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# CRISES: THE NEXT GENERATION?*

When I first began working on the theory of currency crises in 1977, I imagined that it was a subject mainly of historical interest. The motivating events were the speculative attacks that brought down the Bretton Woods system in 1971 and the Smithsonian system in 1973. Given the end of fixed rates for major economies, it seemed unlikely that such events would recur.

Of course, that's not how it turned out. The fixed rates of Latin American nations offered a target for large speculative attacks in the runup to the debt crisis of the 1980s; the fixed rates of the European Monetary System offered targets for a wave of speculative attacks in 1992-3; and the more or less fixed rates of Asian and other developing nations offered targets for yet another round of attacks in 1997-8.

Yet while the continuing relevance of the general idea of speculative attacks has justified the original theoretical interest in the subject, the actual models have not fared as well. When Eichengreen, Rose, and Wyplosz (1995) introduced the terminology of "first-generation" and "second-generation" crisis models, they also highlighted the somewhat disheartening fact that each wave of crises seems to elicit a new style of model, one that makes sense of the crisis *after the fact*. And sure enough, the Asian crisis

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led to a proliferation of "third-generation" models, quite different from either the first or the second generation. (Like third-generation mobile phone service, the third generation of crisis models has not yet quite lived up to its billing. Producers have not been able to agree on a common set of standards, and with the fading of the Asian financial crisis there is also question about whether we have a "killer ap." But with recent financial news in Japan and the U.S., things may be looking up.)

This paper represents a very rough effort to get ahead of the curve, by asking what a "fourth-generation" crisis model might look like. The main insight, if there is one, is that third-generation currency crisis models are actually not very specific to *currency* crises: the mechanisms for speculative attack and self-fulfilling pessimism that these models identify, while they do make room for an Asian-style crisis in which capital flight leads to plunging currencies that validate the initial loss of confidence, also allow with small modification for other types of financial crisis. In particular, some third-generation crisis models are very close in spirit to the closed-economy "financial fragility" models of Bernanke and Gertler (1989). What this suggests is that a fourth-generation crisis model may not be a currency crisis model at all; it may be a more general financial crisis model in which other asset prices play the starring role.

Moreover, I will argue that even the open-economy aspects of third-generation models may not be all that crucial. It's true that a simple story of financial collapse is easier to tell if one assumes that capital has someplace else to run to; otherwise, a loss of confidence leads to a fall in the price of capital, which at first sight seems to rule out the kind of self-fulfilling loop that plays so central a role in many models. However, this need not always be the case. In particular, I will argue for a tie-in between the possibility of financial crisis and another one of my obsessions, the possibility of Japanese-style

liquidity traps.

This paper is in four parts. The first part briefly summarizes the evolution of currency crisis models, from first generation to third. The second part focuses on third-generation models, and in particular on what they say about policy during a crisis. The third part then offers a highly stylized open-economy fourth-generation model. The fourth part offers a loose translation of that model into closed-economy IS-LM-type macroeconomics, which allows a discussion of policy options during a fourth-gen crisis.

## 1. *A brief history of currency crisis modeling*

The history of currency crisis modeling is presumably familiar to all economists working in international macroeconomics. The only value that can be added in this brief recapitulation is an effort to identify several trends that seem to be present in the moves between successive generations.

First-generation crisis models, exemplified by Krugman (1979) and Flood and Garber (1984) essentially viewed a central bank's efforts to peg an exchange rate using reserves as being similar to a commodity agency's efforts to peg a resource price using its stockpile. In each case, if there is a long-run upward trend in the "shadow price" - the resource price or exchange rate that would prevail if the stock of resources or foreign exchange were all to be sold - the stabilization policy is ultimately doomed. And in fact in each case it can be shown that rational, fully-informed speculators will abruptly clean out the stock the instant the shadow price exceeds the peg. The reason is backward induction: any delay would offer an opportunity for capital gains, so individual speculators have an incentive to purchase the stock ahead of the expected crisis date; and in so doing they advance that crisis date, until

it occurs at the earliest possible moment.

From the perspective of what has happened since, there are three things worth noting about this analysis.

First, the root cause of the crisis is poor government policy. In these models, the source of the upward trend in the shadow exchange rate is the government's need for seignorage; solve the fiscal problem and there would be no crisis. And the speculative target is provided by the government's pursuit of inconsistent policies: persistent deficits together with an exchange rate peg. So the models basically imply that governments get the crisis they deserve.

Second, the crisis, though sudden, is deterministic: a crisis is inevitable given the policies, and the timing is in principle predictable (though a look at the models suggests that it would be very hard to predict that timing in practice.)

Finally, the credibility of the finance minister aside, first-generation crises seem to do no harm. They only reveal an economic problem that was there in any case. The simple models, by construction, cannot exhibit a post-crisis recession; but even if one tries to introduce realistic features like non-traded goods and even price stickiness, it is more or less impossible to generate a real-economy slump in the aftermath of a first-generation currency crisis.

In self-defense, I might note that the currency crises of the early 1970s, which were the inspiration for the original model, did in retrospect seem inevitable; and also that they were not followed by real-side punishment. So all of this did not seem as off-base then as it does now, several major waves of crisis later. The Latin American crisis of 1982 *was* followed by a real-side slump; but while currency runs were part of the story there, the main event seemed to be a sovereign debt crisis, which plausibly

could explain the nasty output and employment consequences.

On to the second generation. The inspiration for second-generation modeling was the series of speculative attacks on EMS currencies in 1992-3; the seminal papers were by Obstfeld (1994a, b).

There were several obvious divergences in the EMS crisis from the assumptions of first-generation models. Seignorage was not an issue: the governments involved retained access to capital markets throughout, and the activities of their printing presses were dictated by macroeconomic policy considerations, not budget needs. Indeed, it's hard to see much evidence of irresponsible policies in any of the countries involved. Also, there was not an obvious long-run trend in equilibrium exchange rates - a point that has gained even more force as the years have passed, and the pound sterling has actually appreciated to well above its pre-crisis level against continental currencies. Finally, the connection between capital flight and abandonment of the peg was not the mechanical linkage envisioned in the early models - you run out of reserves, and that's it. Instead, it was a matter of policy choice: in 1992 British officials chose not to pay the price for defending the pound with higher interest rates, while French officials made the opposite decision.

So the second-generation models gave a quite different version of what a crisis was all about. In truth Obstfeld (1994a) offers several variants, and one of them is a budget-driven story that, while not about seignorage per se, is still about fiscal imperatives. But the main story that has stuck focuses on macroeconomic tradeoffs and decisions.

In the canonical version, more or less based on Britain in September 1992, a country's government has imperfectly committed itself to a currency peg at an uncomfortable level. That is, the level of the currency is one that constrains monetary policy, forcing the government to accept a lower level of

employment in the short run than it would otherwise have wanted to have. Nonetheless, as long as the peg is credible, this is a price that the government is willing to pay, presumably because there are political and/or long-run economic goals served by maintaining the peg.

However, if the peg ceases to be credible, investors will demand higher interest rates in order to hold assets denominated in the country's currency. And if the government defends the peg by providing those higher interest rates, it will worsen employment, increase financial distress (the prevalence of floating-rate mortgages in Britain was a key political consideration in 1992), or both. So even a government that would be willing to pay the price of sustaining its peg in the absence of speculative attack might be unwilling to stand up to such an attack. And so speculators who believe that other speculators are about to attack are themselves encouraged to do so. The result is the possibility of self-fulfilling crises of confidence.

Two points of difference between this story and the previous one: First, crises are no longer the result of obviously irresponsible policy. Perhaps one can argue that a government should not try to peg unless it is unalterably committed to the peg - the "bipolar" hypothesis, aka the law of the excluded middle. But much of the stigma is removed from government actions.

Second, the determinacy of the crisis is removed. There is a question about whether second-generation models necessarily imply that crises are self-fulfilling, or for that matter whether self-fulfilling crises can occur for first-generation reasons. However, the general thrust of the second-generation models is toward the idea that crises may occur suddenly in situations where no crisis seemed inevitable.

One point from the earlier models remains, however: If a speculative attack drives a currency off its

peg, this does not imply a negative shock to employment and output. Indeed, in this case the contrary should be true: because the policy constraint of a peg is removed, the result is actually positive for short-run macroeconomics. (Other costs may lie down the road, assuming that the government had some good reason for adopting the peg, but that is a different question.)

Again, this result seemed broadly plausible after the EMS crisis, since Britain at least did quite well after its ejection from the Exchange Rate Mechanism. (I used to joke that they should put up a statue of George Soros in Trafalgar Square.) But obviously this implication raises eyebrows when one comes to the Asian crisis. Admittedly one crisis country, Brazil, discovered that it was more like Britain than like Thailand: its devaluation, when it came, turned out to be expansionary rather than contractionary (and this good news, arguably, marked the end of the crisis.) But the general rule was that currency crises led to severe short-term real output declines.

At this point there are three main variants of the third-generation crisis story; I bear some of the blame for two of them. One version involves moral-hazard-driven investment, which leads to an excessive buildup of external debt and then to a collapse. This story has its origins in work by McKinnon and Pill (199?), was picked up in Krugman (1998), and was extensively developed in papers by Corsetti, Pesenti, and Roubini (1998). A second version, largely associated with Chang and Velasco (1998a,b) is built around open-economy versions of the Diamond-Dybvig bank-run model.

Finally, a third story stresses the balance-sheet implications of currency depreciation. A crude formal version of this type of third-generation model was in Krugman (1999a), and an even cruder but easier to understand informal version in Krugman (1999b). A number of more sophisticated models have since been developed, including efforts like that of Schneider and Tornell (2000) to combine a

moral-hazard-driven bubble with a balance-sheet driven crisis when the bubble bursts.

It is this third variant that I will focus on, and will review in the next part of the paper. But let me now say something about the direction in which the literature seems to have trended.

In the original crisis models a currency crisis was something that was deserved, predictable, and harmless. That is, it was caused by the government's pursuit of contradictory and unsustainable policies; given this, it had to happen, and indeed had to happen at a particular time; and since it only made the economic fundamentals visible, the crisis did not actually damage the economy. With the second generation models it becomes much less clear that the crisis is deserved, and it becomes unpredictable, though it is still mostly harmless. With the third-generation models, crises become a clearly bad thing - largely because they are no longer mainly about monetary policy. Indeed, as we'll see shortly, the depreciation of the nominal exchange rate becomes more a symptom than a fundamental aspect of these crises.

## 2. *The balance-sheet view of crises*

The third-generation model that I introduced in Krugman (1999a) was in a sense similar in spirit to the Chang-Velasco bank-run models: it attempted to explain crises in terms of a flight of capital from an economy that was not fundamentally unsound. However, I was concerned that what seemed to me to be the most striking aspect of the Asian crisis, the dramatic reversal in the current account balances as a share of GDP, did not seem crucial - and also therefore that the dilemmas of economic policy in a crisis were not fully captured. Quoting myself: "Despite the evident centrality of the transfer problem to what

actually happened to Asia, this issue has been remarkably absent from formal models. Perhaps because the modelers have been mainly concerned with the behavior of investors rather than with the real economy per se, all of the major models so far have been one-good models in which domestic goods can be freely converted into foreign and vice versa without any movement in the terms of trade or the real exchange rate."

How could the transfer problem be placed at the center of the story? The balance-sheet problems that clearly afflicted Asian economies (and still afflict them, years later) offered a natural link. Start with highly leveraged firms with lots of foreign-currency-denominated debt, and imagine a large outflow of capital for whatever reason. This would lead to currency depreciation, which would greatly reduce if not eliminate the net worth of firms. And if one supposes, in the fashion of Bernanke and Gertler (1989) that an imperfect capital market means that firms with poor balance sheets cannot invest, the result can be a real investment collapse that validates the capital flight.

Let me not do a restatement of the original model, but instead focus on the "cartoon" version offered in Krugman (1999b). This version "translates" the more formal version, which is actually a real model with no monetary variables, into a modified version of the Mundell-Fleming model. The simplest version of Mundell-Fleming involves three equations. First is an aggregate demand equation relating domestic spending to real income and the interest rate, together with net exports that depend on the real exchange rate:

(1) $y = D(y, i) + NX(eP^*/P, y)$

Second is a money-demand equation:

(2) $M/P = L(y, i)$

Finally, in the simplest version, investors are supposed to be risk-neutral and have static expectations about the exchange rate, implying an interest-arbitrage equation

(3) $i = i^*$

In practice, this model is too simple for even the most basic uses; in particular, nobody believes in static expectations about *e*. Even if one is prepared to dismiss rational intertemporal modeling, almost everyone would prefer a version of (3) in which markets expect *e* to return to some "normal" value, possibly one determined by purchasing power parity. But let us stick with the simplest version.

This setup can be regarded as simultaneously determining output *y* and the exchange rate *e*. Figure 1 shows how this works. The vertical line AA shows all the points at which, given (2), the domestic and foreign interest rates are equal. Meanwhile, the line GG shows how output is determined given the exchange rate; it is upward-sloping because depreciation increases net exports and therefore stimulates the economy.

To turn this into a model that can yield crises, all we need to do is add a strong balance sheet effect from currency depreciation. Suppose, then, that many firms are highly leveraged, that a substantial part of their debt is denominated in foreign currency, and that under some circumstances their investment will

be constrained by their balance sheets. Then the aggregate demand equation will have to include a direct dependence of domestic demand on the real exchange rate:

(1') $y = D(y, i, eP^*/P) + NX(eP^*/P, y)$

Let's also, for the sake of a slight improvement in realism, suppose that "fear of floating" leads the central bank to lean against the exchange rate, so that we replace the AA curve with one that includes a monetary response:

(2') $M(e)/P = L(y, i)$ with M decreasing in e

This gives an AA curve that is backward-bending; as we'll see in a second, this helps us tell a story about output effects.

The importance of the balance-sheet effect would depend on the level of the exchange rate. At very favorable exchange rates, few firms would be balance-sheet constrained; so at low $eP^*/P$ the direct effect of the exchange rate on aggregate demand would be minor. At very *unfavorable* real exchange rates, firms with foreign-currency debt would be unable to invest at all, and therefore the direct exchange-rate effect on demand would be trivial at the margin. But in an intermediate range, the effect might be large enough to outweigh the direct effect on export competitiveness, so that over that range depreciation of the currency would be contractionary rather than expansionary.

So, as suggested by Aghion, Bacchetta, and Banerjee (1999), we might expect the GG curve to

have a backward-bending segment, as in Figure 2; and hence there could be multiple stable equilibria, one with a "normal" exchange rate, one with a hyperdepreciated exchange rate and a bankrupt corporate sector; given that monetary policy becomes more contractionary, we also get a fall in output.

And so we have the possibility of a third-generation currency crisis. Something - it could be anything - causes a sudden large currency depreciation; this depreciation creates havoc with balance sheets; and the economy plunges into the crisis equilibrium.

It's all very crude and ad hoc; but it does seem to get at some of the issues that arise in real crises. In particular, this approach helps suggest why policy during a crisis is so difficult. In Krugman (1999b) I ran through the usual answers, and found each one wanting:

1. *IMF financial support* : This provides a country with additional funds to intervene in the exchange market - more dollars to support the baht, won, whatever. Leaving aside monetary policy, however, this is a *sterilized* intervention; so it is an attempt to use sterilized intervention to move the exchange rate away from the crisis equilibrium. Calling the IMF the international lender of last resort sounds impressive; calling it, more accurately, the "sterilized intervenor of last resort" probably more accurately conveys the limits of what it can accomplish.

2. *Rollovers and standstills* : Anything that induces investors who would otherwise have tried to convert domestic currency into dollars not to do so is in effect a sterilized intervention on behalf of the currency. And if there is a very large pool of mobile capital, a standstill that freezes only bank loans (or even one that also freezes bondholders) will alter the composition of capital flight but not its volume; the economy can still be plunged into the bad equilibrium regardless.

3. *Fiscal policy* : For what it worth, this kind of model suggests that instead of conventional fiscal

austerity, countries experiencing a third-generation currency crisis ought to consider fiscal *expansion*. (More on this when we come to fourth-generation crises.) Fiscal expansion shifts GG to the right, and if undertaken on a sufficient scale can rule out the crisis equilibrium. The question is whether countries are able to undertake such expansion on the needed scale.

4. *Monetary policy* : The principal, and much-disputed, tool in IMF stabilizations has been a temporary sharp tightening of monetary policy to support the exchange rate, following by gradual loosening once confidence seems to have been restored. Somewhat surprisingly, this model allows a rough rationale for this strategy. Consider Figure 3, and imagine that for some reason markets appear to have become convinced that the economy is heading for the crisis equilibrium - a belief that, if unchecked, will become self-fulfilling. One way to prevent this from happening is to drastically tighten monetary policy, shifting the AA curve so far to the left that it becomes like A'A' - that is, far enough to rule out the crisis equilibrium. Once investors have become convinced that the exchange rate is not going to depreciate massively, this monetary contraction can be relaxed. The problem, of course, is that along the way the economy faces a sharp contraction in real output, with all the social and perhaps political disruption that causes. And in any case, the exchange rate is not the only potential source of balance-sheet problems - which will become apparent when we come to the fourth-generation model.

(v) *Structural reform* : When crises occur, governments are invariably urged to announce and implement major structural reforms such as privatization, cleanup of bad banks, etc..

In the context of our model, it is hard to see why this is an effective crisis policy. That is not to say that structural reform is a bad thing: many crisis countries had (and still have) very unsound economic

systems. But if you believe that the crisis itself is mainly a matter of self-fulfilling pessimism, it is hard to see why structural reform should be helpful - unless, the all-purpose answer, it somehow leads to increased confidence.

The kind of reasoning described above is what led me to endorse the idea of ruling out the bad equilibrium by *force majeure*, imposing capital controls as a temporary emergency measure during a crisis. Nothing that has happened since suggests that this was a silly position: Malaysia clearly got away with controls, and recent analysis by Rodrik and Kaplan (2001) makes a plausible case that the controls did a lot of short-term good. However, let me not dwell on this point, because my fourth-gen approach will lead in a quite different direction.

Instead, let me emphasize a funny thing about this type of model. If one grants that the effects of asset prices like the exchange rate are a key linkage in financial crisis, why emphasize the exchange rate above other alternatives? The main answer is experience: exchange rate movements seem to have played a key role in the most recent major bout of financial crises. But if we want to get ahead of the curve, to do models not of the last wave of crises but of possible future crises, we should look for what is possible given our general approach rather than what has already happened.

So here's my proposal for a fourth-generation crisis model: it looks a lot like a third-generation model, except that it considers asset prices other than the exchange rate.

Having said that, one quickly realizes that to a large extent the model already exists, in the Bernanke et al analysis of balance-sheet effects and financial fragility in domestic macro. But in the remainder of this paper I will try to take that analysis to a few new places, and stress the continuity with the currency crisis modeling.

## 3. *Asset prices and crises*

The starting point for the particular variant of third-generation crisis model I have described is the observation, stressed by Bernanke and Gertler in a domestic-macro context, that balance sheets matter - that in an imperfect capital market the ability of firms to exploit even profitable investment opportunities may depend on their ability to provide sufficient collateral to let them borrow the needed funds. The potential havoc wrought by currency depreciation then operates through the liability side of that balance sheet: if the price of foreign exchange rises, and firms have foreign currency debt, their net worth falls.

But why not also talk about the asset side of the balance sheet? The natural, and not at all original, story is one in which a decline in confidence leads to declining asset prices, which leads to a fall in investment that validates both the decline in asset prices and the fall in confidence.

The point I want to make in this section is how easily such considerations can turn a negative-feedback story with a unique equilibrium into a positive-feedback story where pessimism can feed on itself.

Consider, then, a setup similar to the illustrative model in Bernanke and Gertler (1989), but even more artificial. We imagine a small open economy, producing a single tradeable good. The economy lasts for only two periods. In period 0 investors may or may not borrow "seed money" to get themselves into business; there are N such investors, and each must borrow B in terms of the single good to get started. The real interest rate on this borrowing is r, and we may take it as given.

Each investor is also endowed with an equal share of a productive resource, with the total quantity

of that resource equal to K. In period 1 an investor who has made the initial investment of B can choose to produce according to a production function F(k), where k is the amount of the resource he uses. He may use either more or less than he owns, selling any surplus for a price q. The price of the resource will be determined in a competitive market in which those potential investors who borrowed the necessary seed money are the buyers, and the potential investors who did not borrow are the sellers.

Suppose that $n<N$ potential investors actually went ahead. Then it is immediately apparent that the price of the resource will be

$$(4)\quad q = F'(K/n)$$

which is increasing in n. It is also immediately apparent that an investor who does borrow will earn an economic profit of

$$(5)\quad EP = S(q)/(1+r) - B$$

where S(q) is the "surplus" earned in period 1 over and above the cost - either market cost or opportunity cost - of the resources used in production. S(q) will be decreasing in q; so from (4) and (5) we see that the profitability of investing is decreasing in the number of actual investors.

If capital markets were perfect, then, there would be a unique equilibrium value of n - perhaps 0 or N, but also possibly an interior solution.

But now suppose that there are problems with monitoring. Again following Bernanke and Gertler (1989), let me suppose that these are extreme: that the lender in period 0 has no way of knowing what the borrower has done with the loan. The lender's only recourse in the case of non-payment is the ability to seize the borrower's marketable resource in period 1. So the lender will not lend more than the borrower's collateral:

(7) $B \leq (qK/N)/(1+r)$

Suppose that (7) is always binding - that is, that investing is always profitable, *if* the seed money can be borrowed. But q is increasing in n. So we now have the result that each investor will invest - will be *able* to invest - only if enough other investors are also expected to invest, so that his collateral is worth enough to persuade lenders to give him the necessary seed money.

And we therefore have multiple equilibria. One equilibrium is with all N potential investors investing; this leads to a high q, which allows each investor to offer sufficient collateral to raise the necessary seed money. The other equilibrium is with no investment, and hence in this hard-edged model a zero q, so that nobody has collateral - and hence nobody can invest.

"Stylized" doesn't do justice to the unrealism of this model, but it makes the point: balance-sheet considerations can turn what would otherwise be a model with a unique equilibrium into one in which self-fulfilling pessimism can cause investment to collapse, not because of the exchange rate and transfer problems stressed in the third-generation crisis models, but because of the effects of confidence on domestic asset prices. The basic story line is pretty much the same, but the asset price is different.

With some tweaking it would clearly be possible to soften the result in this model, making self-fulfilling financial crisis something that is possible under certain conditions, rather than always. It would also clearly be possible to put the usual suspects into the list of factors creating vulnerability: excessive past investment, high leverage, etc.. However, let me leave this model with the observation that we have now seen that the basic story of the latest wave of currency crisis models is basically a story about financial crises in general, and that the exchange rate need not play the starring (or any) role in that story. And with that let me move to the translation into IS-LM-type modeling.

## 4. *Financial crisis in a closed economy*

Let's now see how the story described above could lead to a crisis scenario that is a close cousin of the Asian-style crisis modeled earlier, but this time in a closed economy. (We need not really mean that the economy is closed, only that domestic asset markets rather than the currency market become central.) To do this we make the jump already implicit in the symbols used above, namely that the q we are talking about is indeed Tobin's q.

We start by assuming a demand-side driven economy, which implicitly means assuming some kind of nominal stickiness, in which q determines investment and hence through a multiplier the level of output:

(8) $y = y(q)$

What determines q? Having done a rigorous if silly model, we can now allow ourselves some serious ad hockery; so let's simply suppose that q is increasing in y, which determines profits, and decreasing in i. (This is pretty much how the models of market gurus like Abby Joseph Cohen work! Is that a positive or negative indicator?)

(9) $q = q(y, i)$

Rather than have a money demand function, let me last follow the suggestion of Romer (1998) and go directly to a monetary reaction function, which in this stripped-down exposition is simply a matter of the central bank raising interest rates if y is high, reducing them if y is low.

(10) $i = i(y)$

Equation (8) will define a goods-market equilibrium schedule; equations (9) and (10) together an asset-market equilibrium schedule. So we can think about this cartoon model in y,q space.

Drawing on the old tradition of nonlinear business cycle theory (e.g. Tobin 1955), we can suppose that the impact of q on y is nonlinear. Below some level reducing q has little effect, because gross investment is near zero and cannot go any lower; above some level raising q also has little effect, because capacity constraints or something prevent further expansion. (My vagueness is deliberate.) So we get a goods-market equilibrium schedule that looks like the curve GG in Figure 4. The family resemblance to GG in the previous figures is not accidental.

What about asset-market equilibrium? This depends both on the private-sector response (9) and on the monetary reaction function (10). Clearly, the schedule can slope either way.

If the monetary authority is sufficiently responsive to output levels, the schedule AA is downward-sloping, as in Figure 4. In that case there is a unique equilibrium, and nothing that looks like a financial crisis.

If the monetary authority is not sufficiently responsive, we can have an upward-sloping AA schedule, and therefore the possibility of multiple equilibria as in Figure 5. So one could envisage a version of financial crisis in which the economy suddenly jumps to the bad equilibrium here, and that monetary policy simply is not responsive enough to prevent it from doing so. However, that is a pretty unconvincing story, or at any rate one that calls simply for better policy at the central bank.

If one wants a really scary story, one has to imagine that for some reason the central bank *cannot* cut the interest rate enough to make the AA curve slope downward. And of course there is such a scenario: what if the interest rate is already at zero? Then we have the zero-bound or liquidity trap story, which becomes a very serious one if one is depending on monetary policy to avert financial crisis. The picture would look like Figure 6: as y declines the monetary authority would cut i enough to make AA downward-sloping, but once the interest rate is zero there is nothing more it can do, and the AA curve becomes upward-sloping. In that case monetary policy cannot rule out the bad equilibrium, if it exists.

Now we have our domestic financial-market counterpart to the currency crisis story. Something happens to confidence: a technology bubble bursts, or a hapless Prime Minister refuses to resign, or a president talks down the economy in an effort to build support for his tax cut, or something. The result

is a drop in asset prices that, because of its effects on investment, deflates the economy, validating that price decline; and the central bank is unable to stop the collapse into the bad equilibrium even by cutting rates all the way to zero.

At this point the policy options become limited. I have argued at length, in the case of Japan, that zero is not necessarily a lower bound for inflation - that promises to pursue an inflation target should in principle be able to reduce the real interest rate below zero and hence regain traction for monetary policy. Work by Svensson (2000, 2001), in particular, has refined that idea, suggesting that price level and/or exchange rate targets might serve the purpose better than an inflation target. However, in all cases such policies would be hard to make credible - and credibility is all-important.

This is also the kind of situation in which "pump-priming" fiscal expansion could live up to its name: a sufficiently large temporary fiscal expansion could rule out the bad equilibrium and put the economy back into a favorable equilibrium. Again, the key words are "sufficiently large": half-hearted fiscal expansion, Japanese-style, would not be enough to achieve self-sustaining recovery.

In the event of such a crisis one could also be sure to hear calls for structural reform. As in the case of currency crisis, however, it is hard to see why such reform would actually help in dealing with the crisis as opposed to raising general efficiency.

The general point is that intellectually consistent solutions to a domestic financial crisis of this type, like solutions to a third-generation currency crisis, are likely to seem too radical to be implemented in practice. And partial measures are likely to fail.

So that is my proposal for a fourth-generation crisis approach - one that could certainly be refined and made far more rigorous. Have I succeeded in the goal of getting ahead of the curve, of sketching

out a model of crisis *before* the events actually occur? Only time will tell. Intellectually, I hope so. But as someone who actually has to live in the world economy, I hope this modeling approach is irrelevant.

REFERENCES: TO BE SUPPLIED

**Figure 1**

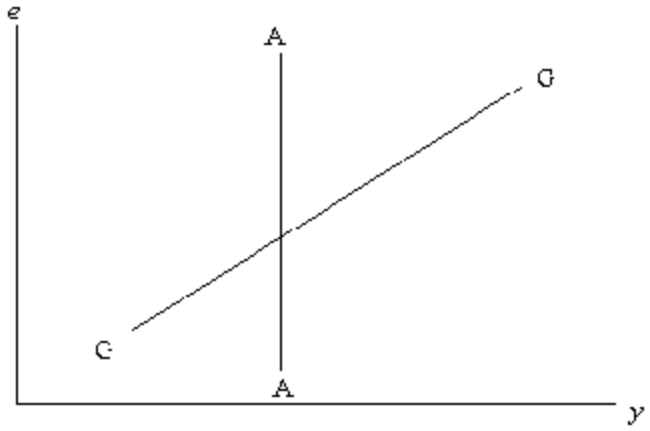


**Figure 2**

c

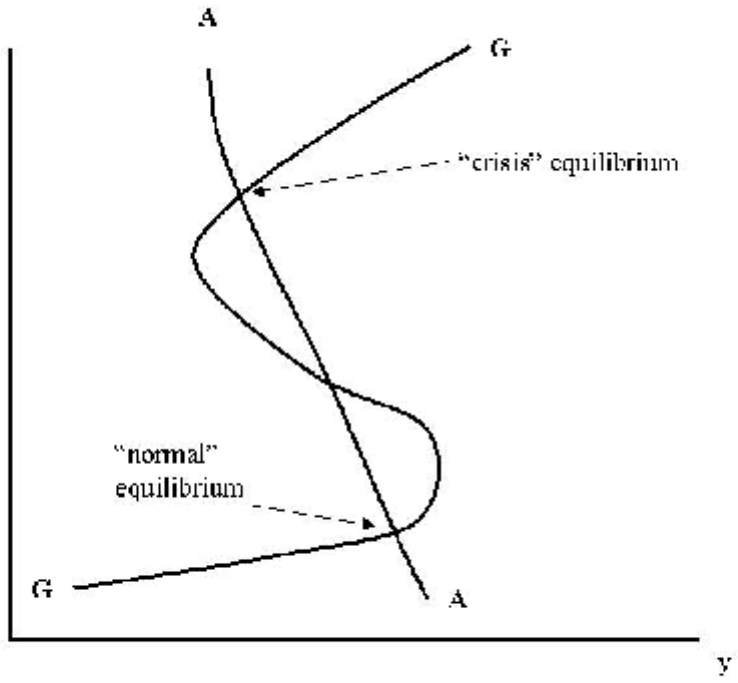

**Figure 3**

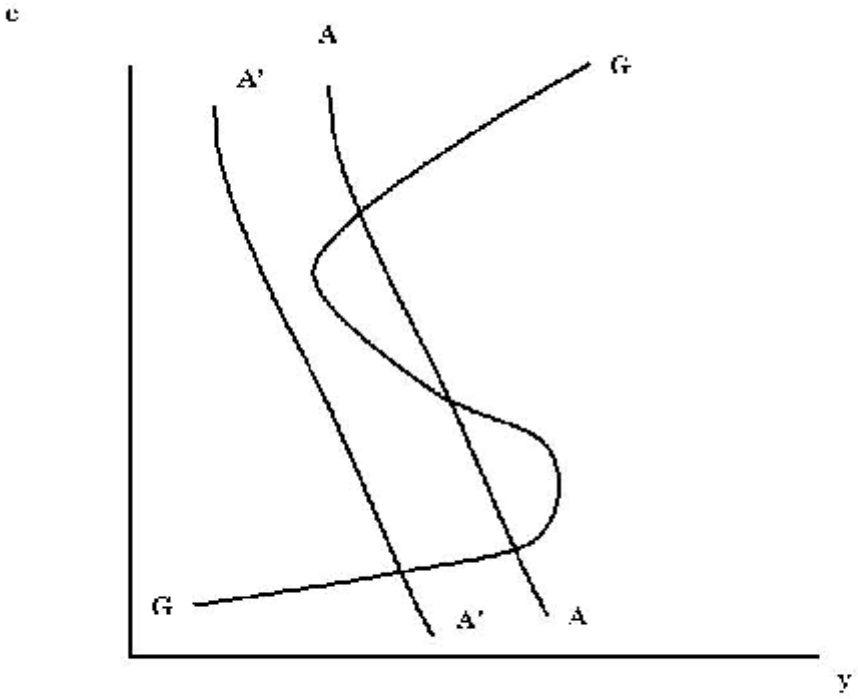

**Figure 4**

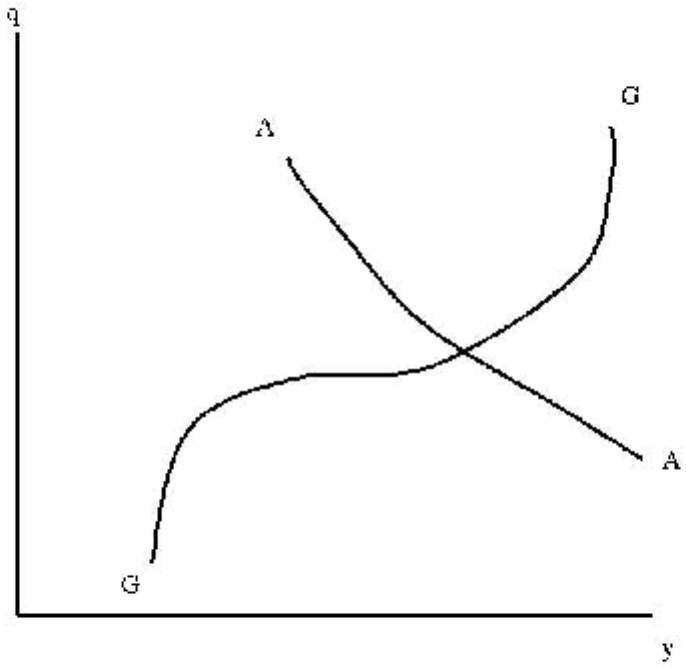

**Figure 5**

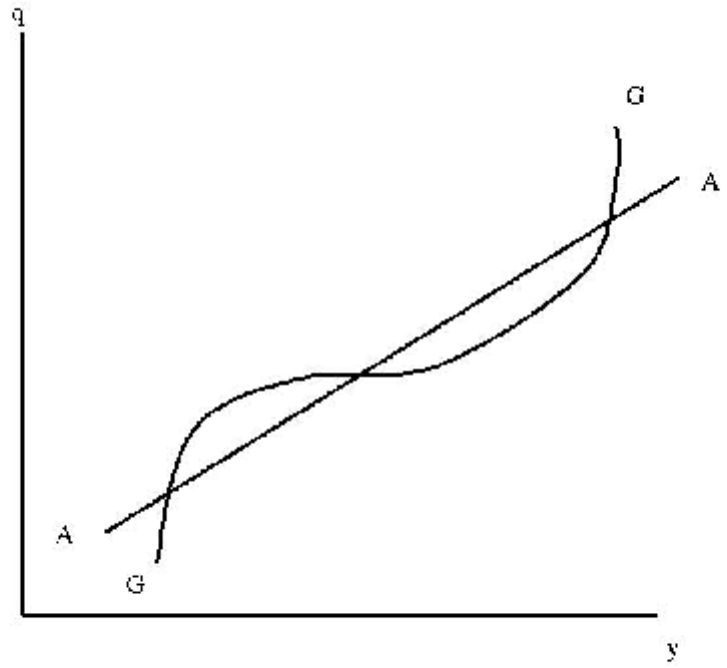

**Figure 6**