

# The Millennium Bug

## Self-Fulfilling Prophecies

*By Daniel Bachman*

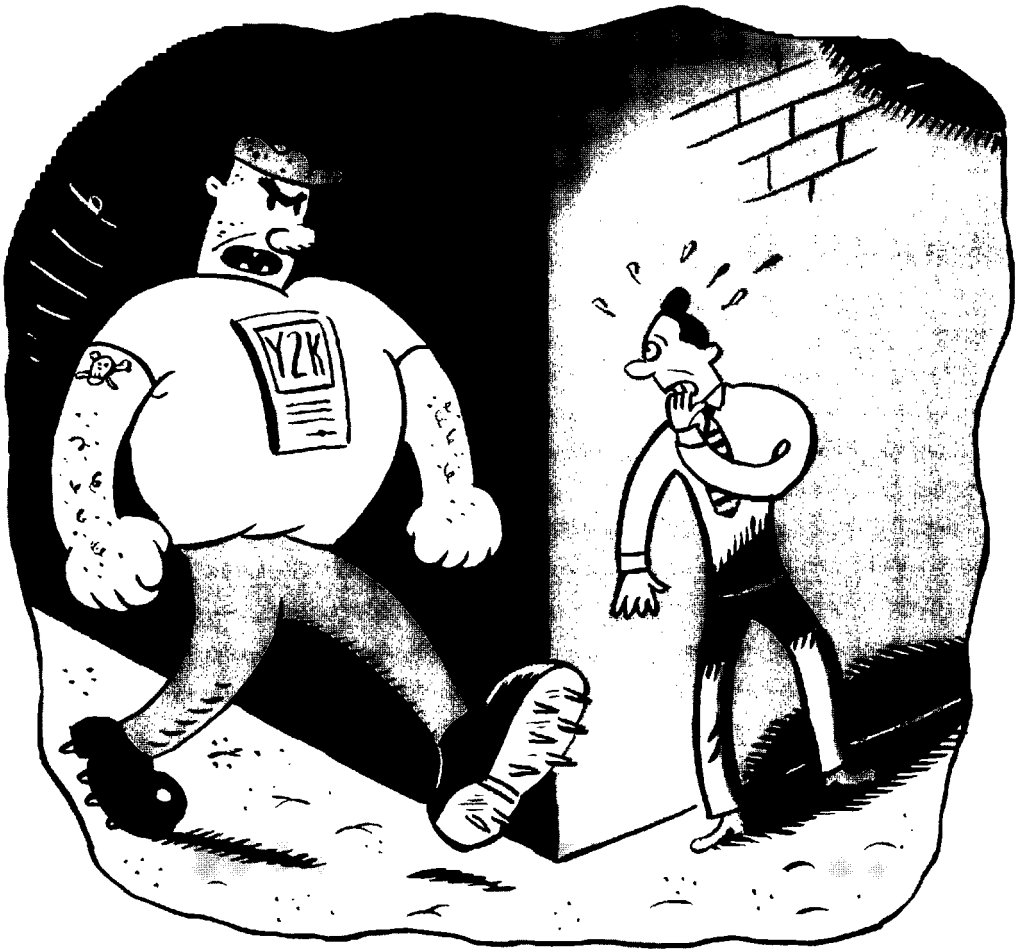
The Year 2000 computer problem has by now received considerable attention from pundits and technology gurus. Technical details – how many computers might be affected, how many factories might shut down, whether major systems will survive the onslaught – remain fuzzy. Nonetheless, opposing camps have already emerged. The Chicken Littles, led by Ed Yardeni of Deutsche Bank, are convinced that the sky will fall. Meanwhile, the consensus of the Philadelphia Fed's venerable Survey of Profes-

sional Forecasters suggests that the impact will be small and short-lived.

**Even if the disaster scenarios fizzle, defensive economic behavior could lead to a recession.**

But even if the optimists are largely right – even if the computer glitches have only a modest direct impact on production and distribution – anticipatory behavior by households and businesses could have some surprising consequences. We at WEFA expect Y2K to keep the economy growing faster

than expected in 1999, but the end of the year could be wild. Indeed, those nostalgic for the 1970's can even look forward to the return of gasoline lines and spot material shortages. Then, at the beginning of the new millennium, companies will want to work off inventories, and growth will lag badly.



Of course, major supply shocks à la Yardeni that reduce productive capacity for some time are not out of the question. And such shocks, major or minor, could be greatly amplified by ongoing questions of legal liability.

#### **HOW Y2K CHANGES THE ECONOMIC OUTLOOK**

It's easy to make the optimists' case. Y2K pessimists generally underestimate the degree of redundancy built into a competitive economic system. They also overestimate the importance of big computerized systems in the functioning of the economy.

The role of the air traffic control system is a good example. If, in fact, the integrated network of radars and computers does fail on Jan. 1, airplanes will not fall out of the sky. Other systems, allowing decentralized tracking by individual airports and aircraft, will keep the planes flying. Continuing failure would force airlines to reschedule flights, and the total capacity of the system would surely fall. But air travel is very unlikely to come to a halt.

This is no guarantee that Y2K-related disruptions won't be serious or difficult to unwind. It does suggest, however, the inher-

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ent difficulty in analyzing their macroeconomic impact. We at WEFA have thus chosen to focus on factors that are important, but easier to pin down. We concentrate on the behavioral impact of economic actors faced with the uncertainty inherent in Y2K. And we identify one general rule for analysis and six major points at which the bug could affect the broader economy.

### SIZE MATTERS

Our rule is simple: the larger the organization, the less likely it is to fail. Large organizations generally have the resources and awareness to manage the problem. Indeed, the managers of very largest systems, such as the electricity supply system, have long been aware of the issue and have already sunk substantial resources into minimizing the consequences of failures or preventing them altogether.

By contrast, many small organizations will fail or be forced to operate without electronic information. The failure of a small bank or company can occur (and does dozens of times a day) without unduly affecting the economy. Moreover, small organizations can more easily dodge the Y2K bullet because they are less dependent on computers for storing information. One tiny credit union we know considered a simple fallback plan: ledger books and pencils.

The organizations at greatest risk, then, are the ones in the middle. These are the organizations that can't do without electronic data management, but may not have the resources or management to cope with Y2K retrofitting.

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The good news is that such organizations are mostly private firms in competitive markets. Thus failure generally means that their trade goes elsewhere – a prospect that is hard on the firm's owners, but of little consequence for the rest of us.

Y2K could thus accentuate natural selection in the market, sorting out managers who can rise to the challenge from those who cannot. Companies that successfully continue to operate in the new millennium will grab larger market share and possibly control of their rivals. We know of one mutual fund that is actively seeking investments in well-managed companies and that intends to sell short the stock of their poorly managed competitors. While civilization won't end, some of the corporate artifacts of modern capitalism will probably succumb to the millennium bug.

### IMPACT POINT 1: THE PAYMENTS SYSTEM AND FINANCIAL MARKETS

The financial system is the largest information system in the world. Our rule applies fully here, because financial markets and institutions have long been aware of the problem and have probably spent more money than any other industry to contain it.

Wall Street's worst nightmare is a sudden halt in trading. This could happen if software used directly in trading failed, or if banks and other middlemen were unable to confirm and record transactions. The financial system is heavily dependent on computerized systems to operate smoothly, and institutions are cross-linked so that failure of any big wire house to clear transactions could bring down the whole show.

The Federal Reserve has plunged into the problem, however, using its extensive regulatory authority to force the major market players to test their systems and make corrections.

The Fed has almost completed its own internal systems review. Initial simulations have already been carried out on both the Fed's inter-bank systems and on other securities trading systems. Individual banks and financial firms will probably slip through the cracks, but the system as a whole should be sufficiently robust to support trading as the century turns.

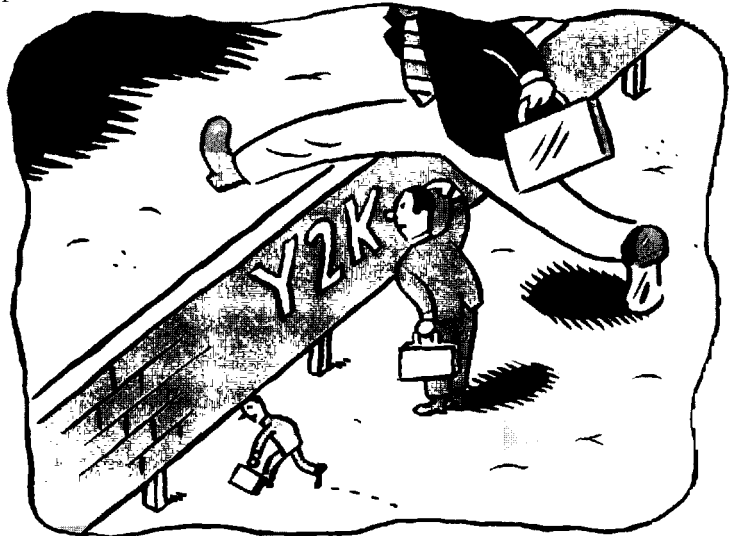
Beyond the payments system, however, there are several areas in which the Fed must tread carefully. The specialized financial media will certainly recommend that households have extra cash on hand at the beginning of the year, and people probably won't need much prodding. Can you really be sure ATM's will work on Jan. 1? The Fed is printing tens of billions in extra currency to cover this demand – and, incidentally, has to figure out how to store and distribute all that cash.

If the mint's printing presses don't cover the problem, the Fed also has ways of conserving the currency stock – for example, by turning it around faster when it comes back to the regional Federal Reserve banks. Absent sufficient currency, the Fed will probably look the other way at informal credit and voucher systems that take the place of scarce legal tender.

Cash withdrawals, of course, drain reserves from the banking system. To keep banks solvent, the Fed will presumably be ready to replenish their coffers, most likely by purchasing Treasury securities on the open market.

Banks face unique problems in planning

for the millennium – problems that go beyond insuring that their computer systems work. Identifying the Y2K-related risks in borrowers is a daunting task. Conservative bankers will therefore strongly prefer to be in



*big + small companies can get through it – mid size have the most trouble*

T-bills than in loans at the end of the millennium, even where the potential borrowers have strong credit ratings. Public-private interest rate spreads are likely to jump at the end of 1999, and even longstanding customers may find credit hard to obtain. Remember, too, that this short-term credit crunch will come at the moment many companies will need capital to build inventories. Banks may also restrict consumer loans, since the short-term outlook will be particularly uncertain at the end of the year.

This situation will cry out for extensive Fed action to keep the economy awash in cheap credit over the period. Yet, since economic growth is likely to be above the long-term growth rate of capacity at the end of 1999,

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Fed decision-makers will have to be ready to move counter to conventional monetary policy wisdom. We hope they do, as the New Year will very probably bring an economic slowdown when the anticipated inventory cycle comes full circle.

### IMPACT POINT 2: INVENTORY ACCUMULATION

By late 1999, newspapers, magazine and television will be brimming with advice to keep groceries on hand "just in case" – and survivalists will be joined by the rest of us.



Businesses will seek to do the equivalent, which means that inventories are likely to soar in late 1999.

How much extra inventory will be needed? With very conservative assumptions, we estimate that companies will add 4 percent to base-level inventories by the end of the year. And substantially greater accumulation is possible. Inventories currently cover 42 days of production and sales. Thus increasing coverage by one week, on average, would require a 17 percent rise. And that would almost certainly create a mini-boom-and-bust, as busi-

nesses ran down the excess once they were over the Y2K hump.

This mini-cycle would occur even if Y2K turns out to be an insignificant technical problem. For it is the expectation here – not the reality – that counts.

Consumers will contribute to the inventory buildup, too. Aside from groceries, they will probably top off their gasoline tanks – or at least try to – on Dec. 31. Meeting this blip in demand would be a staggering task for the distribution system, so gas lines in the last few days of 1999 are in the cards. Even if Y2K generates no enduring supply disruption, consumer purchases in anticipation of the end of the year followed by a rundown in consumer inventories will create a mini-cycle in spending that will feed the larger business inventory cycle.

### IMPACT POINT 3: EMBEDDED CHIPS

Chips now show up all over – even in farm animals. And it will not be possible to identify and fix all the Y2K-vulnerable ones before the end of 1999. This certainty has provided the doomsday economists with grist for panic (Your car won't start! Your pacemaker won't work!), much of which is groundless.

Most microprocessors outside conventional computers don't track dates, and many that do can function adequately without dates. Indeed, the Gartner Group, a consulting company that has been on the pessimistic side of the Y2K problem, estimates that just two-tenths of a percent to 1 percent of all embedded chips are not Y2K-compliant.

In many cases where dates do matter, the Y2K problem can be overcome easily. And in most others, the damage will be self-limiting: the failure of one manufacturer or retail chain in a world of decentralized markets does not endanger the entire economy.

The electricity distribution grid, which is highly centralized, is often cited as the largest area of concern. But problems in power distribution are less frightening than they first appear. Recent disruptions in New Zealand and Quebec had no discernable macroeconomic impact. And while economists are not competent to judge the engineering issues involved in maintaining the power grid, there doesn't seem to be evidence that the system is sufficiently vulnerable to cause a recession-size shock.

#### **IMPACT POINT 4: INVESTMENT SPENDING**

An easy way to insure Y2K compatibility is to buy new equipment. It is so easy, in fact, that we expect investment spending to remain stronger than would otherwise be expected in 1999. There will be a surge in orders of producers' durable equipment as companies realize that the best defense against the Y2K problem – whether in embedded chips or in computers – is to accelerate their investment plans. Indeed, recent growth in spending on information processing equipment may already reflect a sense of urgency.

Strikingly, Federal Reserve economists have predicted that investment spending will slow in the second half of 1999 because companies will not want to rock the boat with new equipment before the millennium. Since the new equipment is sure to be Y2K compliant, however, and since many companies have not yet felt compelled to fix the problem, we think a surge in orders is much more likely than stagnation.

While this looks like good news for capital equipment makers and the economy, it runs head-on into current economic trends. As of the end of 1998, many United States corporations were pulling in their horns, expecting a

slowdown or recession in 1999. At WEFA, we don't expect a recession. But a decline in investment spending could leave more companies vulnerable on Jan. 1, 2000. And panic buying in mid-1999 is possible as businesses belatedly realize they need new equipment.

#### **IMPACT POINT 5: GOVERNMENT FINANCES**

While competitive markets insure that the economy will continue to operate, the centralization of the Federal Government is more worrisome. Washington has its fingers in many economic pies, adding to demand through transfers and vendor payments and siphoning away demand through tax collections. Both types of transactions could create problems large enough to affect the economy.

On the spending side, Federal transfers – everything from Social Security to Medicaid – account for 13 percent of disposable personal income. If the checks don't go out, consumer demand would certainly fall.

Of course, it would be a political disaster if Social Security payments stopped, so we expect the checks to be in the mail even if the President has to sign them by hand. Payments to workers and contractors, however, could easily be delayed, and the backup in payments through the supplier chain could add a few twists to the credit and spending crunch in the months after the New Year. A handful of industries – notably health care with about one-quarter of revenues coming directly from the Federal Government – will be at greatest risk.

Problems on the income side are rather different. The Government should continue to receive revenue since the banking system is likely to operate smoothly. The failure of the I.R.S.'s computers would create chaos in processing forms, but wouldn't block collections.

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The failure of the Treasury's accounting systems, however, could cause Washington to lose track of how much was actually in the bank. And this could increase uncertainty in already-tense credit markets, with the Federal Government issuing short-term debt even as its assets pile up in bank accounts.

Failures at the state and local levels are possible, but here the rule of size comes into play: Larger cities and states have the resources to solve Y2K-related fiscal problems; smaller jurisdictions may fail, but their failure is unlikely to lead to economic collapse. A school board unable to generate paychecks by computer could probably issue them by hand. A city unable to process property taxes for several months might need a bridge loan. With the national payments system on track, however, and a Fed that is willing to supply sufficient credit, such problems should not lead to economic disaster.

### IMPACT POINT 6: THE FOREIGN TRADE SECTOR

Foreign countries are behind the United States in coping with Y2K, creating two areas of concern. First, the United States financial system is tied into others, both through software connections for payments clearances and through financial institutions that manage the web of credit supporting trade and investment. The resulting risks to the payments system are real, but probably can be contained because the Fed and large banks are well aware of them. It is therefore unlikely that our wire transfer mechanism would crash simply because the Germans or the Swedes didn't have Y2K-friendly systems.

The real economy, however, provides room for some dramatic shifts in trade flows and exchange rates. United States companies

building inventories will be particularly sensitive to the prospect of disruptions from foreign suppliers because overseas manufacturers are behind the United States in Y2K remediation. This suggests that an import surge in 1999 is quite likely, one parallel to the stockpiling of domestically made goods. Foreigners may also increase orders of United States goods, leading to an export boom at the same time.

Financing the import surge should not prove difficult as international investors, leery of the Y2K competence of foreign banks, will want to shift portfolios toward the United States at about this time anyway. International capital flows are generally larger and more flexible than goods flows, so the dollar should appreciate even as the trade balance weakens in late 1999.

After the first few months of 2000, the import surge will reverse. Not only will United States companies want to use up the stockpiles of imported goods, but foreign suppliers suffering from Y2K-related problems will be less able to fill orders. While this might initially make United States companies more competitive in global markets, Y2K problems abroad may offset the impact by reducing demand overall.

Meanwhile, capital will presumably start to drain from the United States, as the uncertainty surrounding Y2K evaporates. The capital movements point to dollar depreciation, but this is not inevitable. If European or Japanese financial systems are disrupted, hot money may remain in the United States for some time after the turn of the century.

### THE ECONOMIC OUTLOOK WITH Y2K

Figure 1 compares WEFA's forecasted growth of gross domestic product for 1999 and 2000, with and without the Y2K phenomenon. The



contrast is startling: We expect Y2K to keep the economy growing in an otherwise weak economic environment through 1999. Indeed, inventory accumulation, along with additional investment in computer fixes and a burst of exports, will push growth above the long-term sustainable growth rate of 2.3 percent in the second half of the year.

Once Jan. 1 rolls around, however, businesses will move back to normal inventory and investment behavior, which will include running down the extra inventories amassed as a precaution in late 1999. Growth is likely to soften significantly.

The figure shows WEFA's most recent forecast for G.D.P. growth with and without the Y2K impact. Without the Year 2000 impact, economic growth would slow considerably in 1999. Y2K will

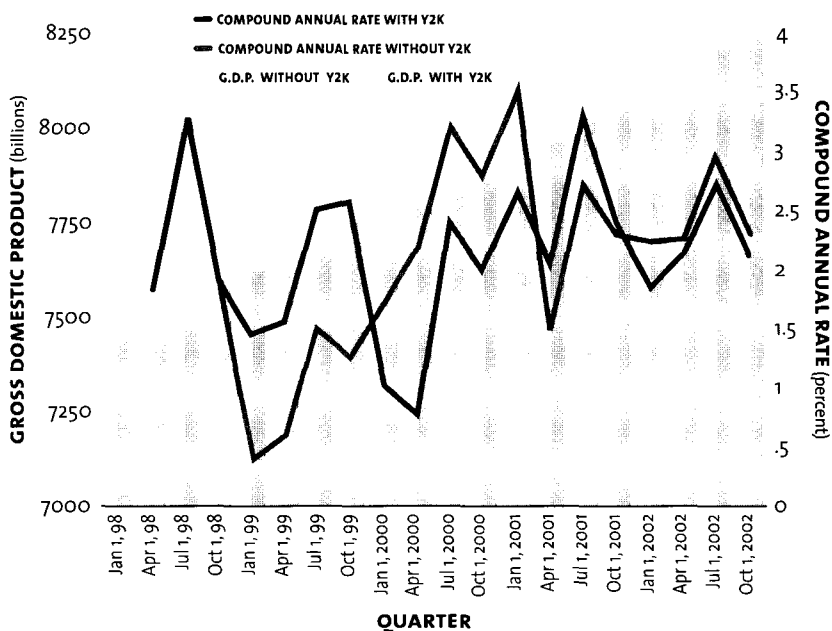
help to keep the growth rate up and accelerating through the end of 1999. By early in the year 2000, however, the millenium bug problem will pull growth down as inventories are run down.

Some observers argue that Y2K will reduce growth in 1999 because they confuse potential output with aggregate demand. Under our assumptions, Y2K reduces productive capacity by one-tenth to three-tenths of a percent, largely because computer software and hardware will depreciate more quickly

than expected. In the short run, however, the important impact will come from spending to replace the depreciated capital, as businesses defend themselves against the risk that suppliers will not be able to fill orders after the millennium bug hits. Thus, Y2K will clearly add to G.D.P. growth in 1999.

The resulting press on production in 1999

#### THE IMPACT OF Y2K ON THE G.D.P.



SOURCE: WEFA, Inc.

will lead to spot shortages and, almost certainly, a spike in inflation at the end of the year. This should be transitory, however, abating after the New Year.

#### LONG-TERM ISSUES

We at WEFA expect Y2K to generate a supply shock akin to, say, the energy crisis of 1973-74, although not nearly as large. But it will also generate legal uncertainty about liability for disruptions, a factor that could do far more serious damage to the economy.



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### PRODUCTIVITY GROWTH AND COMPLIANCE COSTS

From the economic model-builder's perspective, Y2K amounts to a sudden depreciation of the capital stock: physical capital that might have lasted longer will need to be replaced because it will not work properly after Jan. 1, 2000. For the same reason, the "intellectual capital" embodied in software must also be replaced earlier than planned.

But the total depreciation involved is not enormous. The Fed, using data from Securities and Exchange Commission, guesses that United States companies will pay on the order of \$50 billion to fix the Y2K problem, not including hardware expenditures. As a benchmark for comparison, note that the private physical capital stock in 1996 totaled \$16.5 trillion. The total stock including intellectual capital is obviously much larger. The depreciation implied by Y2K is thus on the order of three-tenths of a percent of the physical capital stock. The Fed estimates that the supply-side impact on G.D.P. will be a tenth of a percentage point of growth in 1998 and 1999, small enough to be lost in measurement errors.

Nevertheless, an anticipated productivity shock is a signal event. Indeed, the behavior of the economy in this period may help to advance the debate on the heretofore-esoteric economic theories of "rational expectations" and "real" business cycles. Should an anticipated supply shock create a business cycle? Only your friendly neighborhood economic theorist knows.

### THE LIABILITY TIME BOMB

At WEFA, much of our (relative) optimism for the economy in 2000 is based on our size

rules. With failures concentrated in small and medium-sized enterprises, a well-functioning financial system should allow prepared companies to absorb the assets of the losers relatively quickly, allowing a smooth transition to the post-millennium bug world. The well-known American inclination to settle disputes in court, however, suggests that such optimism may be unwarranted.

Who is liable for Y2K failures? Software vendors, insurance companies and industrial suppliers will blame one another, making their cases in large, expensive lawsuits. Worse, the huge financial stakes will almost certainly dictate protracted settlement negotiations. The most enduring damage from Y2K could thus come from tying up substantial capital in bankrupt companies. We did not include an impact of these legal problems in our simulation, but it remains perhaps the scariest Y2K problem of all.

### SELF-FULFILLING PROPHECIES

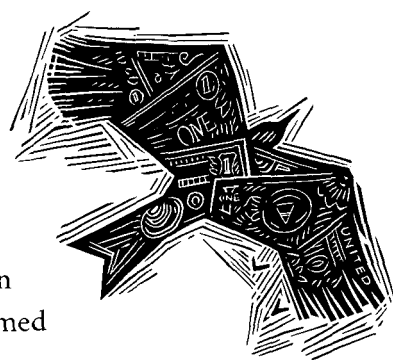
The end of a millennium should have no meaning for economists. But 2000 will be different, because of the millennium bug. Check that: The bug itself may not prove serious, it is in how we react to the prospect of disruptions. Modest attempts by businesses and households to protect themselves against the bug could have a large economic impact – as could the Fed's response to rational defensive economic behavior.

Ideally, the Fed will keep credit very plentiful over the transition, even if Y2K brings with it evidence of incipient inflation and material shortages. The shortages will no doubt be brief. However, since continuing credit shortages linked to ill-defined legal liabilities are a real possibility, the Fed should be prepared to keep the credit spigot open well into the year 2000. **M**

# Capital Mobility

## Ties Need Not Bind

By Barry Eichengreen



Since the Asian crisis erupted, Indonesia has been wracked by unrest and President Suharto has been driven from office. But in neighboring Malaysia, Prime Minister Mahathir Mohamed responded to the same crisis in a radically different way, imposing a curfew on capital rather than on unruly students.

Once the home of wide-open financial markets and a highly capitalized stock market, Malaysia now controls both purchases and sales of its currency. Not just banks and stock brokers are affected: Citizens are prohibited from taking as little as \$100 out of the country, and the law is enforced by random searches at the airport.

Mahathir argues that this infringement on civil liberties, the financial equivalent of a dusk-to-dawn curfew, is needed to protect Malaysia from marauding hedge funds that mug innocent bystanders. It would be madness, in his view, to leave currency speculators unrestrained, jeopardizing the health of the economy.

Capital controls, it seems, are back in fashion. Paul Krugman of M.I.T. recently argued in *Fortune* magazine that emergency conditions warranted emergency

**Imported capital helped fuel the great boom in East Asia. But capital flight now threatens to drive emerging markets back to poverty. Is there a way to save the baby while jettisoning the bath water?**

SCOTT BALDWIN (4)