Globalisation and monetary operations in emerging economies

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1. Introduction

Globalisation has encouraged a convergence of monetary policy operating procedures in emerging market economies towards market-based instruments. The progressive easing of capital controls and the development of debt markets have undermined interest rate controls. The liberalisation of foreign borrowing has made quantitative loan limits on domestic banks less effective in restraining overall borrowing by firms. This trend towards market-based procedures has gone hand in hand with greater transparency and more explicit signalling of changes in the stance of monetary policy. This evolution parallels that in policy objectives towards inflation targeting (Table 1).

The influence of globalisation on operating procedures (controls versus market-based policies, quantities versus interest rates, short- versus medium-term rates) is discussed in Section 2. Section 3 considers how operating procedures may need to be modified under exceptional circumstances. Some ways for central banks to improve liquidity in the markets in which they operate are set out in Section 4. The final section examines how central banks can best extract information about market expectations, and the extent to which globalisation may be making this harder.

2. Main issues in operating procedures

Direct controls or market-based policies?

Monetary policy generally used to be implemented through direct controls on banks. Maximum (and sometimes minimum) interest rates were set on various classes of deposits and loans, banks were required to hold (often large) proportions of their assets in government securities (or on deposit with the central bank) and limits were placed on how quickly they could expand their loan books.[2] But using such controls involved what Bisignano (1996) has termed "balancing monetary objectives with market efficiency". The controls reduced the efficiency of financial markets in various ways, such as by limiting the scope for competition within the banking industry. Financial repression that keeps interest rates low may also discourage saving, or shift it from the regulated financial instrument system into other assets such as equities and real estate, or drive it offshore.

These controls also became ineffective over time. Intermediation prevented from occurring through banks would instead take place through bank-like intermediaries such as building societies, savings and loan associations, finance companies and merchant banks. Sometimes these were affiliates of the banks, which directed customers to them. If the central bank responded by bringing these intermediaries under the regulatory net, new institutions would again spring up outside it.

Financial innovation and globalisation have led most central banks to operate monetary policy by influencing conditions in the market for bank reserves. But there are still some exceptions. For instance, in China the central bank still sets bands for interest rates on many bank deposit and loan products although rates in the bank reserves and bond markets are now market-determined.

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[2]   Such controls also often involved instructions on the sectors to which loans were made. Brazil and India still require banks to use a set proportion of their deposits for agricultural loans, although these types of restraints are becoming less binding.

Table 1

Targets of central banks and institutional aspects (as at late 2003)

	Policy objective	Policy decision body	Frequency of meetings	Operating target	Main policy instrument
China	Low inflation, growth	MPC	Quarterly	O/n rate, money base	1-year deposit rate, reserve requirement
Hong Kong SAR	Exchange rate[1]	EFAC	Monthly	Exchange rate[1]	Base rate
India	Price stability, growth	CB board committee	Weekly	O/n rate	Liquidity adjustment facility rate
Indonesia				Base money (soon o/n rate)	
Korea	2.5-3.5% inflation[2]	MPC	Monthly	O/n call rate	Target o/n rate
Malaysia	Exchange rate[1]	CB board	Monthly	O/n rate	3-month interest rate
Philippines	4-5% inflation[2]	Monetary board	Monthly	O/n rate	Repo rates
Singapore	Price stability	MIPM (like an MPC)	Weekly	Effective exchange rate	FX interventions
Thailand	0-3.5% inflation	MPC	Monthly	2-week repo rate	Policy rate
Argentina	Inflation[3]			Money base	
Brazil	4±2.5% inflation[2]	MPC	Monthly	O/n repo rate	Target o/n repo rate
Chile	2-4% inflation	CB board	Monthly	O/n rate	Monetary policy rate
Colombia	3% inflation[2]	CB board		O/n rate	Lombard rate
Mexico	3±1% inflation	CB board	Fortnightly	Bank reserves	Bank reserves target
Peru	2.5±1% inflation	CB board		O/n rate	Benchmark rates
Venezuela				Short-term rate	
Czech Republic	2-4% inflation[2]	CB board	Monthly	1-2 week rate	2-week repo rate
Hungary	2% inflation[2]	Monetary council	Fortnightly	3-month rate	2-week deposit rate
Poland	2.5±1% inflation[2]	MPC	Monthly	2-week rate	14-day reference rate
Russia	5.5-7.5% inflation[2]	MPC		Monetary base	2-week refinance rate
Algeria					Required reserve ratio
Israel	1-3% inflation	Governor[4]	Monthly	O/n, weekly rate	
Saudi Arabia	Exchange rate[1]	Senior management		O/n rate	Repo rate[5]
South Africa	3-6% inflation	MPC	6 times/year	O/n rate	O/n repo rate
Turkey	<10% inflation[2]	MPC	Monthly	Base money	Discount rate
Australia	2-3% inflation	CB board	Monthly	O/n rate	Target o/n rate
Canada	1-3% inflation	Governor[4]	8 times/year	O/n rate	Target o/n rate
Euro area	<2% inflation	CB board	Fortnightly[6]	O/n rate	Min repo bid rate
Japan	>0 inflation?	Operational committee	Fortnightly	O/n rate	Bank reserves target
Sweden	2±1% inflation	CB board	Fortnightly	O/n rate	Repo rate
Switzerland	0-2% inflation	CB board	Quarterly	3-month Libor	Target Libor
United Kingdom	2.5% inflation	MPC	Monthly	Short-term rates	2-week repo rate
United States	Low inflation, growth	FOMC (an MPC)	8 times/year	O/n rate	Target o/n rate

Note: CB = central bank; EFAC = Exchange Fund Advisory Committee; FOMC = Federal Open Market Committee; MIPM = Monetary and Investment Policy Meeting; MPC = Monetary Policy Committee/Council; o/n = overnight.

[1] Against US dollar. [2] Currently has higher interim target. [3] Target to be set in 2004. [4] Advised by a committee. [5] Largely follows US federal funds rate. [6] Normally only changes monetary policy settings at first meeting of month.

Sources: Central banks; JPMorgan Chase.

There are also circumstances under which market-based operating procedures may not work well. For example, such procedures require that the bank reserves market is reasonably liquid and efficient and that there is a liquid market (government securities, repos or perhaps foreign exchange) in which the central bank can trade to affect bank reserves. These issues are taken up further in Section 4. In some economies, the banking system may be "shell-shocked" after a banking crisis, and may concentrate almost exclusively on managing its large stock of non-performing loans and rebuilding capital. Such banks often buy government securities rather than lend to the private sector. And heavily indebted companies become more reluctant to borrow. In such circumstances bank credit may be insensitive to movements in policy interest rates.

Interest rates or quantities in the bank reserves market?

The choice between monetary aggregates and interest rates has long been a matter of debate among economists. The classic conclusion is that sticking to a money aggregate will stabilise the economy if shocks come from the real economy (that is, the IS curve) but sticking to an interest rate target is preferable if shocks affect the demand for money (see Poole (1970)). Nowadays, most central banks choose to target interest rates rather than quantities (Table 1). Interest rate changes normally have a clear effect on the cost of credit, with bank loan interest rates often immediately following changes in the operating target. For an economy with a fixed exchange rate and an open capital account, such as Saudi Arabia, a short-term interest rate is the natural target as it can be set with respect to the foreign interest rate; see Al-Jasser and Banafe (1999). Interest rate moves can be readily compared with market expectations embedded in the yield curve (discussed further in Section 5), which is not the case with a quantity target.

There are still some recent cases of targeting quantities. The Bank of Thailand's country paper describes how, for a short while after the 1997 crisis led to the abandonment of its implicit fixed exchange rate, the Bank set daily and quarterly money base targets. But it soon found that radical changes in the financial system undermined the relationship between base targets and broader money aggregates, and in turn macroeconomic objectives.

Mexico's central bank pursues a (negative) bank reserves target. As the banks are short of funds, this amount is known as the "corto" (a "short position"). When the central bank tightens monetary policy it increases its target for this borrowing so that at least some banks will end up with a costly overdraft at the central bank that will put upward pressure on interest rates; see Bank of Mexico (2003). A quantity target may operate as a less strict interest rate target. In the short term, greater variation would be tolerated in interest rates to reduce the variation in financial quantities or in the exchange rate resulting from shocks; see Ortiz (2000) and Schaechter (2001). It has been argued that, in Mexico, the strong role of the exchange rate in inflation and inflationary expectations, allied with the relatively small role of banks in providing credit to the private sector, mean that a system which reduced exchange rate volatility, even at the expense of higher volatility in short-term interest rates, would be preferable.

However, Ortiz (2000) refers to a "not-so-distant future" when inflationary expectations will be anchored by the inflation target, and so will react less to exchange rate movements. Long-term debt markets will then be more developed. At this time, Mexico's central bank will move to using an interest rate as its operating target/instrument. Marcos (1999) interprets the corto as a signalling arrangement, arguing that the size of the corto is minimal relative to banks' overall funding but announced changes have a large effect on interest rates.

Quantity targeting is sometimes required by IMF programmes.[3] It may be used by central banks judged to lack credibility, at least as a transitional regime. Quantity targeting can also be useful when the overnight interest rate has been cut to zero; see Section 3.

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[3] For example, the loan agreement between Thailand and the IMF after the 1997 crisis set a ceiling on net domestic assets of the central bank, putting an upper limit on the monetary base. This is becoming less common. The country paper by the Central Bank of Brazil describes how, when Brazil adopted inflation targeting in 1999, it persuaded the IMF to phase out the ceiling on net domestic assets as a performance criterion in favour of a formal consultation mechanism based on the inflation target. This has now become a common practice. Although the IMF is still pressing Argentina and Turkey to keep the broad monetary base within a varying corridor, this is likely to be replaced by an inflation targeting regime in due course. See Blejer et al (2001).

Overnight or medium-term interest rates?

If a nominal interest rate is the operational target, the next question is, which interest rate? The overnight rate in the bank reserves market is the most common choice (Table 1), as it is usually the rate the central bank can control most easily. But some central banks hesitate to focus exclusively on the overnight rate as short-lived fluctuations may be misinterpreted as a change in monetary policy. However, unintended fluctuations are now generally quite small. Looking at average absolute daily changes in the overnight interest rate, these are now only around 10 basis points in the median emerging economy. This reflects the impact of structural reforms, such as floating currencies and tender systems for selling government debt, and greater experience in conducting market operations; see Stebbing (2003). Also, it is now general practice to announce changes in the policy stance so unintended fluctuations are less likely to be misinterpreted.

In other cases, the concern may be that movements in overnight interest rates are not well connected to movements at longer maturities that are more relevant to consumption and investment decisions. In some economies banks tie loan rates to overnight rates (eg Brazil, Korea, Saudi Arabia, South Africa, the United States), while in others medium-term rates are the benchmark (eg Hungary, Mexico, the United Kingdom). However, this argument may be circular. Once a rate is chosen by the central bank as its policy focus, it is more likely to be used as a benchmark: see Canada's experience as described in Borio (1997).

What style of operating procedure?

Central banks with an interest rate target like to keep fluctuations in short-term interest rates relatively low.[4] In a perfect market, having an averaging period for reserves might be enough to keep rates smooth.[5] But in practice the market does not work quite this well. The market for bank reserves is subject to various shocks (described in Annex A) to which the central bank responds (see Annex B).

The central bank signals its monetary stance and supports this by structures or operations which keep the market-clearing interest rate close to the announced target. There are two main styles of monetary policy operating procedures. The "corridor" approach (or as Issing et al (2001) call it, the "European" style) has three key features: a corridor bounded by two administered rates set by the central bank; use of occasional market operations (repos or collateralised loans); and reserve requirements with averaging to smooth short-term interest rates. The "active" approach ("Fed" or "hands on" style as Bartolini and Prati (2003) call it) has a smaller role for reserve requirements while involving daily or more frequent market operations, and uses standing facilities operating primarily as a "safety valve" for individual banks (BIS (1997)). Among emerging economies, central European central banks and the Reserve Bank of India operate more in the corridor style. In contrast, many East Asian central banks, Brazil and South Africa are closer to the active approach. In January 2003, the US Federal Reserve moved some way from the active approach in the direction of the corridor approach.

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[4] As medium-term interest rates reflect expectations of future movements in short-term rates, central banks have more influence over medium-term rates when short-term rates give a clear signal. More orderly market conditions may make the transmission mechanism quicker and more predictable. Moreover, it should assist in the quest for financial stability by making it easier for financial institutions to assess and manage risks. Excessive volatility in money markets may feed uncertainty about economic fundamentals. Failure to keep overnight rates near the announced target may adversely affect the overall reputation of the central bank, especially if interest volatility is seen as a symptom of misallocation of liquidity among banks and uncertainty about monetary policy. Furthermore, interest volatility blurs signals from the market.

[5] If banks expect interest rate fluctuations during the averaging period, they will try to purchase reserves when rates are "low" and sell when they are "high", which should have the effect of smoothing interest rates over the averaging period (an effect sometimes referred to as the "martingale property").

3.   Operating procedures in exceptional circumstances

In normal times central banks deal with modest shocks to the bank reserves markets, of which movements in government deposits are often the most unpredictable.[6] However, operating procedures that work best in normal times are not necessarily optimal in exceptional circumstances. Emerging economies with floating exchange rates may face what has been termed "sudden stops" in capital inflows. Those with fixed exchange rates may be subject to speculative attacks. In both of these exceptional cases, the authorities may wish to drive short-term interest rates up to very high levels for a short period. The challenge is to moderate how much higher overnight rates pass through into medium-term interest rates which affect domestic economic activity.

Such concerns might lead central banks following an "active" approach to target a medium-term (say somewhere between two weeks and three months) interest rate which might be thought relevant to most domestic borrowers. This might allow high overnight rates to support the currency in foreign exchange markets with a limited effect on domestic demand. For central banks using a "corridor" approach, it may be necessary to raise or suspend the top of the corridor for a short period. In some cases, central banks may judge it worth sacrificing some clarity in policy in order to maintain greater flexibility. The absence of a strong link between overnight rates and longer-term rates may, however, also have certain advantages.

Following the 1997 Asian crisis and the 2001 terrorist attacks, the Singaporean authorities temporarily widened the (undisclosed) bands within which they allow the effective exchange rate to vary. Three other cases of responses to exceptional circumstances are considered below.

Hong Kong SAR's response to the "double play"

An exceptional shock may require operations outside the usual financial markets. After the Asian financial crisis of 1997, Hong Kong's currency board came under a speculative attack. A few highly leveraged hedge funds used a "double play", taking short positions against both the currency (futures) and equity markets. If the authorities had abandoned the currency board arrangement, the first position would have been profitable. If instead the authorities had maintained the currency board, interest rates would have been driven up, equity prices would have fallen and so the second position would have been profitable. Initially these tactics worked as interest rates were driven very high. But the authorities made a dramatic and unexpected move in August 1998, making very large purchases in the equity market which made the short positions unprofitable. This was a very controversial move at the time, and was seen by many as inconsistent with Hong Kong's long-nurtured reputation for free markets. However, it was successful: the linked exchange rate was maintained, interest rates fell back and the authorities gradually sold off the acquired equities at a large profit; see Goodhart and Lu (2003).[7]

Mexico

From early to mid-2002 international investor sentiment about Latin American economies deteriorated, as reflected in bond spreads and exchange rate depreciations. The latter threatened to push inflation well above targets. The responses of the authorities in the various economies differed, in part due to differences in their operating procedures but also in part because the shocks, transmission mechanisms and preferences of the authorities differed across the various economies.
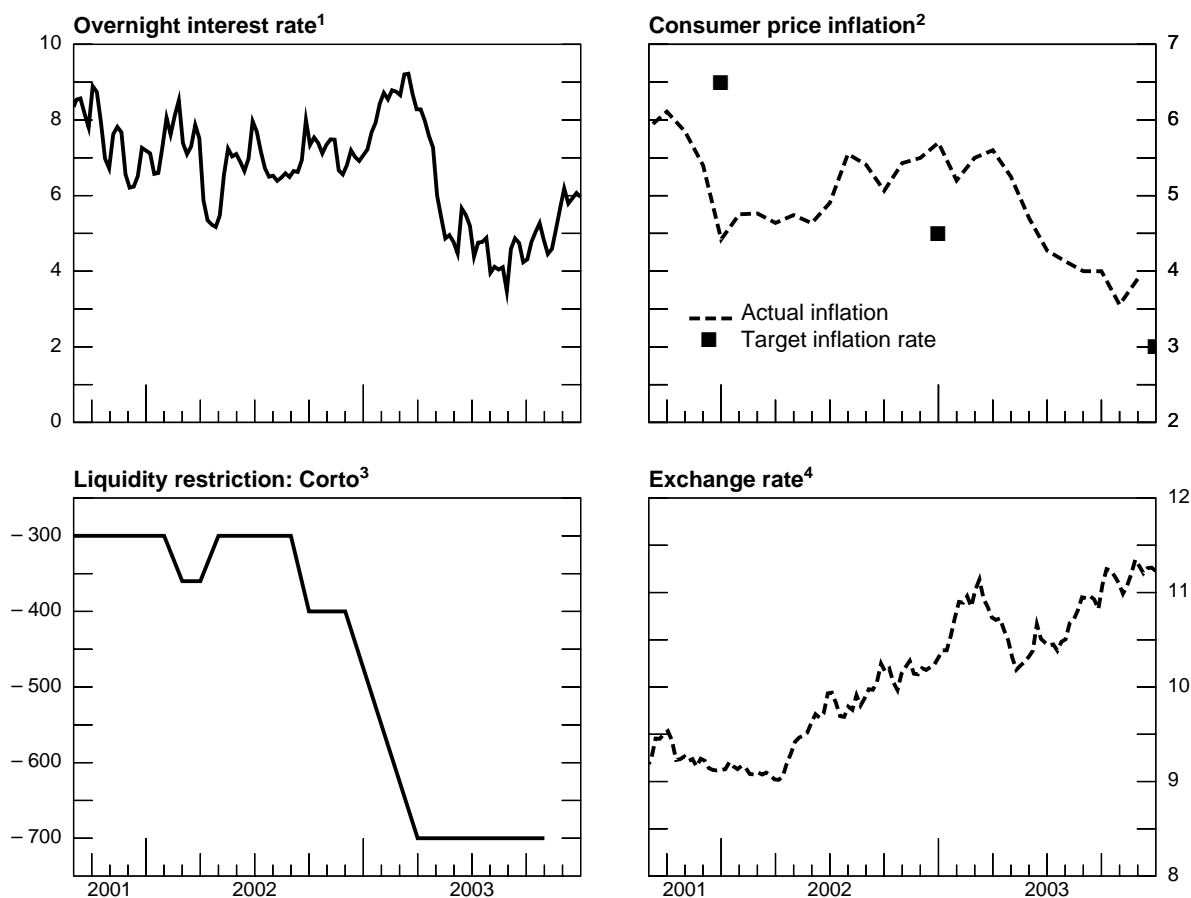
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[6]   Table B4 in Annex B shows that this seems true regardless of the openness of the economy or other differences. See the paper in this volume by Mihaljek for further discussion.

[7]   As many of the acquired shares were sold off by being parcelled up in a "tracker fund" (which operated like a passive unit trust), a higher proportion of the equity market is probably now held by domestic retail investors than before the crisis.

Mexico announces policy in terms of quantities. The Mexican authorities initially did not adjust the "corto" from April-June 2002 as short-term interest rates rose (Graph 1).[8] This could be taken as an implicit signal that they viewed the move in interest rates (at least the direction) as appropriate to avoid inflation rising excessively. From late 2002 to early 2003 the Mexican authorities explicitly signalled a desire for tighter monetary conditions by making the "corto" tighter. This was thought to be appropriate as inflation had exceeded the 2002 target and did not appear to be heading down towards the lower 2003 target. From April 2003 short-term interest rates fell sharply as inflation fell. This raised an issue of communication: there had been no explicit signal by the central bank that it wanted easier monetary conditions. However, the lack of any subsequent adjustment in the corto suggested that the authorities, by then, regarded easier monetary conditions as appropriate, since inflation was falling at this time.

Graph 1

Mexico: financial indicators

Overnight interest rate[1]

Consumer price inflation[2]

- - - Actual inflation
■ Target inflation rate

Liquidity restriction: Corto[3]

Exchange rate[4]

[1] In percentages. [2] Annual percentage changes. [3] In peso. [4] Peso per US dollars.

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[8] By contrast, in Brazil, already very high interest rates were eased slightly. While in February 2002 consensus forecasts for inflation were very similar for Mexico and Brazil (4% for 2002 and 5% for 2003), by August they were significantly higher in Brazil but unchanged in Mexico. It was only in late 2002, when inflation rose sharply, that Brazil tightened monetary policy.

Japan

The Bank of Japan responded to a sluggish economy by cutting interest rates in the second half of the 1990s. By 1999 overnight rates were virtually zero, but deflation meant that real interest rates were still positive and there were few signs of a sustained recovery. In March 2001 the Bank adopted new operating procedures by setting a target for bank reserves with the central bank. It was initially set at JPY 5 trillion, which was steadily increased to JPY 27-32 trillion by late 2003. Interest rates stayed near zero but consumer prices continued to fall. Recently the authorities said they would maintain this stance until the deflation ended.

4. Improving liquidity to make operating procedures more effective

The greater reliance on financial markets, now more open to international influences, raises the issue of what a central bank can do to encourage liquid and efficient markets in both bank reserves and the security/instrument with which it transacts with banks.

Liquidity of the bank reserves market

The central bank will most readily be able to use the bank reserves market to influence overall financial market conditions when this market operates smoothly. Yet there are often various impediments to liquidity in this market. Van 't dack (1999) notes that taxation of interbank transactions in Colombia, a high degree of unofficial dollarisation in Peru and regional segmentation of interbank markets in Russia all led to less liquid interbank markets. There have also been cases where previously liquid markets dried up during crises.

On the one hand, liquidity may be enhanced by allowing broad access to the market. On the other hand, the bank reserves market may operate best when there is little doubt about the credit standing of all participants. For this reason it is usually limited to banks subject to licensing and supervision.

Liquidity of domestic bond and repo markets

While central banks can still employ market operations by controlling the primary issue of either government or their own securities (Table B2 in Annex B), liquid secondary markets are preferable: see Stebbing (2003). This is one reason central banks have encouraged them; see the paper by Chung in this volume.

Government securities markets are now reasonably liquid in most emerging economies, although often less so than in advanced economies. Measures that may improve liquidity include governments issuing bonds even when running large surpluses; avoiding locking up a large proportion of government paper in mandatory holdings by banks and insurance companies to meet prudential requirements; shorter settlement cycles, which is facilitated by having "dematerialised" securities (ie computer entries rather than physical scrip); central counterparties and real-time gross settlement (RTGS); better infrastructure for clearing and settlement; standardised conventions and master agreements; proper supervision of markets and participants; allowing short-selling; establishing benchmarks; developing associated derivatives markets; minimising taxes on transactions; a liberal approach to participation by foreign banks in domestic financial markets; steady and predictable primary issuance and encouraging a wider investor base (such as by development of funds managers such as pension funds and unit trusts); see Mohanty (2002). Some of these areas are admittedly outside the direct purview of central banks.

Alternatively, the central bank could issue its own paper. Such paper constitutes around half the central bank's liabilities in Korea and over a fifth in Hong Kong SAR, Hungary, Mexico and Poland. This may be desirable where secondary markets are undeveloped, as operating in primary markets mixes monetary and debt management. The Hong Kong Monetary Authority issued its own paper as the government had no debt and the Authority wanted to develop the bond market and establish a benchmark yield curve. In Mexico, the central bank wanted longer-term paper than the government wanted to issue. However, one problem associated with the central bank issuing paper is that it might not earn enough returns on its assets (principally foreign reserves) to cover the interest paid on them, leading to losses. In Chile, the central bank issued promissory notes in the 1990s to fund accumulation

of international reserves associated with intervention intended to hold back the peso's appreciation. The resultant interest expenses are still causing losses. In some economies (eg the Philippines, Poland), the central bank ceased issuing its own securities after the government reversed its previous opposition to the use of its own securities for market operations. There are some plausible arguments against having both government and central bank paper on issue. Splitting the public sector paper market between government and central bank paper makes both less liquid; McCauley (2003) therefore advocates the government issuing more bonds than it needs for its own financing and placing deposits with the central bank.

As central banks increasingly use repos rather than outright transactions (Table B2), liquidity in the repo market will become the more important factor, but many of the considerations mentioned above still apply.

5.   Extracting information about market expectations

Financial markets offer potentially useful information for central banks as they summarise the views of market players who have strong incentives to have well informed opinions. Unlike much other information, market prices are available immediately and are not revised. While even unbiased expectations may be poor predictors, they will be useful indicators of sentiment.[9] Central banks need to know about market expectations of short-term rates in order to assess the likely impact of a policy change.[10] This argues for market operations being concentrated in short maturities so that the longer maturities continue to provide information about market expectations.

The term structure of government securities may be most useful for assessing policy expectations over the longer term and the credibility of the policy regime. Private sector debt instruments (including interest rate swaps, interbank credits and certificates of deposit) have the problem that it can be hard to distinguish credit spreads from monetary policy expectations. Interest rate futures only refer to fixed expiry dates (and so may not be useful for measuring very short-term expectations) and are often illiquid for contracts beyond a few months. This information may be supplemented by a market survey of economists (the Bank of England's survey asks for probability distributions from individual respondents, and so gives measures of both the divergence of opinions and the strength with which individuals hold their opinions).

Simple interpretations (eg measuring the one-year bond yield expected to prevail in a year's time by subtracting the current yield on a one-year bond from twice that on a two-year bond) abstract from the risk premium on longer-term assets, and the liquidity premia on less traded assets. If these premia are sufficiently small, as they usually are for repos, they can be ignored. If they are constant, then changes in expectations can be readily identified even if not the expectations themselves. However, changes in risk aversion, or perceptions of risk, may lead to significant changes in risk premia. Söderlind and Svensson (1997) find there is little evidence of constant risk premia over short horizons, based on their experience with Swedish, UK and US data. Yields may also be affected by differences in the taxation of different instruments, as noted in the paper by Chung in this volume.

A probability distribution of future interest rates and exchange rates can be extracted from option prices, assuming risk neutrality; see the paper by Chui et al in this volume.[11] A problem with their construction, especially in emerging economies, is that options are often thinly traded, particularly when their strike price is far away from the current future price and when they have a long maturity.

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[9]   For example, in Hong Kong SAR the authorities know the exchange rate will stay very close to the link rate but futures and options prices give information on market sentiment towards the exchange rate.

[10]   This is not to say the central bank should necessarily follow these expectations. This is of course an old debate. The Federal Reserve's failure to follow market expectations (which were apparently based on one newspaper column) of a further cut in the federal funds rate in mid-2003 was rather perversely followed by criticism of the Federal Reserve rather than of the failed predictions in the market; see Baum (2003).

[11]   The Bank of Israel has issued small amounts of foreign exchange options specifically to derive such information.

When both indexed and non-indexed bonds are issued and heavily traded, this can give a good measure of inflationary expectations. The paper by Sokoler in this volume reports on the use of information as an important input to policy decisions, and if necessary as a means of justifying to the government the need for tight monetary policy. Indexed bonds tend to be most useful for measuring medium-term expectations as longer-term indexed securities are generally bought and held by institutional investors. There may be a selection bias, however, in that indexed securities will be bought by investors with higher than average inflationary expectations. It is also not obvious whether an indexed bond should have a higher or lower risk premium. All this suggests that use of this approach may provide a better measure of changes in inflationary expectations than in the level.

If the central bank is to extract information about *market* expectations from traded instruments, it must ensure its own transactions do not dominate the market. Transactions using repos do not directly affect prices in the bond market. Similarly, swap transactions in a liquid market do not as a rule directly affect the exchange rate.[12]

As domestic financial markets in emerging economies become more globalised, international factors increasingly influence them, reducing their information content. Graph 1 in Anderson and Moreno's contribution to this volume shows that for many economies, movements in bond yields and equity prices closely follow those in major economies. This suggests that they may give relatively little information about domestic conditions and prospects. This issue deserves further investigation.

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[12] Swap rates may be becoming more useful than bond yields as an indicator of interest rate expectations; see Reinhart and Sack (2002) and Clerc et al (2002) for conflicting views on this.

Annex A:
The demand for, and supply of, bank reserves

Banks hold funds in accounts with the central bank, known as "bank reserves", to facilitate settlement of transactions by bank customers or because they are required to hold reserves by the central bank.

Settlement balances

Banks almost always settle transactions between each other on the books of the central bank, for many reasons.[13] First, it may be compulsory, as in Canada. Second, the central bank is almost universally regarded as the safest counterparty. Third, banks may not want a rival organisation to gain more information about their operations. Finally, the central bank may provide routine intraday or overnight credit and possible emergency liquidity assistance. See CPSS (2003) for more discussion.

Settlement balances have a high (opportunity) cost when, as is generally the case, they bear no interest. Banks will still aim to hold sufficient balances to avoid the penalties that arise if they cannot meet their obligations at the end of the day.

Reserve requirements

Banks are usually required to place a minimum amount of bank reserves with the central bank in proportion to their customers' deposits (Table A1). The fact that Australia, Hong Kong SAR, Sweden, Switzerland and the United Kingdom have successfully operated monetary policy without such requirements shows they are not essential. But they may facilitate monetary operations. Reserve requirements may also be a way of charging banks for the services provided to them by the central bank, sometimes have prudential motives or boost central bank independence by giving it a source of revenue, and were formerly a monetary policy tool in their own right; see Nel (2000).

Some economies apply differing reserve requirements to differing types of deposits. In the United States this has led to a decline in required reserves as "sweep programmes" automatically transfer depositors' funds from reservable to non-reservable accounts; see Krieger (2002). There are also differences in what counts in meeting reserve requirements. Some economies include vault cash, and in South Africa it accounts for half the required reserves.[14]

Reserve requirements can help smooth overnight interest rates if they are specified as a fortnightly or monthly average rather than needing to be met every day, and if it is possible to use the reserve requirement holdings to meet settlement needs. This is especially desirable in less developed financial systems where interbank markets are less liquid and long and variable lags in the clearing and settlement systems lead to uncertainty about the timing of future settlements. However, averaging may also reduce the need for banks to trade in the interbank market and so hamper its development.

The demand for reserves will be harder to predict if reserve requirements are related to the current level of bank liabilities. For this reason most central banks build in a lag between the calculation period and the required holding period. A desire to reduce uncertainty about required reserves led the US Federal Reserve in 1998 to reinstate the lag in reserve requirements it had removed in 1984.

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[13] There have been exceptions. Prior to December 1996 banks in Hong Kong SAR settled on the books of HSBC, the largest bank in the economy. The Monetary Authority had an account with HSBC and from July 1988 imposed rules (the "accounting arrangements") to give the Authority a degree of power over monetary conditions. In the United Kingdom many small banks settle on the books of larger banks (the "settlement banks") which themselves have accounts at the central bank.

[14] There are security risks and additional transport costs if banks are encouraged to move cash back to the central bank and it may arguably give an unfair benefit to banks located close to the central bank; Borio (1997) and Van der Merwe (1999). However, allowing too much vault cash to count for reserve requirements may lead to an accumulation of soiled banknotes in circulation; Park (2002). Vault cash is a rising proportion of required reserves in the United States and many banks are able to meet their reserve requirements exclusively from it. Germany excluded vault cash in 1995 partly to avoid this. Hungary stopped allowing vault cash to count in July 2000, as part of aligning its requirements to those of the ECB.

Table A1

Rules on banks' required reserves (as at late 2003)

| | Required ratio | Interest paid on reserves | Averaging period | | Eligible assets: deposits with CB plus |
			Length	Lag from calculation period	
China	6%	1.9%	10 days		Vault cash
India	4.5%	Bank rate (on part over 3%)	2 weeks	2 weeks	None
Indonesia	5%	None	None	2 weeks	None
Korea	1-5%, avg 3%	None	2 weeks	1 week	Vault cash (up to 35%)
Malaysia	4%	None	2 weeks	2 weeks	None
Philippines	17%	4% (on 40% of reserves)	1 week	1 week	Vault cash and government securities (up to 75%)
Singapore	3%	None	2 weeks	2 weeks	None
Thailand	6%	None	2 weeks	2 weeks	Vault cash (up to 2.5% points)
Argentina	22-40%	Federal funds – 20 bp	1 month	None	Vault cash
Brazil	Varies[1]	Varies[1]	Varies[1]	Varies[1]	Vault cash (up to 33%)
Chile	3.6-9%	Half previous month's inflation	1 month	None	Vault cash
Colombia	2.5-13%	Yes[2]	15 days	8 days	Vault cash
Mexico	Zero[3]	None	28 days	.	.
Peru	6% (20% fc)	None	1 month	None	Vault cash
Venezuela	15%	None	1 week	1 week	None
Czech Republic	2%	Repo rate	1 month	2 days	None
Hungary	5%	Below market[4]	1 month	1 month	None
Poland	4.5%	None	1 month	1 day	Vault cash (limited)
Russia	7-10%	None	20 days	1 month	Vault cash
Algeria	4.25%				
Israel	0-6%	None	1 month	None	Vault cash
Saudi Arabia	7% (demand); 2% (time)	None	None	15 days	None
South Africa	2.5%	None	1 month	15 business days	25% of vault cash[5]
Turkey	6% (11% fc)	Yes	2 weeks	2 weeks	None
Euro area	2%[6]	Market rate	1 month[7]	24 days	None
Japan	0.05-1.2%	None	1 month	Partly lagged	None
United States	3-10%	None	2 weeks	2 weeks	Vault cash

Note: fc = foreign currency. Hong Kong SAR, Australia, Sweden, Switzerland and the United Kingdom have no required reserves (although the United Kingdom has a 0.15% cash ratio deposit to finance some of the central bank's costs). Canada has a zero reserve requirement.

[1] Brazil has different reserve requirements for eight types of deposits. [2] 75-100% of inflation target. [3] Allows overdrafts in bank reserves; also has system of "compulsory deposits". [4] Rising to market rates by May 2004. [5] Being phased out; none will count by August 2004. [6] Deposits <2 years. [7] From 2004 will change to an irregular period of 28 to 46 days to align with meetings of the ECB Council; see ECB (2003).

Main sources: Nel (2000); questionnaires from the 1998, 2002 and 2003 Deputy Governors' Meetings.

Trends in reserve requirements

Reserve ratios impose a form of "seigniorage" tax on banks, which tends to be higher in emerging economies than in advanced economies; see Hawkins (2003, Table 3). Concerns that this tax may be reducing intermediation or redirecting it away from banks has led central banks to seek to reduce their reserve requirements (and averaging itself reduces the burden of reserve requirements (Table A2)). These same concerns have also led some emerging economies to pay interest on required reserves (Table A1).

Table A2

Bank reserves as a percentage of bank deposits

	Dec 1980	Dec 1990	Dec 2000	June 2003 (or latest)
Emerging Asia[1]	14	12	8	8
Latin America[2]	30	20	13	21
Central and eastern Europe[3]	...	17[4]	17	11
Africa and Middle East[5]	56	13	11	11
United States	6	4	2	2
Selected other advanced economies[6]	8	2	2	1

[1] Unweighted average of India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [2] Unweighted average of Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [3] Unweighted average of the Czech Republic, Hungary, Poland and Russia. [4] End-1993. [5] Unweighted average of Algeria, Israel, Saudi Arabia, South Africa and Turkey. [6] Unweighted average of Australia, Canada and Switzerland.

Source: IMF, *International Financial Statistics*, line 20 as a percentage of the sum of lines 24 and 25.

Nowadays emerging economies rarely vary reserve requirements to affect financial conditions, although there are still some cases. Argentina lowered reserve requirements to ease monetary policy when its currency board framework prevented it from lowering interest rates, Brazil raised requirements when its currency was under pressure in 2002 and China raised them in August 2003 to restrict bank lending.

The supply of bank reserves

The supply of bank reserves can be analysed by rearranging the central bank's balance sheet.

Central bank balance sheet

Liabilities		Assets	
Foreign liabilities	FL	Foreign assets	FA
Currency	C		
Bank reserves	R		
Deposits by government	GD	Lending to government	GL
Other liabilities and capital	OL	Other assets (including lending to banks)	OA

This gives: $R = (FA - FL) + (GL - GD) - C + (OA - OL)$

and taking changes $\Delta R = \Delta F + \Delta G - \Delta C + \Delta NOA$.

This is a simplification in some ways. For example, some changes in the government's accounts with the central bank have their counterpart in changes in central bank capital (ie ΔG is offset by ΔNOA) rather than affecting the bank reserves market.

Foreign assets

Foreign exchange intervention is generally not a major source of variability in the bank reserves market (other than during crises) in advanced economies; see Borio (1997). Given the standard two-day settlement lag for foreign exchange transactions, this component is known with certainty within the horizon of daily operations. However, emerging economies, even those eschewing formal pegs, more commonly engage in foreign exchange intervention, and sometimes in large amounts; see the paper by Mohanty in this volume for further information.

Currency

Currency fluctuations are sometimes erratic, and there can be large seasonal fluctuations around Christmas, Easter and Chinese New Year. There is often a within-week pattern of increases before public holidays as consumers withdraw cash and subsequent decreases as shops bank their receipts. Generally, the fluctuation in the demand for notes has no effect on the policy rate as these fluctuations tend to net out over the year. In countries recovering from high inflation, however, longer-term currency increases may be significant.

Government transactions

Central banks report that net government deposits are the hardest component to predict (see Table B4) even now that few central banks lend to governments. The complications raised by transactions with government are discussed in the paper by Mihaljek in this volume.

Annex B:
Monetary policy operating procedures

Monetary policy operating procedures encompass both standing facilities, which allow banks to initiate transactions with the central bank, and market operations undertaken by the central bank. Both can play an important role in keeping interest rates at desired levels.

Standing facilities

Central banks pursuing a corridor approach bound the overnight interest rate by providing standing deposit and lending facilities.[15] Table B1 lists these facilities while Graph B1 provides an illustrative example of their operation. The Czech experience shows three possible responses to a corridor: the overnight rate being bound by it, varying significantly within it, and keeping close to its midpoint.[16]

Access to the lending or credit facility (often termed "lombard" or "discount window") is sometimes restricted.[17] Obviously, collateralised credit facilities are restricted by the holdings of eligible paper. Some central banks charge more for loans beyond a certain amount (Chile, Hong Kong SAR, Israel).

The deposit facility will not offer an attractive return in order to avoid it being used too often. In the Philippines the central bank tiers the interest rates it pays; as of July 2003 it paid 6.75% on the first PHP 5 billion, 3.75% on the next 5 billion and only 0.75% on deposits exceeding PHP 10 billion.

Graph B1

Czech Republic: Central bank lending and deposit facility rates[1]

Lending facility rate[2]
Overnight rate
Deposit facility rate[3]
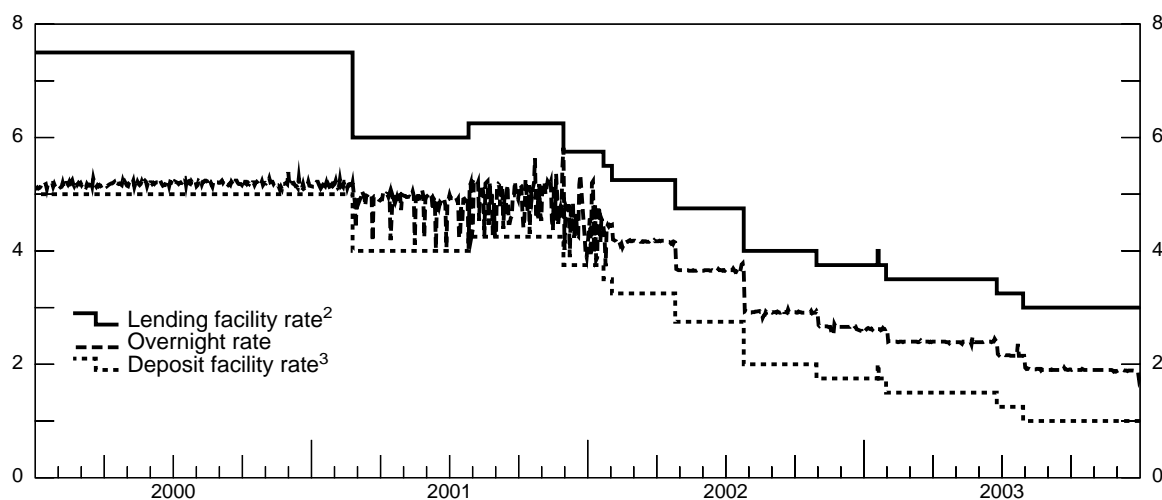
[1] In percentages. [2] Lombard rate. [3] Discount rate.

Sources: Bloomberg; national data.

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[15] Central bank loans to banks, often at below market interest rates, had been used for financing priority industries or smaller companies in many emerging economies, but this "policy lending" has now largely disappeared.

[16] The reduced volatility since early 2002 reflects a longer reserve maintenance period and the setting of the two-week repo rate at the midpoint of the deposit and lombard rates, both moves bringing Czech procedures in line with those of the ECB.

[17] As in the United States until early 2003, Korea's central bank sets the interest rate on its loan facility below its target for the cash rate but discourages banks from accessing liquidity adjustment loans too frequently. A 100 basis point premium is charged to banks that borrow for three consecutive months and The Bank of Korea inspects the financial condition of banks making frequent use of the facility; see Park (2002). The loans are also subject to an aggregate ceiling within which individual banks are allocated a quota.

Table B1

Standing facilities (as at late 2003)

	Form of credit provided by central bank	Interest-paying placements with central bank	Spread between rates on facilities (basis points)	Collateral required for credit facilities	Other restrictions on use of credit facilities	CB has discretion to set rate for individual banks?
China	Rediscount window					
Hong Kong SAR	Discount window	None	.[1]	CB[2]	No	No
Indonesia	FPJP (o/n facility)	Deposit facility		G, CB	Yes	No
Korea	Temporary credit facility	None	.	G, CB	Yes	No
Philippines	Overnight lending	Overnight borrowing	225	G	No	
Singapore	End-of-day liquidity facility			G	Yes	No
Thailand	Liquidity window	None	.	CB, G	No	No
Argentina	Rediscount facility	Yes		G	Yes	No
Brazil	Discount window	None	.	G	No	No
Chile	Liquidity credit line	Liquidity deposit facility	100[3]	No	No	No
Colombia	O/n repo	Borrowing auction	100	G	No	No
Mexico	Overdraft	None	.	G	Yes	No
Peru	O/n credit facilities	Deposit facility[4]	125	CB, G, AAA	Yes	No
Venezuela	Rediscount facility	None	.	G	No	No
Czech Republic	O/n repo	O/n deposit facility	200	Yes	Yes	
Hungary	O/n collateralised credit	Deposit facility	200	G,C	No	No
Poland	Lombard loans	Short-term deposits	300	G	No	No
Russia	O/n collateralised loan	O/n deposits	>1,000	CB, G	No	Yes
Algeria		Deposit facility				
Israel	Borrowing facility			G		
Saudi Arabia	Overnight repos	Reverse repos		G	No	No
South Africa	Final clearing repo	Final clearing reverse repo	300	G,CB		
Turkey	Liquidity window	Bid facility	600	G	Yes	No
Australia	Collateralised lending	Interest paid on reserves	50	Yes		
Canada	Fixed-term loan		50	Yes		
Euro area	Marginal lending facility	Marginal deposit facility	200		No	No
Japan	Complementary lending facility	None	.	Yes	Yes	No
United Kingdom	Lending facility	Deposit facility	200	Yes	Yes	
United States	Discount window	None	.	Yes	Yes	No

Note: India and Malaysia have no standing facilities. AAA = AAA-rated entities; CB = central bank; G = government bonds; C = investment grade corporate bonds.

[1] Previous deposit facility paid 200 bp less than credit facility in 1992-97 and 300 bp less in 1997-98. [2] Some HK dollar debt issued by quasi-government agencies and multilateral institutions is also accepted. [3] Rising to 500 for large borrowers. [4] Both new soles and dollars, with the latter more used.

Source: Central banks.

Market operations

Market operations may be conducted by central banks on a regular but infrequent basis, or a number of times a day, depending on whether a corridor or active approach is being used. They fall into five general categories:

- issue of short-term paper (either the central bank's own paper or the government's);

- outright transactions in the secondary market;

- repurchase transactions (repos) against domestic currency assets. In substance (but not legal form) they are equivalent to a collateralised loan. Repos inject liquidity while temporary sales (reverse repos) withdraw liquidity;

- foreign exchange swaps. These are similar to repos but use foreign currency rather than a domestic government bond as the underlying asset. Liquidity can be injected by a spot purchase of foreign currency combined with an equivalent forward sale (and withdrawn by a spot sale/forward purchase);

- interbank market transactions, including taking deposits or making loans.

Some central banks also use transfers of government deposits as a quasi-market operation.

Table B2 shows that in both advanced and emerging economies the most widely used instruments are repos (and reverse repos), followed by outright purchases and sales of bonds.

Deciding on the mix of instruments to use depends on many factors: the costs and flexibility of transactions, availability of paper and state of the public finances. It may be easier to send clear signals to the market if just one or two particularly visible instruments are used, while greater flexibility would argue for using a wider range of instruments. Opening up the banking market to foreign banks may be more successful if they are presented with instruments and procedures with which they are familiar.

Outright transactions

Markets for short-term paper may be more commonly used as they are more liquid than those for longer-term paper. Government and central bank securities are generally regarded as involving no credit risk and thus are easier to use for market operations. (However, in some crises, default may be considered a real possibility, which would greatly complicate such operations.) They also avoid possible complications from buying private sector paper. Counterparties may try to offload riskier paper, and as Axilrod (1995) argues, "the central bank would find it difficult to avoid purchasing at least some of the paper; if it refused, the market itself would turn away from the paper on the thought that the central bank has access to information unavailable to the market generally (as in practice it may well have)". Well respected credit ratings might help avoid such problems but they are not available in all emerging economies. The imprimatur associated with being acceptable to the central bank could narrow credit spreads of that class of private sector paper, making them less reflective of their underlying risk. Among private issuers, the central bank may prefer to restrict itself to the banks about which it is better informed. The choice of paper for market operations may also be affected by changes in taxation arrangements, as noted by Bisignano (1996).

Separation of debt management and monetary management

The importance of the government "fully funding" its budget (ie issuing sufficient securities to the private sector to cover any deficit) and thus giving the central bank effective control over the supply of bank reserves is emphasised by Stebbing (2003). This separates monetary and debt management. It usually requires the government to auction its bonds. This has the advantage of imposing fiscal discipline as the interest rate consequences of high government borrowing are clear. It also makes the issue of government debt more predictable. Moreover, it can remove conflicts of interest as the central bank might want high interest rates to dampen inflation while the debt manager might prefer low interest rates to reduce servicing costs. Countries are increasingly separating these two functions.

Table B2

Types of market operations employed (as at late 2003)

	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
Percentage of emerging economies									
Employed	68	9	55	82	73	32	41	27	5
Most important	23	0	5	55	5	5	5	0	0
Country details (most commonly used operations in **bold**)									
China	Yes								
India			**Yes**	**Yes**	**Yes**	Yes			
Indonesia	**Yes**						Yes		
Korea	Yes		Yes	**Yes**	Yes				
Malaysia	**Yes**		Yes	Yes	Yes		Yes		Yes
Philippines			Yes	**Yes**	Yes		Yes		
Singapore			Yes	Yes	Yes	**Yes**	Yes	Yes	
Thailand	Yes	Yes	Yes	**Yes**	Yes	Yes			
Argentina	**Yes**								
Brazil	Prohibited		Yes	**Yes**	Yes				
Chile	**Yes**		Yes	**Yes**	Yes	Yes			
Colombia		Yes		**Yes**	Yes				
Mexico	Yes							Yes	
Peru	**Yes**			**Yes**		Yes	Yes		
Venezuela	Yes			**Yes**	Yes				
Czech Republic	Yes			**Yes**	Yes				
Hungary	Yes		Yes	Yes	Yes		**Yes**	Yes	
Poland	**Yes**		Yes	Yes					
Russia			Yes	Yes	Yes		Yes	Yes	
Israel	Yes					Yes	Yes	Yes	
Saudi Arabia				Yes	Yes				
South Africa	Yes			Yes	**Yes**	Yes			
Turkey	Yes		Yes	**Yes**	Yes		Yes	Yes	
Australia			Yes	**Yes**		Yes			
Canada				**Yes**	Yes				**Yes**
Euro area			Yes	Yes	**Yes**	Yes	Yes		
Japan			Yes	**Yes**	Yes				
Sweden	Yes			**Yes**	**Yes**				
Switzerland				**Yes**	Yes	**Yes**			Yes
United Kingdom		Yes	Yes	**Yes**		Occasional			
United States				**Yes**	**Yes**	Yes			

Sources: Central banks; Economist Intelligence Unit.

Auction procedures

Outright transactions (and other forms of market operations) generally involve some kind of auction. A key question is whether to fix volumes or prices. Some central banks prefer to set prices to give a clear signal. In practice, fixed rate auctions can mimic variable rate auctions as tendering can be frequent and the central bank can adjust the rate from tender to tender in response to the volume demanded. Some central banks (such as the Central Bank of Malaysia, the South African Reserve Bank and formerly the Deutsche Bundesbank) generally use variable rate auctions but switch to fixed rate auctions when they want to send a particularly strong signal to the market.

A second issue is the auction type. In multiple price auctions (sometimes known as "discriminatory price" or "American" auctions), there may be a "winner's curse". A bidder may find they have paid too much and make a loss in secondary trading. This is avoided in single price auctions, where all successful bidders pay the same price (sometimes known as a "uniform price" or "Dutch" auction). So while a single price auction may appear to be less attractive to the issuer (as the keenest bidders pay less than under a multiple price auction), it may attract more bidding. However, single price auctions may provide greater incentives for collusion in thin markets. There are also concerns that a very low bid by the marginal successful bidder could set the price, especially in underdeveloped markets where there may be few bids relative to the size of the auction. Multiple price auctions appear to be becoming more prevalent (as they are for primary auctions of government securities) but single price auctions may be better in less developed and illiquid markets where bidders may be more unsure about the likely market price. See Mohanty (2002) for further discussion.

The counterparties allowed to participate in auctions may be limited due to credit risk concerns, particularly in the "active" model, under which auctions may be frequent and quick. They have to meet certain obligations, such as providing information, offering two-way quotes at limited spreads, or (as in Turkey) purchasing minimum quantities of bonds, in exchange for the privilege. As computers reduce the logistical difficulties of dealing with a large number of counterparties, there is less reason to have a small group of dealers.

Repurchase transactions

Repos come in a variety of forms (such as sell/buybacks, securities borrowing, special collateralised loans) that are equivalent for monetary policy purposes but reflect the legal and institutional framework prevailing in various economies. Repos have become the main policy instrument in many economies. No link is necessary between the maturity of the repo and that of the underlying securities, and repo transactions do not directly affect prices in the bond market. Features such as amount, maturity, frequency, disclosure and tender system can be varied to suit the circumstances. For temporary adjustments, a single repo will be cheaper than two outright transactions. Repos allow central banks to limit their risk while expanding the range of assets in which they transact. They also have the advantage for central banks that injections of liquidity are reversed automatically when they mature.

Generally, government and central bank paper are eligible for repos (Table B3). In some cases bank or other higher-quality private sector paper can be used. Widening the range of acceptable paper may be prompted by a desire to develop the secondary market in these securities (as in India) or by the fact that the government securities markets are illiquid (as in Israel and Poland). In general the maturities of repos are fairly short; often less than two weeks. Central banks in most advanced economies mark collateral backing repos to market daily and may require counterparties to post additional collateral.

Foreign exchange swaps

A foreign exchange swap involves two counterparties exchanging specific amounts of different currencies and agreeing to repay at a fixed rate on a fixed date. It is equivalent to a spot purchase of foreign exchange and a forward sale. The effect of (say) a purchase by the central bank is to increase the sum of domestic currency bank reserves. When domestic securities markets are not broad but the foreign exchange market is very liquid, using a swap may be the best way for the central bank to affect the level of bank reserves. At the same time, since the spot transaction in foreign exchange is offset by the futures transaction, it also avoids exerting a direct influence on the spot exchange rate (although there may be a signalling effect). The use of swaps may also help develop a deeper and better functioning foreign exchange market; see Hooyman (1993) and Blejer and Schumacher (2001).

Table B3

Types of securities used in market operations

Percentage of central banks using the instrument (as at late 2003)

	Central bank paper	Central govt bills[1]	Central govt bonds[2]	State/ regional govt paper	Other govt guaranteed paper	Commercial bank paper	Other private sector paper
Outright operations							
Emerging economies	68	63	42	5	16	11	11
Advanced economies	17	83	17	17	33	50	33
Repo operations							
Emerging economies	70	90	60	5	25	5	0
Advanced economies	25	100	13	88	88	75	75

[1] Maturity up to 12 months.   [2] Original maturity over 12 months.

Source: Central banks.

However, there are risks in their use. The value of the underlying asset - foreign exchange - may be volatile, which may lead the counterparty to default. Extensive use of swaps (and other derivatives) may also make the central bank's published balance sheet misleading. This may tempt the central bank to delay monetary policy changes. Foreign exchange swaps involve Herstatt risk when transacted across time zones, as one party might not able to receive the counterparty's currency after delivering its own. The creation of the Continuous Linked Settlement Bank should remove this risk for those currencies for which it operates. Another problem in some countries is shallow forward markets. There may be few counterparties and the market might not be able to generate market prices for swaps. The central bank would then be determining the swap rate.

In Singapore and Switzerland, swaps are the main instruments for monetary policy operations, perhaps reflecting the long history of budget surpluses and the large amounts of bonds held until maturity by large investors, which tends to lower the liquidity in government bond markets. They have also been extensively used in Israel and South Africa.

Transfer of government deposits

Movement of government deposits between the central bank and commercial banks is an important monetary policy tool in Canada. Similarly, Malaysia has sometimes transferred assets from its Employee Provident Fund to the central bank to sterilise capital inflows. Singapore has used its Central Provident Fund in a similar manner. In Saudi Arabia, funds of government institutions placed with the central bank are sometimes used in a similar way. It is not a market-based technique, and does not help develop financial markets; see Quintyn (1994).

Aspects of the bank reserves market (as at late 2003)

	Planning horizon for managing bank reserves market	Least predictable item	Typical frequency of market operations	Bank reserves as a % of bank deposits[1]	Settlement system for large-value items
China			1 or 2 per week	10	RTGS
Hong Kong SAR	2 days	C		0	RTGS
India	1 day	G,C	Daily	5	DTNS[2]
Indonesia	1 week	G	Daily	9	RTGS
Korea	15-16 days	G	Weekly	4	RTGS
Malaysia	2 weeks	G	Twice a day	17	RTGS
Philippines		G	Daily	11	RTGS
Singapore	No formal forecasts	G?		4	RTGS
Thailand	1 month	G	Twice a day	4	RTGS
Argentina	3 months	G	Twice a week	21	RTGS
Brazil	1 month	C,G	Daily	42	RTGS
Chile	1 month	C	Twice a week	5	DTNS[2]
Colombia	2 weeks	G	Twice a day	7	RTGS
Mexico	2 months	C	Daily	17	RTGS
Peru	1 month	C	Weekly	32	DTGS
Venezuela	1 year	G	Daily	25	DTNS
Czech Republic	5 days	NOA	Daily	3	RTGS
Hungary	18 months	G	Weekly	9	RTGS
Poland	Weekly, monthly	G	Weekly	6	RTGS
Russia	1 month	G	Twice a day	26	DTGS
Algeria				10	
Israel	1 month	G	Daily	10	DTNS
Saudi Arabia		F		7	RTGS
South Africa	7-30 days	C	Weekly	4	RTGS
Turkey	2 weeks	C,R	Daily	22	RTGS
Euro area	10 days		Weekly	...	RTGS
United Kingdom	13 weeks (focus on next 2)	C	Twice a day	1	RTGS

G = government. C = currency. F = net foreign assets. NOA = net other assets. R = bank reserves. RTGS = real-time gross settlement. DTNS = deferred time net settlement. DTGS = deferred time gross settlement.

[1] As at June 2003; ratio of line 20 to sum of lines 24 and 25 in IMF *International Financial Statistics*. [2] RTGS expected in 2004.

Sources: Borio (2001); central banks; CPSS.

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