



6 June 2007

Economics Special Report

The Two Crises of International Macroeconomics

In this essay, we contend that key assumptions in international macroeconomic theory, though useful for understanding the economic relationships among developed countries, have been pushed beyond their competence to include relationships between developed economies and emerging markets. The Achilles heel of this extended development model is the assumption that threats to deprive debtor countries of gains from trade provide incentives for poor countries to repay more than trivial amounts of international debt. Replacing this assumption with the idea that collateral is required to support gross international capital flows of today's magnitudes suggests that the pattern of current account balances seen in recent years is a viable equilibrium.

Economic Research

Research Team

David Folkerts-Landau

Head of Research
(+44) 20 754-55502
david.folkerts-landau@db.com

Peter Garber

Global Strategist
(+1) 212 250-5466
peter.garber@db.com

Michael Dooley

Consultant

Deutsche Bank AG/London

All prices are those current at the end of the previous trading session unless otherwise indicated. Prices are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is sourced from Deutsche Bank and subject companies.

Deutsche Bank does and seeks to do business with companies covered in its research reports. Thus, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report.

Investors should consider this report as only a single factor in making their investment decision.

Independent, third-party research (IR) on certain companies covered by DBSI's research is available to customers of DBSI in the United States at no cost. Customers can access this IR at <http://gm.db.com>, or call 1-877-208-6300 to request that a copy of the IR be sent to them.

DISCLOSURES AND ANALYST CERTIFICATIONS ARE LOCATED IN APPENDIX 1

“Whereas domestic loans are generally supported by substantial collateral, the assets that can be appropriated in the event of a sovereign’s default are generally negligible. For this reason, one must look beyond collateral to find incentives for repayment.”

Bulow and Rogoff (March 1989).

“Sovereign lending is distinguished from domestic lending in three ways...collateral is irrelevant.”

“Assuming that collateral is insignificant, we are really left with two explanations for [sovereign] repayments...”

Bulow and Rogoff (February 1989).

Introduction

The fundamental theory of Open Economy Macroeconomics is under intense pressure from the contradictory results persistently spun out by the actual international macroeconomy. In consequence, two different sorts of crises are percolating in this field. The first is the much discussed crisis of the real economy itself: conventional theory and its influential proponents predict that the glaring US current account imbalances should already have caused a disastrous global breakdown. Moreover, nothing but financial illusion now supports the current global system. The longer this punishment is delayed, the worse it will be. It is this crisis and the policy departures to mitigate it that leaders of the field have relentlessly emphasized in academic papers, the financial press, Congressional testimony, and at numerous conferences.

In this essay, we will dwell mainly on the second crisis: the failure of the dominant academic and official sector theory of Open Economy Macroeconomics to match a conflicting reality.¹ The core of this theory is the intertemporal consumption model, which has been too readily extended as a theory of economic development. The fundamental implication is that capital should flow from rich to poor countries to augment domestic savings, capital formation, and growth in poor countries. Financial liberalization and flexible exchange rates facilitate this beneficial trade.

In the last ten years, the experiment implementing exactly the opposite prescription—net flows from poor to rich, resistance to financial

¹We will stress the crisis in the intellectual underpinnings of macroeconomic development, having already spent much ink on why we think there will not soon be a crisis in the actual macroeconomy. See Dooley, Folkerts-Landau and Garber, (2003a, 2003b, 2004a, 2004b, 2004c, 2004d, 2005a, 2005b, 2005c, and 2005d). Most of these can be found in a collective volume at http://econ.ucsc.edu/~mpd/InternationalFinancialStability_update.pdf. Many of these can be found individually at <http://www.frbsf.org/economics/conferences/0502/index.html>.

liberalization, the fixing of undervalued exchange rates and the consequent subsidization of export industries—has been tried with unambiguous success. The authoritative proponents of the standard model have responded to this success only with intense criticism of the resulting global system, a sequence of failed rationales for its imminent collapse, and efforts to turn industrial country policy against it.

Our own interpretation of net capital movements between emerging and industrial countries is that they themselves can provide a strong incentive for repayment of sovereign debt. Specifically, we have argued that net capital outflows from poor countries provide collateral to support the far larger gross capital flows between economies of different stages of development and creditworthiness that are at the heart of successful development.

As a result, large US current account deficits do not generate ever-rising global risks. To the contrary, the cumulating net *accounting* imbalances exist to preclude the *risk* imbalances that would otherwise cumulate to stifle the gross capital flows. In 2004, we presented evidence that reserves accumulated by China through 2003 were consistent with collateral requirements of private transactions involving swaps of equity for fixed income returns.² Below we present “out of sample” results for China from 2004-2006 and show that the doubling of reserves to over one trillion dollars remains fully consistent with the theory and parameters we proposed in 2004. We also show that reserve accumulation for an aggregate of forty-nine emerging market countries fits the same model for 1991-2006. In short, our approach has predictive power. The intertemporal consumption model most evidently does not.

Advancing an alternative theory for capital flows and the current account is not just a theoretical exercise. The macro experiments that implemented the conventional model’s central prescription on the flow of capital from rich to poor ended in resounding failure. The outflows to Latin America in the 1970s subsequently collapsed into the lost decade of the 1980s. The restarting of flows to the Asian emerging markets and Russia in the 1990s led, in turn, to their remarkable collapses.

When pivotal models fail to correspond to the data for an extended period, it seems prudent to reexamine the assumptions that drive them. It is generally a mistake to measure the usefulness of a theory by the realism of its assumptions. But if it is to have any influence, we do expect such a theory to be rich in unexpected implications and, more importantly, to have serious predictive value for the key issues that it purports to analyze. If it fails in this dimension, it is a magnet for replacement. We propose a unified theory of net and gross capital flows and a useful concept of a “balance of risks” based on the standard risk management arrangements found in

² At <http://www.frbsf.org/economics/conferences/0502/index.html>, see Dooley, Folkerts-Landau, and Garber. (September 2004), “The US Current Account Deficit: Collateral for a Total Return Swap”. Also, see (October, 2005) *International Financial Stability*, Chapters 5 and 9 at http://econ.ucsc.edu/~mpd/InternationalFinancialStability_update.pdf

private financial markets. *Accounting* imbalances, taken alone, are an arbitrary and unworkable metric of risk. We believe that our assumptions about the role of collateral in sovereign debt are far more realistic than those that drive the conventional model.

At the outset, we wish to emphasize the two themes that distance our view from its critics. First, it is not just the current account surpluses but the *official* positions in foreign exchange reserves that are crucial for making the system work, in our view. To create collateral against official sector mischief, it is vital to concentrate net foreign assets in a sovereign silo. Surpluses generated by the private sector cannot serve this purpose. Second, governments have sterilized and, in our opinion, will continue to sterilize reserve purchases for very long periods. The standard assumption is that they cannot do so for long, which is why many have persistently predicted the system's imminent demise. We discuss these ideas in detail in the second part of this essay.

1. The Intertemporal Consumption Model of Open Economy Macro

The point of departure of this theory is the standard model of intertemporal household utility maximization. This model posits two types of households within a single economy: one type is rich but with a slow-growing stream of future real income, the other is poorer but with a fast-growing stream of future real income. By the nature of their preferences over the stream of future consumption, both would be better off by smoothing their streams of real consumption, rather than consuming only their current incomes. Therefore, a credit market naturally arises. The poor household increases its current consumption by borrowing from the rich household now, and reduces its future consumption out of its higher future income as it services its debt. The rich household's consumption path is less smooth than before as it gives up some current consumption but, if the market-clearing interest rate is high enough, it is more than compensated by the increase in its future consumption. Thus, there are mutually beneficial gains from intertemporal trade in goods among households within an economy.

The lesson from this model is as clear-cut as any result can be in economics: poorer households with good prospects should borrow from richer households early in their life cycles. Or, as has become popular lately, **capital should flow downhill.**

Now, instead of households, call these entities countries and you already grasp the fundamental concept of a graduate course in open-economy macroeconomics. You have a model of any country's current account balance: the goods and services that are being lent or borrowed by a country this year to or from other countries, respectively. If both countries are assumed to be large, you also have the basis of a model of the global real interest rate, the price that clears this market.

In this theory, the current account balance—the net flow of real capital—is just a facet of the market for intertemporal trade in goods and services. Its

counterpart and mirror image, the capital account balance, is there passively to support the net intertemporal trade in goods. The details of the capital account are irrelevant to this basic result—they are left for later tidying up by importing and bolting on whole the standard diversification theories from finance.³

Finally, taking in the elegant simplicity of this view, you have the basis for a law of science and even what can be perceived as a moral imperative with an authority as unshakeable as the laws of gravity: net capital should naturally flow from rich, slow-growing countries to the rapidly growing emerging market countries. Or, again, **capital should flow downhill**.

This view reached its apotheosis with the dominance of the Washington Consensus during the crises of the 1990s. Yet, in spite of three decades of strong contradiction by actual outcomes, this theory is still the basis for normative analysis of the international macroeconomy. Given its inability to adjust to this poor performance, it is perhaps too obvious to observe that the open-economy macroeconomic theory well-settled in the textbooks has lacked dynamism for decades.

As a rhetorical holding operation until the world sees the light and reverses the unnatural capital flows, more benign views of the system, including our own approach, have been described as “revisionist”⁴ “misleading,”⁵ “Panglossian,”⁶ “mercantilist”,⁷ “musings”⁸ that fail to see that only “a balance of financial terror”⁹ has allowed the system to “defy gravity”¹⁰. Moreover we may be living in a “Wile E. Coyote moment”¹¹ having run out of fuel in our Acme-China rocket shoes before crashing in a puff of dust into the canyon floor below.¹² Some normally pro-free trade economists are so

³ This view is clearly expressed starting with the opening chapters of Obstfeld and Rogoff’s (1996) Foundations of International Macroeconomics, the dominant text in graduate open-economy macro courses. See also Obstfeld and Rogoff (April 1996).

⁴ Obstfeld and Rogoff (October 2004).

⁵ Eichengreen (May 2004).

⁶ Obstfeld and Rogoff (2005), Roubini (February 2007).

⁷ Aizenman and Lee (2005), Wolf (November 2005), Prasad and Wei (April 2005), Roubini (February 2007), p. 4.

⁸ Truman (February 2005),

<http://www.iie.com/publications/papers/paper.cfm?ResearchID=26>.

⁹ Summers (March 2004), (October 2004). In an earlier and more scientific time, we would have used the less geopolitically charged “mutually beneficial gains from trade”.

¹⁰ IMF (March 2007). Financial Times (April 17, 2007), editorial, Roubini (February 2007). Krugman (May 17, 2006), Rogoff (2007a).

¹¹ Krugman (November 2005). The image is there to denote bubble and illusion—when Wile E. Coyote runs off a cliff, he remains suspended in mid-air until the moment he realizes it and then he falls. This image has echoed through the more excitable financial press. See e.g. Financial Times (April 17, 2007), editorial.

¹² For those unfamiliar with the lexicon of academic economics, these are very naughty and judgmental words. We apologize if we have omitted some references that were too strong for general audiences.

committed to ending the current global system that as a tactic they are providing red meat to protectionists through their macro arguments.¹³

2. Collateral and the Sovereign Debt Default Problem

In important respects, our approach to understanding the current global monetary system is an extension of the existing literature on sovereign debt. That literature was originally written in response to the 1980s defaults; and, embarrassingly, through most of its pages it showed that a developing country had little reason to pay its international debts. Nevertheless, at the end of these disheartening derivations a *deus ex machina* of assuming a large enough cost to not paying was imposed to get the more conventional result that such countries face credit ceilings but, within these constraints, would repay and therefore should be net borrowers from rich countries. This sort of model was left beached in the center of the graduate open-economy macro textbook.¹⁴ However, the long history of sovereign defaults might militate for its being the lead chapter, from which we might better absorb its lessons as the basic principles that drive international finance on the massive scale we see today.

The sovereign debt literature starts by observing that the inability to enforce debt contracts across sovereign borders may frustrate any attempt to apply an intertemporal optimizing model to financial relationships among countries. The problem is to identify some credible threat to a sovereign debtor that ensures repayment and, in turn, ensures that intertemporal trades are feasible across borders. For example, the threat to withhold gains from intertemporal trade by enforcing a lending embargo or even blocking balanced gross trade via trade retaliation are unilateral threats a country could make to induce foreign debtors to repay.¹⁵

These hypothetical enforcement mechanisms are attractive because they preserve most of the important qualitative results of the standard intertemporal consumption smoothing model.¹⁶ The volume of net flows may be subject to credit ceilings, and crises may result when credit ceilings bind, but within these constraints the standard results still hold. Most importantly, capital will still flow from rich to poor countries.

As logical propositions to make the intertemporal model workable for economic development, we have no quarrel with assuming such threats. The major problem with these proposed enforcement mechanisms is that

¹³ See Bergsten (January 31, 2007), (May 9, 2007). Goldstein (September 23, 2005), (March 28, 2007).

¹⁴ We have in mind Obstfeld and Rogoff's (1996) graduate textbook. Chapters that precede Chapter 6, which concentrates on sovereign default, develop the intertemporal consumption view as the central theory of the current account, providing the main principles for thinking about the problem, and with expansive implications of lending from rich to poor countries.

¹⁵ The modern classic is Eaton and Gersovitz (1981).

¹⁶ This point is emphasized in Obstfeld and Rogoff's (1996) article for the [Handbook of International Economics](#).

they rarely have been observed in practice. We suspect that such threats are not credible because they hurt the creditor as much as the debtor.¹⁷ But for now, it suffices to point out that there is, as far as we know, very little empirical support for the conjecture that such enforcement mechanisms have been effective in providing incentives for countries to repay their debts.

Collateral provides a well-proven alternative enforcement mechanism. It is perhaps surprising that collateral has not been taken seriously in an international macro context given that it plays a central role in domestic financial systems, including credit to households. We will return below to our view of the empirical content of collateral in the international system. For now, we emphasize the crucial difference between a model driven by a collateral enforcement mechanism, as compared to the models driven by the loss of gains from trade.

First, gains from trade have a present value related to the future value of trade but are not intimately associated with past or future net capital flows. In contrast, as we will define it, collateral can be accumulated only through net capital outflows from the poor country.

Second, gains from trade are symmetric for the rich and poor country, and this makes them an unpromising and non-credible enforcement mechanism.¹⁸ But the need for collateral is not symmetric between rich and poor countries. The essence of collateral is to balance asymmetric risks associated with two-way gross capital flows that are balanced in a book accounting sense. If gross capital flows improve the efficiency of allocating a poor country's savings to its own internal investment, the poor country has a strong incentive to encourage such flows, offsetting the associated asymmetric risks by accumulating collateral through net exports of domestic savings. **The delivery of collateral to offset a risk imbalance automatically creates a book accounting imbalance of gross flows.**

Given current levels of saving in key emerging economies, any net capital that might flow from rich to poor countries would be trifling in its impact on development in comparison to the gross flows and the management and technology that accompany them. Our view embraces as a starting point the lack of financial trust between countries of greatly differing stages of development whose *neglect* is itself the point of departure of the intertemporal consumption model's failure as a theory of development today, as indicated by the opening quotations of this essay.

¹⁷ For example the idea that banks in some offshore center will refuse to accept deposits from sovereigns in order to deny them the option of self insurance following default, seems to us an even less credible threat. "This strategy may be especially relevant after default and can preclude the borrower's ever being lent any positive amount." Eaton and Gersovitz (1981) p.294.

¹⁸ For a small country, they might be imposed anyway to keep the others in line. But this would not be the case for a large debtor country.

It is the active role of gross capital flows in generating growth that we emphasize, not their secondary insurance role in tidying up portfolio risk/return via diversification. The key assumption in our framework is that much of the savings intermediated by domestic financial markets in poor countries is not transformed into productive capital. Intermediation in these markets is equivalent to transfers from savers to preferred beneficiaries including, of course, the government. Gross international capital flows replace domestic financial markets with an efficient alternative. In the conventional model, the role of gross flows is an afterthought, a top-up to the welfare level already established by the intertemporal trade in goods. In our view, intertemporal trade in goods is directly a minor, not the major, aspect of the overall international finance of development.¹⁹ Net trade in goods is not an afterthought—but its welfare-enhancing role lies mainly in its ability to “flow uphill” and unleash gross flows. Thus, we present a unified theory of net and gross flows in a development model.

Collateral Trumps the Conventional Model

Chapter 1 of the conventional model invokes as a basic macroeconomic paradigm the borrowing behavior of a household within a given economy. But it ignores all the institutions of enforcement of financial contracts that actually allow households to borrow. Of course, a household without wealth and collateral can borrow limited amounts of revolving credit card debt with extremely high spreads. In that market, capital flows downhill from rich to poor. But defaults are common; and we do not hear many stories of households escaping poverty by using credit cards. Moving up the credit food-chain, a household that wants to borrow to buy a house first needs to accumulate a down payment—i.e. there is a stage in which a relatively poor household with growing income prospects must be a lender to the system before it can be a borrower. Even then its asset, the house, including the down payment, serves as strongly enforceable collateral against the loan. In domestic financial markets, the aggregate stock of collateral is large relative to the flow of credit. It follows that most debt contracts can and are collateralized and that the supply of collateral is seldom an aggregate constraint on the flow of credit.

In international financial markets, collateral is harder to find. The ideal collateral would be an asset owned by the debtor that could be seized by the creditor. In practical terms, this means that the asset must be in a creditor country and that the courts of the creditor country can and will enforce the terms of the contract.

Internationally usable collateral has several characteristics. First, it cannot itself be borrowed by a sovereign that wants credit. Borrowed international reserves held by a net debtor government cannot themselves support gross capital flows because they will evaporate instantly during a crisis, and losing

¹⁹ For an estimate of the potential quantitative impact of two way trade in financial assets for economic growth see Obstfeld (1994).

them imposes no net penalty on a defaulting country. Second, it must be the asset of a government or quasi-government organization because this is the only class of assets the US has seized or frozen. Third, it must be held in the US, preferably in the form of registered US Treasury securities. The reason for focusing on the US here is that the US actually seizes foreign sovereign assets, even in geopolitically threatening circumstances.²⁰ On the modern history of these seizures, see the Appendix.

This third point has generated a great deal of confusion. Our view is that a substantial part of the US current account deficit supports an accumulation of collateral to cover the sovereign risks surrounding the FDI flowing into e.g. China. Several observers have argued that this does not fit the facts because direct investments in China, for example, are primarily from non-US investors in China.²¹ Why, they argue, would a Japanese investor benefit from collateral held by China in the United States? If collateral is important, shouldn't the collateral assets be held in Japan? For the macro, geopolitical expropriation events that we think are being covered by such collateral, we cannot imagine the government of Japan seizing Chinese government assets held in Japan. Certainly, the US has a much longer and wider track record for seizing foreign government assets in the right geopolitical conditions.

It follows that Chinese reserves held in Japan would have little value as collateral. Indeed, it seems clear that the dollar is the dominant reserve currency because US-jurisdiction, not just US dollar, assets provide reliable collateral services to foreign governments. That is, the collateral servicer, in this case the US government, will much more credibly seize and redistribute collateral than any other sovereign under various geopolitical and internal political disturbances.

In a series of papers, Caballero and Krishnamurthy (2000), Caballero (2006), and Caballero et al. (2007) have explored the implications of *private* collateral for international transactions. In particular, they show that differences in countries' ability to produce assets that can be used as private collateral can generate the pattern of low real interest rates and lasting current account imbalances observed in recent years. From the start, our work has also emphasized the need to explain both persistent and large US current account deficits *and* the ability of the US to borrow at very low real interest rates. Moreover, we think that they are on the right track in the sense that low real yields on dollar assets are consistent with collateral services generated by US financial assets. But our approach is based on the idea that collateral services offered by US assets are attractive to emerging market governments rather than private residents of emerging markets.

²⁰ Any other country that would do these things could also serve as a depository and servicer of collateral.

²¹ Prasad and Wei (2005). Eichengreen (November 2005).

It is not clear to us what the empirical counterpart of their collateral concept would be. They mention export proceeds that could be seized by residents of creditor countries. But we think this concept is quite limiting since it would include only receivables on goods already delivered to the creditor country. In fact, oil delivered and stored in the US has been used to collateralize international loans. However, we do not think this idea can be pushed to include receivables from future exports. Clearly, the debtor could at some cost divert exports to another destination or keep the goods at home. In fact, this sort of collateral seems equivalent to the loss in future gains from trade that is already the dubious penalty at the center of the sovereign debt literature.

Our view is that it is important to consider a country's international collateral as a public good for its residents. Nevertheless, we entirely agree with the lessons from these papers on the centrality of some concept of collateral for understanding the current international monetary system.

It makes more sense to us to look backward for collateral rather than forward. Can *past* exports be pledged as collateral? This seems like an unfruitful source, because those goods already belong to someone else in the creditor country. Nevertheless, past exports can be mobilized as collateral.

If there have been net exports of goods to the more advanced country, someone in the emerging country owns an international asset, which may be vulnerable to courts in the creditor country. However, there are many problems with private collateral. To cover against a default initiated by its government, each private nonresident borrower from the emerging country would have to keep assets in the US equal in value to that nonresident's gross liability and with a proviso that it could be taken in such a default. In this regard, domestic credit markets must look much better to residents of poor countries to finance their local investments because their stock of domestic collateral can be used to reduce local borrowing costs.

This naturally suggests the potential for the government of a poor country to provide a stock of socially useful offshore collateral for its private residents especially if the government itself might be the expected source of a macro credit event. Several institutional arrangements must be in place for such a stock actually to be practical as collateral. First, some well-defined event would have to trigger the implicit collateral agreement. In this regard, the event would not be the default of an individual private debtor. US law is quite clear that a default by an individual nonresident does not give the US court the power to seize the assets of a third-party nonresident, including the nonresident government.

However, if the nonresident government seized US or other countries' assets in that country—e.g. US direct investment—for geopolitical or populist reasons, the US government could block or seize the foreign government's assets in the US. There is no question that the US

government has the legal authority to do so, and, as set out in the Appendix, has done so many times in the past.

Why would a poor country government put its assets in harm's way if it planned to seize foreign investments? It would not and that is the point. The reason poor countries hold enormous amounts of US assets in their reserves is that they provide collateral services. The poor country government could move its assets out of the US, but that would trigger a liquidation of the collateralized contracts and an end to the acquisition of new ones. In the case of China, this would mean the termination of its export-oriented development strategy.

Is it necessary that any individual private investor expects to get some of the seized or blocked collateral from the US government? No. Some readers might want to think of the poor government's assets in the US as hostages. The effect on the creditor government's incentive to default on FDI investors is not dependent on whether the US government passes through seized assets, although it has done so in the past to claimants against the defaulting government. The FDI investor is not directly protected but benefits from the reduction in the range of events that might trigger default. Blocking access to hostages may not benefit private actors, but it is still an incentive to behave.

Does it matter that most investors are not US residents? Again, no. They have only to assume that the US will react to a default by the poor country government. It is clear that this is not very good collateral when compared to the collateral arrangements in a domestic context. But this means that a poor country will need even more of it than does the industrial country private sector to support two-way gross trade in financial assets. In the end, we ask a simple question:

Are international investors more confident of their property rights in (1) a country with a government with a large external debt or (2) a similar country with a government that is a net creditor to the rest of the world? If your intuition is that (2) is the right answer, you should at least be interested in the implications of a collateral-based system. To put it starkly: China is a communist country with the possibility of serious internal political shifts and a potential for future geopolitical problems with the industrial countries that all would prefer to avoid. Yet, industrial country private investors readily put large amounts of FDI into China. They get high current income and capital gains from privileged access to cheap labor and the subsidized nature of the system.

But why are they confident that they will be repaid? Because, in aggregate, the capital is actually in the industrial countries, not in China at all, and mostly in the US—they are getting a high return on capital that is immunized

against geopolitical or massive internal political disturbances.²² In speaking with clients, we have heard that no one has really explicitly done their investment calculations on the basis of this implicit collateral—but they are confident in the security of their investments anyway. We take such confidence as a reduced form of the collateral that gives backing to the continuation of the entire system.

Gross Trade in Assets: Why Is It Beneficial? Why Is the Risk Asymmetric?

Moving financial intermediation into international financial markets may be the most important prerequisite for economic development. The normal pattern is for domestic savings in poor countries to stay at home and to be allocated by private and government intermediaries to domestic capital formation. These markets often waste a large fraction of the savings they intermediate in that the resulting capital stock is of little use in producing competitive goods and services. So in an end run around financial repression, moving ten percent of domestic savings offshore to be intermediated by foreign intermediaries and re-exported back to the developing economy through FDI could result in a far greater than ten percent increase in *effective* domestic capital formation.

But this accounting balance of trade in assets creates an imbalance of risks for residents of the rich and poor countries. The rich country is not likely to seize foreigners' assets on a populist whim. In fact, it probably got rich by respecting property rights. Governments of the poor countries often will be tempted to exercise their sovereign power to expropriate foreign investment for populist or geopolitical reasons. In the numerical example we set out below, part of this incentive simply reflects the much higher productivity of foreign investment in the poor country and its consequent large capital gains.

Since a well-intentioned poor country government cannot be readily distinguished from a populist expropriator or prevent the future emergence of one, this creates a distortion that blocks the path to large gross capital inflows and rapid development. The system has to overcome this distortion before residents of poor countries can benefit from fully efficient international financial intermediation.

²² In a recent paper, Prasad, Rajan, and Subramaniam (April 2007) have shown that developing countries that export net capital have a better growth performance than those that import capital. They dismiss our view that this may have something to do with the benefits of collateral with this same facile argument. They ask "Why, for example, would Korea or Taiwan find comfort when they make direct investments in China if China holds enormous amounts of U.S. government securities?", p. 30. Our answer is that these hostages are a public good just as would be, for example, a military umbrella.

Reserve Accumulation and Collateral

In this section, we update and extend calculations that suggest that emerging market reserves are collateral for gross equity liabilities to nonresidents. We reproduce and extend data published in our 2004c paper; and we show that the near doubling of Chinese reserves from 2003 to 2006 is consistent with this collateral interpretation. This is an out of sample test because we use the same methodology and parameters as in our earlier paper. Moreover, we show that data for forty-nine emerging markets are consistent with the same methodology and parameters.

It is useful to compare the implicit contract between the center and the periphery to a standard derivative contract: a total return swap. A total return swap is a promise by one party to pay the total return (capital gains plus dividends) on the notional amount of an asset such as an equity or equity index for some future interval in exchange for receipt of fixed income on notional principle over the same interval. The interesting aspect of such contracts for our argument is that the less creditworthy party to the contract is required to post collateral for actual and potential mark to market losses. Failure to provide the collateral terminates the contract, effectively a cancellation of principal on both sides and a taking of collateral to cover at least the current market value.

The application of this contractual arrangement to the international monetary system is straightforward. The emerging country receiving equity investment promises to pay the total return on the equity investment. Since there is a net capital outflow from the emerging country, the equity inflows are more than financed by a claim against the balance sheet of the rest of the world. In the simplest case, these claims take the form of fixed income liabilities of the rest of the world. This produces exactly the basic structure of a total return swap on equity.

The “original sin” of the emerging country is that it is born being a credit risk and that the expected present value of the swap will have to be matched by collateral, as well as some additional coverage for future valuation risk. But how much collateral is needed, and what form does it take?

In typical private sector total return swaps, collateral is determined by multiplying potential volatility of the underlying asset over the next ten days by a factor dependent on the credit risk of the counterparty. For a total return swap on a highly liquid US equity, a hedge fund (less creditworthy) would be asked for 15%, for the S+P index 10% collateral would be required; for swaps involving China equities 50% initial margin would be required.

But this is only the initial collateral required for new investment. If, as seems likely, the total return on direct investment exceeds the return on the fixed interest leg, one hundred percent of the mark to market gain on private contracts must be collateralized every day. The implication is that, in addition to the collateral required for the new flow of direct investment, the

mark to market gain on the stock of direct investment requires additional variation margin.

The mechanical but important implication is that a successful development strategy—where investment pays off with large returns—generates capital gains on direct investment and therefore rapid growth of collateral balances.

We can get a feel for the economic importance of these effects by estimating what collateral would be required by private investors for direct investment in China and other emerging markets. The first row of Table 1 shows annual data for the cumulated flow of foreign equity investment into China from 1991 through 2006. Row 2 shows the mark to market value of cumulated FDI assuming a 10% capital gain on the previous year's stock of investment. Row 3 shows the new initial collateral that would be required for the flow of direct investment in each year assuming that the aggregate implicit contract carries the 50% collateral required for private total return swaps with China. Row 4 shows the new variation margin required each year for the net capital gain on the stock of equity investment. This assumes that there is 100% collateral required against mark to market gains.²³ The implied cumulated stock of collateral is shown in Row 5. In 2006 the stock of collateral would be about \$912 billion, an amount larger than the book value of direct investment because of capital gains.

²³ In our (2004c) paper, we did not include "gains on gains" in this calculation. This error is corrected here.

Table 1: China – Collateral and Reserves

	\$ Billion															
	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>
FDI																
Cumulated Book	4	11	36	70	104	144	192	233	271	315	354	403	457	521	610	703
FDI - Mark to Market	4	12	37	75	117	169	233	298	365	446	529	631	749	888	1065	1265
50% Initial Margin	2	4	12	17	17	20	24	21	19	22	19	25	27	32	44	47
100% Variation Margin	0	0	1	4	8	12	17	23	30	37	45	53	63	75	89	106
Collateral--Total Stock	2	6	19	40	65	97	137	181	230	289	352	430	520	627	760	913
Reserve Stock	22	21	22	53	75	107	143	149	158	168	216	291	408	615	822	1069

Table 2: All Emerging Markets – Collateral and Reserves

	\$ Billion															
	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>
FDI																
Cumulated Book	19	47	93	190	290	399	528	679	819	995	1166	1329	1458	1613	1813	2083
FDI - Mark to Market	19	49	100	207	327	469	646	860	1086	1371	1680	2011	2341	2729	3202	3793
50% Collateral Initial Margin	10	14	23	49	50	55	65	75	70	88	86	82	65	77	100	135
100% Variation Margin	0	2	5	10	21	33	47	65	86	109	137	168	201	234	273	320
Collateral--Total Stock	10	25	53	112	182	269	381	521	677	874	1096	1346	1611	1922	2296	2751
Reserve Stock	183	231	297	354	461	553	594	640	692	765	852	1033	1363	1804	2224	2811

Source: IIF, Deutsche Bank

Discrepancies due to rounding

Chart 1 China: Collateral and Reserves

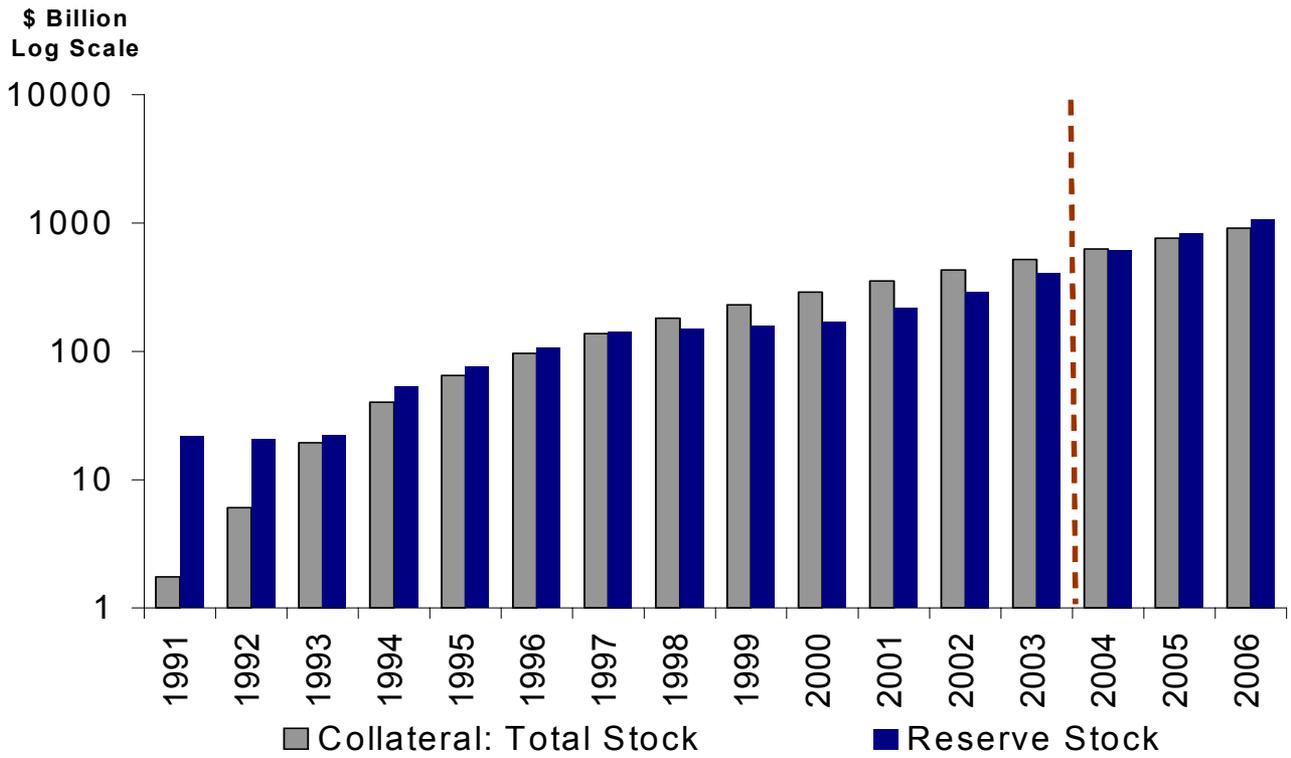
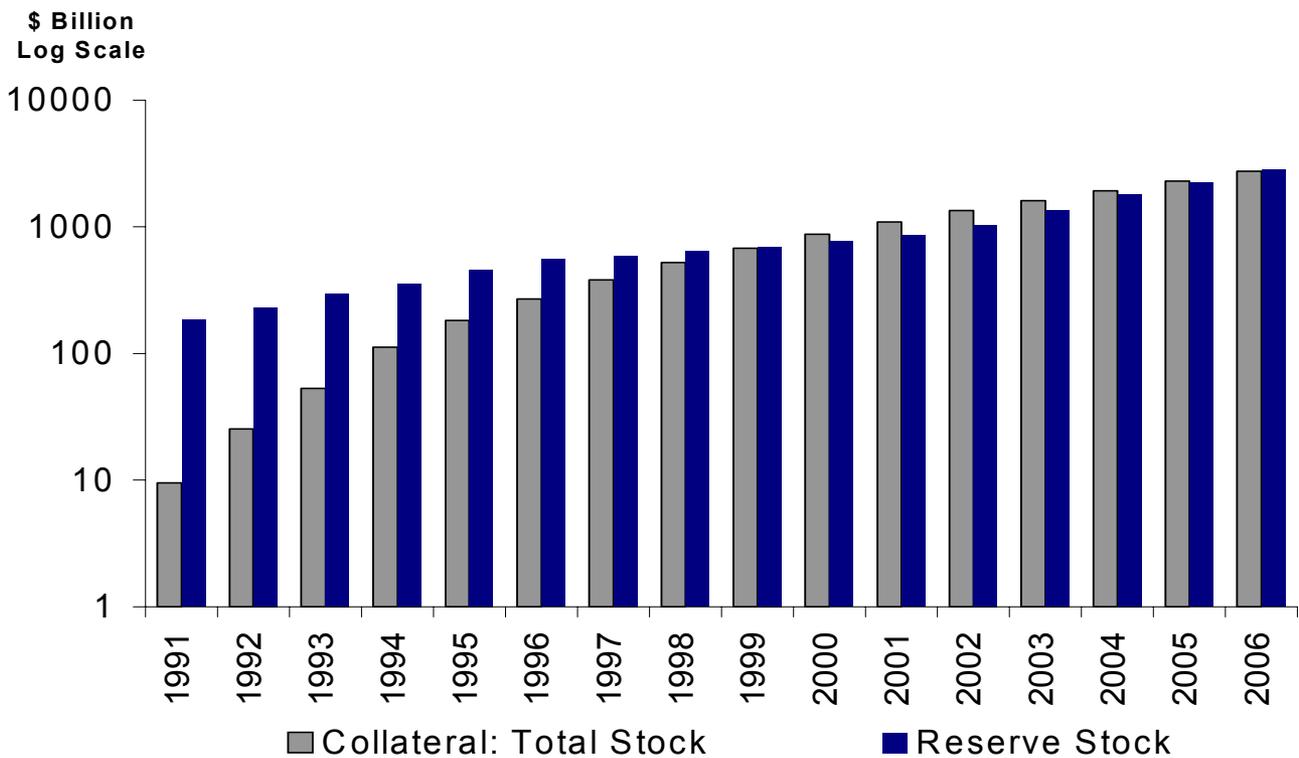


Chart 2 All Emerging Markets: Collateral and Reserves



Source: IIF, Deutsche Bank

The stock of international reserves is shown in Row 6. In 2006, the stock was about \$1,069 billion, clearly the right order of magnitude if we interpret the government's reserve assets as the primary measure of collateral.²⁴

Table 2 shows the same calculations for forty-nine emerging markets contained in the IIF's data base. The striking result is that once again there is a close correspondence between the level and growth of reserve accumulations for this diverse set of emerging markets and the collateral requirements for their inflows of gross foreign equity investments.

In Charts 1 and 2, we have plotted the last two rows of Tables 1 and 2, respectively. These bar charts show the levels of the stocks of foreign exchange reserves and our calculations of required stocks of collateral against FDI in China and in an aggregate of 49 emerging markets. We have put these on a logarithmic scale so that the eye is not distracted by the explosive growth in the last few years. It is evident from the charts that in China, collateral requirements have been consistent with the accumulation of reserves since 1993. The vertical dashed line in Chart 1 indicates that the newly added, out-of-sample years 2004-2006 are tightly consistent with the collateral view. Similarly, Chart 2 indicates that for the aggregate of emerging markets collateral requirements have been consistent with the level of reserve holdings since 1998.

The nature of the social collateral is so obvious it is hard to see. If the center cannot seize goods or assets *after* a default, it has to import the goods and services *before* the default and create a net liability. If the periphery then defaults on its half of the implicit contract, the center can simply default on its gross liability and keep the collateral. *The periphery's current account surplus provides the collateral to support the financial intermediation that is at the heart of development strategies.* The interest paid on the net position is nothing more than the usual risk-free interest paid on collateral.

3. Bretton Woods II Goes on and on and...

The core predictions of the Bretton Woods II interpretation of the international monetary system remain intact. The large US current account deficit has been and is generally expected to be financed by dollar bloc emerging market countries at low real interest rates for many years more, as indicated by low market long-term real interest rates. Low rates in the US and other industrial countries support asset prices that look high by historical standards at this stage of the business cycle but are fully consistent with the unusual combination of low market discount rates in a period of rapid growth, high profit, and low inflation. In this environment, credit risks are low on older projects, and credit spreads reflect this fact.²⁵

²⁴See Dooley (2000) for a discussion of alternative measures of collateral against investments in emerging markets and the role of collateral in financial crises.

²⁵At a given high real interest rate, the marginal projects on the marginal efficiency of investment curve are risky by their nature. If the long term interest rate suddenly drops, they

Indeed, the academic literature and financial press are now littered with discarded, once-authoritative opinions on how the system would soon end from its own weight. For many years, however, proponents of the conventional textbook theory have steadfastly maintained their adherence to the model. Early on, they claimed that the system would adjust naturally over the middle term with a large USD depreciation.²⁶ When this failed to happen, they produced long lists of reasons of why it might collapse at any moment: savings exporting economies would overheat, official sectors in either savings exporting or importing countries would react to the negative effect on their economies, private speculators would run the system, or protectionism or geopolitics would bring it to an end.

The idea that the system we describe is inherently unstable is logically flawed, in our view, and in any case has not been supported by the last seven years' events. Central banks have not reduced the rate at which they have accumulated reserves, and they have not diversified out of dollars.

In this section, we will briefly summarize this list of once-looming catastrophes or rationales and comment on them. In most cases, our comments will be brief, and we will provide references to publications where we have discussed these issues in more detail. In a few cases, we will provide a more extensive critique.

Precautionary Reserves from the Asia Crisis

The initial rationale for the net export of savings was that Asian countries were building excessively precautionary war chests of foreign exchange reserves in response to the Asia crisis of 1997. Once they realized that they had accumulated more than enough they would stop, thereby eliminating the unnatural imbalances and reversing the low interest rates. As central banks have maintained and even accelerated their reserve accumulation in recent years, this story has faded but remains a focus of research.²⁷

U.S. Profligacy

This argument expressed the view that the US current account imbalances were driven by excessive US demands for foreign capital because of both

become infra-marginal; and an entire new range of projects that previously looked like losers become profitable and even low risk. Spreads on previously undertaken projects would then narrow. Eventually, the infra-marginal projects would be exhausted, and a new crop of marginal risky projects would be undertaken at the low interest rate. The return of risk would be reflected in a return to wider credit spreads for these cumulating marginal projects. Of course, well-performing older projects can always be made financially riskier at lower rates by leveraging them up through buyouts.

²⁶ We are now in the eighth year since Obstfeld and Rogoff (March 2000) proclaimed the unsustainability of the US current account deficit, an economic epoch by anyone's reckoning. Although they updated and repeated the warning in Obstfeld and Rogoff (November 2004) and took it to the more excitable financial press (October 2004), there is still no end in sight.

²⁷ See Durdu et al (2007).

declining private savings and the shift of the fiscal balance from a small surplus to a deficit.²⁸ Thus, it only required a shift in US fiscal policy to bring about the adjustment. If this were true, the result should have been a jump up in US and world interest rates, not the dramatic jump down that has persisted. So it is not a giant leap to conclude that, quite to the contrary, we have observed predominantly a net savings supply phenomenon. Also, the US fiscal deficit was little different from those of the major EU countries and much better than Japan's in the face of a much better nominal and real growth performance over the past five years. Finally, as the US fiscal deficit fell significantly, the current account deficit widened. We do not hear this story so stridently pushed any more, but US fiscal policy tightening is still on the table as part of the global adjustment.

China Will Overheat

This argument was first test-marketed in 2003 when China's inflation was moving up from -0.8% in 2002 to above 3% by 2004.²⁹ The argument is the standard one that sterilization of large foreign exchange intervention is imperfect and will eventually fail, leading to rapid inflation. This would then force the end of the policy. This has not happened in the four years since it was broached. Clearly, there are pressures on the economy, but they are channeled by all the old centralized allocation tricks: capital controls, controls on the allocation of credit, reserve requirements, and regulation. With the most recent growth rate at 11% and the rate of foreign exchange purchases growing, warnings of overheating have appeared again in an attempt at a sequel. It seems that there is a four-year cycle on this song-book classic.³⁰

Since Japan has different motivations from China, the system will end when Japan stops intervening.

This argument arose in 2003 and early 2004 when Japan intervened in the foreign exchange markets in record amounts in order to pull itself out of its recession and deflation. But when the MoF did cease intervening after Q1 2004, the zero interest rate policy continued, and the private sector picked up the ball and continued exporting capital at a rate of 3.7% of GDP. Effectively, the intervention had put a floor on the yen, which made for a lower-risk carry trade. Again, the forecast demise of the system has proven premature.

²⁸ For a recent version, see Rogoff (February 2007). Also, Summers (January 31, 2007). Frankel (December 2006) summarizes this view.

²⁹ Goldstein and Lardy (August 26, 2003), (November 2004) discussed this in terms of the distortions in the financial system, difficulty in sterilization, and the inevitable boom, hard landing cycle that the undervaluation of the exchange rate was causing. Greenspan (June 2005) also made the argument in Congressional testimony, although not as urgently.

³⁰ Roubini (2007) is the most recent version of this argument.

Too Much Mark-to-Market Risk from Excessive Reserves

The inevitable appreciation of the Asian currencies will impose large domestic currency losses on central banks and finance ministries. Therefore, they will stop intervening soon rather than face this cumulating political and economic disaster. For some countries, e.g. Korea, the losses from allowing appreciation created political problems and forced a cessation in intervention, but not permanently, as it was realized that Korea was becoming less competitive. China, on the other hand, accelerated its reserve accumulation. In Japan, with the yen around 120, no losses have been realized on its 2003-4 interventions; and the official sector itself has booked gains from the carry trade. Most Western macroeconomists with a voice have warned China of this problem. But this has not moved China and it seems clear to us that there are motives for the Chinese government that are more important than optimization of the value of reserves.

China's Exchange Regime Change Is the Beginning of the End

This shift from a hard fix to a crawling peg in July 2005 was regarded as the start of the inevitable break-up of the system. Since the initial 2.1% nominal appreciation, the renminbi has appreciated 5.8% more vs. the dollar, but the real trade weighted exchange rate has depreciated, and China has dramatically stepped up its foreign exchange interventions.

The Global Private Sector Will Run on the Central Banks that Support the System

Recognizing the high likelihood of appreciation, the private sector was expected to launch buying-in attacks on the central banks that were keeping their currencies weak via intervention.³¹ The pressure put on the central banks to sterilize and avoid overheating would be unbearable and the system would break. Evidently, the controls have been sufficient to prevent this or the central banks have been willing to maintain the system even at this additional cost.

Reserve Diversification

Eichengreen (May 2004) circulated an historical and game theoretic view of the pressure for reserve diversification among surplus countries. Since the dollar would inevitably depreciate, and soon according to the conventional view, the system was extremely fragile and would be pulled down by a first-out-the-door run by central banks themselves from the dollar to the euro or even the yen. The financial press picked up this view and for a while a fashionable debating style at academic conferences was to wave fistsful of headlines announcing the imminent end of the era.³² This actually was a self-

³¹ See Obstfeld (February 2005).

³² See Eichengreen (December 2004). In our view, the current system does not suffer from the same source of instability as the original Bretton Woods System. In that system the US was obliged to exchange gold for dollars at a fixed price, a commitment that did lead to

reinforcing activity—the financial press generally was quoting the opinions of those who waved the headlines.

All this talk of an impending dollar collapse reached a crescendo at the end of 2004 with the euro at \$1.36. Two and a half years later, the central banks in general have still not significantly diversified, and collectively have accelerated their acquisition of reserves. The euro is again around \$1.36 because of the asynchronous business cycles, having fluctuated mostly between \$1.20 and \$1.28 in the previous two years. The yen has since depreciated by around 15% against the USD. Asian currencies, in particular the renmimbi, have appreciated in nominal terms amidst record foreign exchange interventions, again mainly in USD. But except for the won, the real exchange rates have moved very little.

The reserve diversification argument has frequently been played side-by-side with the mark-to-market loss argument above. But if currencies like the renmimbi actually do begin to appreciate dramatically, they will also likely appreciate strongly against currencies like the euro as well.³³ To us, the diversification fixation has the look of a marginal, if not a losing, game.³⁴

The High Price of Oil Will Break the System

Another popular claim among the proponents of the standard model is that the rise in the price of oil has masked the collapse of the Bretton Woods II regime because Asia is no longer the principal financial prop of the system. It is clear that a significant part of the US current account deficit in 2005 and 2006 was to pay for more expensive oil. It is also clear that the oil exporters accounted for more reserve accumulation than the other emerging markets in 2006. Our conclusion, identical to that of everyone else, is that the US and all the other oil importers must have financed part of their current account deficit from investments by oil-exporting countries.

But this does not help to answer the question of what happens when oil prices stabilize. We think that nothing would happen to the Bretton Woods II system. We agree that OPEC countries will eventually start consuming up to their new wealth levels. When this occurs we expect that the US will have a smaller current account deficit, interest rates will be higher, and OPEC investments in dollar assets will also subside.³⁵ We view as a non-sequitur the claim that this would of itself break the systemic relationship between the US and other emerging markets.

inherent instability. In the current system the alternative reserve asset, the euro, is not fixed artificially to the dollar.

³³ On this point, see our analysis of the dynamics of the system, “Living with Bretton Woods II”, Chapter 4 in our (2005d).

³⁴ Nevertheless, in a sort of latter day SETI project, it has set off a “reserve composition watch” industry.

³⁵ Again, see our “Living with Bretton Woods II” for our analysis of this issue.

*Using the Savings-Investment **Identity** to Make **Behavioral** Inferences*

An important argument that has been used to support the conventional model is based on the savings-investment identity. A country's current account imbalance is identically equal to the difference between domestic investment and domestic savings. The world's current account is identically zero. It follows that it must be possible to explain any change in the pattern of current accounts by changes in saving and investment in each region.³⁶

In the past few years, the dominant change has been a fall in the Investment/GDP ratio in emerging markets and a fall in the savings rate in the United States. This certainly works in that an *ex ante* shift in the investment rate in emerging markets *could* be offset by an *independent* fall in savings in the United States. Moreover, income would not be affected in either region.³⁷

There are three flies in the ointment. First, it would be remarkably lucky for these events to occur independently. Given a fall in *ex ante* investment in emerging markets, economists in general would have expected a fall in income in these countries and a fall in *ex post* savings to balance things out. We would not have forecast a rise in net exports sufficient to offset the fall in investment at unchanged levels of output. But if there was a simultaneous and exogenous fall in US savings, and if this increased absorption fell entirely on EM exports, we could get the observed current account pattern at unchanged exchange rates. Thus, observers point to the fiscal deficit in the US and a bubble driven fall in household savings as an exogenous cause of the US current account deficit.³⁸ But notice that world savings and investment have not changed in this story, so the world interest rate should also remain unchanged.

To explain the fall in real interest rates, we need another story. There are two equally unconvincing versions. First, there could have been a world glut of savings independent of this redistribution of savings. That is a nice story, and has had the weight of the Fed behind it, but is simply inconsistent with the data.³⁹ The world savings ratio has not changed, so we have to look elsewhere.

What to do? When you run out of variables, invent a new one and call it "liquidity." Interest rates are low, it is argued, because the system is awash in liquidity. Embarrassingly, this is an argument frequently invoked these days by market professionals.

But what is it? Perhaps central banks create liquidity. It is true that central banks set the short-term interest rates, but it doesn't help much to say "liquidity" means low overnight interest rates, and this accounts for low

³⁶ Rajan (2005)

³⁷ See Rajan (2005)

³⁸ Rogoff (February 2007).

³⁹ Bernanke (March 2005).

interest rates. This is more transparently circular than most arguments that we hear from market commentators. Is liquidity a stock like money? Central banks are not creating much money. And anyway, we used to look for inflation as the sure symptom of too much liquidity. But excessive inflation is exactly the phenomenon that we do not observe.⁴⁰ Maybe liquidity means low risk premia and the narrow spreads we observe for what we might in the past have considered hare-brained projects. But again, we already have a variable called risk premia.

Shifting Tastes for Assets Fail as a Prop for the Conventional View

Some serious theoretical efforts have been made to adapt the standard model to make it consistent with recent evidence.⁴¹ The core predictions of the conventional model can be softened if we add to it an assumption that private preferences for US assets have changed. Private gross capital inflows to the US have been very large in spite of low real yields and rising perceived risks; and this seems to suggest that there has been a shift in private preferences toward US assets. As argued above, Caballero et al. (2007) propose private collateral as the reason for the shift toward US assets. Cooper (2004) has argued that innovations and rapid growth in US financial markets are behind the shift. Blanchard et al. (2005) do not provide a reason for the shift but analyze the consequences of such a shift if assets are not perfect substitutes in private portfolios.

Our approach does not depend on a shift in *private* preferences toward dollar or US assets. It depends on the distortion of private capital flows by observed and expected government intervention to manage the exchange rate. Moreover, we provide a compelling reason for governments to shift their portfolios toward dollar and US assets. Observed private purchases of US assets are generated by the free implicit put offered by emerging market governments to their own and the rest of the world's residents. It makes sense for private investors to hold dollar assets if emerging market governments maintain low interest rates in the home market through financial repression and strictly limit the appreciation of the exchange rate. In markets dominated by government intervention and controls, there are no pure private capital flows. Each purchase of a US asset by a private nonresident is matched by an implicit government commitment to acquire that US asset in the event of trouble.

Finding Refuge in the Bubble Tautology

Having for many years run through the list of arguments for why the system will soon collapse and still with no success in sight, some proponents of the

⁴⁰ Since lack of inflation is deadly to an "excess liquidity" view, its proponents often take a "shoot the data" position in arguing for new index construction to capture the inflation that is invisible to the old. After all, do not people pay much more for gasoline than they did a few years ago? Haven't asset prices like housing leaped also?

⁴¹ For a review of this literature and references, see Xafa (2007),

textbook theory have moved into bubble arguments.⁴² The reason that the system has not yet collapsed is that market speculators have been too lazy or slow-minded to do the simple arithmetic that shows that it will collapse. Or they are working from the delusional belief that the emerging market central banks will continue to intervene for a long time, or from a different delusion that lightning will not strike from the protectionists or geopolitical events. In all these cases, the proponents of the textbook models *know* that assets in general are extremely overpriced.

Its proponents continue to embrace the correct conventional model and berate the asset markets that are delivering the wrong prices. “My theory’s forecasts” plus “the asset markets’ mispricing away from my theory’s forecasts” is always identically equal to actual asset prices, i.e. a tautology. Arbitrary invocation of bubbles is always done to avoid facing the evidence that is undermining one’s favored theory. Although often covered with a veneer of scientific jargon, we see it as authority’s last bastion of denial in sustaining a seriously depreciated theory.

Most critics of the view stated in this section’s first paragraph have by now become heavily invested in the bubble/liquidity glut/Wile E. Coyote interpretation of this reality. That is, we have already run off the cliff and will crash when we *realize* that we are running on thin air.⁴³ We acknowledge the clarity of this approach: it recognizes that the conventional model of how the system works is simply unable to explain the core developments of the last five years. So, to carry on, they must resort to tautology by making untestable claims of market bubbles and then just wait for the inevitable.

Since the current situation is impossible according to the accepted model, it will vanish like a pleasant dream when the market wakes up into an unpleasant reality. The longer the dream lasts the more likely and more painful the morning after.

Our interpretation is just the opposite: the conventional textbook model is a dream and its practitioners will eventually snap out of it, as year after year the data refute it. We like this approach because all everyone has to do is wait to see who is dreaming; and in the interim, we can take positions on the difference of opinion. Over the past four years of global macro history, we have not been disappointed. We were strongly criticized in 2003 for claiming that the system would last for ten years, when academics and market practitioners alike claimed the end was imminent. The system is still on track for the last six of the ten.

⁴² See e.g. Krugman (November 2005), Rogoff (March 2007), Frankel (December 2006).

⁴³ Within Roubini’s descriptions (e.g. May 2007), persistent bubble invocations can be found on most pages referring to the failure of a wide swath of asset markets to price in the massive risks in the system. Summers (December 26, 2006) provides a careful description of the conflicting views of market practitioners and academics on whether asset prices reflect such risks. But after guiding the reader through a number of large, seemingly undiscounted risks, he appears to swing over to the mispricing side with his closing quip: “perhaps the main thing we have to fear is lack of fear itself.”

http://www.ksg.harvard.edu/ksgnews/Features/opeds/122606_summers.html

Some Geopolitical Disturbance Will Destroy the System

The internal economic dynamics of the system evidently have not led to a self-destruction that is visible on the horizon. Among proponents of the standard model, this has led to a shift in emphasis: this unbalanced system may be toppled by a major geopolitical event.⁴⁴ The back story here is that the system makes the industrial country and U.S. economies particularly vulnerable to such an event. This view reaches back a bit to the mispricing/bubble view above; it claims that financial markets have not priced in this possibility.

We also agree that a geopolitical event may threaten the system. A blockage of oil through the Strait of Hormuz, for example, would likely result in a global recession that could easily generate a serious protectionist reaction. More directly, a geopolitical disturbance involving China would obviously portend the sudden end of the game.

But that is exactly an event that the collateral is there to cover. With the world's stock of FDI claims against China covered in the US, such an event would be much less of a financial disturbance than if capital had "flowed downhill" from rich to poor. For then, in addition to the major flow adjustment that such a geopolitical disturbance would compel, industrial countries would also have to adjust financially to a large net stock of defaulted claims.

That leads naturally to the question: which direction of capital flow and net cross-border claims makes the system more secure in the face of an admittedly very negative geopolitical event? Tabling this card in defense of the conventional theory plays into the hand of the collateral view.

Conclusion

The mechanism of modern large-scale development is quite straightforward. Rapid industrialization requires a large inflow of direct and portfolio equity investment; and, in turn, a large current account surplus is required for the periphery to provide the collateral. Contrary to almost universal opinion, successful economic development is powered by net savings flows from poor to rich countries. The current account imbalances of the rich countries do not pull the periphery along by providing global net aggregate demand; they push the periphery by securing efficient capital formation. Seemingly balanced shifts within a country's capital account actually drive its current account through a need to collateralize resulting risk imbalances. The US current account deficit is an integral and sustainable result of its role as the center country in the revived Bretton Woods system.

⁴⁴ See Summers (March 24, 2006), (December 26, 2006), Rogoff (January 2007), (February 2007). In Summers (March 24, 2006), there is a suggestion that somehow fx reserves might be used to launch a financial attack against the US in a geopolitical event, a theme that has appeared sporadically. Thinking through the steps of this game, it is hard to see how it would work without imposing even larger proportional pain on an adversary..

That we write about the current international monetary system and argue that its main features will last for years more does not make us normative proponents of the system. We are in the business of talking about what is and what will be, not what ought to be. We are marked to market every day on the deviation between what we say will be and what actually materializes. The “ought to be” is the business of academics, think tanks, and the official sector, putting forth what amounts to their own political opinion and views about how global resources ought to be allocated.

We also are at our core first-best neoclassical economists. But faced with a phenomenon of persistent “uphill” capital flows, we are prepared for the possibility that the global system will respond in unusual and even grotesque-looking ways. Over the course of many decades, we all compile a series of experiences in the macro economy—economic cycles, patterns of growth, occasional crises, inflation, stagnation, and fiscal and trade imbalances. Academic and official sector research struggles to make sense of this history. And with a lag of years, textbooks and conventional wisdom finally summarize this history with a few theories that have provided the best *fit* for the experience. The theories most emphasized in current textbooks reflect a long-moving average of experience in the post-war decades.

Financial industry research is not much different. Its visions rarely make it into the textbooks because, as a moving average with a much truncated window, it tends to gyrate wildly from notion to notion with current events. Still, we have explanations for a history of experience. When current events look like some set of relationships we have seen in the past, we pull out the theoretical template that best fits the experience. We convince ourselves and try to convince our clients that the present’s future will be like the past’s future. But almost always we have selected these views because they fit the past pattern, not because they really forecast.

When something outside our experience comes along, as it does occasionally, we have to find a new compass. Otherwise, we are left with the old view and with a widening separation between what it says and what asset prices say. More and more, adherents of the old stories are driven to curse the lying data as bubbles, market error, and obtuseness.

Asset prices themselves are tinged by the positioning of those who trade based on the stories of the past. But somehow an underlying intuition of something else in some other part of the market’s mind keeps prices separated from what the old truths say they should be, even in the absence of a new truth. When a new, coherent explanation of this radically different present is finally born, it is derided as yet another “new paradigm” as it makes forecasts of the present’s future that starkly diverge from those of the old story. For some time, authority alone can overpower facts; but steadily dripping for long enough, facts eventually erode authority down to its core. In this tug-of-war, only time will tell: either forecasts past or forecasts present will be wrong.

References

Aizenman and Jaewoo Lee (October 2005), "International Reserves: Precautionary vs. Mercantilist Views, Theory and Evidence", IMF Working Paper WP/05/198, October 2005.

<http://www.imf.org/external/pubs/ft/wp/2005/wp05198.pdf>

Bergsten, C. Fred (January 31, 2007), "The Chinese Exchange Rate and the US Economy", Testimony before Committee on Banking, Housing and Urban Affairs.

<http://www.iie.com/publications/papers/paper.cfm?ResearchID=706>

Bergsten, C. Fred (May 9, 2007), "The Global Imbalances and the US Economy", Congressional testimony.

<http://www.iie.com/publications/papers/paper.cfm?ResearchID=735>

Bernanke, Ben (March, 2005), "The Global Saving Glut and the U.S. Current Account Deficit", Sandridge Lecture, Virginia Association of Economics, Richmond, Va.

<http://www.federalreserve.gov/boarddocs/speeches/2005/200503102/default.htm>

Blanchard, Olivier, Francesco Giavazzi, Filipa Sa (February 2005), "The U.S. Current Account Deficit and the Dollar", NBER Working Paper w11137.

Bulow, Jeremy and Kenneth Rogoff (March 1989), "Sovereign Debt: Is to Forgive to Forget?", *American Economic Review*, Vol. 79, 1, 43-50.

<http://www.economics.harvard.edu/~krogoff/AER1989.pdf>

Bulow, Jeremy and Kenneth Rogoff (February 1989), "A Constant Recontracting Model of Sovereign Debt", *Journal of Political Economy* 97, 155-178.

<http://www.economics.harvard.edu/~krogoff/JPE89.pdf>

Caballero, Ricardo and Arvind Krishnamurthy, (June 2000) "International Liquidity Management: Sterilization Policy in Illiquid Financial Markets", NBER Working Paper #7740.

Caballero, Ricardo, Emmanuel Farhi, and Pierre-Olivier Gourinchas, (March 2007) "An Equilibrium Model of "Global Imbalances" and Low Interest Rates", NBER Working Paper, #12996.

Caballero, Ricardo, (December 2006) "On the Economics of Asset Shortages", NBER Working Paper #12753. .

Cooper, Richard N. (October 31, 2004), "US deficit: It is not only sustainable, it is logical," *Financial Times*.

Dooley, Michael P. (January 2000), "A Model of Crises in Emerging Markets," The Economic Journal, 110, 256-272.

<http://econ.ucsc.edu/~mpd/EJCrisis.pdf>

The following seven papers are available at

<http://www.frbsf.org/economics/conferences/0502> :

Dooley, Michael, David Folkerts-Landau and Peter Garber, (June 18, 2003a) "Dollars and Deficits: Where Do We Go From Here?" Deutsche Bank Global Markets Research.

_____ (September 2003b), "An Essay on the Revived Bretton Woods System," NBER Working Paper no. 9971.

_____ (March 2004a), "The Revived Bretton Woods System: The Effects of Periphery Intervention and Reserve Management on Interest Rates and Exchange Rates in Center Countries" NBER Working Paper No. 10332. First published as "The Cosmic Risk: An Essay on Global Imbalances and Treasuries" and "Periphery Reserve Diversification: Does It Threaten the Pegs?", Deutsche Bank Global Markets Research, February 2004.

_____ (July 2004b), "Direct Investment, Rising Real Wages and the Absorption of Excess Labor in the Periphery" NBER Working Paper No.10626. First published as "A Map to the Revived Bretton Woods End Game: Direct Investment, Rising Real Wages, and the Absorption of Excess Labor in the Periphery", Deutsche Bank Global Markets Research, June 2004.

_____ (September 2004c), "The US Current Account Deficit and Economic Development: Collateral for a Total Return Swap," NBER Working Paper No. 10727. First published by Deutsche Bank Global Markets Research, August, 2004.

_____ (December 2004d), "The Revived Bretton Woods: Alive and Well", Deutsche Bank Global Markets Research.

_____ (July 2005a), "Savings Gluts and Interest Rates: The Missing Link to Europe," NBER Working Paper No. 11520.

_____ (November 2005b) "Interest Rates, Exchange Rates and International Adjustment", NBER Working Paper No. 11771. First published as "Living with Bretton Woods II", Deutsche Bank Global Markets Research, September 20, 2005.

_____ (October 27, 2005d) International Financial Stability, Asia, Interest Rates and the Dollar, Deutsche Bank collected volume.
http://econ.ucsc.edu/~mpd/InternationalFinancialStability_update.pdf

Michael Dooley and Peter Garber, (2005c), "Is it 1958 or 1968? Three Notes on the Longevity of the Revived Bretton Woods System," Brookings Papers on Economic Activity, 1: 147- 187.

Durdu, Ceyhun Bora, Enrique G. Mendoza and Marco E. Terrones, (2007) "Precautionary Demand for Foreign Assets in Sudden Stop Economies: An Assessment of the New Mercantilism," NBER Working Paper w13123 <http://papers.nber.org/papers/W13123>

Eaton, Jonathan and Mark Gersovitz, (April 1981), "Debt with Potential Repudiation", Review of Economic Studies, 48, 289-309. [http://links.jstor.org/sici?sici=0034-6527\(198104\)48%3A2%3C289%3ADWPRTA%3E2.0.CO%3B2-3](http://links.jstor.org/sici?sici=0034-6527(198104)48%3A2%3C289%3ADWPRTA%3E2.0.CO%3B2-3)

Eichengreen, Barry, (May 2004), "Global Imbalances and the Lessons of Bretton Woods", NBER Working Paper 10497. <http://www.frbsf.org/economics/conferences/0502/Eichengreen.pdf>

Eichengreen, Barry (December 2004), "The Dollar and the New Bretton Woods System". <http://www.econ.berkeley.edu/~eichengr/policy/cityuniversitylecture2jan3-05.pdf>

Eichengreen, Barry (May 2005), "Sterling's Past, Dollar's Future: Historical Perspectives on Reserve Currency Competition", NBER Working Paper w11336. http://www.econ.berkeley.edu/~eichengr/research/tawney_lecture2apr29-05.pdf

Eichengreen, Barry (November 2005), "The Blind Men and the Elephant". <http://www.econ.berkeley.edu/~eichengr/policy/KyotoPaper.pdf>

Financial Times (April 17, 2007), editorial, "Global Imbalances keep defying Gravity". <http://www.ft.com/cms/s/66da4260-ec7f-11db-a12e-000b5df10621.html>

Frankel, Jeffrey (December 2006), "Global Imbalances and Low Interest Rates: An Equilibrium Model vs. a Disequilibrium Reality". <http://ksghome.harvard.edu/~jfrankel/BISwpCmtsCaballeroFG-AuCISENR.pdf>

Goldstein, Morris (March 28, 2007), "Assessing Progress on China's Exchange Rate Policies", Testimony before Committee on Finance, US Senate. <http://www.petersoninstitute.org/publications/papers/paper.cfm?ResearchID=721>

Goldstein, Morris (September 23, 2005), "Currency Manipulation and Enforcing the Rules of the International Monetary System", prepared for conference on IMF reform.

<http://www.petersoninstitute.org/publications/papers/goldstein0905imf.pdf>

Goldstein, Morris and Nicholas Lardy (August 26, 2003), "A Modest Proposal for China's Renminbi", Financial Times.

<http://www.iie.com/publications/opeds/oped.cfm?ResearchID=256>

Goldstein, Morris and Nicholas Lardy (November 2004), "What Kind of Landing for the Chinese Economy?", Institute for International Economics,

<http://www.iie.com/publications/pb/pb04-7.pdf>

Goldstein, Morris and Nicholas Lardy (March 4, 2005), "A Faulty Strategy Weakens China's Prospects", Financial Times.

<http://www.iie.com/publications/opeds/oped.cfm?ResearchID=29>

Greenspan, Alan (June 23, 2005), "China", Testimony before Committee on Finance, U.S. Senate,

<http://www.federalreserve.gov/BoardDocs/Testimony/2005/20050623/default.htm>

International Monetary Fund (March 2007), "Global Capital Flows: Defying Gravity", Finance and Development, Vol. 44, Number 1.

<http://www.imf.org/external/pubs/ft/fandd/2007/03/picture.htm>

Krugman, Paul (November 2005), "Will There Be a Dollar Crisis?",

http://econ.ucsd.edu/seminars/0506seminars/Krugman_FA05.doc.

Krugman, Paul, (May 17, 2006), "Coming Down to Earth", NY Times.

http://economistsview.typepad.com/economistsview/2006/05/paul_krugman_co.html

Obstfeld, Maurice, (December 1994), "[Risk-Taking, Global Diversification, and Growth](#)", American Economic Review, American Economic Association, vol. 84(5), pages 1310-29.

Obstfeld, Maurice (2004), "External Adjustment," *Review of World Economics*, v. 140: 541-68. <http://www.nber.org/papers/w10843>

Obstfeld, Maurice, and Kenneth Rogoff, (April 1996), "The Intertemporal Approach to the Current Account", NBER Working Paper 4893,

<http://www.nber.org/papers/w4893> Chapter in Grossman, Gene and Kenneth Rogoff, eds., Handbook of International Economics, vol. 3, North Holland, 1995.

Obstfeld, Maurice, and Kenneth Rogoff, (1996) Foundations of International Macroeconomics, Cambridge: MIT Press.

Obstfeld, Maurice and Kenneth Rogoff, (March 2000), "Perspectives on OECD Capital Market Integration: Implications for U.S. Current Account Adjustment", in Federal Reserve Bank of Kansas City, Global Economic Integration: Opportunities and Challenges, 169-208.

<http://www.kc.frb.org/PUBLICAT/SYMPOS/2000/S00rogo.pdf>

Obstfeld, Maurice, and Kenneth Rogoff, (2000), "The Six Major Puzzles in International Macroeconomics: Is there a Common Cause?" in Ben S. Bernanke and Kenneth Rogoff (eds.), *NBER Macroeconomics Annual 2000*. Cambridge, MA: MIT Press.

<http://www.economics.harvard.edu/~krogoff/NBER2000.pdf>

Obstfeld, Maurice and Kenneth Rogoff, (October, 2004), "The US Deficit: the Problem is a Global Concern", *Financial Times*.

http://post.economics.harvard.edu/faculty/rogoff/papers/US_Deficit_Problem_Not_Only_A_Domestic_Issue.pdf

Obstfeld, Maurice and Kenneth Rogoff (November 2004), "The Unsustainable US Current Account Position Revisited", NBER Working Paper No. 10869.

<http://www.frbsf.org/economics/conferences/0502/Obstfeld.pdf>

Obstfeld, Maurice and Kenneth Rogoff (2005) 'Global Current Account Imbalances and Exchange Rate Adjustments', *Brookings Papers on Economic Activity*, 1: 147-187.

<http://www.economics.harvard.edu/faculty/rogoff/papers/BPEA2005.pdf>

Obstfeld, Maurice (February 2005) "Sustainability and the US Account: Dark Musings", Powerpoint.

<http://www.frbsf.org/economics/conferences/0502/Obstfeld.ppt>

Prasad, Eswar and Shang-Jin Wei, (April 2005), "The Chinese Approach to Capital Inflows: Patterns and Possible Explanations", NBER Working Paper, No 11306, <http://papers.nber.org/papers/w11306.pdf>

Prasad, Eswar, Raghuram Rajan, and Arvind Subramanian (April 2007) "Foreign Capital and Economic Growth". Working paper.

<http://www.iie.com/publications/papers/subramanian0407.pdf>

Rogoff, Kenneth (January 2007), "The \$200 Trillion Question", <http://www.economics.harvard.edu/faculty/rogoff/views.html>

Rogoff, Kenneth (February 2007), "Betting with the Houses Money",

<http://www.project-syndicate.org/commentary/rogoff27>

Rogoff, Kenneth (March 2007), "The Hedge Fund Hegemon",

<http://www.project-syndicate.org/commentary/rogoff28>

Roubini, Nouriel (November, 2006) "Global Imbalances: A Contemporary "Rashomon" Saga",

<http://www.centrecourtnot.org/pdf/conference9/Nouriel%20ROUBINI.pdf> .

Roubini, Nouriel, (May 2007) "Asia is Learning the Wrong Lessons from its 1997-98 Financial Crisis: The Rising Risks of a New and Different Type of Financial Crisis in Asia", Roubini Global Economics.

Roubini, Nouriel and Brad Setser, (February 4, 2005), "Will the Bretton Woods 2 Regime Unravel Soon? The Risk of a Hard Landing in 2005-2006", Federal Reserve Bank of San Francisco symposium on Revived Bretton Woods System: A New Paradigm for Periphery Development?.

<http://www.frbsf.org/economics/conferences/0502/index.html>

Summers, Lawrence H. (March 2004), Speech at the Third Annual Stavros Niarchos Lecture, Institute for International Economics, Washington, DC.

<http://www.iie.com/publications/papers/paper.cfm?researchid=200>

Summers, Lawrence H. (October 2004), "The U.S. Current Account Deficit and the Global Economy", IMF, Per Jacobsson Lecture.

<http://72.14.209.104/search?q=cache:Q9GOpopMApYJ:www.perjacobsson.org/2004/100304.pdf+summers+imbalances+lecture&hl=en&ct=clnk&cd=3&gl=us>

Summers, Lawrence H. (March 24, 2006), "Reflections on Global Account Imbalances and Emerging Markets Reserve Accumulation".

http://www.president.harvard.edu/speeches/2006/0324_rbi.html

Summers, Lawrence H. (December 26, 2006), "Lack of Fear Gives Cause for Concern", Financial Times.

http://www.ksg.harvard.edu/ksgnews/Features/opeds/122606_summers.html

Summers, Lawrence H. (January 31, 2007), Testimony, Joint Economic Committee Hearing.

<http://www.jec.senate.gov/Documents/Hearings/summerstestimony31jan2007.pdf>

Truman, Edwin (February 2005), "A Revived Bretton Woods System? Implications for Europe and the United States", Conference speech at "Revived Bretton Woods System: A New Paradigm for Asian Development?", Federal Reserve Bank of San Francisco, February 4, 2005.

<http://www.iie.com/publications/papers/paper.cfm?ResearchID=26>

U.S. Information Agency, (August 28, 1990), "Freeze of Iraq, Kuwait Assets Has Many Precedents," www.fas.org/news/iraq/1990/900828-152460.htm.

Wolf, Martin, (November 2005), "Will Asian Mercantilism Meet Its Waterloo?" Richard Snape Lecture, Melbourne.

<http://72.14.209.104/search?q=cache:xPL-7-6zSeAJ:www.pc.gov.au/lectures/snape/wolf/wolf.pdf+rogoff+mercantilism&hl=en&ct=clnk&cd=2&gl=us>

Xafa, Miranda, (May 2007), "Global Imbalances and Financial Stability",
International Monetary Fund WP/07/111.
<http://www.imf.org/external/pubs/ft/wp/2007/wp07111.pdf>

Appendix. The US Actually Seizes Sovereign Assets⁴⁵

The International Emergency Economic Powers Act of 1977 (IEEPA, which supplanted the Trading with the Enemy Act of 1917) empowers the president of the United States to freeze foreign-owned assets under U.S. control. The IEEPA authorizes the use of sanctions when the president sees an "unusual and extraordinary threat" to the "national security, foreign policy, or economy" of the United States and declares a national emergency.⁴⁶ The word "emergency" allows the window to be slammed shut if, for example, a foreign country threatens to launch a financial attack by withdrawing funds or to pull out a substantial amount of funds out in order to prevent their seizure. As described by the U.S. Information Agency, a freeze on foreign-owned assets

can be applied selectively to a particular country, or to a group of countries, in time of war or in response to a national emergency....

The procedure can be used to serve three purposes:

- to deny authorities in blocked countries access to assets that might be used against the US
- to protect the true owners of the assets from illegal attempts to seize their property
- to create a pool of assets for possible use in settling US claims against blocked countries, or for use as a bargaining chip in negotiating an eventual return to normal relations.⁴⁷

During World War II, assets owned by Germany, Japan, and Italy were blocked and eventually used in settling war claims against them. Similarly, assets of Hungary, Romania, Latvia, Lithuania, Estonia, Bulgaria, and Czechoslovakia were blocked after these countries fell under Soviet domination. Asset blockings were subsequently imposed against North Korea and China in 1950, Cuba in 1963, North Vietnam in 1964, Rhodesia (now Zimbabwe) in 1965, Kampuchea (Cambodia) in 1975, Iran in 1979, Libya in 1986, Panama in 1988, the Federal Republic of Yugoslavia (Serbia and Montenegro) in 1992, and Afghanistan in 1999. In 1990 the United States blocked \$30 billion in assets belonging to Iraq and Kuwait. In 1979 it blocked \$12 billion of Iran's assets, including \$5 billion in offshore branches of U.S. banks; part of this was used to pay off syndicated loans by U.S. banks to Iran, and \$1.4 billion was sent to the Bank of England to cover

⁴⁵ We have taken this appendix from Dooley and Garber (2005c). It is in Chapter 9 at http://econ.ucsc.edu/~mpd/InternationalFinancialStability_update.pdf

⁴⁶ See the International Emergency Economic Powers Act (IEEAPA), United States Code (www.treas.gov/offices/enforcement/ofac/legal/statutes/ieepa.pdf). Assets frozen under the IEEAPA are administered by the Treasury's Office of Foreign Asset Control (OFAC).

⁴⁷ U.S. Information Agency, (August 28, 1990).

claims in the United Kingdom. Another \$1 billion was held against awards from the Iran-U.S. claims tribunal.⁴⁸

These asset freezes have occurred under a variety of circumstances. Some of the asset blockings were aimed at adversaries in a declared or undeclared war (Germany, Japan, Italy, China, North Korea, and Iraq). Some were aimed at friendly countries that had been occupied, with the aim of preserving the assets pending the restoration of a government recognized by the United States (Latvia, Lithuania, Estonia, and Kuwait). Some countries saw their assets blocked when they opposed the United States geopolitically or became hostile without war breaking out (Cuba, Iran). Some freezes were implemented as part of a global imposition of sanctions (F.R. Yugoslavia, Rhodesia). Notwithstanding the differences in circumstances, this history shows that the center country can repeatedly “default” on official liabilities and still remain the key provider of reserves.

⁴⁸ U.S. Information Agency, (August 28, 1990).

Appendix 1

Important Disclosures

Additional information available upon request

For disclosures pertaining to recommendations or estimates made on a security mentioned in this report, please see the most recently published company report or visit our global disclosure look-up page on our website at <http://gm.db.com>.

Analyst Certification

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst(s). In addition, the undersigned lead analyst(s) has not and will not receive any compensation for providing a specific recommendation or view in this report. David Folkerts-Landau/Peter Garber

Regulatory Disclosures

SOLAR Disclosure

For select companies, Deutsche Bank equity research analysts may identify shorter-term trade opportunities that are consistent or inconsistent with Deutsche Bank's existing longer term ratings. This information is made available only to Deutsche Bank clients, who may access it through the SOLAR stock list, which can be found at <http://gm.db.com>

Disclosures required by United States laws and regulations

See company-specific disclosures above for any of the following disclosures required for covered companies referred to in this report: acting as a financial advisor, manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/comanaged public offerings in prior periods; directorships; market making and/or specialist role.

The following are additional required disclosures:

Ownership and Material Conflicts of Interest: DBSI prohibits its analysts, persons reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage.

Analyst compensation: Analysts are paid in part based on the profitability of DBSI, which includes investment banking revenues.

Analyst as Officer or Director: DBSI policy prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director, advisory board member or employee of any company in the analyst's area of coverage.

Distribution of ratings: See the distribution of ratings disclosure above.

Price Chart: See the price chart, with changes of ratings and price targets in prior periods, above, or, if electronic format or if with respect to multiple companies which are the subject of this report, on the DBSI website at <http://gm.db.com>.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, in addition to those already made pursuant to United States laws and regulations.

Analyst compensation: Analysts are paid in part based on the profitability of Deutsche Bank AG and its affiliates, which includes investment banking revenues

Australia: This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act.

EU: A general description of how Deutsche Bank AG identifies and manages conflicts of interest in Europe is contained in our public facing policy for managing conflicts of interest in connection with investment research.

Germany: See company-specific disclosures above for (i) any net short position, (ii) any trading positions (iii) holdings of five percent or more of the share capital. In order to prevent or deal with conflicts of interests Deutsche Bank AG has implemented the necessary organisational procedures to comply with legal requirements and regulatory decrees. Adherence to these procedures is monitored by the Compliance-Department.

Hong Kong: See <http://gm.db.com> for company-specific disclosures required under Hong Kong regulations in connection with this research report. Disclosure #5 includes an associate of the research analyst. Disclosure #6, satisfies the disclosure of financial interests for the purposes of paragraph 16.5(a) of the SFC's Code of Conduct (the "Code"). The 1% or more interests is calculated as of the previous month end. Disclosures #7 and #8 combined satisfy the SFC requirement under paragraph 16.5(d) of the Code to disclose an investment banking relationship.

Japan: See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Russia: The information, interpretation and opinions submitted herein are not in the context of, and do not constitute, any appraisal or evaluation activity requiring a licence in the Russian Federation.

South Africa: Publisher: Deutsche Securities (Pty) Ltd, 3 Exchange Square, 87 Maude Street, Sandton, 2196, South Africa. Author: As referred to on the front cover. All rights reserved. When quoting, please cite Deutsche Securities Research as the source.

Turkey: The information, interpretation and advice submitted herein are not in the context of an investment consultancy service. Investment consultancy services are provided by brokerage firms, portfolio management companies and banks that are not authorized to accept deposits through an investment consultancy agreement to be entered into such corporations and

their clients. The interpretation and advices herein are submitted on the basis of personal opinion of the relevant interpreters and consultants. Such opinion may not fit your financial situation and your profit/risk preferences. Accordingly, investment decisions solely based on the information herein may not result in expected outcomes.

United Kingdom: Persons who would be categorized as private customers in the United Kingdom, as such term is defined in the rules of the Financial Services Authority, should read this research in conjunction with prior Deutsche Bank AG research on the companies which are the subject of this research.

Deutsche Bank AG/London**European locations****Deutsche Bank AG London**

1 Great Winchester Street
London EC2N 2EQ

Tel: (44) 20 7545 8000
Fax: (44) 20 7545 6155

Deutsche Bank AG

Herengracht 450
1017 CA Amsterdam
Netherlands

Tel: (31) 20 555 4911
Fax: (31) 20 555 4428

Deutsche Bank AG, Helsinki

Kaivokatu 10 A, P.O.Bvox 650
FIN-00101 Helsinki
Finland

Tel: (358) 9 25 25 20
Fax: (358) 9 25 25 85

**Deutsche-Bank AG,
Secoursale de Paris**

3, Avenue de Friedland
75008 Paris Cedex 8
France

Tel: (33) 1 44 95 64 00
Fax: (33) 1 53 75 07 01

**Deutsche Securities
S.V.B., S.A.**

P0 de la Castellana, 42
7th Floor
28046 Madrid
Spain

Tel: (34) 91 782 8400
Fax: (34) 91 782 8465

Deutsche Bank AG

Hohenstaufengasse 4
1010 Vienna
Austria

Tel: (43) 1 5318 10
Fax: (43) 1 5318 1114

**Deutsche Bank AG
Equity Research**

Große Gallusstraße 10-14
60272 Frankfurt am Main
Germany

Tel: (49) 69 910 41339
Fax: (49) 69 910 34225/7

Deutsche Bank AG

Stureplan 4 A, Box 5781
S-114 87 Stockholm
Sweden

Tel: (46) 8 463 5500
Fax: (46) 8 463 5550

Deutsche UFG

10 Povarskaya Street
121069 Moscow
Russia

Tel: (7) 501 967 37 27
Fax: (7) 501 967 37 30

Deutsche Bank Sim S.p.a

Via Santa Margherita 4
20123 Milan
Italy

Tel: (39) 0 24 024 1

Fax: (39) 0 24 024 2636

Deutsche Bank AG

Uraniastrasse 9
PO Box 7370
8023 Zürich
Switzerland

Tel: (41) 1 224 5000
Fax: (41) 1 227 3100

International locations**Deutsche Bank Securities Inc.**

60 Wall Street
New York, NY 10005
United States of America

Tel: (1) 212 250 2500

Deutsche Bank AG London

1 Great Winchester Street
London EC2N 2EQ
United Kingdom

Tel: (44) 20 7545 8000
Fax: (44) 20 7545 6155

Deutsche Bank AG

Große Gallusstraße 10-14
60272 Frankfurt am Main
Germany

Tel: (49) 69 910 41339

Deutsche Bank AG

Deutsche Bank Place
Level 16
Corner of Hunter & Phillip Streets
Sydney, NSW 2000
Australia

Tel: (61) 2 8258 1234
Fax: (61) 2 8258 1400

Deutsche Bank AG

Level 55
Cheung Kong Center
2 Queen's Road Central
Hong Kong

Tel: (852) 2203 8888
Fax: (852) 2203 6921

Deutsche Securities Inc.

Level 20, 2-1-1 Nagatacho
Sanno Park Tower
Chiyoda-ku, Tokyo 100-6171
Japan

Tel: (81) 3 5156 6701
Fax: (81) 3 5156 6700

Global Disclaimer

The information and opinions in this report were prepared by Deutsche Bank AG or one of its affiliates (collectively "Deutsche Bank"). The information herein is believed by Deutsche Bank to be reliable and has been obtained from public sources believed to be reliable. With the exception of information about Deutsche Bank, Deutsche Bank makes no representation as to the accuracy or completeness of such information.

This published research report may be considered by Deutsche Bank when Deutsche Bank is deciding to buy or sell proprietary positions in the securities mentioned in this report.

For select companies, Deutsche Bank equity research analysts may identify shorter-term opportunities that are consistent or inconsistent with Deutsche Bank's existing, longer-term Buy or Sell recommendations. This information is made available on the SOLAR stock list, which can be found at <http://gm.db.com>.

Deutsche Bank may trade for its own account as a result of the short term trading suggestions of analysts and may also engage in securities transactions in a manner inconsistent with this research report and with respect to securities covered by this report, will sell to or buy from customers on a principal basis. Disclosures of conflicts of interest, if any, are discussed at the end of the text of this report or on the Deutsche Bank website at <http://gm.db.com>.

Opinions, estimates and projections in this report constitute the current judgement of the author as of the date of this report. They do not necessarily reflect the opinions of Deutsche Bank and are subject to change without notice. Deutsche Bank has no obligation to update, modify or amend this report or to otherwise notify a reader thereof in the event that any matter stated herein, or any opinion, projection, forecast or estimate set forth herein, changes or subsequently becomes inaccurate, except if research on the subject company is withdrawn. Prices and availability of financial instruments also are subject to change without notice. This report is provided for informational purposes only. It is not to be construed as an offer to buy or sell or a solicitation of an offer to buy or sell any financial instruments or to participate in any particular trading strategy in any jurisdiction or as an advertisement of any financial instruments.

The financial instruments discussed in this report may not be suitable for all investors and investors must make their own investment decisions using their own independent advisors as they believe necessary and based upon their specific financial situations and investment objectives. If a financial instrument is denominated in a currency other than an investor's currency, a change in exchange rates may adversely affect the price or value of, or the income derived from, the financial instrument, and such investor effectively assumes currency risk. In addition, income from an investment may fluctuate and the price or value of financial instruments described in this report, either directly or indirectly, may rise or fall. Furthermore, past performance is not necessarily indicative of future results.

Derivative transactions involve numerous risks including, among others, market, counterparty default and illiquidity risk. The appropriateness or otherwise of these products for use by investors is dependent on the investors' own circumstances including their tax position, their regulatory environment and the nature of their other assets and liabilities and as such investors should take expert legal and financial advice before entering into any transaction similar to or inspired by the contents of this publication. Trading in options involves risk and is not suitable for all investors. Prior to buying or selling an option investors must review the "Characteristics and Risks of Standardized Options," at <http://www.optionsclearing.com/publications/risks/riskchap1.jsp>. If you are unable to access the website please contact Deutsche Bank AG at +1 (212) 250-7994, for a copy of this important document. Furthermore, past performance is not necessarily indicative of future results. Please note that multi-leg options strategies will incur multiple commissions.

Unless governing law provides otherwise, all transactions should be executed through the Deutsche Bank entity in the investor's home jurisdiction. In the U.S. this report is approved and/or distributed by Deutsche Bank Securities Inc., a member of the NYSE, the NASD, NFA and SIPC. In Germany this report is approved and/or communicated by Deutsche Bank AG Frankfurt authorised by Bundesanstalt für Finanzdienstleistungsaufsicht. In the United Kingdom this report is approved and/or communicated by Deutsche Bank AG London, a member of the London Stock Exchange and regulated by the Financial Services Authority for the conduct of investment business in the UK and authorised by Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin). This report is distributed in Hong Kong by Deutsche Bank AG, Hong Kong Branch, in Korea by Deutsche Securities Korea Co. and in Singapore by Deutsche Bank AG, Singapore Branch. In Japan this report is approved and/or distributed by Deutsche Securities Inc. The information contained in this report does not constitute the provision of investment advice. In Australia, retail clients should obtain a copy of a Product Disclosure Statement (PDS) relating to any financial product referred to in this report and consider the PDS before making any decision about whether to acquire the product. Deutsche Bank AG Johannesburg is incorporated in the Federal Republic of Germany (Branch Register Number in South Africa: 1998/003298/10) Additional information relative to securities, other financial products or issuers discussed in this report is available upon request. This report may not be reproduced, distributed or published by any person for any purpose without Deutsche Bank's prior written consent. Please cite source when quoting.

Copyright © 2007 Deutsche Bank AG 01/2007

GRCM2007PROD010413