

Independent or Irrelevant?
Notes on the Political Economy of Central Banking in the
Brave New World

Jayati Ghosh

December 2002

(Paper to be presented at IDEAs Conference on “International money and developing countries: Theoretical and policy issues in the current context”, Muttukadu, Tamil Nadu, 16-19 December 2002)

I

The first government-sponsored banks that were set up in Europe in the days of incipient capitalism (such as in Sweden in 1668 and in England in 1694) had little of the functions and roles that we now associate with central banks. They were set up and maintained largely for the financial advantages they were perceived to be bringing in for the governments concerned. But the requirements of capitalist functioning and ease of market transactions created the demand for ever more complex and sophisticated financial intermediation, and therefore for some degree of regulatory control over the instruments of such intermediation. The important function of lender of last resort thus became a major, and relatively early, element of central bank activity.

Over time, the role of central banks has evolved to such an extent that they are now seen, by mainstream economists, as the dominant agency that effectively determines both the microeconomic conditions of the financial sector and the aggregate macroeconomic stance. Thus, central banks are responsible for the micro function of regulation and supervision relative to the health of individual banks and financial entities, in addition to acting as the lender of last resort. Further, because of the role of supposedly governing overall monetary conditions and prices, central banks are now seen as being primarily responsible for whatever aggregate macroeconomic policy remains, given the self-imposed limits that tend to be imposed on fiscal policy. To the mainstream, this dominant role appears to be that of maintaining price stability and preventing or fending off financial crises, which in turn are assumed to create sufficient conditions for stable economic growth in the real sector.

Yet the ironies of capitalist development are such that, even as central banks become the repositories of the supposed instruments of public action in the age of finance, they have actually been rendered less effective and indeed often powerless in dealing with their declared arena of intervention and control. The rise of finance and the associated wave of banking and financial liberalisation have eroded the powers and therefore the functions of central banks, to the extent that they can no longer fulfil the

roles which have been granted to them for the last half century or more. And this comes at a time when central banks are supposedly more powerful than ever before, and are increasingly being granted some degree of “independence” from governments, in order to be able to pursue the objective of price stability in single-minded fashion.

Consider the basic roles of central banks that had become the norm for most of the second half of the 20th century. The standard elements of central bank activity have included:

- regulating the issue of currency (base money) and setting norms for credit allocation by banks
- determining the rate of interest by setting the central bank discount rate, which acts as a floor to other interest rates
 - acting as banker to government
 - acting as banker to commercial banks, and most crucially being the lender of last resort in the event of bank runs
- regulating and supervising the functioning of banks and other financial institutions
 - managing the country’s external reserves
 - managing the exchange rate
 - providing countercyclical monetary policy
 - avoiding or reducing the impact of more general financial crises
 - in some developing countries, assisting in directed credit allocation in order to fulfil a strategic and developmental role of banking.

This amounts to a formidable list, and it is immediately evident that for many of these functions (especially the last four), central banks must necessarily act in tandem with other agencies of the state. Yet each of these functions has been dramatically constrained by policies of financial liberalisation that have been pursued by these very governments, who are thereby undermining their own abilities to undertake these functions.

The area of financial and banking regulation in particular deserves a closer look. Financial markets are famously prone to market failure, primarily because of the many imperfections associated with information incompleteness and asymmetry, moral hazard, principal-agent problems and the like. Despite the current policy fashion, this clearly calls for substantial public regulation and supervision. However, it has been generally acknowledged that bank regulation is required even beyond more general financial market regulation. This is due to both the specific nature of banks and the institutional context in which they operate. The two essential features of banking systems are that typically, their liabilities are mostly demand deposits, which are highly liquid, while their assets tend to be mostly illiquid. This “fractional reserve banking” means that there is always a possibility of a run on an individual bank, which renders any banking system inherently unstable. Institutionally, banks offer transactions assets to the public, and therefore provide liquidity for transactions demand. This makes banks the most important form of all lending services, which - for reasonably smooth functioning of the system - must continue to be available to the public even when other capital markets fail. Banks, after all, are built on trust. As intermediaries they accept deposits from risk-averse savers, who are offered avenues of making relatively small investments in highly liquid financial assets characterised by low income risk, to fund large investments that are relatively illiquid and characterized by a high degree of capital and income risk. They are able to serve this role because of the belief that sheer scale allows them to cover costs, hedge against risk and honour their commitments. For these reasons, the ability of a central bank to adequately regulate and supervise the activities of banks is absolutely crucial to current capitalism.

There are broadly three types of banking regulation. The first type can be described as “activity regulation”, which generally defines the activities that banks can engage in. Until recently, these rules used to be fairly stringent, setting limits on both the sectoral and geographical activities of banks. The most famous example of this is of course the Glass-Steagall Act of the United States, a banking legislation that emerged in the immediate post-Depression era of the 1930s. This limited the ability of banks in the US to engage in interstate banking, and it also disallowed commercial banks

from indulging in investment banking, insurance and purely trading activities. The financial deregulation of the early 1980s in the US undid much of that legislation. Similarly, in India, in the past legislation disallowed banks from engaging in secondary security market activities. This was altered by the recent liberalisation, which has also allowed development finance institutions to set up mutual funds and commercial banks. In general, the typical form that recent banking deregulation has taken in most countries has been to allow banks to provide a range of other financial services, such as stock brokerage, insurance, underwriting securities, and even to own non-bank financial companies such as mutual funds.

The second form of banking regulation can be described as solvency regulation. This is also known as “prudential regulation”, which establishes leverage restrictions on banks, such as capital adequacy norms (the Basle standards have become not only statutory but also the basis for much further legal imposition in many countries). Deposit insurance schemes also fit into such regulatory forms. There has been little explicit deregulation in this area; if anything the official criteria tend to be tighter now, and more difficult for banks in developing countries especially to meet. However, the liberalisation that allowed for many new financial instruments and new forms of financial intermediation in almost all countries has meant that there has been a *de facto* relaxation of these criteria. The expansion of derivatives markets, the growing use of various forms of swap, the associated pyramiding of assets, have all meant a loosening of definitions of what exactly constitutes a bank’s capital base and problems in estimating the degree of liquidity involved in each form of asset. This in turn has not only meant that banks’ portfolios have become riskier, but also that quite often the extent of the risk is not really known (and therefore certainly not recorded or incorporated into bank strategy).

The third type of regulation is usually described as liquidity control, or credit policy. These include reserve requirements, which impose a floor on the proportion of liquid assets (or cash) that banks are required to hold, and thereby create demand for high-powered or base money. The idea is that then the central bank can try to influence the quantity of money in circulation through open market sales (or purchases) in the

bond market, when then decreases (or increases) the supply of bank reserves. The notion that central banks can actually influence money supply somehow remains popular even though it is so demonstrably false. In reality, in a financially sophisticated world (and indeed, in any world in which agents are willing to trust any medium of exchange of their own creation) aggregate money supply is determined by the level of money demand. Further, the proliferation and greater area of functioning of non-bank financial institutions has meant that in any case it is now much more difficult for central banks even to pretend to control aggregate liquidity.

This does not refer only to broader definitions of money supply, which can be difficult to measure because financial innovation allows for a much higher velocity of base money. It can even affect base money itself. Thus, in many economies it is no longer even possible to determine the level of M1, because of some new banking deposit instruments, which are both cheque and savings accounts, so that deposits can be used interchangeably for transactions purposes or for asset holding. If deriving the level of M1 is so difficult, it is clearly next to impossible to estimate the even broader definition of money such as M5 and M7. Moves such as tightening credit rules tend to have little effect on aggregate liquidity especially when other non-bank financial institutions effectively fulfil similar roles. More extensive banking liberalisation, which also involves capital account transactions, renders the problem even more intense. A number of emerging markets, for example, now offer what are known as “dollarised assets”, that is foreign exchange denominated bank deposits. This not only allows for movements between transactionary and speculative holding of money within the same instrument, but introduces the currency market element into the issue, as discussed below.

What the central bank can and does influence is the level of the interest rate, by setting a floor for the entire structure of interest rates through its own discount rate. However, increasingly financial liberalisation has removed the ability of central banks to set ceilings on interest rates, by removing the norms that supposedly introduced “financial repression” into the system. Thus, while it was always the case that central banks could influence the *nominal* but not the *real* rate of interest

(because the price level remained endogenously determined), it is now the case that even the movement of all other nominal interest rates may not reflect commensurately the movement of the base rate, or central bank discount rate.

Overall, therefore, the various forms of banking deregulation mean that banks themselves are subject to much greater risk. In a context of high interest rate policy that also typically emerges in a newly externally liberalised context because of the attention that must be paid to cross-border flows, this means intensified effects on banks, which end up operating in both a higher cost and higher risk environment. Meanwhile, since other financial institutions increasingly provide both transactions and credit services, the tools for monetary policy tend to operate through broader and more complex sets of markets. Increased competition between banks and non-bank financial institutions over more or less the same territory, makes them all opt for riskier and more problematic investment, thereby worsening the stability of traditional banks and undermining the banking system overall. What this all means in turn, is that, while the relationship between monetary policy and economic activity was never a straightforward one, it has become even more complex and unstable.

It is fairly obvious how such deregulation affects the abilities of a central bank to fulfil the functions outlined above. While it can continue to try and regulate base money, it is less and less likely to be able to do so. While it can provide the floor for the structure of interest rates, it cannot determine the ceiling, or even whether other interest rates respond commensurately. In terms of acting as banker to government, its abilities are now circumscribed often by governments themselves, which tend to tie their own hands by specifying tight limits to deficit financing. It has declared powers of regulation and supervision, but these are explicitly eroded by the *de jure* changes in regulation and effectively rendered impractical by *de facto* changes and financial innovation which have resulted in the proliferation of financial institutions and instruments and the pyramiding of financial assets. All this in turn seriously corrodes the ability of central banks to engage in effective countercyclical macroeconomic policies. The external policies, of managing the external reserves and the exchange rate, are also seriously undermined, as discussed below. Indeed, the

only function that still seems to be relevant, is that of acting as the lender of last resort, preventing destabilising bank runs and financial collapses that could threaten the system. But even this function seems to be less effective, certainly in terms of preventing financial crisis and substantial market volatility.

The role of central banks in assisting in currency stability became one of the most noted functions once capital account liberalisation had created the possibility of volatile movements in exchange rates. Since very wide-ranging external capital account liberalisation essentially means that even speculative capital inflows and outflows cannot be prevented, the exchange rate can become hostage to speculative forces that not only create financial volatility but also can have devastating real economy consequences. Central bank intervention, typically through open market operations in currency markets, are supposed to act as the stabilising force as well as to steer the exchange rate along the lines broadly desired by macroeconomic stance of the government. Yet the record of central bank intervention in this regard is hardly impressive. Even for developed countries, much recent empirical work points to the fact that central bank open market operations in exchange markets either have little or no effect on exchange rates (Galati and Mellick, 1999; Caballero and Krishnamurthy 2002), or actually increase market volatility and the possibilities of speculative attack (Dominguez 1999; Stix, 2001; Reitz 2002). Of course, central bankers in all too many emerging markets have already found this out the hard way. Given the apparent volatility-enhancing effects of central bank intervention, it is clearly an ambiguous policy pool at best, and not a particularly effective one.

Once partial dollarisation has occurred, in the form of foreign exchange denominated deposits to be held by residents being permitted in the banking system, the scope for volatility is greatly enhanced. As Korkut Erturk (2002) has already pointed out, these can become “the vehicle through which liquidity preference and currency substitution become intertwined”, so that an abrupt increase in liquidity preference can trigger a currency crisis. Even the IMF, which in several of these dollarised countries was a major advocate of such practices, now recognises the dangers. “ Dollarisation of financial sector balance sheets poses systemic risks and is a potential further channel

of contagion. Non-residents' withdrawals of foreign exchange deposits triggered bank runs in Uruguay and Paraguay in the aftermath of the Argentine crisis. As commercial banks' liquid foreign exchange assets were inadequate to cover the demand for deposits, central banks provided lender-of-last-resort financing, thereby straining their official foreign exchange reserves. Besides the risk of a sudden outflow of deposits, banks are exposed to credit risks when extending loans denominated in foreign exchange to unhedged borrowers. Credit risk thus can cause or aggravate mismatches of assets and liabilities in foreign exchange." (IMF 2002 page 32)

This inability to prevent currency market volatility, or even to manage the exchange rate more generally, is closely related to the loss of central bankers' ability to prevent, mitigate or even reduce the effects of, sharp financial crisis, especially in emerging markets. Such crises – for example in Argentina and Turkey – are already being discussed in detail at this conference, so I will not further belabour this issue. However, what may deserve further discussion at this point is the reduced effectiveness of the countercyclical operations of central banks even in developed countries, most particularly the powerlessness in combating deflation in Japan and even incipient deflation elsewhere.

In Japan, short-term nominal interest rates have been near zero since 1996, and have been at zero for nearly two years now. However, because Japan has experienced deflation since 1997, which is currently at the rate of GDP deflators moving at nearly –2 per cent per annum, this has mean real interest rates which are sufficient to deter both additional investment and consumption at prevailing expectations. (Even consumer price levels are falling at an estimated rate of 2 per cent per annum in 2002.) This has many elements of the classic deflation that was first observed in capitalism in the late 19th century, in what was then called the “World Depression” in prices. It is generally argued that at that time, monetary stringency aggravated and amplified the cyclical downturn, which in turn led to a contraction in real income and employment. There are two aspects that are typically mentioned in the literature. The first is the “Fisher effect” of debt deflation, whereby deflation causes increases in the real value of debt held by companies. Even when the nominal interest rate falls

sufficiently to offset the effect of price changes on the real value of debt, it could still be associated with falling or deferred investment expenditure, which would lead to further deflation. In addition, when money wages are sticky downwards, price deflation can lead to countercyclical increases in real wages, which again would further aggravate the problem insofar as they acted as a further constraint on employment.¹ However, the chief significance of deflation lies not only in the fact that it indicates downward pressure on profit rates, forcing firms to continually cut costs if they are selling in a market where prices are falling, but also that there is significant excess capacity throughout the economy.

The persistent deflation in Japan, and the apparent inability of the central bank in Japan to achieve any reversal through all the range of monetary instruments available to it, including very aggressive easing of monetary policy even to the point of a zero bid rate on the overnight financing facility, has also given rise to acceptance that Japan is in what was first designated by Keynes as a “liquidity trap” situation. Of course, Keynes’ use of liquidity preference, which became the basis for his exposition of the liquidity trap, challenged the simple mechanical relationship between money creation, the price level and the nominal level of economic activity that was the basis of the traditional quantity theory. The more vulgar uses of the term today are instead based on Hick’s IS-LM framework, in which at some low rate of interest the LM curve turns infinitely elastic, that is horizontal, because expanding the money supply no longer has any effect on the rate of interest, or indeed on anything else. Recently Paul Krugman (1999), operating within a broadly monetarist (that is, ultimately money is neutral) model of the economy, finds theoretical justification for the possibility of a liquidity trap for an entirely different reason from that which was originally postulated by Keynes. Krugman argues that the failure of money growth in Japan to raise prices as postulated by the traditional quantity theory, does not reflect any possible problems with the theory itself, but rather the lack of credibility of the Bank of Japan, which has thus far been geared to fighting inflation, and therefore

¹ Indeed, this was the argument that was used to counter Alfred Marshall’s fond belief that deflation could be positive insofar as it helped to redistribute income to workers without explicit wage negotiations to that effect. Instead, it was evident that deflation caused hardship both to workers, through loss of employment, and to agriculturalists, who were heavily indebted in nominal terms.

cannot make credible its intention to produce inflation. This in turn leads to the extremely convoluted policy prescription that the Bank of Japan must proceed to make itself credible by becoming incredible in terms of its own past commitments; that is, it must commit to a permanent inflation target that would involve not just immediate expansion of money supply, but also future increases in money supply to ensure a stable rate of inflation. Apparently this would increase expectations of investors sufficiently to overcome the current liquidity trap conditions!

The more obvious contradictions and problems of this argument have already been critiqued by Jan Kregel (2000) who has pointed out that in Japan at the moment, “what is required is a credible policy to ensure increased higher rates of return on investment, which may or may not be accompanied by rising prices.... From a Keynesian point of view it might be more appropriate to say that Japan is in an underemployment equilibrium with deficient aggregate demand than in a liquidity trap.” The more obvious theoretical critique of Krugman’s argument is that, whether or not the Japanese economy is in a liquidity trap, in fact the Bank of Japan cannot influence aggregate money supply in the first place, however, much it chooses to relax various restrictions on its creation. This is because money supply is a function of money demand, and a climate of uncertainty and deflation necessarily changes the liquidity preference schedule. In such a context, to talk of “inflation targeting” through supposed management of aggregate money supply is completely misleading. Therefore, even in Japan’s case at the moment, the only monetary instrument available to the central bank – the interest rate – has been exhausted and proved ineffective, and therefore macroeconomic strategy requires the use of other instruments and policies beyond those of the central bank. There could be no more telling example of the current powerlessness of central banks than this.

II

If all this is true, and recent changes through financial liberalisation and innovation as well as other macroeconomic stances have meant that central banks are really so comprehensively incapacitated, then why is there so much of a fuss about them at the moment? Why, in particular, are calls for “central bank independence” made so

regularly across the world, and even implemented in many countries? Why are both the media and capital markets themselves so focussed on who the Governor of a particular central bank is (especially in the G-3 countries) and what his pronouncements are? And why do so many governments of developing countries persist in attempts at financial liberalisation, which will only reduce even further the ability of their central banks to stabilise and regulate financial activity and play a developmental role?

The reasons cannot be found simply in a wrong-headed notion of how the economy and the financial system work, although this may certainly play some part. Clearly, there are other interests at work here, and since much of macroeconomic policy making is also about its income distribution effects, it reflects the interests of particular classes and groups who stand to gain from such policies, whether or not they achieve what they are explicitly supposed to.

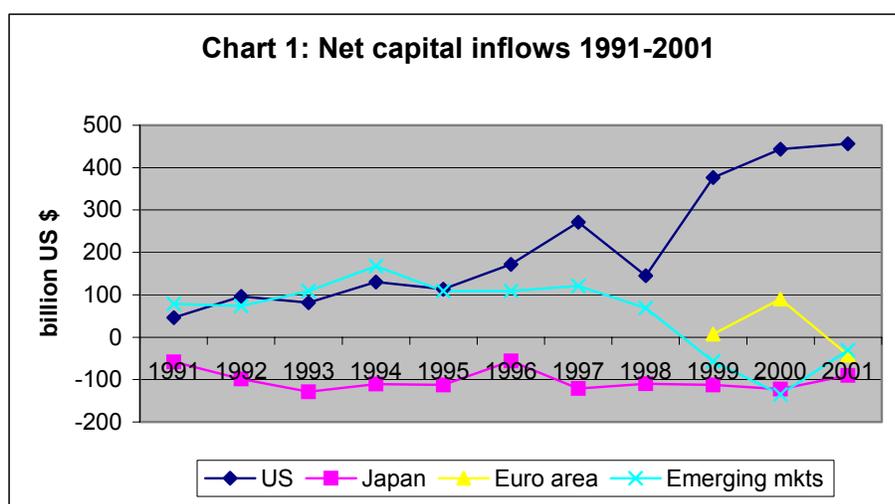
Consider the currently fashionable aim of “central bank independence”. This is usually referred to as independence from the political process, and therefore from the state. At one level, the very aim is manifestly absurd, since the basic wherewithal of the central bank, the management of the country’s currency cannot occur without the explicit backing of the state and its power. Since money is ultimately a creation of human minds depending upon trust and reflecting economic and other power, it necessarily requires state support simply in order to exist. Therefore, no central bank can ever be “independent” of the government. In fact, central independence usually implies a policy stance on its part: a focus on price stability as the basic aim of central bank policy, rather than any other objective such as increasing employment. Since an obsession with price stability may conflict with other more “popular” objectives, and even prevent attempts at countercyclical action, those who argue for central bank independence believe that bankers should essentially be free to ignore any sort of political pressure for relaxing monetary policy even when it means sacrificing economic activity and employment. In effect, it means removing monetary policy from the sphere of any political or democratic accountability.

It is important to note that this does not mean that the central bank therefore becomes “apolitical”; rather, it implies a certain political choice on the part of the policy makers who grant the central bank such autonomy of action in favour of price stability. The interests of rentiers and other groups, who are more interested than others in keeping inflation low, are therefore privileged over the interests of those – say workers without jobs – who would be in favour of increasing employment, or those – such as small scale industrialists and agriculturalists – interested in higher level of economic activity in general. Across the world, therefore, the shift in policy discussion that has made this option of central bank independence so popular, reflects shifts in the balance of political and economic power, between rentiers and other groups in particular societies. This political economy shift has been facilitated and even exacerbated by the growing integration of many householders into what used to be a much more exclusive segment of society. More and more people in the developed world, including workers in employment, now have their interests closely tied with those of the fortunes of the capital markets. This actually reflects the withdrawal of the state from its earlier social security functions to a large extent, and the consequent need for people to ensure for their futures through private savings. Such small investors in turn are as anti-inflationary as large rentiers, and contribute to the political constituency that argues for central bank independence as well.

In many developing countries there is a further consideration as well. Most of the policies of financial liberalisation in developing countries, which have subsequently therefore become “emerging markets”, have been driven by one of two visions. The first, which is by far the most widely prevalent, is the hope that financial liberalisation and other measures to attract investors will attract significantly more foreign capital inflows into developing economies. The second, which has tended to be confined to the more ambitious of the newly industrialising economies, is the hope of becoming an international financial centre, and reaping all the benefits of increased activity, employment and profits through the consequent expansion in high value services generally. In pursuance of these goals, governments of developing countries have generally been willing to accede to almost all requests or conditions laid down by private international capital with respect to financial liberalisation. The granting of

formal autonomy of actions to central banks, and thereby declaring that price stability will take precedence over other macroeconomic goals, is also one other means of attracting kudos from the international financial press and therefore, it is usually hoped, from international investors.

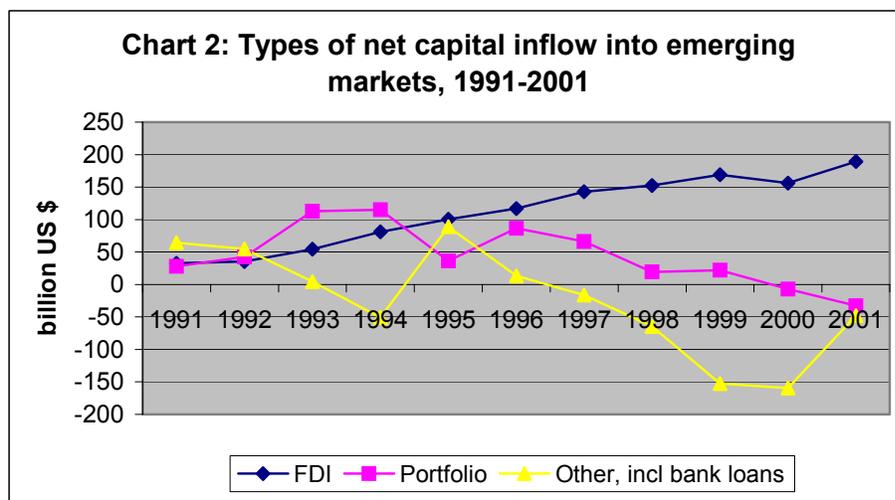
However, the experience since 1991 suggests that both of these hopes have been over-optimistic at best, and even misplaced. Despite all the much-hyped liberalisation and integration of world markets, developing countries as a group have actually received less net capital inflow as a share of GDP in the 1990s than they did in the 1970s, during the petrodollar recycling phase. Even if only “emerging markets” are considered, leaving out the large number of Least Developed Countries and others that have not reached the status of “emerging”, the picture is still unexpectedly bleak. All emerging markets together accounted for only 5 – 7 per cent of global bond and equity market capitalisation by the end of 2001. The main recipient of international capital resources has in fact been the United States economy, which has absorbed 70 per cent of the world’s savings in recent years, which amounted to more than \$400 billion in 2001. In that year, *gross* emerging market financing was less than half of *net* US inflows. Chart 1 below shows how emerging markets have fared in terms of net capital inflows, relative to the major developed economies.



Source: IMF 2002

It is evident that while for the first half of the 1990s, emerging markets fared fairly well in terms of net capital inflows, subsequently such flows stagnated and later collapsed to turn negative by 2000. Japan has obviously been a net supplier of capital abroad, but it is interesting that the Euro area in 2000 received net inflows. The overwhelming role of the US as the recipient of the world's savings became especially marked from 1998 onwards, and it clearly dwarfs all other players. Evidently, all the financial liberalisation and inflation control measures that swept emerging markets from the early 1990s, have not helped it to attract more net capital inflows. Indeed, it could be argued that the waves of crises in emerging markets, which were themselves largely the results of such blanket financial liberalisation, operated to scare away investors and reduce net inflows.

Such a view tends to be reinforced by the pattern of net inflows into emerging markets. Chart 2 shows a more disaggregated picture of inflows into emerging markets alone. What is remarkable is that portfolio flows have been declining since the mid 1990s, but capital inflows other than FDI (which include bank loans) have turned quite strongly and continuously negative after 1996. The only saving grace is in terms of FDI flows. But these, as is well known, are heavily influenced by the sheer weight of FDI into People's Republic of China, which has accounted for the greater proportion of such flows



Source: IMF 2002

The point, therefore, is that the forms of financial liberalisation that have reduced the powers of central banks, have not at the same time really helped developing countries to increase their access to international capital markets to any substantive extent. Nevertheless, the very process of trying to attract such capital inflow carries very high costs for the domestic economy. The first cost, in terms of financial liberalisation that drastically undermines the capability of the monetary authorities to address basic macro policy issues or undertake effective regulation of the financial sector, has already been discussed. In addition, this trajectory necessarily means upward pressure on domestic interest rates, which now tend to get determined with a view to attracting capital and achieving exchange rate stability rather than in terms of domestic economy requirements. This also acts as a depressant on domestic economic activity. Finally, if in this context central bank “independence” is also sought, this would also mean further constraints on fiscal policy as well, since it would put limits on government’s recourse to deficit financing, raise the cost of government borrowing, and put the economy on a deflationary course even if that is not desired.

So the trade-off between giving up control of monetary policy and attracting capital inflow does not really appear to exist, except unfortunately in the minds of policy makers across the developing world. But in fact, if this bluff could actually be called, it would still be possible to make central banks function in the way that they are supposed to. For this to happen, of course, it would be necessary to bring financial regulation and control back to the centre stage of macroeconomic policy.

References

- Caballero, Ricardo J and Arvind Krishnamurthy (2001) A “vertical” analysis of crises and central bank intervention, World Bank working paper, October.
- Dominguez, Kathryn (1999) The market microstructure of central bank intervention, NBER Working Paper No w7337
- Erturk, Korkut (2002) Reflections on currency crises, Paper submitted to IDEAs Conference on “International money and developing countries: Theoretical and policy issues in the current context”,
- Galati, Gabriele and William Mellick (1999) Perceived central bank intervention and market expectations: An empirical study of the yen/dollar exchange rate, BIS Working Paper No 77
- IMF (2002) Global Financial Stability Report: Market developments and issues, September
- Keynes, John Maynard (1936) The General Theory of Money, Employment and Output
- Kregel, Jan (2000) Krugman on the liquidity trap: Why inflation won't bring recovery in Japan, Levy Institute Working Paper
- Krugman, Paul (1999) Thinking about the liquidity trap, mimeo, available on website
- Reitz, Stefan (2002) Central bank intervention and exchange rate expectations – Evidence from the daily DM/US \$ exchange rate, Discussion Paper 17/02 Economics Research Centre of Deutsche Bundesbank
- Stix, Helmut (2001) Does central bank intervention influence the probability of a speculative attack? Evidence from the EMS, Oesterreichische Nationalbank Working Paper