NBER WORKING PAPER SERIES

MONETARY POLICY IN EMERGING MARKETS: A SURVEY

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Working Paper 16125
http://www.nber.org/papers/w16125

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
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June 2010

The author would like to thank Olivier Blanchard, Ben Friedman, Oyebola Olabisi, Eswar Prasad and participants at the ECB conference in October 2009, for comments on an earlier draft. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 16125
June 2010
JEL No. E0,E5,F41,O16

ABSTRACT

The characteristics that distinguish most developing countries, compared to large industrialized countries, include: greater exposure to supply shocks in general and trade volatility in particular, procyclicality of both domestic fiscal policy and international finance, lower credibility with respect to both price stability and default risk, and other imperfect institutions. These characteristics warrant appropriate models.

Models of dynamic inconsistency in monetary policy and the need for central bank independence and commitment to nominal targets apply even more strongly to developing countries. But because most developing countries are price-takers on world markets, the small open economy model, with nontraded goods, is often more useful than the two-country two-good model. Contractionary effects of devaluation are also far more important for developing countries, particularly the balance sheet effects that arise from currency mismatch. The exchange rate was the favored nominal anchor for monetary policy in inflation stabilizations of the late 1980s and early 1990s. After the currency crises of 1994-2001, the conventional wisdom anointed Inflation Targeting as the preferred monetary regime in place of exchange rate targets. But events associated with the global crisis of 2007-09 have revealed limitations to the choice of CPI for the role of price index.

The participation of emerging markets in global finance is a major reason why they have by now earned their own large body of research, but it also means that they remain highly prone to problems of asymmetric information, illiquidity, default risk, moral hazard and imperfect institutions. Many of the models designed to fit emerging market countries were built around such financial market imperfections; few economists thought this inappropriate. With the global crisis of 2007-09, the tables have turned: economists should now consider drawing on the models of emerging market crises to try to understand the unexpected imperfections and failures of advanced-country financial markets.

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Monetary Policy in Emerging Market Countries: A Survey

Thirty years ago, the topic of Macroeconomics or Monetary Economics for Developing Countries hardly existed[1], beyond a few papers regarding devaluation.[2] Nor did the term "emerging markets" exist. Certainly it was not appropriate at that time to apply to such countries the models that had been designed for industrialized countries, with their assumption of financial sectors that were highly market-oriented and open to international flows. To the contrary, developing countries typically suffered from "financial repression" under which the only financial intermediaries were uncompetitive banks and the government itself, which kept nominal interest rates artificially low (often well below the inflation rate) and allocated capital administratively rather than by market forces.[3] Capital inflows and outflows were heavily discouraged, particularly by capital controls, and were thus largely limited to foreign direct investment and loans from the World Bank and other international financial institutions.

Over time, the financial sectors of most developing countries – at least those known as emerging markets – have gradually become more liberalized and open. The globalization of their finances began in the late 1970s with the syndicated bank loans that recycled petrodollars to oil-importers. Successive waves of capital inflow followed after 1990 and again after 2003. The largest outpouring of economic research was provoked not so much by the capital booms themselves as by the subsequent capital busts: the international debt crisis of 1982-89, the emerging market crises of 1995-2001, and perhaps the global financial crisis of 2008-09.

In any case, the literature on emerging markets now occupies a very large share of the field of international finance and macroeconomics. International capital flows are central to much of the research on macroeconomics in developing countries. This includes both efficient-market models that were originally designed to describe advanced economies and market-imperfection models that have been designed to allow for the realities of default risk, procyclicality, asymmetric information, imperfect property rights and other flawed institutions.

In the latter part of the 19th century most of the vineyards of Europe were destroyed by the microscopic aphid Phylloxera vastatrix. Eventually a desperate last resort was tried: grafting susceptible European vines onto resistant American root stock. Purist French vintners initially disdained what they considered compromising the refined tastes of their grape varieties. But it saved the European

[1] The field apparently did not get a comprehensive textbook of its own until Agenor and Montiel (1st edition 1996, 2nd edition 1999).

[2] Two seminal papers on devaluation in developing countries were Diaz-Alejandro (1963) and Cooper (1971).

[3] McKinnon (1973) and Shaw (1973). King and Levine (1993) and Levine, Loayza, and Beck (2000), using data for 80 and 74 countries, respectively, conclude that domestic financial development is conducive to growth. Rajan and Zingales (1998a) support the causal interpretation by means of data on disaggregated industrial sectors and their dependence on external finance.

vineyards, and did not impair the quality of the wine. The New World had come to the rescue of the Old.

In 2007-08, the global financial system was grievously infected by so-called toxic assets originating in the United States. Many ask what fundamental rethinking will be necessary to save macroeconomic theory. Some answers may lie with models that have been applied to fit the realities of emerging markets, models that are at home with the financial market imperfections that have now unexpectedly turned up in industrialized countries as well. Purists will be reluctant to seek salvation from this direction. But they should not fear. The hardy root stock of emerging market models is incompatible with fine taste.

1. Why do we need different models for emerging markets?

At a high enough level of abstraction, it could be argued, one theory should apply for all. Why do we need separate models for developing countries? What makes them different? We begin the chapter by considering the general structural characteristics that tend to differentiate these countries as a group, though it is important also to acknowledge the heterogeneity among them.

Developing countries tend to have less developed institutions (almost by definition), and specifically to have lower central bank credibility, than industrialized countries.[4] Lower central bank credibility usually stems from a history of price instability, including hyperinflation in some cases, which in turn is sometimes attributable to past reliance on seignorage as a means of government finance in the absence of a well-developed fiscal system. Another common feature is an uncompetitive banking system, which is again in part attributable to a public finance problem: a traditional reliance on the banks as a source of finance, through a combination of financial repression and controls on capital outflows.

Another structural difference is that the goods markets of small developing countries are often more exposed to international influences than those of, say, Europe or Japan. Although their trade barriers and transport costs have historically tended to exceed those of rich countries, these obstacles to trade have come down over time. Furthermore developing countries tend to be smaller in size and more dependent on exports of agricultural and mineral commodities than are industrialized countries. Even such standard labor-intensive manufactured exports as clothing, textiles, shoes, and basic consumer electronics are often treated on world markets as close substitutes across suppliers. Therefore these countries are typically small enough that they can be regarded as price-takers for tradable goods on world markets. Hence the "small open economy" model.

[4] E.g., Fraga, Goldafjn and Minella (2003).

Developing countries tend to be subject to more volatility than rich countries.[5] Volatility comes from both supply shocks and demand shocks. One reason for the greater magnitude of supply shocks is that primary products (agriculture, mining, forestry and fishing) make up a larger share of their economies. These activities are vulnerable both to extreme weather events domestically and to volatile prices on world markets. Droughts, floods, hurricanes, and other weather events tend to have a much larger effect on GDP in developing countries than industrialized ones. When a hurricane hits a Caribbean island, it can virtually wipe out the year's banana crop and tourist season – thus eliminating the two biggest sectors in some of those tropical economies. Moreover, the terms of trade are notoriously volatile for small developing countries, especially those dependent on agricultural and mineral exports. In large rich countries, the fluctuations in the terms of trade are both smaller and less likely to be exogenous.

Volatility also arises from domestic macroeconomic and political instability. Although most developing countries in the 1990s brought under control the chronic pattern of runaway budget deficits, money creation, and inflation, that they had experienced in the preceding two decades, most have still been subject to monetary and fiscal policy that is procyclical rather than countercyclical. Often income inequality and populist political economy are deep fundamental forces.

Another structural difference is the greater incidence of default risk.[6] Even for government officials who sincerely pursue macroeconomic discipline, they may face debt-intolerance: global investors will demand higher interest rates in response to increases in debt that would not worry them coming from a rich country. The explanation may be the reputational effects of a long history of defaulting or inflating away debt.[7] The reputation is captured, in part, by agency ratings.[8]

Additional imperfections in financial markets can sometimes be traced to underdeveloped institutions, such as poor protection of property rights, bank loans made under administrative guidance or connected lending, and even government corruption.[9] With each round of financial turbulence, however, it has become harder and harder to attribute crises in emerging markets solely to failings in the macroeconomic policies or financial structures of the countries in question. Theories of multiple equilibrium and contagion reflect that not all the volatility experienced by developing countries arises domestically. Much comes from outside, from global financial markets.

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[5] Hausmann, Panizza, and Rigobon (2006) find that real exchange rate volatility is three times higher in developing countries than in industrialized countries (but that the difference is not attributable to larger shocks). As De Santis and Imrohoroğlu (1997) report, stock market volatility is higher too.

[6] Blanchard (2005) explores implications of default risk for monetary policy.

[7] The term "debt intolerance" comes from Reinhart, Rogoff and Savastano (2003). They argue that countries with a poor history of default and inflation may have to keep their ratios of external debt to GDP as low as 15 percent to be safe from the extreme duress of debt crises, levels that would be easily managed by the standards of advanced countries. The tendency for budget deficits to push interest rates up more quickly in debt-intolerant countries than in advanced countries helps explain why fiscal multipliers appear to be substantially lower in developing countries -- Ilzetzki, Mendoza and Vegh (2009). (Trade openness is another reason.)

[8] Rigobon (2002) finds that Mexico's susceptibility to international contagion diminished sharply, after it was upgraded by Moody's in 2000. Eichengreen and Mody (2000, 2004) confirm that ratings and default history are reflected in the interest rates that borrowers must pay.

[9] La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), Johnson, La Porta, Lopez-de-Silanes and Shleifer (2000) and Wei (2000), among many others.

The next section of this chapter considers goods markets and concludes that the small open economy model is probably most appropriate for lower-income and middle-income countries: prices of traded goods are taken as given on world markets. Two key variants feature roles for nontraded goods and contractionary effects of devaluation. The subsequent three sections focus on monetary policy per se. They explore, respectively, the topics of inflation (including high-inflation episodes, stabilization, and central bank independence), nominal anchors, and exchange rate regimes. The last three sections of the chapter focus on the boom-bust cycle experienced by so many emerging markets. They cover, respectively, procyclicality (especially in the case of commodity exporters), capital flows, and crises.

2. Goods markets, pricing, and devaluation

As already noted, because developing countries tend to be smaller economically than major industrialized countries, they are more likely to fit the small open economy model: they can be regarded as price-takers, not just for their import goods, but for their export goods as well. That is, the prices of their tradable goods are generally taken as given on world markets.[10] It follows that a devaluation should push up the prices of tradable goods quickly and in proportion.

2.1 Traded goods, pass-through and the Law of One Price

The traditional view has long been that developing countries, especially small ones, experience rapid pass-through of exchange rate changes into import prices, and then to the general price level. There is evidence in the pass-through literature that exchange rate changes are indeed reflected in imports more rapidly when the market is a developing country than when it is the United States or another industrialized country.[11] The pass-through coefficient tells to what extent a devaluation has been passed through into higher prices of goods sold domestically, say, within the first year. Pass-through has historically been higher and faster for developing countries than for industrialized countries. For simplicity, it is common to assume that pass-through to import prices is complete and instantaneous.

This assumption appears to have become somewhat less valid, especially in the big emerging market devaluations of the 1990s. Pass-through coefficients appear to have declined in developing countries, though they remain well above those of industrialized economies.[12]

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[10] The price-taking assumption requires three conditions: intrinsic perfect substitutability in the product as between domestic and foreign, low trade barriers, and low monopoly power. Saudi Arabia, for example, does not satisfy the third condition, due to its large size in world oil markets.

[11] High pass-through especially characterizes developing countries that are (unofficially) dollarized in the sense that a high percentage of assets and liabilities are denominated in dollars. Reinhart, Rogoff, and Savastano (2003b).

[12] Burstein, Eichenbaum, and Rebelo (2003, 2005) find that the price indexes are kept down by substitution away from imports toward cheaper local substitutes. Frankel, Parsley and Wei (2005) are

On the export side, agricultural and mineral products, which remain important exports in many developing countries, tend to face prices that are determined on world markets. Because they are homogeneous products, arbitrage is able to keep the price of oil or copper or coffee in line across countries, and few producers have much monopoly power. The situation is less clear, however, regarding the pricing of manufactures and services. Clothing products or call centers in one country may or may not be treated by customers as perfect substitutes for clothing or call centers in another country.

2.2 When export prices are sticky

There is good empirical evidence that an increase in the nominal exchange rate defined as the price of foreign currency (that is, a devaluation or depreciation of the domestic currency) causes an increase in the real exchange rate.[13] There are two possible approaches to such variation in the real exchange rate. First, it can be interpreted as evidence of stickiness in the nominal prices of traded goods, especially non-commodity export goods, which in turn requires some sort of barriers to international arbitrage, such as tariffs or transportation costs. Second, it could be interpreted as a manifestation that nontraded goods and services, which by definition are not exposed to international competition, play an important role in the price index. Both approaches are fruitful, because both elements are typically at work.[14]

If prices of exports are treated as sticky in domestic currency, then traditional textbook models of the trade balance are more relevant. Developing countries tend to face higher price-elasticities of demand for their exports than do industrialized countries. Thus it may be easier for an econometrician to find the Marshall-Lerner condition satisfied, though one must allow for the usual lags in quantity response to a devaluation, producing a J-curve pattern in the response of the trade balance.[15]

2.3 NonTraded Goods

The alternative approach is to stick rigorously to the small open economy assumption, that prices of all traded goods are determined on world markets, but to

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among those finding that passthrough to prices of narrowly defined import products is indeed higher for developing countries, but that it has declined since 1990, and investigating the reasons. Loayaza and Schmidt-Hebbel (2002) find a decline in passthrough for Latin America. One explanation for the decline since the 1980s is an environment of greater price stability – Choudhri and Hakura (2006).

[13] E.g., Edwards (1989), Taylor (2002), and Bahmani-Oskooee, Hegerty and Kutan (2008). In other words, though some real exchange rate fluctuations are exogenous – and would show up in prices if the exchange rate were fixed -- some are not.

[14] Indeed, the boundary between the two approaches is not as firm as it used to seem. On the one hand, even highly tradable goods have a non-traded component at the retail level (the labor and real estate that go into distribution costs and retail sales) -- Burstein, Eichenbaum and Rebelo (2005) and Burstein, Neves, and Rebelo (2003). On the other hand, even goods that have in the past been considered nontradable can become tradable if, for example, productivity reduces their costs below the level of transport costs and thus makes it profitable to export them -- Bergin, Glick, and Taylor (2006) and Ghironi and Melitz (2005). This is a promising area of research.

[15] Two empirical studies of trade elasticities for developing countries are Marquez (2002) and Bahmani-Oskooee and Kara (2005).

introduce a second category: nontraded goods and services. Define Q to be the real exchange rate:

$$Q \equiv \frac{E(CPI^*)}{(CPI)} \qquad (1)$$

Where
E ≡ the nominal exchange rate, in units of domestic currency per foreign.
CPI ≡ the domestic Consumer Price Index, and
CPI^* ≡ the world Consumer Price Index.
Assume that the price indices, both at home and abroad, are Cobb-Douglas functions of two sectors, tradable goods (TG) and nontradable goods (NTG), and that for simplicity the weight on the nontradable sector, α, is the same at home and abroad:

$$Q \equiv \frac{E(P_{TG}{}^{*1-\alpha}\ P_{NTG}{}^{*\alpha})}{(P_{TG}{}^{1-\alpha} P_{NTG}{}^{\alpha})}$$

$$\equiv \frac{(EP_{TG}{}^*)P_{TG}{}^{*-\alpha}\ P_{NTG}{}^{*\alpha}}{(P_{TG})P_{TG}{}^{-\alpha} P_{NTG}{}^{\alpha}}$$

We observe the real exchange vary, including sometimes in apparent response to variation in the nominal exchange rate. The two possible interpretations, again, are: (1) variation in the relative price of traded goods $(EP_{TG}{}^*)/P_{TG}$, which is the case considered in the preceding section, or (2) variation in the within-country relative price of nontraded goods (i.e., the price of nontraded goods relative to traded goods). In this section, to focus on the latter, assume that international arbitrage keeps traded goods prices in line: $P_{TG} = EP_{TG}{}^*$. Then the real exchange depends only on the relative price of nontraded goods.

$$Q \equiv \frac{(P_{NTG}{}^* / P_{TG}{}^*)^{\alpha}}{(P_{NTG} / P_{TG})^{\alpha}} \qquad (2)$$

If the relative price of nontraded goods goes up in one country, that country's currency will exhibit a real appreciation. [16]

Two sources of variation in the relative price of nontraded goods make this simple equation useful and interesting, particularly for developing countries. They are very different in character: one is best thought of as monetary in origin and short-term in duration, the other as real and long-term.

Begin with the latter: the famous Balassa (1964)-Samuelson (1964) effect. An empirical regularity that shows up robustly in long-term data samples, whether cross-section or time series, is that when a country's per capita income is higher, its currency is stronger in real terms. This real appreciation can in turn usually be associated with an increase in the relative price of nontraded goods, as per the above equation. The elasticity coefficient is estimated at around .4.[17] Balassa and Samuelson identified the causal mechanism as productivity growth that happens to be concentrated in the tradable

[16] There was a time when some economists working in developing countries insisted that the proper *definition* of the term "real exchange rate" was the price of traded goods relative to non-traded goods.. Harberger (1986).
[17] E.g., Rogoff (1996).

good sector. (Bergin, et al, 2006, and Ghironi and Melitz, 2005, have shown theoretically why this may be no coincidence.) Regardless of the mechanism, the empirical regularity is well-established.[18]

Having said that, individual countries can deviate very far from the Balassa-Samuelson line, especially in the short run. There has been an unfortunate tendency, among those papers that invoke the Balassa-Samuelson relationship, to try to assign it responsibility for explaining *all* variation in the relative price of nontraded goods and therefore in the real exchange rate, even in the short run. A more sensible approach would be to recognize the large temporary departures of the real exchange rate from the Balassa-Samuelson line, and to think about what causes them first to appear and then disappear gradually over time.

Fortunately, we have long had some simple models of how monetary factors can explain large temporary swings in the real exchange rate. A monetary expansion in a country with a currency peg will show up as inflation in nontraded goods prices, and therefore as real appreciation, in the short run. A devaluation will rapidly raise the domestic price of traded goods, thereby reducing the relative price of nontraded goods and showing up as a real depreciation. The Salter-Swan model originally showed these effects, and their implications for internal balance (attaining the desired trade balance) and external balance (attaining the desired point on a tradeoff between output and price level acceleration).[19]

Dornbusch (1973, 1980) extended the nontraded goods model, in research on the case of pegged countries that was once as well-known as his famous overshooting model for the case of floating countries. The extension was to marry Salter-Swan with the Monetary Approach to the Balance of Payments. No flexible-price assumptions were harmed in the making of this model: The nominal price of nontraded goods was free to adjust. But, in the aftermath of a devaluation or in the aftermath of a domestic credit contraction, the levels of reserves and money supply would lie below their long-run equilibria. Only via a balance of payments surplus could reserves flow in over time, thereby gradually raising the overall money supply and nontraded goods prices in tandem. In the long run all prices and quantities, including the real exchange rate, would be back to their equilibrium values -- but *only* in the long run. Movements in the relative price of nontraded goods that arise from money factors in the short run and from Balassa-Samuelson in the long run remain a good way to think about real exchange rates in developing countries.

2.4 Contractionary effects of devaluation

Devaluation is supposed to be expansionary for the economy, in a "Keynesian approach to the trade balance," that is, in a model where higher demand for domestic goods, whether coming from domestic residents or foreign, leads to higher output rather than higher prices. Yet, in currency crises that afflict developing countries, devaluation often seems to be associated with recession rather than expansion.

Political costs of devaluation

[18] Kravis and Lipsey (1988), De Gregorio, Giovannini and Wolf (1994), and Choudhri and Khan (2005).
[19] Salter (1959) and Swan (1963) and Corden (1994).

In a widely quoted statistic, Cooper (1971) found that political leaders often lose office in the year following devaluation. Frankel (2005) updated the estimate and verified statistical significance: A political leader in a developing country is almost twice as likely to lose office in the six months following a currency crash as otherwise. Finance ministers and central bank governors are even more vulnerable. The political unpopularity of devaluations in developing countries helps explain why policy makers often postpone devaluations until after elections.[20]

Why are devaluations so unpopular? It is often thought that they have adverse distributional effects. But the urban elites that are most important to the political process in most developing countries are more likely to benefit from the relative price effects of devaluation (an increase in the price of agricultural products relative to services) than is the rural population. One possibility is that devaluations act as a proxy for unpopular IMF austerity programs or other broad reform packages. IMF-associated austerity programs have often resulted in popular unrest. [21] I also tested the proposition that devaluations are acting as a statistical proxy for unpopular IMF austerity programs by conditioning the previous calculation on the adoption of IMF programs. The IMF program variable does not seem to raise the frequency of leader job loss, relative to devaluations that did not involve an IMF program.[22] There is more support for the hypothesis that finance ministers and central bankers are likely to lose their jobs when a devaluation is perceived as violating previous public assurances to the contrary; but this only explains part of the effect. The dominant reason appears to be that devaluations are indeed contractionary.

Empirical studies

Edwards (1986) and Acar (2000) found that devaluation in developing countries is contractionary in the first year, but then expansionary when exports and imports have had time to react to the enhanced price competiveness. (In the very long run, devaluation is presumed neutral, as prices adjust and all real effects disappear.) Bahmani-Oskooee (2006) also found some evidence of contractionary effects. For the countries hit by the East Asia crisis of 1997-98, Upadhyaya (1999) found that devaluation was at best neutral in the long run, while Chou and Chao (2001) found a contractionary effect in the short run. Ahmed, et al. (2002) find that contractionary devaluations are a property of developing countries in particular. Rajan and Shen (2006) find that devaluations are only contractionary in crisis situations, which they attribute to debt composition issues.

Connolly (1983) and Kamin (1988) did not find contractionary effects. Nunnenkamp and Schweickert (1990) rejected the hypothesis of contraction on a sample

[20] Stein and Streb (1998).

[21] For example, riots following food-subsidy cutbacks contributed to the overthrow of President Nimeiri of Sudan in 1985. Edwards and Santaella (1993) report nine cases of post-devaluation coup attempts, in a study that looks at the role of IMF presence along with various measures of political instability in determining whether devaluations during the period 1950-1971 were economically successful. Lora and Olivera (2004) find that voters punish presidents for pro-market policies and for increases in the rate of inflation, but not for exchange rate policies per se. For an earlier summary of the political consequences of IMF-type austerity programs, see Bienen and Gersovitz (1985).

[22] Conditioning on the IMF dummy variable has no discernible effect on the frequency of leader turnover. Either with or without an IMF program, the frequency of job loss following devaluations is about 20%, almost double the rate in normal times.

of 48 countries, except during the first year in the case of manufactured exports (as opposed to agricultural). Some who find no negative correlation attribute the findings of those who do to the influence of third factors such as contemporaneous expenditure-reducing policies.

Confirming a new phenomenon, Calvo and Reinhart (2001) found that exports do not increase at all after a devaluation, but rather fall for the first eight months. Perhaps firms in emerging market crises lose access to working capital and trade credit even when they are in the export business.

Effects via price pass-through

Through what channels might devaluation have contractionary effects? Several of the most important contractionary effects of an increase in the exchange rate are hypothesized to work through a corresponding increase in the domestic price of imports, or of some larger set of goods. Indeed, rapid pass-through of exchange rate changes to the prices of traded goods is the defining assumption of the "small open economy model," which has always been thought to apply fairly well to emerging market countries. The contractionary effect would then follow in any of several ways. The higher prices of traded goods could, for example, reduce real incomes of workers and therefore real consumption.[23] Or they could increase costs to producers in the non-traded goods sector, coming from either higher costs of imported inputs such as oil or higher labor costs if wages are indexed to the cost of living.[24] Krugman and Taylor (1978) added increased tariff revenue to the list of ways in which devaluation might be contractionary.[25] The higher price level could also be contractionary through the "real balance effect," which is a decline in the real money supply. The tightening of real monetary conditions, which typically shows up as an increase in the interest rate, could then exert its contractionary effect either via the demand side or via the supply side.[26]

These mechanisms were not much in evidence in the currency crashes of the 1990s. The reason is that the devaluations were not rapidly passed through to higher prices for imports, for domestic competing goods, or to the CPI in the way that the small open economy model had led us to believe. The failure of high inflation to materialize in East Asia after the 1997-98 devaluations, or even in Argentina after the 2001 devaluation, was good news. But it called for greater scrutiny of the assumption that developing countries were subject to complete and instantaneous pass-through.[27]

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[23] Diaz-Alejandro (1963) identified a loss in aggregate demand coming from a transfer of income from (low-saving) urban workers who consume traded goods, to (high-saving) rich owners of agricultural land. Barbone and Rivera-Batiz (1987) point the finger at profits of firms owned by foreign investors.

[24] References include Corbo (1985) for the context of Chile in 1981, Solimano (1985) on wage indexation, Agénor (1991) on intermediate inputs, and Hanson (1983) on both imported inputs and indexed wages.

[25] Cooper (1971) provided the original compendium of ways in which devaluation could be contractionary. Montiel and Lizondo (1989) and Morley (1992) present analytical overviews.

[26] Williamson (1991) argued that Poland's "shock therapy" of 1990 was an example of the contractionary effect of devaluation on demand. Van Wijnbergen (1986) introduced a contractionary effect on the supply side: firms in developing countries are known often to be dependent on working capital as a factor of production, and devaluation reduces the availability of that working capital.

[27] Burstein, Eichenbaum and Rebelo (2005) locate the slow adjustment to the overall price level in the non-traded sector. Burstein, Neves and Rebelo (2005) attribute slow adjustment to the insulation between dock prices of imported goods and retail prices created by distribution costs.

Balance sheet effect from currency mismatch

Balance sheet effects have become easily the most important of the various possible contractionary effects of devaluation. Banks and other firms in emerging markets often incur debt denominated in foreign currency, even while much of their revenues are in domestic currency. This situation is known as currency mismatch. When currency mismatch is combined with a major devaluation, otherwise-solvent firms have trouble servicing their debts. They may have to lay off workers and close plants, or go bankrupt altogether. Such weak balance sheets have increasingly been fingered in many models, not only as the major contractionary effect in a devaluation, but also as a fundamental cause of currency crises in the first place.[28]

A number of empirical studies have documented the balance sheet effect, in particular the finding that the combination of foreign-currency debt plus devaluation is indeed contractionary. Cavallo, Kisselev, Perri and Roubini (2004) find that the magnitude of recession is related to the product of dollar debt and percentage devaluation. Bebczuk, Galindo and Panizza (2006) find that devaluation is only contractionary for the one-fifth of developing countries with a ratio of external dollar debt to GDP in excess of 84%; it is expansionary for the rest. [29]

Why do debtor countries develop weak balance sheets in the first place? What is the origin of the currency mismatch? There are four theories. First, so-called *"Original sin:"* Investors in high-income countries are unwilling to acquire exposure in the currencies of developing countries.[30] Second, *adjustable currency pegs*: an apparently fixed exchange rate lulls borrowers into a false sense of security and so into incurring excessive unhedged dollar liabilities.[31] Third, *moral hazard*: borrowing in dollars is a way for well-connected locals to put the risk of a bad state of nature onto the government, to the extent the authorities have reserves or other claims to foreign exchange.[32]

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[28] The analytical literature on balance sheet effects and output contraction includes, but is not limited to: Caballero and Krishnamurty (2002), Calvo, Izquierdo, & Talvi (2003), Cespedes, Chang and Velasco (2000, 2003), Cespedes, Chang and Velasco (2003, 2004), Chang and Velasco (1999), Christiano, Gust and Roldos (2002), Cook (2004), Dornbusch (2002), Jeanne and Zettelmeyer (2005), Krugman (1999), Mendoza (2002), and Schneider and Tornell (2004).

[29] Calvo, Izquierdo and Meija (2004), using a sample of 32 developed and developing countries, find that openness, understood as a large supply of tradable goods, reduces the vulnerability of a given current account deficit, so that lack of openness coupled with liability dollarization are key determinants of the probability of Sudden Stops. Calvo, Izquierdo, and Talvi (2003) and Cavallo and Frankel (2008), too, stress that the required change in relative prices is larger the more closed an economy is in terms of its supply of tradable goods.

[30] The phrase was coined by Ricardo Hausmann, and was intended to capture the frustrating position of a policy-maker whose policies had been fated by history to suffer the curse of currency mismatch before he even took office. E.g., Eichengreen and Hausmann (1999) and Hausmann and Panizza (2003). Velasco (2001) is skeptical of the position that original sin deprives policy makers of monetary independence regardless of the exchange rate regime. Goldstein and Turner (2004) point out things countries can do to reduce currency mismatch.

[31] Hausmann and Panizza (2003), however, find no empirical support for an effect of exchange rate regime on original sin, only country size.

[32] E.g., Dooley (2000a); Krugman (1999); and Wei and Wu (2002).

Fourth, *procrastination of adjustment:* when the balance of payments turns negative, shifting to short-term and dollar-denominated debt are ways the government can retain the affections of foreign investors and thus postpone adjustment.[33] These mechanisms, along with running down reserves and staking ministerial credibility on holding a currency peg, are part of a strategy that is sometimes called "gambling for resurrection." What they have in common, beyond achieving the desired delay, is helping to make the crisis worse when it does come, if it comes.[34] It is harder to restore confidence after a devaluation if reserves are near zero and the ministers have lost personal credibility. Further, if the composition of the debt has shifted toward the short term, in maturity, and toward the dollar, in denomination, then restoring external balance is likely to wreak havoc with private balance sheets regardless the combination of increases in interest rate versus increases in exchange rate.

We return to these issues when considering emerging market financial crises in section 8 of this survey.

3. Inflation

3.1 High Inflation Episodes

Hyperinflation is defined by a threshold in the rate of increase in prices of 50% per month by one definition, 1000% per year by another.[35] The first two clusters of hyperinflationary episodes in the 20th century came at the ends of World War I and World War II, respectively. The third could be said to have come at the end the Cold War: in Latin America, Central Africa, and Eastern Europe.[36]

Receiving more scholarly attention, however, have been the numerous episodes of inflation that, while quite high, did not qualify as hyperinflation. As Fischer, Sahay and Vegh (2002) wrote:

> "Since 1947, hyperinflations … in market economies have been rare. Much more common have been longer inflationary processes with inflation rates above 100 percent per annum. Based on a sample of 133 countries, and using the 100 percent threshold as the basis for a definition of very high inflation episodes, … we find that (i) close to 20 percent of countries have experienced inflation above 100 percent per annum; (ii) higher inflation tends to be more unstable; (iii) in high inflation countries, the relationship between the fiscal balance and seigniorage is strong… (iv) inflation inertia decreases as average inflation rises; (v) high inflation is associated with poor macroeconomic performance; and (vi) stabilizations from high inflation that rely on the exchange rate as the nominal anchor are expansionary."

Dornbusch and Fischer (1993), after the distinction between hyperinflation and high inflation, also made a distinction between high inflation episodes and moderate inflation episodes. The dividing line between moderate and high inflation is drawn at 40%. The

[33] In other words, a country without a serious currency mismatch problem may develop one just in the year after a sudden stop in capital inflows but before the ultimate currency crash. Frankel (2005).
[34] This helps explain why the ratio of short-term foreign debt to reserves appears so often and so robustly in the literature on early warning indicators for currency crashes, discussed in Section 8 of the chapter.
[35] Dornbusch, Sturzenegger and Wolf (1977); Sachs (1987).
[36] Dornbusch and Fischer (1986).

traditional hypothesis is of course that monetary expansion and inflation elicit higher output and employment – provided the expansion is an acceleration from the past or a departure from expectations. In any case, at high rates of inflation this relationship breaks down, and the detrimental effects of price instability on growth dominate, perhaps via a disruption of the usefulness of price signals for the allocation of output.[37] Bruno and Easterly (1998) found that periods during which inflation is above the 40% threshold tend to be associated with significantly lower real growth .

Why do countries choose policies that lead to high inflation, given the detrimental effects? Seignorage or the inflation tax is one explanation. Dynamic inconsistency (low credibility) of government pledges to follow non-inflationary rates of money growth is another.

As Edwards (1994) pointed out, the modeling approach has shifted away from starting with an exogenous rate of money growth, and instead seeks to endogenize monetary policy by means of political economy and public finance. According to Cukierman, Edwards, and Tabellini (1992), for example, countries with polarized and unstable political structure find it hard to collect taxes, and so are more likely to have to resort to seignorage. Fischer (1982) found that some countries collect seignorage worth 10% of total government finance. The public finance problem is worsened by the Olivera-Tanzi effect: because of lags in tax collection, disinflation reduces the real value of tax receipts. Catao and Terrones (2005) found evidence for the inflation tax view: developing economies display a significant positive long-run effect on inflation of the fiscal deficit when it is scaled by narrow money (the inflation tax base). Easterly, Mauro and Scmidt-Hebbel (1995) pursued the Cagan logic that high inflation arises when the needed revenue exceeds that corresponding to the seignorage-maximizing rate of money growth.

3.2 Inflation stabilization programs

In almost all developing countries, inflation came down substantially during the 1990s, though many had previously undergone several unsuccessful attempts at stabilization before succeeding. High-inflation countries often had national indexation of wages and other nominal variables; removing the indexation arrangements was usually part of the successful stabilization programs.[38]

In theoretical models that had become popular with monetary economists in the 1980s, a change to a credibly firm nominal anchor would fundamentally change expectations so that all inflation, in traded and non-traded goods alike, would disappear, without loss of output in the transition. This property has not been the historical experience, however. Stabilization is usually difficult. [39]

[37] E.g., Fischer (1991, 1993).
[38] E.g., Fischer (1986, 1988).
[39] E.g., Dornbusch (1991).

Where excessive money growth is rooted in the government's need to finance itself by seignorage, one reason stabilization attempts are likely to fail is if they don't address the underlying fiscal problem.[40]

Inflation inertia is another explanation. Calvo and Vegh (1998) reviewed the literature on attempts to stabilize from high inflation and why they so often failed. Exchange-rate based stabilization attempts generally show a lot of inflation inertia.[41] As a result of the inertia, producers gradually lose price competitiveness on world markets in the years after the exchange rate target is adopted. Calvo and Vegh (1994) thus found that the recessionary effects associated with disinflation appear in the late stages of exchange rate-based programs. This is by contrast with money-based programs, in which recessionary effects show up early, as a result of tight monetary policy.

A third explanation for failed stabilization attempts is that the declaration of a money target or an exchange rate peg is not a completely credible commitment: the policy can easily be changed in the future. Thus the proclamation of a rule is not a sufficient solution to the dynamic consistency problem.[42] Some attribute inertia of inflation and the loss of output during the transitions to the imperfect credibility of such targets, and thus urge institutional restrictions that are still more binding, for example, dollarization in place of Argentina's failed quasi-currency-board. But there can be no more credibly firm nominal anchor than full dollarization. Yet when Ecuador gave up its currency in favor of the dollar, neither the inflation rate nor the price level converged rapidly to US levels. Inflationary momentum, rather, continued.

3.3 Central Bank Independence

The characteristics of underdeveloped institutions and low inflation-fighting credibility that are common afflictions among developing countries standardly lead to two prescriptions for monetary policy: that it is particularly important (i) that their central banks should have independence[43] and (ii) that they should make regular public commitments to a transparent and monitorable nominal target. These two areas, independence and targets, are considered in this and subsequent sections, respectively.

A number of emerging market countries have followed the lead of industrialized countries, and given their central banks legal independence. In Latin America the trend began with Chile, Colombia , Mexico, and Venezuela in the 1990s.[44] The Bank of Korea was made independent in 1998, following that country's currency crisis. Many other developing countries have moved in the same direction.[45]

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[40] Cukeriman (2008); Burnside, Eichenbaum and Rebelo (2006). Sachs (1987) argued that Bolivia's 1985 stabilization achieved credibility because the budget gap was closed.
[41] E.g., Kiguel and Liviatan (1992) and Uribe (1997).
[42] The originators of the dynamic consistency analysis were Barro and Gordon (1983), Calvo (1988), and Kydland and Prescott (1977).
[43] E.g., Cukierman, Miller and Neyapti (2002).
[44] Junguito and Vargas (1996).
[45] Arnone, Laurens and Segalotto (2006).

Does institutional insulation of the central bank from political pressure help to bring down inflation, at lower cost to output than otherwise? Cukierman, Webb and Neyapti (1992) lay out three measures of Central Bank Independence (CBI) and present the resultant indices for 72 countries. As with currency regimes (section 5.4 of the chapter), it is not necessarily enough to look at whether the central bank has de jure or legal independence. The three indices are: legal independence, turnover of governors of central banks, and an index derived from a questionnaire that the authors had asked monetary policy makers fill out. The authors find that de jure status is sufficient -- legal measures are important determinants of low inflation -- in developed countries, but *not in developing countries*. Conversely, turnover of central bank governors is strongly correlated with inflation in developing countries. The implication is that independence is important for all, but the distinction between de jure independence and de facto independence is necessary in developing countries. Haan and Kooi (2000), in a sample of 82 countries in the 1980s, including some with very high inflation, find that CBI as measured by governor turnover can reduce inflation. Cukierman, Miller and Neyapti (2002) report that the countries in transition out of socialism in the 1990s made their central banks independent, which eventually helped bring down inflation.

Crowe and Meade (2008) examine CBI in an updated data set with a broad sample of countries. They find that increases in CBI have tended to occur in more democratic countries and in countries with high levels of past inflation. Their study has a time series dimension, beyond the usual cross section, and uses instrumental variable estimation to seek to address the thorny problem that CBI might not be causally related to low inflation, if both result from a third factor (political priority on low inflation). The finding: greater CBI is associated with lower inflation. Gutiérez (2003) and Jácome and Vázquez (2008) also find a negative statistical relationship between central bank independence and inflation among Latin American and Caribbean countries. Haan, Masciandaro, and Quintyn (2008) find that central bank independence lowers the mean and variance of inflation with no effect on the mean and variance of output growth.

There are also some skeptics, however. Mas (1995) argues that central bank independence won't be helpful if a country's political economy dictates budget deficits regardless of monetary policy. Landström (2008) finds little effect from CBI.

4. Nominal targets for monetary policy

The principle of commitment to a nominal anchor in itself says nothing about what economic variables are best suited to play that role. In a non-stochastic model, any nominal variable is as good a choice for monetary target as any other nominal variable. But in a stochastic model, not to mention the real world, it makes quite a difference what is the nominal variable toward which the monetary authorities publicly commit in advance.[46] Should it be the money supply? Exchange rate? CPI? Other alternatives? The ex ante choice will carry big ex post implications for such important variables as real income.

[46] Rogoff (1985) may be the best reference for the familiar point that the choice of nominal target ex ante makes a big difference in the presence of ex post shocks.

Inflation, the exchange rate, and the money supply are all well-represented among developing countries' choices of nominal targets.[47] The choice of what variable should serve as nominal anchor is explored next.

4.1 The move from money targeting to exchange rate targeting

Inflation peaked in the median emerging market country overall around 1990, about ten years behind the peak in industrialized countries..

Many developing countries attempted to bring down high inflation rates in the 1980s, but most of these stabilization programs failed. Some were based on orthodox money growth targets. Enthusiasm for monetarism largely died out by the end of the1980s, perhaps because M1 targets had recently proven unrealistically restrictive in the largest industrialized countries. Even from the viewpoint of the proverbial conservative central banker who cares only about inflation, public promises to hit targets that cannot usually be fulfilled subsequently will do little to establish credibility. The Bundesbank had enough credibility that a long record of proclaiming M1 targets and then missing them did little to undermine its conservative reputation or expectations of low inflation in Germany. Developing countries in general do not enjoy the same luxury.

When improved price stability was finally achieved in countries that had undergone very high inflation and repeated failed stabilization attempts in the 1980s, the exchange rate was usually the nominal anchor around which the successful stabilization programs were built.[48] Examples include Chile's tablita, Bolivia's exchange rate target, Israel's stabilization, Argentina's convertibility plan, and Brazil's real plan. (The advantages, and disadvantages of fixed exchange rates for emerging markets are discussed in section 5.)

But matters continued to evolve subsequently.

4.2 The move from exchange rate targeting to inflation targeting

The series of emerging market currency crises that began in December 1994 and ended in January 2002 all involved the abandonment of exchange rate targets, in favor of more flexible currency regimes, if not outright floating. In many countries, the abandonment of a cherished exchange rate anchor for monetary policy took place under the urgent circumstances of a speculative attack (including Mexico and Argentina). A few countries made the jump to floating preemptively, before a currency crisis could hit (Chile and Colombia). Only a very few smaller countries responded to the ever rougher seas of international financial markets by moving in the opposite direction, to full dollarization (Ecuador) or currency boards (Bulgaria).

From the longer-term perspective of the four decades since 1971, the general trend has been in favor of floating exchange rates.[49] But if the exchange rate is not to be the nominal anchor, then some other variable should play this role.[50]

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[47] Mishkin and Savastano (2002).

[48] Atkeson and Kehoe (2001) argue that money targeting does not allow the public to monitor central bank behavior as well as exchange rate targeting does.

[49] Collins (1996); Larrain and Velasco (2001); Chang and Velasco (2000).

With exchange rate targets tarnished by the end of the 1990s, monetarism out of favor, and the gold standard having earlier been relegated to the scrap heap of history, there was a clear vacancy for the position of Preferred Nominal Anchor. The regime of Inflation Targeting (IT) was a fresh young face, coming with an already-impressive resumé of recent successes in wealthier countries (New Zealand, Canada, United Kingdom, and Sweden). IT got the job. Brazil, Chile, Colombia and Mexico switched from exchange rate targets to Inflation Targeting in 1999,[51] the Czech Republic, Hungary and Poland about the same time, as well as Israel, Korea, South Africa, and Thailand**.** Mexico followed in 2000, then Indonesia and Romania in 2005 and Turkey in 2006.[52]

In many ways, Inflation Targeting has functioned well. It apparently anchored expectations and avoided a return to inflation in Brazil, for example, despite two severe challenges: the 50% depreciation of early 1999, as the country exited from the real plan, and the similarly large depreciation of 2002, when a presidential candidate who at the time was considered anti-market and inflationary pulled ahead in the polls.[53]

One might argue, however, that the events of 2007-2009 put strains on the Inflation Targeting regime in the way that the events of 1994-2001 had earlier put strains on the regime of exchange rate targeting. Three other kinds of nominal variables have forced their way into the attentions of central bankers, beyond the CPI. One nominal variable, the exchange rate, never really left – certainly not for the smaller countries. A second category of nominal variables, prices of agricultural and mineral products, is particularly relevant for many developing countries. The greatly heightened volatility of commodity prices in the 2000s decade, culminating in the spike of 2008, resurrected arguments about the desirability of a currency regime that accommodates terms of trade shocks. A third category, prices of assets such as equities and real estate, has been especially relevant in industrialized countries, but not just there.[54] The international financial upheaval that began in mid-2007 with the US sub-prime mortgage crisis has forced central bankers everywhere to re-think their exclusive focus on inflation to the exclusion of asset prices.

Proponents of IT have always left themselves the loophole of conceding that central banks should pay attention to other variables such as exchange rates, asset prices, commodity prices to the extent that they portend future inflation. In many of the last century's biggest bubbles and crashes, however, monetary policy that in retrospect had been too expansionary pre-crisis never showed up as goods inflation, only as asset inflation. Central bankers tend to insist that it is not the job of monetary policy to address

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[50] Baillu, Lafrance and Perrault (2003) and Svensson (2000) emphasized this point.

[51] Loayza and Soto (2002) and Schmidt-Hebbel and Werner (2002). (Chile had started announcing inflation targets earlier, but kept a BBC exchange rate regime until 1999.)

[52] Rose (2007).

[53] Giavazzi, Goldfajn, and Herrera (2005).

[54] Caballero and Krishnamurthy (2006), Edison, Luangaram, and Miller (2000), Aizenman and Jinjarak (2009) and Mendoza and Terrones (2008) explore how credit booms lead to rising asset prices in emerging markets, often preceded by capital inflows and followed by financial crises.

asset prices. E.g., De Gregorio (2009) makes the point that asset bubbles can be addressed with tools other than monetary policy.

Fraga, Goldfajn and Minella (2003) found that inflation-targeting central banks in emerging market countries miss their declared targets by far more than they do in industrialized countries. Most analysis of Inflation Targeting is better suited to large industrialized countries than to developing countries, in several respects.[55] First, the theoretical models usually do not feature a role for exogenous shocks in trade conditions or difficulties in the external accounts. The theories tend to assume that countries need not worry about financing trade deficits internationally, presumably because international capital markets function well enough to smooth consumption in the face of external shocks. But for developing countries, international capital markets often *exacerbate* external shocks, rather than the opposite. Booms, featuring capital inflows, excessive currency overvaluation and associated current account deficits are often followed by busts, featuring sudden stops in inflows, abrupt depreciation, and recession.[56] An analysis of alternative monetary policies that did not take into account the international financial crises of 1982, 1994-2001 or 2008-09, would not be useful to policy makers in emerging market countries.

Capital flows are prone to exacerbate fluctuations in particular when the source of the fluctuations is trade shocks. This observation leads us to the next relevant respect in which developing countries differ from industrialized countries.

IT can be vulnerable to the consequences of supply shocks, which tend to be larger for developing countries for reasons already noted in Section 1. As has been shown by a variety of authors, Inflation Targeting (defined narrowly) is not robust with respect to supply shocks.[57] Under strict IT, to prevent the price index from rising in the face of an adverse supply shock, monetary policy must tighten so much that the entire brunt of the fall in nominal GDP is borne by real GDP. Most reasonable objective functions would, instead, tell the monetary authorities to allow part of the temporary shock to show up as an increase in the price level. Of course this is precisely the reason why many IT proponents favor *flexible* inflation targeting, often in the form of the Taylor Rule, which does indeed call for the central bank to share the pain between inflation and output.[58] It is also a reason for pointing to the "core" CPI rather than "headline" CPI.

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[55] This is not to forget the many studies of inflation targeting for emerging market and developing countries, most of them favorable. Savastano (2000) offered a concise summary of much of the research as of that date. Amato and Gerlach (2002) and Masson, Savastano, and Sharma (1997) argued that IT can be good for emerging markets, but only after certain conditions such as freedom from fiscal dominance are satisfied. Batini and Laxton (2006) argue that pre-conditions have not been necessary. Laxton and Pesenti (2003) conclude that because central banks in emerging market countries (such as Czechoslovakia) tend to have lower credibility, they need to move the interest rate more strongly in response to movements in forecasted inflation than a rich country would. Others include Debelle (2001); De Gregrio (2009); Gonçalves and Salles (2008), Goodfriend and Prasad (2007); Hammond, Kanbur, Prasad (2009); Jonas and Mishkin (2005); Mishkin (2000; 2008); and Mishkin and Schmidt-Hebbel (2007).

[56] Kaminsky, Reinhart and Vegh (2005); Reinhart and Reinhart (2009); Gavin, Hausmann, Perotti and Talvi (1997).

[57] Among other examples: Frankel (1995b) and Frankel, Smit, and Sturzenegger (2007).

[58] E.g., Svensson (2000).

4.3 "Headline" CPI, Core CPI, and Nominal Income Targeting

In practice, Inflation-Targeting central bankers usually respond to large temporary shocks in import prices for oil and other agricultural and mineral products as they should: by trying to exclude them from the measure of the CPI that is targeted.[59] Central banks have two approaches to doing this. Some explain ex ante that their target for the year is inflation in the Core CPI, a measure that excludes volatile components, usually food and energy products. The virtue of this approach is that the central banks are able to abide by their commitment to core CPI when the supply shock comes (assuming the supply shock is located in the farm or energy sectors; it doesn't work, for example, if the shock is labor unrest or power failures that shut down urban activity). The disadvantage of declaring core CPI as the official target is that the person in the street is less likely to understand it, compared to the simple CPI. Transparency and communication of a target that the public can monitor are the original reasons for declaring a specific nominal target in the first place.

The alternative approach is to talk about the CPI *ex ante*, but then in the face of an adverse supply shock explain *ex post* that the increase in farm or energy prices is being excluded due to special circumstances. This strategy is questionable from the standpoint of credibility. The people in the street are told that they shouldn't be concerned by the increase in the CPI because it is "only" occurring in the prices of filling up their car fuel tanks and buying their weekly groceries. Either way, ex ante or ex post, the effort to explain away supply-induced fluctuations in the CPI undermines the credibility of the monetary authorities. This credibility problem is especially severe in countries where there are grounds for suspecting that government officials already fiddle with the consumer price indices for political purposes.

One variable that fits the desirable characteristics of a nominal target is nominal GDP. Nominal income targeting is a regime that has the attractive property of taking supply shocks partly as P and partly as Y, without forcing the central bank to abandon the declared nominal anchor. It was popular with macroeconomists in the 1980s.[60] Some claimed it was less applicable to developing countries because of long lags and large statistical errors in measurement. But these measurement problems are smaller than they used to be. Furthermore, the fact that developing countries are more vulnerable to supply shocks than are industrialized countries suggests that the proposal to target nominal income is *more* applicable to them, not less, as McKibbin and Singh (2003) have pointed out.

In any case, and for whatever reason, nominal income targeting has not been seriously considered since the 1990s, either by rich countries or poor.

5. Exchange Rate Regimes

[59] Devereux, Lane, and Xu (2006) show theoretically, advantages of targeting non-traded goods to the extent that exchange rate pass-through is high (as in section 2.1).

[60] It was easier to see the superiority of nominal GDP targeting when the status quo was M1 targeting . (The proposal for nominal income targeting might have been better received by central banks if it had been called "Velocity-Shift-Adjusted Money Targeting.")

Many Inflation-Targeting central banks in developing countries have all along put more emphasis on the exchange rate than they officially admitted. This tendency is the famous Fear of Floating of Reinhart (2000) and Calvo and Reinhart (2000, 2002).[61] When booming markets for their export commodities put upward pressure on their currencies (2003-2008), they intervene to dampen appreciation. Then, when crisis hits, the country may intervene to dampen the depreciation of their currencies. Central banks still do – and should – pay a lot of attention to their exchange rates. The point applies to the entire spectrum from managed floaters to peggers. Fixed exchange rates are still an option to be considered for many countries, especially small ones.[62]

5.1 The advantages of fixed exchange rates

For very small countries, full dollarization remains one option, or joining the euro, for those in Europe. The success of EMU has inspired regional groupings of developing countries in various parts of the world to discuss the possibility of trying to follow a similar path.[63]

Fixed exchange rates have many advantages, in addition to their use as a nominal anchor for monetary policy. They reduce transactions costs and exchange risk, which in turn facilitates international trade and investment. This is especially true for institutionally locked-in arrangements, such as currency boards[64] and dollarization.[65] Influential research by Rose (2000) and others over the last decade has shown that fixed exchange rates and, especially, monetary unions for developing countries, increase trade and investment substantially. In addition fixed exchange rates avoid the speculative bubbles to which floating exchange rates are occasionally subject.

5.2 The advantages of floating exchange rates

Of course fixed exchange rates have disadvantages too. Most importantly, to the extent financial markets are integrated, a fixed exchange rate means giving up monetary independence; the central bank can't increase the money supply, lower the interest rate, or devalue the currency, in response to a downturn in demand for its output.

It has been argued that developing countries have misused monetary discretion more often than they have used it to achieve the textbook objectives. But a second disadvantage of a fixed rate presupposes no discretionary abilities: it means giving up the

[61] Among the possible reasons for aversion to floating, Calvo and Reinhart (2002) emphasize high pass-through and contractionary depreciations.

[62] Meanwhile, in response to the global financial crisis of 2007-09, small countries on the periphery of Europe felt newly attracted to the idea of rapid adoption of the euro (Iceland and some Central European countries).

[63] Bayoumi and Eichengreen (1994) and Levy Yeyati and Sturzennegger (2000) apply OCA criteria to a number of relevant regions. Bayoumi and Eichengreen (1999) and Goto and Hamada (1994) for Asia.

[64] Ghosh, Gulde and Wolf (2000), Hanke and Schuler (1995) and Williamson (1995).

[65] Calvo (2002) and Schmitt-Grohe and Uribe (2001).

automatic accommodation to supply shocks that floating gives,[66] especially trade shocks: a depreciation when world market conditions for the export commodity weaken, and vice versa.[67] Berg, Borensztein, and Mauro (2003) say it well:

> "Another characteristic of a well-functioning floating exchange rate is that it responds appropriately to external shocks. When the terms of trade decline, for example, it makes sense for the country's nominal exchange rate to weaken, thereby facilitating the required relative price adjustment. Emerging market floating exchange rate countries do, in fact, react in this way to negative terms of trade shocks. In a large sample of developing countries over the past three decades, countries that have fixed exchange rate regimes and that face negative terms of trade shocks achieve real exchange rate depreciations only with a lag of two years while suffering large real GDP declines. By contrast, countries with floating rates display large nominal and real depreciations on impact and later suffer some inflation but much smaller output losses."

Besides the inability to respond monetarily to shocks, there are three more disadvantages of rigidity in exchange rate arrangements. It can impair the central bank's lender of last resort capabilities in the event of a crisis in the banking sector, as Argentina demonstrated in 2001. It entails a loss of seignorage, especially for a country that goes all the way to dollarization. For a country that stops short of full dollarization, pegged exchange rates are occasionally subject to unprovoked speculative attacks (of the "second-generation" type[68]).

Some who see costly speculative attacks as originating in the maturity mismatch problem suggest that exchange rate variability is beneficial in that it forces borrowers to confront the risks of foreign-currency-denominated debt. The warning is that the choice of an adjustable peg regime, or other intermediate exchange rate regime, leads to dangerously high unhedged foreign-currency borrowing. It is argued that a floating regime would force borrowers to confront explicitly the existence of exchange rate risk, and thereby reduce unhedged foreign-currency borrowing.[69] This sounds like an argument that governments should introduce gratuitous volatility because private financial agents underestimate risk. But some models establish this advantage of floating, even with rational expectations and only uncertainty that is generated only by fundamentals.[70]

5.3 Evaluating overall exchange rate regime choices

Econometric attempts to discern what sort of regime generically delivers the best economic performance across countries – firmly fixed, floating, or intermediate – have not been successful. To pick three, Ghosh, Gulde and Wolf (2000) find that firm fixers perform the best, Levy-Yeyati and Sturzenegger (2003) that floaters do the best, and Reinhart and Rogoff (2004) that intermediate managed floats work the best! Why the stark discrepancy? One reason is differences in how the studies classify de facto

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[66] Ramcharan (2007) finds support for the advantage of floating in response to supply shocks, for the case of natural disasters.

[67] Among peggers, terms-of-trade shocks are amplified and long-run growth is reduced, as compared to flexible-rate countries, according to Edwards and Yeyati (2005). Also see Broda (2004).

[68] Chang and Velasco (1997). The generations of speculative attack models are explained below.

[69] Céspedes, Chang and Velasco (2004) and Eichengreen (1999, p. 105).

[70] Chamon and Hausmann (2005), Chang and Velasco (2004), Jeanne (2005), and Pathak and Tirole (2004)

exchange rate regimes. (To be discussed in the next section.) But another reason is that the virtues of alternative regimes depend on the circumstances of the country in question. No single exchange rate regime is right for all countries.

A list of Optimum Currency Area criteria that qualify a country for a relatively firm fixed exchange rate, versus a more flexible rate, should include these eight characteristics:[71]

1. Small size.
2. Openness, as reflected, for example, in the ratio of tradable goods to GDP.[72] The existence of a major-currency partner with whom bilateral trade, investment and other activities are already high, or are hoped to be high in the future, would also work in favor of a fixed rate..
3. "Symmetry of shocks," meaning high correlation of cyclical fluctuations (particularly demand shocks) in the home country and in the country that determines policy regarding the money to which pegging is contemplated. This is important because, if the domestic country is to give up the ability to follow its own monetary policy, it is better if the interest rates chosen by the larger partner are more often close to those that the domestic country would have chosen anyway.[73]
4. Labor mobility.[74] When monetary response to an asymmetric shock has been precluded, it is useful if workers can move from the high-unemployment country to the low-unemployment countries. This is the primary mechanism of adjustment across states within the monetary union which is the United States.
5. Countercyclical remittances. Emigrant's remittances (i) constitute a large share of foreign exchange earnings in many developing countries, (ii) are variable, (iii) appear to be countercyclical.[75] That remittances apparently respond to the difference between the cyclical positions of the sending and receiving country, makes it a bit easier to give up the option of responding to shocks by setting monetary policies different from those of the partner.
6. Countercyclical fiscal transfers. Within the United States, if one region suffers an economic downturn, the federal fiscal system cushions it; one estimate is that for every dollar fall in the income of a stricken state, disposable income falls by only an estimated 70 cents. Such fiscal cushions are largely absent at the international level, with the possible exception of the role of France in the Communité Financière Afrique. (Even where substantial transfers exist, they are rarely countercyclical.)

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[71] Four surveys offering a more complete discussion of the choice of exchange rate regime and further references are: Edwards (2002) , Edwards and Savastano (1999), Frankel (2004) and Rogoff (2004).

[72] The classic reference is McKinnon (1963).

[73] Mundell (1961); Eichengreen (1999).

[74] The classic reference is Mundell (1961).

[75] Only the countercyclicality is in need of documentation. Clarke and Wallstein (2004) find that remittance receipts go up in response to a natural disaster. Kapur (2003) finds that they go up in response to an economic downturn. Yang and Choi (2007) find that they respond to rainfall-induced economic fluctuations. Frankel (2009) finds that bilateral remittances respond to the differential in sender-receiver cyclical conditions. Some other authors, however, do not find evidence of such countercyclicality.

7. Well-developed financial system.[76]
8. Political willingness to give up some monetary sovereignty. Some countries look on their currency with the same sense of patriotism with which they look on their flag.

5.4 Categorizing exchange rate regimes

It is by now well-known that attempts to categorize countries' choice of regime (into fixed, floating, and intermediate) in practice differ from the official categorization. Countries that say they are floating, in reality often are not.[77] Countries that say they are fixed, in reality often are not.[78] Countries that say they have a Band Basket Crawl (BBC) regime, often do not.[79]

There are a variety of attempts to classify de facto regimes. Some seek to infer the degree of exchange rate flexibility around the anchor; others seem to infer what is the anchor.[80] Pure de facto studies look only at the times series of exchange rates and reserves[81]; others pay more attention to other information, including what the country says.[82] Less well-known is that the de facto classification regimes do not agree among themselves. The correlation of de facto classification attempts with each other is generally as low as the correlation with the IMF's official classification scheme.[83]

Indeed, neat categorization may not be possible at all. That Argentina was in the end forced to abandon its currency board, in 2001, also dramatizes the lesson that the choice of exchange rate regime is not as permanent or deep as had previously been thought. The choice of exchange rate regime is more likely endogenous with respect to institutions, rather than the other way around.[84]

5.5 The Corners Hypothesis

The "corners hypothesis" — that countries are, or should be, moving away from the intermediate regimes, in favor of either the hard peg corner or the floating corner — was proposed by Eichengreen (1993) and rapidly became the new conventional wisdom with the emerging market crises of the late 1990s.[85] But it never had a good theoretical

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[76] Husain, Mody and Rogoff (2005)and Aghion, Bacchetta, Ranciere, and Rogoff (2009) find that countries appear to benefit by having increasingly flexible exchange rate systems as they become richer and more financially developed.

[77] Calvo and Reinhart (2002).
[78] Obstfeld and Rogoff (1995).
[79] Frankel, Schmukler and Servén (2000), Frankel and Wei (2007).
[80] Frankel and Wei (2008).
[81] These include Calvo and Reinhart (2000, 2002), Levy-Yeyati and Sturzenegger (2001, 2003a,b, 2005), and Shambaugh (2004).
[82] These include Ghosh, Gulde and Wolf (2000, 2002) and Reinhart and Rogoff (2003, 2004).
[83] Benassy et al (2004) and Frankel (2004).
[84] Alesina and Wagner (2003) and Calvo and Mishkin (2003).
[85] Fischer (2001), Council on Foreign Relations (1999), and Meltzer (2000).

foundation.[86] It subsequently lost popularity. Perhaps it is another casualty of the realization that no regime choice is in reality permanent, and that investors know that.[87] In any case, many countries continue to follow intermediate regimes such as band-basket-crawl, and do not seem any the worse for it.

6. Procyclicality

As noted in the introduction, one structural feature that tends to differentiate developing countries from industrialized countries is the magnitude of cyclical fluctuations. This is in part due to the role of factors that "should" moderate the cycle, but in practice seldom do that. If anything, they tend to exacerbate booms and busts instead: procyclical capital flows, procyclical monetary and fiscal policy, and the related Dutch Disease. The hope that improved policies or institutions might reduce this procyclicality makes this one of the most potentially fruitful avenues of research in emerging market macroeconomics.

6.1 The procyclicality of capital flows in developing countries

According to the theory of intertemporal optimization, countries should borrow during temporary downturns, to sustain consumption and investment, and should repay or accumulate net foreign assets during temporary upturns. In practice, it does not tend to work this way. Capital flows are more often procyclical than countercyclical.[88] Most theories to explain this involve imperfections in capital markets, such as asymmetric information or the need for collateral. Aguiar and Gopinath (2006, 2007), however, demonstrate that the observation of procyclical current accounts in developing countries might be explained in an optimizing model if shocks take the form of changes in the permanent trend of productivity rather than temporary cyclical deviations from trend.

One interpretation of procyclical capital flows is that they result from procyclical fiscal policy: when governments increase spending in booms, some of the deficit is financed by borrowing from abroad. When they are forced to cut spending in downturns, it is to repay some of the excessive debt that the incurred during the upturn. Another interpretation of procyclical capital flows to developing countries is that they pertain especially to exporters of agricultural and mineral commodities, especially oil. We consider procyclical fiscal policy in the next sub-section, and the commodity cycle (Dutch disease) in the one after.

6.2 The procyclicality of demand policy

The procyclicality of fiscal policy

[86] The feeling that an intermediate degree of exchange rate flexibility is inconsistent with perfect capital mobility is a misinterpretation of the principle of the Impossible Trinity. To take a clear example, Krugman (1991) shows theoretically that a target zone is entirely compatible with uncovered interest parity. Williamson (1996, 2001) favors intermediate exchange rate regimes for emerging markets.

[87] Reinhart and Reinhart (2003).

[88] Kaminsky, Reinhart, and Vegh (2005); Reinhart and Reinhart (2009); Perry (2009); Gavin, Hausmann, Perotti and Talvi (1996); and Mendoza and Terrones (2008).

Various authors have documented that fiscal policy tends to be procyclical in developing countries, in comparison with industrialized countries.[89] Most studies look at the procyclicality of government spending, because tax receipts are particularly endogenous with respect to the business cycle. Indeed, an important reason for procyclical spending is precisely that government receipts from taxes or royalities rise in booms, and the government cannot resist the temptation or political pressure to increase spending proportionately, or even more than proportionately.

The political business cycle

The political business cycle is the hypothesized tendency of governments to adopt expansionary fiscal policies, and often monetary policies as well, in election years. In this context, the fiscal expansion takes the form of tax cuts as easily as spending increases. The theory was originally designed with advanced countries in mind. Some comprehensive empirical studies find evidence that the political budget cycle is present in both developed and less-developed countries. But developing countries are thought to be even more susceptible to the political business cycle than advanced countries.[90]

One interpretation is that institutions such as constitutional separation of powers in the budget process are necessary to resist procyclical fiscal policy, and these institutions are more often lacking in developing countries.[91] Brender and Drazen (2005) offer another interpretation: the finding of a political budget cycle in a large cross-section of countries is driven by the experience of ''new democracies'' – most of which are developing or transition countries -- where fiscal manipulation by the incumbent government succeeds politically because voters are inexperienced with elections. They find that once these countries are removed from the larger sample, the political fiscal cycle disappears.

The procyclicality of monetary policy

Countercyclical monetary policy is difficult to achieve, particularly because of lags and uncertainty. For this reason, it is often suggested that the advantages of discretion in monetary policy are not large enough to outweigh disadvantages, such as the inflation bias from dynamic inconsistency, especially for developing countries. Hence the support for the tying of hands and committing to a nominal target.

Taking as given, however, some degree of commitment to a nominal target, it would seem to be self-defeating to choose a nominal target that could build unnecessary procyclicality into the automatic monetary mechanism. But this is what inflation targeting does in the case of supply shocks. Again, where terms of trade fluctuations are important, it would be better to choose a nominal anchor that accommodates terms of trade shocks rather than exacerbating them.

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[89] Gavin and Perotti(1997), Lane and Tornell (1999), Tornell and Lane (1999), Kaminsky, Reinhart, and Vegh (2004), Talvi and Végh (2005), Alesina, Campante and Tabellini (2008), and Mendoza and Oviedo (2006).

[90] Persson and Tabellini (2003, chapter 8) use data from 60 democracies over the period 1960-1998. Shi and Svensson (2006) use data from 91 countries over the period 1975–1995 Also Schuknecht (1996). Drazen (2001) offers an overview.

[91] Saporiti and Streb (2003). Alesina, Hausmann, Hommes and Stein (1999) study fiscal institutions.

6.3 Commodities and the Dutch Disease

Clear examples of countries with very high export price volatility are those specialized in the production of oil, copper, or coffee, which periodically experience swings in world market conditions that double or halve their prices.

The Dutch Disease refers to some possibly unpleasant side effects of a boom in peteroleum or other mineral and agricultural commodities.[92] It arises when a strong, but perhaps temporary, upward swing in the world price of the export commodity causes the following pattern: a large real appreciation in the currency, an increase in spending (in particular, the government increases spending in response to the increased availability of tax receipts or royalties[93]), an increase in the price of nontraded goods relative to non-export-commodity traded goods, a resultant shift of resources out of non-export-commodity traded goods, and a current account deficit . When the adversely affected tradable goods are in the manufacturing sector, the feared effect is deindustrialization. In a real model, the reallocation of resources across tradable sectors may be the inevitable consequence of a global increase in the real commodity price. But the movement into non-traded goods is macroeconomic. That it is all painfully reversed when the world price of the export commodity goes back down is what makes this a disease, particularly if the complete cycle is not adequately foreseen.

Other examples of the Dutch Disease arise from commodity booms due to the discovery of new deposits or some other expansion in supply, leading to a trade surplus via exports or a capital account surplus via inward investment to develop the new resource. In addition, the term is also used by analogy for other sorts of inflows such as the receipt of transfers (foreign aid or remittances) or a stabilization-induced capital inflow. In all cases, the result is real appreciation and a shift into nontradables, and away from (non-commodity) tradables. The real appreciation takes the form of a nominal appreciation if the exchange rate is flexible, and inflation if the exchange rate is fixed.

A wide variety of policy measures have been proposed, and some adopted, to cope with the commodity cycle.[94] Some of the most important are institutions to insure that export earnings are put aside during the boom time, into a commodity saving fund, perhaps with the aid of rules governing the cyclically adjusted budget surplus.[95] Other proposals include using futures markets to hedge the price of the commodity and indexing debt to the price.

6.4. Product-oriented choices for price index by inflation-targeters

Of the possible price indices that a central bank could target, the CPI is the usual choice. The CPI is indeed the logical candidate to be the measure of the inflation objective for the long-term. But it may not be the best choice for intermediate target on

[92] E.g., Corden (1984). Frankel (2010) is a survey of the Dutch Disease and the more general Natural Resource Curse.
[93] E.g., Lane and Tornell (1998).
[94] E.g., Sachs (2007).
[95] Davis et al (2001). Chile's rule adjusts the budget surplus for the deviation of the copper price from its long run value as well as GDP from potential, with two panels making the determination.

an annual basis. We have already noted that IT is not designed to be robust with respect to supply shocks. If the supply shocks are terms of trade shocks, then the choice of CPI to be the price index on which IT focuses is particularly inappropriate.

Proponents of inflation targeting may not have considered the implications of the choice between the CPI and production-oriented price indices in light of terms of trade shocks. One reason may be that the difference is not, in fact, as important for large industrialized countries as for small developing countries, especially those that export mineral and agricultural commodities.

A CPI target, if implemented literally, can be destabilizing for a country subject to terms of trade volatility. It calls for monetary tightening and currency appreciation when the price of the imported good goes up on world markets, but not when the price of the export commodity goes up on world markets – precisely the opposite of the desired pattern of response to terms of trade movements. The alternative to the choice of CPI as price target is an output-based price index such as the PPI, the GDP deflator, or an index of export prices. The important difference is that imported goods show up in the CPI, but not in the output-based price indices; and vice versa for exported goods: they show up in the output-based prices but much less in the CPI.

Terms of trade shocks for small countries can take two forms: a fluctuation in the nominal price (i.e., dollar price) of export goods on world markets and a fluctuation in the nominal price of import goods on world markets. Consider each in turn.

Export price shocks

A traditional textbook advantage of floating exchange rates applies to commodity exporters in particular. When world demand for the export commodity falls, the currency tends to depreciate, thus ameliorating the adverse effect on the current account balance and output. When world demand for the export commodity rises, the currency tends to appreciate, thus ameliorating the inflationary impact. One possible interpretation of the emerging market crises of the 1990s is that declines in world market conditions for oil and consumer electronics, exacerbated by a procyclical falloff in capital flows into emerging market countries that exported these products, eventually forced the abandonment of exchange rate targets. The same devaluations could have been achieved much less painfully if they had come automatically, in tandem with the decline in commodity export prices.

It is evident that a fixed exchange rate necessarily requires giving up the automatic accommodation of terms of trade shocks. A CPI target requires giving up accommodation of trade shocks as well; but needlessly so. A form of inflation targeting that focused on an export price index or product price index would experience an automatic appreciation in response to an increase in the world price of the export commodity: in the absence of such an appreciation, the price index would rise, requiring the monetary authorities to tighten. Thus the succinct argument for targeting a product-oriented index is that it offers the best of both worlds: the automatic accommodation of terms of trade shocks that floating promises, as well as the nominal anchor that an exchange rate target or inflation target promise.

Do inflation targeters react perversely to import price shocks?

For countries that import oil rather than export it, a major source of terms of trade fluctuations takes the form of variation in world oil prices. As Part 4 noted, there is a danger that CPI targeting, if interpreted too literally by central bankers, would force them to respond to an increase in the dollar price of their import goods by contracting their money supply enough to appreciate their currencies proportionately.

Given the value that most central bankers place on transparency and their reputations, it would be surprising if their public emphasis on the CPI did not lead them to be at least a bit more contractionary in response to adverse supply shocks, and expansionary in response to favorable supply shocks, than they would be otherwise. In other words, it would be surprising if they felt able to take full advantage of the escape clause offered by the idea of core CPI. There is some reason to think that this is indeed the case. A simple statistic: the exchange rates of inflation-targeting countries (in dollars per national currency) are positively correlated with the dollar price on world markets of their import baskets. Why is this fact revealing? The currency should not respond to an increase in world prices of its imports by appreciating, to the extent that these central banks target core CPI (and to the extent that the commodities excluded by core CPI include all imported commodities that experience world price shocks, which is a big qualifier). *If anything, floating currencies should depreciate in response to such an adverse terms of trade shock.* When these IT currencies respond by appreciating instead, it suggests that the central bank is tightening monetary policy to reduce upward pressure on the CPI.

Every one of the inflation targeters in Latin America shows a monthly correlation between dollar prices of imported oil and the dollar values of their currencies that is both positive over the period 2000-2008 and greater than the correlation during the pre-IT period.[96] The evidence supports the idea that inflation targeters – in particular, Brazil, Chile and Peru -- tend to react to the positive oil shocks of the past decade by tightening monetary policy and thereby appreciating their currencies. The implication seems to be that the CPI which they target does not in practice entirely exclude oil price shocks.

What is wanted as candidate for nominal target is a variable that is simpler for the public to understand *ex ante* than core CPI, and yet that is robust with respect to supply shocks. Being robust with respect to supply shocks means that the central bank should not have to choose *ex post* between two unpalatable alternatives: an unnecessary economy-damaging recession or an embarrassing credibility-damaging violation of the declared target.

PEP and PP targeting

The idea of producer price targeting (PPT) is a moderate version of a more exotic proposed monetary regime called Peg the Export Price – or PEP, for short. Under the PEP proposal, a copper producer would peg it currency to copper, an oil producer would peg to oil, a coffee producer to coffee, etc.[97]

[96] Frankel (2009b).
[97] Frankel (2003, 2005).

How would PEP work operationally? Conceptually, one can imagine the government holding reserves of gold or copper or oil, and buying and selling the commodity whenever necessary to keep the price fixed in terms of local currency. Operationally, a more practical method would be for the central bank each day to announce an exchange rate vis-à-vis the dollar, following the rule that the day's exchange rate target (dollars per local currency unit) moves precisely in proportion to the day's price of gold or copper or oil on the New York market (dollars per commodity). Then the central bank could intervene via the foreign exchange market to achieve the day's target. The dollar would be the vehicle currency for intervention -- precisely as it has long been when a small country defends a peg to some non-dollar currency. Either way, the effect would be to stabilize the price of the commodity in terms of local currency. Or perhaps, since these commodity prices are determined on world markets, a better way to express the same policy is stabilizing the price of local currency in terms of the commodity.

The argument for the export targeting proposal, relative to an exchange rate target, can be stated succinctly: It delivers one of the main advantages that a simple exchange rate peg promises, namely a nominal anchor, while simultaneously delivering one of the main advantages that a floating regime promises, namely automatic adjustment in the face of fluctuations in the prices of the countries' exports on world markets. Textbook theory says that when there is an adverse movement in the terms of trade, it is desirable to accommodate it via a depreciation of the currency. When the dollar price of exports rises, under PEP the currency per force appreciates in terms of dollars. When the dollar price of exports falls, the currency depreciates in terms of dollars. Such accommodation of terms of trade shocks is precisely what is wanted. In past currency crises, countries that have suffered a sharp deterioration in their export markets have often eventually been forced to give up their exchange rate targets and devalue anyway. The adjustment was far more painful -- in terms of lost reserves, lost credibility, and lost output -- than if the depreciation had happened automatically.

The desirability of accommodating terms of trade shocks is also a particularly good way to summarize the attractiveness of export price targeting relative to the reigning champion, CPI targeting. Consider again the two categories of adverse terms of trade shocks: a fall in the dollar price of the export in world markets and a rise in the dollar price of the import on world markets. In the first case, a fall in the export price, one wants the local currency to depreciate against the dollar. As already noted, PEP delivers that result automatically; CPI targeting does not. In the second case, a rise in the import price, the terms-of-trade criterion suggests that one again might want the local currency to depreciate. Neither regime delivers that result.[98] But CPI targeting actually has the implication that the central bank tighten monetary policy so as to *appreciate* the currency against the dollar, by enough to prevent the local-currency price of imports from rising. This implication – reacting to an adverse terms of trade shock by appreciating the currency – is perverse. It can be expected to exacerbate swings in the trade balance and output.

[98] There is a reason for that. In addition to the goal of accommodating terms of trade shocks, there is also the goal of resisting inflation; but to depreciate in the face of an increase in import prices would exacerbate price instability.

Product Price Index

A way to render the proposal far more moderate is to target a broad index of all domestically produced goods, whether exportable or not. An index of product prices is superior to the GDP deflator in that – just like the CPI – it can easily be collected monthly. Even in a poor small country with very limited capacity to gather statistics, government workers can survey a sample of firms every month to construct a primitive index of product prices as easily as they can survey a sample of retail outlets to construct a primitive CPI.

If a broad index of export or product prices were to be the nominal target, it would of course in practice be impossible for the central bank to hit the target exactly, in contrast to the way that is possible to hit virtually exactly a target for the exchange rate, the price of gold, or even the price of a basket of four or five exchange-traded agricultural or mineral commodities. There would instead be a declared band for the export price target, which could be wide if desired, just as with the targeting of the CPI, money supply, or other nominal variables. Open market operations to keep the index inside the band if it threatens to stray outside could be conducted in terms either of foreign exchange or in terms of domestic securities.

7. Capital flows

7.1 The opening of emerging markets

The first major post-war wave of private capital flows to developing countries came after the large oil price increases of the 1970s. The major borrowers were governments in oil-importing countries, and the major vehicles were syndicated bank loans, often "recycling petrodollars" from surplus OPEC countries, via the London euromarket. This first episode ended with the international debt crisis that surfaced in 1982. The second major wave began around 1989, and ended with the East Asia crisis of 1997. It featured a greater role for securities rather than bank loans, especially in East Asia, and the capital went relatively more to private sector borrowers. The third wave began around 2003, this time including China and India, and may have ended with the global financial crisis of 2008.

The boom-bust cycle, however, masks a long-run trend of gradually increased opening of financial markets. We begin this part of the chapter by documenting the extent to which emerging market countries have indeed emerged, that is, the extent to which they have opened up to the international financial system. We then consider the advantages and disadvantages of this financial integration

7.2 Measures of financial integration

Integration into international financial markets, much as integration into goods markets, can be quantified in three ways: direct observation of the barriers to

integration, measurements based on flow quantities, and measurements based on the inferred ability of arbitrage to equalize returns across countries.

Legal barriers to integration

Most developing countries had serious capital controls as recently as the 1980s, but a majority liberalized them subsequently, at least on paper. Many researchers use the binary accounting of de jure regulations maintained by the IMF, or the higher-resolution version of Quinn (1997). These measures suggest substantial liberalization, especially in the 1990s. The drawback is that de jure regulations may not reflect the reality. Some governments do not enforce their capital controls (lack of enforcement can arise because the private sector finds ways around the controls, such as leads and lags in payments for imports and exports), while others announce a liberalization and yet continue to exercise heavy-handed "administrative guidance."

Quantities (gross or net) of capital flows.

Many researchers prefer to use measures relating to capital flow quantities, because they reflect de facto realities. There are many possible quantity-based measures. They include current account magnitudes, net capital flows, gross capital flows, debt/GDP ratios, and the "saving-retention coefficient" in a regression of national investment rates against national saving rates.[99] They also include risk-pooling estimates such as a comparison of cross-country consumption correlations with cross-country income correlations. Tests find that the volatility of consumption in developing countries has, if anything, gone up rather than going down as one would expect if free capital flows smoothed interemporily.[100]

One disadvantage of trying to infer the degree of capital mobility from capital flow quantities is that they reflect not only the desired parameter but the magnitude of exogenous disturbances. A country with genuine capital controls may experience large capital outflows in a year of exogenously low investment while a country with open markets may experience no net outflows in a year when national investment happens to equal approximately national saving. Finance experts thus often prefer to look at prices rather than quantities.

Arbitrage of financial market prices.

If prices of assets or rates of return in one country are observed to fluctuate in close synchronization along with prices or returns in other countries, it is good evidence that barriers are low and arbitrage is operating freely.

Sometimes one can test whether the price of an asset inside an emerging market is close to the price of essentially the same asset in New York or London. One example is

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[99] Examples of this "Feldstein-Horioka regression" applied to developing countries include Dooley, Frankel and Mathieson (1987) and Holmes (2005). Even when instrumenting for the endogeneity of national savings, the coefficient remains surprisingly high for developing countries, which throws additional doubt on whether this is actually a measure of barriers to capital mobility. There is evidence that increases in the budget deficit are associated with decreases in national saving (both in developing countries and others -- Giavazzi, Jappelli and Pagano, 2000) some theories notwithstanding.

[100] Prasad, Rogoff, Wei, and Kose (2003) and Levchenko (2004). Such tests are better interpreted as throwing doubt on the proposition that capital flows work to smooth consumption than as tests of the degree of financial integration.

multiple listings of the same equity on different exchanges (e.g., Telmex). A second is prices of American Depository Receipts or Global Depository Receipts. A third is the price of a country fund traded in New York or London compared to the Net Asset Value of the same basket of equities in the home country.[101]

The more common kind of arbitrage tests are of interest rate parity, which compare interest rates on bonds domestically and abroad. Of course bonds at home and abroad are often denominated in different currencies. There are three versions of interest rate parity, quite different in their implications: Closed or covered interest parity, open or uncovered interest parity, and real interest parity.

Covered interest differentials are a useful measure of whether capital controls are effective; they remove the currency element by hedging it on the forward market. A growing number of emerging markets issue bonds denominated in their own currencies and offer forward rates, but many do not, and in most cases the data do not go back very far. A more common way of removing the currency element is to look at the *sovereign spread*: the premium that the country must pay to borrow in dollars, relative to LIBOR or the US Treasury bill rate. The sovereign spread largely reflects default risk, and remains substantial for most developing countries.[102] An alternative is the *Credit Default Swap*, which became increasingly available for the larger emerging markets after 1997 and again shows substantial default risk.[103] There are some indications that such measures may have underestimated risk during the boom phase of the credit cycle, relative to fundamentals, even ex ante.[104]

Equalization of expected returns across countries is implied by perfect financial integration, *if* risk is unimportant – a very strong assumption. Uncovered interest parity is the condition that the interest differential equals expected depreciation (which is stronger than covered interest parity, the arbitrage condition that the interest differential equals the forward discount, because the existence of an exchange risk premium would preclude it). Another way of testing if expected returns are equalized across countries, is to see if the forward discount equals expected depreciation. Often expected returns are inferred from the systematic component of ex post movements in the exchange rate. The rejection of the null hypothesis is consistent and strong (though not as strong for emerging markets as in advanced countries). In financial markets, exploitation of this forward rate bias is very popular, and goes by the name of the "carry trade": investors go short in the low-interest-rate currency and long in the high-interest-rate currency. Although there is always a risk that the currency will move against them, particular in an "unwinding" of the carry trade, on average they are able to pocket a profit.[105]

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[101] Asymmetric information can characterize segmented markets. There is some evidence that domestic residents sometimes have better information on the value of domestic assets than do foreign residents. E.g., Frankel and Schmukler (1996) and Kim and Wei (2002).

[102] Eichengreen and Mody (2000, 2004) estimated econometrically the determinants of interest rate spreads on individual issues.

[103] Adler and Song (2009) and Ranciere (2002).

[104] Eichengreen and Mody (2001), Kamin and Von Kleist (1999), and Sy (2002).

[105] Bansal and Dahlquist (2000); Brunnermeier, Nagel, and Pedersen (2009); Burnside, Eichenbaum, and Rebelo (2007), Chinn and Frankel (1993); Frankel and Poonawala (2010); and Ito and Chinn (2007).

Expected returns in equity markets are another way of approaching the quantification of financial integration. The literature is surveyed by Bekaert and Harvey (2003). Liberalization of emerging markets shows up as increased correlation between returns locally and globally.[106] Meanwhile, that increased correlation reduces one of the major benefits of investing in emerging markets in the first place: portfolio diversification.[107]

Real interest rate equalization is the third of the parity conditions. The proposition that real interest rates are equalized across countries is stronger than uncovered interest parity.[108] The proposition that real returns to equity are equalized is stronger still, as bonds and equity may not be fully integrated even within one country.[109] Since sovereign spreads and covered interest differentials are often substantial for developing countries – and these would be pure arbitrage conditions, in the absence of capital controls and transactions costs -- it is not surprising that the stronger parity conditions fail as well.

Sterilization and offset

Given the progressively higher degree of capital mobility among developing countries, particularly among those known as emerging markets, models that previously would only have been applied to industrialized countries are now applied to them as well. This begins with the traditional textbook Mundell-Fleming model, designed to show how monetary and fiscal policy work under conditions of high capital mobility. Monetary economists – usually with advanced countries in mind -- argue today that models can dispense with the LM curve, and the money supply itself, on the grounds that money demand is unstable and central banks have gone back to using the interest rate as their instrument anyway.[110] These concepts are still often necessary, however, for thinking about emerging markets, because they are necessary for thinking about the question of sterilization and offset.

An application of interest is the principle of the Impossible Trinity: are exchange rate stability, open financial markets, and monetary independence mutually incompatible? Research does seem to bear out that countries with flexible exchange rates have more monetary independence.[111]

The literature on *sterilization and offset* is one way to parameterize whether capital mobility is so high that it has become difficult or impossible for a country with a fixed exchange rate to pursue a monetary policy independent of the rest of the world. The parameter of interest is the *offset coefficient*, defined as the fraction of an increase in net domestic assets (and thereby in the monetary base) that has leaked out of the country through a deficit in the capital account (and thereby in the overall balance of payments) after a given period of time. The offset coefficient could be considered another entry on

[106] Bekaert and Harvey (1997).
[107] Harvey (1995) and Goetzmann, and Jorion (1999).
[108] Imperfect integration of goods markets can disrupt real interest parity even if bond markets are highly integrated. E.g., Dornbusch (1983).
[109] Harberger (1980) looked at overall returns to capital and found them no more equalized for developing countries than for industrialized countries.
[110] Woodford (2003); Friedman (2004).
[111] Shambaugh (2004); Obstfeld, Shambaugh, and Taylor (2010).

the list of criteria in the preceding section for evaluating the degree of capital mobility. It is the aspect of capital mobility that is of greatest direct interest for the conduct of monetary policy.

Econometrically, any sort of attempt to estimate the offset coefficient by regressing the capital account or the overall balance of payments against net domestic assets is plagued by reverse causation. If the central bank tries to sterilize reserve flows – and the point of the exercise is to see if it has the ability to do so – then there is a second equation in which changes in net domestic assets depend on the balance of payments. Sorting out the offset coefficient from the sterilization coefficient is difficult.[112] Early attempts to do so suggested that central banks such as Mexico's lose less than half of an expansion in domestic credit to offsetting reserve outflows within one quarter, but more in the long run.[113] This is consistent with Mexico's attempt to sterilize reserve outflows in 1994, which seemed to work for almost a year, but then ended in the peso crisis.

Perhaps it is easier to sterilize reserve inflows than outflows: a number of emerging market central banks in the early 1990s succeeded in doing so for a year or two, by selling sterilization bonds to domestic residents.[114] But they found this progressively more difficult over time. Keeping the domestic interest rate above the world interest rate created a quasi-fiscal deficit for the central bank.[115] Eventually they gave up, and allowed the reserve inflow to expand the money supply. China during the period after 2004 experienced the largest accumulation of reserves in history.[116] Although a highly regulated banking sector has efficiency costs, it does have advantages such as facilitating the sterilization of reserve flows. For several years China succeeded in sterilizing the inflow.[117] Eventually, in 2007-08, China too had to allow the money to come in, contributing to overheating of the economy.

Capital controls

Most developing countries retained capital controls even after advanced countries removed theirs, and many still do.[118] Although there are many ways to circumvent controls,[119] it would be a mistake to think that they have little or no effect.

There are many different varieties of capital controls. An obvious first distinction is between controls that are designed to keep out inflows and those that work to block outflows.

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[112] Kouri and Porter (1974).
[113] Cumby and Obstfeld. (1983) and Kamas (1986).
[114] E.g., Colombia, Korea, and Indonesia. Calvo, Leiderman and Reinhart (1993, 1994a, 1994b, 1995), Frankel and Okongwu (1996), and Montiel (1996).
[115] Calvo (1991).
[116] Largely attributable to unrecorded speculative portfolio capital inflows -- Prasad and Wei (2007).
[117] Liang, Ouyang, and Willett (2009) and Ouyang, Rajan and Willett (2007).
[118] Dooley (1996) surveyed the subject. A variety of country experiences were considered by Edison and Reinhart (2001) and in Edwards (2007) and Larrain (2000).
[119] Capital controls become harder to enforce if the trade account has already been liberalized. Exporters and importers can use leads and lags in payments, and over- and under-invoice. Aizenman (2008).

Controls on inflows[120] are somewhat more likely to be enforceable. It is easier to discourage foreign investors than to block up all the possible channels of escape. Furthermore controls on outflows tend to discourage inflows and so can fail on net.[121]

Chile famously deployed penalties on short-term capital inflows in the 1990s, which succeeded in shifting the maturity composition of inflows, considered more stable, without evidently reducing the total.[122] They do come with disadvantages,[123] and Chile removed its controls subsequently. After the global financial crisis of 2008-09, Brazil revived the policy.

Controls on capital outflows receive less support from scholars, but are still sometimes used by developing countries, especially under crisis conditions. When Malaysia imposed controls on outflows in 1998 so as to be able to maintain its exchange rate, the result was not the disaster of which many economists had warned.[124] Magud and Reinhart (2007) find that capital controls in other countries have been less successful at reducing the volume of flows.

7.2 Does financial openness improve welfare?

A large literature is re-evaluating whether financial integration is beneficial, for developing countries in particular. For a country deciding whether to open up to international capital flows, the question is whether advantages of financial integration outweigh the disadvantages. Important surveys and overviews include Fischer (1997), Obstfeld (1998, 2009), Edison, Klein, Ricci, and Sloek (2004); Henry (2007), Kose, Prasad, Rogoff, and Wei (2009), Prasad, Rogoff, Wei and Kose (2003, 2010) and Rodrik (1998).[125]

Benefits to financial integration, in theory

In theory, financial liberalization should carry lots of benefits. Potential gains from international trade in financial assets are analogous to the gains from international trade in goods. First, it enables rapidly-developing countries to finance their investment more cheaply by borrowing from abroad than if they were limited to domestic savings. Second, it allows consumption smoothing in response to adverse shocks. Third, it allows diversification of assets and liabilities across countries. Fourth: it facilitates emulation of foreign banks and institutions. Fifth: it promotes discipline on macro policy.

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[120] Reinhart and Smith (1998).

[121] International investors are less likely to put their money into a country if they are worried about their ability to take the principal, or even the returns, out again. Bartolini and Drazen (1997).

[122] E.g., Edwards (1999), De Gregorio, Edwards, and Valdes (2000) and Agosin and French-Davis (1996). Colombia had somewhat similar controls against short term capital inflows – Cardenas and Barrera (1997).

[123] Forbes (2007) finds that Chile's famous controls on capital inflows raised the cost of capital for small firms in particular. For Reinhart and Smith (2002) the main problem is being able to remove the controls at the right time.

[124] Rodrik and Kaplan (2002) found that Malaysia's decision to impose controls on outflows helped it weather the Asia crisis. But Johnson and Mitton (2001) found that Malaysian capital controls mainly worked to provide a screen behind which politically favored firms could be supported.

[125] Other useful contributions to this large literature include Eichengreen and Leblang (2003), Mishkin (2007), and Rodrik and Subramanian (2009).

Increasing doubts, in practice

Financial markets do not work quite as smoothly in practice as some of the textbook theories suggest. Three salient anomalies: capital often flows "uphill" rather than from rich to poor, capital flows are often procyclical rather than counter cyclical, and severe debt crises don't seem to fit the model.

Capital flows uphill. Countries that have lower income usually have lower capital/labor ratios. In a neoclassical model, with uniform production technologies, it would follow that they have higher returns to capital and, absent barriers to capital mobility, should on average experience capital inflows. But capital seems to flow from poor to rich as often as the reverse, as famously pointed out by Lucas (1990).[126]

Procyclicality. As already noted, rather than smoothing short-term disturbances such as fluctuations on world markets for a country's export commodities, private capital flows are often procyclical: pouring in during boom times and disappearing in recessions.

Debt crises. Financial liberalization has often been implicated in the crises experienced by emerging markets over the last ten years. Certainly a country that does not borrow from abroad in the first place cannot have an international debt crisis. Beyond that, there are concerns that (a) international investors have sometimes lost enthusiasm for emerging markets abruptly, unexplained by any identifiable change in fundamentals or information at hand, (b) that contagion sometimes carries the crises to countries with strong fundamentals, and (c) that the resulting costs, in terms of lost output, often seem disproportionate to any sins committed by policymakers.[127] The severity of the 2008-09 crisis inevitably raised once again the question of whether modern liberalized financial markets are more of a curse than a blessing.[128] Sometimes the doubts are phrased as a challenge to the "Washington consensus" in favor of free markets generally.[129]

Tests of overall benefits

Some empirical studies have found evidence that these benefits are genuine.[130] Some, more specifically, have found that opening up equity markets facilitates the

[126] Prasad, Rajan, and Subramanaian (2007); Alfaro, Kalemli-Ozcan and Volosovych (2008); Reinhart and Rogoff (2004); and Gourinchas and Jeanne (2009), Kalemli-Ozcan, Reshef, Sorensen, and Yosha (2009) and Dominguez (2009). The general consensus-answer to the paradox is that inferior institutions in many developing countries prevent potential investors from capturing the high expected returns that a low capital/labor ratio would in theory imply.

[127] Barro (2002) estimates that the combined currency and banking crises in East Asia in 1997-98 reduced economic growth in the affected countries over a five-year period by 3 percent per year.

[128] E.g., Kaminsky (2008).

[129] E.g., Estevadeordal and Taylor (2008).

[130] Gourinchas and Jeanne (2006) estimate the gains from international financial integration at about 1 percent, which they consider small. Hoxha, Kalemli-Ozcan and Vollrath (2009) find relatively large gains from financial integration.

financing of investment.[131] Others have less sanguine results.[132] The theoretical prediction that financial markets should allow efficient risk-sharing and consumption-smoothing is not borne out in many empirical studies.[133]

Conditions under which capital inflows are likely beneficial

A blanket indictment (or vindication) of international capital flows would be too simplistic. Quite a lot of research argues that financial liberalization is more likely to be beneficial under some particular circumstances, and less so under others. A recurrent theme is that the aggregate size of capital inflows is not as important as the conditions under which they take place.

Some recent papers suggest that financial liberalization is good for economic performance if countries have reached a certain level of development, particularly with respect to institutions and the rule of law.[134] One specific claim is that financial opening lowers volatility[135] and raises growth[136] only for rich countries, and is more likely to lead to market crashes in lower-income countries.[137] A second claim is that capital account liberalization raises growth only in the absence of macroeconomic imbalances, such as overly expansionary monetary and fiscal policy.[138] A third important finding is that institutions (such as shareholder protection and accounting standards) determine whether liberalization leads to development of the financial sector,[139] and in turn to long-run growth.[140] The cost-benefit trade-off from financial openness improves significantly once some clearly identified thresholds in financial depth and institutional quality are satisfied.[141] A related finding is that corruption tilts the composition of

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[131] Bekaert and Harvey (2002), Chari and Henry (2004, 2008), Edison and Warnock (2003), and Henry (2000a,b, 2003) and Bekaert, Harvey (2005) show that when countries open their stock markets, the cost of capital facing domestic firms falls (stock prices rise), with a positive effect on their investment and on economic growth. Others who have given us before-and-after studies of the effects of stock market openings include Claessens and Rhee (1994). Henry and Sasson (2008) find that real wages benefit as well.

[132] Cross-country regressions by Edison, Levine, Klein, Ricci, and Sloek (2002) and Prasad and Rajan (2008) suggest little or no connection from financial openness to more rapid economic growth for developing countries and emerging markets.

[133] Kose, Prasad and Terrones (2009).

[134] Kose, Prasad and Taylor (2009) find that the benefits from financial openness increasingly dominate the drawbacks once certain identifiable threshold conditions in measures of financial depth and institutional quality are satisfied. Similarly, Aizenman, Chinn, and Ito (2008) find that greater financial openness with a high level of financial development can reduce or increase output volatility, depending on whether the level of financial development is high or low. Also Bekaert, Harvey, and Lundblad (2009)

[135] Biscarri, Edwards, and Perez de Gracia (2003). Aghion, Bacchetta and Banerjee (2004) and Bacchetta and van Wincoop, (2000) argue theoretically that volatility is higher for countries at an intermediate level of financial development than for those who have not yet liberalized.

[136] Edwards (2001) and Klein and Olivei (2008).

[137]Martin and Rey (2002) find that financial globalization may make emerging market financial crashes more likely. But Ranciere, Tornell and Westermann (2008) find that countries experiencing occasional financial crises grow faster, on average, than countries with stable financial conditions. Kaminsky and Schmukler (2008) find that financial liberalization is followed in the short run by more pronounced boom-bust cycles in the stock market, but leads in the long run to more stable markets.

[138] Arteta, Eichengreen and Wyplosz (2003). They reject the claim that it is the level of development that matters.

[139] Chinn and Ito (2002).

[140] Klein (2003); Chinn and Ito (2005); and Obstfeld (2009).

[141] Kose, Prasad, and Taylor (2009).

capital inflows toward the form of banking flows (and away from FDI), and toward dollar-denomination (vs. denomination in domestic currency), both of which have been associated with crises.[142] Inadequacies in the financial structures of developing countries probably explain the findings that financial opening in those countries does not produce faster long-run growth as it does in industrial countries. The implication is that financial liberalization can help if institutions are strong and other fundamentals are favorable, but can hurt if they are not.[143]

All of these findings are consistent with the longstanding conventional lesson about the sequencing of reforms: that countries will do better in the development process if they postpone opening the capital account until after other institutional reforms. The reasoning is that it is dangerous for capital flows to be allowed to respond to faulty signals.[144] The observable positive correlation between the opening of capital markets and economic growth could be attributable to reverse causation — that rich countries liberalize as a result of having developed, not because of it. Edison, et al, (2002), however, conclude from their own tests that this is not the case.

7.3 Capital inflow bonanzas

With each episode of strong capital inflows to emerging markets, everyone would like to believe that the flows originate in good domestic fundamentals, such as macroeconomic stabilization and microeconomic reforms. Some research, however, indicates that external factors are at least as influential as domestic fundamentals. Low US interest rates are often identified as a major influence.[145] This research is important because during booms the authors are often among the few offering the warning that if inflows result from easy US monetary policy more than in domestic fundamentals, outflows are likely to follow in the next phase of the cycle. Even preceding the 2008 global financial crisis, much of the research on the carry trade implied that capital flows from low interest rate countries (the United States, Japan and Switzerland) to high interest rate countries (Iceland, New Zealand and Hungary) could rapidly unwind. Earlier, Calvo, Leiderman and Reinhart (1993, 1994ab, 1996) were prescient with respect to the 1994 Mexican Peso crisis. [146] Reinhart and Reinhart (2009) again find that global factors, such as U.S. interest rates, have been a driver of the global capital flow cycle since 1960. These papers also shed important light on how emerging market authorities manage the inflows, as between currency appreciation, sterilized foreign exchange intervention, unsterilized intervention, and capital controls.

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[142] Wei and Wu (2002).
[143] Prasad, Rajan, and Subramanian (2007).
[144] The results of Edwards (2008) indicate that relaxing capital controls increases the likelihood of experiencing a sudden stop if it comes ahead of other reforms. Contributions on sequencing include Edwards (1984), McKinnon (1993), and Kaminsky and Schmukler (2003).
[145] Arora and Cerisola (2001), Borensztein, Zettelmeyer, and Philippon (2001), and Frankel and Okongwu (1996) are among those finding significant effects of US interest rates on emerging market spreads.
[146] Also Fernandez-Arias (1996) and Montiel and Reinhart (2001). Eichengreen and Rose (2000), analyzing data for more than 100 developing countries, 1975-1992, find that banking crises are strongly associated with adverse external condition, in particular, high interest rates in northern counties.

8 Crises in Emerging Markets

The boom phase is often followed by a bust phase.[147] We begin with an enumeration and definition of the various concepts of external crises in the literature.

8.1 Definitions: Reversals, stops, attacks, and crises

Current account reversals are defined as a reduction within one year of the current account deficit of a certain percentage of GDP. Typically a substantial current account deficit disappears, and is even converted into a surplus.[148] An observed switch from current account deficit to surplus could, however, be due to an export boom, which is quite different from the exigent circumstance that most have in mind. More refined concepts are needed.

"Sudden Stops" is an expression first used by Dornbusch, Goldfajn and Valdes (1995). They are typically defined as a substantial unexpected reduction in net capital inflows. The first theoretical approach to the problem of sudden stops is Calvo (1998). A large theoretical literature followed.[149]

Operationally, the Calvo, Izquierdo and Mejia (2004) criterion for sudden stop is a sudden cut in foreign capital inflows (a worsening of the financial account, at least two standard deviations below the sample mean) that is not the consequence of a positive shock (namely a trade shock), but rather is accompanied by a costly reduction in economic activity.[150] Another way to restrict the episodes to reductions in deficits that cannot result from a boom – rising exports and income— is to add the criterion that they are accompanied by an abrupt reduction in international reserves.

An important variety of sudden stops is called "systemic," that is, threatening the international financial system, not just a single country.[151] In order to isolate episodes of capital account reversals related to systemic events of an external origin, they define crises as periods of collapsing net capital inflows that are accompanied with skyrocketing Emerging Markets bond spreads.

"Speculative attacks" are defined as a discrete increase in demand for foreign currency, in exchange for domestic currency, by speculators (i.e., market participants betting on a devaluation). The precise date of the speculative attack may come later than the sudden stop, for example if the central bank is able to prolong the status quo after the loss of capital inflows, by running down reserves for a period of time. In typical models, the speculative attack is successful, in the sense that the central bank runs out of reserves on that same day, and is forced to devalue in the way the speculators anticipated. But there is also a notion that there can be *unsuccessful speculative attacks*, in which the authorities fight the speculation, for example by raising interest rates sharply

[147] Overviews of crises in emerging markets that ended the 1990s boom include Fischer (2004), Kenen (2001) and Desai (2003).
[148] Edwards (2004a, b) and Milesi-Ferretti and Razin (1998, 2000).
[149] References include, among many others, Arellano and Mendoza (2003), Calvo (2003), Calvo, Izquierdo and Talvi (2003, 2006), Calvo and Reinhart (2001), Guidotti, Sturzenegger and Villar (2004), and Mendoza (2002, 2006).
[150] Also Edwards (2004b).
[151] Calvo, Izquierdo and Loo-Kung (2006).

or paying out reserves, and ultimately are able to maintain the parity, versus *successful speculative attacks,* in which they are ultimately forced to devalue.[152] The latter is sometimes defined as a currency crash, if the devaluation is at least 25% and it exceeds the rate of depreciation in preceding years by at least 10%.[153]

Generations of models of speculative attacks

The leading theoretical framework for currency crises is built around models of speculative attacks. The literature is often organized into a succession of several generations. In each case, the contribution made by the seminal papers was often the ability to say something precise about the date when the speculative attack occurred. But the generations can be distinguished according to whether the fundamental problem is seen as, respectively: overly expansionary monetary policy, multiple equilibria, or structural problems associated with moral hazard and balance sheet effects.

The first generation models began with Krugman (1979) and Flood and Garber (1984).[154] The government was assumed to be set on an exogenous course of rapid money creation, perhaps driven by the need to finance a budget deficit. A resulting balance of payments deficit implies that the central bank will eventually run out of reserves and need to devalue. But under rational expectations, speculators will anticipate this, and will not wait so long to sell their domestic currency as to suffer capital loss. But neither will they attack the currency as early as the original emergence of the deficit. Rather, the speculative attack falls on the date when the reserves left in the vault of the central bank are just barely enough to cover the discontinuous fall in demand for domestic currency that will result from the shift from a situation of a steady exchange rate and prices to a new steady state of depreciation and inflation.

The second generation of models of speculative attacks argue that more than one possible outcome – crisis and no-crisis – can be consistent with equilibrium, even if there has been no change in fundamentals. In a self-fulfilling prophecy, each market participant sells the domestic currency if he or she thinks the others will sell. The seminal papers are by Obstfeld (1986b, 1996).[155] One branch of the second generation models focuses on the endogeneity of monetary policy: the central bank may genuinely intend not to inflate, but may be forced into it when, for example, labor unions win higher wages.[156] Many of the models build on the theories of bank runs (Diamond and Dybvyg, 1983)[157] and the prisoners' dilemma (where speculators each try to figure out whether the

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[152] Guidotti, Sturzenegger and Villar (2004) distinguish between sudden stops that lead to current account reversals and those that don't. In the latter case, presumably the country found an alternative source of financing, namely reserve depletion or exceptional funding from an international financial institution.

[153] E.g. Frankel and Rose (1996). A "currency crisis" is defined as a sharp increase in exchange market pressure that shows up *either* as a 25% devaluation or as a loss of reserves that is a commensurate proportion of the monetary base.

[154] Obstfeld (1986a) did it in an optimizing model.

[155] Attacks occur deterministically if fundamentals such as reserves are weak, and do not occur if they are strong. Multiple equilibria arise in a third case: intermediate levels of fundamentals. Also Sachs, Tornell and Velasco (1996a).

[156] Obstfeld (1996) and Jeanne (1997).

[157] Among the authors applying the bank runs theory to emerging market crises are Chang and Velasco (1997, 1999a, b, 2001). The fundamental problem of bank illiquidity is exacerbated by financial

others are going to attack).[158] The balance sheet problems discussed earlier also often play a key role here. Morris and Shin (1998) make the important modification of introducing uncertainty into the model, which can rule out multiple equilibria.

Another important category of speculative attack models attributes crises neither to monetary fundamentals, as in the first generation, nor to multiple equilibria, as in the second generation.[159] The culprit, rather, is structural flaws in the financial system that create moral hazard in the behavior of domestic borrowers vis-à-vis their government. Certain domestic borrowers, whether banks or firms, have close connections with the government. When the East Asia crisis hit in 1997, the problem came to be known popularly as "crony capitalism."[160] The government in turn has access to a supply of foreign exchange, in the form of foreign exchange reserves, and perhaps also in the ability to tax export receipts or to borrow from the IMF. Even in cases where the government says explicitly ahead of time that domestic borrowers will not be bailed out, those that are well connected believe (usually correctly) that they will be bailed out in the event of a crisis. Thus they over-borrow. The speculative attack comes on the day when the stock of international debt that has some claim on government rescue becomes as large as the supply of reserves. (Again, rational speculators will not wait longer, because there would then not be enough foreign currency to go around.) The ideas go back to Diaz-Alejandro (1985). Dooley (2000a)'s "insurance model" can claim the honor of having been written just before the East Asia crisis.[161] Krugman (1998) is probably the most widely cited.[162]

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liberalization. Under fixed exchange rates, a run on banks becomes a run on the currency if the Central Bank attempts to act as a lender of last resort. Kaminsky and Reinhart (1999) documented the frequency with which banking crises and currency crises come together. Also Diamond and Rajan (2001), Hausmann and Rojas-Suárez (1996), and Burnside, Eichenbaum, and Rebelo (2004). Martinez Peria and Schmukler (2001) examined the role of deposit insurance. Dages, Goldberg, and Kinney (2000) found that foreign ownership of banks is not the problem. Radelet and Sachs (1998) suggested that the East Asia crisis of 1997-98 was essentially an international version of a bank run.

[158] One variant of the game theory approach, motivated by concerns that a single large hedge fund could deliberately engineer a crisis, posits a player that is larger than the others: Corsetti, Pesenti and Roubini (2002); and Corsetti, Dasgupta, Morris, and Shin (2004).

[159] The "two generations" language originated with Eichengreen. Views vary as to what should be designated the third generation. Krugman (1999) says that the third generation should be identified by balance sheet effects, not by banking bailouts per se. But, to me, only bailout moral hazard considerations merit the designation of a third generation.

[160] Claessens, Djankov and Lang (2000) statistically study family-controlled firms in East Asia. Rajan and Zingales (1998b) study relationship banking.

[161] Likewise McKinnon and Pill (1996).

[162] Corsetti, Pesenti and Roubini (1999a, b), Chinn, Dooley, and Shrestha (1999) and Chinn and Kletzer (2001) are among those attributing the East Asia crisis to structural flaws in the financial system of the moral hazard sort. In the theories of Burnside, Eichenbaum, and Rebelo (2001a,b, 2004), government guarantees to banks give them an incentive to incur foreign debt. Calvo and Mendoza (1996) see roots of Mexico's 1994 peso crisis in financial globalization, anticipation of a banking-system bailout, and self-fulfilling prophecy.

Although it is often presumed that foreign residents, rather than domestic residents, lead the way in pulling money out of a country during a speculative attack, there is no presumption in theory that this is the case. Nor does the empirical evidence seem to support it.[163]

8.2 Contagion

It has long been noted that when one emerging market is hit by a sudden stop, it is more likely that others will be as well. The correlation tends to be much greater within the same general geographic area.[164]

There is not complete agreement as to the definition of contagion. Some correlation across emerging markets can be explained by common external shocks.[165] Masson (1999) calls these monsoonal effects. They are best not termed contagion, as the phrase implies transmission from one country to another, which Masson calls spillover effects. Spillover effects that can be readily interpreted in terms of fundamentals include investment linkages, trade linkages, and competition in third markets. A number of interesting specific channels of contagion from one country to another have been identified empirically.[166] Finally, there is what might be called pure contagion, which runs via investor behavior in a world of imperfectly efficient financial markets. One example is information cascades: investors may react to a crisis in Thailand or Russia by revising their estimation of the value of the "Asian model" or the odds of IMF bailouts.[167] Another example is illiquidity in international financial markets and reduced risk tolerance, which in crises such as 2008 seem to induce flight from emerging markets generally, alongside flight from high-yield corporate debt and any other assets suspected of illiquidity or risk.

8.3 Managing Emerging Market Crises

There have long been three legs to the policymaking stool of managing crises in developing countries: adjustment of national policies, "Private Sector Involvement," and

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[163] Choe, Kho and Stulz (1999, 2005) and Frankel and Schumkler (1996). If anything, domestic investors have the informational advantage.

[164] Eichengreen, Rose and Wyplosz (1996); Baig and Goldfajn (1999); Bae, Karolyi, and Stulz (2000); Bekaert, Harvey, and Ng (2005), Forbes and Rigobon (2000, 2002), Rigobon (2000); Kaminsky and Reinhart (2000, 2002); Kaminsky, Reinhart and Vegh (2003), Kaminsky and Schmukler (1999); and Corsetti,Pericoli and Sbracia (2005).

[165] A prominent example of a common external shock is an increase in US interest rates, a factor discussed earlier. Uribe and Yue (2003).

[166] Glick and Rose (1999), Forbes (2002) and Forbes and Chinn (2004) find that contagion moves along the lines of trade linkages. Kaminsky and Reinhart (2008) find that when contagion spreads across continents, it passes through major financial centers along the way. Kaminsky and Schmukler (2002) find contagion via rating agencies. Borensztein and Gelos (2003) find herding among emerging market mutual funds.

[167] This is not to say investors are irrational. Calvo and Mendoza (2000) demonstrate that globalization "may promote rational contagion by weakening individual incentives for gathering costly information." Morck , Yeung and Yu (2000) attribute the correlation among emerging markets to shared weak property rights.

the role of the IMF and other multilateral participation.

Adjustment

In the traditional orthodoxy, a crisis required adjustment of the macroeconomic policies that had gotten the country into the problem in the first place. In the old language of Harry Johnson, this meant some combination of expenditure-switching policies, in practice meaning devaluation, and expenditure reducing policies, meaning monetary and fiscal contraction – typically substantial doses of all of the above.

A tightening of monetary policy is often the first response to a sudden stop. The urgent need in a currency crisis is to improve the balance of payments. Raising interest rates is thought to do this in two ways: first by making domestic assets more attractive to international investors, and second by cutting domestic expenditure and therefore improving the trade balance.

Many have analyzed the so-called interest rate defense, particularly the question whether and when it is preferable to devaluation.[168] Furman and Stiglitz (1998) emphasize that an increase in the interest rate can decrease the attractiveness of the country's assets to foreign investors, rather than increasing it, because of the increase in default risk.[169] But this point does not change the basic logic that some combination of monetary contraction and devaluation is called for, to restore external balance, absent some international angel willing and able to make up the gap in financing. The possibility that devaluation is contractionary *does*, by contrast, interfere with the basic logic that the central bank can deploy the optimal combination of an increase in the interest rate and an increase in the exchange rate to restore external balance without losing internal balance.[170]

Private Sector Involvement

If a crisis debtor is to compress spending and the IMF or other parts of the international financial community is to chip in with an emergency loan, the foreign exchange should not go merely to helping the countries creditors cash in and depart the scene. Private Sector Involvement was the term for the requirement adopted in the 1990s for "bailing in" private creditors rather than "bailing them out." The idea is that creditors agree to roll over loans as part of the complete package that includes the national government and the IMF, and that it is in their interest collectively to do so even if the free rider problem tempts each of them to get out. This process was thought to have been easier in the 1980s, when the creditors were banks finite in number and susceptible to negotiation, and to have grown more difficult subsequently, when the creditors have more often constituted a larger number of widely-dispersed bondholders. But the basic issue is the same either way.

The International Financial Institutions

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[168] Aghion, Banerjee and Bacchetta (2000); Flood and Rose (2002); Christiano, Gust, and Roldos (2002); Caballero and Krishnamurthy (2001); Drazen (2003); and Eichengreen and Rose (2003).

[169] Also Blanchard (2005). This point is rooted in the theory of imperfect information and credit rationing – Stiglitz and Weiss (1981). Lahiri and Vegh (2003, 2007) show that, under certain conditions, it is feasible to delay the crisis, but raising interest rates beyond a certain point may actually hasten the crisis.

[170] Frankel (2003).

The International Financial Institutions (the IMF, the World Bank, and other multilateral development banks) and governments of the United States and other large economies (usually in the form of the G-7, in the past) are heavily involved in "managing" financial crises.[171]

The IMF is not a full-fledged Lender of Last Resort, though some have proposed that it should be.[172] The Fund does not contribute enough money to play this role in crises, even in the high-profile rescue programs where the loans are a large multiple of the country's quota. Usually the IMF is viewed as applying a "Good housekeeping seal of approval," where it vouches for the remedial actions to which the country has committed.

IMF conditionality has been severely criticized.[173] There is a broad empirical literature on the effectiveness of conditional IMF lending.[174] The better studies have relied on large cross country samples that allow for the application of standard statistical techniques to test for program effectiveness, avoiding the difficulties associated with trying to generalize from the finding of a few case studies. The overall conclusion of such studies seems to be that IMF programs and IMF conditionality may have on balance a positive impact on key measures of economic performance. Such assessments suggest that IMF programs result in improvements in the current account balance and the overall balance of payments.[175]

The impact of IMF programs on growth and inflation is less clear. The first round of studies failed to find any improvement in these variables. Subsequent studies suggest that IMF programs result in lower inflation.[176] The impact of IMF programs on growth is more ambiguous. Results on short-run growth are mixed; some studies find that implementation of IMF programs leads to an immediate improvement in growth,[177] while other studies find a negative short-run effect.[178] Studies that look at a longer time horizon, however, tend to show a revival of growth.[179] This is to be expected: countries entering into IMF programs will often implement policy adjustments that have the immediate impact of reducing demand, but could ultimately create the basis for sustained growth. The structural reforms embedded in IMF programs inherently take time to improve economic performance. Finally, the crisis that led to the IMF program, not the IMF program itself, is often responsible for an immediate fall in growth.

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[171] Among many references: Cline (1985, 1994), Eichengreen and De Long (2002) and Frankel and Roubini (2003).

[172] Fischer (1999).

[173] E.g., Furman and Stiglitz (1998) and Radelet and Sachs (1998). In the East Asia crises, the criticism focused not just on the austerity of macroeconomic conditionality, but also on the perceived 'mission creep" of venturing into microeconomic reforms not conventionally associated with financial crises.

[174] Including Bird and Rowlands (1997), Faini, de Melo, Senhadji-Semlali and Stanton (1991), Joyce (1992), and Hutchison (2003).

[175] Haque and Khan (2002) provide a survey.

[176] Conway (1994), Bagci and Perrudin (1997) and Dicks-Mireaux, Mecagni and Schadler (2000) found that inflation fell following an IMF program; the result was statistically significant only in the first two of these three studies.

[177] Dicks-Mireaux, Mecagni and Schadler (2000).

[178] Bordo and Schwartz (2000) compare countries receiving IMF assistance during crises in the period 1973-98 with countries in the same region not receiving assistance and find that the real performance (for example, GDP growth) of the former group was possibly worse than the latter.

[179] Conway (1994).

Despite such academic conclusions, there was a movement away from strict conditionality subsequent to the emerging market crises of the 1990s. In part, the new view increasingly became that the Fund could not force a country to follow the macroeconomic policy conditions written into an agreement, if the deep political forces within the country would ultimately reject the policies.[180] It is necessary for the local government to "take ownership" of the reforms.[181] One proposal to deal with this situation was the Contingent Credit Line: a lending facility that would screen for the policy conditions ex ante, and then unconditionally insure the country against external financial turmoil ex post. The facility was reborn under the name Flexible Credit Line in the 2008-09 financial crisis, with less onerous conditionality. But most emerging market countries managed to avoid borrowing from the Fund this time, with the exception of some, particularly in Eastern Europe, that were in desperate condition.

Some critics worry that lending programs by the International Financial Institutions and G-7 or other major governments create moral hazard, that debtor countries and their creditors have little incentive to take care because they know they will be rescued. Some even claim that this international moral hazard is the main reason for crises, that the international financial system would operate fine if it weren't for such meddling by public institutions.[182]

There is a simple way of demonstrating that moral hazard arising from international bailouts cannot be the primary market failure. Under a neo-classical model, capital would flow from rich high capital/labor countries to lower-income low capital/labor country, for example from the United States to China. Instead it often flows the opposite way, as already noted. Even during the peaks of the lending booms, the inflows are less than would be predicted by an imperfection-free neoclassical model.[183] Therefore any moral hazard incentive toward greater capital flows created by the IFIs must be less than the various market failures that inhibit capital flows.

8.4 Policy Instruments and Goals After a Balance of Payments Shock

Why have so many countries suffered deep recessions as part of the adjustment process in the aftermath of a deterioration in their balance of payments? One school of thought is that policy has been too contractionary, perhaps because the IMF does not understand that an increase in the interest rate increases default risk.[184]

In this section we consider the problem of a central bank attempting to attain two goals -- internal and external balance – by means of two policy instruments – the exchange rate and the interest rate.[185] Our interpretation of internal balance is $Y = \overline{Y}$,

[180] According to the influential strain of research represented by Acemoglu et al (2003), Easterly and Levine (2002) and Hall and Jones (1999), institutions drive out the effect of policies. Evrensel (2002) finds that the IMF is not able to enforce macroeconomic conditionality.
[181] Boughton (2003).
[182] Bordo and Schwartz (2000), Calomiris (1998), Dooley and Verma (2003), and Meltzer (2000). But Lane and Phillips (2001) find no evidence that country spreads react to changes in the moral hazard of international bailouts.
[183] E.g., Blanchard (1983).
[184] Furman and Stiglitz (1998), as discussed in the preceding sub-section.
[185] The graphical analysis is from Frankel (2003a) , but the algebra has been added.

where $Y \equiv$ real income and $\overline{Y} \equiv$ potential output.
Our interpretation of external balance is that overall balance of payments $BP = 0$,
where $BP = CA + KA$,
$CA \equiv$ current account, and
$KA \equiv$ capital account.
One could just as easily choose different goals for the levels of Y and BP.

Internal and External Balance When Devaluation is Expansionary

Assume for now: $Y = A(i) + TB$,
where $i \equiv$ domestic interest rate; and
absorption, A, is a function of the interest rate, with $\frac{dA}{di} < 0$.
Assume that the trade balance, linearized for simplicity, is given by $TB = xE - mY$.
where
$E \equiv$ the exchange rate, defined as the price of foreign currency.
If the trade balance is derived from an elasticities approach (the country has some monopoly power in its export good, as in Section 2.2), then x is related to the sensitivity of export demand to relative prices; if the trade balance is derived from the traded goods / nontraded goods model (the country is a price-taker in all traded goods, as in the small open economy model of section 2.3), then x is related to sensitivity of the supply of traded goods to relative prices. "Sensitivity" could simply mean, for example, the elasticity, normalized for the quantity of goods relative to E, if there were no additional effect on import spending or the demand for traded goods.

Assume that the capital account of the balance of payments is given by the function:

$$KA = k(i-i^*), \text{ where } \frac{dk}{d(i-i^*)} > 0,$$

and $i^* \equiv$ world interest rate.

First we derive the internal balance relationship, solving for Y as a function of i and E.

$$Y = A(i) + TB \qquad (3)$$

$$TB = xE - mY \qquad (4)$$

Substitute (4) into (3): $Y = \frac{A(i) + xE}{(1+m)}$ (5)

We want the relationship between i and E that gives internal balance (output equal to potential: $\overline{Y} = Y \Rightarrow$

$$\overline{Y} = \frac{A(i)}{(1+m)} + \frac{xE}{(1+m)} \quad . \qquad (6)$$

An increase in E would improve the trade balance, resulting in a rise in Y as well. In order to go back to the potential output, we need to increase the interest rate. Thus the graph looks like this, labeled NN:

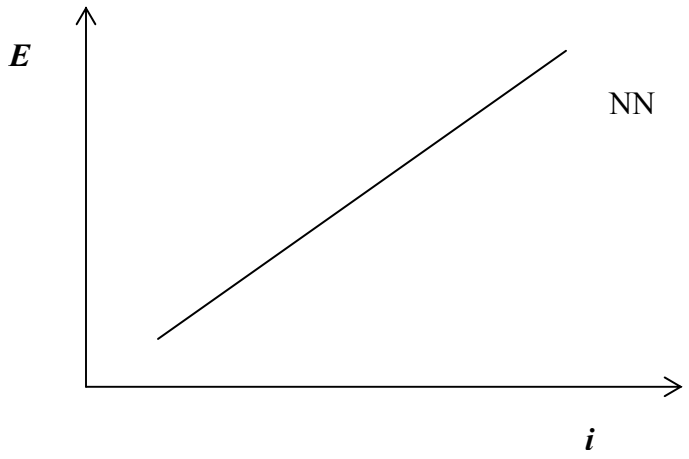

Figure 1: Slope of Internal Balance curve is conventionally positive.

We obtain the slope of the NN curve by differentiating equation (6):

$$\left.\frac{\partial E}{\partial i}\right|_{Y=\bar{Y}} = -\frac{A_i}{x} \qquad (7)$$

As A_i < 0, the slope is positive, which is why we have drawn *NN* sloping upward. Intuititively, because a devaluation is expansionary, it would have to be offset by a contractionary increase in the interest rate if total output is to remain at the same level.

Second we derive the external balance relationship, solving for BP as a function of *i* and *E*. The Balance of Payments is the sum of the trade balance and the capital account:

$$BP = TB + KA$$
$$BP = xE - mY + k(i - i^*) \qquad (8)$$

We plug equation (5) into equation (8) to eliminate *Y*, and rearrange to obtain the *BP* in terms of *E* and *i*. External Balance is achieved when *BP=0*; therefore

$$BP = \frac{xE}{1+m} - \frac{mA(i)}{1+m} + k(i) = 0 \qquad (9)$$

We draw the relationship between *i* and *E* that gives external balance.
If *E* increases then the interest rate has to fall in order to restore external balance. Therefore, the trade surplus created by the increase in *E* would be offset by the capital outflow and increase in imports. In the graph we label the external balance line *BB*:

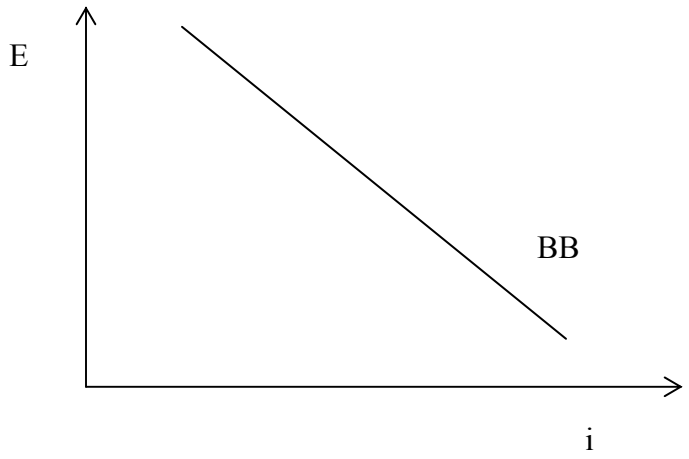

Figure 2: Slope of External Balance curve is negative.

To obtain the slope, we differentiate equation (9) to obtain:

$$\left.\frac{\partial E}{\partial i}\right|_{BP=0} = \frac{m}{x} A_i - \frac{1+m}{x} k_i \qquad (10)$$

As A_i<0 and k_i>0, the slope is negative, which is why we have drawn *BB* sloping downward. Intuitively, a devaluation improves the trade balance, which could be financed by borrowing from abroad if the interest rate is raised.

The points below the BB curve are points of deficit. The interest rate isn't high enough to attract the necessary capital inflow. Assume an exogenous adverse capital account shock, a rise in the world interest rate *i** or some other downward shift in KA, as in a speculative attack. In other words, the country now finds itself in balance of payments deficit. If the country has an adverse capital account shock, then BB curve shifts to the right (BB´) so the country finds that its location point now corresponds to a Balance of Payments deficit, because it is to the left of the new BB' Schedule. At *E* the objective is to reach *E*' where the economy is at both at internal and external balance. In this case the policy options are clear: the central bank has to raise the interest rate and depreciate the currency. While the increase in the interest rate attracts capital inflows, it also causes a contraction in output. Fortunately, the country has another instrument, the exchange rate, at hand. Devaluation will improve exports, which in turn will pick up both the trade balance and the output. The optimal combination of *E* and *i* will put the economy at the intersection of the two graphs, where the new external balance constraint is satisfied, without a recession. This is harder in practice than in theory, due especially to uncertainty; but policy-makers can grope their way to equilibrium through a tatonnement process.

Notice that the fundamental logic of the graph does not change even if default risk means that k_i is very small. Even if the capital account does not improve, an increase in

the interest rate still improves the balance of payments by reducing spending and therefore raising the trade balance.

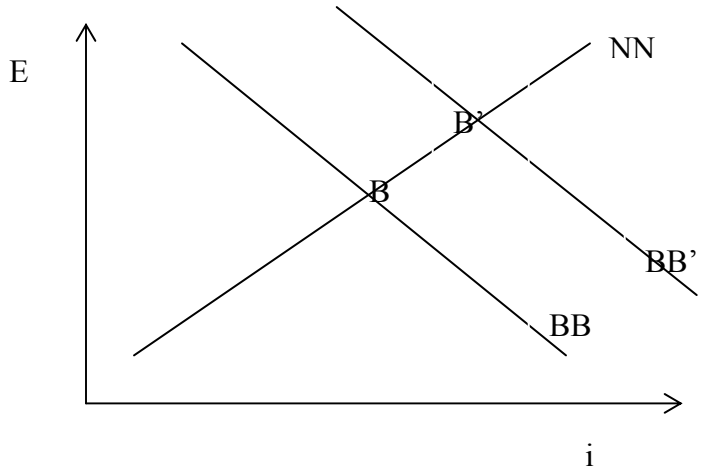

Figure 3: "Sudden stop" shifts External Balance curve out.

Internal and External Balance When Devaluation is Contractionary

Now assume that devaluation has a contractionary effect on domestic demand, for example because of a balance sheet effect from dollar debts, or any of the other reasons discussed in Section 2.4:

$Y = A(i, E) + TB$ $\qquad \frac{dA}{di} < 0\,, \ \frac{dA}{dE} < 0\ .$

We have the following solution for output: $Y = \frac{A(i,E) + xE}{(1+m)}$ (11)

Set $Y = \overline{Y}$ and differentiate to obtain the new slope of NN,

$$\left.\frac{\partial E}{\partial i}\right|_{Y=\overline{Y}} = -\frac{A_i}{x + A_E}$$

We will assume that x the stimulus to net exports from a devaluation is small in the short run, because the elasticities are small, so that A_E dominates, and the devaluation is indeed contractionary overall: The slope is negative.

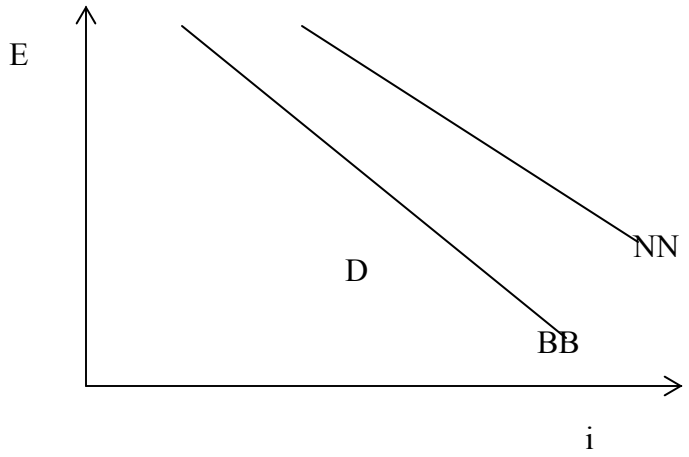

Figure 4: Balance sheet effect turns Internal Balance slope negative.

We again illustrate the shift in the figure if there is an exogenous adverse balance of payments shock. Now both internal and external balances have negative slopes. They may not intersect at all. In this case, we are not confident in which direction the interest and the exchange rate should go. When the balance of payment goes into deficit due to a shock in the capital account (a point like D) a devaluation will restore the external balance (by improving the trade balance); but at the same time a devaluation hurts the economy as it is contractionary. Moreover, the improvement in exports may not be enough to offset the contractionary effects so the country may go into a recession. We have a situation where we may not be able restore equilibrium internally and externally, at least not at reasonable levels of *E* and *i ;* and even if we can in theory, it is not possible to say whether *E* should be increased a lot and *i* decreased, or vice versa. Even assuming the two curves intersect somewhere, a process of tatonnement by policy-makers may take a long time to get there, and the curves may have moved again by that time. The lesson: it is better in the first place not to develop balance sheets that are so vulnerable as to put policy-makers in such a difficult situation as illustrated in the figure.

8.5. Default and avoiding it

One option for a country in severe payments difficulty is simply to default on its debt. Yet it has relatively been rare during the post-war period for countries to do so. The big question is "why?" Two answers are most common.

Why don't countries default?

The first reason why countries are said not to default on their debt is that they don't want to lose access to capital markets in the future. International investors will want to punish defaulters by refusing to lend to them in the future, or perhaps by lending only at severe penalty interest rates. But is that threat regarding the distant future enough to discourage countries from defaulting and thereby saving a great deal of foreign exchange today? And, for their part, is the threat by international investors never to lend again credible in the sense that they will have the incentive to stick to it in the future?

Bulow and Rogoff (1989) answer no: that threat won't sustain non-default, in a repeated game. [186]

The other common answer is that countries are afraid that if they default they will lose trade. In one version, they are afraid of losing the trade credit, or even access to the international payments system: even if they pay cash for an import, the cash might be seized by a creditor in payment of an outstanding debt. The classic reference is Eaton and Gersovitz (1981). Some persuasive empirical evidence appears to support this theory.[187] It is also consistent with evidence that countries possessing high overall trade/GDP ratios suffer from fewer sudden stops[188]: international investors will be less likely to pull out, because they know the country is less likely to default. Under this logic, a higher ratio of trade is a form of "giving hostages" that makes a cut off of lending less likely.

Another possible answer to the question, "why don't countries default" is that they do, but not explicitly. Countries often announce that they are unable to service their debts under the schedule or terms contractually agreed to. A painful process usually follows in which they negotiate new terms.

Ex ante measures for better risk-sharing

The largest cost arising from protracted negotiations over restructuring is the disincentive to domestic investment and output created by the debt overhang in the meantime. Domestic firms will not seek to earn foreign exchange if they think it will be taken away from them, to service past debts.[189]

Reformers wishing to reduce the severity of emerging market crises have asked whether there is not a way for lenders and borrowers to agree ahead of time on a more efficient way to share risk. The goal of minimizing high costs to restructuring debt is the same as that which is thought to be achieved in the domestic context by bankruptcy law.[190] One proposed solution is to establish the equivalent of an international bankruptcy court, perhaps as a "debt workout" office of the IMF. [191]

Collective Action Clauses are one proposal that was eventually adopted in some prominent emerging markets. The investors agree ex ante in the bond contract that in the event a restructuring should prove necessary, a few holdouts among the creditors will not be able to obstruct a settlement that the rest regard as beneficial. CACs are sold as a

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[186] Dooley and Svensson (1994), however, argue that debtors are unable to suspend debt service permanently and credibly.

[187] Rose and Spiegel (2004) and Rose (2005) find that bilateral debt reschedulings lead to losses of trade along corresponding bilateral lines, estimated at 8 percent a year for 15 years, from which he infers that lost trade is the motivation debtors have to avoid such defaults. Rose and Spiegel (2008) find that strong bilateral trade links are correlated with low default probabilities.

[188] Calvo, Izquierdo and Mejia (2004), Edwards (2004), and Cavallo and Frankel (2008).

[189] Krugman (1989) and Sachs (1983) argued that the efficiency burden of the debt overhang in the 1980s was sufficiently great that forgiveness would make all better off, creditors as well as debtors, a logic that contributed to the Brady Plan writedowns at the end of the decade. Some have suggested that the plans to forgive loans to Highly Indebted Poor Countries might work the same way, but Henry and Arslanalp (2005) conclude not. Also Edwards (2002).

[190] Friedman (2000), Claessens, Klingebiel, and Laeven (2003), Frankel and Roubini (2003) .

[191] Sachs (1998). One short-lived version was the proposed Sovereign Debt Restructuring Mechanism. Krueger (2003) and Shleifer (2003).

realistic way to accomplish private sector involvement without the worst of the moral hazard problems of IMF bailouts. The prediction of Barry Eichengreen, that the adoption of CACs would not discourage investors in the case of more creditworthy issuers, appears to have been accurate.[192] But neither have they yet made a big difference in crisis resolution.

Ex ante provision of collateral can allow financing to take place where reputations and other institutions are not strong enough to sustain it otherwise. Models that presume the necessity of collateral in emerging markets are some of the most promising for possible re-importation back into the mainstream of macroeconomics in rich countries.[193]

We have mentioned above attractions of financing via equity, FDI, and commodity-indexed bonds. Each of these can be regarded as risk-sharing arrangements that are more efficient than ordinary bonds or bank loans: in the event of a "bad state of nature," such as a decline in world demand for the country's exports, the foreign investor suffers some of the losses automatically, avoiding the need for protracted negotiations with the borrower.

8.6. Early warning indicators

Having learned to become less ambitious than attempting to estimate full structural models of reality, some economists have tried to the simpler task of testing whether economic indicators can help predict when and where emerging market crises will strike.[194] One motivation is to shed light on competing models of speculative attack, or theories of crisis origins more generally. Often the motivation is just to give policy-makers some advanced warning of possible crises, so that the dangers can be addressed before disaster strikes. (For this motivation, one must make sure that the relevant data are available in real time.)

It is often pointed out that if reliable indicators of this sort were readily at hand, they would induce behavior that would disrupt the relationship: either private investors would pull out of the country at an earlier date or else policy-makers would correct imbalances in time and so prevent the crisis altogether . This point is useful as a caveat to researchers not to expect that finding reliable indicators will be easy. But neither is it a reason not to try. If observable imbalances get gradually worse as the probability of a crisis rises, it is natural for the IMF (or any other party) to be at the forefront of those trying to ascertain the relationships. If the research bears fruit, and policymakers' actions then succeed in eliminating crises, that is a consummation devoutly to be wished for. More likely the IMF would be faced with the dilemma posed by the knowledge that announcing concerns when the crisis probability rises to, say, 50%, runs the risk of precipitating a crisis that otherwise might not have occurred. In any case, we are not in the fortunate position of having had tremendous success in finding early warning indicators.

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[192] Eichengreen and Portes (1995), Eichengreen (1999), Eichengreen and Mody (2004).

[193] Caballero and Krishnamurthy (2000, 2001, 2003, 2005) and Mendoza and Smith (2006). It goes back to the seminar article of Kiyotaki and Moore (1997).

[194] Berg and Pattillo (1999a, b) and Goldstein, Kaminsky and Reinhart (2000) evaluate different approaches.

The studies often use panels, combining a cross-section of many countries with time series. A few studies use a cross-section of countries to see what determines which countries suffered more and which less when hit by the common shock of a salient global episode.[195]

Asset prices

Bubbles – or, perhaps safer to say, extreme booms – in equity markets and real estate markets have come to be associated with high-income countries. But they can afflict emerging markets as well, as noted earlier. Stock market prices are apparently among the more successful early warning indicators of crises in emerging markets.[196]

Reserves

The foreign exchange reserve holding behavior of developing countries differs in some ways from that of advanced countries. For one thing, they hold more.[197] Many studies have found that reserves, sometimes expressed as a ratio to the money supply, sometimes relative to short-term debt, would have been a useful predictor of the emerging market crises of the 1990s.[198]

After the emerging market crises of the 1990s, the traditional rule of thumb that developing countries should hold enough reserves to equal at least three months of imports was replaced by the "Guidotti rule." This is the guideline that they should hold enough reserves to cover all foreign debt that is short-term or maturing within one year. most emerging market countries worked to increase their holdings of reserves strongly, typically raising the Guidotti ratio of reserves to short term debt climbed from below one to above one.[199] The motive was precautionary: to self insure against the effects of future crises or the need to return to the IMF.[200] (It would be hard to say which they feared more.) Economists wondered whether the levels of reserves were excessive, since most are held in the form of US Treasury bills which have a low rate of return.[201] This was

[195] Sachs, Tornell and Velasco (1996b) for the "tequila effect" of the 1994 Mexican peso crisis; Obstfeld, Shambaugh and Taylor (2009, 2010) or Rose and Spiegel (2009) for the 2008 global financial crisis.

[196] Rose and Spiegel (2009) find that equity prices are the *only* robustly significant indicators that can predict which countries got into trouble in 2008.

[197] And not just because developing countries are less likely to float than are advanced countries. Frenkel (1974) and Frenkel and Jovanovic (1981) .

[198] Including Sachs, Tornell and Velasco (1996b), Frankel and Rose (1996) and Kaminsky, Lizondo and Reinhart (1998), among others.

[199] Guidotti (2003).

[200] Aizenman (2009), Aizenman and Lee (2007), Aizenman and Marion (2003) and Jeanne and Ranciere (2009) conclude that reserves in emerging market countries generally can be explained by a precautionary model, although reserves in a few Asian countries exceed that level.

[201] Jeanne (2007) and Summers (2006). Rodrik (2006) argued that the countries would be better off using some of the reserves to pay down short-term debt.

especially true of China.[202] But in the global financial crisis of 2008, it appears that the caution of most of the reserve holders was vindicated.[203]

Bank credit

Many studies find that rapid expansion of domestic bank credit is an early warning indicator of crises. Loayza and Ranciere (2006) note the contradiction of this finding with the literature that uses bank credit as a proxy for the extent of intermediation and financial development; the reconciliation is the distinction between the short run and the long run.

Composition of inflows

Some authors have found that the *composition* of capital inflows matters more than the total, in seeking to predict the frequency and severity of crises.[204]

International bank lending, in particular, has been implicated in most crises, usually because of the acute problem of moral hazard created by the prospect of government bailouts. Foreign direct investment is a less risky source of capital inflow than loans.[205] The same is true of equity flows.[206]

As noted in Part 2, borrowers with a currency mismatch – foreign currency liabilities and domestic currency revenues -- suffer from an adverse balance sheet when the currency is forced into devaluation.[207] Analogously, borrowers with a maturity mismatch – liabilities that are shorter-term than the domestic investment projects in which the funds were invested – suffer when interest rates are forced upward. [208] Conditions that make a crisis painful when it happens do not automatically imply that crises are more likely to happen.[209] But the majority view is that poorly structured balance sheets, suffering from currency mismatch or maturity mismatch, make crises both more likely to occur, and more severe when they do occur. Indeed, as we have seen in Part 7, many of the latter-day models of speculative attack are based precisely on the balance sheet problem.

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[202] Many, such as Goldstein and Lardy (2009), believe China's peg to the dollar is essentially mercantilist, while McKinnon (2004) argues that it is appropriate. Dooley, Folkerts-Landau and Garber (2003), argue that China's tremendous amassing of reserves is not precautionary, but rather part of a deliberate and successful development strategy. This claim is consistent with the general finding of Rodrik (2008) that currency undervaluation promotes growth.

[203] Aizenman (2009) and Obstfeld, Shambaugh and Taylor (2009, 2010) find that high reserve levels paid off after all, in the global crisis of 2008, because those with high reserves were statistically less likely to get into trouble. Rose and Spiegel (2009), however, do not find reserves to have been a useful predictor in 2008.

[204] Calvo, Izquierdo and Mejia.(2004) and Frankel and Rose (1996) find significant effects of composition measures in probit regressions, but not for overall ratios of current account deficits or debt to GDP.

[205] E.g., Lipsey (2001) and Frankel and Rose (1996).

[206] Razin, Sadka, and Yuen (1998).

[207] Baliño, Bennett, Borensztein (1999), Calvo, Izquierdo, and Mejia (2004), and Cespedes et al. (2003). Calvo, et al. (2003) call it "domestic liability dollarization."

[208] E.g., Rodrik and Velasco (1999).

[209] Some have argued that circumstances making crises more severe will also make them less likely to happen because steps will be taken to avoid them. E.g., Dooley (2000b).

Measuring mismatch is more difficult than talking about it. One proxy for currency mismatch is the ratio of foreign liabilities of the financial sector to money.[210] An alternative proxy is a measure of deposit dollarization computed as "Dollar Deposits / Total Deposits" in the financial system.[211]

The ratio of short-term debt to reserves has received attention, of which the Guidotti threshold (1.0) is one case. Perhaps because the ratio efficiently combines two important numbers, reserves and short-term debt, the ratio is emphasized in more studies of early warning indicators than any other statistic.[212]

9. Summary of Conclusions

The macroeconomics of developing countries has become a field of its own. Among the characteristics that distinguish most developing countries from the large industrialized countries are: greater exposure to supply shocks in general and trade volatility in particular (especially for the commodity exporters), procyclicalty of international finance (contrary to orthodox theory), lower credibility with respect to both price stability and default risk (due in part to a past history of financing deficits by seignorage and default), procyclicality of fiscal policy (due in part to the imposition of austerity in crises), and other imperfect institutions.

Some models of monetary policy originally designed for industrialized countries -- dynamic inconsistency in monetary policy and the need for central bank independence and commitment to nominal targets – apply even more strongly to developing countries, in light of the credibility problem. But because most developing countries are price-takers on world markets, the small open economy model, with nontraded goods, is more often useful than the two-country two-good model. Contractionary effects of devaluation are far more important for developing countries, particularly the balance sheet effects that arise from currency mismatch.

The choice of exchange rate regime is no more clear-cut for emerging market countries than it is for advanced countries. On the one hand, small size, openness and less developed financial markets point relatively more to fixed exchange rates. On the other hand, terms of trade volatility and the experience with speculative attacks point toward more flexible exchange rates. Some began to float after the crises of the 1990s. In place of the exchange rate as favored nominal target for monetary policy, the conventional wisdom has anointed inflation targeting, with the CPI as the choice for price index. This chapter has departed in one place from the mission of neutrally surveying the literature: It argues that events associated with the global crisis of 2007-09 have revealed limitations to this role for the CPI.

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[210] Alesina and Wagner (2003) and Guidotti et. al. (2003). The drawback, of course, is that the foreign liabilities of the financial sector is not the same as foreign-currency liabilities of domestic residents. Goldstein and Turner (2004).

[211] Computed by Arteta (2005a, b).

[212] Examples include Berg, Borensztein, Milesi-Ferreti, and Pattillo (1999), Frankel and Rose (1996), Goldstein, Kaminsky and Reinhart (2000), Mulder, Perrelli and Rocha (2002), Rodrik and Velasco (1999, 2000), and Sachs (1998) among others.

Although the participation of emerging markets in global finance is a major reason why they have by now earned their own large body of research, they remain highly prone to problems of asymmetric information, illiquidity, default risk, moral hazard and imperfect institutions. Many of the models designed to fit developing countries were built around such financial market imperfections, and few thought this inappropriate. Since the crisis of 2007-09 showed that the United States and other rich countries have these problems too, to a much greater extent than previously understood, perhaps some of the models that had been applied to emerging markets could now be of service in thinking how to rebuild mainstream monetary macroeconomics.

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