

Department of Economics Working Paper

**Financial Risk and Macroeconomic Imbalances:
Impetus and Implications.**

Mathew Bradbury Ph.D.

Queens College, (CUNY)
Department of Economics
300A Powdermaker Hall
65-30 Kissena Blvd.
Flushing, NY 11367
Phone: 718-997-5440
Fax: 718-997-5466
<http://www.qc-econ-bba.org/>

Financial Risk and Macroeconomic Imbalances: Impetus and Implications.

Mathew Bradbury Ph.D.
Queens College, City University of New York

Abstract

This paper argues that, in part, external imbalances observed in the current phase of globalization are a strategic domestic policy response to the failure of international institutions to manage systemic risk associated with international capital markets. The crises of the 1990s brought to the forefront three key realizations. First large waves of capital flows are subject to surge and reversal. Second, there is no ultimate lender of last resort to bar against bank run dynamics that are at the core of currency crises. And third, the discipline has not provided a canonical model of crises to guide policy response. Developing countries have undertaken a policy of self-insurance in order to reduce vulnerability to crises, this self-insurance is observed as massive stockpiles of foreign reserves. These seemingly superadequate levels of reserves come at a high social cost. But, reserves are not seen as superadequate when considering the explosive nature of a country's public and private debt structures. Regional reserve pools would help reduce the need for reserves as would markets for safer debt instruments. Without these reforms countries will continue to manage their exchange rate in order to accumulate reserves. This neo-mercantilism generates widespread external imbalances that are rigid to adjustment creating a scenario for looming global financial instability.

Keywords: Reserves, Financial Crises, Debt, Capital Markets
JEL Classifications: E61, F3, F34, F36, F5, G01, G01, G15

Introduction

The 1990s saw financial crises in almost every region of the world. These crises increased in both frequency and severity. Perhaps the apex of this series of crises is the global financial crises occurring at present, detonated by the sub-prime mortgage debacle in the United States. These crises are thematic of the last two decades of globalization because, at least from the economists vantage, the single most defining characteristic of globalization has been the financial aspect. The boom in capital flows across the globe has been facilitated by widespread liberalization of financial markets. This has, on the one hand, taken the form of encouraging liberalized capital markets in developing countries and on the other has taken the form of increased deregulation and the proliferation of financial innovation. Over this period we have seen a rash of financial crises amongst claims that the deepening of the investor base and the utilization of exotic instruments to allow broader hedging had systemically reduced risk in international lending. The unraveling of these claims is becoming painfully relevant as familiar financial boom-bust dynamics and contagion paralyze financial markets globally. There is a realization that exotic financial instruments were too little understood and that significant institutional investors, such as hedge funds, were less transparent and more highly leveraged than thought. Indeed Wall Street, the national banking system of the United States and the dominant paradigm concerning the efficiency of free financial markets have all undergone triage and reorganization.

While these troubles are new, or at least rare, in the United States, the resulting contagion and strain on foreign financial systems is familiar to emerging markets.

The United States is uniquely equipped to handle its current troubles in that the U.S. Dollar is still the dominant international reserve currency. The spread of panic over the globe has ensured demand for the dollar through the “flight to quality” response as investors seek relatively safe haven. In developing countries a banking crisis as severe as that now faced by the U.S. would be part and parcel of massive capital flight and would necessitate a radically depreciating exchange rate as the next shoe to drop. Because of the prevalence of original sin in emerging markets, most external debt would be denominated in foreign currency and so balance sheet effects would set off sovereign or widespread private default. These events would help consummate the downward spiral.

But today many emerging markets are also uniquely equipped to deal with the global retrenchment of capital flows. This is because the last two decades of pressure toward liberalized capital markets has taught emerging markets not to expect tranquility from international financial markets, but turbulence. In a climate where international institutions are inadequate to the task of dealing with this turbulence, emerging markets have undertaken a strategic policy of self-insurance against financial shocks. This policy has been executed in the form of accumulation of massive stocks of reserves.

This paper argues that this policy of self-insurance is a necessary policy choice when international institutions fail to provide mechanisms for provision of risk management as a public good. Furthermore, it is argued that the strategy of reserve accumulation necessitates imposing policies that promote surpluses for the accumulation of net foreign assets. For this reason financial risk, in the absence of sufficient institutional capacity, promotes what is here termed neo-mercantilism. The consequences of widely adopted neo-mercantilism are widespread external imbalances with structural resistance to adjustment. As pressures from these imbalances build it becomes increasingly likely that these external positions will unwind in an unruly way. The rubric is reminiscent of the classic prisoner's dilemma in that, the lack of collective risk management, in the form of institutional capacity, forces individual incentives to dominate collective incentives. The implication of these individual actions in the aggregate is that the overall degree of risk is increased, making all players worse off.

The first section of the paper broadly discusses the institutional failures of the international financial architecture (Hereafter, IFI) that create an environment of limited policy options in which

individual countries must cope with risk. The second section discusses the trends in reserve accumulation and notions of reserve adequacy. The third section highlights debt dynamics and the final section concludes.

Surges and reversals, inherent volatility

The turbulence of the 1990s revealed three important characteristics of the dominant financial aspect of economic integration. Capital flows are extremely large and can be extremely volatile, providing finance to developing countries in a highly procyclical manner. These characteristics of international finance can place great strain on developing countries. It has been argued that no exchange rate regime, fixed or floating, can ensure macroeconomic stability given the magnitude and volatility of these capital flows. (Vernengo, 2006) Much of this volatility stems from imperfections in financial markets themselves. Arguments pertaining to the inefficiency of financial markets have many nuances but the Keynesian view of financial markets as a “Beauty Contest” highlights these in a way that has had much tenacity over the years. This view stresses that asset prices may not be tied to fundamentals but rather be determined by the average opinion of average opinion. In this view the notion that markets will work to get prices right is lost as is the argument that currency crisis is an unfortunate but “just” manifestation of market discipline. (Eatwell & Taylor, 2000)

The spread of the East Asian crisis to Russia and Brazil revealed that herding behavior could bring about contagion of crises. Large, volatile and unpredictable swings in financial flows present a systemic risk into the process of economic integration. What is needed is an international financial system that is less prone to extremely large surges and reversals of capital flows.

Three key areas have been chosen as the focus for reform of institutions within the international financial system. First, the inefficiencies inherent in finance can be contained to some degree if the regulatory system that monitors and enforces standards and codes of conduct is efficient. As finance has taken on an increasingly global presence there lacks a effective regulatory system to matching its span. If capital markets only operate efficiently when efficiently regulated, then problems arise when the domain of financial activity becomes larger than the domain of the regulator. Regulatory structures that have helped financial systems operate relatively smoothly on national scales are absent at the international level. Participants then must act individually to cope with even the normal level of systemic risk and prepare for times when these risks reach exceptional levels.

Second, abnormal manifestations of systemic risk may call for more drastic intervention to preserve the functioning of the financial system. To this end, the presence of a lender of last resort is essential in preventing bank run dynamics at an international level, and managing balance of payments crises for a smoother adjustment. Though the IMF and other coordinated efforts by major banks have typically acted in this manner in the past, neither is equipped to truly act as international lender of last resort. The IMF is constrained by limited resources and to be credible the lender of last resort must be able to credibly devote unlimited resources. The ability to do so, makes it less likely that it will have to. The IMF has in the past acted too little to late. Partly because access to IMF lending facilities is conditional upon adherence to various macroeconomic policies and performance standards. Requirements like fiscal surpluses may be harder to meet in the run up to a crisis, and indeed the policy of running a recession to correct for current account imbalances may exacerbate rather than alleviate a country's woes.

Third, the international system lacks a mechanism by which liquidity and payments problems can be worked out in an orderly manner. The lack of a sovereign debt restructuring mechanism injects added uncertainty to markets when difficulties first arise, thereby adding to whatever pessimism or panic may be driving a shortage of liquidity.

Though less often discussed than the aforementioned reforms, there is a final source of systemic

risk and opportunity for reform within the international financial system. The instruments that constitute the lender-borrower relationship create debt structures that are prone to vicious cycles. Financial markets tend to lend to developing countries in a highly procyclical way. This exacerbates overheating in good times and creates roll over risk during bad times. In fact, the structure of foreign liabilities itself may be prone to cyclical behavior such that satisfying liquidity demands becomes harder in bad times. This occurs because debt service behaves countercyclical. These cyclical characteristics leave less room for authorities to manage economic shocks and have the potential to amplify negative shocks, generating self-fulfilling dynamics.

Models of Modern Crises Dynamics

Globalization of the last century and a half saw the rise of the largest waves of capital flows to ever pass over the face of global capital markets. Yet, this dominance of the financial aspect had as its handmaiden increased frequency and severity of financial crises. Nearly every region of the world experienced at least one episode of financial crises. As these events occurred the discipline struggled to provide the world with a canonical model of crises, none has yet been found. The Mexican “Tequila” crisis called into question Krugman's (1979) model of balance of payments crises. With it the notion that market discipline would always act in a “just” way to punish countries whose fundamentals were out of line was challenged. Obstfeld (1980) brought into the dialog the notion that these crises might have self-fulfilling dynamics that could provoke a run on the currency irrespective of the initial state of fundamentals. This debate between first and second generation models was quickly settled in favor of self-fulfilling dynamics with the outbreak of the East Asian (1997) crisis. Yet still, gaping holes remained. The trigger for the crisis, the reason it spread to Russia (1998) and Brazil (1998), and the real economic effects of the financial crisis were all left unexplained. A third generation of crises models was born. From the orthodoxy, these models generally view the crisis as a temporary jump to a bad equilibrium in an inherently fragile system. There are two primary explanations for what causes this inherent fragility in the first place. The first focuses on maturity mismatches, the second on the balance sheet effects of large currency mismatches.

Maturity mismatch models rely largely on traditional bank run panic dynamics. The notion is that domestic financial intermediaries borrow short term abroad in order to invest in long term domestic opportunities. This situation is stable those lenders who have provided short term loans do not have erratic and positively correlated liquidity preferences. When this assumption is violated, longer term investments must be cannibalized or liquidated to satisfy immediate liquidity demands. These models are exemplified by the work of Diamond and Dybvig (1983) and Chang and Velasco (2001).

Work emphasizing currency mismatches hinges upon the balance sheet of the firm. If the balance sheet of a significant sector of the economy is characterized by liabilities denominated in foreign currency and revenues denominated in domestic currency then an inherent fragility exists. Depreciation of the currency would mean widespread bankruptcy, default and or tightening credit constraints. If the currency were called into question, perhaps by an initial sudden stop or capital flight, the fragility presented by balance sheet mismatches would represent formidable risks to holders of domestic assets and thereby serve to accelerate capital flight. Here we have again, bank run panic dynamics where the flight is not to liquidity but from the country. The papers of Aghion et, al. (1999) and Calvo (2000) are works exemplary of currency mismatch models.

Frenkel-Neftci (F-N) cycles incorporate both elements of maturity mismatch and currency mismatch but go further to explain how these mismatches occur and what about the economy drives them to levels that increase the fragility of the financial system. These models explain how processes typical of competition for returns at the micro level may transfer excessive risk taking to the aggregate generating overall macroeconomic fragility. These models posit that domestic financial bubbles are

fueled by capital flows as agents take positions in assets with promising spreads. The process of competition forces more agents in the economy to take similar positions in assets providing a spread and high rates of return. Since agents are borrowing abroad to exploit these spreads, the maturity structure and currency structure of the balance sheet worsens for a significant sector of the economy.

If the currency is called into question, again the fragility of the macroeconomy will accelerate capital flight.¹ Authorities will be forced to use rising interest rates to court capital flows. F-N cycles explain the proliferation of financial fragility, through systemic risk and the nature of competition in financial markets, and the substantial real effects on the economy as rising interest rates drive the economy into recession. (Eatwell & Taylor, 2000)

These scenarios represent recent approaches to explaining balance of payments crisis. But as of yet there is no consensus.² Perhaps the only consensus that has emerged as undeniable is that growing financial integration does predispose the world economy toward more crises. Without a canonical model, the discipline is hobbled when recommending best policies to prevent these episodes.

Domestic Policy Responses

Given an inadequate institutional environment that fails to treat systemic risk at the international level and no canonical crises model to prescribe definitive policy responses. The debate over strategies to reduce vulnerability has largely been directed at the domestic policy front. Countries have undertaken strategies to reduce the overall level of debt but like the volatility of international capital markets capital markets, the structure of external debt has largely been taken as given. The use of capital controls and the choice of exchange rate regime has dominated the policy debate on how to reduce vulnerability to crises.

In terms of currency, debate has taken a bipolar form between dollarization and free floating rates. Either exchange rate regime can be argued to reduce the exposure to systemic risk inherent in financial markets, but each has limitations. And the debate between fixed and floating rates rages on.³

Dollarization, has the advantage of eliminating balance sheet mismatches and exchange rate risk. However, dollarization implies a loss of control over monetary policy and sacrifice of seigniorage revenues. Under dollarization the authorities may have limited ability to react to other economic shocks thereby provoking other forms of crises.⁴

Similarly, advocacy for floating rates is hinged on reducing currency mismatch. The argument is that a fixed exchange rate masks the exchange rate risk inherent in borrowing abroad in foreign currency. This creates a moral hazard through an implied government guarantee making borrowing in foreign currency appear artificially cheap. Thus, a flexible exchange rate should plainly reveal the presence of exchange rate risk, discouraging borrowing in foreign currency.⁵

Countries like Ecuador and El Salvador have moved in the direction of dollarization. Countries that have moved to increased flexibility include Brazil, Korea, Indonesia and Mexico. Other BRIC

1 Losses from short selling currency are principally unbounded as there is no telling how far the exchange rate may need to climb.

2 For a summary of the policy dialog implied by mainstream modern crises models see Krugman (2000)

3 For a very inclusive survey of the issues pertaining to both developed and developing countries see Vernengo (2006)

4 Though eliminating exchange rate risk, maturity mismatch is not directly treated by dollarization.

5 There is something deeper going wrong here. If domestics face shocks that are correlated: exchange rate depreciation, recession etc... then according to standard notions of risk sharing they would not take on the risk of borrowing in foreign currency. Instead it would be foreigners who would take on this risk, lending in domestic currency. (Krugman 2000) The problem of original sin points to significant flaws in the risk sharing process between international borrowers and lenders. This political economy has yet to be definitively mapped. Eichengreen and Hausman have done extensive work on the problem of Original Sin and find this moral hazard argument of implicit guarantees incorrect as an explanation for excessive borrowing in foreign currency. So flexible exchange rates will not overcome Original Sin.

countries, Russia and India, are classified as having a managed float. China, claims to allow the Renminbi to float against an undisclosed basket of currencies. Despite these claims there has been only highly managed movement of the exchange rate against the US dollar. Between 2005 and 2006 the exchange rate was allowed to move by less than 2% over three month intervals.^{6,7}

As pointed out by Calvo and Reinhart, (2000) emerging markets exhibit a fear of floating and despite IMF classification continue to intervene heavily in foreign exchange markets. It has been emphasized by Griffith-Jones and others that in the absence of an adequate international institutional environment, the choice of exchange rate regime is no panacea for reducing vulnerability to crisis. (Vernengo, 2006) The fear of floating exhibited by many emerging markets may indicate that exchange rate intervention is being used to reduce vulnerability to crises. This is a revealed policy choice that, as discussed, does not find justification in the mainstream prescriptions for the exchange rate regime that would reduce vulnerability to crises. In fact, the most salient revealed policy trend in developing countries is massive accumulation of reserves. This policy is undertaken as a means of self-insuring against systemic risk inherent in international capital market. This policy confronts developing nations as the best strategy for reducing vulnerability in an environment when policy options are constrained by the failure of international institutions to provide the required global public goods that would reduce systemic financial risk.

Trends in Reserve Accumulation

The reserves to short-term debt ratio emerged from the crises of the 1990s, particularly the East Asian 1997 crisis, as the single best predictor of reserve adequacy and vulnerability to crises. The benchmark for reserve adequacy is defined by the Greenspan-Guidotti rule (G-G) which specifies that reserves be adequate to cover short-term debt. Countries where the coverage ratio of reserves to short-term debt is less than one are three times as likely to experience a sudden stop or large reversal of capital flows.⁸ (Rodrik & Velasco, 1999) A smaller reserves to short-term debt ratio is associated with greater incidence and depth of crisis. (IMF 2000) Many regions of the developing world have leaned toward accumulation of massive stocks of reserves. These regions exhibiting debt coverage ratios in great excess above the G-G benchmark. In 2006, the developing world had accumulated reserves nearing 30% of GDP and 8 months of imports. The East Asia and Pacific region has shown the most aggressive reserve accumulation, far surpassing most other developing regions that are not dominated by oil exporting countries. This trend began in the late 1990s and accelerated dramatically around 2002. By 2006 the region had accumulated \$1.8 Trillion in international reserves. (Figure, 1)

Exponential reserve accumulation in East Asia and Pacific has continued through 2007 and into 2008. Within this region, China has consistently dominated and has at present the largest stockpile of reserves in the world. By the first quarter of 2008 China held \$1.7 Trillion.

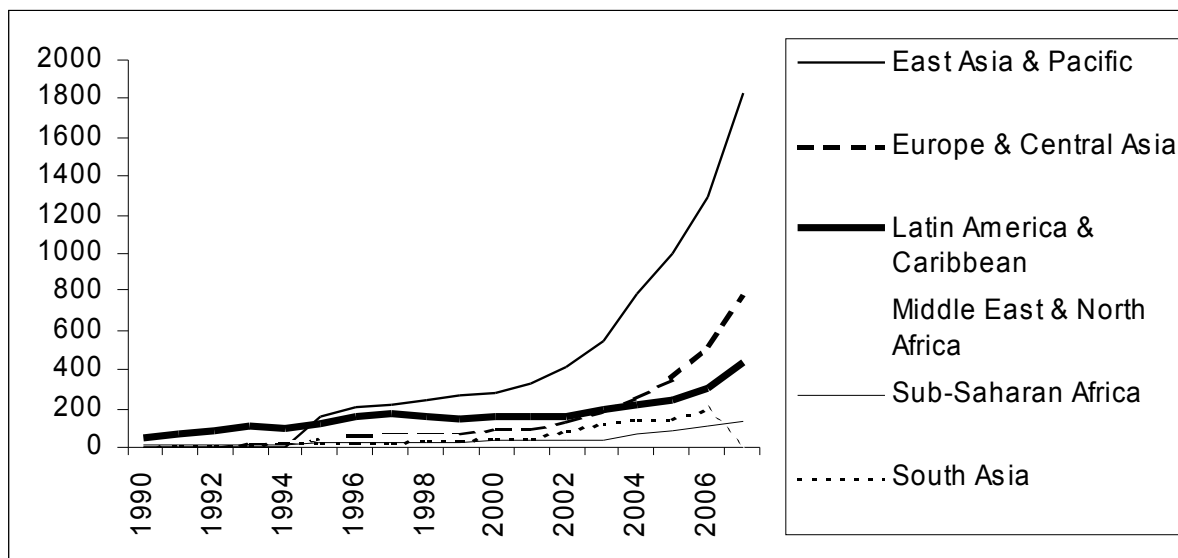
If we rank developing countries according to reserve stocks, many of those that experienced crisis in the 1990s fall into the top 20. (Table. 1) Seven of those crisis countries are in the top ten: Russia, Korea, Brazil, Singapore, Malaysia, Thailand and Mexico. Reserves and the coverage ratio of short-term debt have risen in most of these countries and display coverage well above that recommended by the G-G rule. (Table. 2)

6 See IMF's De Facto Exchange rate Regime Classification System, found online:
<http://www.imf.org/external/np/mfd/er/index.asp>

7 In response to the current global financial crisis China has halted its slow managed appreciation.

8 For more on the importance of the short-term debt coverage ratio see: Sachs, Tornell, and Velasco (1996); Radelet, Steven and Jeffrey D. Sachs (1998).

Figure 1.
Reserves, (Minus Gold). US\$Billions.



Source: World Development Indicators, World Bank
Note: Data covers each developing region through 2006.

Table 1.
Reserves Top 20 Developing Countries.
(US\$Billions)

		Q1/2008			Q1/2008
1	China	1684.3	11	Libya	87.1
2	Russia	493.3	12	Turkey	76.6
3	India	299.7	13	Nigeria	59.7
4	Korea, Republic of	264.2	14	Indonesia	56.8
5	Brazil	194.2	15	Argentina	48.8
6	Singapore	177.5	16	Romania	39.8
7	Algeria	123.6	17	Czech Republic	37.6
8	Malaysia	120.0	18	Philippines	32.8
9	Thailand	107.5	19	Peru	32.6
10	Mexico	91.0	20	Ukraine	32.43719

Source: Joint External Debt Statistics, BIS, World Bank, OECD, IMF

These very high levels of reserves well exceed what might be needed to smooth domestic absorption. Extremely high reserve levels suggest that in large part, developing countries are accumulating reserves as an insurance policy against external shocks stemming from the volatility of international capital markets.⁹ But, assuming the G-G rule of reserve adequacy, the levels of insurance

⁹ Authors emphasizing the role as insurance: Rodrick (2006), Aizenman and Woo (2005), Jeanne and Ranciere (2006)
Others emphasizing reserves as a consequence of undervaluation: Dooley, Micheal., Folkerts-Landqu, David and Peter

as measured by the short-term debt coverage ratio are far beyond what would be considered adequate to ward off speculative attack.

There is a large social cost to hoarding idle reserves, so either these hoards are irrational or the dynamics of crisis necessitate them. In the latter case, observed levels are not seen as superadequate at all. The social costs of holding reserves is incurred because of the interest differential between reserves and external debt. The rate of return on reserves is very low while most emerging markets must pay premiums substantially above this rate on their external debt. Estimates of the social cost of reserve stocks held in 2006 was around 1% of GDP.¹⁰ (Rodrik, 2006)

Table 2.

	Total reserves minus gold (current US\$Billions)	Reserves to short-term debt
	2006	2006
India	170.74	14.87
Indonesia	41.10	1.29
China	1068.49	6.23
Russia	295.57	7.51
Malaysia	82.13	7.02
Philippines	20.03	4.58
Mexico	76.27	10.39
Thailand	65.29	3.76
Argentina	30.90	0.91

Source: World Bank, World Development Indicators

Given the social cost of holding reserves, why would countries choose to hold them in such excess of the G-G rule, rather than using them to reduce short-term debt? This strategy would seem to free up the same level of liquidity, but avoid the costs associated with interest differentials.

One reason may be that the G-G rule is not adequate to ensure liquidity for countries with significant but precarious access to international capital markets. This may be the case if liquidity pressures in a time leading up to crisis are not expressed entirely by current short-term debt. Consequently, the reserves relative to current short-term debt ratio does not indicate how much future liquidity need is covered.

Among those factors that may contribute to the need to hold reserves well above and beyond the G-G rule are: macroeconomic fundamentals; the exchange rate regime; the quality of private risk management and financial sector supervision; and the size and currency composition of the external debt.¹¹ (Fischer, 2001) the structure of external debt may also play a role. Beyond its level, external debt may interact with external shocks to generate vicious cycles. These vicious cycles can make the

Garber, (2004). This paper assumes that undervaluation is a consequence of the need for reserve accumulation.

10 Rodrik's calculation is calculated using assumed interest differential of 5% and based on reserves above that needed to satisfy 3 months of imports.

11 One would expect a flexible exchange rate to require less reserve stocks yet, Korea, Brazil, Mexico, turkey, Indonesia Argentina and the Philippines are among several cases that are classified as "floating" but exhibit very aggressive reserve accumulation.

liquidity needs of a country difficult to predict.¹² These pressures will raise the required level of reserves above the G-G threshold.

Regarding macroeconomic fundamentals, the presence or persistence of current account deficits must augment the bleed of reserves indicated by short-term debt. Turning around the current account demands adjustment through the exchange rate, interest rate, or the level of income. Yet movement in these same variables may set off vicious cycles from within the debt structure. Rising interest rates or an exchange rate devaluation might improve the trade balance but worsen the burden of debt service. The current account might be slow to adjust to the interest rate or nominal exchange rate if explosive trends in debt service take an increasingly strong countervailing position against improvement in net trade. Rising debt and rising debt service significantly add to the liquidity pressure indicated by current short-term debt. Deterioration of key sustainability indicators such as the short-term debt coverage ratio or debt to GDP may make matters worse. If movement in these indicators influences the risk premium, these trends may feed back on debt service costs and reinforce investor pessimisms that keep capital scarce.

If, as is the case in most developing countries, the proportion of foreign currency denominated debt is large, then a devaluation will directly increase the burden of servicing external debt.¹³ The revaluation of the debt leads to further sustainability fears, and risk premiums may rise further.

Rising interest rates will also force up the debt service burden. These rates may rise if the authorities increase the domestic rate in order to call forth capital, if risk premiums rise, or if international rates, from which the spread is calculated, spike.

It has been part of the conventional wisdom, supported by the IMF, that the fiscal stance is of utmost importance in countries with open capital markets and fixed exchange rates. For this reason contractionary policy has often been used in order to court capital flows during economic downturns, regardless of whether these downturns were domestic in origin or triggered by external shock. In this case, the vicious debt cycles seen in the 1990s were a combination of misguided policy and the character of the debt structure.

When vicious debt cycles are present debt service increases at just the wrong time: when global recession sends exports earnings down and core interest rates up, when domestic growth is in a slump, or when tightening international capital markets make the possibility of rolling over debt much more difficult and expensive.¹⁴ Indexation of debt service to *real* variables, like GDP, has been one financial innovation proposed to eliminate or reduce the countercyclical nature of debt service burdens. This type of instrument has the potential to reduce liquidity risk in the borrowing country, and have positive spillover effects that reduce risk and the cost of borrowing for emerging markets as a class. A reasonable hypothetical scenario conducted for Argentina prior to the 2001 crisis revealed that this type of instrument would have substantially reduced liquidity pressures while providing no net loss of interest to investors. (Borensztein and Paolo, 2004) Alone this instrument would not have cured Argentina's problems, but may have provided room for a more orderly exit from what was a doomed exchange rate regime.

Financial innovations like GDP-indexed bonds have garnered little to no traction.¹⁵ Individual

12 It is difficult to predetermine how high risk premiums may rise or how long capital markets could remain tight.

13 This may also challenge a country's solvency as the value of all debt denominated in foreign currency rises. For a treatment related to public debt see: Carlos E. Schonewald Da Silva and Matias Vernengo (2007)

14 Explosive debt dynamics set off by contraction fiscal policy may amplify deterioration of the fiscal balance placing governments in a liquidity crunch. These trends may precipitate twin-deficits in the current account and fiscal balance that may lead to debt and currency sustainability problems. This dynamic of endogenous fiscal deterioration was evident in Argentina (2001) and Brazil under the Cardoso Administration. For work on Brazil see Chapter 7 in Matias (2006); for the dynamics of the exchange rate and government debt sustainability see Schonewald da Silva and Matias (2007).

15 Yet at the same time financial markets have evolved. This evolution has not always produced instruments that reduce

countries may not have incentive to issue them because they will face a novelty premium. Investors may not be willing to hold them until there is a critical mass of issuers to ensure liquidity. (Griffith-Jones and Sharma, 2006) Given these and other issues, financial markets cannot be expected to “evolve” into safer instruments, and coordinated efforts backed by international or regional financial institutions will be needed.

Even neglecting current accounts and countercyclical debt service, current short-term debt on its own may still not be an adequate measure of future liquidity needs. This may be the case if in the run up to crises lending exhibits a maturity bias favoring short-term debt.¹⁶

While most crisis literature has pointed to excessive short-term debt as a cause of liquidity crisis, some work has pointed to short-term debt as a symptom of the crisis.

Several authors have conducted empirical work in the determination of maturity structure and found traction in the argument that financial fragility may lead to rising short-term debt so that the maturity structure of debt may tend toward exacerbating financial fragility. Short-term debt can then be viewed as a mechanism that translates conditions of financial fragility to illiquidity. (Detragiache and Spilimbergo (2001), Diamond and Rajan, 2000; Jeanne, 2001; Torre & Schmuckler, 2004)

The point is that financial fragility may itself be the consequence of an external shock generating pernicious forms of debt. Whether this interaction occurs through currency mismatches, spiking interest rates or maturity bias, in each case it will increase liquidity pressures at the wrong time.

Pernicious forms of debt generating added liquidity needs will inhibit a country's ability to manage international perceptions of risk. As a consequence, the truly adequate level of reserves is forced to exceed Greenspan-Guidotti rule. Just how far in excess is difficult to determine. It depends on how bad the domestic balance sheet and financial structure are, and how strong the tendency is toward endogenous debt deterioration. On the other hand, the animal spirits of international investors may provoke unpredictable swings in risk pricing.

Fiscal and External Sustainability

To give a better idea of how explosive debt characteristics might lead to added liquidity demands and worsen fundamentals of risk perception, we can view the dynamics of the balance of payments. Bad debt dynamics will work through the external debt held by various sectors of the economy, private and public to influence the balance of payments. Once these liability structures are in place they may dictate how flexible the current account is to standard adjustment mechanisms such as exchange rate depreciation. The following section highlights these mechanisms.

Making use of the standard balance of payments identity, $CA + KA + FA + EO - \Delta FX = 0$, we can write the net foreign asset position (NFA) as:¹⁷

$$NFA_t = CA_t + KG_t = (\Delta FX_t - FA_t) + KG \quad (1)$$

countercyclical debt service cycles but have been directed at exotic instruments like derivatives which, because they are poorly understood, likely introduce more risk to the system rather than less. In turn the institutional investor Pensions and Hedge funds have become major players in the market. We are now seeing how a lack of transparency in these highly leveraged firms is generating a realization of risks not anticipated.

¹⁶ See, Torre and Schmuckler (2004),

¹⁷ For simplicity I have eliminated errors and omissions (EO) as well as the capital account (KA). Keeping with the Balance of Payments Statistics of the IMF, the capital account measures certain transfers, such as debt forgiveness, the financial account records capital flows.

The net foreign asset position (mirror of net foreign debt) can be expressed as the sum of the current account (CA) and net capital gains (KG). Equivalently it may be expressed as the sum of net capital outflows and capital gains where net capital outflows consist of the change in foreign exchange (ΔFX) and net capital inflows (FA). It follows that if the current account is in deficit, net foreign assets must be declining. This can occur either through a loss of reserves, or through rising external debt, net capital inflows.¹⁸

Turning now to the current account, the net foreign asset position becomes the sum of the balance of trade (NX) and net foreign interest income.¹⁹ Here A and L are external assets and liabilities, respectively and i_t^A and i_t^L are the nominal yields on these assets and liabilities.

$$NFA_t = NX + (i_t^A A_{(t-1)} - i_t^L L_{(t-1)}) + KG \quad (2)$$

If we define k_t^A and k_t^L to be the rate of capital gains on assets and liabilities and take (π) as the domestic rate of inflation, then the real rate of return on foreign assets (liabilities) becomes $r_t^A = (1 + i_t^A + k_t^A) / (1 + \pi)$. Letting lower case letters denote ratios to GDP equation (2) can be used to express the familiar equation showing the change in the net foreign asset position of a country. Where (g) is the growth rate of domestic GDP.

$$nfa_t - nfa_{(t-1)} = nx + (r_t^L - g_t) nfa_{(t-1)} + (r_t^A - r_t^L) a_{(t-1)} \quad (3)$$

Equation (3) displays the familiar role of the trade balance in the evolution of net foreign assets. A rising trade deficit requires financing through capital inflows or a reduction of reserves. However, the trade balance is just one determinant of the net foreign asset (debt) position. The second expression on the right hand side of equation (3) reveals that the inherited net foreign asset position plays a key role in the evolution of net external assets (liabilities). So too does the gross scale of foreign assets and liabilities as shown in the last term in equation (3).

The net rate of return on accumulated foreign assets plays a key role in the dynamics of net foreign assets. In terms of domestic currency the net valuation effect of a change in the real exchange rate is given by:

$$\frac{(\delta NETRET_t)}{(\delta RER)} = \frac{(\delta r_t^A)}{(\delta RER)} A_{(t-1)} - \frac{(\delta r_t^L)}{(\delta RER)} L_{(t-1)} \quad (4)$$

18 If the CA deficit occurs in a climate where investors have reduced appetite for risk they may seek to lend only short term. If this, endogenous maturity of the debt structure is the case then the current account deficit will be financed by rising short term debt or be met with falling reserves. In either case the reserves to short term debt ratio will deteriorate. This consequence would serve to push up risk premiums, making lending more expensive or precipitating or reinforcing a sudden stop.

19 Again I have excluded net transfers from the analysis (KA) to focus on the eternal liability structure of the entire economy.

Even if the initial net foreign asset position is balanced the exchange rate can have a non-zero valuation impact so long as rates of return on foreign assets and liabilities are differentially affected by movements in the exchange rate. (Lane and Milesi-Ferretii, 2005)

Keeping in mind equation (1), interest rate shocks and exchange rate movements may work through the real rate of return so that both the inherited net foreign asset position and the gross external asset level play a role in determining the required capital inflow or exchange rate loss required to maintain the balance of payments identity.

If valuation effects of movements in the exchange rate or interest rate spread come to dominate the trade component of equation (3), then a depreciation or interest rate defense against a sudden stop in capital flows will be rendered useless and foreign reserves must fall. With reserves declining and/or debt rising investor pessimism may be reinforced, further increasing the spread through rising risk premiums. The classic transfer problem is complicated by the structure of external assets and liabilities. This is particularly true for emerging markets who typically hold low yield foreign reserves as the primary asset and large proportions of foreign currency denominated debt that is sensitive to risk premiums as liabilities.

The composition of debt does matter, as does its level. Increased financial integration without attention to building domestic capital markets and utilizing debt instruments that move procyclically, rather than countercyclically, place frictions in the process of current account adjustment.

Another way, and perhaps more salient means, of showing the importance of debt is through disaggregating the external liability structure to focus on the sectoral components of foreign debt. The financial account records capital inflows. These inflows consist of direct investment, portfolio (equity and debt) and other investment. In emerging markets sovereign debt makes up a significant portion of portfolio debt investment. Working from equation (1) to denote the investment savings balance of the economy. Equation (5) states that the inflow of foreign savings be sufficient to cover the investment savings gap of the private ($I_p - S_p$) and public ($I_g - S_g$) sectors.

$$S_f = (I_p - S_p) + (I_g - S_g) = -CA \quad (5)$$

Focusing in on the accumulation of foreign debt of the public sector, debt dynamics again play a key role. The evolution of government debt depends upon the primary budget surplus (B) and the governments interest obligations on outstanding debt. Outstanding government debt (D_g) debt consists of debt denominated in domestic currency (D_d) and debt denominated in foreign currency (D_f). Debt owed to foreigners carries an interest rate (r_f) which incorporates a risk premium above (r).

$$D_g = D_g(1+r) + eD_f[(1+r^f) - (1+r)] - B \quad (6)$$

Indicating ratios to GDP by lower case letters equation (6) can be rearranged to show the primary surplus required to keep the public debt to GDP ratio stable.

$$b \geq \left[\frac{r-g}{1+g} \right] d_g + \left[\frac{r^f-r}{1+g} - 1 \right] ed^f \quad (7)$$

Equation (7) highlights the fact that a primary budget surplus can be driven into overall deficit by the depreciation of the exchange rate, the gap between the interest rate and growth of GDP and the interest rate spread.²⁰ The first expression on the right hand side shows that familiar result that increasing growth is the best way to reduce the overall debt to GDP ratio. But the last term on the right hand side brings into the equation the several potential problems. The rate of interest paid to foreigners (r^f) carries with it a risk premium which may be susceptible to investor pessimism as well as deterioration of fundamentals. Rising risk premiums, exchange rate devaluation and a history of heavy reliance on external financing of the budget deficit may provide for an explosive debt service burden which can drive a primary surplus into deficit.

Equations (3) and (7) are designed to highlight the importance of debt structure and vicious cycles in influencing the external liquidity constraint of a country. These vicious cycles can be triggered by external financial shocks. For instance, a tightening of global capital markets, or sudden stop may demand improvement of the current account. This financial shock may have two consequences, first it will drive up the cost of external borrowing, pushing up risk premiums. And second, exchange rate depreciation may be needed to improve the trade balance. However, movements in each of these adjustment variables will serve to increase debt service and if the effects are large enough improvement in the trade balance can be overcome by bad debt dynamics. If this is the case, the net external position will tend to worsen and reserve loss or mounting debt will cause a deterioration of key sustainability indicators such as the reserves to short-term debt ratio. Recognizing these vicious debt cycles leads policymakers to seek an accumulation of foreign reserves at what appears to be super adequate levels.

The impact of debt dynamics on liquidity can be seen in relevant crisis episodes of the late 1990s. (Figure 2) Though it has been well documented that high levels of short-term debt played a large role in each crisis, the spectacular rise in debt service for Brazil (1998) and Argentina (2001) in the run up to their crisis is staggering. A glance at the data reveals that high debt service costs were present in Indonesia (1997) but that rising debt service also played a role in the experiences of Thailand (1997), Brazil (1998) and Argentina (2001). The East Asian region reflects both a deterioration of the short-term debt to reserves indicator and endogenous short-term debt, as short-term debt takes increasing share of total debt. Though short-term debt was very high in Argentina, endogeneity of short-term debt does not seem to be an issue in the cases of Brazil and Argentina. Nor does the short-term debt coverage ratio reflect the deteriorating liquidity conditions prior to each crisis.

Explaining the relative importance of short-term debt in East Asia versus the apparent importance of rising debt service in Latin America may require more explanation.

In each region the strengths and weaknesses of the financial structure are quite different. In addition, the sector of the economy in which most of the debt was held differed. These characteristics will inform how a negative external shock to confidence manifests in explosive debt dynamics.

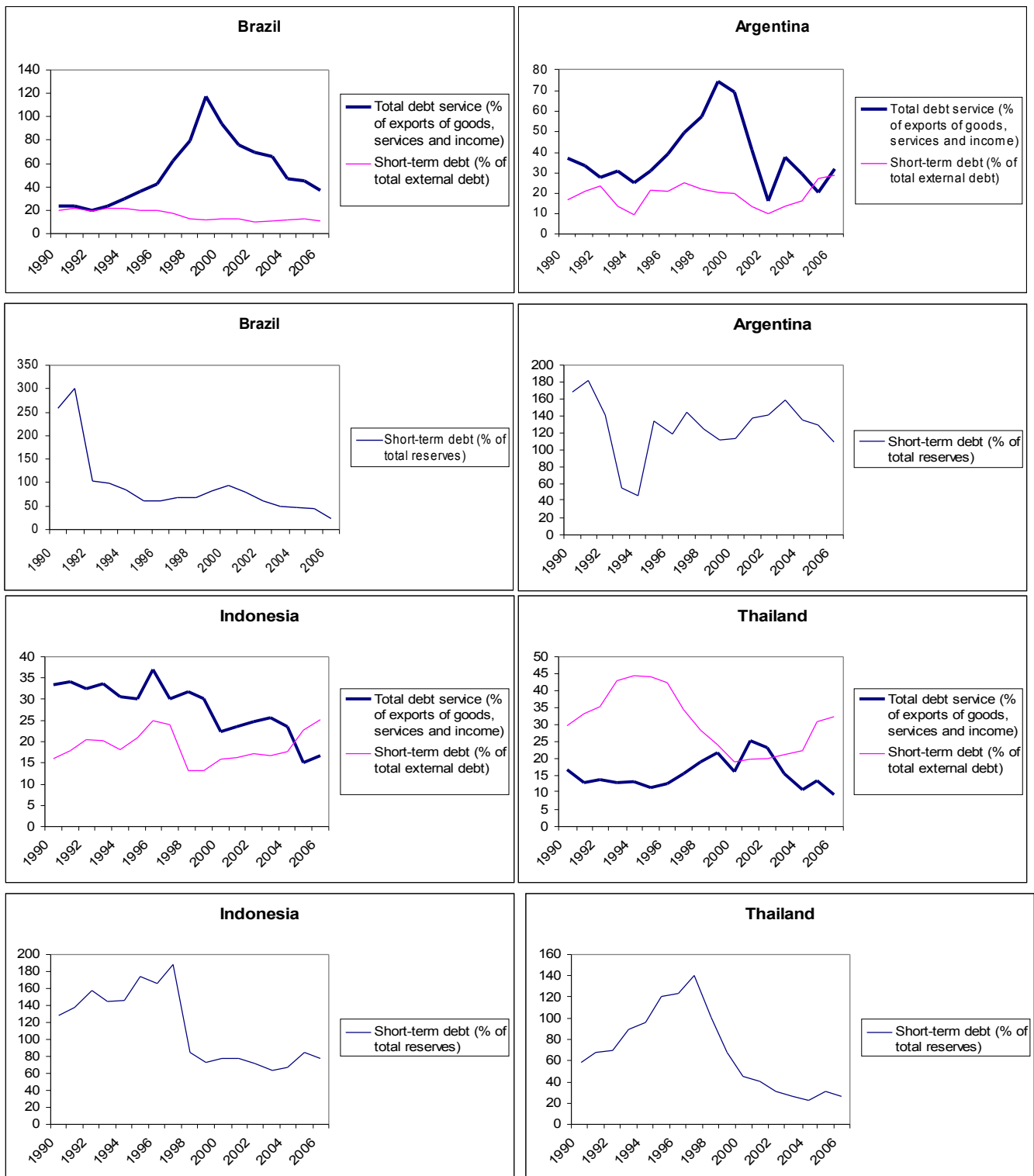
For instance increased pessimism on the part of international investors may lead to a reduction in the appetite for risk, and hence a movement away from emerging market assets. There may be two ways to deal with this type of contraction in international capital flows.

The first is the conventional notion that rising interest rates might be used to compensate for rising risk premium. The second, more subtle way, might take the form of portfolio shift along the maturity axis. Lending at shorter maturities is cheaper for borrowers in emerging markets but also reduces exposure to currency and rollover risk on the part of lenders. For this reason, falling risk appetite may lead to a portfolio shift toward shorter maturities, and hence a rise in short-term debt.²¹

20 For exchange rate dynamics and sustainability of public debt see Schonerwald Da Silva and Vernengo (2007)

21 In environments of high risk investors avoid price risk (interest rate and exchange risk) by moving into shorter term foreign currency lending. This scenario is discussed in Torre and Schmuckler (2004)

Figure 2 Debt Service, Short-Term Debt, and Debt Coverage Ratios, Selected Crisis Countries.



Source: World Development Indicators Database. World Bank.

In Latin America the debt was primarily held by the government, so pessimisms regarding debt sustainability would have been directed at the government sector. Rising interest rates were then a policy tool to encourage flows during tighter international capital markets. In East Asia the private sector had taken on most of the debt. Slipping investor confidence tightened supply to the private sector for longer-term credit leading to a rise in short-term debt.

These stylized trends reinforce the notion that coverage ratios in excess of the G-G rule are a rational response to explosive dynamics built into the debt structure. This volatility in the liquidity needs of a country as international conditions deteriorate goes beyond short-term debt to include debt service. Issues related to the interest rate, maturity structure and currency denomination may worsen the liquidity position and generate risks that exacerbate investor pessimism, potentially triggering a run on the currency in the form of capital flight.

Conclusion

The overall impression supports the idea that the Greenspan-Guidotti rule alone is inadequate to capture liquidity pressures and that explosive dynamics emanating from the structure of the debt must be taken into account. When negative external shocks trigger explosive debt dynamics reserve hoards in excess of short-term debt no longer appear super-adequate. Reducing the social cost of reserves by reducing current short-term debt will, under the Greenspan-Guidotti rule, appear as an alternative strategy to improve liquidity by the same amount as accumulated reserves. But these two strategies are not equivalent means of improve liquidity if when looking forward short-term debt and other debt based liquidity needs behave countercyclically.

Adequate coverage then requires that reserves be held in excess of the G-G rule, and reserve hoards appear rational even given their associated social cost. To bring down the required level of insurance and the level of reserves, volatility of the debt structure must be reduced and other elements that fail to reduce global systemic risk must be improved.

Deeper domestic capital markets and the ability to issue long-term foreign debt in domestic currency would help reduce reliance on both external debt and external debt denominated in foreign currency. Real indexation to a variable such as GDP would help to reduce the countercyclical nature of debt service. All of these developments would help reduce risk for a single country and would likely induce spillovers that reduced risk for emerging markets as a class, reducing the cost of borrowing. However, significant improvement on these fronts is a long way off. Without options to reduce the volatility of debt based liquidity demands and without some mechanism of pooling reserves, countries will continue to insure themselves against the volatility of international capital through the accumulation of huge stockpiles of international reserves.

China likely represents the best strategy to this end. Rather than pursuing the growth cum debt model of the past, China maintains an undervalued exchange rate that provides for huge trade surpluses. On the other side of this trade balance must be a trade deficit, China is growing via the dissavings of the rest of the world. China now has the largest stockpile of reserves in the world, far more than would be required to support its undervalued exchange rate if growth by foreign dissavings were its only motivation.

For China and for many emerging markets these reserves represent the cost of insurance against volatility in international capital markets. As this form of individual insurance becomes the global trend, so do external imbalances. As external imbalances become larger and more pervasive, the threat of global economic volatility will loom larger and become more certain. Unwinding will likely proceed in an unruly fashion because it is policy to promote them.

Interestingly, this prospect only reinforces the logic that drives reserve accumulation in the first place. At its root, insurance is a necessity in a world with unfettered global capital flows that are prone

to volatility. Since no collective mechanism for insurance is in place, a country must create its own. Aside from this inefficient form of insurance, countries are limited in the latitude of debt restructuring and debt contracts, so risk prone forms of debt will remain predominant. Finally, without an orderly mechanism for working through debt default and no lender of last resort, individual investors will remain susceptible to panic and avalanching pessimism.

The evolution of instruments and institutions to adequately deal with financial risk has not kept up with the increasing dominance of the financial aspect to the global economy. Consequently, the the market failures common to the financial sphere become, and will continue to become global market failures.

References:

- Aghion, P., Bacchetta, P., & Banerjee, A. (1999). A Simple Model of Monetary Policy and Currency Crises, Mimeo
- Areta, Carlos, Eichengreen Barry, & Wyplose, Charles. (2001) When does Capital Account Liberalization Help More Than It Hurts. CEPR Discussion Paper, no 2910. August, 2001.
- Borensztein, Eduardo, & Mouro, Paolo. (2004) The Case for GDP-Indexed Bonds. *Economic Policy*, April. pp. 165-216.
- Calvo, G. (1998). Capital Flows and Capital-Market Crisis: The Simple Economics of Sudden Stops. *Journal of Applied Economics*, Vol. 1, No. 1, Nov 1998, pp. 35-53.
- Calvo, G., & Reinhart, C. (1999). Fear of Floating. NBER. WP, 7993.
- Calvo, G. (2000) "Capital Markets and the Exchange Rate: With Special Reference to the Dollarization Debate in Latin America". NBER.
- Calvo, G and Mendoza. (2000). Capital Market Crisis and economic Collapse in Emerging Markets: an Information Frictions Approach. *The American Economic Review*. Vol 90. n2.
- Chang and Velasco. (2001). A Model of Financial Crisis in Emerging Markets. (revised version of Chang and Velasco (1998)
- Corsetti, Pesenti and Roubini. (1998). What Caused the Asian Currency and Financial Crisis? NBER WP6843.
- Detragiache, Enrica, & Spilimbergo, Antonio. (2001) Crisis and Liquidity: Evidence and Interpretation. IMF Working Paper no 01/2.
- Diamond and Dybvig (1983). Bank Runs, Deposit Insurance, and Liquidity. *Journal of Political Economy*, XCI (1983), 401-419.
- Dooley, Micheal. (1997). A Model of Crisis in Emerging Markets. *The Economic Journal*, 110 (January), 256-272.
- Dooley, Micheal, Folkerts-Landqu, David, & Peter Garber. (2004) The Revived Bretton Woods System: The Effect of Periphery Intervention and Reserve Management on Interest Rates and Exchange Rates in Center Countries. NBER WP/10332
- Eichengreen, Rose and Wyplosz. (1996). Contagious Currency Crisis. NBER WP 5681.
- Eichengreen, B. & Hausman, R. (1999). Exchange Rates and Financial Fragility. Presented at 1999 Jackson Hole conference.

- Fischer, Stanley. Opening Remarks at the IMF/World Bank International Reserves: Policy Issues Forum, Washington DC, April 28, 2001. Retrieved August 2008 from, <http://www.imf.org/external/np/speeches/2001/042801.htm>
- Griffith-Jones, Stephany, & Sharma, Krishnan. (2006). GDP-Linked Bonds: Making it Happen. DESA Working Paper no.21
- IMF. (2000). Debt and Reserve Related Indicators of External Vulnerability. Policy Development and Review Department. March 23, 2000. Retrieved August 2008 from, <http://www.imf.org/external/np/pdr/debtres/>
- IMF. (2000). Exchange rate Regimes in an Increasingly Integrated World Economy. IMF Occasional Paper 193. 2000. Retrieved August 2008 from: <http://www.imf.org/external/np/mfd/er/index.asp>
- IMF. (2006). Exchange Rates and Trade Balance Adjustment in Emerging Markets Economies. Policy Development and Review Department. October 10, 2006. Retrieved August 2008 from, <http://www.imf.org/external/np/pp/eng/2006/101006.pdf>
- Jeanne, Oliver, & Ranciere, Romain. (2006). The Optimal Level of International Reserves For Emerging Market Countries: Formulas and Applications. IMF. Working Paper No. 06/229.
- Johnston, Barry, Darbar, Salim, & Echeverria, Claudia. (1997). Sequencing Capital Account Liberalization: Lessons from the Experience in Chile, Indonesia, Korea and Thailand. November, 1997. IMF WP 97/157
- Krugman, P. (1979). A Model of Balance of Payment Crisis. *Journal of Money Credit and Banking*, Vol 11, No.3. August, pp 311-25.
- Krugman, P. (1998). What Happened to Asia. January. Mimeo.
- Krugman, P. (1999). Balance Sheets, the Transfer Problem and Financial Crisis. In P. Isard, A Razin, and A. Rose, eds., *International Finance and Financial Crisis*, Kluwer.
- Krugman, P. (2000) "Crisis: The Price of Globalization?" In Symposium Sponsored By the Federal Reserve Bank of Kansas City, Global Economic Integration: Opportunities and Challenges, Jackson Hole Wyoming. August 24-6.
- Lane, P and Milesi-Ferretti, G. (2005). Financial Globalization and Exchange Rates. IMF Working Paper, WP/05/3
- Obstfeld, M. (1986). Rational and Self-fulfilling Balance of Payments Crisis. *American Economic Review*, 76(1) Mar, pp. 72-81
- Ocampo. Regional Financial Cooperation: Experiences and Challenges.

- Radelet, Steven and Jeffrey D. Sachs, 1998, *The East Asian Financial Crisis: Diagnosis, Remedies, Prospects*. Brookings Papers on Economic Activity.
- Rodrick, Dani. (2006). *The Social Cost of Foreign Exchange Reserves*. NBER WP/11952
- Rodrik, Dani,. & Velasco, Andres. (1999). *Short-Term Capital Flows*. NBER WP/73/64.
- Sachs, Tornell, and Velasco (1996) *Financial Crisis in Emerging Markets:Lessons from 1995* Brookings Papers on Economic Activity: 1, Brookings Institutions, 147-215;
- Shiller (1995) *Conversation, Information, and Herd Behavior*. *The American Economic Review*, Vol. 85, No. 2, Papers and Proceeding of the Hundredth and Seventh Annual Meeting of the American Economic Association Washington, DC, January 6-8, 1995. pp. 181-185.
- Taylor (1998). *Capital Market Crisis: Liberalization, Fixed Exchange Rates and Market-Driven Destabilization*. *Cambridge Journal of Economics* 1998, 22, 663-676.
- Taylor, Lance. & Eatwell, John. (2000). *Global Finance at Risk*. The New Press.
- Torre, Augusto de la,. & Schmuckler, Sergio. (2004). *Coping With Risks Through Mismatches: Domestic and international Financial Contracts For Emerging Economies*. *International Finance* 7:3, 2004. pp. 349-390.
- Torre, Augusto de la,. Gozzi, Juan Carlos,. & Schmuckler, Sergio. (2007). *Capital Market Development: Whither Latin America*. World Bank Policy Research Working Paper No. 4156.
- Vernengo, Matias. (2006). *Globalization and Endogenous Fiscal Crisis*. Chapter 7, in Means to Prosperity. Routledge.
- Vernengo, Matias. (ed.). (2006) *Monetary Integration and Dollarization*. Eduard Elgar Publishing Limited.
- Vernengo, Matias. (2005). *Fiscal Squeeze and Social Policy During the Cardoso Administration (1995-2002)*. University of Utah, Department of Economics. Working Paper No: 2005-11.
- Schonerwald Da Silva, Carlos E., & Vernengo, Matias. (2007). *Foreign exchange and the Dynamics of Public Debt in Latin America*. Working Paper No. 2007-02.