policymakers should seek to ensure that foreign reserves are high enough to prevent simultaneous runs on a country's banking system and its currency. This would suggest tracking an indicator like foreign reserves to M2. Some recent research suggests that, according to this criterion, foreign reserve holdings were not that excessive, and that countries with higher foreign reserves to M2 experienced less depreciation pressure.[9]

Even foreign reserves to M2 may not provide a complete picture. First, markets appear to care not only about the level of foreign reserves, but their rapid or persistent depletion. Second, foreign reserve levels that exceed conventional rules of thumb may still be seen as

[9] Shambaugh, Obstfeld and Taylor (2009).

insufficient if they are low compared to a country's peers. Third, in some countries, the government (via sovereign wealth funds) or the private sector (eg pension funds) holds large amounts of foreign assets. The repatriation of some of these assets appears to have helped stabilise external financing conditions during periods of financial stress. In those cases, conventional indicators of reserve adequacy could overstate the need for foreign reserves.

Table 1

Foreign reserve adequacy[1]

	Outstanding year-end position					As a percentage of							
	In billions of US dollars				% GDP	Short-term external debt[2]				M2			
	96	07	08	09	09	96	07	08	09	96	07	08	09
Asia[3]	477	2,907	3,318	4,028	55	170	449	586	545	22	35	35	35
China	105	1,528	1,946	2,399	49	376	1,249	1,868	1,597	11	28	28	27
Hong Kong SAR	63	147	178	245	116	36	144	189	252	19	19	22	29
India	20	267	247	259	21	260	340	338	302	11	28	27	23
Indonesia	18	55	49	60	11	51	185	174	198	15	31	30	27
Korea	33	262	200	265	32	45	176	172	175	6	19	19	20
Malaysia	26	101	91	93	49	226	447	402	544	20	40	35	31
Philippines	10	30	33	37	23	121	225	406	305	26	39	43	43
Singapore	77	163	174	188	106	44	127	150	164	73	77	75	69
Thailand	37	85	108	134	51	80	866	997	1,048	18	31	38	42
Latin America	142	397	440	466	13	145	238	362	305	71	47	49	37
Argentina	18	44	44	43	14	60	200	279	350	27	51	49	46
Brazil	58	179	193	232	15	111	292	364	300	21	20	24	18
Chile	16	17	23	25	16	201	86	113	130	54	18	28	25
Colombia	9	20	23	23	10	142	201	390	374	23	26	28	24
Mexico	19	86	94	94	11	60	256	240	277	13	15	18	16
Peru	11	27	30	31	24	166	284	248	309	266	165	157	132
Venezuela	11	24	33	18	5	273	347	901	398	91	33	36	0
CEE[4,5]	78	753	703	724	20	452	153	144	167	...	38	40	37
Czech Republic	12	35	37	42	21	262	200	236	311	32	25	27	27
Hungary	10	24	34	42	33	169	88	99	126	49	29	43	50
Poland	18	66	62	80	19	718	245	178	236	37	29	28	31
Russia	11	467	413	417	34	42	493	490	618	22	86	86	80
Turkey	16	73	70	69	11	125	124	119	132	35	23	24	20
Other	25	359	510	488	50	263	605	993	695	...	72	89	80
Israel	11	28	42	59	30	565	587	556	590	38	34	44	53
Saudi Arabia[6]	13	301	438	397	107	217	1,058	2,215	1,254	...	169	207	176
South Africa	1	29	30	32	11	8	170	207	240	1	12	16	12

[1] Regional aggregates for the outstanding year-end position of FX reserves are the sum of the economies listed, simple averages otherwise. [2] Short-term external debt defined as short-term liabilities to BIS reporting banks: consolidated cross-border claims to all BIS reporting banks in countries outside the reporting area with a maturity of up to and including one year plus international debt securities outstanding with a maturity of up to one year. [3] Countries shown plus Chinese Taipei. [4] Central and eastern Europe: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and Turkey. [5] M2 for Croatia unavailable. [6] For Saudi Arabia, excluding investment in foreign securities.

Sources: IMF; Thompson Reuters; national data.

2. Alternatives to foreign reserve accumulation

A number of EMEs have obtained access to foreign currency financing to deal with the crisis. An important development following the Lehman Brothers collapse was the significant expansion in central bank swap arrangements. In an effort to supply US dollar financing (or liquidity) to the global markets, the Federal Reserve implemented a number of swap agreements with central banks from advanced market economies (eventually, the size of these swap lines was unlimited). The central banks of Brazil, Mexico, Korea and Singapore

also established swap lines with the Federal Reserve (for US$ 30 billion each).[10] In Europe, the European Central Bank implemented cooperation agreements with the Central Bank of Hungary and the National Bank of Poland. In Asia, in the course of the 2000s, central banks concluded a number of bilateral foreign currency swap arrangements, many under the so-called Chiang Mai Initiative (CMI). This has been further enhanced by recent initiatives to create a US$ 120 billion regional swap facility drawing on foreign reserves of participating East Asian central banks (CMI Multilateralisation). Apart from these central bank facilities, Colombia, Mexico and Poland gained access to the newly created IMF Flexible Credit Line (FCL) aimed at countries with sound fundamentals.

An ongoing issue is whether central bank swap lines or new IMF facilities can provide effective alternatives to foreign reserve accumulation. On the one hand, there is evidence to suggest that Federal Reserve swap lines played an important role in restoring stability in global FX markets and also in Brazil and Korea.[11] Furthermore, central banks believe that foreign reserve holdings and access to central bank swap facilities or to the IMF Flexible Credit Line have contributed to improved market confidence.[12] Indeed, some believe that even very large foreign reserves might be insufficient to preserve stability if the shock is sufficiently large (as was the case in the current crisis). On the other hand, there is more certainty and discretion associated with the use of foreign reserves. Some of these alternative facilities are of limited duration and future access is uncertain. There may also be stigma associated with the use of some of these facilities.[13]

On balance, the crisis appears to have reinforced the perception among EME authorities that it is important to maintain sufficiently large foreign reserves. As noted above, many authorities resumed foreign reserve accumulation as soon as was feasible. However, reserve accumulation is costly and the crisis has also renewed the question of what the appropriate indicators of foreign reserve adequacy are, and whether viable alternatives to foreign reserves are available.

II. Domestic currency financing and monetary policy

As described in contributions by central banks to this volume and by Moreno and Villar (2010),[14] the crisis led to disruptions in some domestic financial markets. For example, the prevalence of uncollateralised overnight lending in some markets, as well as heightened perceptions of counterparty risk, led to declines in interbank transactions in some countries. Reversals of capital inflows in EMEs were sometimes associated with efforts to liquidate domestic assets, draining domestic liquidity. In some markets, domestic bond yields picked up sharply, and investor demand switched to shorter maturity assets. The liquidity squeeze was in some cases accentuated by increased equity market volatility, which increased margin requirements. Central bank sales of foreign currency could also add to the liquidity drain. In some cases, domestic residents cut off from external financing switched to domestic markets for financing or increased their utilisation of domestic liquidity. There was also a flight

[10] Among the EMEs listed, these facilities have been used by Korea and Mexico.

[11] For example, see Baba and Packer (2009), Stone et al (2009) and Baba and Shim (2010).

[12] For related discussions see, for example, the contributions to this volume by Sidaoui, Cuadra and Ramos Francia (2010) on Mexico by Yorukoglu and Atasoy (2010) on Turkey and by Ong (2010).

[13] For further discussion, see Moreno (forthcoming).

[14] See Moreno and Villar (2010).

to quality in some countries as domestic residents moved their funds to larger or more stable financial institutions, especially state-owned institutions.

Policy responses to developments in domestic financial markets may be classified as (i) central bank measures to supply or support domestic currency financing; and (ii) adjustments to monetary policy.

A. Central bank measures to supply or support domestic currency financing[15]

1. Central bank operations

Measures were implemented so as to offset shortfalls in domestic liquidity (if any) and to dampen volatility in short-term interest rates. A number of central banks stepped up the scale of their open market operations. For example, in August 2008, the Czech National Bank (CNB), which traditionally entered the domestic interbank market to drain liquidity, introduced extraordinary liquidity-providing repo operations with two-week and three-month maturities. While these operations were mostly used at the end of 2008 and the beginning of 2009, they were to remain available until the end of 2010.

The range of assets accepted as collateral in open market operations and their maturity was also expanded. For example, a number of central banks (eg in Argentina and the Czech Republic) allowed the use of government bonds or guaranteed loans as eligible collateral in repo transactions with the central bank. In Korea, the range of collateral was expanded to include bank debentures and certain government agency bonds (previously only treasury bonds, government-guaranteed bonds and monetary stabilisation bonds were eligible). In Chile, bank term deposits were accepted as collateral in central bank repo transactions and the central bank extended the overnight liquidity facility for banks to 180-day tenors. Some central banks also expanded the range of eligible counterparties for central bank open market operations, reducing the focus on banks. For example, the Bank of Korea added 12 securities companies as eligible counterparties for repo operations to the original list of 19 banks and two securities companies.

Some central banks have also used FX swaps to provide domestic currency liquidity. For example, the CNB has offered CZK/EUR currency swaps to commercial banks in order to provide CZK liquidity to foreign bank branches. (However, this instrument has been infrequently used.)

Central banks also strengthened discount window lending or created special financing facilities. In Brazil, the central bank was authorised to use the discount window to buy loan portfolios of (small) banks via repo agreements. In India, a special refinance facility allowed scheduled commercial banks to borrow up to 1% of their net demand and time liabilities (NDTLs) up to a maximum period of 90 days; this facility was offered between October 2008 and October 2009. In Mexico, the central bank established a new facility allowing banks to access liquidity using a broader range of eligible assets than in the existing operating facility and at a lower cost.

It may be noted that in some cases (eg Colombia, Malaysia, South Africa and Thailand) domestic currency financing in money markets was unaffected and the central bank did not need to resort to special or unconventional measures.

Policy responses sometimes implied coordination with the Treasury or other state agencies. For instance, in Mexico, the government bond markets were disrupted by foreign investors, who closed their positions, particularly those at longer maturities. In order to restore the

[15] The discussion in this section reflects central bank responses to a questionnaire.

normal functioning of the bond markets, the Mexican Treasury sought to accommodate the shift in demand away from long-term bonds to short-term bonds by reducing long-term bond issuance during the fourth quarter of 2008 (both for fixed-rate and inflation-indexed instruments) and increasing the issuance of short-term instruments. [16] In parallel, the central bank started auctioning interest rate swaps to ease the pressures in credit institutions' balance sheets and, more generally, credit conditions across the economy. As another example, the Bank of Korea participated in the creation of funds to recapitalise banks and purchase non-performing loans (NPLs).

Some actions by the authorities in a number of EMEs also had important implications for the operation of the financial sector. These include guarantees for debt issuance to improve funding conditions in the commercial paper market or to facilitate the rollover of short-term domestic debt (eg Mexico), or credit guarantees. In some cases, financing via state-owned financial institutions appeared to provide an alternative to the direct provision of financing by the central bank.

2. Reduced domestic currency reserve requirements

Many central banks that either maintained high average reserve requirements or had raised them prior to the failure of Lehman Brothers were able to reduce them countercyclically in response to the crisis. These included China, India and Malaysia in Asia, and Brazil, Colombia and Peru in Latin America (Graph 2). Colombia and Peru also used *marginal* reserve requirements, which fell sharply.

As is well known, domestic bank reserve requirements have traditionally been used as a monetary policy tool in countries with less developed financial markets. Central banks lacking government securities for open market operations still use reserve requirements to sterilise the impact of FX market intervention. However, the crisis highlighted the role of reserve requirements in supplying liquidity during periods of financial turmoil. For example, in Brazil, reserve requirements were used with a great deal of flexibility. Reduced reserve requirements released an estimated R$ 116 billion, or 4% of GDP (2009 prices).[17] An innovation was the use of rebates in reserve requirements to encourage purchases of bank assets and foreign currency (as a way of offsetting the contractionary impact on the liquidity of US dollar sales by the central bank). Specifically, deductions of reserve requirements on deposits from leasing companies and on time deposits were allowed if they were used to buy assets from other banks subject to certain restrictions, or to buy US dollars.[18] An interesting feature of the use of reserve requirements to encourage asset purchases is that they are an alternative to the central bank expanding its own balance sheet to undertake asset purchases.[19]

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[16] See Sidaoui, Cuadra and Ramos-Francias (2010). In Chile, the issuance of one- and two-year central bank bonds was reduced.

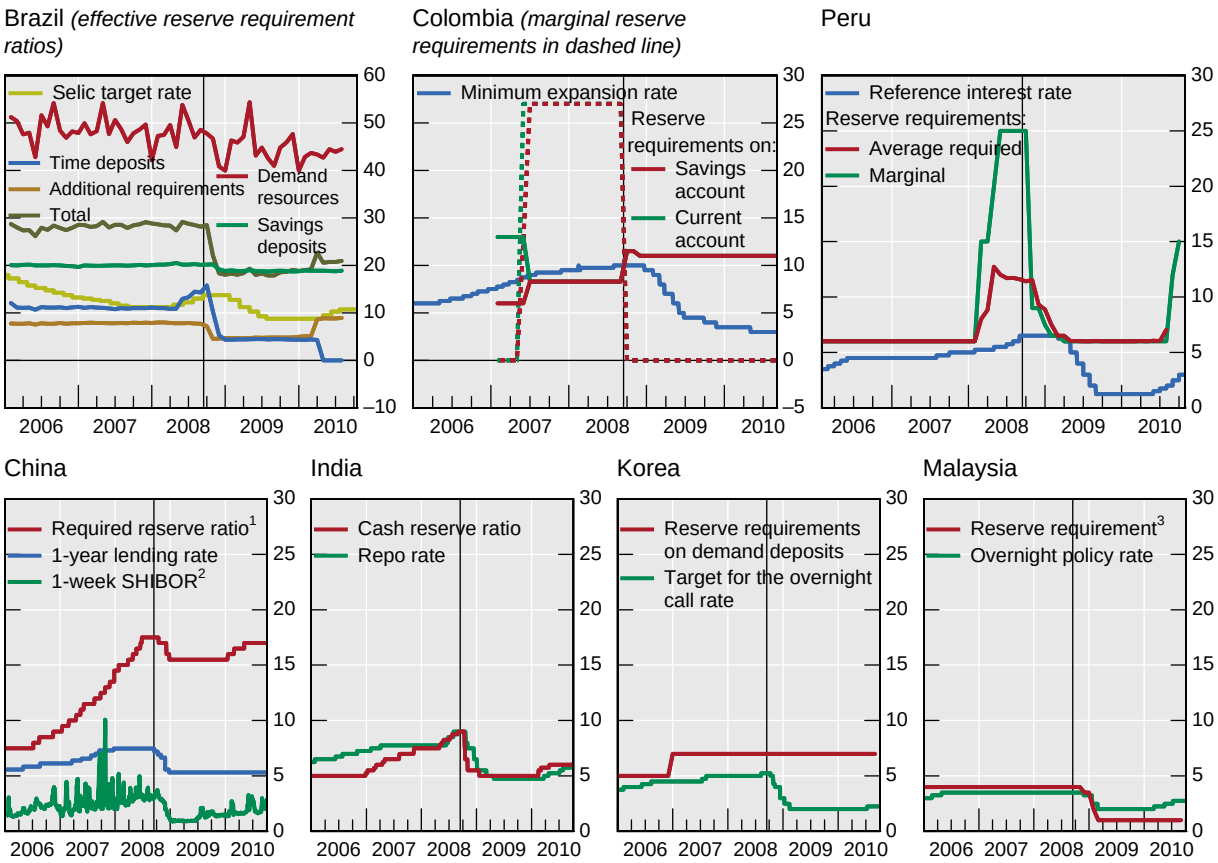
[17] The bulk of the released funds referred to drawdowns of the so-called "additional requirements" (that had been introduced in the 2002 crisis) (R$ 42 billion), and of the requirements on time deposits (R$ 62 billion).

[18] See details in Mesquita and Toros (2010). The various adjustments to reserve requirements thus include not only lower nominal ratios but also changes in other related variables (eg an increase during the crisis in the amounts that can be deducted from time deposits from R$300 million to R$2 billion and from additional requirements from R$100 million to R$1 billion.) These effects are taken into account in the "effective reserve requirements" shown in Graph 2. I thank Jose Antonio Marciano and Rodrigo Collares Arantes of the Central Bank of Brazil for making the data available and for providing guidance on interpretation.

[19] Reserve requirements can also play a role as a supplementary tool to interest rate policy. See the contributions of the central banks of Colombia and Peru for this meeting.

Graph 2

Domestic reserve requirements and policy rates



[1] For major banks. [2] Repo rate prior to October 2006. [3] For commercial banks.

The vertical line marks the date of the Lehman Brothers bankruptcy on 15 September, 2008.

Sources: Bloomberg; CEIC; Central Bank of Brazil; Central Bank of Peru; national data.

B. Adjustments to monetary policy

The spread of the crisis to EMEs after the collapse of Lehman Brothers in September 2008 created a dilemma for some EME monetary authorities. On the one hand, credit spreads on virtually all financial assets widened as market liquidity dropped sharply. Emerging market assets were strongly affected by this, and most EME currencies fell sharply. This shock to confidence, and recent high inflation, tended to argue against cutting policy interest rates. Second, there was a sharp contraction in global output and a steep and rapid reduction in policy rates in the advanced market economies; government bond yields in major markets also dropped sharply. The slowdown in growth and widening interest rate differentials in favour of EMEs suggested that EMEs had the incentive and leeway to cut interest rates.

In practice, the timing of the cuts in policy rates varied across countries, reflecting the fact that inflation fell more rapidly in some regions, notably in Asia, but remained high in others, for example in Latin America (where inflation had exceeded inflation targets for much of 2008) or in Indonesia and Russia. In terms of the dilemma cited above, policymakers in countries still experiencing high inflation at the time of the failure of Lehman Brothers apparently assigned greater weight to the risk that easing could increase inflation expectations and further unsettle financial markets, thus accentuating depreciation pressures, than to the need to offset tighter financing conditions and support economic activity. These countries did not lower rates until after the peak period of market turbulence had passed and the inflation pressures had declined with the global economic downturn and

lower commodity prices (around December 2008 or January 2009, or even later; see Table 2 and Graph 2). As noted earlier, the authorities instead relied on alternative tools to support the financial sector and economic activity, starting around September or October 2008. The cycle of easing, which started earlier in Asia, also generally appears to have ended earlier, during the first half of 2009. In contrast, easing continued until late 2009 in a number of Latin American economies as well as in other EMEs. However, rates were subsequently raised in a number of EMEs.

Table 2

Changes in monetary policy or short-term interest rates[1]

	Inflation			Monetary policy rates				
	Dec 2008	Latest reading[2]	Target 2009	End 2009	Last change[3]		Cumulative changes during period[3]	
					Policy decision	Date	Sep–Dec 08	Jan–Dec 09
Emerging Asia								
China	1.2	0.6		5.31	–0.27	22 Dec 08	–2.16	0.00
Hong Kong SAR	2.0	0.5	…	0.03	–0.02	…	–1.54	–0.17
India	5.7	7.3	…	4.75	–0.25	21 Apr 09	–2.50	–1.75
Indonesia	11.1	2.8	4.5±1	6.50	–0.25	5 Aug 09	0.25	–2.75
Korea	4.1	2.8	3.0±0.5	2.00	–0.50	12 Feb 09	–2.25	–1.00
Malaysia	4.4	–0.1	…	2.00	–0.50	24 Feb 09	–0.25	–1.25
Philippines	8.0	4.4	3.5±1	5.00	–0.25	9 Jul 09	–0.50	–1.50
Singapore	4.3	–0.2	…	0.19	0.06	…	–0.25	–0.06
Thailand	0.4	3.5	0.5 – 3.0	1.25	–0.25	8 Apr 09	–1.00	–1.50
Latin America								
Argentina	7.2	7.7	…	9.50	–0.25	21 Oct 09	1.75	–1.50
Brazil	5.9	4.3	4.5±2	8.75	–0.50	22 Jul 09	0.75	–5.00
Chile	7.1	–1.4	3±1	0.50	–0.25	9 Jul 09	0.50	–7.75
Colombia	7.7	2.0	4.5 – 5.5	3.50	–0.50	23 Nov 09	–0.50	–6.00
Mexico	6.5	3.6	3±1	4.50	–0.25	17 Jul 09	0.00	–3.75
Peru	6.7	0.2	2±1	1.25	–0.75	6 Aug 09	0.50	–5.25
Other emerging markets								
Czech Republic	3.6	1.0	2.0±1	1.00	–0.25	16 Dec 09	–1.25	–1.25
Hungary	3.5	5.3	3.0	6.25	–0.25	21 Dec 09	1.50	–3.75
Israel	3.8	3.8	1.0 – 3.0	1.25	0.25	28 Dec 09	–1.75	–1.25
Poland	3.4	3.7	2.5±1	3.50	–0.25	24 Jun 09	–1.00	–1.50
Russia	13.3	8.8	…	8.75	–0.25	28 Dec 09	2.00	–4.25
Saudi Arabia	9.0	4.0	…	2.00	–0.50	Jan 09	–3.00	–0.50
South Africa	9.0	5.8	3.0 – 6.0	7.00	–0.50	13 Aug 09	–0.50	–4.50
Turkey	10.1	6.5	7.5	6.50	–0.25	19 Nov 09	–1.75	–8.50
Memo:								
Euro area	1.6	0.9	Below, but close to, 2	1.00	–0.25	7 May 09	–1.75	–1.50
Japan	0.4	–1.9	…	0.30	–0.20	19 Dec 08	–0.45	0.00
United States	0.1	2.7	…	0.13	–0.88	16 Dec 08	–1.88	0.00

[1] Argentina, Central Bank of Argentina (BCRA) seven-day reverse repo rate; for Brazil, SELIC target rate; for Chile, official monetary policy rate; for China, benchmark one-year lending rate; for Colombia, minimum expansion rate; for the Czech Republic, two-week repo rate; for the euro area, repo rate; for Hungary, base rate; for India, repo rate; for Indonesia, one-month official discount rate; for Israel, base rate; for Korea, target for the overnight call rate; for Japan, overnight call rate; for Malaysia, overnight policy rate; for Mexico, bank funding rate; for Peru, reference interest rate; for the Philippines, midpoint of repo and reverse repo rate range; for Poland, reference rate; for Russia, refinancing rate; for Saudi Arabia, repo rate; for Singapore, overnight interbank rate; for South Africa, official repo rate; for Turkey, minimum interbank overnight rate; for Thailand, overnight repo rate; for the United States, federal funds target rate; in percentage points. [2] For India, wholesale prices; November data for China, Hong Kong SAR, Hungary, Israel, Japan, Malaysia, Singapore, Saudi Arabia and South Africa; December data otherwise; annual changes, in per cent. [3] In basis points.

Source: national data.

1. Interest rates, supplementary tools and policy assignment

As noted above, central banks used a variety of tools to respond to the crisis, including changes in monetary operations and reduced reserve requirements as well as changes in policy rates. Indeed, the crisis has generated considerable interest in the use of supplementary or "macroprudential" instruments to dampen boom and bust cycles.[20] This raises the question of how these instruments might be related to interest rate policy. Both interest rates and supplementary instruments are ways of trying to ease or tighten financial conditions and ultimately affect the availability and cost of financing for private and public borrowers. For example, it has been demonstrated that interest rates and capital adequacy ratios may both be adjusted to deal with the same macroeconomic or financial shock.[21] They are partial substitutes (ie the authorities can raise interest rates or capital requirements). As macroprudential instruments do this by influencing the incentives and robustness of the financial sector they have a direct effect on the monetary policy transmission mechanism. From this point of view, such instruments can strengthen or weaken how the policy rate is ultimately reflected in the availability and cost of financing faced by borrowers (private and public).

How much interest rates and macroprudential instruments will be used will depend in part on the monetary framework, whether macroeconomic and financial stability considerations coincide, the effects of these instruments and institutional considerations.

For example, under a fixed exchange rate regime (eg Hong Kong SAR), policymakers have no interest rate tool and would have to rely on supplementary tools. In some cases, such as when there are rising inflationary pressures, rapid credit growth and higher asset prices, both policy interest rates and supplementary macroprudential instruments should clearly reinforce each other to tighten financing conditions. A more difficult question is how to deal with possible policy dilemmas. For example, as noted above, following the collapse of Lehman Brothers some EME authorities were faced with, on the one hand, high inflation, and, on the other hand, tightening financing conditions and the risk of a severe economic downturn.[22] Some central banks (eg Brazil and Peru) lowered reserve requirements to enhance domestic currency financing, while keeping interest rates unchanged (Graph 2); they only lowered rates as inflation prospects improved. In other EMEs, however, there was greater synchronisation of interest rates and reserve requirements. There are also important differences in the use of reserve requirements over the cycle; for example, China and India appear to have relied more heavily on adjustments to reserve requirements during the period of expansion prior to the failure of Lehman Brothers than other EMEs.

The development or condition of the financial system may also have a bearing on the types of instruments used. For example, in some cases where domestic interbank markets are less developed, the authorities may find it more effective to set bank lending rates (eg as in

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[20] Some of these instruments are monetary or microprudential, now re-examined through a macroprudential lens with a view to assessing their implications for the business cycle, credit growth and systemic risks or financial stability. Apart from reserve requirements, the instruments include measures that influence credit and the quality of bank balance sheets, such as credit targets or ceilings on credit (eg ceilings are used by Korea focusing on credit to small- and medium-sized enterprises (SMEs)), loan-to-value (LTV) ratios (eg used in Hong Kong SAR), capital adequacy requirements and buffers, and loan loss provisioning (notably countercyclical dynamic provisioning, recently adopted in Colombia). For a discussion of macroprudential instruments see CGFS (2010).

[21] See Cecchetti (2009).

[22] During expansion periods in the 2000s, a common dilemma was posed by a combination of low goods and services price inflation with rapid increases in both credit growth and asset prices. The questions then are: to what extent should interest rates respond to asset price increases or rapid credit growth? What role should be assigned to supplementary or macroprudential instruments?

China) directly rather than to rely exclusively on open market operations to set interbank rates. The way in which supplementary tools affect the transmission of monetary policy will determine the extent to which they will be used. In some cases, higher reserve requirements do not increase deposit rates and could be used to tighten financing conditions without attracting capital inflows during periods of expansion.[23] This could address the dilemma faced by the authorities regarding the need to raise domestic interest rates during periods of large and expansionary capital inflows.

Institutional factors are an important determinant of which tools are used. Many central banks are no longer responsible for financial supervision and regulation; consequently, reserve requirements are one of the few supplementary tools they have available to influence financing conditions in the economy.[24] Coordination between central banks and supervisory authorities is necessary to ensure that other tools (eg capital adequacy requirements, loan loss provisioning, etc) are used in conjunction with monetary policy to dampen boom and bust cycles and preserve medium-term financial stability.

III. Assessment of crisis responses

A. Measures to provide foreign currency liquidity or financing

BIS staff contributions to this volume[25] indicate that global factors played a large role in determining the incidence of stress episodes reported by central banks during the recent crisis. In this setting, it appears unlikely that the responses by EME authorities could have prevented the disruptions in the FX markets or interruptions in external financing; for them to do so, global financial conditions had to stabilise. Instead, measures to improve the availability of foreign currency liquidity (drawing on foreign reserves, and in some cases on foreign exchange swap facilities) appear to have compensated for or covered shortfalls in foreign currency financing until global market conditions improved, which occurred sometime around the second quarter of 2009. For example, in Korea, operations to support foreign currency financing (for which US$ 55 billion in foreign reserves were set aside) appear to have played a major role in ensuring that the decline in the rollover ratio on maturing foreign debt to around 40% in the latter part of 2008 did not result in widespread defaults and lasting interruptions in external financing. Measures to provide foreign currency financing, in Korea and elsewhere, may also have helped to dampen exchange rate volatility, and lowered financing costs for borrowers seeking to access new credit or roll over external debts. One indication of the success of these measures is that, as conditions have normalised, private capital flows have returned and some of the foreign currency financing support in EMEs has been successfully withdrawn.

There is some empirical evidence on the effectiveness of these measures.[26] In the Hong Kong Monetary Authority (HKMA) contribution to this meeting, Fung and Yu (2010) find

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[23] For further analysis of how reserve requirements affect monetary policy transmission, see the contribution in this volume by Vargas, Betancourt, Varela and Rodríguez (2010).

[24] In countries where the central bank is also responsible for bank supervision and regulation, other tools become available. For example, the RBI adjusted the risk weights for capital adequacy requirements or loan loss provisioning requirements to contain risks associated with credit to certain sectors. In the aftermath of the collapse of Lehman Brothers, it lowered the statutory liquidity ratio of the banking sector but has since restored it to its previous level (see Sinha. (2010)).

[25] See Takats (2010) and Moreno and Villar (2010, particularly Graph 1).

[26] See also discussion in section I.B.2 of this paper.

that HKMA policy actions helped mitigate dislocations in the money and FX swap markets and effectively reduced the covered interest parity (CIP) deviations following the collapse of Lehman Brothers. Furthermore, a recent study of Brazil (Stone et al (2009)) finds that the measures by the Central Bank of Brazil reduced on impact the relative cost of onshore dollar financing (a market proxy for FX liquidity). However, announcement effects are estimated to be bigger than those of the interventions themselves. In particular, the announcement of the FX swap with the Federal Reserve had the biggest empirical effect suggesting that external, rather than domestic, policy responses to the crisis played the largest role in stabilising market conditions. The level and implied volatility of the spot exchange rate are also estimated to have been positively affected by the FX easing measures, implying that those measures stabilised the exchange rate in addition to easing dollar liquidity.

B. Measures to provide financing in domestic markets and monetary policy responses

The preceding discussion suggests that one of the key goals of policymakers in adopting the auxiliary measures discussed below was to preserve the flow of credit and consequently the operation of the monetary transmission mechanism. While more systematic analysis is needed to assess the various measures adopted, an impression can be obtained by reviewing: (i) the path of interest rates at various maturities as policy rates were lowered; (ii) the behaviour of credit to the private sector over time.

1. Interest rate behaviour

Financing conditions in domestic money markets and in the banking sector improved from around December 2008 onwards as policy rate declines were associated with significant reductions in interbank and average bank lending rates (Table 3). In contrast, the reductions in bond yields were generally smaller (in some cases yields increased), so that yield curves in EMEs steepened.

The decline in three-month and bank lending rates suggests that programmes to support the banking sector and credit extension, as well as the reduction in policy rates, may have helped to lower the cost of credit. Competitive pressures among banks to obtain business as economic activity weakened may also have played a role. These effects appear to have offset the factors that contributed to the downward rigidity in domestic bond yields, including widening risk premia for assets at longer maturities.

Table 3

Interest rates changes

1 December 2008–31 December 2009

	Policy or short-term rate[1]	Interbank three-month	Lending rate	Local currency bonds[2]	Foreign currency bonds[3]
Emerging Asia					
China	–0.3	–0.9	–0.3	0.5	–1.2
Hong Kong SAR	–0.5	–1.9	–0.1	0.4	...
India	–2.8	–5.9	–1.5	0.2	...
Indonesia	–3.0	–4.9	–1.1	–6.3	–6.0
Korea	–2.0	–2.6	–1.7	–0.1	...
Malaysia	–1.3	–1.3	–1.1	0.4	–1.7
Philippines	–2.0	0.1	–1.8	–1.3	–2.4
Singapore	–0.2	–0.1	0.0	–0.3	...
Thailand	–2.5	–2.5	–1.4	0.2	...
Latin America					
Argentina	–1.5	–7.4	–21.1	1.9	–9.3
Brazil	–5.0	–5.1	–15.0	–3.4	–2.0
Chile	–7.8	–7.9	...	–1.0	–1.5
Colombia	–6.5	–6.2	–7.6	–4.2	–2.7
Mexico	–3.8	–3.6	–5.5	–1.7	–1.9
Peru	–5.3	–5.4	–0.8	–3.5	–2.6
Other emerging markets					
Czech Republic	–1.8	–2.5	–0.4	–0.0	...
Hungary	–4.8	–4.9	–3.2	–0.8	–2.1
Israel	–1.3	–1.4	–2.0	–0.6	...
Poland	–2.3	–2.5	–2.0	1.0	–0.7
Russia	–3.3	–9.6	–0.3	–0.6	–5.2
Saudi Arabia	–1.0	–4.2	...	...	...
South Africa	–5.0	–4.8	–5.0	0.1	–3.7
Turkey	–9.8	–12.9	...	–10.4	–3.2

[1] Argentina, BCRA seven-day reverse repo rate; for Brazil, SELIC target rate; for Chile, official monetary policy rate; for China, benchmark one-year lending rate; for Colombia, minimum expansion rate; for the Czech Republic, two-week repo rate; for Hungary, base rate; for India, repo rate; for Indonesia, one-month official discount rate; for Israel, base rate; for Korea, target for the overnight call rate; for Malaysia, overnight policy rate; for Mexico, bank funding rate; for Peru, reference interest rate; for the Philippines, midpoint of repo and reverse-repo rate range; for Poland, reference rate; for Russia, refinancing rate; for Saudi Arabia, repo rate; for Singapore, overnight interbank rate; for South Africa, official repo rate; for Turkey, minimum interbank overnight rate; for Thailand, overnight repo rate; in percentage points. [2] For India, wholesale prices; December data for Chile, Colombia, the Czech Republic, Indonesia, Korea, Mexico, Peru, the Philippines, Russia, Thailand and Turkey; November data otherwise. [2] Argentina, BCRA issues at issue, closest to one-year maturity (one-year maturity until February 2007); for Israel, eight-year government bond; for the Philippines, 10-year government bond; for Turkey, two-year government bond; five-year government bond yield otherwise. [3] EMBI Global.

Sources: IMF, *International Financial Statistics*; Bloomberg; CEIC; Datastream; JPMorgan Chase; national data.

A more precise assessment of these effects requires systematic empirical analysis. In Hong Kong, empirical analysis by Fung and Yu (2010) indicates that policy actions did not affect the three-month HIBOR–OIS spread (the indicator of stress in the interbank market), in line with IMF findings on the apparent ineffectiveness of liquidity support measures by central banks in developed countries. One explanation is that the actions may have been anticipated by market participants. However, as noted above, the HKMA's actions appear to have mitigated disruptions in the FX swap markets. The HKMA assigns particular importance to the role of its five temporary measures (see Fung and Yu (2010)) in stimulating interbank financing, by reducing uncertainty about the availability of funds (by providing additional longer-term funding to banks against a wider range of collateral at a potentially lower interest cost) and reducing perceived counterparty risk (by containing the solvency risk in the banking system).

2. Trends in bank credit

Bank credit displayed a robust upward trend in most EMEs until around the third quarter of 2008. The trend later flattened in a number of countries and declined in others (the last with a recent rebound – see Graph 3).

An important question is the extent to which the decline in credit growth reflected reductions in credit supply or demand. A reduction in credit supply would suggest that the impact of the crisis on the financial sector has amplified the effects of the very large cyclical downturn. In contrast, if demand effects are dominant, this would suggest that efforts to supply financing and support the operation of the financial sector have been successful in boosting credit supply and mitigating the adverse effects of the crisis in developed financial markets. While disentangling credit supply and demand effects requires more systematic analysis, the fact that the decline in credit growth in 2009 was accompanied by much easier financing conditions than in October–November 2008 and lower policy and bank lending rates (Table 3 and Annex Graph A1) suggests that reduced credit demand has been an important driver of slower credit growth.[27] At least two factors – bank deposits and still strong balance sheets – appear to have supported credit supply. The policy responses cited above may also have helped.

Reliance on bank deposits, which on average tended to grow. Loan-to-deposit ratios in many EMEs tend to be below unity, suggesting a greater reliance on deposits (as opposed to wholesale financing) to fund credit. On average, deposits in EMEs have remained on an upward trend, which would tend to support credit growth. However, this in part reflects substitution away from other investments in favour of the banking sector. It may also reflect the impact of guarantees or other policies to support the banking sector. These averages mask significant cross-country variation as loan-to-deposit ratios exceed unity in some countries (eg Chile and Colombia). Furthermore, deposits have recently declined or displayed volatility in a number of EMEs (Graph A2).

Still strong balance sheets.[28] The relative resilience of bank deposits was at least partly the result of the strength of banks' balance sheets. This was reflected in: (i) *the limited deterioration in credit quality*; (ii) *still profitable banks*; and (iii) *significant capital buffers and bank resilience to shocks*. The cyclical downturn tended to reduce borrower creditworthiness, with lending to exporters, SMEs and households in some cases posing concerns. However, median NPL ratios in a set of EMEs have been low, declining from around 7% at the beginning of the decade to less than 3% in 2007. Furthermore, unlike many banks in advanced economies, EME banks generally had limited exposure to toxic assets.[29]

Present indications for most countries are that NPL ratios will generally not reach the levels observed in past crises. With regard to bank profitability, while profits fell from their peaks in 2007, banks remained profitable in a number of EMEs. Both narrowing net interest margins and in some cases increases in provisioning (to cover loan losses) lowered profitability. More generally, however, bank provisions to NPLs tended to decline (countercyclically) as the economy slowed. Lastly, by 2007, banks in EMEs typically had regulatory capital ratios well above the minimum 8% (based on the 1988 Basel Accord). In some countries, Tier 1 capital ratios also exceeded 8%.

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[27] Credit supply factors also appear to have been important; see Cowan and Marfán (2010).

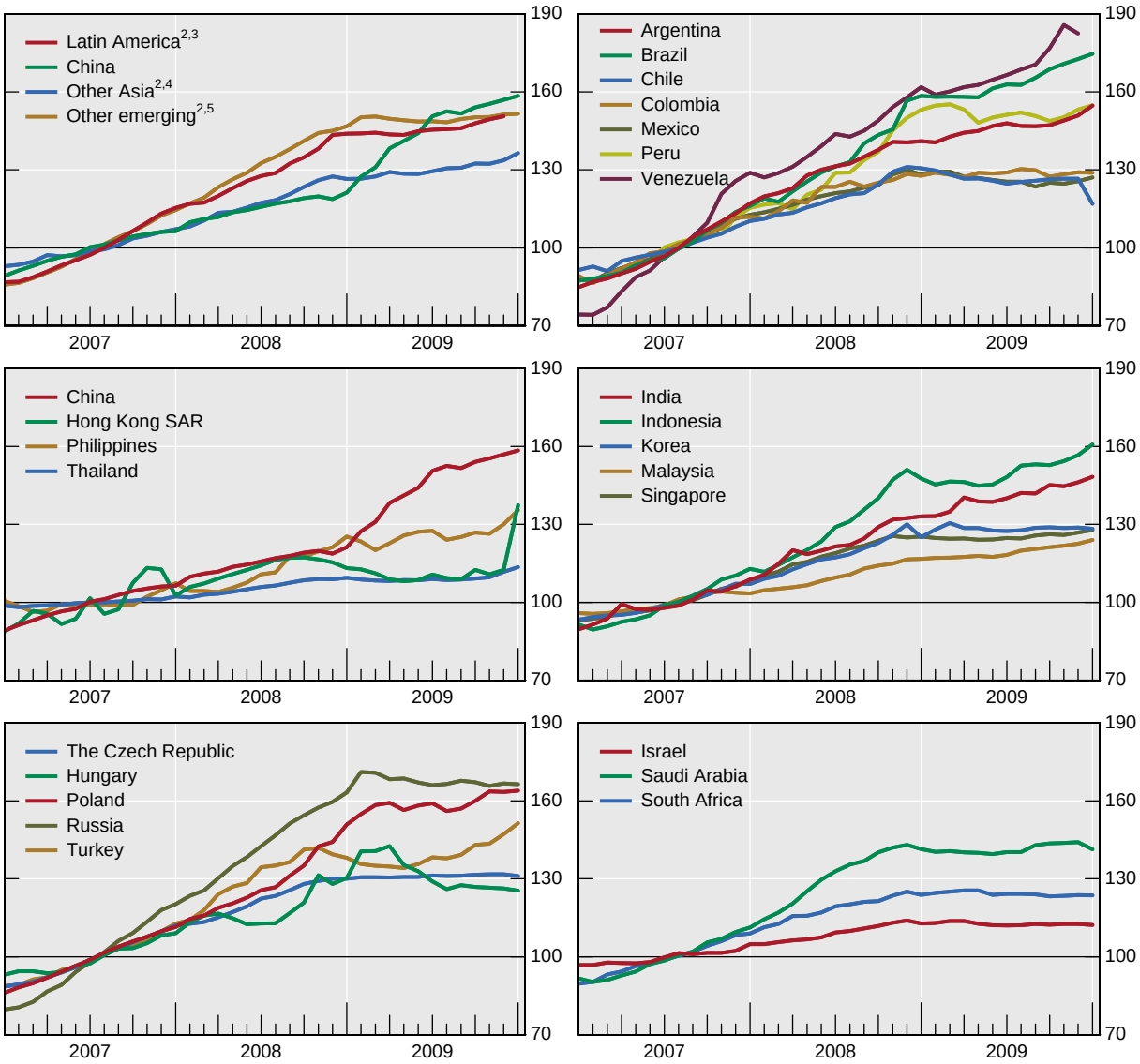
[28] Some central bank contributions for this meeting (eg Ibrahim (2010), Sidaoui, Cuadra and Ramos Francia (2010) and Kozinski (2010)) highlight the importance of robust banking systems.

[29] Banks in some EMEs were affected but without threatening their financial stability.

Graph 3

Domestic bank credit to the private sector[1]

2007 = 100



[1] In nominal and local currency terms. [2] Weighted average of the economies listed, based on 2005 GDP and PPP exchange rates. [3] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [4] Chinese Taipei, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [5] The Czech Republic, Hungary, Israel, Poland, Russia, Saudi Arabia, South Africa and Turkey.

Source: national data.

3. Other criteria

Dampening shocks. A concern during a crisis is ensuring that any major exchange rate or asset price shock is not amplified. Trying to dampen exchange rate or asset price volatility poses some trade-offs. On the one hand, not allowing adjustment can be distortionary – movements in financial prices can help with the price discovery process if they absorb shocks or stimulate corrective action. On the other hand, a lot of volatility could lead to market closure and aggravate financial stability risks. This is the case if there is a breakdown in the payment system; a loss of confidence in the liquidity position of banks that can lead to a bank run; or if firms are unable to adjust their exposures. Output volatility also poses concerns if firms or households are unable to borrow.

Innocent bystanders. It is generally accepted that those taking excessive risks should pay the consequences of their actions. Unfortunately, during a crisis, many other parties – households, companies, or even governments – are negatively affected, even if they did not take excessive risks. In other words, their behaviour did not cause the crisis; they were "innocent bystanders". For central banks, sustaining economic activity and avoiding high unemployment become strong macroeconomic arguments for ensuring continued access to credit for such "innocent bystanders".

Exit policies. An important issue in the assessment of crisis responses is the relative ease in exiting from these policies. For example, efforts to unwind unconventional policies (eg to end central bank operations at longer maturities) could complicate interest rate policy, raising communication problems. If a central bank were to discontinue operations at longer maturities it could be interpreted as monetary policy tightening even if the central bank has no intention of raising the policy rate. Exiting from other policies that have a bearing on financial stability could also pose concerns. For example, the authorities in a number of EMEs have provided guarantees on external debt or bank deposits. These guarantees pose moral hazard issues, so there is an incentive to remove them as soon as possible. The timing of the exit from these policies has generally been announced either as a fixed date or as conditional on the normalisation of financial conditions. However, in financially integrated economies, exiting could make financial systems vulnerable to increases in market volatility. Withdrawing guarantees when others have not done so can also present difficulties, so there are issues of cross-country coordination. Policies to support certain sectors (eg SMEs) raise the issue of balancing the need for support to "innocent victims" of the crisis against the need to ensure that sectors can function independently as the recovery proceeds.

On balance, the authorities appear to have accepted a significant amount of volatility in exchange rates and in equity and bond prices. At the same time, the steps taken appear to have helped countries to emerge with their financial systems relatively intact (ie no breakdown in payments, no runs, and the ability – sometimes with government assistance – to close positions). The flow of credit to some more vulnerable borrowers and "innocent bystanders" (eg SMEs[30]) was facilitated in some cases by government policies or the actions of state-owned banks. As for exit policies, these have been facilitated in EMEs by fairly robust economic recovery and attractiveness as investment destinations.

IV. Conclusions

What did central banks learn about the instruments at their disposal for dealing with the domestic repercussions of an international financial crisis? A number of points may be highlighted from this brief survey.

First, central banks successfully found ways to provide financing in FX markets to offset the sudden withdrawal of foreign funding and disruptions in international FX markets. In many cases, intervention had to be designed to address complex issues, such as the smooth unwinding of foreign currency derivatives positions in some countries. Some central banks found ways of increasing confidence, thereby reducing uncertainty about counterparty risks or the availability of financing. These factors played a large role in preventing defaults on external debts as well as lasting disruptions to EME financial systems.

Second, a number of central banks drew heavily on foreign reserves, reinforcing perceptions that adequate levels of such reserves are needed. However, the crisis raises new questions

[30] Ibrahim (2010) discusses the condition of SMEs in Malaysia.

about the appropriate measures of foreign reserve adequacy. At the same time, there have been very large increases in the availability of foreign currency resources for EMEs, and the extent to which such resources could provide an alternative to domestic foreign reserve accumulation warrants further examination.

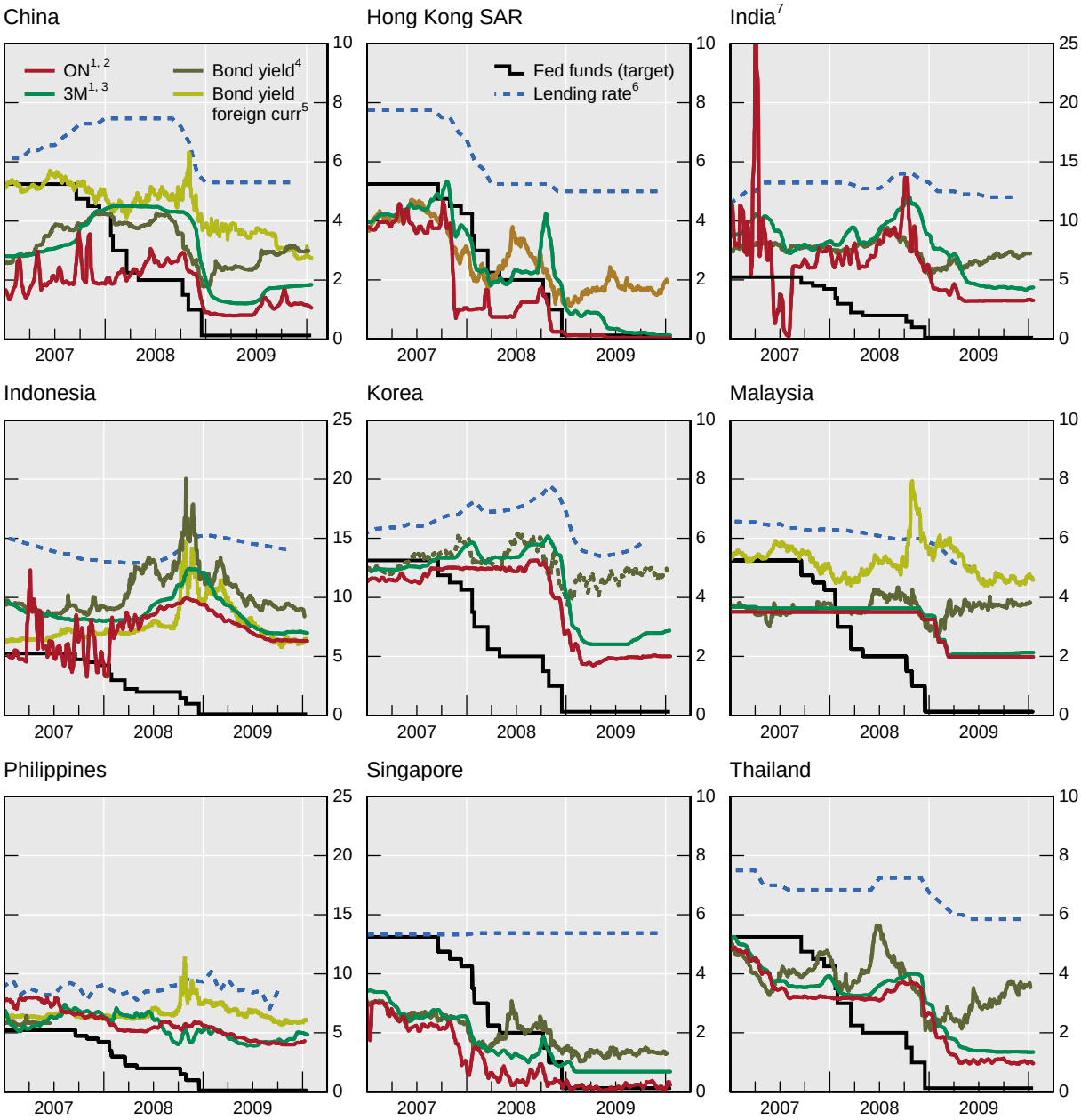
Third, central banks innovated in a number of ways to support local currency financing. A number of central banks extended maturities, accepted new types of collateral and also new counterparties in implementing open market operations. Others reduced reserve requirements, in some cases in ways that provided support to priority sectors. These measures appear to have contributed to easier domestic financing conditions and supported domestic credit. In this context, the strength of domestic banking systems appears to have played an important role (eg by helping to stabilise deposits). However, exiting from some of these measures raises a number of challenges in terms of implications for monetary policy, financial stability or necessary structural adjustment.

Annex graphs

Graph A1

Interest rate

In per cent



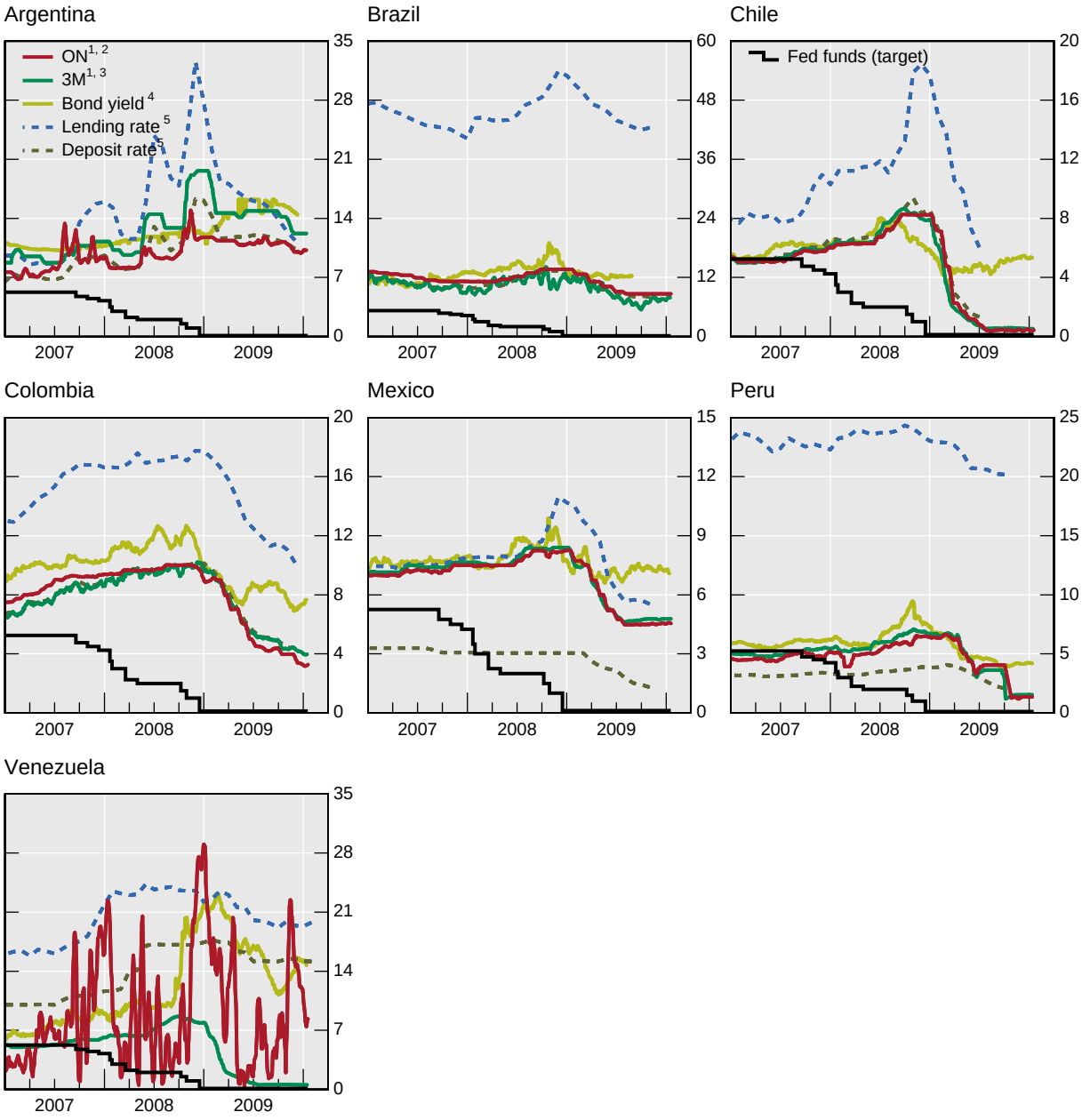
[1] 10-day moving average. [2] Interbank overnight. [3] Interbank 3-month. [4] 5-year government bond yield. [5] EMBI Global. [6] IMF International Financial Statistics definitions. [7] The interbank overnight rate peaked at 43.725% on 21 March 2007.

Sources: IMF, International Financial Statistics; Bloomberg; CEIC; Datastream; JPMorgan Chase; national data.

Graph A1 (cont)

Interest rate

In per cent



[1] 10-day moving average. [2] Interbank overnight. [3] Interbank three-month. [4] Argentina, BCRA issues at issue, closest to one-year maturity (one-year maturity until February 2007; five-year government bond yield otherwise. [5] IMF *International Financial Statistics* definitions.

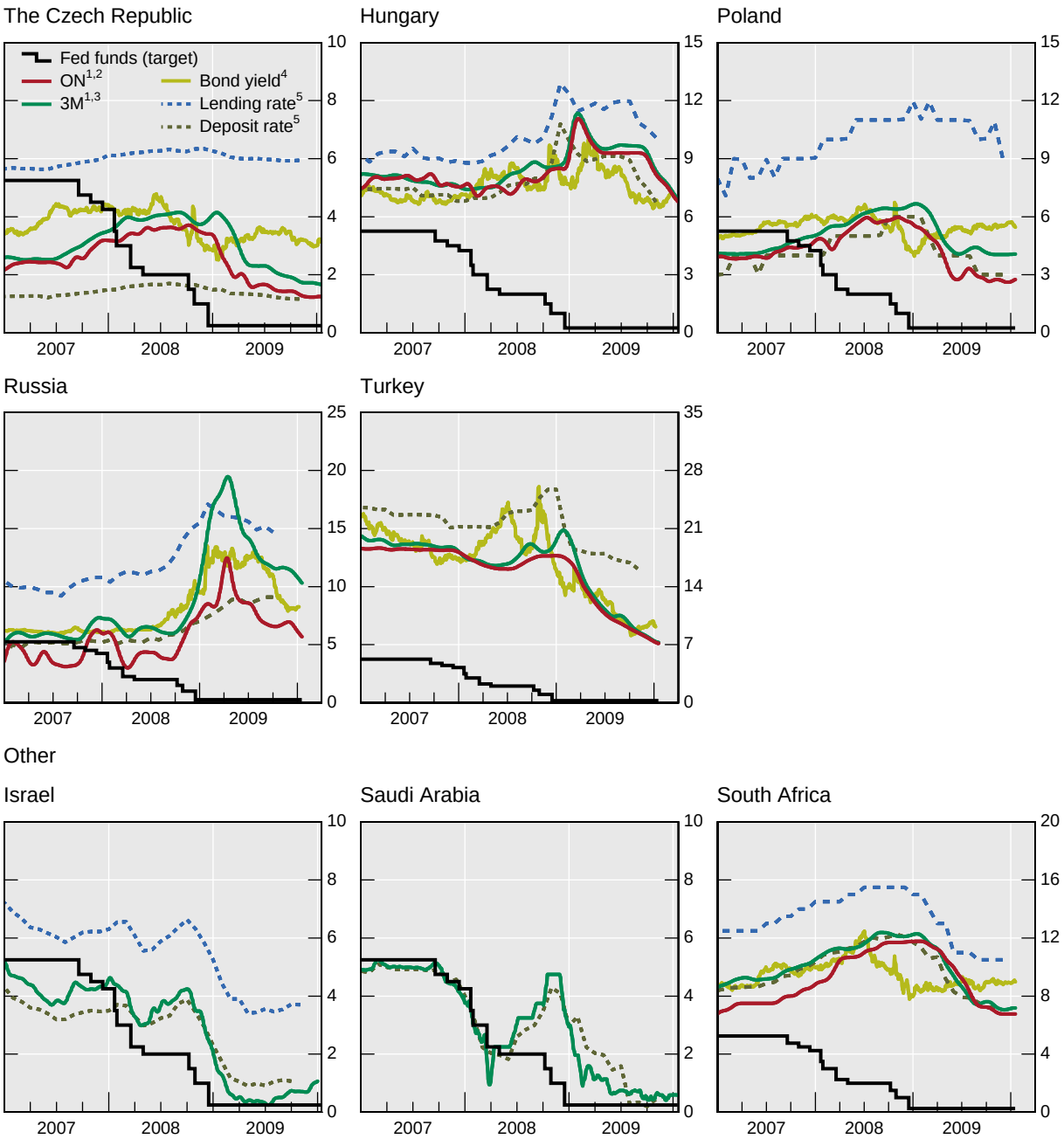
Sources: IMF, *International Financial Statistics*; Bloomberg; CEIC; Datastream; JPMorgan Chase; national data.

Graph A1 (cont)

Interest rate

In per cent

CEE



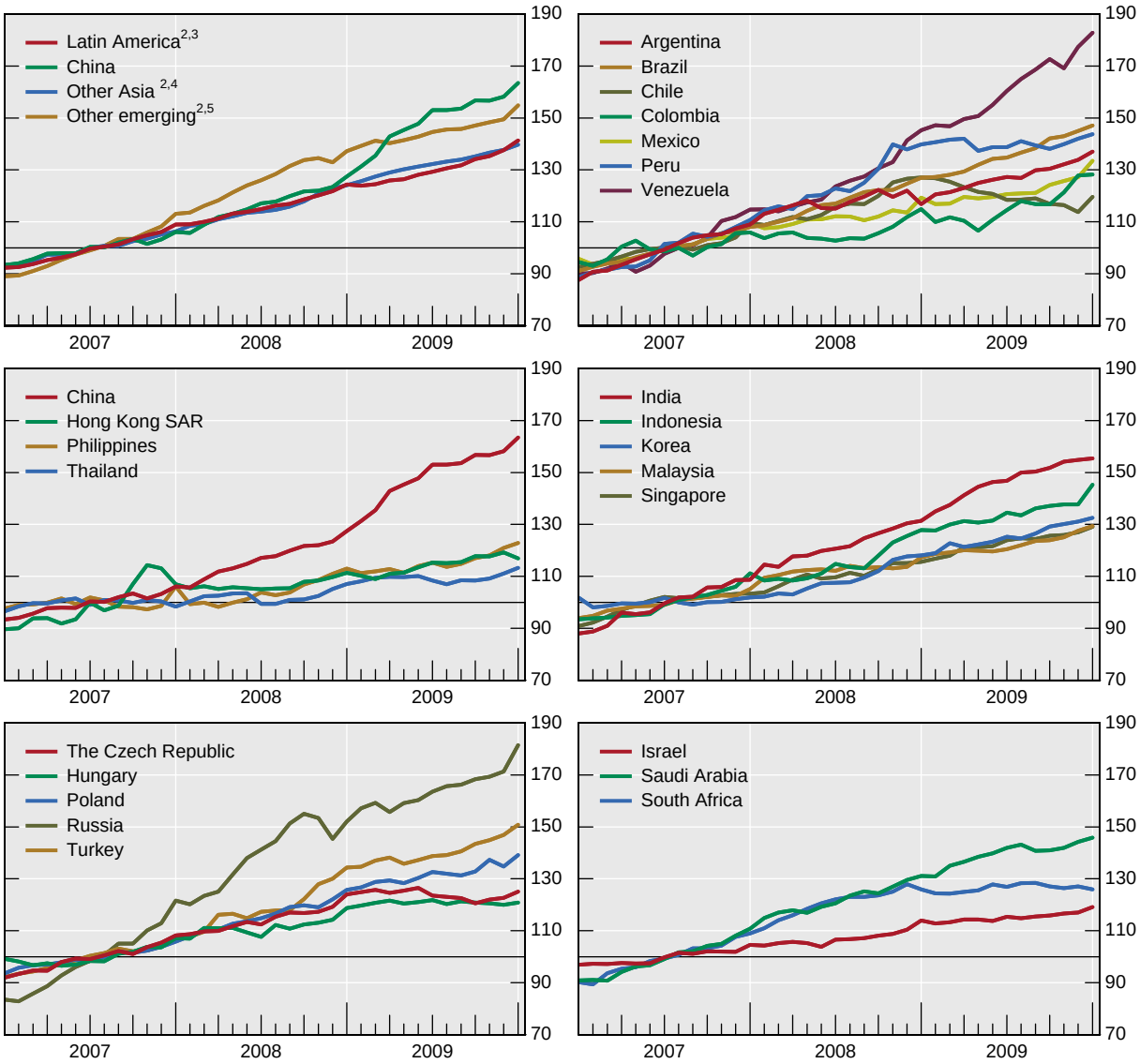
[1] 10-day moving average. [2] Interbank overnight. [3] Interbank three-month. [4] Argentina, BCRA issues at issue, closest to one-year maturity (one-year maturity until February 2007); for the Philippines, 10-year government bond yield; five-year government bond yield otherwise. [5] IMF *International Financial Statistics* definitions.

Sources: IMF, *International Financial Statistics*; Bloomberg; CEIC; Datastream; JPMorgan Chase; national data.

Graph A2

Bank deposits[1]

2007 = 100



[1] In nominal and local currency terms. [2] Weighted average of the economies listed, based on 2005 GDP and PPP exchange rates. [3] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [4] China, Chinese Taipei, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [5] The Czech Republic, Hungary, Israel, Poland, Russia, Saudi Arabia South Africa and Turkey.

Source: national data.

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