

Foreign exchange market intervention: methods and tactics

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Introduction

This paper focuses on the methods and tactics of foreign exchange market intervention with an emphasis on how the tactics of intervention can depend on intervention objectives and the environment. The paper highlights the main features of the survey responses provided by emerging market central banks on questions of the methods and tactics of intervention. Links are drawn to other information about methods and tactics of foreign exchange market intervention.

King (2003), amongst others, makes the point that different objectives should involve different intervention methods and tactics. Yet there is a considerable degree of consistency in the actual choice of mechanics across the emerging market group covered by the BIS survey undertaken for this meeting. This consistency appears not only within the emerging market group, but extends also to developed countries.¹ Specifically, spot transactions predominate; they are conducted with those counterparties that operate in the deepest part of the market; and at times when the market is most liquid. And where other intervention techniques are used, such as auctions of option contracts, by design the central bank is also operating where the market is thickest.

Given the need to select methods and tactics to maximise the effectiveness of intervention, at one level it is perhaps surprising that most central banks choose to transact at a time and place where their relative size is minimised. At another level, however, the choice to operate in the thickest part of the market reflects the importance that central banks attach to avoiding volatility and to maintaining credibility.

The main area where different approaches and different attitudes are evident relates to the visibility of intervention operations. This issue is given special attention.

As background, at the outset the channels through which intervention is thought to influence the exchange rate are discussed. Subsequently, choice of markets in which intervention takes place, the preferred degree of visibility of intervention, and the choice of instrument and transaction method are addressed in turn. Finally, some thoughts are offered on intervention size, frequency and timing. It is perhaps around these issues that the general preference for plain vanilla operations becomes most apparent.

Methods and tactics: some background considerations

Foreign exchange market intervention involves trying to change the value that market participants put on a particular currency. How to do this is not immediately clear, particularly as the foreign exchange market is far from homogeneous.

High-frequency, high-pressure foreign exchange trading by market-making professionals is the part of the market most actively reported. In this market, prices seem able to be disturbed by even quite inconsequential pieces of news with little evidence of fundamental determinants working to establish an equilibrium value.

For cross-border investors with medium- to long-term investment horizons, on the other hand, the immediate and near-term pressure of order flows on market-makers' open positions is almost irrelevant. What matters is the likely accumulation of such foreign exchange flows over the investment

¹ Judging from the description of foreign exchange market intervention tactics contained in the papers associated with the Jurgensen Report (1983), there has also been a high degree of consistency of tactical choice-making over time.

horizon. With this focus, economic fundamentals are likely to be more relevant.² Even so, the short-term relationship between economic fundamentals and exchange rates is notoriously imprecise; simply extrapolating recent trends might be better (or less bad) than attempting to predict such developments from analysis of fundamentals. Some investors with medium-term horizons might thus turn to auto-regressive and “technical” prediction methods, which are certainly cheaper than fundamentals analysis in terms of time and effort. Order flow information might also be useful for cost-effective insights into the interaction between fundamentals and exchange rate behaviour. However, order flow information is most readily available to market participants least able or willing to use it - the institutions engaged in clearing customer orders. Such institutions typically operate with tight limits on net open foreign exchange exposures. In general, firms specialising as market-makers seek to make their income from “clipping the ticket” (crossing the bid-ask spread and generating fee income) and do not commit enough risk capital to provide for large speculative positions to be taken.

The vast numerical majority of participants in the market, however, are firms engaged in commerce across currency boundaries, or financing their business in international capital markets, or investing in assets denominated in different currencies. They relate to the market as price-takers. Over time, their willingness to use those currencies will depend on the profitability of their cross-currency business, and change with variations in that profitability. It is through this mechanism that economic fundamentals of competitiveness and macrobalance will eventually shape exchange rate trends. It is these forces that fundamental investors are trying to anticipate.

Finally, at least some of these agents just discussed will be attempting to second-guess the interests and behaviour of the others, adding to the complexity of the exchange rate determination process. Against that complex background, central banks must choose operational methods that effectively influence this heterogeneous group’s collective valuation of the currency. Economic theorists have attempted to identify the channels through which central bank actions might influence such valuations.

Channels of influence

The most commonly discussed channels of influence are:

1. The **monetary policy** channel. A potentially important influence on the exchange rate is the relationship between interest rates at home and abroad. Changes in real interest rate differentials caused by monetary policy actions tend to move the exchange rate, especially if unanticipated. This can be a welcome addition to the transmission of monetary policy actions to the economy. At times, however, the authorities would prefer a different balance of transmission channels; that is, a different balance of monetary conditions as between interest rates and the exchange rate (see, for example, Holub’s discussion with respect to the Czech Republic’s experience in this volume).

However, the focus of these papers is mostly on sterilised intervention.³ In first-order terms, therefore, the monetary policy channel is in principle “closed” for the purpose of this discussion. In practice, however, there is rarely a clean distinction between sterilised and unsterilised intervention (see the accompanying paper *Domestic implications of forex market intervention* and Canales-Kriljenko (2003) for further discussion). Moreover, there are important second-order linkages from sterilised intervention back to the monetary policy channel. These linkages operate through the existence of policy trade-offs - whereby inflation and real economy developments both enter the objective function of the monetary authorities - and through expectations of how those trade-offs will affect future policy.

2. The **portfolio balance** channel. Viewed from the perspective of a representative investor in an international portfolio of assets, a change in the relative scarcity of domestic versus

² Interestingly, the literature on the usefulness of order flows for explaining exchange rate developments suggests that the flows themselves may contain information on the diverse array of otherwise unobservable behaviours shaping the macroeconomic fundamentals (Evans and Lyons (2004)). The point is that what matters for medium- to longer-term investors is the future shape of the fundamentals that will in turn shape exchange rate behaviour (see also Engel and West (2004)).

³ Noting, however, that in some countries monetary policy is implemented via the foreign exchange market, with sterilisation being contingent on achieving the exchange rate objective. Hong Kong SAR and Malaysia are cases in point. In Singapore, the objective of policy is price stability, but the exchange rate is a contingent operational target.

foreign currency assets will cause a portfolio reallocation that changes relative prices in the process. One of those relative price changes might be the exchange rate.

Until a few years ago, the general consensus was that this channel is rather weak. For a start, at least in the context of large and well developed financial systems, only very small changes in the relative scarcity of domestic and foreign assets can be induced by sterilised intervention. The intervention capacity of the central bank is just too small compared with the total quantum of domestic and foreign assets that might be exchanged for each other. Empirical research has tended to lend weight to this argument. More recent research, however, is somewhat more open to the possibility that the exchange rate can be influenced by foreign exchange market interventions through changes in the relative scarcity of imperfectly substitutable assets, even in developed country cases.⁴

In addition, it is possible that in smaller, less well developed financial systems, the scale of a central bank's intervention capacity is comparatively large relative to the set of substitutable assets, as argued by Galati and Melick (2002). In relative terms, emerging market foreign reserve holdings tend to be bigger than in the average developed economy, Japan excepted.. And the degree of substitutability tends to be lower, as reflected in higher risk premia on emerging market domestic currency debt.⁵

It is worth highlighting one subset of actors in the foreign exchange market whose portfolios might readily be disturbed by intervention, perhaps especially in less well developed markets. They are the specialist foreign exchange market intermediaries noted above, the banks and other dealers who, by virtue of limited willingness or capacity to bear risk, react quickly to disturbances to their portfolios. Constraints on their willingness or ability to absorb new flows show up as reductions in the *liquidity* of the market, and associated exchange rate volatility. However, there is a tendency in the literature to discuss the role of such intermediaries in relation to a different channel of influence ("order flow", see below).

3. The **signalling** or **expectations** channel. Intervention might change perceptions of one or more of the factors that are relevant to different groups of market participants. Perceptions of future relative scarcities, of future income streams and of risk can and do change prices without a single transaction taking place.

Some discussions of signalling concentrate on signals of *future monetary policy*,⁶ and there is some evidence that it is through changed expectations of future monetary policy that exchange rates are influenced.⁷ Other discussions of signalling allow for unspecified signals of the future course of *exchange rate policy*. The literature on speculative attacks suggests that such signals can be powerful, but with the direction of influence depending crucially on the credibility of the signal. In general, a central bank's signals of determination to resist currency appreciation might be more credible than signals of resistance to depreciation.

Another component of the signalling or expectations channel relates to coordination failure, meaning the propensity for exchange rates to deviate for extended periods from their

⁴ Dominguez and Frankel (1993); Sarno and Taylor (2001).

⁵ Particularly where formal restrictions - eg authorisation or prior reporting requirements - or informal restrictions - eg understandings that large transactions will be notified to the central bank prior to execution - limit substitutability in the very short term. Such restrictions are more common in emerging market economies: a recent IMF survey (Canales-Krijlenko (2003)) shows that nearly half of emerging market economies prohibit residents from holding foreign currency denominated financial assets abroad or making payments to each other in foreign currency; one third and one quarter respectively prohibit non-residents from receiving domestic currency loans or denominating domestic financial contracts in domestic currency; and a quarter have some form of verification requirement for forward market contracts to check their connection with an underlying current or capital transaction.

⁶ Attention to this was drawn by Mussa in 1981 and featured prominently in the thinking of the Jurgensen Working Party's report in 1983. However, as Truman (2003) points out, if the effect of foreign exchange market intervention on exchange rates comes through signals about monetary policy, it is monetary policy rather than intervention that is doing the work.

⁷ Sarno and Taylor (2001), for example, conclude that intervention is likely to be more effective if it is consistent with the underlying stance of monetary and fiscal policy. If monetary policy is not related to intervention in a predictable way, however, this link is weakened. Such may be the case in some emerging market economies. Domaç and Mendoza (2004) found that monetary policy signals in Mexico and Turkey do not seem to affect the level or volatility of the exchange rate.

equilibrium values because of trading dynamics akin to those observed in asset market speculative bubbles. If autoregressive (trend-following, momentum) trading strategies are dominant enough, even those traders who are aware of probable disequilibrium may take positions that reinforce the disequilibrium.⁸ Why bet against the herd if one expects the herd instinct to dominate for the period of exposure?⁹

In this view, central bank intervention could serve to disrupt extrapolative trading, or persuade the “swinging voter” that equilibrating forces are likely to dominate. In this sense, intervention might coordinate trading in the direction of equilibrium.¹⁰ The central bank in effect gives voice to people’s half-formed views, or consolidates their expectations, in a way that has a material effect on behaviour. Hence this channel would perhaps best be described as the **coordination** channel.

4. The **order flow** channel (sometimes described as the microstructure channel). Over the last decade or so, increasing attention has been paid to the details of financial market structure and practice. Microstructure researchers have used data from banks and infrastructure providers on the detailed flow of orders and tick price movements, which are now available on an extremely high-frequency basis. They have discovered that there is a relationship between order flow and subsequent price action that is different from the relationship between trading volumes and price action, and has better predictive qualities than the relationship between news releases on conventional fundamentals and subsequent price action.¹¹

Market professionals are perhaps able to detect from order flow patterns forces that are relevant to the exchange rate, and act on that information in a way that helps shape exchange rate behaviour. Central banks may be able to alter order flows with their own orders. If market professionals react more powerfully to changes in the order flow pattern that are presumed to originate from commercial entities rather than the central bank, anonymous and secret interventions may be more powerful.

Under this mechanism, the size of intervention relative to market turnover is important, suggesting that this channel may be more effective in emerging market economies where markets are less liquid. As documented by Ho and McCauley (2003), foreign exchange markets in most emerging market economies do tend to be relatively small with bid-ask spreads that appear to be less uniform (both across currencies and through time) and wider than those in industrial economies.¹² This indicates less liquidity. Moreover, in emerging market economies, central banks may have better access to information on flows.

On the other hand, for the order flow channel to work as postulated, the market professionals who have an insiders’ view of the flows must be active in driving exchange rate developments and not just passive participants in the process. In most countries, the market-makers (bank or non-bank dealers, typically) do not take significant risk positions, but instead just clear flows within tight self-imposed limits on net open positions. Indeed, in many markets it would be inconsistent with market convention for the market-makers to “front-run” the new orders of commercial customers.

With these possible channels of influence as background, we now turn to a discussion of the choices on tactics and methods that central banks face in practice when intervening.

⁸ Frankel and Froot (1990); Taylor and Allen (1992).

⁹ Evans and Lyons (2002b) observe that autoregressive trading within the interbank market tends to be mean-reverting rather than extrapolative. However, transaction flows of end holders of foreign exchange risk tend to be positively autocorrelated (Lyons (FAQs)).

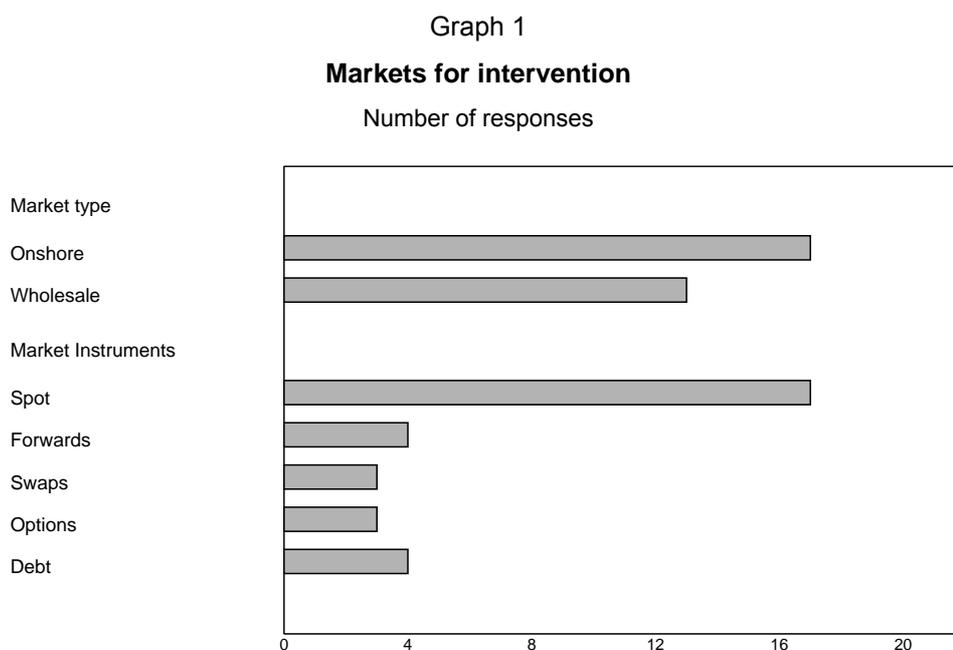
¹⁰ Sarno and Taylor (2001, pp 862-3) provide useful discussion of the conceptual basis for this channel of influence.

¹¹ See Evans and Lyons (various) for contributions to and surveys of this literature. Scalia (2004) is an example of an empirical application of the microstructure perspective to intervention in an emerging market context (the Czech Republic).

¹² Foreign exchange market institutions in emerging market economies may also tend to be more fragmented than in developed markets. The numbers of banks and bureaus operating in the foreign exchange markets of emerging market economies can be very large. Brazil, for example, reported just over 400 foreign exchange dealers in 2001, with 30 of those operating as market-makers (Canales-Kriljenko (2003)).

Choice of markets

In a survey of a large number of developing and emerging market economies conducted in 2001, the IMF reported that the very great majority - 82% - of intervention in emerging market economies is conducted in the spot market (Canales-Kriljenko (2003)). The results of the BIS survey show the same dominance of the spot market, with the additional flavour that it is the onshore, wholesale spot market where the vast majority of interventions take place (Graph 1). The main reasons given were either that the onshore wholesale spot market is “the” market - the alternatives do not exist in any material sense - or that it is in that market where liquidity is greatest.



Consistent with liquidity being an important consideration to the central banks in the sample, most mainly intervene in their own time zone (Table 1 below). Indeed, the only example where another time zone was reported as regularly being used for intervention is Hong Kong SAR, which is a special case in the sense that “intervention” is effectively passive and automatic, driven by the currency board arrangements. The London and New York time zones are only used if banks with clearing accounts at the HKMA want to transact Hong Kong dollars for US dollars in those centres, in which case the local offices of the HKMA are available. Support for the currency board arrangement on a 24-hour basis helps the arbitrage process keep the Hong Kong interest rates/exchange rate combination consistent with maintenance of the peg.

In a similar vein, a clear majority of intervention is conducted during normal business hours, in order to be transacting when the market is deepest and at its most liquid (Table 1).

As discussed above, some research suggests that one of the potentially more powerful channels of influence would seem to be utilising market frictions to engineer an outsize price response. Given these frictions, interventions that are small in scale - when assessed against the total volume of assets that are substitutable across currencies over time - can simultaneously be large in scale - when assessed in terms of the relationship between order flow and daily risk-bearing capacity. Once a price reaction has been engineered, achieving persistence requires repeat interventions, extrapolative (autocorrelated) dynamics, and/or a change in market views as to the relevance of economic fundamentals.

In the light of this, then, what explains the evident preference for interventions at times and places where the frictions are smallest? Five possibilities (at least) come to mind. The first and most obvious of course is that central banks that intervene do not share the inference drawn from research that these microstructure/market dynamics channels are effective in achieving the desired objective.

Second, if central banks were on the other hand successful in generating an outside price response by utilising these mechanisms, intervention might add to very high-frequency volatility, in the same way that any “lumpy” transaction or flow can disturb pricing in a thin market.¹³ For many central banks, one of the main purposes of intervention is to dampen volatility, and in general most central banks would regard additional volatility as a costly side effect.¹⁴

Third, for those central banks that prefer to remain anonymous when intervening, transacting in the thinnest part of the market is likely to attract the greatest attention.

Fourth, for those central banks that actively use the signalling channel, either to indicate likely monetary policy attitudes to continued exchange rate trends or to coordinate views around the implications of economic fundamentals for the rate, transacting in thin markets might be seen as counterproductive to the effectiveness of the signalling. The choice of illiquid market could be interpreted as a sign of weakness or desperation and therefore an indication that the central bank’s views should be ignored.

Finally, in some cases there really is no alternative - the onshore, wholesale, normal hours, spot market is all that is really available.

Table 1

Implementation aspects of intervention

	Intervention timing			Time zone		Preferred visibility	
	Mainly business hours	Occasionally outside business hours	Visibility relevant to choice?	Own time zone	Another time zone also	Visible	Invisible
Number of responses	16	4	0	17	2	6	4

Source: Central bank responses to the BIS questionnaire.

Visibility

A curious feature brought to light by surveys of different approaches to foreign exchange intervention is the sharp difference of views on the extent to which visibility of intervention is desirable. Part of this question relates to issues of governance and accountability, which is discussed elsewhere (see the Moser-Boehm paper in this volume). Part is also tactical in nature. Some central banks believe that visibility brings greater effectiveness; some the opposite.

It should be noted at the outset that central banks from time to time seek invisibility precisely in order to minimise their impact on the exchange rate. Where the prime objective is to build reserves, or rebuild reserves after an earlier intervention, it may be that there is no subsidiary objective of depressing the currency. In such situations, the purchase of reserves may be undertaken quietly. Reserve acquisition exercises in South Africa and Australia are cases in point. In other countries, such as Turkey and Mexico, reserve acquisition may be highly visible but also highly predictable in order to minimise the effect on the exchange market. And central banks in many countries will switch between

¹³ There is some empirical evidence suggesting that central bank foreign exchange market interventions increase the high-frequency volatility of the exchange rate (see Disyatat and Galati, in this volume).

¹⁴ See the results of the BIS survey, reported in Mihajek in this volume.

quiet and highly visible interventions depending on the circumstances and the objectives of the moment.

None of the central banks in the BIS survey indicated that the choice of the timing of intervention, relative to normal market hours, was related to a desire for visibility or invisibility. Some, however, indicated a general preference for visibility, and some a general preference for tactical secrecy (Table 1).

Why is it that some central banks prefer visibility, some the opposite? The arguments in the literature in favour of transparency seem powerful. They include: the evidence that the signalling and coordination channels - channels which operate through publicity - are relatively important; awareness of the motivations of the authorities minimises the noise that would be introduced by policy uncertainty; consistency with transparency in other elements of public policy; and a basis for accountability.

For these reasons, a number of central banks structure interventions so as to ensure transparency. In Colombia and Mexico, for example, most interventions are conducted via auctions with preannounced quantities that are in turn triggered by published formulas related to the behaviour of the exchange rate. In Chile and Turkey, auctions are also used for some operations, in large part in order to make interventions transparent. In other countries, such as Peru, intervention operations are explicitly intended to be visible, so that the signalling channel is utilised to the fullest. Argentina prefers transparency so as to reinforce the credibility of the new exchange rate arrangements, differentiating intervention under the new arrangements from intervention under previous arrangements (see the discussion in Irigoyen's paper in this volume). In yet other cases where the exchange rate regime depends on central bank intervention - the currency board in Hong Kong SAR and the exchange rate peg in Malaysia are the main examples - the visibility of the central bank is essential in order to align expectations with the continuation of the peg.

On the other side, several counterarguments in favour of secrecy have been adduced by, *inter alia*, Dominguez and Frankel (1993), Enoch (1998), Neely (2000), Sarno and Taylor (2001), Chiu (2003) and King (2003). The list includes the desire to minimise the impact of intervention when the central bank does not want to intervene but is instructed to do so by the relevant decision-making authority; cases where the central bank expects to fail; where intervention is inconsistent with other policy objectives, hence confusing signals will be given; and where the central bank is not sure what it wants to achieve. Intervention in such cases would, however, be inconsistent with most understandings of best practice.¹⁵ Other possibilities include a desire to obtain the best price when transacting (Enoch (1998)).

Two factors that may be especially important to central banks seeking to intervene quietly are:

1. **Risk of speculative attack**

Under fixed-but-adjustable peg exchange rate regimes, an announced exchange rate target provides a clear level that the authorities are obliged to defend. Accordingly, strict secrecy about limits to the authorities' ability to hold the peg seems to be the norm. The 1990s, with the ERM crisis in 1992 and the Asian financial crisis in 1997, provided numerous examples of speculative attacks on currencies where those limits had been threatened, and consequential expectations of possible devaluation had reached critical levels.

The use of the label "speculative attack" is not intended to be pejorative, conveying the sense of a deliberate and coordinated effort by a group of agents to overthrow a policy setting or arrangement. Although some degree of explicit coordination might occur in some circumstances, in the majority of cases individuals and companies are likely to be acting independently to protect themselves against losses or obtain gains from expected changes in the exchange rate. Coordination is implicit, with the coordination device being the shared views of the implications of macroeconomic or other information for the probability of an exchange rate change.

Under managed floating, there is no such hard and fast level. Hence speculative attack dynamics are less likely to arise as the exchange rate can adjust to reflect today's pressures,

¹⁵ Canales-Kriljenko and Karacadağ (2003) provide a discussion of best practice for intervention.

reducing the predictability of tomorrow's exchange rate movement.¹⁶ However, intervention that acts to slow down the adjustment of a floating exchange rate could increase its predictability. If the intervention is expected to be effective in the short run but not in the longer run, an accelerated movement to catch up with the trend can be anticipated once intervention ceases. Hence information about the fact of intervention and limits to intervention capacity or willingness might draw speculative attacks. The paper by Érsek in this volume describes Hungary's experience with speculative attacks in 2003, which motivated a switch to covert intervention.

For this reason, central banks with managed floats may also be keen to avoid attracting destabilising speculation, and prefer secrecy with respect to their presence when intervening, and especially in respect of any limits associated with the intervention. Exceptions to the general principle of full transparency are often regarded as acceptable when it comes to foreign exchange operations.¹⁷

2. Use of the **order flow channel**

Hung's (1977) argument that central banks seeking to use the order flow channel to affect the exchange rate will prefer invisibility has been accepted by several subsequent contributors to the literature. The idea is that if professional traders observe a flow of orders initiated by market players, they will assume the presence of some quasi-fundamental driver - not the central bank - and initiate positions of their own that reinforce the direction of movement. A central bank might therefore want to disguise its presence by using an agent bank that is sworn to secrecy. Chiu's (2003) finding that those central banks that intervene most frequently tend to be less forthcoming in disclosing their interventions could be consistent with this argument, given that frequent interveners are more likely to be seeking to utilise order flow dynamics than central banks that intervene infrequently.¹⁸

Some commentators, however, reject the argument that secrecy helps harness the power of the order flow channel. King (2003), for example, suggests that private sector agents will learn to detect the attempts of central banks to clothe their operations in secrecy, if there is money to be made by doing so. As official data on intervention have become available, it has become possible to assess the accuracy of press and market commentator reports of intervention - the results are mixed. Nonetheless, with more countries now adopting disclosure practices that are consistent with SDDS, the time frame over which interventions can feasibly remain secret is probably diminishing.

The value of secrecy when using the order flow channel can also be questioned on more fundamental grounds. Investment banks, money market funds, pension funds, hedge funds and other large speculative players who take significant positions in foreign exchange markets typically do not have direct access to information about the identities behind flows. That information is privy to the market-makers, who take and clear orders from customers, but who, as previously noted, typically do not take large speculative positions. In other words, if there is value in information on the identities behind order flows, that information tends to be most available where it is least likely to be used.

There are numerous examples of central banks seeking invisibility during interventions. Canales-Krijlenko's (2003) survey reported that around half of developing and transition economy central banks did not announce their presence in the market when intervening.¹⁹ (Central banks in the

¹⁶ Meese and Rogoff's famous (1983) finding that a naive random walk outperforms other exchange rate forecasting models is consistent with this line of thinking. Predictability might, however, still be present in floating exchange rate cases for other reasons. For example, if the exchange rate displays asset price bubble characteristics, recent trends may become useful predictors of the near future. Woo (1987) provided early evidence of speculative bubbles in developed country foreign exchange markets.

¹⁷ More discussion of these issues is contained in the paper by Moser-Boehm in this volume. See also Chiu (2003).

¹⁸ To illustrate, the Bank of Japan has in recent years adopted an intervention style that emphasises large-scale, infrequent interventions. At the same time, the Bank of Japan has concluded that secret interventions do not work well (Ito (2004)).

¹⁹ Canales-Krijlenko detected some association between preference for invisibility and pegged or crawling band exchange rate regimes. Some of the reported preference for invisibility might therefore be associated with concerns to avoid attracting destabilising speculation.

BIS survey were not always explicit about their preferences, making a comparison with Canales-Krijlenko's results difficult.)

The authorities in Indonesia and South Africa, amongst others, indicate a preference for not being seen when intervening. The Monetary Authority of Singapore avoids disclosure of the limits of the exchange rate range that has been determined to be consistent with achieving the inflation target. In several other countries, including the Czech Republic, Korea and Poland, the authorities indicate that contemporaneous disclosure is determined on a case by case basis. Mainly seeking flexibility, the Reserve Bank of Australia added an extra layer of anonymity during an intervention in 1998 by taking out option positions (via an agent bank) that would require option market-makers to initiate new spot market orders in order to hedge their own positions against the risk that the options would be exercised (Reserve Bank of Australia (1999)).

Choice of instrument

The financial instrument of choice for intervening central banks is a **spot** foreign exchange transaction. Graph 1 above shows how little use is made of forwards, derivatives and cross-currency debt instruments, although there are important examples of the use of each.²⁰ Again, the logic of the case for exploiting market frictions to maximise the size of the effect on prices might have suggested that more use would be seen of the less liquid markets for intervention. Few clues were provided by survey respondents as to the reason for the concentration on plain vanilla spot transactions. However, this topic has been addressed by others, with the following considerations being highlighted:

- Some have noted that intervention by way of forward contracts afforded a greater measure of secrecy, for longer, than intervention by way of spot contracts. There is, however, only tentative support for the use of forward contracts as a way of hiding intervention in the current survey. Survey responses showed only a limited correspondence between those countries that report themselves as preferring anonymity and those which report using forward contracts as an instrument of intervention.

Growing preference for transparency has reduced one motivation for the use of forwards. Also relevant is the fact that several countries (eg New Zealand in 1984, South Africa in the second half of the 1990s, Thailand in 1997) had bad experiences with the use of forward contracts. Because a forward contract does not require immediate funding, and because it offers the tantalising prospect of being able to close out before settlement - which might also be after the intervention objective has been achieved - political pressures to defend a particular exchange rate have sometimes led to large and ultimately costly forward books being built. Precisely those attributes that make for secrecy also reduce the constraints on overuse of the instrument.²¹

- **Swaps**, like forwards, defer the cash flow impact of the intervention relative to the cash flow that would be associated with a spot transaction. In contrast with the forward, however, with a swap some of the cash flow is spread out over the term of the contract. For some central banks and counterparties, this spreading of credit risk over multiple time buckets has advantages in relation to use of risk limits. Bank Indonesia and the Reserve Bank of India use the swaps market from time to time.
- **Options** have been used tactically in the past by central banks (for example, Australia, in 1998). Options are currently being used strategically by Colombia and Mexico to achieve a clear and transparent mapping of intervention to objective. Chile has also used options in this manner.

²⁰ This appears to be somewhat in contrast with the result reported in Neely's 2000 survey of foreign exchange market intervention by central banks. Around half of the respondents to that survey reported sometimes using the forward market for intervention. The overlap between survey populations is not complete (Neely's survey population included developed countries), and the words used in the questions are not identical. Thus the inconsistency may be more apparent than real.

²¹ Although this need not be the case. Accrual accounting and modern risk management methodology place forward contracts on an even footing with spot transactions in terms of transparency and the ability to assess risk.

Tactical use of options bears some similarities with use of forward contracts. Both forms of contract require little or no immediate funding. Both also allow interventions to be undertaken with greater secrecy, at least for a period. In the case of options, the anonymity derives from the fact that so long as the option counterparty maintains client confidentiality, all that the market observes is a flow of (probably) spot transactions as the option counterparty seeks to hedge their exposure against the changing risk that the option will be exercised. Thus, as the exchange rate moves towards the strike price, the option seller will accelerate hedging operations, entering the spot market in the direction that is consistent with the central bank's objective.

As with forward contracts, however, these particular characteristics come with associated dangers. Understanding the risk characteristics of the collection of contracts entered into requires more care with options than with spot transactions.²² And secrecy can also reduce the constraints on politically inspired but economically or financially dangerous interventions that publicity would otherwise rule out.

These problems are unlikely to arise with the strategic approach to the use of option contracts as implemented in Colombia and Mexico.²³ In both cases, the central bank sells option contracts under well publicised auction rules. The combination of option instrument and auction method means that market participants choose the price at which the option contract is dealt, and the extent to which the options (puts, in the case of appreciation; calls, in the case of depreciation) are exercised. This structure transparently introduces an element of automatic stabilisation into the market, while making available to the private sector a more complete set of hedging instruments than might otherwise exist. As implemented in Colombia and Mexico, the option strategy has been used to build foreign exchange reserves at a pace that alters with the amount of pressure on the currency - faster reserve acquisition in conditions of more rapid appreciation - where the change in pace is determined by option holders rather than the central bank.

- One definition of foreign exchange market intervention is any transaction that alters the net foreign currency position of the public sector for policy, or non-commercial reasons. That definition broadens the focus beyond changes in the foreign currency asset position of the central bank to the overall portfolio of the central bank and other public sector agencies. Included within this broadening are **debt operations** that have a foreign currency exposure implication.

Government debt can be issued in a variety of cross-currency forms, including full or partial foreign currency *denomination*, and full or partial *indexation* to a foreign currency. Including some component of foreign currency denomination or indexation in a debt instrument is similar in effect to intervening by way of swap transactions.

Active use of adjustments to currency denomination and indexation of debt instruments has been an aspect of Latin American foreign exchange market operations, but the technique is not used elsewhere. Brazil, in particular, has systematically switched denomination structures as between periods of calm and crisis, responding both to incentives to reduce funding costs when currency risk premia alter, and to concerns to make hedging instruments available to a nervous private sector (Mori (2004)). At various times, Chile, Mexico and Peru (in 2002 especially) have also used debt denomination/indexation as a intervention instrument.

- **Verbal intervention**, or “open mouth operations”, is apparently not used often by the central banks in this sample. One central bank noted that it used verbal intervention only once in the past three years, when its governor and the chairman of the banking supervision agency jointly warned domestic banks to manage their foreign exchange risks and watch their open foreign exchange positions.

²² Blejer and Schumacher (2000) discuss the issues that follow from central bank use of derivatives.

²³ See Ramirez (2004) and the references therein for details of intervention through options in Colombia.

In sharp contrast, some countries have made very active use of verbal intervention to assist their efforts to alter exchange rate behaviour. In Japan, for example, there have been many examples of Ministry of Finance spokesmen publicising the official view on the behaviour of the exchange rate. Moreover, as would be anticipated, modern empirical research points to the power of announcement effects, thus requiring careful disentanglement of data on announcements from data on actions when evaluating the effect of intervention.²⁴

A paper provided by the Central Bank of Chile highlights the potential value of structured communications - a strong form of open mouth operations - in achieving an influence on the exchange rate (de Gregorio and Tokman, in this volume). The paper provides clear empirical support for the power of the mechanism when the central bank is credible. In relation to the interventions in 2001, for example, the announcement of a preparedness to intervene - coupled with an explicit statement of the resources available for intervention and the time frame over which intervention might take place - is estimated to have led to an appreciation of nearly 3%. Yet the estimated effect of the actual interventions that followed the announcement is insignificantly different from zero.

The transparency of the intervention strategy in Chile in 2001 is also interesting for another reason. As discussed earlier, one of the motivations for secrecy is to avoid giving speculators a target to "attack" - limits to the authority's resources are normally presumed to be such a target. In this case, at least, transparency was clearly beneficial.

- **Moral suasion** was also noticeably absent from the list of instruments reported by central banks responding to the BIS survey. In Neely's (2000) survey of developing and transition economies, however, nearly a quarter of the central banks surveyed reported using moral suasion as an intervention tool. The absence from our survey of responses possibly reflects the fact that no direct question was asked about the use of moral suasion, rather than a change in practice since Neely's survey was conducted.

Choice of transaction method

In most markets, several different means of conducting transactions are available to central banks seeking to influence the exchange rate. The options include:

- Transacting directly - usually by telephone - with market-makers. In such cases, the central bank is operating as would a corporate customer of the market-maker, calling to request to be quoted a bid and offer price, then transacting at the quoted price.
- Transacting with a voice broker's customers (typically market-makers, but in some cases large corporates and financial institutions may also have access to the broker) via the broker's service. In such cases, the price called by the broker can be accepted ("hit") by the central bank, or, less commonly, the central bank can make a (two-sided, bid and offer) price itself with the broker and wait to be hit, adjusting the price as required in order to motivate a market-maker to hit the price.

Such transactions differ from transacting directly with a market-maker in that the price is made before the market-maker knows that the other party is the central bank. If the market-maker was aware of the identity of the counterparty from the outset, and had formed the view that the central bank was intervening rather than undertaking regular business, the (two-sided) price might be adjusted in anticipation of a difficulty in clearing the position with other market-makers. This difference, however, would be very short-lived. Once this market-maker had become aware that their price had been hit by the central bank undertaking a presumed intervention, future quotes registered with the broker would be adjusted accordingly. The difference would not have a large impact on the market-maker's overall position, since the standard parcel size for transactions via the broker is relatively small in order to limit exposure to such risk.

²⁴ See Disyatat and Galati in this volume for a more complete discussion.

- Transactions can be undertaken with market-makers (and others who have access) via an electronic broker, where such a system exists. Differences between the transactions via voice brokers and via electronic brokers are very small, at least in respect of the issues relevant to the nature and effectiveness of foreign exchange market intervention. However, in some cases central banks may be able to use information on the flow of prices posted at the electronic broker to assess the most propitious moment to intervene (as discussed in the next section).
- In many countries, electronic trading platforms exist. These are functionally a blend of telephone price-making by market-makers and broker systems, in that market-makers quote two-way prices to the system without knowing the identity of the potential counterparty that might hit the price.

Such systems allow the central bank to pick and choose between different bids and offers, which from time to time might provide a tactical advantage if they are also aware of the likely individual positions of the market-makers. For example, in some countries (Brazil, Colombia, Hungary, Korea, Peru, the Philippines, South Africa and Turkey) central banks daily conduct formal or informal surveys of market-makers' net open positions, and have other information relevant to assessing likely positions. The trading platform itself might be configured to provide information to the central bank on the current flow of orders yet to be transacted. Choosing to transact with a bank that is closer than the others to its risk limits could have a more powerful impact on the subsequent price action associated with that bank clearing its position in the market. Certainly, as the accompanying paper on *Survey of central banks' views on effects of intervention* discusses, the majority of central banks believe they have an informational advantage that can be tactically useful when intervening (in contrast to the conventional assumption of the literature).

- Conducting auctions, ie inviting bids from counterparties chosen with reference to a range of factors, including settlement risk and their track record in supporting market liquidity. Auctions can set the quantity and allow the price to be market-determined (as in Colombia and Mexico), or vice versa. Auctions fit well with a strategy in which the central bank wants to maintain transparency, assure neutrality as between individual counterparties, and indicate a willingness to allow market determination of the exchange rate.

The transaction types listed above all allow for the central bank's presence in the market to be visible, if not immediately to all participants, at least within a short time frame. Other transaction types provide for less visibility:

- Transacting directly - usually by telephone - with large corporates which normally undertake their transactions with market-makers. In such cases, the central bank may be aware through its information networks of large transactions that are imminent. A negotiated price might be reached that motivates the corporate to deal with the central bank rather than the market, or in some markets moral suasion might be used to achieve the same effect.

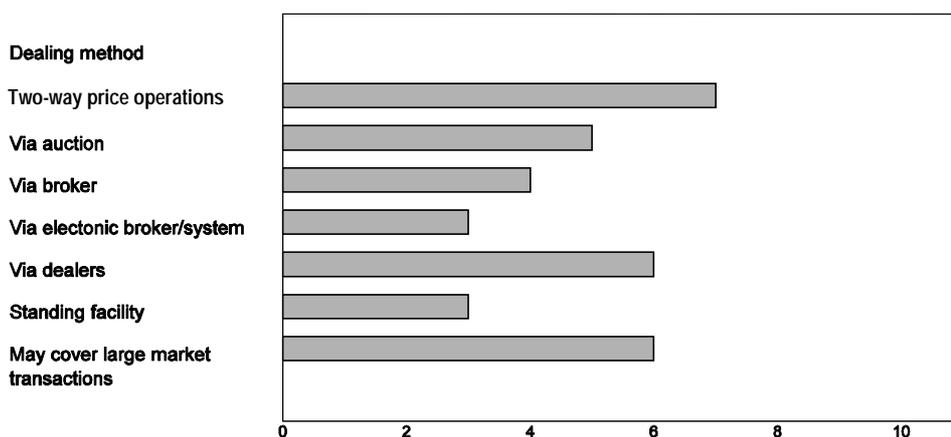
In some cases, special facilities may be established for off-market transactions with a certain class of market participants, such as Mexico established (via the deposit insurance agency) for banks facing credit line closure and (directly) for holders of tesobonos in 1995. Treatment of petroleum revenues in large petroleum-exporting countries (eg Norway and Mexico) is similar. While the existence of such facilities is usually public knowledge, their use is often privileged information.

- Transacting via agents. An agent, such as a large commercial bank (that may or may not also be a market-maker in the foreign exchange market), might be given a mandate to transact up to specified quantities within specified price limits. Secrecy will often be required by the central bank, so that the market transactions appear to other market participants as if they had been induced by corporate business. Because the granting of the mandate to a single player has the potential to convey commercially valuable information, the requirement for secrecy is likely to be respected. Equally, because the arrangement conveys some privilege to the agent bank, it is common that the choice of agent bank is rotated around the qualifying candidates in pursuit of neutrality.

Amongst the respondents to the BIS survey, there was no clear predominance of any particular dealing method, as Graph 2 indicates. Choice of dealing arrangement seems to depend largely on the technology available to the market, with those technologies that offer the greatest access to

information and greatest liquidity being used ahead of the other options. As to the issue of visibility, the majority of those central banks that indicated a preference for anonymity also indicated that they will occasionally deal directly with large corporates (public sector as well as private sector) in off-market transactions. But the sample size is too small to draw any strong associations.

Graph 2
Markets for intervention
 Number of responses



Choice of intervention size, frequency and timing

The paper by Mihaljek in this volume discusses central banks' perspectives on the effectiveness of intervention, including whether effectiveness is influenced by the size of intervention. A large range of transaction sizes was reported as being used, as would be expected given the range of objectives for intervention. Where reserve accumulation with minimum effect on the exchange rate is the objective, a pattern of frequent but individually small interventions (or options-based mechanisms, as discussed above) would be expected. Where influencing the exchange rate is the objective, larger and accordingly less frequent interventions might be expected.

Under the heading of "larger and less frequent", however, there are several possibilities. In the last year, the Japanese authorities have, for example, reportedly taken the view that *very large and frequent* interventions are noticeably more effective than large and infrequent (Ito (2004)). Certainly, Japanese intervention during 2003-004 was on an unprecedented scale at USD 320 billion (7% of GDP). The survey responses suggest that central banks in the emerging market economy that report intervening less frequently in smaller amounts tend to view interventions as more likely to be successful than those that report intervening less frequently in larger amounts.

Another tactical issue involves the question of the **timing of interventions relative to the positioning of market participants**. As discussed earlier, a potential way to effect exchange rate behaviour is influencing the actions of agents who use technical analysis as the dominant tool for making investment decisions. Here the issue is not size, but the effective use of size to shift the exchange rate trend observed by technical analysis for long enough to induce changes in private sector positions. This is similar in nature to harnessing the favourable power of private sector expectations, except that here the expectations are formed purely from the recent history of the exchange rate itself.

Around half of the respondents to the BIS survey indicated that they actively observe the information required to effectively utilise technical-based trading patterns to their advantage. Such information includes the critical levels that technical analysis packages calculate; market positioning (for example, net long or short positions in the local foreign exchange market, or in international markets such as the Chicago Board of Trade, where reports are available on the positioning of international money market accounts and others); and typical stop-loss levels used by these market participants. The point about

these key market levels is that once they are breached, the new trades initiated by market participants using technical trading methods will tend to reinforce the direction of movement - whether those trades are designed to follow the trend or to recover from breaking a stop-loss limit.

However, even though the majority of survey respondents observe information on key market levels, and see a case for using the information in this way, just three report actively using such information to aid decisions on the timing of interventions. As before, this suggests that central banks tend to eschew tactics that might add to short-term volatility and raise questions that bear on credibility.

Reinforcing a favourable trend is another technique that central banks use to harness the support of market participants using technical-based trading techniques. In recent interventions, the Bank of Japan has reportedly traded in the same direction as the market once the exchange rate trend had turned in their preferred direction - "leaning with the wind" rather than against. Such an approach is also contemplated by the Reserve Bank of New Zealand, which recently announced a preparedness to intervene (having eschewed intervention since the float of the New Zealand currency in 1985). The New Zealand authorities have set out four criteria that need to be met before intervention can take place: the exchange rate must be exceptionally high or low relative to its trend; that level must be unjustifiable in terms of economic fundamentals; intervention must be consistent with the monetary policy objectives as set out in the Policy Targets Agreement; and there must be a reasonable expectation of being able to influence the exchange rate in the direction of equilibrium. In their view, these criteria mean that the Reserve Bank "would intervene at opportune times, not when the currency's direction is being dominated by strong international trends or consensus opinions" (Orr (2004); see also Eckhold and Hunt in this volume). Although those criteria do not rule out interventions against the exchange rate trend where it is judged likely that the intervention would successfully affect the trend, it seems more likely that interventions based on these criteria would seek to accelerate the return of the exchange rate towards equilibrium.

The distinction between interventions "with" and those "against the wind" highlights the circumstance- and objective-dependent character of foreign exchange market interventions and the tactics used by central banks. By successfully leaning with the wind, a central bank will increase the volatility of the exchange rate in some dimensions, but shortening the time that the exchange rate remains away from trend will reduce another (cyclical) dimension of volatility. And by choosing sometimes to reinforce a favourable trend and sometimes to fight against an unfavourable one, a central bank is making operational decisions based on a combination of policy and market-dynamic considerations that would be difficult to capture in any intervention rule book.

Concluding remarks

Central banks from emerging market economies these days have considerably more experience with foreign exchange market intervention than their developed country counterparts. The range of techniques and tactics deployed is clearly wider than has been the case with intervention by developed economies over the last three decades or so. That is especially the case in three areas: the use of direct controls, consistent with the stage of development of many of these financial markets; the sale of option contracts by auction; and the use of foreign currency debt denomination or indexation as a supplementary tool (the latter two techniques featuring in Latin America). However, the great majority of intervention across the group takes conventional forms, with spot transactions in the most liquid part of the wholesale market predominating.

Although intervening central banks within the emerging market group tend to rate their interventions as quite successful, and although they devote substantial resources to monitoring their foreign exchange markets, in general they are loathe to attribute success to the selection and use of "clever" tactics. To be sure, a number of instances can be found where monitoring procedures have helped with the timing and structure of intervention. But equally, the view to be obtained through intensive monitoring remains murky and the ability to predict outcomes remains limited. As one participant at the meetings suggested, the selection of technique and tactics is an ongoing process of adaptation with no small amount of trial and error.

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