

Risk–Informed Capital Flows A Global VaR Approach*

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The Age of E–Everything

The closing years of the 20th century have seen an unprecedented increase in international flows, both of capital and of information. The reasons were twofold: economic liberalisation, namely the dismantling of barriers to international capital flows, and technological progress. The latter had two aspects relevant to our topic: progress in computational speed and capacity permitted the development of increasingly sophisticated and complex financial instruments, while the reduction in telecommunications costs permitted almost instantaneous global transmission of data and capital. As a result, capital markets became increasingly integrated and the volumes of capital flows increased out of all proportion to the growth in trade.

When the crisis hit it was not totally unexpected, as the underlying causes had been recognised for some time: unhedged foreign currency borrowing, excessive short-term external debt and growing bubbles in stock and property prices. What went far beyond the expected, however, was the magnitude of the crisis and the speed with which contagion spread across countries in the same region and to other regions of the globe.

In the words of a recent IMF report, this was a “new breed of economic crisis” (IMF, 2000). In the age of e–everything, the Asian crisis probably could claim to be the first e–crisis, a crisis in which the fundamental financial disequilibria were augmented through speculative position–taking at the speed of global electronic messaging, the first major crisis in which financial instruments (such as derivatives) and procedures (leveraging, hedging, programme trading) relied heavily on the power of electronics.

* This paper draws on work being carried out with Jorge Braga de Macedo for the international forum Eurofi2000 “Banking and Financial Europe after the Euro”, as described in Braz and Macedo (2000).

This paper will argue in favour of solutions which are equally influenced by electronics. It will argue that the same technological progress that helped to make the crisis more intense, namely sophisticated financial instruments and electronic transmission of information and funds, can also help to reduce the probability and scale of future crisis. Newly developed instruments such as derivatives can serve to hedge positions and improve asset–liability management, and techniques already in common usage in commercial banking, namely the analysis of value–at–risk (VaR), can be extended to provide a synthetic measure of the vulnerability of central bank accounts. This information, appropriately standardised and provided on a regular basis, can help financial markets to take decisions on capital flows on the basis of better quality information and can help policy makers decide between policy choices which take into account their impact on the risk–adjusted balance sheet of the country.

The Asian Crisis: An Interpretation

The relevant economic literature has for some time recognised that a key to understanding the financial crisis of the later 1990s is the issue of vulnerability, namely the vulnerability of the central bank to an attack on its solvency, reducing the credibility of its commitment to defend a given exchange rate position (Dornbusch, 1998a; Blejer and Schumacher, 1999). As frequently happens in a crisis of confidence, decisions by economic agents are made on the basis of perceptions rather than firm information. Government authorities contribute to this by being ambiguous or secretive with the facts.

In the Asian crisis, the extent of deposit guarantees was left undefined in some cases and, as had happened in many other crises, some central banks were thought to be operating in futures markets and other off–balance sheet areas without being explicit. As a result, investors and creditors, both domestic and foreign, participate in a frenzied scramble to recover their investments, frequently generating situations of panic and overshooting of variables such as exchange and interest rates. All parties could be better off if their decisions were based on facts rather than perceptions and many analysts and institutions have called for greater transparency of relevant information.

With hindsight it is easy to analyse the fundamental causes of the Asian crisis: a combination of macroeconomic imbalance and weakness in financial and corporate systems and, principally, external imbalances reflecting strong private capital inflows, high domestic private investment rates and the appreciation of the US dollar, to which the currencies of many Asian countries were formally or informally pegged (IMF, 2000).

Unlike previous crises, which tended to come at the end of gradual current account deterioration, the Asian crisis was a capital markets crisis (Dornbusch, 1998a). The central issue in the crisis was that of unsound finance, which translated into national balance sheet vulnerability. Balance sheet crises have far more leverage — both in collapsing a country’s financial structure and economy and in spreading contamination to other countries. The core problem is that of a mismatch of maturities and of a mismatch of currency denominations, issues which have long been central to asset–liability

management in commercial financial institutions. The obvious conclusion (in the words of Dornbusch, 1998b) is that “the right answer for crisis avoidance is controlling risk”.

The Solution: Risk Management

With the continuous decline in computational cost (according to Moore’s law, the computational capacity of a microchip doubles every eighteen months, reducing by half the cost of electronic calculations), there has been a rapid development of computer-intensive risk management technologies, namely in the areas of market risk and credit risk (see, for example CDFT’s website/ www.cdgroup.fi). It is already common practice for commercial banks to measure the exposure of their portfolios to changing market conditions, such as movements in interest rates, yield curves, exchange rates and the prices of stocks, bonds and commodities, as well as the derivative instruments based on these prices. The most advanced techniques are those that use full valuation historical or stochastic simulation to calculate the value-at-risk (VaR).

International standards for bank supervision and regulation have recognised and, in some cases, provided incentives for banks to develop internal models for calculating risk-adjusted capital requirements. Parameters for VaR estimation by internal risk measurement models of commercial banks were established by the BIS in 1996, with respect to market risk (see BIS, 1996). More recently, models evolved to include credit risk, such as counterparty risk in swap contracts, and further development is under way to allow all bank operations to be included in a bank-wide VaR measure.

Unlike traditional accounting measures of balance sheet items which look at historical costs and accumulated depreciation, VaR analysis is based on market values as they evolve over time. Also, it looks at all operations, including contingent liabilities and off-balance-sheet items. It is a measure of the vulnerability of the balance sheet to movements in the prices of its components. Since financial crises are precipitated by increased vulnerability, it seems natural to propose the use of the same technology to analyse the balance sheet of the national financial authority or central bank. This is particularly so in view of the increasing use that central banks make of derivatives and other contingent liabilities. Blejer and Schumacher (2000) list five reasons for central banks to engage in derivative operations:

- i)* To provide additionally to incomplete or illiquid markets;
- ii)* To defend a fixed exchange rate regime or an exchange rate band;
- iii)* To alleviate the conflict between the defence of an exchange rate regime and the stability of the financial system;
- iv)* As an automatic stabiliser of a foreign exchange market;
- v)* As an alternative instrument for monetary management under specific circumstances.

Examples of such interventions include the Bank of Spain operations in the options market during the 1992/93 ERM crisis, Mexico's stabilisation scheme of August 1996, the Bank of Thailand sale of forward contracts in 1997 and the recent use of foreign exchange swaps by the Reserve Bank of Australia to increase liquidity to deal with the Y2K problem. More traditional and widespread examples of central bank contingent liabilities include the provision of credit guarantees and of deposit insurance (in cases where there is no autonomous deposit insurance fund).

Techniques for the pricing of derivatives have been developed over several years and are in common usage by commercial banks, while traditional operations such as deposit insurance can be seen as the equivalent of a put–option held by the banks and written by the central bank (see Blejer and Schumacher 2000 for the corresponding formula). All standard assets in the central bank portfolio (foreign currency reserves, bonds, gold) can be included in the VaR measure with technology currently in extensive use by commercial banks. Additionally, policy risk can be added in the case of central banks, financing of budget deficits, for example, will have a negative net effect inasmuch as liabilities (base money) increase and the corresponding asset (loan to the Treasury, assumed not to be repaid) has an economic value of zero.

A Proposal : Transparent, Policy–Focused VaR–Analysis

In the post–mortem of the Asian crisis a wide variety of proposals was made, ranging from various models of new international financial architecture, regional IMFs, different forms of capital controls, etc. One of the few areas of agreement was that more transparency was essential. One result has been the creation of the Special Data Dissemination Standard (SDDS), a new benchmark for IMF members in providing accurate and timely financial and economic information to markets and the public at large. At the same time, emphasis has been placed on the need for better information and transparency (World Bank, 2000) and for a systematically greater focus by the international financial institutions on national financial vulnerabilities, including excessive leverage or unsustainable exchange rate regimes (US Treasury, 2000).

In line with the above analysis of factors which exacerbated the Asian crisis, with the unanimous desire for greater transparency, and with current practice of international commercial banks in risk management, a proposal can be made for central banks to work towards producing and publishing regular VaR reports of national financial accounts (consolidated central bank accounts plus relevant Treasury accounts). The advantages of this proposal are many:

- The VaR measure is a synthetic yet comprehensive indicator, incorporating all the assets and liabilities of the national financial system, including contingent liabilities, thus permitting rapid comparison between different countries and the analysis of the evolution over time for any single country.

- It incorporates all known information on international currency, bond, equity and commodity markets, updated continuously as that information evolves.
- It permits the inclusion of items usually excluded from the central bank balance sheet, such as derivative operations and contingent liabilities like deposit insurance or credit guarantees.
- It permits analysis of policy options prior to decision-making, by the use of “what-if” scenarios to study the impact on the VaR number of implementing alternative policies (for example, informing cabinet ministers of the impact on the national VaR measure of proposals to increase spending and the budget deficit).
- It permits both regular tracking of the situation under “business-as-usual” conditions as well as stress-testing to view the maximum likely loss of value under extreme scenarios.
- It permits the incorporation of portfolio effects (in which the total VaR is less than the sum of the components – see Annex 1) as well as the analysis of components, to examine where the greatest risks originate.
- It reduces the temptation of central bank officials to try to “beat the market”, by making all their operations more transparent, increasing the accountability of officials and promoting good governance in institutions that usually prefer a very broad definition of “independence”.
- From a global perspective, the use of VaR analysis promotes capital efficiency by allowing international investors to utilise available funds in such a way as to maximise returns for a given level of risk, measured uniformly across different markets.

Conclusion

The best way to avoid situations like the Asian crisis is to make investment and capital flow decisions better informed as to the current risk levels implicit in different countries and regions. This could already be done with existing technology extended and adapted to include all the assets and liabilities of a national balance sheet for each country. The proposed technology is that of value-at-risk, for which some guidelines already exist as developed by the Bank for International Settlements (BIS). Countries should be encouraged to provide VaR reports in a common format, under the supervision of an international agency, such as the BIS or the IMF (for example as part of the SDDS).

To mitigate the need for each central bank to have large reserves or expensive hedging instruments to help in asset liability of management, a special facility with the nature of “lender-of-last resort” should be established, either at a multilateral level (IMF or BIS) or on a regional or even a bilateral basis. The credit limits available under such arrangements would be one of the items included in the VaR report.

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Annex 1

VaR Report

Portfolio Name	VaR 1% p.a.	VaR 1%	VaR 5%	Volatility	MTM	Limit	Unit	SimType
Ex: Total Exposure by Asset Class	-58.458	-3.060	-2.149	1.327	463.040	0.000	M USD	MC
Bond Portfolio	-61.054	-3.196	-2.247	1.387	407.435	0.000	M USD	MC
Equity Portfolio	-24.655	-1.291	-0.931	0.582	42.639	0.000	M USD	MC
FX Portfolio	-4.682	-0.245	-0.184	0.130	12.966	0.000	M USD	MC

Portfolio Name	VaR 1% p.a.	VaR 1%	VaR 5%	Volatility	MTM	Limit	Unit	SimType
Ex: Total Exposure by Currency	58.458	-3.060	-2.149	1.327	463.040	0.000	M USD	MC
EUR Total	-40.748	-2.133	-1.512	0.912	172.915	0.000	M USD	MC
GBP Total	-28.880	-1.512	-1.074	0.669	184.839	0.000	M USD	MC
JPY Total	-5.981	-0.313	-0.227	0.138	17.835	0.000	M USD	MC
USD Total	-23.481	-1.229	-0.901	0.563	87.452	0.000	M USD	MC

