

Implications of recent changes in banking for the conduct of monetary policy

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Introduction

This paper examines the relationship between recent changes in banking systems in emerging market economies and the conduct of monetary policy at the operational level. The focus is on the mechanics of monetary policy operations, and changes in the effectiveness of the transmission of policy impulses to the wider economy.

To anticipate the conclusions, the progressive switch to market-based monetary policy techniques has generally made it easier for central banks to guide the economy. More open and deregulated financial markets have on balance helped. Market-based monetary policy techniques are able to influence people's behaviour even when they are outside the central bank's regulatory net, with additional transmission channels coming into play. Even more importantly, the adoption of market-based techniques is usually accompanied by more purposeful and transparent monetary policy frameworks that improve signalling.

After a brief review of the links between monetary policy operations and the structure of the financial system in theory, relevant evidence on the operation of these links in practice is examined. The paper then discusses the evolving monetary policy transmission mechanism, relating those changes to developments in the structure of the banking system. A conclusion follows.

1. Monetary operations and financial system structure: in theory

It is natural that central banks would select the tools most suited to the task. Thus the tools used to affect monetary conditions would be mainly a function of two things: the monetary policy target and the state of financial system development. With underdeveloped financial systems, especially those dominated by (unsophisticated) banks, central banks would tend to directly regulate the lending and deposit-taking activities of banks as the chief method for exerting influence over monetary conditions.² Conversely, with sophisticated, developed financial systems where money and capital markets compete with banks, central banks would tend to use indirect, market-friendly methods. This pattern seems clearly evident in Table 1 below.

Given this perspective, changes in banking system structure and behaviour will lead to changes in monetary policy operations, as central banks find that the old tools of direct intervention and regulation are less effective and the new market-based indirect tools more effective. The differences between direct and indirect monetary instruments have been well documented, as has the relationship between the effectiveness of the different approaches to monetary policy implementation at different stages of financial system development (see for example Alexander et al (1995), BIS (1996), IMF (2004)). Moreover, this description of the issue seems to fit well with the experience of advanced countries in

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² For example, "From the time of its establishment in 1950, the Bank of Korea ... in practice [] long had to rely on direct regulatory instruments because direct regulation was more effective in manipulating the money supply under the situation in which the financial markets remained underdeveloped and there was a chronic excess demand for funds" (Bank of Korea (2003)).

the 1970s and 1980s, when direct monetary policy instruments were progressively abandoned in favour of market-based instruments.^{3, 4}

Table 1
Use of operational tools of monetary policy at various stages of development
 As a percentage of the total sample

	Developing countries	Emerging countries	Developed countries
Credit and interest rate controls	4	22	0
Liquid asset ratios (LAR)	65	30	7
Reserve requirements	100	96	70
Discretionary, market-based ops	96	96	100
Open-ended/standing facilities	96	96	100

Source: IMF (2004). Data relate to 23 countries in each of the three categories, as at the end of 2001.

2. Monetary operations and financial system structure: in practice

Starting in the 1980s but especially in the 1990s and early 2000s, emerging market economies also modernised monetary policy operating procedures, essentially along the same lines that the developed economies had earlier.⁵ That can be seen in Table 2, which highlights the main features of operating procedures used in emerging market economies. However, market-based operating procedures have been adopted even though banking systems continue to show noticeable structural differences relative to those in developed economies. For example, in many emerging market financial systems, secondary debt markets still have little depth. This complicates the idea that central banks tune interventions to match the financial system's structure. A somewhat different perspective is that the choice of operating procedure reflects preferences as to regulatory style. Adoption of market-based mechanisms tends to coincide with the choice to deregulate product markets and capital markets. In turn, markets adapt. In this perspective, central banks need not wait for financial markets to evolve a sufficient degree of sophistication. Instead, they can promote the necessary change by leading the innovation.

The main features of monetary operations in emerging market economies (summarised in Table 2) are:

1. There is now a high degree of uniformity in the way that monetary policy is implemented across the emerging market world. The chief characteristics of the now-dominant approach are:
 - (a) Short-term money market interest rates are the main operating target. Transmission to other interest rates is almost wholly through the incentive effects of altered relative interest rates, ie market forces.

³ The sole exception has been the retention in some cases of minimal reserve ratio requirements to ensure a non-zero demand for central bank cash, the idea being that a more stable fulcrum for market operations results. But to reduce the distortion arising from the associated implicit tax, mandatory reserve balances are typically remunerated at close to market rates.

⁴ Borio (1997a) provides a comprehensive account of the state of play towards the end of this transition to market-based instruments.

⁵ Van 't dack (1999) provides a discussion of the early part of this modernisation phase. See also Hawkins (2005).

- (b) Standing facilities are often used to bound departures of short-term interest rates from target, sometimes in the form of a quite narrow interest rate “corridor”.
 - (c) In the majority of cases where standing facilities provide an automatic mechanism for supplying central bank cash consistent with the target, active open market operations are used to reduce the variance of interest rates around the operating target.
 - (d) In those cases where standing facilities are set at large distances (in interest rate terms) from the target, active open market operations are used to ensure that the supply of central bank cash is consistent with the target.
 - (e) Open market operations are mostly conducted by way of competitive tenders.
2. As these characteristics also describe the dominant approach used in developed countries, there is also considerable uniformity between the groups.
 3. Interest rate controls and direct limits on lending have been almost totally removed (the most important exceptions being some sectoral lending preferences that remain in force in **Brazil, China, India, Korea** and **Venezuela**; and residual interest rate controls in **China, India** and **Russia**). Reserve ratio requirements have been substantially reduced, and remuneration of mandatory reserve holdings is more commonplace (see also Annex Table 9).
 4. Much of the transformation of monetary policy operating procedures to market-based arrangements had already taken place by the end of the 1990s.

Clearly, some points of difference remain between typical operating procedures used in the emerging market economy (EME) group and the developed market group. Three countries in the EME group use the exchange rate as the operating target, and operating procedures are tuned accordingly. For the others, the main points of difference relate to: the residual use of lending directives or “guidance”; active adjustments of reserve ratios for monetary policy purposes in some cases; and incomplete remuneration of required reserves even in situations where the ratio requirement is non-trivial. Nonetheless, it is quite striking how many of the EMEs now rely on highly conventional approaches to policy implementation.

Indeed, exceptions to a clearly interest rate-focused operating procedure are increasingly rare. Seven EMEs stand out as having distinctive approaches. As noted, three - **Hong Kong SAR, Singapore** and **Venezuela** - have the exchange rate as the focus, consistent with either a fixed exchange rate or (in Singapore’s case) an exchange rate operating target. Singapore’s approach is the most unusual, marrying an exchange rate operating objective with a price stability mandate. The Monetary Authority of Singapore has managed to escape the normal traps associated with this potentially internally inconsistent arrangement by maintaining sufficient flexibility on the exchange rate target in the face of shocks to the equilibrium real exchange rate.⁶

Four countries have ostensibly continued to use bank liquidity - essentially, bank deposits at the central bank - as one of the main operating targets of monetary policy implementation. In **India** and **Russia**, the level of bank liquidity targeted at any one point in time is not made clear. Nor, early on, were the respective central banks very clear about what configuration of short-term interest rates and bank liquidity would be judged appropriate to meet monetary policy objectives. Over time, however, both central banks have become more explicit about the desired level of short-term interest rates. Both now set a corridor for overnight interest rates by way of standing deposit and borrowing facilities for banks at specified interest rates. Judging by revealed behaviour, in both cases the volume of bank liquidity supplied or accommodated has progressively become subsidiary to the operational interest rate objective.

In **Mexico**, the Bank of Mexico has until recently also had an operational focus on bank liquidity. Unlike in India and Russia, the size of the “corto” - the (negative) quantity targeted - was well known and was in fact the major signalling device. While continuing to use cortos (“shortages”) to affect demand for bank liquidity in order to amplify the effect of changes in supply, since the spring of 2004 the Bank of Mexico has been much more explicit about the short-term interest rates it intends to achieve. In short, as in India and Russia, the operational focus for monetary policy has shifted

⁶ See Ho and McCauley (2003) for a full exposition.

increasingly towards a defined short-term interest rate configuration, even if such a configuration remains short of being called a target.

Table 2
Main characteristics of operating procedures

	Arrangements in mid-1990s ¹			Arrangements in mid-2005 ²		
	Operating target	Main instruments	Direct instruments	Operating target	Main instruments	Direct instruments
Asia						
China	MONEY		ARR, DIR-MS ICONTROL	MONEY	OMO	ARR, DIR-MS ICONTROL
Hong Kong SAR	ERATE	FXOPS, CORR		ERATE	FXOPS	
India	BKLIQ	PDS, OMO, RDISC	ARR, DIR-MS	BKLIQ+ STIR	PDS, OMO CORR	ARR
Indonesia	ERATE+ BKLIQ	PDS, OMO, RDISC	ARR, DIR-MS	STIR	PDS, OMO	ARR
Korea	BKLIQ+STIR	OMO, STAND	ARR	STIR	OMO, STAND	RR
Malaysia	MTIR	OMO, CORR	ARR, DIR-MS GDEP	STIR	CORR, OMO	RR
Philippines	...		...	STIR	OMO, CORR RDISC	ARR
Singapore	ERATE	FXOPS	RR	ERATE	FXOPS	RR
Thailand	BKLIQ, STIR ERATE	OMO	RR, DIR-MS	STIR	OMO, CORR	RR
Latin America						
Argentina	ERATE	FXOPS, RDISC, OMO	...	BKLIQ	FXOPS, PDS, CORR	RR
Brazil	BKLIQ, MONEY	CORR, OMO	ARR	STIR	OMO, RDISC	RR
Chile	STIR ³	RDISC, OMO	RR	STIR	OMO, CORR	RR
Colombia	STIR, ERATE	OMO, FXOPS	ARR	STIR	OMO, CORR	RR
Mexico	BKLIQ	OMO	ARR ⁴	BKLIQ+ STIR	PDS+CRAUC	
Peru	BKLIQ		RR			
Venezuela	MONEY		...	ERATE	FXOPS, PDS	RR
Europe						
Czech Republic	...	...	RR, GDEP	STIR	CORR, OMO	RR, GDEP
Hungary	ERATE	OMO, RDISC FXOPS	RR	STIR	CORR, PDS	RR
Poland	STIR	...	ARR	STIR	CORR, OMO	RR

Note: For footnotes and a key to acronyms, see the end of the table.

Table 2 (cont)

Main characteristics of operating procedures

	Arrangements in mid-1990s ¹			Arrangements in mid-2005 ²		
	Operating target	Main instruments	Direct instruments	Operating target	Main instruments	Direct instruments
Other						
Algeria	...	...	...	...	...	...
Israel	STIR	FXSWAP	RR	STIR	PDS, FXSWAP	RR
Russia	ERATE, NFA, NDA	FXOPS, PDS, CRAUC, RDISC	ARR, SURR, ICONTROL	ERATE, BKLIQ	FXOPS, PDS, CRAUC, CORR	RR, SURR, ICONTROL
Saudi Arabia	ERATE	OMO, RDISC, FXOPS	RR, DIR-MS	ERATE	OMO, FXOPS	RR
Turkey			...	STIR	OMO, CORR	RR

Key:

... = information not yet available

ARR = active (ie adjusted for monetary policy reasons in last five years) reserve requirement

BKLIQ = bank liquidity or money base

CORR = corridor of short-term interest rates formed by standing facilities [Note: when listed before OMOs, the corridor is judged to be the stronger of the two determinants of monetary conditions]

CRAUC = credit auction

DIR-MS = directions, credit ceilings and/or moral suasion

ERATE = exchange rate

FXOPS = foreign exchange operations (automatic or discretionary)

FXSWAP = FX swaps for domestic liquidity management

GDEP = government deposits which can be shifted at the central bank's discretion to or from commercial banks

ICONTROL = interest rate controls

MONEY = money growth

MTIR = medium-term interest rates (three- to six-month)

NDA = net financial assets (maximum)

NFA = net financial assets (minimum)

OMO = open market operations in secondary markets

PDS = primary debt sales

RDISC = rediscount lending

STAND = standing credit facilities, with interest rates adjusted for monetary policy reasons [Note: = CORR when essentially unlimited in size - subject to collateral - and coupled with standing deposit facilities]

STIR = short-term interest rate (overnight to two-month)

SURR = surrender requirements for FX

¹ Information extracted from Kamin et al (1998), Van 't dack (1999) and national sources. ² Bolded items in the body of the table highlight important changes in practice. ³ Indexed (ie real) rate. ⁴ While Mexico does not use a reserve requirement (average cash balances at the central bank are normally targeted at zero), in August 1998 commercial banks were required to make special (remunerated) deposits at the Bank of Mexico in a measure designed to tighten liquidity conditions.

In **Argentina**, the monetary programme is specified in terms of a base money target range, which is adjusted annually in the light of perceived changes in base money demand in order to keep overall monetary conditions consistent with policy objectives. Although there are standing facilities at posted interest rates which create the appearance of an interest rate corridor, it is unclear to what extent those interest rate settings are adjusted to ensure consistency with the money base target range. In other words, the use of the corridor as an instrument of monetary policy is not clear.

To examine the relationship between the operational approach and the structure of the banking system, an index of the use of non-market monetary policy instruments (NMMPI) was constructed and related to various structural indicators. Details on index construction and the resulting values are provided in Annex Table 9. It suffices to say here that the index weighs most heavily the use of interest

rate controls, direct control on credit creation and allocation, and active adjustments of reserve ratios where no interest is paid on required reserves.

Graph 1 provides a selection of indicators of banking system structure, plotted against the NMMPI index.⁷ The only relationship that shows any strength is that between the NMMPI index and government ownership of banks (left-hand panel, middle row). This is consistent with the view that government ownership weakens managers' incentives to pursue profit-maximising strategies, which in turn weakens their likely responsiveness to price signals. In such circumstances, central banks might choose to use direct controls of various forms. It is also consistent with an argument that preferences with respect to regulatory style are revealed both in choices on the monetary policy operational approach and bank ownership. To the extent that one can detect a positive relationship between use of non-market instruments for monetary policy and overall restrictiveness on entry into the banking system and bank activities (right-hand panel, bottom row), the thesis that regulatory preferences dominate is further supported. (This direction of causation question is explored further in the next section.)

Apart from the relationship between the NMMPI index and government ownership of banks, there is very little consistent relationship evident between the approach taken to monetary policy operations and banking system structure.⁸

Understanding causation

As discussed earlier, it is unclear in principle whether changes in operating procedures should be regarded as a response to changes in financial system structure, or the other way around. Or indeed whether both are a function of attitudes towards market determination of prices in the economy. We do not have the data necessary to test for causation. A fundamental difficulty is that banking system structure and operating procedures both evolve progressively, over a number of years. And causation probably runs in both directions.

In preparing for this meeting, central banks were asked whether recent changes in operating procedures were caused by, or were intended to cause, changes in banking system structure. As the major innovations were in place by the early 1990s in a large number of cases, relatively few central banks were able directly to answer the question. Those answers that were provided are, however, informative.

In the *central and eastern European* cases, the main trigger for reform has been the accession-related need to converge on European Union practices. This has been true for the **Czech Republic**, where arrangements are now essentially identical with those of the European Central Bank. The story is very similar in **Hungary** and **Poland**, although reserve requirements remain slightly higher than in western Europe.

At the same time, in all three countries central banks hoped that these changes in operating procedures would induce beneficial changes in banking system behaviour, including promoting the development of a liquid interbank market, partly by incentivising banks to manage their own liquidity positions (especially important in the Polish case), and thereby reducing the volatility of short-term interest rates (cited by the Czech and Polish central banks). Reductions in the implicit tax burden on banks associated with lowering reserve requirements and remunerating required reserves were intended in all three countries to reduce a tendency towards disintermediation.

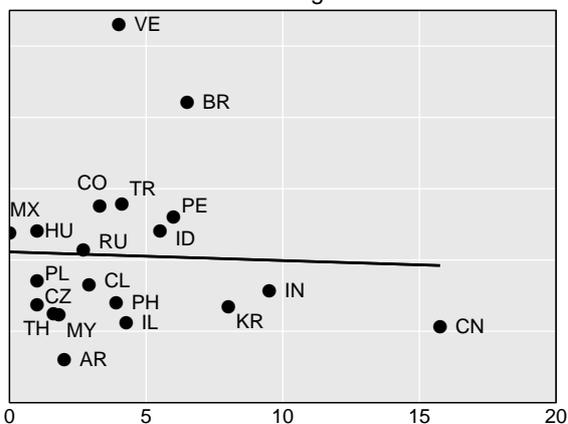
⁷ It should be noted that two of the indicators of banking system structure are indices constructed by Barth et al (2002). As with many such indices drawn from attempts to place numerical values on qualitative factors - including the index constructed for this paper - the accuracy of the indices' representation of the respective structural factors should be taken with a grain of salt. This is especially so for difficult-to-measure issues such as the quality of corporate governance and the nature of regulatory constraints.

⁸ There is some hint of a *positive* relationship between the NMMPI index and the productive efficiency of the banking system as proxied by operating costs as a ratio of total assets (right-hand panel, top row). This, however, is a counterintuitive result which collapses once India is removed from the sample, which removes the positive slope, indicating that the relationship is not robust.

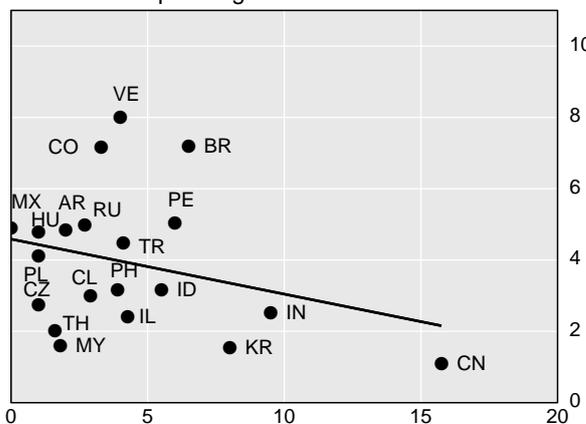
Graph 1

Overall index of non-market monetary policy instruments (NMMPI, x-axis) against selected variables (y-axis)

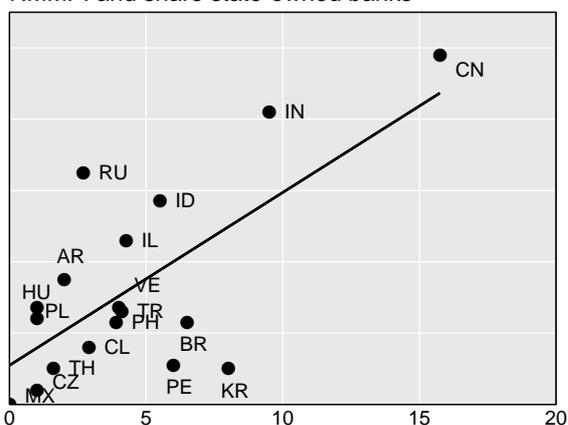
NMMPI and net interest margin ¹



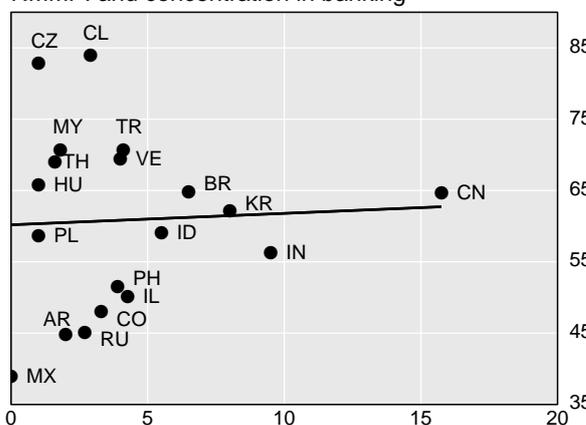
NMMPI and operating costs ¹



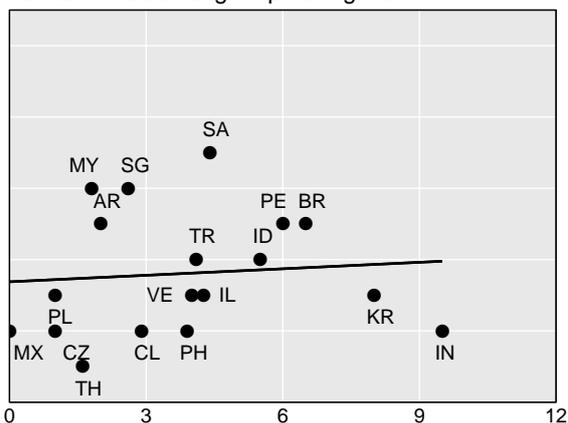
NMMPI and share state-owned banks ²



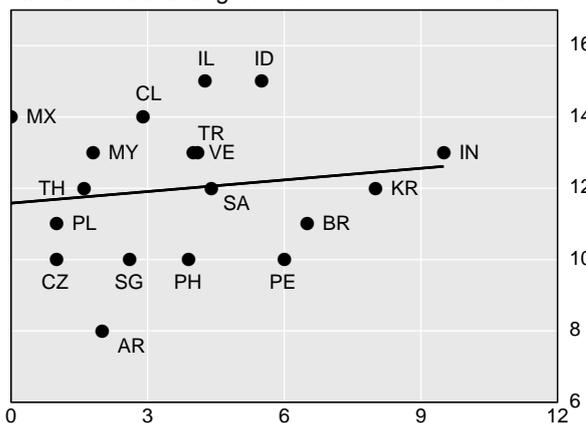
NMMPI and concentration in banking ³



NMMPI and banking corporate governance index ⁴



NMMPI and banking overall restrictiveness index ⁵



AR = Argentina; BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; HK = Hong Kong SAR; HU = Hungary; IN = India; ID = Indonesia; IL = Israel; KR = Korea; MY = Malaysia; MX = Mexico; PE = Peru; PL = Poland; RU = Russia; SA = Saudi Arabia; SG = Singapore; TH = Thailand; VE = Venezuela; PH = Philippines; ZA = South Africa.

¹ As a percentage of total average assets, 2003-04 average. ² Defined as assets of state-owned banks as a percentage of major banks' total assets, 2003. ³ Five largest banks' assets as a percentage of total assets, 2003. ⁴ This index is the sum of three component indexes: the Strength of External Audit index, the Bank Accounting index and the External Ratings and Creditor Monitoring index. Table 7 in Barth et al (2003). ⁵ A higher number indicates greater restrictiveness on banking activities and ownership. Table 3 in Barth et al (2003).

Sources: Barth et al (2003); Bankscope; BIS calculations.

This is not to say that the direction of causation has run entirely from operational changes to the structure of the banking system, rather than the other way around. Magyar Nemzeti Bank, the central bank of **Hungary**, indicated that a narrowing of the interest rate corridor was facilitated by the spread of overnight money market instruments, and a widening of the range of collateral taken in central bank operations has been facilitated by the appearance of new securities such as mortgage bonds. In an interesting episode to which we will return later, the National Bank of **Poland** (NBP) was forced to alter its procedures - radically but temporarily - by banking system behaviour. For various reasons, in 1997 higher short-term interest rates resulting from a tightening of policy were not being translated into higher bank retail interest rates. For a period, the NBP offered six- and nine-month deposits directly to households, in competition with banks, and at higher rates than being offered by banks. The innovation was sufficient to motivate banks to raise retail rates.

In *Asia*, central banks also point to an intention to alter the way that the financial system works as a substantial part of the reason for changing procedures. In **India**, for example, the Reserve Bank is trying to modernise the financial system. A progressive shift to indirect, market-based policy instruments, together with structural reforms and financial liberalisation, has increased the role of financial prices in the transmission mechanism (and with that the efficiency with which the financial system allocates resources). Observing signs of interest rate stickiness, the Reserve Bank has prompted a shortening of the period between interest rate resets on deposits, and is looking to further liberalise remaining interest rate controls on contractual savings. Again, direction of causation is not a one-way street. The Reserve Bank notes that the process of change has been gradual, and predicated on the development of prudential regulation and financial openness.

In **Singapore**, monetary operations have been essentially unchanged since 1981. However, changes in the way the Monetary Authority of Singapore regulates banks are in general aimed at inducing behavioural changes in the financial system. The objective is to further develop financial services as an engine of growth. **Thailand** also serves as an example of causation running in both directions, though primarily from changed attitudes towards economic management style to financial regulation. Thus the post-crisis economic and financial reforms were collectively aimed at opening Thailand to international markets in order to capture some of the benefits from globalisation. All dimensions of the financial system were involved. In the process, the Bank of Thailand found that financial sector reform led to a breakdown of the quantity relationships previously relied on to implement the monetary programming required under IMF financing. This in turn reinforced the move to a price-based monetary policy approach.

In *Latin America*, causation is also seen to run in both directions. A particularly interesting case is **Mexico**, where changed operating procedures, in the context of the new inflation targeting strategy, helped produce the nominal stability needed for the expansion of corporate and household lending. Heightened sensitivity to interest rate adjustments is an important consequence. At the same time, the changed focus of the new arrangements - in particular, the switch away from exchange rate management - has altered exchange rate hedging practices in the wider community. Banks, amongst others, are much less exposed to shifts in the exchange rate, allowing the Bank of Mexico to adjust interest rates independently of FX market developments. Thus changes in policy approach have produced changes in financial system (and wider community) behaviour that have in turn motivated further adaptation of policy operations.

Chile and **Colombia** provide striking examples of different directions of causation. The Central Bank of Chile switched from indexed to non-indexed instruments in mid-2001. A deepening and internationalisation of the nominal fixed income market followed this "nominalisation". In contrast, the Bank of the Republic feels constrained in its choice of instruments by the immaturity of the Colombian money market. Rather than using the simpler two policy interest rate structure observed in developed market settings, a four rate structure is used. The two "inner" rates are the minimum and maximum rates accepted at repo and reverse repo auctions respectively, while the "outer" two rates are the equivalent of the interest rates on the standing deposit and credit facilities that form interest rate corridors in such systems. The spreads between these pairs have narrowed progressively, but the Bank of the Republic would clearly prefer to move to a simpler structure when feasible.

All in all, assessed on the basis of the explanations for changes in operating procedures provided by central banks, it appears that central banks are mostly leading rather than following changes in the banking system. Some examples of central banks responding to exogenous developments are provided, but they are more limited in number, and mostly relate to special circumstances.

This assessment has important implications for policy. It casts doubt on many of the proposed structural or behavioural “preconditions” for the successful implementation of market-based policy instruments⁹ - preconditions relating to government ownership and control of banks being an important exception. Waiting for institutions to evolve before adopting market-based mechanisms might be a less successful strategy than promoting that evolution by adopting such mechanisms as part of a modernisation programme. In the wider context of financial globalisation, Kose et al (2005) have a parallel discussion with a somewhat similar conclusion. They argue that financial globalisation in the presence of weak institutions and a fragile financial sector is likely to create costs in the form of poor resource allocation and crises. But they further argue that financial globalisation itself promotes changes in institutions and financial systems that reduce vulnerability and improve the efficiency of resource allocation. Moreover, these changes are needed if countries are to increase growth.

3. Implications for the transmission mechanism

The adoption of market-based monetary policy operations at the same time as markets have been liberalised and opened to international capital markets has had profound effects on the transmission of monetary policy. These effects are multidimensional; many enhance but others weaken monetary policy. The transmission of monetary policy impulses to interest rates set by financial institutions is addressed first, before broadening out the discussion to include other channels of transmission.¹⁰

The institutional interest rate transmission channel¹¹

Market-based monetary policy exploits the incentives of financial institutions to pass on to their customers both higher marginal costs of funding - for the sake of maintaining profitability - and lower marginal costs of funding - for the sake of acquiring market share. In principle, therefore, liberalisation of markets should improve the effectiveness of the interest rate transmission mechanism. Interest rates are allowed to respond, constraints on freedom of institutions to act in pursuit of profits are removed, more channels of transmission are opened, and monopoly power is constrained by additional competition.

This implies that where the long-term profit motive is a weak force, the adoption of market-based instruments might not improve transmission. In financial systems that are dominated by institutions whose shareholders either care little about long-term profitability, or who have been unable to institute governance arrangements that align managers’ interests with their own, reduced marginal costs of funding might not get passed on to customers. Instead, widened net interest margins might be used as a source of extra revenue for public projects (in cases where governments or local authorities are the main owner of banks), or of rent for managers. Higher marginal costs might also not be passed on where managers care less about the bottom line than the goodwill of dominant borrowers, who might also be a source of rent for those managers.

Likewise, in uncompetitive banking markets, banks might be quicker to pass on higher than lower funding costs. Early studies of retail bank interest rate behaviour showed the existence of such an asymmetry in the United States (see, for example, Hannan and Berger (1991) and Neumark and Sharpe (1992)), where markets might be expected to be more competitive than in the typical EME. In the context of six European countries, Mojon (2000) shows that interest rates are more flexible the greater is external and within-industry competition. Cotarelli et al (1995) also show a connection between interest rate stickiness and competition in Italy. Similar evidence is available for EME cases. Cottarelli and Kourelis (1994) estimated the dynamic response of lending rates to changes in money

⁹ See IMF (2004) for example.

¹⁰ For a general overview of the determination of interest rates, see BIS (1996).

¹¹ Note that the discussion in this section is couched in terms of the reaction of bank lending rates to changes in bank funding costs, treating the latter as synonymous with changes in central bank interest rates. It sets aside the responsiveness of bank deposit rates to changes in central bank rates, not because this is unimportant but rather because the same behavioural forces are at work, with very similar consequences for the monetary transmission mechanism.

market rates for 31 countries, including several emerging market economies. They found substantial cross-country differences in the speed and size of lending rate responses, related to five main structural factors: government ownership of banks, barriers to entry to the banking market, capital controls, the size of the market for short-term monetary instruments, and volatility of interest rates in that market. The inflation rate was also found to be relevant to pass-through, with higher inflation rates facilitating faster pass-through. Since earlier work had suggested that bank concentration affected the speed and size of pass-through from policy rates to lending rates, this was also tested. No such relationship was found. The broad conclusion from these analyses is consistent with the idea that liberalised financial systems, using market-based policy instruments, show stronger transmission, although the evidence is not overwhelming.^{12, 13}

A full cross-country, through-time examination of the hypothesis that a stronger role for the profit motive, more open and competitive banking systems, and a reduction in regulatory constraints on interest rate adjustment have made the interest rate transmission mechanism less sticky is beyond the scope of this paper. We instead simply look at changes in interest rate transmission over time for indirect confirmation of the hypothesis.

A crude approach is to examine covariances of lending interest rates with money market interest rates in different time periods. This is done in Graph 2. Covariances were calculated for lag lengths ranging from 0 to 3 months, with the largest covariances from each period plotted. The support for an increase in interest rate pass-through as countries liberalise their financial systems is decidedly mixed. Where there are data for the first and second halves of the 1990s, the number of cases showing stronger pass-through in the later period is the same as the number showing weaker pass-through. And where there are data for both the second half of the 1990s and the first half of the 2000s, more cases show a weakening than show a strengthening in pass-through over time. Nor is the hypothesis that pass-through strengthens with financial market liberalisation rehabilitated by evidence of a shift towards *faster*, albeit weaker, pass-through. The lag length at which strongest covariance was measured increased in almost as many cases as it fell, with even more showing no change.

A somewhat more sophisticated approach is to estimate pass-through from an error correction model where the dynamics are represented by distributed lags. Using such an approach, De Brouwer (1995) provided evidence of increasing pass-through from money market to lending interest rates as deregulation progressed in western Pacific countries, albeit for an early phase of liberalisation (1980s and early 1990s). In most of the emerging market cases in his sample, larger and faster pass-through is observed over time (see the first two columns in Table 3).¹⁴ That change is less obvious in the more developed country cases where pass-through was higher at the start, and stays roughly unchanged or diminishes somewhat in certain periods (especially in **Singapore**¹⁵). Pass-through generally increases for both deposit rates and lending rates, though the rise is larger and faster for the former, perhaps explained by higher transactions costs, and a stronger relationship element in lending than deposit-taking.

¹² Studies at the bank level point to the possible importance of other determinants of loan rate stickiness. Berstein and Fuentes (2004) identify bank size as important in Chile, along with the proportion of businesses relative to households in the loan book and the proportion of non-performing loans (all increasing in stickiness). Gambacorta (2004) finds that bank size does not matter in the case of Italian banks, where stickiness is found to be less where banks are illiquid or not well-capitalised (ie have low buffer stocks to absorb margin variations), and where the proportion of short-term lending is high. Interestingly, Gambacorta finds that heterogeneity of pass-through disappears in the long run. Di Lorenzo and Marotta (2005) dispute findings that EMU has increased pass-through in the Italian and Portuguese banking markets, raising doubts about banking market openness as an explanator of loan rate stickiness.

¹³ It should be noted that the issue of pass-through is related to, but conceptually not the same as, the issue of the determination of the average size of bank interest rate spreads. For selected discussions on the latter in an emerging market context, see Bensidoun et al (1997), Brock and Rojas-Suarez (2000), Afanasieff et al (2001), Demirgüç-Kunt et al (2004) and Martinez Peria and Mody (2004).

¹⁴ De Brouwer also provided estimates for pass-through from money market rates to deposit rates, and for the period 1980 to 1984. As these estimates tell essentially the same story, they are not shown.

¹⁵ The reduction in pass-through in Singapore is not surprising in view of the increasing focus on the exchange rate as an operating target for monetary policy. The greater the focus of monetary policy on the exchange rate, the more short-term interest rates are determined by interest rate differentials with partner countries and other determinants of capital flows (Glick and Moreno (1994)), which are only partly related to the domestic conditions relevant for loan pricing. Perhaps more surprising is the close relationship of loan rates and money market interest rates in Hong Kong.

Graph 2
Covariance of lending rate with money market rate

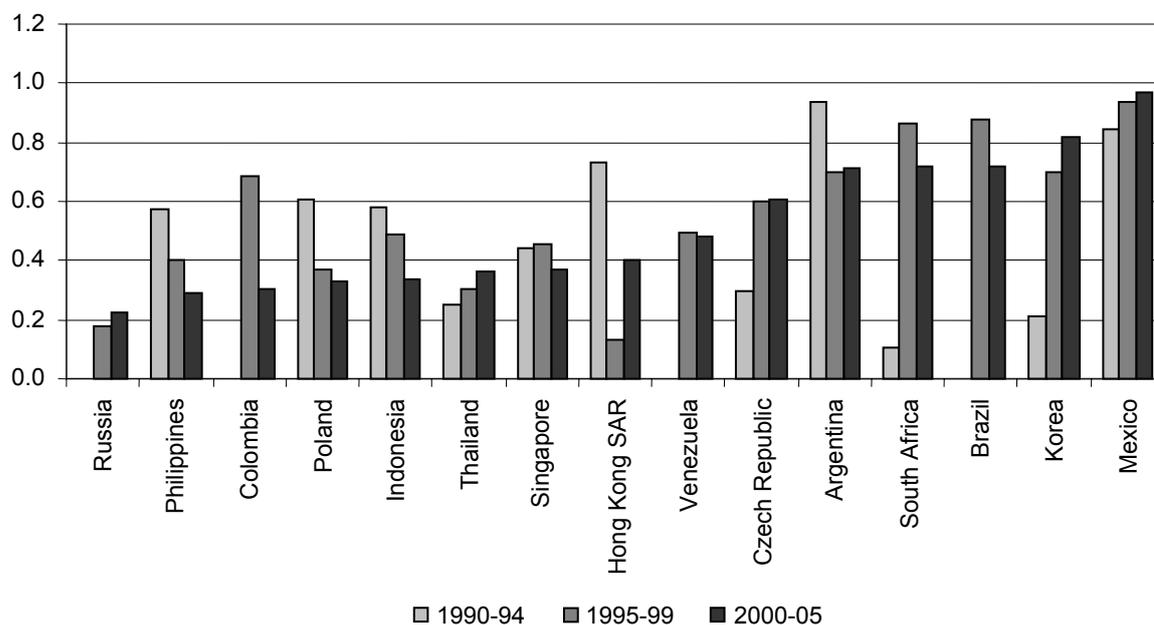


Table 3
Pass-through from money market to domestic loan interest rates

Cumulative response of loan rate to 1 percentage point rise
in money market rate after 1 and 12 months

Cum change after <i>n</i> months:	De Brouwer's estimates				Updated estimates			
	1985-89		1990-94		1990-94		2000-04	
	1	12	1	12	1	12	1	12
Less advanced	0.18	0.42	0.27	0.78	0.33	0.82	0.48	0.84
Indonesia	0	0	0.12	0.90	0.12	0.65	0.13	0.68
Malaysia	0.06	0.43	0.13	0.71	0.21	0.83	(0.02)	(0.20)
Philippines	0.58	0.83	0.69	0.86	0.80	1.00	0.83	1.00
Thailand	0.06	0.42	0.13	0.64	0.17	0.81	(0.11)	(0.50)
More advanced	0.38	0.67	0.32	0.71	0.19	0.87	..	..
Hong Kong	0.62	0.89	0.52	0.81	0.12	0.83	-	-
Singapore	0.14	0.45	0.12	0.60	0.26	0.90	(0.41)	(0.87)
Most advanced	0.62	0.91	0.72	0.88	0.76	0.99	0.78	0.88
Australia	0.68	1.02	0.49	0.87	0.87	1.00	0.95	1.00
Japan	0.43	0.65	0.82	0.87	0.36	0.96	0.19	0.52
Canada	0.57	0.91	0.80	0.95	0.82	1.00	1.00	1.00
United States	0.78	1.06	0.78	0.81	0.98	1.00	0.99	1.00

Note: Estimates are bracketed where the relevant coefficients are statistically insignificant and/or the adjusted R squared is very low. Updated estimates for Hong Kong for the latest period are not sensible, so are not reported (see text). Numbers in bold are simple averages of countries in the group for which data exist (excluding bracketed estimates).

Source: De Brouwer (1995); BIS calculations.

Consistent with the idea that interest rate pass-through increases as time passes and financial systems are deregulated, Espinosa-Vega and Rebucci (2004) provide evidence that Chile's interest rate pass-through is now similar to that in Australia, Canada, New Zealand, the United States and five European countries. Chile's start on the financial liberalisation path was relatively early within the EME group.

The last two columns of Table 3 present updated estimates, using the same methodology as De Brouwer (see Annex 1 for details). Presumably because of slightly different data sources, some of the estimates in the 1990-94 period are a little different from De Brouwer's, but the general story that more advanced countries with profit-driven banks operating in competitive markets show less lending rate stickiness remains intact.

Because the 1995-99 period was characterised by much turmoil in money and banking markets in all of the EME countries in the sample, we chose to confine our updating of De Brouwer's estimates to the 2000-04 period. Here we thought that the post-crisis normalisation of conditions would be sufficiently advanced to reveal the underlying relationships associated with the banking system's evolving structure. As it happens, however, in many cases the relationships evident in the early 1990s had broken down in the 2000s. This is the case for Malaysia, Thailand and Singapore, where previously statistically significant coefficients describing both the cointegrating vector in the interest rate market and the dynamics of adjustment have become insignificant. (In Hong Kong, the estimated relationship shows a statistically significant negative connection between money market and lending interest rates, which is counterintuitive so is not reported). And in some other cases the degree of stickiness seems to have increased (Indonesia, Japan) notwithstanding noticeable structural change in the former case at least.

This evidence confirms that the relationship between market structure and the performance of the interest rate transmission mechanism is complicated. From a cross-country perspective, the standard hypothesis still seems supported. But judging from the experience of the crisis-hit Asian economies, liberalisation does not automatically translate into more powerful interest rate transmission.

What might be going on? One structural explanation for reduced responsiveness of lending rates to short-term interest rates in these countries concerns the effect of increased globalisation.¹⁶ Although the general shift towards more flexible exchange rates suggests greater independence of national monetary policies and hence domestic short-term interest rates, the opening-up of capital markets also provides borrowers access to alternative sources of funds offshore (as well as onshore). Short-term international interest rate differentials tend to move through wider ranges than long-term interest rate differentials - increased capital mobility tends to favour the convergence of long-term interest rates internationally. One corollary is incomplete pass-through from short-term to long-term interest rates domestically, including those attached to term loan contracts. To the extent that interest rates attached to shorter-term loan contracts are affected by those attached to longer-term contracts, there might also be some spillover to pass-through from short-term funding costs to short-term loan rates.

Another key reason for weak pass-through, at least during certain periods, might have to do with the health of the financial system. Several mechanisms might be involved. Where previous loans or investments have gone bad, financial institutions might seek to use increased margins to rebuild capital, increase provisioning and write down bad debts. Especially where bank capital has been eroded and accounting practices allow banks to hide bad debts, banks might continue to support "zombie" firms by "evergreening" impaired loans. Hanging on to bad loans may crowd out opportunities to make new good loans, limiting the stimulatory effect of lower interest rates. (There is considerable evidence of such an effect at work in Japan in the 1990s and some, though less, evidence for banking systems hit by the Asian financial crisis.¹⁷ Certainly, the presence in several Asian economies of high levels of non-performing loans and weak corporate lending in the late 1990s and early 2000s suggests the possibility of widespread evergreening.) Furthermore, when the banking system is in poor health, it is highly likely that the economy is simultaneously facing difficulties. In such situations, risk aversion rises and information costs also seem to prevent banks acting

¹⁶ Various papers contained in *BIS Papers* no 23 discuss the effects of globalisation.

¹⁷ See Ahearne and Shinada (2004) and Fukuda et al (2005) for recent examples of research into bank support for zombie firms in Japan. Bonin and Imai (2004) provide evidence of bank support for weak firms in Korea.

countercyclically (by lending to those who can take advantage of opportunities created by the failure of others). In fact, Stiglitz-Weiss type credit rationing tends to increase, reducing the sensitivity of lending to changes in funding costs.

This discussion relates to difficulties that central banks experience in stimulating economic activity during times when bank balance sheets are in poor shape. Such difficulties often lead to large injections of liquidity as central banks push on the proverbial string, with little effect on lending activity. Judging by comments provided by central banks, it seems that the overhang of such liquidity also means that increases in interest rates can also be difficult to transmit during the recovery phase.¹⁸ For example, while Disyatat and Vongsinsirikul (2002) suggest that **Thailand's** problems following the financial crisis were likely reasons for more sluggish transmission of *stimulatory* interest rate impulses, the Bank of Thailand's questionnaire response for this meeting cited the liquidity overhang from that period as impeding transmission of *higher* policy interest rates.

Similar problems were also cited by the Bank of **Korea** and the National Bank of **Poland**. In the latter case, when confronted with a negligible effect of higher policy rates on retail interest rates - for both deposits and loans - in 1997 the National Bank of Poland competed directly with banks for retail deposits. It was successful in motivating banks to compete for funds at higher interest rates, and to pass on the higher cost of funds in the form of higher lending rates. It should be noted, however, that the existence of a liquidity overhang does not seem automatically to translate into monetary policy ineffectiveness with respect to tightening interest rates. The Bank of Japan is currently concerned about the risk of an excessive response of interest rates to the prospect of progressive normalisation of liquidity conditions.

Further indirect confirmation that the health of the banking system is part of the explanation for weakened interest rate transmission in the first half of the 2000s comes from evidence on pass-through in Hungary. Horváth et al (2004) estimate pass-through for Hungary for the period 1997 to early 2004. Comparing their results with those from earlier research, they conclude that interest rate transmission has improved. Although the Hungarian banking sector experienced some post-liberalisation difficulties, they were not as severe as seen in post-crisis Asia.

A possible third reason for reduced pass-through echoes the experience of reduced pass-through from changes in exchange rates to changes in import prices and thence consumer prices. Put simply, greater stability in consumer prices has been accompanied by reduced pass-through. Interest rates are also considerably less volatile in the most recent period. As shown in Annex 1, the variance of both money market rates and lending rates has fallen by between a third and a half in typical cases.

Broader channels of transmission

As just discussed, the evidence on interest rate transmission within the financial institution sector provides only mixed support for the argument that adoption of market-based instruments coupled with liberalisation of markets makes monetary policy more effective. Overall, however, the evidence for a generalised weakening in the transmission mechanism is not strong.

As Sellon (2002) found in the US context (where some interest rates have become more responsive to monetary policy), structural changes such as increased use of variable rate loans and low-cost mortgage refinancing have broadened the transmission mechanism. Central banks in developed financial markets have generally become *more* cautious about adjusting interest rates aggressively, for fear of provoking overly large responses. The sense of a *more powerful* transmission mechanism is associated with several factors, including: increases in financial leverage, particularly in the household sector, increasing its sensitivity to changes in financing costs; the stronger role that induced but unpredictable shifts in asset prices might play in affecting wealth and hence spending; and the heightened power of expectations channels.

The view that the overall effectiveness of monetary policy has increased was also reflected in responses to questions posed to central banks in preparation for this meeting. Nine out of the 13 central banks which ventured a conclusion rate their influence over the economy as now *stronger*

¹⁸ The concept of a liquidity overhang and an associated non-linear interest rate transmission mechanism has gained renewed respectability following experience in Japan in the 1990s and the resurgence of interest in liquidity traps.

than before. The nature of their responses is discussed further below (with reference to Table 4). In the meantime, it is worth noting that implicit in a number of the comments offered by central banks is the particular role of the *credit channel* in the overall transmission of monetary policy impulses.

As noted by Kamin et al (1998), the credit channel is relevant for both financially repressed economies and advanced liberalised financial systems. This reflects its two conceptions, one “old” (in terms of the economics literature) and one “new”. The old conception concerns quantity rationing by providers of credit, predominantly banks, resulting from interest rate and other direct regulations that cause an unsatisfiable demand for credit when such regulations are binding. The new conception recognises other rationale for the existence of quantity rationing, such as lenders’ responses to information problems when assessing the riskiness of borrowers, and risk management practices that involve setting quantitative limits on sectoral and connected party exposures. The new conception extends beyond quantity rationing, however. Where borrowers are large enough to have access to both banks and corporate debt markets, but these sources of finance are not perfect substitutes, changes in economic conditions that alter banks’ willingness to lend can lead to shifts in the interest rate spread between corporate debt and bank financing.¹⁹

It has long been understood that the old conception of the credit channel has relevance for EMEs. But, as discussed in this paper, its relevance is declining as regulatory restrictions to interest rate and bank balance sheet adjustment are removed. The relevance of the new conception of the credit channel for EMEs has also been documented in a number of cases. For example, Kim (1999) and Borensztein and Lee (2000) show that the credit channel was a powerful force during and after Korea’s late-1990s financial crisis; Disyatat and Vongsinsirikul (2002) provide evidence for the existence of a credit channel in Thailand; and Fernandez (2004) provides evidence for Chile. In each case, the theory and the evidence relating to the new view of the credit channel point to an important amplification of the effects of changes in central bank interest rates on economic activity.

But it is not entirely clear whether liberalisation of banking systems implies a strengthening or weakening of the amplification of monetary policy through the credit channel. On the one hand, a strengthening might be expected as more households and firms engage with banks to finance expenditures, as leverage increases, and as balance sheets become more sensitive to changes in the value of assets. On the other hand, as growing numbers of firms access deeper and more liquid debt markets both onshore and offshore, as substitutability of sources of finance increases, as information about the state of health of borrowers becomes more readily available, and as corporate governance arrangements improve in quality, we could expect a weakening in the role of the credit channel. In the absence of time series evidence specifically tracking the evolving performance of the credit channel in emerging markets, we are forced to infer the net effect from evidence on the changing power of the overall transmission mechanism of monetary policy, and from central bank perceptions of what is causing such changes.

In these respects, the perceptions of EME central banks about the increasing power of the transmission mechanism as financial deepening proceeds parallels the evidence available from more developed markets. Sellon’s (2002) work has already been cited. A substantial investigation as to the implications of financial structure for the transmission mechanism was conducted by the BIS and national central banks in 1995 (summarised in Borio (1997b)). That study concluded that monetary transmission is relatively more powerful in (developed) countries where agents are more highly leveraged and exposed to fluctuations in asset values, where interest rates are more flexible, and where non-institutional forms of market finance are more developed.

EME central banks in our survey placed particular emphasis on changes in monetary policy regimes when explaining their perception that monetary policy is now more powerful (see Table 4). Clearer objectives and greater transparency - often in the context of adoption of an inflation targeting framework - are thought to have increased the focus and purposefulness of the central bank, and thereby the effectiveness of the expectations channel.

¹⁹ Kashyap et al (1993), Gertler and Gilchrist (1993, 1994), Ceccetti (1995) and Christiano et al (1998) are prominent references in this literature. For a European perspective, see, for example, De Haan (2003) and Ehrmann et al (2001).

In addition, increasingly flexible exchange rates and the growth of capital markets have broadened the range of policy transmission channels to larger enterprises. Several central banks cited the growing role of asset prices in the transmission of monetary policy, noting especially the exchange rate and prices of traded financial instruments. Frequent reference was made to the broadening of transmission channels associated with greater financial depth. Removal of restrictions on access to credit markets, increasingly competitive credit markets that innovate in the design of loan contracts, improvements in information technology and information management that allow better assessment of credit risk, and changes in attitude towards financing of small and medium-sized enterprises as well as households are just some of the recent changes that have increased the engagement of such entities with financial intermediaries. (These trends are discussed in much more detail in the accompanying paper on developments in bank credit.)

As a result of these changes, a smaller proportion of the private sector - from large enterprises to households - is now credit-constrained through lack of access to efficient intermediation services. In turn, the utilisation of new-found access to credit is leading to increased leverage and exposure to assets whose capital values are in principle sensitive to monetary conditions. Overall, the recent evolution of banking markets and financial systems has provided more ways for central banks to influence the economy.²⁰

The impression of an overall strengthening of the power of monetary policy obtained from surveying Table 4 is broadly confirmed in the results from an "opinion survey" of central banks participating in this meeting, summarised in Graph 3 below. This opinion survey made a number of statements that the respondents were asked to rate as being completely irrelevant to their situation (0), relevant to some extent (1), very relevant (2) or completely relevant (3).

The statements thought by the average respondent to be most relevant describe increased effectiveness of monetary policy via expectations-related channels following greater *predictability* and heightened *transparency*. Greater sensitivity of households to interest rates due to increased *leverage*, and a strengthened exchange rate channel, were also rated as being relevant "to some extent".

Interestingly, changed hedging practices of financial institutions, corporates and households were considered to be hardly relevant factors in weakening interest rate transmission. This is somewhat in contrast with concerns in some developed markets about increased lending rate stickiness resulting from, inter alia, more active interest rate risk management by non-financial corporates, longer times between mortgage interest rate resets and generally greater optionality available to creditors. One possible reason that more fleet-footed interest rate risk management by corporates might not have been rated as a factor weakening the interest rate transmission channel is the perception that such developments have been offset by correspondingly higher corporate leverage. However, in many if not most of the countries surveyed, corporates have been deleveraging over a number of years. This is perhaps the reason that the statement relating more effective monetary policy transmission to greater corporate leverage found little resonance with respondents.

²⁰ Some would argue that these gains come at a price, namely the ability of imperfectly informed agents to use greater financial freedom to make greater mistakes that individually might be of no real consequence but collectively might make for a more fragile system. For arguments along these lines, see Borio and White (2004). There are other reasons to be concerned about the potential for increases in boom-bust behaviour associated with credit market and other imperfections, especially in the EME context. Tornell and Westermann (2003) connect booms and busts following financial liberalisations to credit market imperfections, including those that generate currency mismatches (on which, see also Goldstein and Turner (2004)). Caballero and Krishnamurthy (2004) connect exchange rate volatility and the credit channel in emerging markets, arguing that in crisis conditions the interaction can render expansionary monetary policy impotent.

Table 4

Factors cited by central banks as influencing the effectiveness of monetary policy in recent years

	Reducing effectiveness	Increasing effectiveness	Overall effect
Asia			
China		<ul style="list-style-type: none"> • IR deregulation → ↑ power IT channel • ↑ ER flexibility gradually increasing indep of MP • Introduction of profit motive in state owned banks → ↑ sensitivity to MP • ↑ bond market depth + ↑ household borrowing → wider sphere of influence for MP 	[Not clear from response. More effective indirect channels, but early days. Some suggestion that direct channels are weaker, but not clearly stated.]
Hong Kong SAR			[Not regarded by HKMA as relevant]
India		<ul style="list-style-type: none"> • IR deregulation → ↑ power IR channel 	More effective (IR stickiness still, but declining)
Indonesia	<ul style="list-style-type: none"> • Float + liberalisation → ↑ relative role of ER, which is less amenable to MP influence 		Less effective
Korea	<ul style="list-style-type: none"> • ↓ interest elasticity of real variables 	<ul style="list-style-type: none"> • IR operating focus → more precise control over policy instrument • ↑ share of banks post-crisis + ↑ bond market depth + ↑ household borrowing → wider sphere of influence for MP 	More effective
Malaysia			[Too early to tell]
Philippines	<ul style="list-style-type: none"> • Limited signs of reduced pass-through from money market IR to retail IR. Possibly associated with NPLs and sluggishness of lending. 	<ul style="list-style-type: none"> • Adoption of IT → more leverage over expectations • Switch from money targeting to IT reduced reliance on unstable relationships • Financial deepening → wider sphere of influence for MP 	More effective
Singapore		<ul style="list-style-type: none"> • ↑ transparency w.r.t. operational target → more effective influence over market 	More effective
Thailand	<ul style="list-style-type: none"> • ↓ share of banks post-crisis + liquidity overhang → ↓ sensitivity of retail IR to money market IR 	<ul style="list-style-type: none"> • ER float + ↑ depth of capital markets → ↑ power asset price channel 	Less effective

Table 4 (cont)

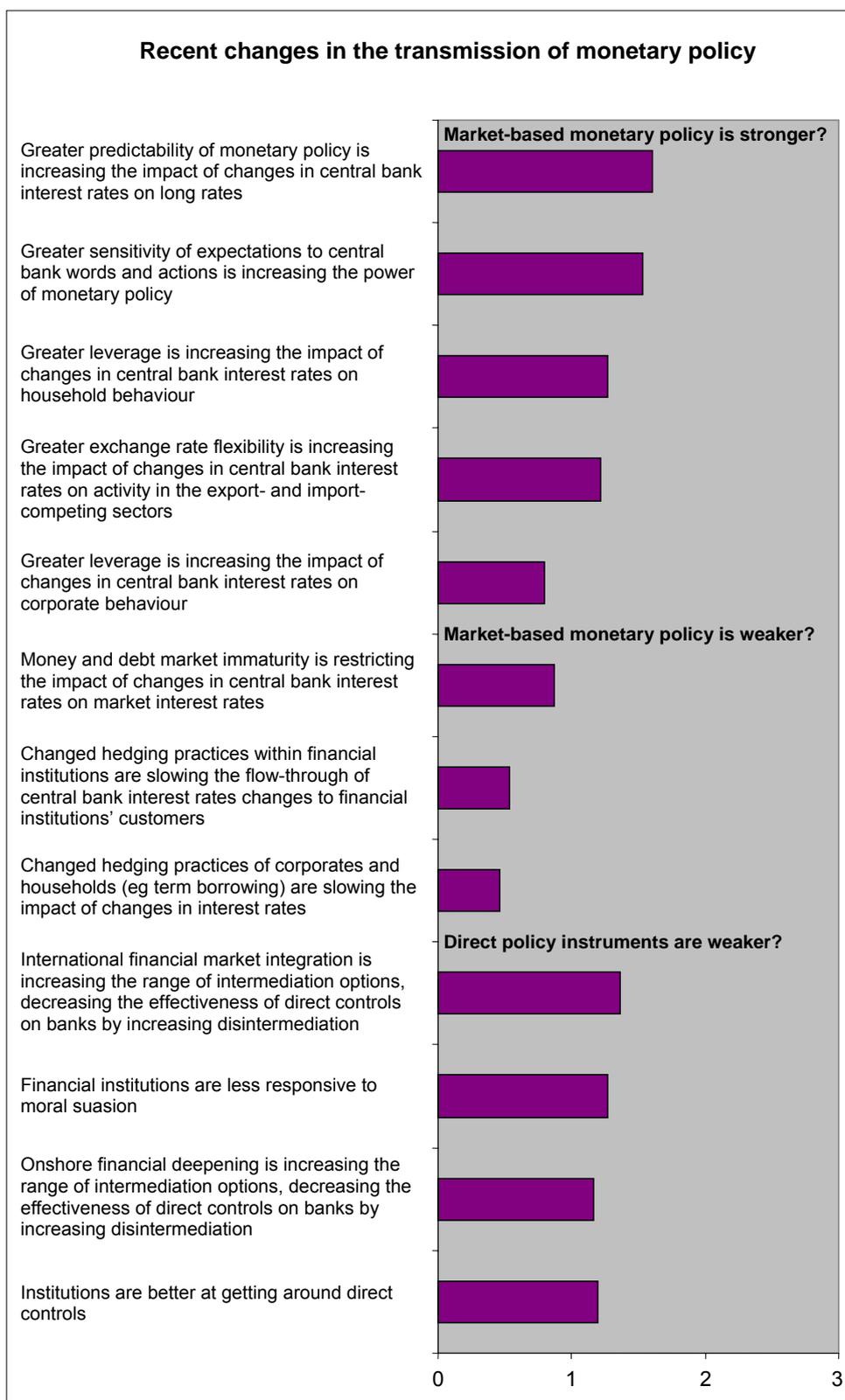
Factors cited by central banks as influencing the effectiveness of monetary policy in recent years

	Reducing effectiveness	Increasing effectiveness	Overall effect
Latin America			
Brazil			
Chile		<ul style="list-style-type: none"> • Adoption of IT → more leverage over expectations • Financial deepening → wider sphere of influence for MP 	More effective
Mexico		<ul style="list-style-type: none"> • CB independence + adoption of IT → more leverage over expectations • Lengthening of maturities → ↑ sensitivity of banks to IR • Financial deepening → wider sphere of influence for MP • ↑ transparency w.r.t. operational target → more effective influence over market 	More effective
Europe			
Czech Republic		<ul style="list-style-type: none"> • Adoption of IT → more leverage over expectations • ↑ experience of CB with IT → more effective MP • ↑ household borrowing → wider sphere of influence for MP 	More effective
Hungary	<ul style="list-style-type: none"> • Deregulation + globalisation → ↓ role of IR channel 	<ul style="list-style-type: none"> • Adoption of MP → more leverage over expectations • Deregulation + globalisation → ↑ role of ER channel • Private sector willingness to hold FX risk → ↑ role of ER channel 	Mixed
Russia	<ul style="list-style-type: none"> • IR channel not very effective 	<ul style="list-style-type: none"> • Switch from money targeting to IT reduced reliance on unstable relationships • ER channel now more effective (ruble can compete with dollar), but creates trade-off for CB wanting to preserve export competitiveness • Financial deepening → wider sphere of influence for MP • ↓ speculative element in banking → increased sensitivity to MP 	More effective
Turkey		<ul style="list-style-type: none"> • Adoption of IT → more leverage over expectations • More precise control over policy instrument → ↑ power IR channel 	More effective

ER = exchange rate; IR = interest rates; IT = inflation targeting; MP = monetary policy.

Source: Central bank responses to a BIS questionnaire.

Graph 3



Of particular interest to the issues addressed in this paper is the perceived degree to which immature markets are seen as holding back the effectiveness of the interest rate channel of monetary policy. However, while this factor was not seen as being entirely irrelevant to the average country surveyed, nor did it quite reach the level of being relevant “to some extent”.

At the same time as the effectiveness of market-based monetary policy is seen as increasing, the effectiveness of direct regulations is to some degree seen as being on the wane. Four statements relating to increasing difficulty in applying direct controls were rated as being relevant “to some extent”.

4. Concluding remarks

Apart from China and to a lesser extent India, Indonesia, Venezuela and Russia, most countries in the emerging markets group have made the transition to full, or near-full, reliance on market-based mechanisms for monetary policy implementation, and for the distribution of monetary policy impulses through the financial system. Judging from the experience of countries in the group, the adoption of market-based mechanisms has more to do with attitudes towards government direction and regulation than with the state of development of financial markets. Indeed, market development may be more a function of the approach taken by policymakers than the other way around.

Market-based monetary policy operations in liberalised financial markets may not uniformly improve monetary control. Especially for small open economies with few restrictions on capital mobility, external financial conditions might dominate, weakening the relative influence of central banks. Transmission of monetary policy impulses might also be interrupted when banking systems and/or enterprises are in bad health. Evidence of a weakening in the pass-through of changes in central bank interest rates can be found in the aftermath of financial crises in some EMEs.

However, most central banks surveyed for this paper think that monetary policy is now more powerful than before. Accompanying changes in monetary policy frameworks, especially those that emphasise inflation targets, seem to be the most important factor. These changes harness the expectations channel to an extent not present in previous arrangements. In addition, greater financial depth within the private sector is thought to be important, consistent with an increased role of credit channel effects.

Annex 1: Estimating interest rate pass-through

Following De Brouwer (1995) we estimate pass-through of money market interest rates to bank lending rates using an error correction model of the following form:

$$\Delta LendR_t = \mu - \beta_1 LendR_{t-1} + \beta_2 MMR_{t-1} + \sum_{j=1}^n \pi_j \Delta LendR_{t-j} + \sum_{j=0}^m \theta_j \Delta MMR_{t-j}$$

where $LendR$ is the interest rate set on loans by banks, MMR is the money market interest rate (see Table 7 in this Annex for data definitions), and β_2/β_1 is the coefficient on the cointegrating relationship between money market and lending interest rates. De Brouwer used a standard general-to-specific method to find a suitably parsimonious specification of the dynamics; in general, this involved only the contemporaneous change in the money market rate, and in one case (Australia) also the first lag of the change in the money market rate. For consistency, we used De Brouwer's estimating equation:

$$\Delta LendR_t = \mu - \beta_1(LendR_{t-1} - \beta MMR_{t-1}) + \theta_0 \Delta MMR_t$$

where $\beta = \beta_2/\beta_1$. Estimation results are reported in Table 5 below.

Table 5

Estimated pass-through from money market to domestic loan interest rates

1990 Q1-1994 Q4	μ	β_1	β	Θ_0	N.obs	AdjR ²	DW	SE
Indonesia	0.17	0.08**	1.60**	0.06*	60	0.51	2.50	0.39
Malaysia	0.68**	0.13**	0.64**	0.06	60	0.37	2.63	0.10
Philippines	2.38**	0.53**	0.85**	0.49**	60	0.56	2.31	1.01
Thailand	0.79*	0.13**	0.71**	0.04	60	0.23	1.81	0.36
Hong Kong SAR	0.74	0.14	0.49*	-0.01	48	0.05	1.48	0.33
Singapore	0.60**	0.17**	0.70**	0.08*	60	0.50	1.66	0.13
Australia	1.60**	0.33**	0.86**	0.70**	60	0.71	2.14	0.18
Japan	0.60**	0.22**	0.64**	0.11**	60	0.75	1.30	0.06
Canada	0.88**	0.54**	0.94**	0.58**	60	0.38	1.80	0.49
United States	0.45	0.13	0.83**	0.81**	60	0.64	1.61	0.13
2000 Q1-2004 Q4								
Indonesia	0.80**	0.09**	0.67**	0.03**	60	0.52	1.85	0.14
Malaysia	0.61	0.02	-10.42	-0.06	60	0.03	2.16	0.06
Philippines	4.29**	0.73**	0.58**	0.23*	60	0.45	2.02	0.79
Thailand	0.16	0.05	1.60	0.09	60	-0.00	1.89	0.14
Hong Kong SAR	-0.43*	-0.10**	1.04**	0.01	60	0.19	0.91	0.17
Singapore	0.65	0.13	0.27**	0.09**	60	0.12	1.60	0.04
Australia	0.95**	0.25**	0.94**	0.88**	60	0.89	2.74	0.05
Japan	0.08**	0.05**	1.77**	0.27**	60	0.41	1.96	0.01
Canada	1.95**	1.12**	1.00**	1.02**	60	0.93	2.10	0.06
United States	2.54**	0.85**	1.00**	0.92**	60	0.98	1.97	0.03

Note: * indicates significance at the 5% level; ** indicates significance at the 1% level.

Source: BIS calculations.

The cumulative changes over n (1 and 12) months reported in Table 3 in the text are calculated as:

$$\gamma + (1-\gamma) \sum_{j=2}^n \beta_1 (1-\beta_1)^{j-2} \quad \text{where } \gamma = \left(\frac{\beta_1}{\beta_2} \right) (\beta_2 + \theta_0 (1-\beta_1))$$

The breakdown in the explanatory power of the equation for Malaysia and Thailand, the reduced significance of the error correction term for Singapore, the negative coefficient on the error correction term in the second period for Hong Kong SAR and the reduced pass-through evident in Indonesia and Japan are together suggestive of a substantial change in the interest rate relationship between the two periods. A glance at the data suggests a marked reduction in the variance of both series. That is confirmed in the data reported in Table 6. Other potential explanations are discussed in the text.

Table 6
Volatility of money market and lending rates
Standard deviation of rates in first differences

	Money market rate		Lending rate	
	1990-94	2000-04	1990-94	2000-04
Indonesia	2.24	2.69	0.56	0.21
Malaysia	0.42	0.04	0.13	0.06
Philippines	1.66	1.05	1.52	1.06
Thailand	2.13	0.24	0.42	0.14
Hong Kong SAR	1.16	0.71	0.34	0.19
Singapore	0.48	0.22	0.18	0.05
Australia	0.36	0.15	0.33	0.15
Japan	0.24	0.03	0.12	0.01
Canada	0.60	0.22	0.63	0.22
United States	0.22	0.21	0.22	0.21

Source: BIS.

Table 7
Money and loan rate data definitions

	Money market rate	Lending rate
Australia	Weighted average short-term rate of outstanding loans. † Beginning in January 1995, rate paid on unsecured overnight loans of cash as calculated by the Australian Financial Markets Association and published on Reuters page at 11 am. ‡ Beginning in January 1999, weighted average rate of the interest rates at which banks have borrowed and lent exchange settlement funds during the day. The rate is weighted by loan amounts.	Beginning in January 1977, rate charged by banks on loans to small and large businesses.
Canada	Rate refers to the overnight money market financing rate. Monthly figures are the average for the seven days ending the last Wednesday of the month.	Rate that chartered banks charge on large business loans to their most creditworthy customers; when there are differences among banks, the most typical rate is taken. Monthly figures are for the last Wednesday of the month.
Hong Kong SAR	Hong Kong interbank rate (Hibor) is the annual interest rate in Hong Kong dollars on lendings and borrowings made between banks in the interbank market for a specified period ranging from overnight to one year.	Rate quoted by the Hongkong and Shanghai Banking Corporation Limited.
Indonesia	Rate on one-day loans between commercial banks.	Weighted average rate charged by commercial banks on loans to the private sector for working capital in national currency. Rate is weighted by loan amounts.
Japan	From November 1990, lending rate for collateral and overnight loans in the Tokyo Call Money Market. Previously, lending rate for collateral and unconditional loans.	Before 1993, the lending rate excluded overdrafts. Beginning in 1993, weighted arithmetic average of contracted interest rates charged by all banks on both short- and long-term loans, discounts and overdrafts.
Malaysia	Weighted average overnight interbank rate. Monthly rates refer to the average for the trading days of the month. Daily rates are calculated as the average of interbank deposit rates for the day, weighted by the volume of transactions.	Weighted average rate offered by commercial banks on all loans in national currency. The rate is weighted by loan amounts.
Philippines	Weighted average rate on overnight loans between commercial banks, thrift banks, savings banks and non-bank financial institutions with quasi-banking functions to cover reserve deficiencies. The rate is weighted by loan amounts.	Weighted average rate on 91-day treasury bills denominated in national currency. Rate is weighted by the volume of bills sold.
Singapore	The rates are the modes of the three-month interbank rates quoted by money brokers. Monthly data refer to the rates on the last Friday (or working day closest to the last Friday) of the month.	Average minimum rate charged by the 10 leading commercial banks.
Thailand	Rate on loans between commercial banks. ‡ Beginning in January 1989, daily average of commercial banks' overnight rates for interbank lending.	Minimum rate charged by commercial banks on loans to prime customers.
United States	Federal funds rate: weighted average rate at which banks borrow funds through New York brokers. Monthly rate is the average of rates of all calendar days, and the daily rate is the average of the rates on a given day weighted by the volume of transactions.	Base rate charged by banks on short-term business loans. Monthly rate is the average of rates of all calendar days and is posted by a majority of the top 25 insured US chartered commercial banks.

Sources: Thomson Financial for Hibor; IMF *International Financial Statistics* for all other rates.

Annex 2: Interest rate corridors

The use of standing facilities to create corridors to bound the fluctuation of short-term money market interest rates is now common in both developed and emerging market contexts. Discretionary open market operations were seen as a point of difference between more and less sophisticated central banks, with the latter relying more on bank-initiated transactions through standing facilities.²¹ From the perspective that monetary policy is about controlling the quantum of the money base, transactions at the discretion of the central bank seem superior to transactions at the discretion of banks.

Nowadays, however, monetary policy is seen as more about controlling interest rates than the money base. Discretionary open market operations are accordingly targeted on achieving a given level of short-term interest rates. A number of advanced central banks now use standing facilities with quite narrow interest rate spreads (eg +/- 25 bp in the cases of Australia, Canada and New Zealand) to determine the prevailing level of short-term money market interest rates, with open market operations used for the secondary objective of smoothing liquidity and moderating interest rate fluctuations.

These standing facilities make the quantity of central bank cash explicitly endogenous, by providing unlimited access (subject only to collateral requirements and institutional rules on who is eligible to maintain current balances with the central bank) to extra cash at the posted interest rate.²² This creates the **ceiling** for market interest rates. With unlimited access also to a deposit facility at the posted rate, the return on the next best alternative use of funds is established, creating a **floor** for market rates. The essential reason for the use of standing facilities to create an **interest rate corridor** is the simplicity and transparency of the corridor arrangement, features that are of at least as much value to emerging market central banks as they are to their developed country counterparts.

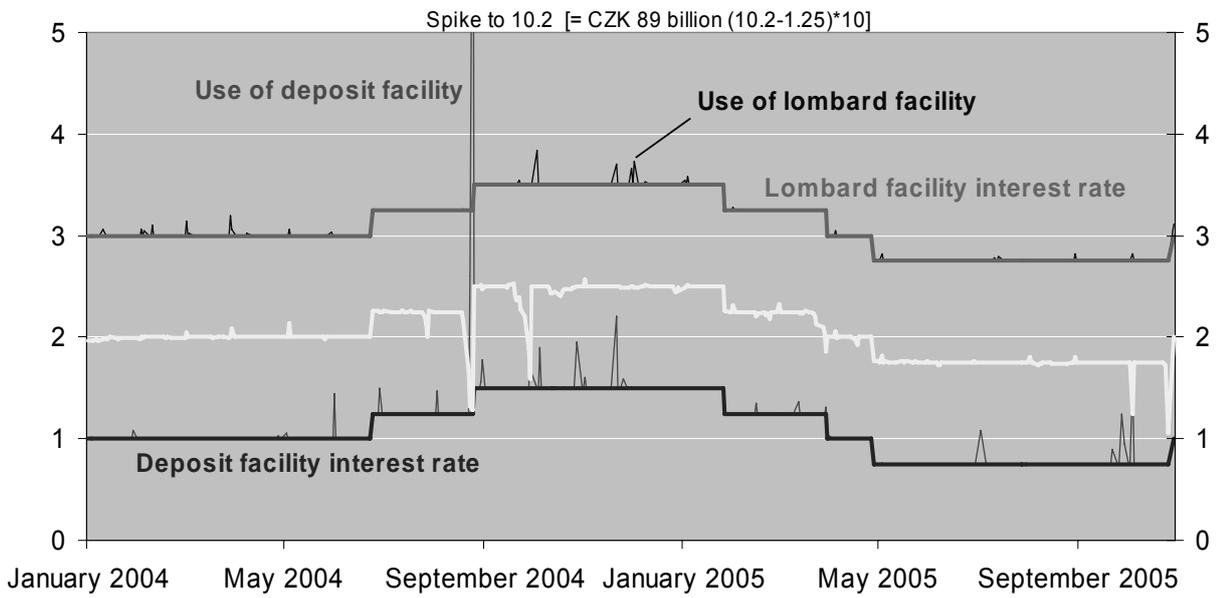
The operation of a corridor arrangement is illustrated by the Czech Republic's experience, shown in Graph 4. On most days, short-term interest rates in the market are close to the target (two-week repo) rate, and well inside the interest rates posted for the lombard (borrowing) facility and the deposit facility. Occasionally, where for example liquidity forecasts underlying decisions on the quantum of open market operations have gone wrong, or some frictions have prevented full allocation of amounts offered at the open market tenders, an unusual surplus or deficit of cash might arise. A surplus shows up as a spike in settlement balances at the central bank, often accompanied by a dip in the overnight market interest rate towards, but not below, the corridor's floor. A deficit shows up as a spike in the use of the lombard facility, often accompanied by a rise in the overnight interest rate towards, but not above, the corridor's ceiling. As can be seen from Graph 4, liquidity surpluses have recently been more common in the Czech Republic, but overnight interest rates have only rarely been very far from the policy target rate.

²¹ For example, Van 't dack (1999, p 4) highlighted the point that "a higher proportion of reserves is now supplied through operations in open markets, with the use of standing facilities limited to providing marginal accommodation or serving as emergency finance" as an example of the modernisation of operating procedures.

²² Note that in extreme circumstances, central banks might place restrictions on access to the lending window even before limits associated with lack of available collateral bind. For example, central banks might be unable or unwilling to raise interest rates fast enough to choke off demand for central bank credit. In some crisis situations, the demand for central bank credit might become interest-insensitive. In these situations, quantitative limits might be the only means available to avoid inadvertently funding a flight to foreign currency, for example.

Graph 4

The interest rate corridor and use of standing facilities in the Czech Republic



Note: Use of facilities is measured in units of CZK 10 billion and plotted relative to the corresponding facility's interest rate.

Annex 3: Supplementary tables

Table 8

Types of market operations employed

	Issue of CB paper	Issue of govt paper	Purchase and sale of bonds	Repos/ reverse repos	Foreign exchange swaps	Taking deposits/ borrowing	Loans	Transfer of govt deposits
China	Yes		Yes					
India		Yes	Yes	Yes				
Indonesia	Yes					Yes		
Korea	Yes		Yes	Yes				
Malaysia	Yes		Yes	Yes		Yes		Yes
Philippines			Yes	Yes		Yes		
Singapore			Yes	Yes	Yes	Yes	Yes	
Thailand	Yes	Yes	Yes	Yes	Yes			
Argentina	Yes		Yes	Yes				
Brazil	Prohibited		Yes	Yes				
Chile	Yes		Yes	Yes	Yes			
Colombia		Yes		Yes				
Mexico	Yes					Yes	Yes	
Peru	Yes			Yes	Yes	Yes		
Venezuela	Yes		Yes	Yes				
Czech Republic	Yes			Yes				Yes
Hungary	Yes		Yes	Yes		Yes	Yes	
Poland	Yes		Yes	Yes				
Russia		Yes	Yes	Yes	Yes	Yes	Yes	
Israel	Yes			Yes	Yes	Yes	Yes	
Saudi Arabia		Yes		Yes	Occa- sionally			
South Africa	Yes			Yes	Yes			
Turkey	Yes		Yes	Yes		Yes	Yes	

Sources: IMF; Hawkins (2005); BIS.

Table 9

Overall index of non-market monetary policy operations

	Direct instruments			Reserve requirements					Statutory liquidity requirements?	NMMPO Index Value
	Interest rate controls	Bank-by-bank credit ceilings	Directed credits	Reserve requirement ?	Uniform rate?	Maximum reserve ratio	Adjusted last 5 yrs for mon pol?	Remunerated?		
	A	B	C	D	E	F	G	H	I	J
Index factor	5	5	5	1	1	0.1	5	1	1	
China	Yes		Yes	Yes	No	6%	Yes	1		15.75
Hong Kong SAR										0
India			Yes	Yes		5%	Yes	1	Yes	9.5
Indonesia				Yes		9%	Yes	1		5.5
Korea			Yes	Yes	No	5%		2		8
Malaysia				Yes		4%		2		1.8
Philippines				Yes	No	9%		1	Yes	3.9
Singapore				Yes		3%		2	Yes	2.6
Thailand				Yes		6%		1		1.6
Argentina				Yes	No	35%		0		2
Brazil				Yes	No	45%		1		6.5
Chile				Yes	No	9%		1		2.9
Colombia				Yes	No	13%		1		3.3
Mexico						0%				0
Peru				Yes	No	20%		2		6
Venezuela				Yes		15%		2		4
Czech Republic				Yes		2%		0		1
Hungary				Yes		5%		0		1
Poland				Yes		3.5%		0		1
Russia				Yes		3.5%		2	Yes	2.7
Turkey				Yes	No	11%		1	Yes	4.1
Israel				Yes	No	6.3%		2	Yes	4.26
Saudi Arabia				Yes	No	7%		2	Yes	4.4

Note: Column C: China uses window guidance to influence the structure of credit; India has measures to direct credit towards the rural sector; Korea uses the Aggregate Credit Ceiling system to direct credit towards small and medium-sized enterprises. Column H takes value of 0 if required reserves are remunerated at fully or at very near market rates, 1 if partially remunerated and 2 if mostly not remunerated. Column J is calculated as $\{\Sigma(A..C) + [D+E+(F*G*H)] + I\}$.

Sources: National sources; Hawkins (2005).

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