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Deflation and its challenge to monetary policy in East Asia

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1 Introduction

Recently, monetary policy-makers around the world have turned their attention to deflation (Bean (2002), Bernanke (2002), Feldstein (2002), Latter (2002), Li (2002), Stevens (2002), Ueda (2003), Yam (2002a,b,c) and Yamaguchi (2002)). In part, this attention reflects waning certainty that Japan's four-year fall in consumer prices, which shows no sign of abating, is *sui generis*. Thus, Japan's experience is being consulted afresh for lessons on how to avoid deflation (Ahearne, et al. (2002)) and how to get out of deflation. Unfortunately, East Asia can offer other examples of deflation. These have been less examined and remain less well understood, however, even by the standards of the debate over the causes, implications and proper treatment of deflation in Japan.

Until recently, East Asia outside of Japan provided few obvious candidates for deflation. During the early 1990s, economies such as China, Hong Kong, and Korea contended with quite high rates of inflation. During the East Asian crisis of 1997-98, sharp currency depreciations interrupted the trend to lower inflation in Indonesia, Korea, Malaysia, the Philippines and Thailand. Despite these starting points in the 1990s and traumas in the late 1990s, inflation has dropped considerably for East Asia ex-Japan as a whole from high to moderate levels to only around 2% in 2002 (Graph 1).

Several Asian economies have already joined Japan in deflation, defined here as a persistent decline in consumer prices (CPI) over 12 months. Indeed, at least in one global sample, the "handful of countries [that] have deflation…are all in Asia" (Stevens (2002), p. 13). As in Japan, deflation is chronic in Hong Kong and arguably in China as well. Hong Kong has recorded over four straight years of deflation through December 2002, not only a longer run of deflation than that in Japan (50 months versus 46) but also with a much larger cumulative decline in CPI (Graph 2). After having pulled out of a long period of falling prices in early 2000, China slipped back into deflation in late 2001. Prices in China subsequently fell for 14 months until early 2003 when prices resumed rising gradually.

Elsewhere in East Asia, deflation has been episodic or has merely threatened. Taiwan, China (Taiwan hereafter) has experienced deflation on and off since 2001, with prices falling slightly on average in 2002. While increases in taxes on alcohol and tobacco may lift prices in 2003, the historically high unemployment rate will continue to put downward pressure on prices. Prices in Singapore began to fall at the end of 2001, as the economy went through a sharp recession and the government cut charges for its services. Prices began to rise in 2002 and headline inflation is forecast to remain just positive. In Thailand, deflation threatened in mid-2001 when inflation fell to a mere 0.1%; since then, core inflation has remained at a very low level, well below headline inflation. In any event, despite near-term pressure from oil prices, all three economies are growing at rates below capacity, building up deflationary pressure, and they could find themselves in deflation from a downdraft of exports or from the compound effects of atypical pneumonia.

Other regional economies are still enjoying declines in inflation or have seen it level off. Core inflation in Korea has generally remained within the upper end of the target band of 3% plus or minus 1%. Even in India and the Philippines, where inflation has been a problem, inflation rates have dropped considerably to around 3%. Indonesia remains the only exception with inflation still relatively high, but even there inflation has dropped considerably to just above 10% at the end of 2002 in part owing to a stronger rupiah.

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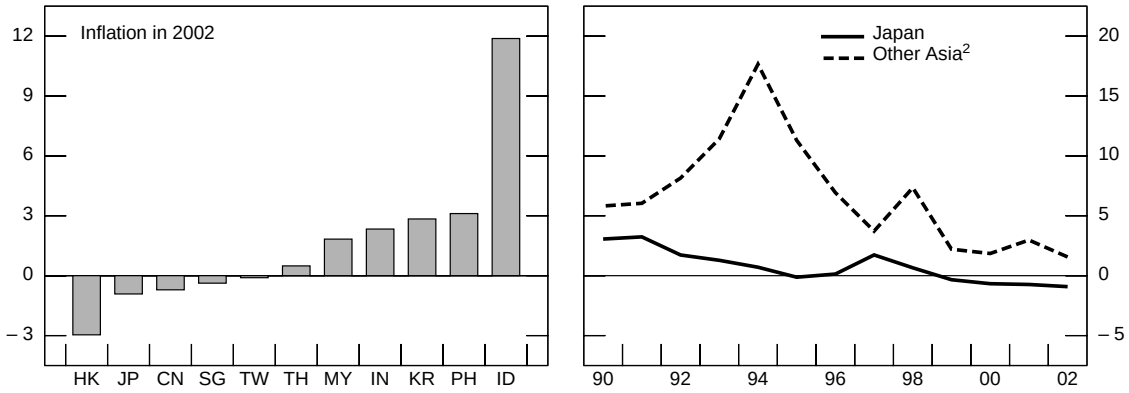
It is of course true that the global embrace of the goal of low inflation has increased the risk of deflation. Low inflation may pose a particular risk of deflation in much of East Asia, however. Low inflation in the United States and the euro area, given productivity differences between in the production of services and manufactured goods, implies falling global manufactured goods prices. East Asia is particularly susceptible to the influence of this ongoing global deflation in traded goods prices owing to its openness and the large role of manufacturing in many of its economies. Any sustained currency appreciation can only increase this risk. On top of this interaction of global background and regional economic structural factor, are overlain risks of deflation that arise from lower asset prices and/or dysfunctional banking systems. Lower asset prices mean lower wealth and consumption, less collateral for borrowing, reduced incentives to invest and an overhang of debt. A distressed credit mechanism is handicapped in supporting demand, especially in the non-traded goods sector.

Graph 1 **Inflation in Asia[1]**



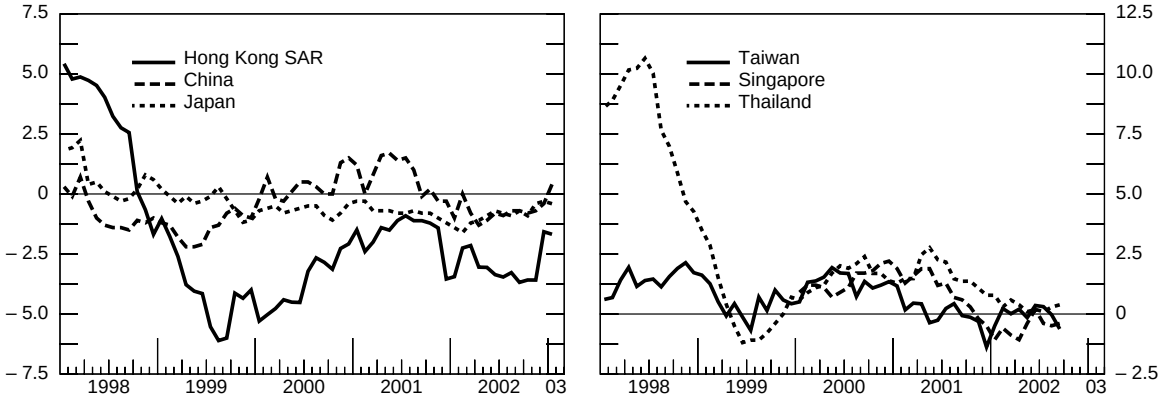
HK = Hong Kong SAR; JP = Japan; CN = China; SG = Singapore; TW = Taiwan, China; TH = Thailand; MY = Malaysia; IN = India; KR = Korea; PH = the Philippines; ID = Indonesia.

[1] Annual percentange change in consumer prices. [2] Other Asia defined as a weighted average of China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan (China) and Thailand; average based on 1995 GDP and PPP exchange rates.

Sources: IMF; national data.

Policy-makers in general, and those in East Asia in particular, need to understand the reasons why deflation is a concern, the confluence of forces that that have raised the risk of deflation in the region and the challenges it poses to monetary policy. The rest of the paper is organised as follows. The next section discusses the issues and problems associated with deflation, emphasizing its interaction with the two zero lower bounds. Section 3 examines the sources of deflation for the East Asian economies, looking to the demand side, the supply side, and international influences. Section 4 discusses the challenges deflation poses to monetary policy, both in its operational aspects and in its strategic aspects. Section 5 offers some concluding remarks.

Graph 2 **Inflation in selected economies [1]**



[1] Annual percentage changes in consumer prices.
Source: National data.

2 How big a problem is deflation?

This section reviews the general arguments for the hazards of deflation, noting the similarities to and differences with disinflation. Then prior views of the strength of these arguments as applied to East Asia are considered. Finally, the association of deflation and growth thus far in China, Hong Kong and Japan is briefly reviewed against the background of experience with deflation around the turn of the Nineteenth Century.

2.1 The hazards of deflation

Deflation shares many of its ill effects with disinflation (a reduction in the rate of inflation). Like unanticipated disinflation, unanticipated deflation will redistribute income away from debtors and profits to creditors and wage-earners. In a world of short-term or frequently re-priced financial contracts and perfect labour market flexibility, such redistributions would be one-off and short-lived. At times and in places, long-term nominal financial contracts, such as noncallable government and corporate bonds, and long-term labour contracts or slow adjustment of an upward trajectory of nominal wages, in contrast, can still squeeze profits as inflation falls unexpectedly. The well-developed sterling corporate bond market of his age underlay Keynes' concern for the "dead hand of the past" weighing on enterprise. To take an extreme example, the hundred-year, 7½% dollar bond issued by Disney in 1993 would prove a heavy weight for even a copyrighted mouse to carry without the inflation that was so confidently foreseen ten years ago.

Deflation can be worse than disinflation because of two zero bounds, the well known, inherent bound on interest rates, and the less well known, behavioural bound on nominal wages. The zero lower bound on interest rates implies that the real short-term rate cannot be lowered below (the absolute value of) the rate of deflation (inflation). If monetary stimulus is conceived as setting the real short-term interest rate below the "natural" rate, then no monetary stimulus is possible once the rate of deflation hits the natural rate. For example, if the natural rate is 3%, then if prices are falling by the same rate of 3%, then a zero short-term interest rate provides no monetary stimulus. More generally, deflation will put limits on the room for manoeuvre of monetary policy, and in particular will preclude real short-term rates from being brought down to, or even below, zero.

With regard to wages, downward nominal rigidity can interact perversely with deflation. Real wage declines can sometimes facilitate sectoral or cyclic adjustment. When inflation is positive, keeping the rise of nominal wages below the inflation rate is sufficient to lower the real wage. However, if prices are falling faster than the rate of productivity growth, nominal wages must be cut to lower real (product) wages, which is generally more difficult. Even if there is not strictly a zero lower bound on the changes in nominal wages, the decline may be slow in relation to prices and productivity. As a result,

the real wage and the labour share of income may rise.[2] Instead of clearing in price, deflationary rises in the real wage may result in the labour market clearing in quantity, resulting in some combination with of higher measured unemployment, lower participation rates and lower immigration. The danger is a rising real wage and falling employment until wages are finally ground down in a long and painful process.

The two zero bounds operate in different markets but nevertheless can interact. A firm experiencing a declining price for its output will seek to reduce costs to preserve its profit margin. If its debt costs are stuck at zero plus intermediation margins on bank debt and credit spreads on its securities, then the firm may all the more target its labour costs (which for most firms will be larger than their interest costs). While the process of production may be reorganised to boost productivity, the firm may also try to reduce nominal wages.

Lower nominal wages, however, can increase the risks associated with the zero bound on interest rates. As wages fall, household income shrinks in relation to household debt service payments. In flow terms, a decline in earnings means a disproportionate decline in disposable income if debt service remains unchanged, putting pressure on consumption. In stock terms, lower income raises the ratio of debt to discounted income. Either way of looking at it, falling income and fixed debt service points to the possibility of a disproportionate decline in consumption.

Such interactions heighten the possibility of a debt-deflation spiral, especially if general price deflation is associated with asset price deflation (Fisher (1933), Bernanke (1983) and King (1994)). High fixed debt servicing costs and rising real wages, given an absence of pricing power in a deflationary environment, would tend to squeeze firms' profit margins. Narrower profit margins would in turn reduce the incentive for, and the internal funds to finance, capital spending and could result in more bankruptcies. With lower collateral values and weaker revenues, firms may seek to reduce debt by diverting cash flow from investment to debt repayment. Moreover, falling nominal interest rates may tighten interest rate spreads for banks. Faced with rising bankruptcies, falling collateral values, and narrowing interest spreads, bankers may become reluctant to extend credit, further intensifying pressure on firms to de-leverage. Such a vicious circle could in turn give rise to higher default rates and worsening bank assets, potentially undermining a banking sector's stability.

2.2 The hazards of deflation in East Asia

Is emerging Asia less vulnerable to problems associated with deflation? In particular, are there reasons to expect the two zero bounds to bind less? Unexpected deflation would seem generally to pose less of a threat to East Asia than it might pose owing to the nature of financial contracts. Bond markets are less well developed and tend to feature shorter duration instruments; most corporate and mortgage debt is of short-term or carries floating rates. Thus, the burden of fixed rate debt on enterprise associated with disinflation in general, and deflation in particular, would seem less of a threat. Moreover, the zero lower bound on interest rates would seem to be less of a threat in those economies enjoying relatively rapid growth. For the East Asian economies that are catching up technologically, relatively rapid productivity growth means that trend growth and the "natural rate" can be expected to be relatively high. If providing monetary stimulus entails setting a short-term interest rate below the natural rate, then it follows that these Asian economies can experience a faster rate of deflation without losing the capacity to provide monetary stimulus. For instance, if productivity is growing at 4% and the labour force by 1%, then a 5% short-term real interest rate might be close to neutral. In this case, as long as deflation is substantially less than 5%, then a zero policy rate could still provide some stimulus.[3] On the wage front, emerging markets are often thought to enjoy more flexible labour markets, which might be better able to produce nominal wage cuts that may be required to maintain employment with deflation.

That said, it does not follow that East Asia has little to fear from deflation. There are reasons to believe that some economies in East Asia may be more exposed to global deflationary forces, and reasons to

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[2] The new Keynesian Philips curve analysis of Rotemberg and Woodford (1999) might interpret this sequence quite differently. In this view, the desired margins of monopolistically competitive firms are subject to shocks, that is, narrowing or widening for unexplored reasons. If desired margins were suddenly to narrow, some combination of lower prices, higher nominal wages and lower productivity is required. If wages do not rise enough or productivity does not decelerate enough, then prices have to fall to produce the desired narrowing of margins. Starting in this manner from shocks to variable margins is a very different conception of the process than one that starts with deflation and works through downward nominal wage stickiness to a real wage shock, with implications as in Sachs (1979).

3 Stevens (2002, p. 15) makes this point.

doubt the presumptions just outlined that floating rate finance, rapid growth and flexible labour markets would limit the costs of deflation.

In a world in which the prices of internationally traded manufactured goods prices are falling (see below), emerging market economies, or at least lower income ones, may be more likely to experience deflation. By Engel's Law, agricultural and manufactured goods, whose prices are falling, bulk larger in, for instance, the Chinese consumption basket than that of the United States. Thus, even if China and the United States share the pattern of rising service prices and falling manufactured goods prices, the result can be mild inflation in the United States, but mild deflation in China.

Internally, floating rate finance, rapid growth and flexible labour markets may not be so effective in limiting the costs, if East Asian economies fall into deflation. While loan contracts in East Asia may generally carry floating interest rates, a quarter of bank loans in China are of medium or long term,[4] and the increasing role played by so-called Islamic banking in Malaysia implies a growing share of fixed-rate finance. Regarding the natural rate, while many Asian economies have been growing rapidly, the banking system in China, Taiwan and Thailand are all burdened with substantial stocks of bad loans. As a result of an impairment of the credit process, the warranted interest rate may be lower than trend growth, and the room for manoeuvre for monetary policy may be narrower than one would guess from the growth rate. With regard to wage flexibility, the presumption that East Asian labour markets would be nimble enough to prevent deflation from raising the real wage may not be well founded. Consider a comparison of Hong Kong and Japan.

Hong Kong's economy enjoys a reputation for flexibility, yet it is not clear on the current evidence that wages in Hong Kong have been more downwardly flexible than those in Japan. In Hong Kong, an early attempt in the fall of 1998 at an across-the-board wage cut by a prominent local employer encountered political opposition. In the event, nominal wages appear to have no more than flattened out, despite higher unemployment associated with two recessions in the last five years.[5] (There are indications that pay for new hires has declined, unlike in Japan.) Given ongoing deflation, therefore, real wages and salaries have risen even as unemployment has risen (Graph 3). Given the problems associated with wage indices, it is worth noting that the labour share of income in Hong Kong has also risen. In turning to the comparison with Japan, it must be recalled that wages in Japan may be at the most flexible end of the industrial country spectrum since the traditional Japanese employment system featured substantial bonuses that afforded flexibility in pay, even if employee numbers were less flexible in the larger firms. While the cyclic upswing of 2000 saw nominal and real wages generally rising, both nominal and real wages tended to fall in 2001-2002 (Graph 4).[6] In the twelve months to December 2002, nominal wages fell by almost 3%, well in excess of the rate of deflation. That the bonus system is associated with nominal wage flexibility is evident from the monthly pattern of wage changes, with the largest year-over-year decreases in December and June-July, when the bonuses are paid. Judging from this comparison, at least, it may not be safe to assume that extraordinary wage flexibility can be relied on to protect East Asia from some of the assumed risks of deflation.

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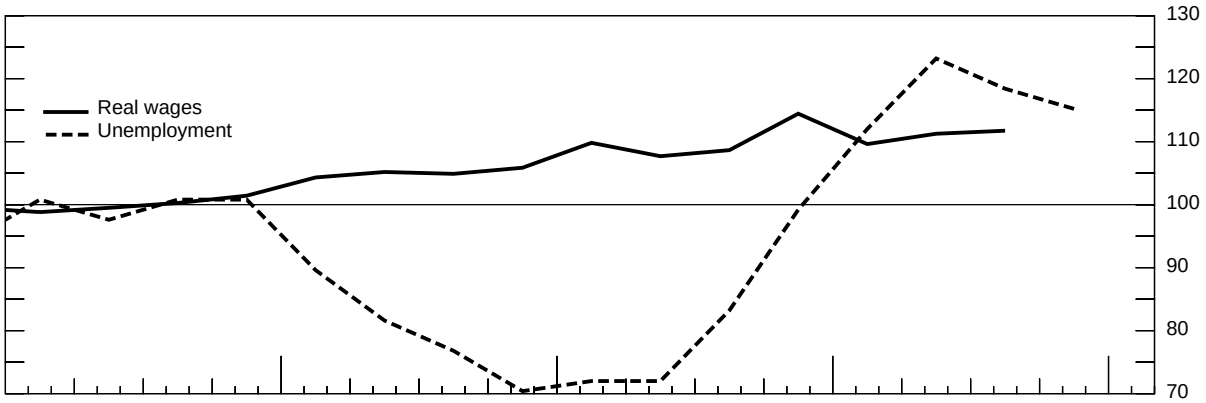
4 Fan and Zhang (2003), p. 7, but it is not clear whether the interest rates are floating or fixed.

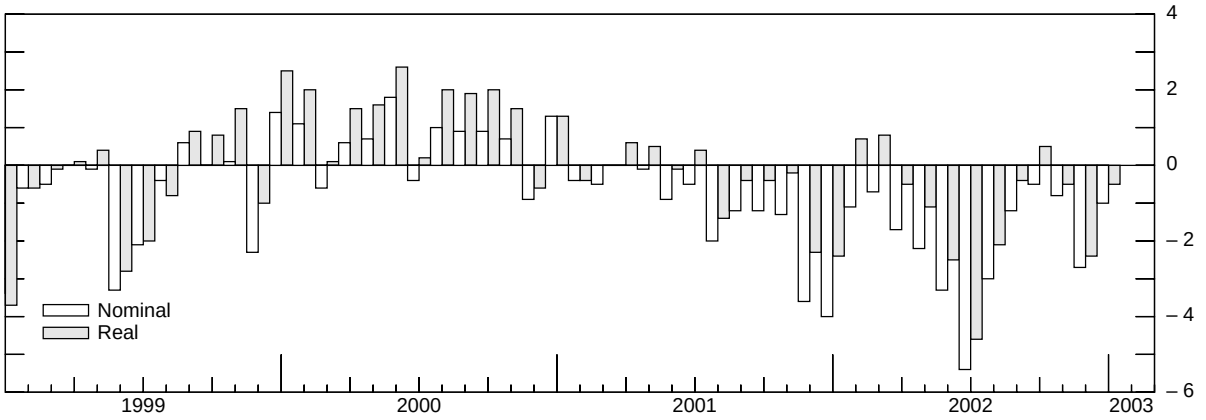
5 Discussion of wage trends at an April 2003 seminar at the Hong Kong Institute for Monetary Research, however, suggested that a household survey of wage trends pointed to wage declines despite the evidence of the employer reports.

6 Early indications during the deflationary period suggested that the real wage was continuing to rise, keeping the labour share of income relatively high, even as unemployment on balance rose. See Osawa, et al (2001) Chart 6 and Box Chart 1. These authors found evidence of increasing flexibility with employment levels becoming more sensitive to activity in Japan, and regular wages becoming more sensitive; both changes reflect the increasing share of irregular employees (part-timers, contract workers, etc.).

Graph 3A **Real wages and unemployment in Hong Kong [1]**



Graph 3B **Real and nominal wages in Japan [2]**



[1] Index 1999=100. [2] Annual percentage changes.
Source: National data.

2.3 Deflation and growth

Thus, in turning to the evidence on the association of deflation and growth, it is not clear whether to expect East Asia's recent experience to resemble more that of the late Nineteenth and early Twentieth Centuries than the worst of the scenario sketched above. In ten countries between 1882 and 1913, output averaged 2.8% growth during inflation periods and a lower but hardly recessionary rate of 1.7% during deflation periods (Table 1). Thus, deflation was associated with slower growth but not necessarily with recession.[7] Then, technological progress such as the extension of railroads and the application of electricity might have increased supply rapidly so that output expanded while prices declined. In contrast, the 1930s can be seen as suffering from reductions in demand, leading to deflation and economic shrinkage.

[7] Only the US economy shrank during deflation years on average during this period.

Table 1

Output growth and inflation
In percentage

	Deflation periods[1]		Non-deflation periods		Memo: Years of deflation
	Average annual percentage growth (1882-1913)				
	Prices	Output	Prices	Output	
United States	-3.7	-1.2	1.4	4.4	5
Japan[2]	-3.7	1.8	4.4	2.7	4
Germany	-2.0	4.0	1.8	2.6	8
France	-1.1	2.1	0.2	1.6	2
Italy	-1.2	1.3	1.4	2.2	14
United Kingdom	-3.0	1.4	1.0	1.9	8
Canada	-4.7	1.1	1.1	4.6	3
Belgium	-4.2	1.6	1.5	2.1	8
Sweden	-2.8	2.0	2.2	3.3	12
Denmark	-3.5	2.8	1.8	3.0	10
Average	-3.0	1.7	1.7	2.8	7

[1]Deflation defined as at least two consecutive years of price decreases. [2] 1885-1913

Source: 1999 BIS Annual Report

On a similar view, East Asia's recent experience with deflation shows some likeness to that at the turn of the last century in that growth on average continued in periods of deflation (Table 2). Notwithstanding the qualitative similarity, it is difficult to view price deflation in Japan and Hong Kong mainly as an outcome of some favourable supply shocks. Perhaps this difficulty warns us against a too benign view of the nature and implications of deflation a century ago. In any case, it is worthwhile to consider more systematically the possible sources of deflation in East Asia, to which we now turn.

Table 2

Output growth and inflation
In percentage

	Deflation periods		Non-deflation periods		Memo: Months of deflation
	Average annual percentage growth 1990-2002[1] (China 1994-)				
	Prices	Output	Prices	Output	
China	-1.1	7.5	8.6	9.4	33
Hong Kong	-3.0	3.5	8.3	4.3	50
Japan	-0.7	0.8	1.4	1.9	46
Average	-1.6	3.9	6.1	5.2	

[1]Deflation defined as at least 12 consecutive months of year-on-year CPI decreases. Monthly inflation/deflation is associated with quarterly GDP growth in the following manner: if prices fall in at least two out of three months in a quarter, then that quarter is considered to be in a deflation period.

Source: CEIC

3 Sources of deflation

This section examines some of the possible sources of deflation in East Asia. Both insufficient demand and excess supply have contributed to downward pressure on prices. It should be noted that a collapse in asset prices and associated credit can put pressure on prices from both sides. On the demand side, wealth effects will tend to hold back consumption, an excessive capital stock can restrain investment, and a damaged credit mechanism can further check both sources of demand. At the same time, an overhang of supply in real estate or productive capacity can pressure prices down. External price developments have also played a role in East Asia's deflation, irrespective of whether the international price deflation has its source in demand or supply factors.

Existing analysis of deflation in East Asia has emphasised the full range of factors to be considered. Kim (2002) places emphasis on the post-crisis weakness in investment in East Asia excluding Japan. He also highlights how a healthy banking system to finance consumption and flexible exchange rate policy can buffer regional economies from global traded price deflation. Gerlach and Peng (2003) put weight on two external shocks, the fall in commodity prices in 1997-98 and the global recession of 2001. If one views the decline of global commodity prices in 1997-98, however, as a result of the Asian crisis, then the more ultimate source of the deflation remains to be explained. This line of argument would need to be developed to offer an explanation for the concentration of deflationary economies in East Asia. Ueda (2003) reads the evidence to suggest that the faster growing industries have seen greater price declines in Japan, suggesting the importance of supply factors. He also shows that import-competing goods have suffered more deflation than goods prices in general.

3.1 Insufficient demand

Weak domestic demand

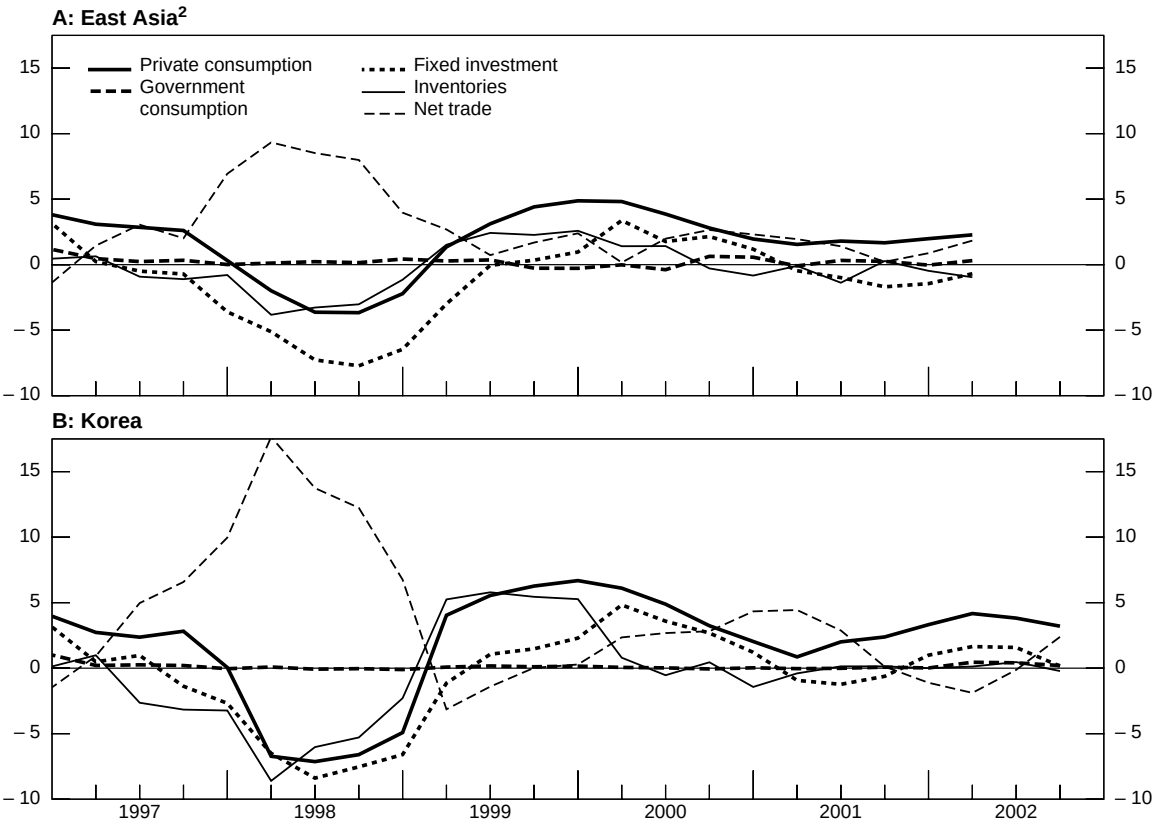
Domestic demand in many East Asian economies has not grown robustly, putting downward pressure on prices (Graph 4). The strength of consumption and investment stands out in Korea.

In much of Asia, relatively high unemployment and uncertain job prospects continue to put a drag on consumer spending. The unemployment rate in Hong Kong rose to a record 7.8% in the first quarter of 2002 and continued to remain above 7% for the rest of the year. While China's official jobless rate remains less than 4%, the actual figure could be much higher if the so-called "xiagang", laid off workers who are still on payroll for token salaries, and the unregistered unemployed were included (Fang (2002)). The unemployment rate in Japan remained at a record high of 5.5% in December 2002 while unemployment in Singapore and Taiwan is also high by historical standards.

When households reduce their spending as a result of poor economic growth and high unemployment, retail sales decline. In order to encourage spending, retail outlets may lower their prices or offer sales discounts more often. Retail sales in Hong Kong and Singapore have been declining and are quite flat in Taiwan. In Japan, consumption has held up better than one might have predicted in view of falling wages and unemployment. Consumer spending in Thailand has trended up while consumers in China show increasing appetite to spend.

Private investment continues to be weak in most regional economies (Graph 5). This may reflect over-investment in the years leading up to the crisis, particularly in the non-traded goods sector. Falling private investment in Singapore has shown no signs of rebound yet while that in Malaysia and Thailand appears to have bottomed out at relatively low levels. Even in Korea and Hong Kong, where investment rebounded in 2000, it remains well below previous levels. The exception was private investment in Taiwan, which appears to have particularly benefited from the upswing in the technology cycle until mid-2000, when it began to fall sharply. Now many Taiwanese firms are putting much of their marginal investments across the Strait of Taiwan.

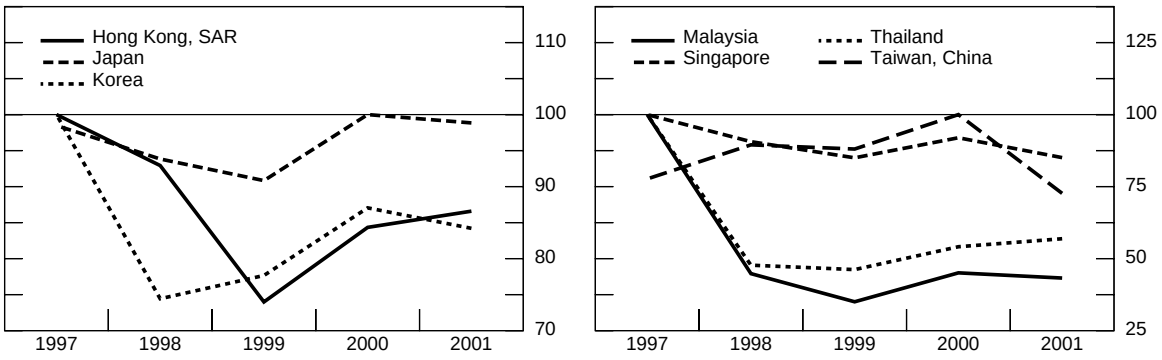
Graph 4 **Contribution to real GDP growth[1]**



[1] In percentage points. [2] Weighted average of Hong Kong, the Philippines, Singapore, Taiwan (China) and Thailand, based on 1995 GDP and PPP exchange rates.

Sources: Global Insight; OECD; national data.

Graph 5 **Gross fixed capital investment, private sector[1]**

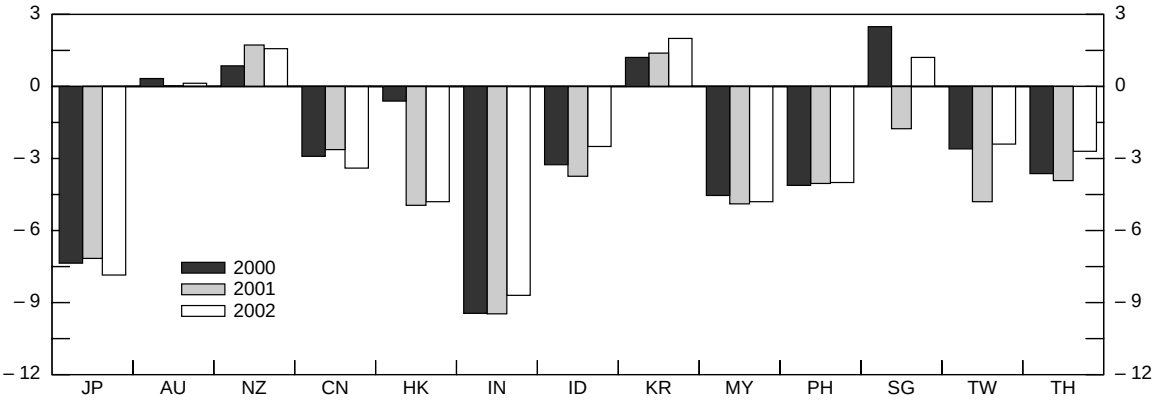


[1] 1997–2001 peak = 100.

Sources: OECD; national data.

Government spending may be approaching its limit as a source of growth in some regional economies owing to the large government budget deficits (Graph 6). The Chinese government has issued RMB 600 billion ($73 billion) bonds to finance infrastructure projects to stimulate growth over the last few years. As a result of the fiscal pump-priming, total public expenditure went up to 20% in 2001 from 12% of GDP in 1996 while the recorded fiscal deficits rose to 2.6% of GDP in 2001 and near 3% in 2002 from just 0.7% in 1997. As a result, it is becoming more difficult to rely on continued fiscal stimulus, as was acknowledged by the Chinese finance minister recently in public. Hong Kong's worsening fiscal deficits have prompted the government to consider tax hikes and deeper cuts in spending such as another reduction in the salary of its large civil service work force, which could put further downward pressure on prices.

Graph 6 **Government budget balances[1]**



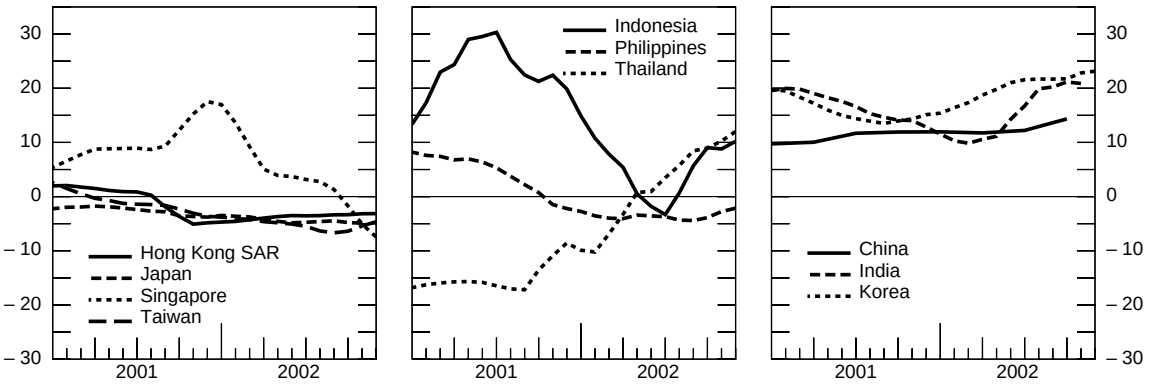
AU = Australia; NZ = New Zealand.

[1] As a percentage of GDP.

Sources: IMF; OECD; national data.

Slow credit growth reflects weak domestic demand but can also be a separate source of deflation if constraints on the supply of credit restrain spending (Graph 7).[8] That reduced demand for loans is slowing credit growth is evident in economies such as Hong Kong or Singapore, where banks are healthy but bank credit has also shown weakness.

Graph 7 **Bank credit growth to the private sector[1]**



[1] Annual percentage changes; three-month moving averages; in nominal terms.

Sources: IMF; national data.

In other places, problems with bad loans may constrain banks' ability and willingness to lend as they focus on restoring their equity, cleaning up their loan books, and avoiding new risks. Non-performing loans (NPLs) remain at a high level in many East Asian economies despite the establishment of asset management companies (AMCs) in these economies. Kim (2002) presents evidence that credit extended to the private sector has grown more rapidly where NPLs are lower (but excludes Hong and Singapore to make the point), and that such credit is correlated with the strength of consumption (including Hong Kong and Singapore). In China, for example, official figures for NPLs in the banking system remain as high as 23% even after RMB1.4 trillion ($170 billion) of NPLs were transferred from the banks to the AMCs. Many observers take the view that the imperative to reduce NPLs is restraining Chinese banks' lending to enterprises outside the state sector, notwithstanding rapid credit growth in general and to households in particular. In Japan, the Resolution and Collection Corporation has made only limited progress in resolving the NPL problem. It may take some time before the

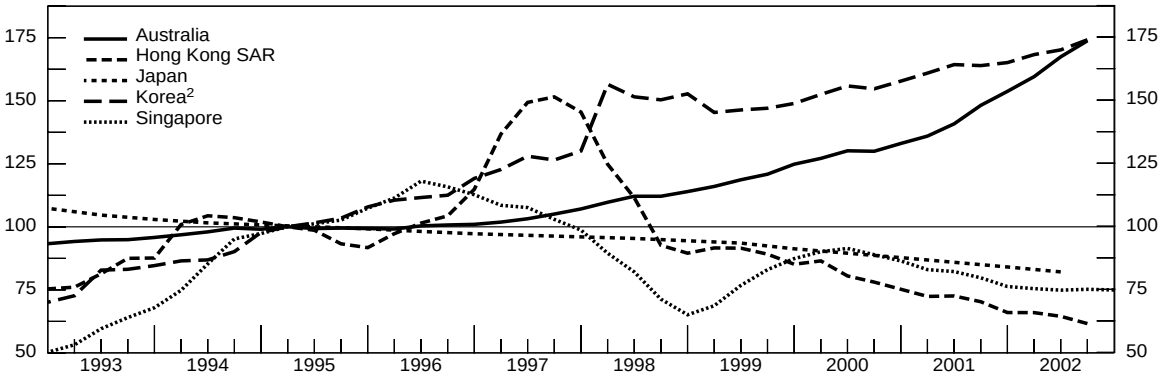
[8] Credit growth in Indonesia needs to be adjusted for exchange rate valuation effects on dollar loans.

managers of Japanese banks are relieved of their preoccupation with the mistakes of the past and are thereby enabled to concentrate on lending again. Efforts in Taiwan to clean up the banking system have encountered a political gridlock. A bill to increase the capital of the Financial Restructuring Fund to NT$1.1 trillion ($32 billion) from the current NT$140 billion is still pending in the legislature. An effort to reform farmers' and fishermen's credit cooperatives led to demonstrations, resulting in the resignation of key economic ministers including the finance minister.

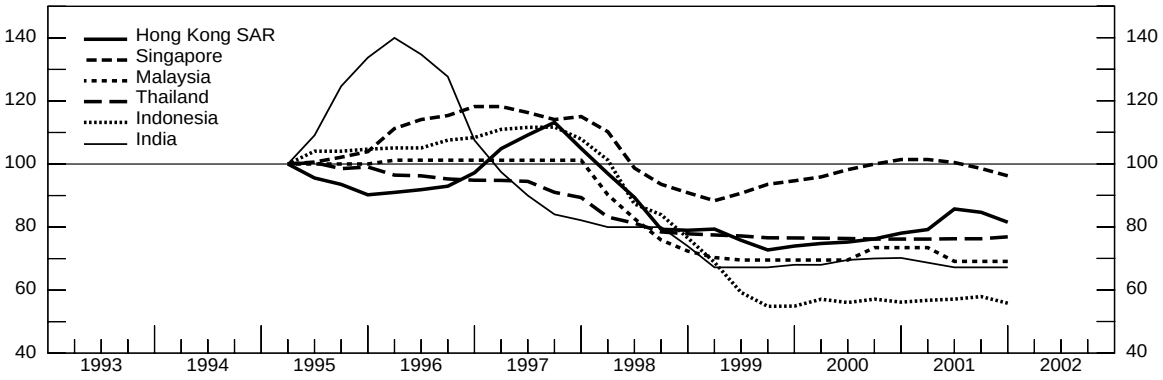
Asset price declines

Asset price declines in many Asian economies, especially after the bursting of the speculative bubble in 1995-97, have direct and indirect effects on inflation. As elsewhere, real estate prices (Graph 8a) tend to have a stronger effect than equity prices.[9] A sharp fall in property prices contributed directly to a substantial decline in inflation in many regional economies owing to the large weight of housing costs in the CPI. The 60% decline in property prices in Hong Kong since the Asian crisis has had a particularly marked effect on housing costs there, explaining over half of overall deflation in 2001.[10] The Hong Kong government hopes that the recent measures introduced to stabilise housing prices mainly through reducing the supply of land and government units will help to prevent deflation from worsening. Other Asian economies have also suffered from falling rentals since 1995-97 (Graph 8b). An important and unexplored issue is how housing costs are entered into the consumer price index in various economies. In Hong Kong, for instance, the "cost" of owner-occupied apartments is taken to move with rentals, rather than with the cost of floating-rate mortgages, as is done elsewhere.

Graph 8a **Residential property prices[1]**



Graph 8b **Residential rentals[1]**



[1] First quarter 1995 = 100; in local currency terms (for Indonesia, in US dollar terms). [2] Rental value.

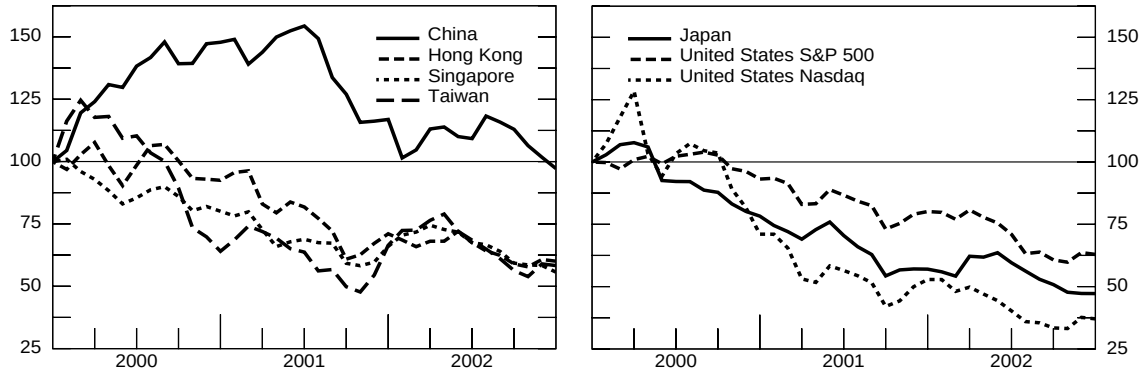
Sources: Datastream; Jones Lang LaSalle; national data.

[9] Goodhart and Hofmann (2001) suggest that the deflationary episodes in the post-war period were preceded by financial crisis and contraction of bank credit, which were in turn accompanied by a substantial decline in asset values, especially property prices.

Declines in real estate prices also have indirect effects on deflation. Falling residential prices lower consumption demand through the wealth effect and reduce investment through a number of channels. In Hong Kong, a 10% drop in property prices is estimated to reduce consumption growth by about one percent, despite a rate of home ownership half that of the United States (Peng, Cheung and Leung, 2001, p 44). The widespread trauma in Hong Kong of "negative equity", that is, a situation in which the value of the residence falls short of the value of the mortgage, only accentuates the wealth effect. In addition, the same decline in property prices is estimated to reduce investment spending by 3%.

The decline of equity prices in Asia has reinforced the wealth effect of property price declines (Graph 9).[11] Equity prices in Asian economies have dropped sharply from their local peaks, reducing consumer spending. Equity prices in Japan have dropped more than 70% since reaching their peak in 1989, reaching a 19-year low. Since early 2000, share prices in Hong Kong, Singapore and Taiwan have fallen by over 30%. In China, an interest rate cut in early 2002 and a series of measures introduced to increase confidence and liquidity in the domestic stock market have not boosted the prices of shares, which have dropped between 30 and 50% since May 2001. [12]

Graph 9 **Equity prices[1]**



[1] End-1999 = 100; in local currency.

Sources: Bloomberg; national data.

Sluggish global demand

Weak global demand has reduced Asia's exports, driving down aggregate demand in regional economies. Growth in US imports, which account for 20-30% of exports of the region (higher if including ultimate exports to the United States of intra-regional trade), dropped sharply in late 2000 and turned negative in the second quarter of 2001 (Graph 10). Import demand from Europe and Japan also weakened, beginning to shrink in the third quarter of 2001. In late 2002, most of the surprises in the export figures came in on the high side. In particular, global demand for electronics and other hi-tech products declined from early 2001, but recovered somewhat in 2002 (Graph 11).

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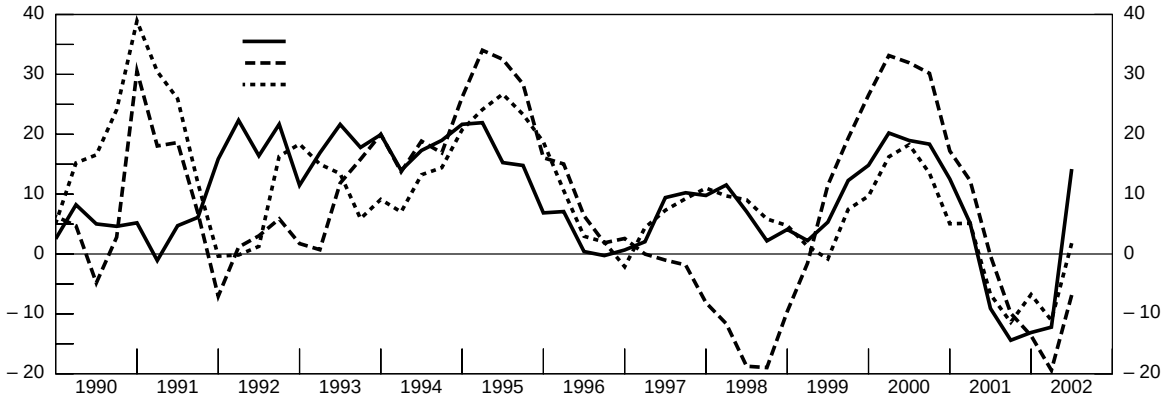
[10] After stripping out the waiver of rents for public housing in December 2001, the persistent slump in private housing rentals still accounted for 45% of deflation.

[11] Peng, Cheung and Leung (2001) find that the wealth effect of a given decline of equity prices is only a quarter of that of the same decline of property prices, although they leave it unclear to what extent this finding results from differences in the relative size of the two asset stocks, the greater propensity of property to be leveraged or a lower sensitivity to a dollar of share price losses.

[12] The most significant policy changed intended to reverse this trend was the opening of the domestic A-share market to foreign investors through the qualified foreign institutional investors scheme. However, the announcement of this scheme so far has not led to any bounce in share prices.

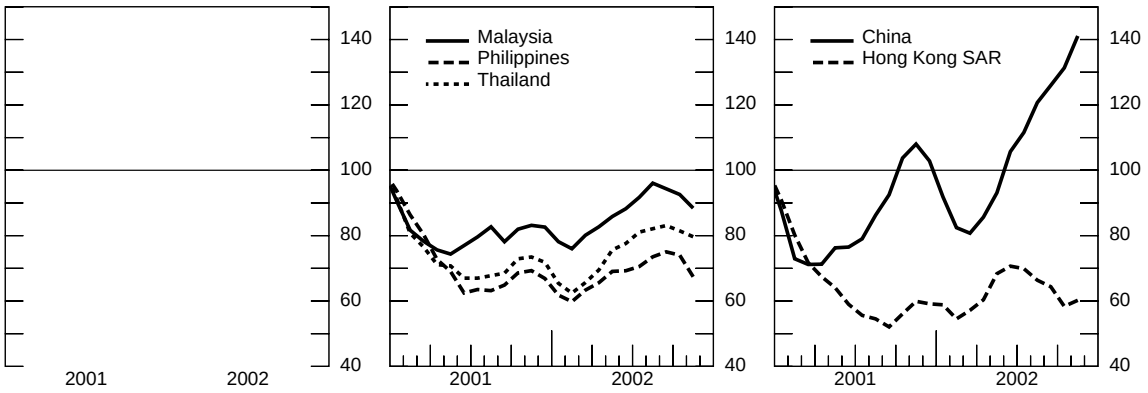
Graph 10 **Export growth of Asia by destination[1]**



[1] Annual percentage changes.

Source: IMF.

Graph 11 **High-tech exports of Asian economies to the United States[1]**



[1] End-2000 = 100; three-month moving average; high-tech exports defined as the sum of the trade classifications SITC 75, 76 and 77.

Source: National data.

3.2 Supply factors

At least three different supply factors have also contributed to deflation in East Asia, not counting the effect of international trade, which is treated in the next section. One is the effect of deregulation. Ueda (2003) highlights a changed policy environment as an explanation for falling prices amid relatively rapid growth of the transportation and communication sector in Japan.

A second supply factor is over-investment and the resulting overcapacity. As elsewhere, over-investment in the IT and telecommunication sectors have contributed to a sharp fall in prices of these products in recent years. The most notable examples are the prices of long distance phone calls and computer equipment. Services are not immune to such overbuilding, as low occupancy ratios in many hotels in the region remind us.

Blocks to industrial consolidation and exit have can sustain overcapacity. In the case of Japan, however, banks' weak capital has meant that they could not afford to let the borrowers default owing to fear of recognising the losses. As a result, many unviable firms are still operating and continue to sell in overcrowded markets. In China, the difficulty of reducing employment even faster than has been done in state-owned enterprises has contributed to sustained excess capacity. This is one aspect of the oversupply noted by the State Bureau of Statistics as a major factor in China's deflation, with few goods sector in excess demand (Qiu (2002)). Again, light loads carried by airlines in some Asian economies point to official policy as a factor in persistent excess supply in some services, as well.

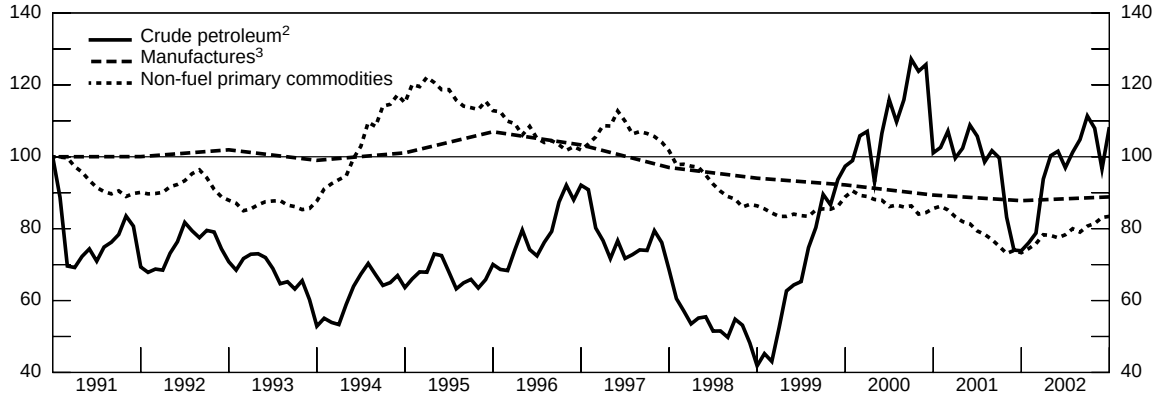
Whether demand or supply shocks, the resultant negative output gaps tend to give rise to deflationary pressure in the economies concerned. Gerlach and Peng (2003) argue that this indeed has been the

case for most Asian economies since the mid-1990s. Changes in output gaps tend to give rise to domestic inflationary or deflationary pressure, which in turn can transmit cross-border through a number of joint or distinct channels, such as trade and exchange rate.

3.3 Deflation: traded or non-traded?

There is a widespread view that increasing international trade is exerting a deflationary force on many economies. One form of this argument emphasises the dismantling of policies that have tended to close off economies from international competition. Another emphasises technological changes that open previously sheltered activities, such as back-office operations or telephone service, to international competition. A more prosaic channel for international trade to diffuse deflation to East Asia, however, is often overlooked. World trade prices (in US dollars) of manufactured goods have been falling for 6 years (Graph 12). In unit value terms, the prices of manufactures in 2002 are more than 10% below those in 1990. This deflation at the global level affects economies differently depending on their level of income and economic structure, as well as on their exchange rate policy.

Graph 12 **Price developments in international trade[1]**



[1] End-1990 = 100; in US dollar terms. [2] Unweighted average of the price of Dubai Fateh, UK Brent and West Texas Intermediate.
[3] Export prices of OECD manufactures.

Looking from the supply side, East Asian economies tend to have much larger manufacturing sectors more exposed to the global deflationary trend of manufactured goods prices. Price trends in traded goods that are thought of as mere changes in relative prices from the perspective of advanced economies can bulk much larger at lower incomes. Also, productivity differentials may also add to downward price pressures among trading partners if real exchange rates fail to reflect such differentials for an extended period. One particular form of the argument regarding international trade that has become popular is that as the world's lowest-cost producer, China is exporting deflation and hollowing out domestic industries in other Asian countries (See Box 1).

Others observe that imports from China are concentrated in the low-end sectors and account for only a small percentage of GDP in major economies such as Japan.[13] Thus, while China's exports would tend to put downward pressure on the prices of labour-intensive goods, it is hard to attribute deflation in other sectors such as high-tech and heavy industries to the influence of China. For instance, half of the 10 largest Chinese exports to Japan in 2001 were in labour-intensive sectors and each of these Chinese products accounts for at least one-third of the Japan's total imports (Table 3). In addition, these products tend to have a higher import penetration in the Japanese market.

[13] See Noland and Posen (2002) for example.

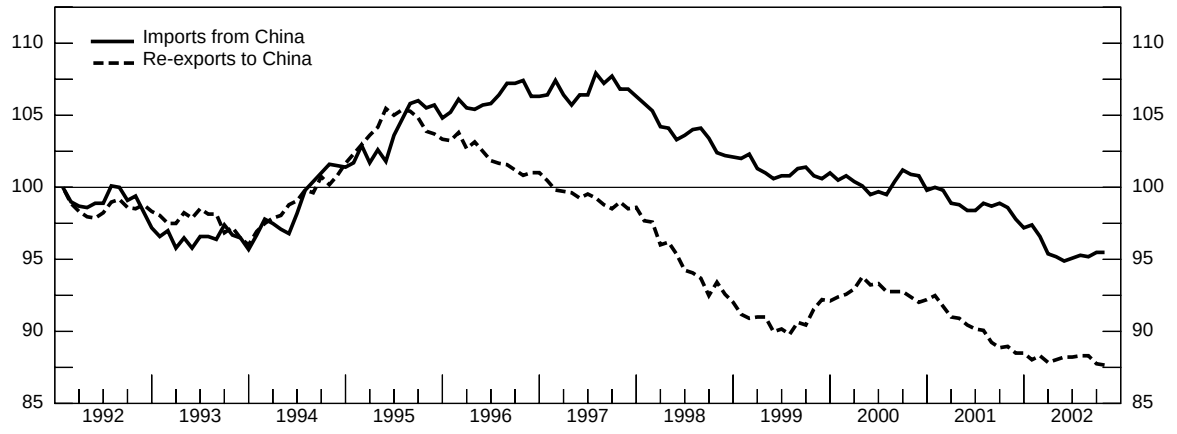
Box: Is China exporting deflation?

Whether China is exporting deflation has become a focus of international policy debate recently. Four related arguments have been advanced to support the view that China exports deflation, especially to its East Asian trading partners (Morimoto et al (2003) and Ghose and Yesildag (2002 and 2003)). The first hypothesis argues that China's vast pool of low-cost labour force allows Chinese exporters to undercut prices of competitors by selling cheap products, as evident in China's dominance in labour-intensive goods exports. Second, large FDI inflows into China hollow out its neighbouring economies, and improved transport infrastructures puts additional pressures on asset prices in its neighbouring economies, both leading to higher local unemployment and weaker domestic demand in these economies. The third view claims that China's expanding (and excess) capacity and its increased participation in the global trading system put downward price pressure, as seen from China's rising share in global trade and reports of excess capacities in China's economy. Finally, some believe that the Chinese currency may be considerably under-valued, further re-enforcing the above three effects.

The question is unlikely to yield quick and easy answers for several considerations. First, an implicit logic of the above arguments is that low-income economies are the culprits of deflation and rich economies are the victims. In other words, the causality of deflationary impulse is assumed (but not tested) to run from poor to wealthy economies and not the other way around. While some (Anderson (2002)) doubt if China's impact is big enough to give rise to global deflation, even China's growing trade shares may also be interpreted as an indication of its increased exposure to possible external deflation, especially in the episodes of the Asian crisis, rapid technological progress, telecom boom-bust and a strong dollar until 2002. More generally, most of these arguments are of partial equilibrium analysis. Since any possible cross-border deflationary transmission is typically two-way interactions such that economies tend to both export and import some deflation, a more useful question to ask is whether China has been a major net exporter of deflation on balance. For example, Ha (2003) shows that some 40% of China's domestic deflation might have been imported via the nominal effective exchange rate link in the 1990s. Though it discusses only the external impact on China's domestic deflation and does not explicitly investigate the possibility of China's outward transmission of deflation, it begs the interesting question of if China is indeed a large net exporter of global deflation.

Hong Kong's trade price data offer a unique vantage point on the possibility that China may have both imported as well as exported deflation. To demonstrate this possibility, the unit value of Hong Kong's imports originated from China can be compared to the unit value of Hong Kong's re-exports destined for China from the rest of the world. While China has been selling cheaper and cheaper goods to the rest of the world since 1997 (via Hong Kong in this case), the prices of China's imports from the rest of the world (again via Hong Kong) have fallen even more since 1995 (Graph 13). More specifically, the unit value of Hong Kong's imports from China dropped by some 10% during 1995-2002, while the unit value of Hong Kong's re-exports to China from the rest of the world fell by more than 15%. While these Hong Kong trade price data capture mostly those trade flows involving only southern China (some 40% of China's total trade flows), they question the view that China is a major, ongoing net exporter of global deflation.

Graph 13 **Unit values of Hong Kong SAR's imports from and re-exports to China[1]**



[1] January 1992 = 100.

Source: Census and Statistical Department, Hong Kong SAR Government.

To the extent that part of China's imports from the rest of the world is used for domestic end consumption, China appears to be directly importing more deflation than exporting. To the extent that most of China's imports from the rest of the world are used as inputs for its exports, trade price data seem to suggest that China may have passed on the imported price deflation to the rest of world. This is supported by the fact that the import content of the Chinese exports is estimated to be some 70% and that China has become a major global assembly hub of cross-border manufacturing activities, importing large volumes of capital goods, intermediary

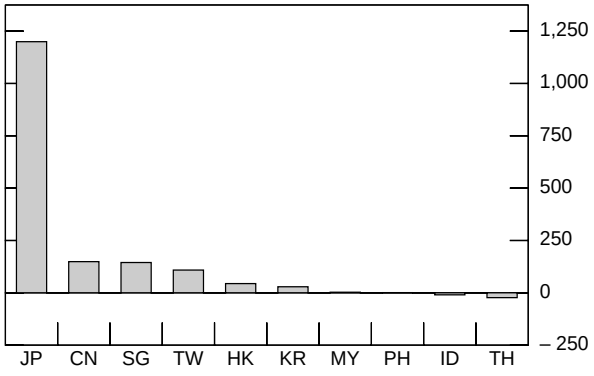
inputs and raw materials (mostly from advanced Asian economies) while churning out growing amount of finished manufactured goods (mainly to the markets of the US, Japan and the Euro area). Still, one cannot rule out the possibility that China has contributed to the observed global manufactured goods price deflation through its active involvement in the late and more labour-intensive stages of the international production chain, given its vast pool of low-cost labour. On balance, however, there is no convincing evidence that China has been a major net exporter of deflation.

Secondly, the above four arguments of China exporting deflation all tend to suggest that China may run a much larger current account surplus than its neighbouring East Asian economies, as China is pricing out its competitors, taking over market shares and hollowing out its neighbouring trade partners. However, both the absolute and relative scales of East Asia's current account balances show that on a secular basis, China's current account surpluses have been smaller than those of the East Asian economies. First, China's cumulative current account surplus in 1990-2002 is $185 billion, less than 10% of the region's aggregate and barely exceeding those of Singapore and Taiwan (Graph 15A). There is no evidence that China's share in East Asia's combined current account has risen structurally, despite its growing share in *gross* trade flows. Second, as a ratio to GDP, China's current account surplus has been mostly below the average of East Asia ex-China since 1990 (Graph 15B). On a cumulative basis, China's current account surplus averaged 1.8% of GDP for this period, clearly below East Asia's average and compared with Singapore's 16.2%, Taiwan's 4.1%, Hong Kong's 3.6% and Japan's 2.4%. Therefore, China's current account surplus is far from excessive relative to its East Asian peers, giving rise to doubts about the view that China has been a major net exporter of global deflation, in part through a substantially undervalued currency.

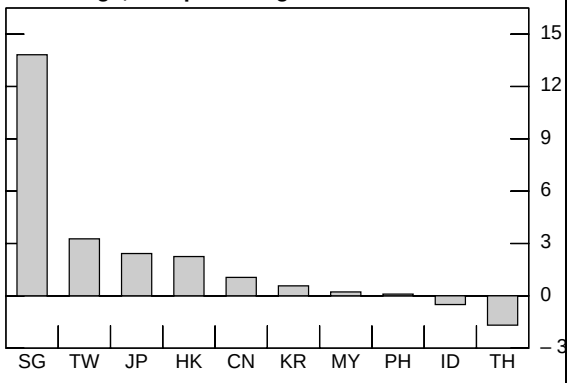
Finally, there seems to be no strong evidence supporting the view that China has substantially added to global deflation via the channel of an undervalued exchange rate since the early 1990s. Concerns did arise in 2002 and 2003 when the dollar experienced some weakness, given a tight link of the renminbi to the dollar. However, the REER and NEER of the renminbi remain around their 1994-2002 averages. Sharp nominal and real depreciations of the Chinese renminbi in the early 1990s had been quickly offset by high domestic inflation around 1993-1994. Since then, both the nominal and real effective exchange rates (NEER and REER) of the renminbi have not weakened on a trend basis. More specifically, the renminbi NEER has been fairly stable relative to that of the weighted average of the NEERs of the key Asian currencies since 1993, while the Chinese renminbi REER has actually appreciated considerably since 1993 relative to Asia's average. Thus, the exchange rate of the Chinese renminbi was highly unlikely to have played any major role in exporting deflation abroad, especially to China's East Asian peers. Chinese exporters may still potentially put downward price pressure on its trading partners, if China's total factor productivity has been rising noticeably faster than the rest of the world. However, the scale of China's current account balance relative to main East Asian economies does not seem to lend support to this hypothesis. On the contrary, because of the Asian crisis and the 9-year tight peg to a strong dollar until quite recently, China might have as well imported considerable price deflation via the currency linkage from abroad (Ha (2003)). Therefore, while the renminbi stability vis-à-vis the US dollar since 1993 could have served as a cross-border transmission mechanism for the two-way deflationary interactions, there is no strong evidence that on balance, China has been a major net exporter of global deflation since the early 1990s.

Graph 15 **Current account balances (1990–2001)**

A: Cumulative, in billions of US dollars



B: Average, as a percentage of 2001 GDP



Sources: CEIC; Merrill Lynch.

Table 3

China's share in Japan's import market, by commodities*
2001 (in percentage)*

Sector	China's import share	Import penetration ratio**	China's import penetration
Labour-intensive			
Clothing and accessories	77.1	44.0	34%
Textiles, yarn and fabrics	50.3	19.2	10%
Furniture	34.6	15.9	6%
Miscellaneous articles (e.g. toys and sporting goods)	34.3	32.8	11%
Footwear	34.1	31.8	11%
Electronic processing			
Precision instruments	66.4	8.5	6%
Machinery (e.g. office machines)	12.0	20.1	2%
Other			
Electrical machinery	19.4	12.6	2%
Fruits and vegetables	17.2		
Fish and fish preparation	16.7		

* Data for the 10 largest Chinese exports to Japan. ** Import penetration ratio is calculated as the ratio of import to the sum of total domestic output and import less export in the particular item.

Sources: Japan's Ministry of Finance and Census of Manufactures, Japan Ministry of Economy, Trade and Industry.

On the demand side, by Engel's Law, consumption baskets tend to have more tradable agricultural and manufactured products at the lower income levels of some economies in East Asia. Thus, Japan, with a high weight of non-traded services in consumption and a relatively closed economy, could be less exposed to the international deflation—although reduced trade restrictions and the increasing consumer acceptance of foreign goods could be increasing this exposure (see below). With a heavier consumption weight on agricultural and manufactured goods and manufacturing accounting for over half of its increasingly open economy, China could be more exposed to global deflation.[14]

Examination of the components in the CPI indices that are leading deflation in regional economies suggests that the weight of different factors varies across economies. Table 4 reports the year-on-year changes in CPI and selected CPI components in five regional economies, including China, Hong Kong, Japan, Singapore and Taiwan, for September 2001 and 2002. These components include traded goods such as food, clothing and furniture, as well as non-traded goods such as housing, transport and education. The first panel shows that all but Singapore were in deflation in September 2001 and deflation tended to worsen in 2002, with prices in Singapore also falling. For China and Japan, more CPI components show declines.[15] The last panel reports the relative contributions of each of the five components to the overall change in the CPI as measured by the product of the percentage changes in the CPI component and the respective CPI weight.[16] The results support the view that the relative contributions of these factors differ across the deflationary economies.

Consistent with Kamada and Hirataka (2002) and Ueda (2003), major contributors to falling prices in Japan appear to be traded goods such as food, clothing and furniture. Global deflation, and increasing Japanese exposure to it through structural changes in retailing and rising trade, possibly related to Japan's loss of wealth from weak asset prices, now form a leading edge of deflation in Japan. In particular, the fall of traded-good prices, partly as a result of imports of cheaper products, accounted for about half of the CPI deflation in September 2002. The fall in prices of clothing could be accentuated by the rise in imports of cheaper clothing and footwear from China, given China's large

[14] Putting aside for the moment the contrast between the yen's depreciation since 1995 and the RMB's stability against an on balance appreciating dollar.
[15] See Monetary Authority of Singapore (2003), p. 53, for a view of the cyclic variation in the dispersion of inflation/deflation in components of the CPI.
[16] Since the CPI weights for China are unavailable, we use the Taiwanese CPI weights as a proxy to calculate the contributions.

import share of these products. In China, prices also seem to be falling faster in traded goods, with such traded goods as clothing and household goods contributing slightly more than non-traded goods to deflation in China.

In Hong Kong, Singapore and Taiwan, however, the declines in prices of non-traded goods such as housing account for the bulk of the fall in CPI, suggesting that falling asset prices and weak domestic demand play the most significant roles. While the global downturn and its strong nominal effective exchange rate through 2001 exacerbated deflationary pressure, the persistent slump in property prices remains the main contributor to deflation in Hong Kong. In fact, Hong Kong's deflation began in November 1998, a month after the housing component recorded its first in a series of declines. In four years of deflation, falling housing prices accounted for over half of the CPI decline. (The ongoing integration between Hong Kong and southern China as well as the increasing ease and convenience of crossing the border may be a structural factor tending to depress housing prices and prolong housing price deflation in Hong Kong — see the Box.) Similar to the situation in Hong Kong, the fall in prices of non-tradable goods such as housing and transport accounting for the bulk of the decline in prices in Taiwan. However, with a substantial weight on food, the large drop in food prices in September 2002 contributed to a worsening of the CPI deflation. Again, price deflation of non-tradable goods contributed the most to Singapore's deflation that started late last year.

Table 4

Year-on-year changes in CPI and prices of selected CPI components
In percentage

	Sept 01					Sept 02					Contributions (Sept 02)				
Sector	**CN**	**HK**	**JP**	**SG**	**TW**	**CN**	**HK**	**JP**	**SG**	**TW**	**CN****	**HK**	**JP**	**SG**	**TW**
Food	0.3	-1.2	-0.8	0.6	0.0	-0.2	-2.5	-0.2	0.4	-3.4	-0.05	-0.67	-0.06	0.11	-0.92
Clothing	-2	-5.2	-1.7	-0.3	-2.0	-2.6	-0.3	-2.3	1.8	0.9	-0.15	-0.01	-0.13	0.0	0.04
Furniture*	-2.4	-8.1	-3.6	…	…	-2.6	-5.4	-3.5	…	…	-0.27	-0.33	-0.13	…	…
Housing	-0.3	-1.8	0.3	-0.6	-1.5	-0.1	-6.6	-0.3	-1.6	-0.5	-0.02	-1.97	-0.06	-0.36	-0.12
Transport	-1.0	-0.1	-1.1	-2.1	0.0	-2.1	-0.6	-0.5	-1.3	-1.6	-0.22	-0.05	-0.07	-0.24	-0.29
Education	1.9	…	1.0	2.0	-0.2	0.8	…	1.1	0.9	-0.0	0.11	…	0.04	0.07	-0.00
CPI	-0.1	-1.1	-0.8	0.5	-0.5	-0.7	-3.7	-0.7	-0.4	-0.8					

* Household goods in China and durable goods in Hong Kong. ** Proxied by CPI weights of Taiwan.

Source: CEIC

3.4 Deflation: exchange rates and current account balances

The question of possible international transmission of deflationary pressures relates closely with the exchange rates. Free floating exchange rates can, in theory, slow or re-enforce cross-border transmission of domestic and external price pressure. In general, an economy would tend to absorb more external deflationary shocks in the context of a home exchange rate fixed to a strong currency and large nominal exchange rate movements of its neighbouring trade partners. The net result often is sharp appreciation of the real effective exchange rate for the home currency, as is in the case of Hong Kong during the Asian crisis. Together with the large negative output gaps, this may explain the observation that Hong Kong has experienced deeper and more prolonged deflation than some of its crisis-hit Asian trading partners (Gerlach and Peng (2003)).

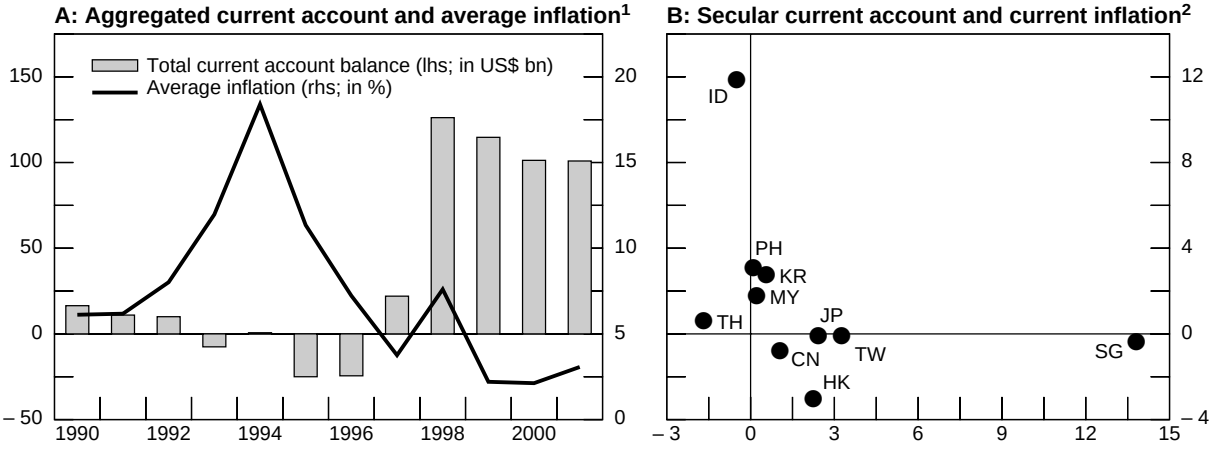
Another way to shed some light on the question of cross-border interactions of deflationary pressures in East Asia is to look at the region's current account as one (imperfect) measure of the possible degree of its excess of domestic aggregate supply. [17] A trend current account surplus, for example, can serve to indicate a chronic excess of private saving over private investment. At some prevailing

[17] Many factors such exchange rate, business cycles, saving behaviour and demography may potentially contribute to an economy's current account.

exchange rates, a persistently large current account surplus in an economy may alleviate downward pressure on the general price levels at home while capturing foreign demand and possibly displacing the problem to the rest of the world. Therefore, both the absolute and relative scales of current account balances may help shed light on the question of whether an economy on balance exports or imports deflation through trade and exchange rate links.

The first observation is that the evolution of East Asia's current account in recent years is consistent with the emergence of deflation in the region. The rising current account surpluses in East Asia since 1990, indicating increasing excess aggregate supply, broadly track its inflation experience (Graph 14A). In particular, with the decline of investment during the Asian crisis, the rest of the world became the vent for the region's surpluses. Second, current account surpluses do seem to be associated with economies in or near deflation. Whether viewed in dollar or relative terms, economies with persistent surpluses include the five that have recently experienced deflation (Graph 14B and Graph 15).

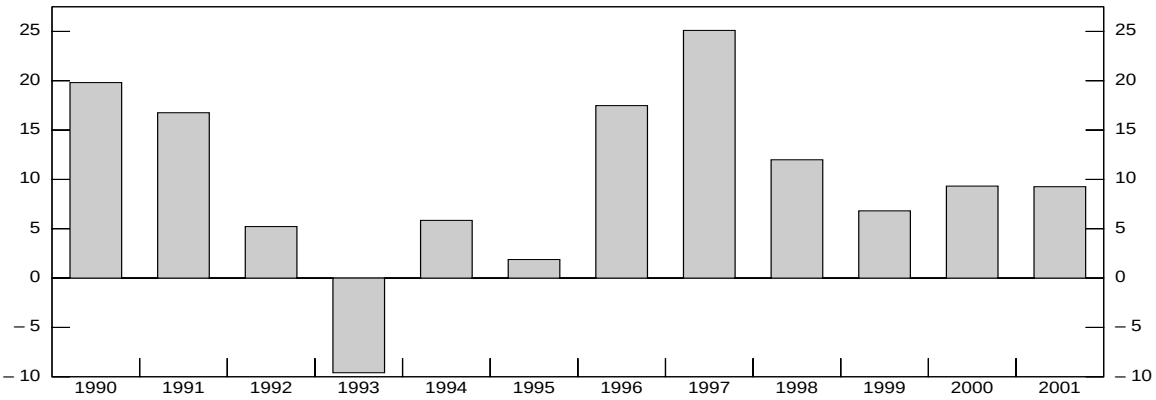
Graph 14 **Current account balances and consumer price inflation in East Asia**



[1] Total or average of the countries in the left-hand panel, excluding Japan. [2] x-axis: average current account balances (1990–2001) as a percentage of 2001 GDP; y-axis: 2002 consumer price inflation.

Sources: CEIC; Merrill Lynch.

Graph 16 **The ratio of China's current account to aggregated current account in East Asia[1]**



[1] In percentages. East Asia as defined as the countries in the left-hand panel of Graph 15.

Sources: CEIC; Merrill Lynch.

3.5 Summing up

We have argued that East Asia other than Japan, with its openness and orientation to manufacturing, and in some economies low incomes, is particularly vulnerable to the ongoing global deflation in the price of traded goods. The experience of asset bubbles in the mid-1990s, and earlier in Japan, and in places the lingering effects of unresolved NPLs on the proper functioning of banking systems, has exacerbated the vulnerability. A conditioning factor that has remained offstage is the exchange rate.

Nominal effective depreciation has the potential to ward off deflation through direct price effects and its effect on net export demand.

To wrap up this section, we regress inflation in 2002 on the cumulated current account, the fall of asset prices from the peak, the 2001 NPL ratio in the banking system and the cumulative nominal effective exchange rate change since end-1996 [REGRESSION NOT SHOWN]. The cumulated current account balance is significant in a bivariate context. Indonesia's combination of asset prices collapse, banking system problems and inflation leaves asset price bust and NPLs not systematically related to deflation. Or perhaps, the collapse of the rupiah overwhelmed these factors. That the exchange rate change dominates the cumulated current account balance should be interpreted with caution insofar as the exchange rate is much more proximately related to price developments than the aggregate savings-investment balance. Perhaps the safest conclusion to draw, even given savings-investment balances, asset price booms and busts and related banking system problems, is that policy matters.

4 Monetary policy and deflation

One can organise the discussion of the challenges that deflation poses to monetary policy under the headings of preventing deflation and conducting monetary policy at zero short-term interest rates. A key question under the first heading is whether monetary policy can and should avoid deflation, and, if so, which central banker's rules of thumb must be discarded to do so. A possible dilemma arises at very short-term interest rates between banks' passing such rates through, at the possible expense of bank profitability and thus even financial stability, or banks' not passing such rates through, limiting their ability to prevent deflation. A key question under the second heading is whether monetary policy has done all it can when the short-term interest rate hits zero. Under this second heading, an important distinction between tactics and strategy often gets lost in the heat of debate. That is, monetary policy may have to operate through instruments other than short-term money-market transactions (such as repos) at zero interest rates, whatever the goal of monetary policy, or policy can set its sights on prices other than a short-term interest rate.

4.1 Avoiding deflation

In this section, we review the argument about whether monetary policy can or should avoid inflation. We then review the limited scope for preemptive action in a number of economies in the region. Next we examine the constraints of lowering interest rates to avoid deflation, noting in particular a dilemma that can arise at very low levels of short-term interest rates between bank profitability and continued transmission of interest rate cuts. Finally, we discuss rules of thumb for monetary policy and, in particular, juxtapose current policy settings to Taylor rule estimates.

General views and the lessons of Japan

Bernanke (2002) answers the question of whether deflation can be avoided with a resounding yes. First, aim for noticeably positive inflation to "preserve a buffer zone for the inflation rate, that is, during normal times it should not try to push inflation down all the way to zero". [18] If inflation is maintained above 1% as a matter of course, then it is less likely that some downdraft of demand will require the short-term interest rate to be set at zero. Second, the authorities must ensure that the financial system, including both the banking system and capital markets, is capable of withstanding the slings and arrows of deflationary shocks. Finally, "when inflation is already low and the fundamentals of the economy suddenly deteriorate, the central bank should act more pre-emptively and more aggressively than usual in cutting rates.

These suggestions may not be as straightforward as they seem at first blush and the third suggestion has led to some controversy. In setting its inflation goal, the Bank of Thailand did not take the first piece of advice in setting its inflation target range at 0 to 3.5%. Secondly, while the Fed retains a role in banking supervision, other central banks require more co-ordination with supervisory agencies to maintain financial stability.

[18] This argument is separate from, and ultimately in addition to, the argument that upward biases in the measurement of inflation suggests that a central bank not take zero as its target for inflation. See Shiratsuka (2001, p. 60) for estimates of the bias in the consumer price index for Canada, Germany, Japan, United Kingdom and the United States.

The third suggestion holds that, when the inflation is low and falling owing to deteriorating fundamentals, a more aggressive interest rate cut than usual may be necessary owing to the risk of losing the interest rate as a policy instrument once it gets close to zero. As elaborated by Ahearne et al (2002), Japanese policy makers, in common with most forecasters, were too slow to see the risk of deflation. They argue that the error in policy, however, was setting policy according to the mean of the expectation of future inflation. Instead, policy should have "taken out insurance" against deflation, or, in other words, erred on the side of looseness, in view of the risk to monetary policy once inflation turned negative and short-term interest rates approached zero.

Yamaguchi (2002) questions the practicality of the suggested pre-emption of inflation, suggesting that unwanted inflation might have been necessary to head off deflation: "The central bank pursuing such a strategy would have to be fully convinced, substantiated by quantitative analyses, and strongly concerned about the risk of deflation a few years into the future. Without such a superb insight, it would hardly be possible for a central bank to abandon a price target, explicit or implicit, at a stage when deflation is yet a remote potential threat". Moreover, he asks whether the recommended policy if pursued would have been effective in the face of an asset price deflation of almost 10% a year for 10 years. "Could an aggressive easing have significantly moderated the fall of real estate price and therefore the balance sheet problem?" Finally, "even if such [a] strategy had proved to be successful, it would only have delayed the inevitable adjustment between the asset prices and economic fundamentals".

Addressing a meeting of central bankers, Feldstein (2002) highlighted the question of timing. "It is also difficult to know just when such a policy should be pursued. The specific context suggested in the Federal Reserve staff study was Japan in the years just before 1995. With the benefit of hindsight that looks like desirable policy. But at the time Japan appeared to be experiencing accelerating real GDP and a positive inflation rate. How would one know whether an expansionary monetary policy in such a context would prevent deflation or would lead to unwanted inflation and a return of the Japanese asset bubble?"

One may also raise the question of the operational meaning of acting "more pre-emptively and more aggressively". The suggested insurance policy by Ahearne et al was a 2.5% drop in interest rates relative to the baseline. Few central bankers would view this as a marginal premium for an insurance policy. Indeed, the staff study paper was released at a time when the target federal funds rate already stood at 1.75%. If this rate already had 1% of pre-emption built into it (see below), then the Fed barely had room left to pursue the experiment simulated for Japan in the early 1990s.

East Asia's scope for pre-emptive action

If one is persuaded of the need for pre-emptive action, what is the scope of such action by central banks in the region? The answer is that the scope is limited. In Singapore, as in Switzerland, short-term interest rates are already below 1%. Elsewhere policy or short-term interest rates are below 2% in China, Taiwan and Thailand (as well as, of course, Hong Kong).

A review of recent interest rate moves in the region does not leave a strong presumption that there has been much pre-emptive lowering of policy rates already. Consider the changes in policy interest rates in the United States and East Asian economies over the period May 1999 to November 2002, which includes a US policy tightening phase as well as an easing phase. Recall that the US Federal Reserve entered an easing phase in December 2000 (Table 5). Although the Fed assessed the risks as balanced in March 2002, renewed doubts about the strength of the US economy led the Fed to cut the federal funds target rate by another 50 basis points in November 2002. Over the easing cycle as a whole, it cut rates by 525 basis points to a 41-year low of 1.25%, on par or even below inflation at around 1-2%. As a result, short-term real interest rates are near zero or even below zero (depending on the price index used). A Taylor rule indicates that the US short-term interest rate was one percent or so below the warranted rate in early 2002 ((BIS (2002), p. 75). Apart from Hong Kong and to a lesser extent Taiwan,[19] most regional economies have matched little of the Fed's interest rate cut, despite, in some cases, their having lower inflation or even deflation.[20] Our estimated Taylor rules for

[19] We shall see below that the policy rate for Taiwan on Table 5 understates the current level of ease as measured by interbank rates.

[20] The decline of the Philippine policy rate, which exceeded the decline in US rates over the past two years, had been raised to address the political risk surrounding President Estrada's ouster, so that the apparent synchronisation with US rates is at least partly accidental.

selected economies below suggest only marginal pre-emption. One interpretation is that central banks in the region are saving their ammunition; another is that they are feeling constrained by the implications of lower rates for bank profitability or real deposit rates.

Table 5

Changes in policy rates in the US and Asia
In percentage

	US	CN	HK[3]	ID	IN	KR	MY[3]	PH	SG[3]	TW	TH
Tightening phase (May 99-Nov 00)[1]	Up 1.75	Down 1.53	Up 0.52	Down 12	Up 0.5	Up 0.5	Down 0.16	Up 5.0	Up 1.02	Up 0.25	Down 0.25
Easing phase (Dec 00-Nov 02)[2]	Down 5.25	Down 0.27	Down 4.18	Down 1.60	Down 1.75	Down 1.0	Down 0.03	Down 6.5	Down 1.98	Down 3.125	Up 0.25
Memo:											
Levels (Dec 02)	1.25	1.98	1.53	12.93	6.25	4.25	3.21	7.00	0.83	1.625	1.75
CPI Inflation rate (2002)	1.6	-0.8	-3.0	11.9	2.5	2.8	1.8	3.1	-0.4	-0.05	0.6

[1] The US Federal Reserve first raised the Federal Funds target rate in June 1999 and tightened in five further steps through May 2000. The period used here is longer, reflecting the Federal Reserve's 'tightening bias' that began in May 1999 and continued into November 2000. [2] The US Federal Reserve first lowered the Federal Funds target rate in January 2001. The easing phase is taken to have begun in December 2000, reflecting the Federal Reserve's 'easing bias' that month, and, although the Fed adopted a "neutral stance" in March 2002, the easing period is taken to have extended through November 2002, when the target fed funds rate was lowered by another 50 basis points. [3]Three month HIBOR/KLIBOR/SIBOR, not a policy rate.

Sources: CEIC. Reuters.

Constraints on lower interest rates to very low levels to avoid deflation

Is it desirable to lower interest rates to prevent deflation? There are three concerns that may give policy-makers pause as they ponder whether to push down policy rates to very low levels. These are the effect on bank profits and possibly financial stability, a fear of a bubble in some asset market, and the distributional consequences of very low deposit rates.

Bank profitability and financial stability

When nominal interest rates are already low, one consideration when contemplating lowering interest rates is a possible policy dilemma between macro and financial stability in East Asia. In terms of macroeconomic stability, cutting interest rates may promote growth by stimulating consumption and investment as well as easing debt burdens and increasing bank lending. In terms of financial stability, however, cutting interest rates may affect the health of the banking system if lower interest rates squeeze banks' margins and hence profits. As interest rates decline, however, banks may respond by not lowering their lending rates in order to maintain their margins. In this case, much of the economy will not enjoy the benefits of lower interest rates. Keynes wrote of this side of the dilemma in the *General Theory:*

> There is finally the difficulty of bringing the effective interest rate below a certain level which may prove important in the era of low interest rates; namely the intermediate costs of bringing borrowers and ultimate lender together…Thus the rate of interest which the typical borrower has to pay may decline more slowly than the pure rate of interest…[21]

Before considering this dilemma as it has appeared in several economies with very low interest rates in East Asia, it is worth briefly to review how low interest rates might lower bank profits. Then we shall consider the dilemma in Japan, Singapore, Hong Kong, Taiwan and China, that is, in ascending order of short-term interest rates.

The effect of very low interest rates on bank profits is a compound of two effects, the *endowment effect* and the *margin squeeze* effect.[22] The first of these operates with arithmetic dependability, although its extent, and even its sign, depend on the structure of a bank's balance sheet. The second, potentially much more powerful, effect depends on how banks price deposits and loans at very low interest rates.

The endowment effect refers to the effect of higher or lower interest rates on a bank's gross profit arising from a bank's own funds (and non-interest-bearing deposits). Such profit expands when interest rates are higher and contracts when interest rates are lower. The effect is positive for most banks in the English-speaking world, where a bank's own capital exceeds its nonmonetary assets like premises and shares.[23]

An argument regarding the effect of inflation on bank profits carries through to deflation. The interaction of the Fisher effect, the endowment effect and income taxes makes banks "born losers" from inflation, in Wallich's (1977) memorable phrase. That is, if inflation rises and nominal interest rates rise to the same extent, banks experience higher nominal, but not real, gross profit on their own funds. The tax authorities tax nominal, not real profit, however, and thereby lower after-tax rates of return with inflation (Petersen (1986)). This works symmetrically, with lower inflation resulting in lower spurious profits and a lower effective tax rate on bank earnings. Moreover, this effect continues to strengthen at higher rates of deflation, as long as banks maintain the margin between their borrowing and lending rates. That is, in deflation, real profit arising from the fall in the price level is not taxed, so the faster the deflation, the lower the effective tax rate on banks. In this respect at least, banks, like other holders of nominal claims, are born winners from deflation (see Box A).

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[21] Following Keynes, and building on the claim of Epstein and Ferguson (1984) that the Federal Reserve backed off from very low short-term rates in 1932 to protect the profits of the banks, Epstein (1995) models a central bank as constrained from setting the interest rate below a break-even level for the banking sytem.

[22] Another effect, not pursued here, is the duration effect (Samuelson (1945)). A mismatch between short-term liabilities and longer term assets at low interest rates is widely held to have been a major means for large banks in the United States to rebuild their capital after the excesses of the late 1980s.

[23] Zimmer and McCauley (1991) found that UK and US banks are net monetary lenders, while Japanese banks are net monetary obligors, while German and Swiss banks are net monetary lenders but with a substantial fraction of their own capital invested in real assets. Such structural differences lead to different priors on the effect of interest rate changes on bank profitability across industrial countries, at least owing to the endowment effect. See English (2002).

Box A: Bank profitability and deflation: the endowment effect

Perfectly anticipated deflation in the absence of taxes need not affect bank profitability. This point emerges from an example of a bank with assets of 100, liabilities of 90 and capital of 10 in a situation of price stability and one of deflation, both fully anticipated.[1] What deflation takes away, namely most of the interest earnings on own funds, it gives back in the form of a real capital gain on the same own funds.

Box Table A1: Bank profitability and deflation with no taxes

	Inflation = 0	Deflation = 5
Assets	100	100
Liabilities	90	90
Capital	10	10
Lending rate	6	1
Deposit rate	5	0
Reported profit	.06(100) - .05(90) = $1.50	.01(100) - .0(90) = $1.00
Nominal return on equity	$1.50/10 = 15%	$1.00/10 = 10%
Real profit	$1.50	$1.00 - $10(-.05) = $1.50
Real return on equity	15%	15%

Only with taxes, say at 20%, does bank profitability change, and in particular increase, with deflation. Again, deflation takes away most of the earnings on own funds. But now the banks' shareholders benefit from the fact that the capital gains on the equity are not taxed. Thus, the endowment effect of the banks' own funds, the Fisher effect and taxes interact to increase bank profitability at lower levels of inflation and into moderate rates of deflation.

Box Table A1: Bank profitability and deflation with 20% income tax

	Inflation = 0	Deflation = 5
Assets	100	100
Liabilities	90	90
Capital	10	10
Lending rate	6	1
Deposit rate	5	0
Reported profit before tax	.06(100) - .05(90) = $1.50	.01(100) - .0(90) = $1.00
Reported profit after tax	$1.50(.8) = $1.20	$1.00(.8) = $0.80
Nominal post-tax return on equity	$1.50/10 = 12%	$0.80/10 = 8%
Real post-tax return on equity	12%	($0.80 - $10(-.05))/$10 = 13%

If banks were just money-lenders, the analysis would end here. Banks pile on top of the business of money-lending, however, an intermediation business that in modern times is an order of magnitude larger than their pure money-lending. Very low interest rates can squeeze the intermediation margin. This margin squeeze at low interest rates may be a much more powerful effect, moreover, than the "born gainer" interaction of taxes and earnings on own funds.

To see how very low interest rates can squeeze intermediation margins, it is useful to divide the gross profits from intermediation into two parts, (gross) funding profit and (gross) lending profit. Monetary policy can be conceived of as setting a policy rate(s) that in turn determines very short-term interbank interest rates. The gap between the deposit rate and the interbank rate gives rise to the funding profit, while the gap between the interbank rate and the lending rate gives rise to the lending profit. Very low interest rates threaten the funding profit and they does so well before policy rates hit zero (see Box B).

Box B: Bank profitability and deflation: the margin squeeze effect

Let us consider the case in which the capital/asset ratio is 10%. Assume the banks lend at 1.6% above the policy rate, and pay 1.4% less than the policy rate on deposits, thus earning a gross margin of 3%. Then, for policy rates (P) greater than 1.4%, the net interest margin (NIM) is

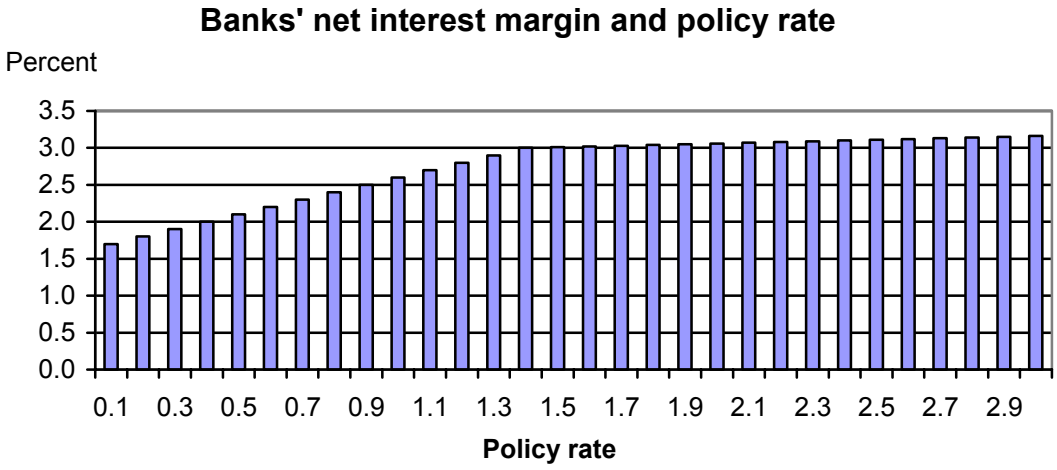
NIM = ((P + 1.6%) * .1) + (3 * .9).

The first term reflects the return on the banks own funds (abstracting away form such nonmonetary assets as premises), while the second reflects the spread between lending and deposit rates. As policy rates less than 1.4%, however, deposit rates cannot be reduced below zero. *If banks pass through the decline in policy rates to lending rates*, the net interest margin reduces to:

NIM = P + 1.6%.

It can be readily seen that the lower return on own assets as interest rates fall (the endowment effect) is a very subtle effect indeed. In contrast, the squeeze that sets in on the banks' margin when the policy rate falls below the gross spread between the deposit rate and the policy rate is large, depriving the banks of half their margin under the assumed circumstances.

The level at which further declines in the policy rate threatens to squeeze the banks' net interest margin will vary across banking systems, depending on competitiveness and the technology for providing cash and payment services. It also depends on the stickiness of deposit rates above zero

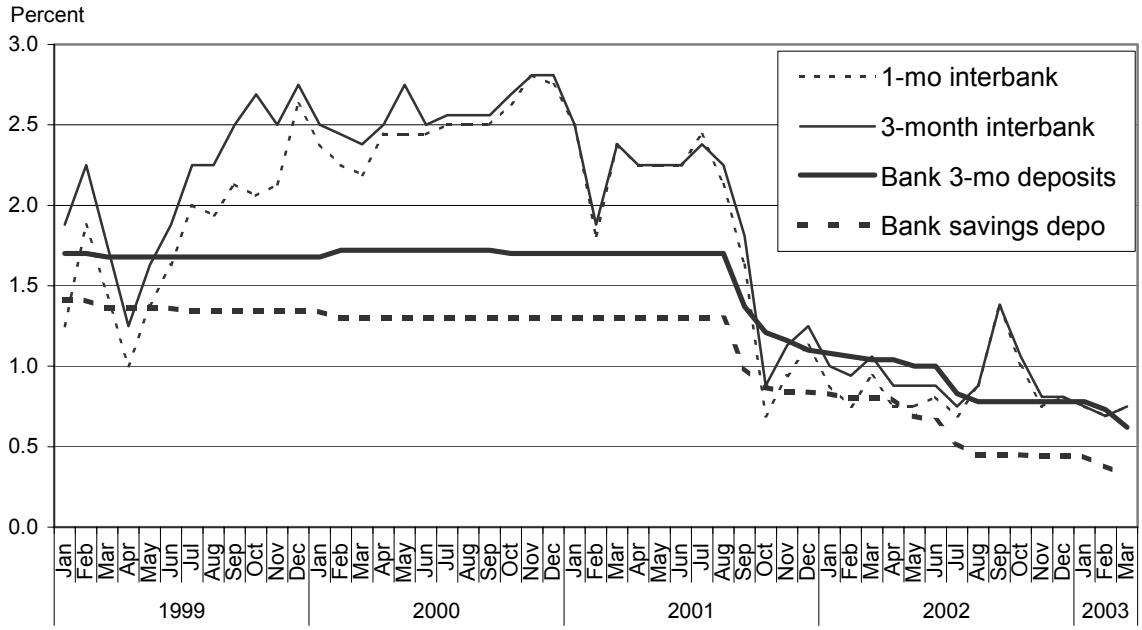


Japan's experience illustrates the potential for a squeeze on bank funding margins at very low interest rates, but also apparently the potential for banks to offset it on the lending side. Fukao (2002) found that the gap between average deposit rates and interbank rates, which may be taken to be a measure of the average funding profit, disappeared in 1995 as the policy rate dropped to 50 basis points (Fukao (2002), p. 30, and personal communication with an author). A small gap re-appeared in 1998, however, suggesting that the initial resistance to essentially zero deposit rates eventually gave way, allowing a narrow gross funding spread to reappear. Of course, when policy rates did go to zero, funding profit again disappeared.

Japan's experience also highlights the dilemma between macroeconomic and financial stability. Commenting on Fukao (2003), von Hagen observed at a BIS conference that deflation had not been associated with an overall squeeze on bank margins in Japan, suggesting wider lending spreads. In Fukao's account, the narrowing of the funding margin originally reflected the phasing-out of deposit-rate controls in the late 1980s and early 1990s, and banks widened their lending margins in response. The most that can be said safely is that the very low policy rates associated with deflation finished the squeeze on funding profit that deregulation had started. In response to the squeeze, "it was natural for banks to raise lending rates relative to market rates"—and perhaps well justified by weakness in risk analysis in the past or the current riskiness of firms. The result, however, for other than large credit-worthy firms able to borrow at rates near money market rates, undermined policy. "Smaller companies have been less able than larger ones to enjoy the expansionary effect of loose money. This may have contributed to the relatively weak recovery of the small-business sector in the 1990s" (Fukao (2002), p. 8). In sum, Japan's example shows that very low interest rates threaten bank profits but that bankers' efforts to in defend those profits can undermine the effect of a zero policy rate.

Singapore, the next case to be examined features short-term interest rates of less than one percent that carry the potential for low interest rates to squeeze banks' gross funding profit. While monetary policy there focuses on the nominal effective exchange rate of the Singapore dollar, prevailing international money market yields and expectations regarding the exchange rate have brought short-term market interest rates down to a level of about 75 basis points. Here, the sharp decline in interest rates in 2001 brought interbank rates down to the level of administered deposit rates (Graph A), implying a squeeze at the margin on funding profit. There is certainly room for the bank deposit rates to fall some more, and they have done so again in the early months of 2003. Thus, the evidence may point to a mixture of adjustment dynamics and the margin squeeze associated with the zero bound on deposit rates. It should be noted that there is no room for the bank saving deposit rate to fall low enough to re-open the 120 basis-point gap below interbank rates that banks enjoyed in most of the year 2000. Whether banks have offset this squeeze on the funding side with any compensating widening of the lending margin is unclear from the available data.

Graph A: Interbank rates and bank deposit rates in Singapore



Source: Monetary Authority of Singapore

Despite the similarity of their interbank interest rates, Hong Kong and Taiwan appear to stand in quite different positions with respect to the potential dilemma between maintaining bank profitability and passing through any further interest rate cuts. In Hong Kong, banks if anything lowered deposit rates faster than interbank rates fell in 2001 (Graph B, showing average rates on deposits of less than HK$100,000, or about $13,000), thereby protecting their funding profit. Going forward, however, Hong Kong banks may not find themselves in so remunerative position. With small denomination time deposit rates at about 10 basis points and the savings deposit rate at just 1 basis point, banks in Hong Kong will not be able to retain their gross funding profit if the Federal Reserve cuts rates again, given the linked exchange rate.

Matters stand very differently in Taiwan (Graph C). At the margin, the funding profit has been squeezed hard. In particular, the interbank rate has approached the one-month deposit rate and the now-abandoned passbook rate.[24] While the squeeze at the margin is severe, it has not shown up in the quarterly data on average deposit rates and average lending rates that are collected for Taiwanese banks, where the margin has if anything widened a bit.[25] It may be that Taiwanese banks have longer duration assets than liabilities, in which case their average margins will be squeezed as their assets are repriced. All in all, Hong Kong banks look to have aggressively maintained their funding margins but the economy now stands on the cusp of the dilemma between squeezed bank profit and impaired pass-through of policy rates to bank borrowers, Taiwanese banks look to have allowed their funding profit to be squeezed at the margin and thus still have room to drop their deposit rates before refusing to lower lending rates is their only path to maintain profits.

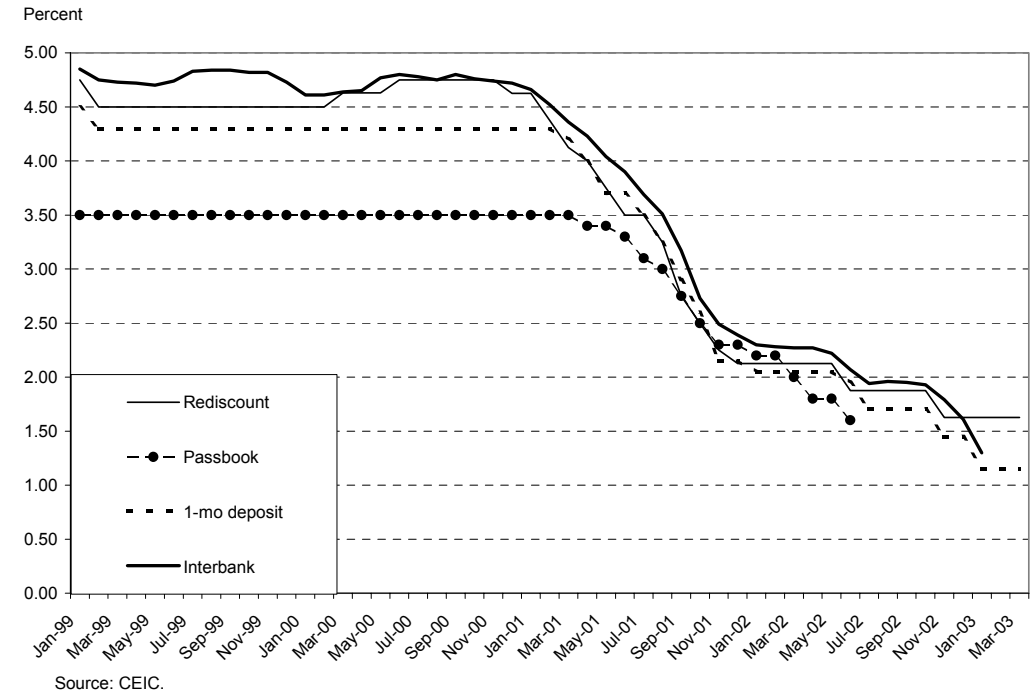
[24] Note that the interbank rate has fallen below the CBC's discount rate, which usually sets a floor for interbank rates. This may be related to the measures described in the next footnote.

[25] The sharp interest rate cuts beginning in December 2000 raised concerns about banks' profitability, especially in view of the banks' heavy burden of non-performing loans. In order to strengthen the profitability of local banks, the central bank raised its rate of remuneration for required reserves and the yield on its negotiable certificate of deposits, the latter above the interbank rate, implying a transfer of profits from the central bank to the banking system.

Graph B: Deposit and interbank rates in Hong Kong

Source: Hong Kong Monetary Authority.

Graph C: Deposit and interbank rates in Taiwan

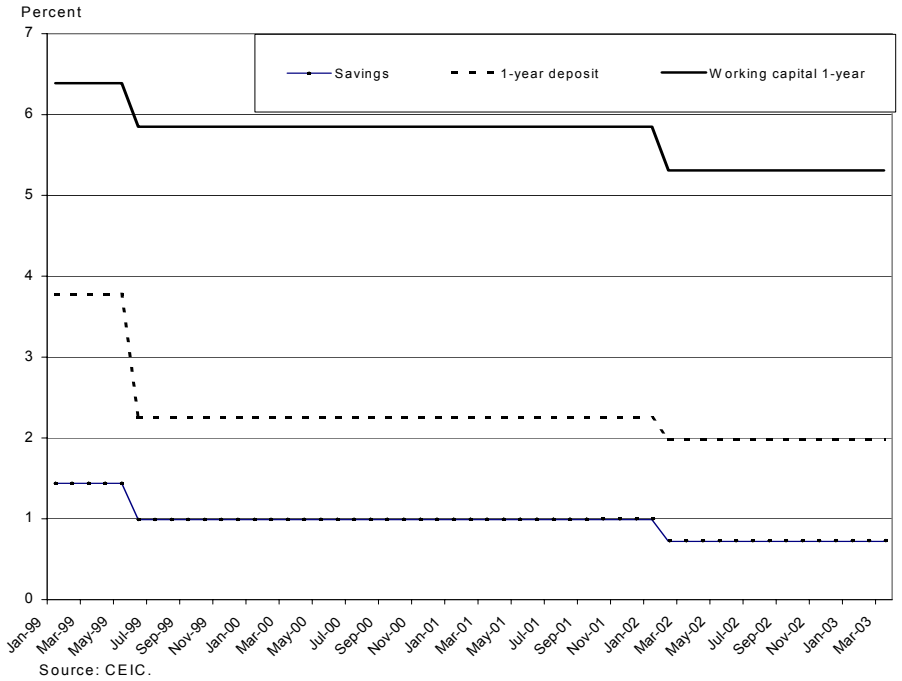


Source: CEIC.

In *China*, interest rates are farther away from the zero constraint but the last interest rate cut nevertheless narrowed bank margins. Government-set interest rates remained unchanged for over two and a half years after June 1999, despite a low rate of inflation and some deceleration of growth. After prices started to fall again in late 2001, the central bank responded by lowering the key interest rates. The one-year lending rate was reduced by 54 basis points while the one-year deposit rate was lowered by only 27 basis points in early 2002. Thus, banks' margins were squeezed by more than 25 basis points. While the People's Bank of China argued that a reduction in margins could increase the speed of reform of commercial banks, another plausible view is that this margin squeeze reflected the

unwillingness to drop the savings rate to half a percent or to narrow the gap between it and the one-year deposit rate. With a reduced profit margin, however, banks will find it more difficult to resolve their non-performing loan problems out of the flow of their own profits.

Graph D: Deposit, rediscount and lending rates in China



Source: CEIC.

Concern for an asset bubble

An additional constraint on cutting interest rates is the concerns about the build up of a bubble in the bond market. In China, for example, market participants interpreted the central bank's interest rate cut in early 2002 as portending more to come, leading many to load up on government bonds. Subsequently, banks began to buy more government bonds rather than lending, pushing down the long-term bond yields to a very low level. Concerned about the drying up of credit and the potential for losses if prices in the bond market crashed, the central bank withdrew liquidity through open market operations in April 2002. As a result, bond prices retreated and banks resumed lending. Another similar concern of the authorities may be that further interest rate cuts to address deflation could inflate what is described as a property bubble in China. There has been a rising demand for housing not only for own use but also for rental purposes since the major Chinese banks began making mortgages several years ago. The central bank has tried to deter banks from lending to property speculators to prevent a property bubble and to limit banks' exposure to declines in property prices.

Income of depositors

The practice in Asia to keep *real short-term rates nonnegative* may also constrain interest rate setting. In East Asia, a much larger share of household assets are in bank deposits than in most advanced economies. In some economies, consumers finance durable goods not with credit but rather with their own savings. In addition, interest income is a major source of income for many households, especially retirees. As a result, falling interest rates encounter political resistance and run into arguments that they do not stimulate consumption and might even lead to reduced spending. In Thailand, the government has instructed state-owned banks not to cut deposit rates in order to sustain the income of depositors, despite the country's weak economic growth and benign inflation. However, many foreign-owned banks have cut deposit rates despite the government's criticism. It remains to be seen whether the marketing of certain government bonds directly to the household sector will alter bank deposit politics. In Malaysia the bankers' association has cooperated in maintaining yields on a substantial share of deposits at levels comparable to wholesale money market rates.

East Asian monetary policy and rules of thumb

Rules of thumb that develop under conditions of moderate inflation may need to be re-examined in the context of very low inflation or deflation. A very old rule of thumb is that policy rates should be moved in small steps. A very familiar rule of thumb is the Taylor rule. Let us consider each in turn.

The simple rule of thumb is gradualism. In implementing monetary policy, many central banks prefer to *move interest rates in small steps*, most commonly, ¼ of a percent, and spread over a long period of time because of the uncertainty regarding the economy and the monetary transmission mechanism. In the neighbourhood of deflation, however, a central bank may have to prepare to cut interest rates drastically, "pulling out all of the stops". Once inflation rates fall to zero or below, the zero constraint for nominal interest rates will keep real interest rates at a level that may not be consistent with pulling the economy out of deflation.

The Taylor rule suggests that a central bank should *set interest rates according to the deviation of inflation from its target and the output gap.* It serves as a useful rule of thumb to describe movements in the policy rates in many countries, even in those that have no explicit inflation targets. The coefficient on the inflation gap term is usually considered as not depending on whether inflation is above or below its target (or long-run trend), implying that a central bank moves interest rates symmetrically. However, one problem with such a rule is that deflation did not happen very often in the post-war period when the rule of thumb developed.

We estimated a simple Taylor rule for China, Singapore, Taiwan and Thailand in order to assess the monetary easing path in these economies as inflation falls (Graph 17 and Table 6).[26] The usual policy interest rate served as the left-hand side variable for the Taylor rules for China, Taiwan and Thailand,[27] but the nominal effective exchange rate (NEER) served as the policy variable for Singapore, consistent with the exchange rate focus of its monetary policy.[28] Instead of estimating a Taylor rule for Hong Kong, we took Taylor's original suggested coefficients of 1.5 and 0.5 for the inflation and output gaps, respectively, to simulate the warranted short-term interest rate.[29] Notwithstanding the many issues related to the measurement of the output gap and inflation gap, the rates derived from the estimated Taylor rule tend to track the actual policy rates reasonably well over the 1990s for most economies except, by construction, Hong Kong (Graph 17). After 1998, when inflation began to fall rapidly and in some economies prices actually began to fall, monetary policy tended to become more expansionary as prescribed by the Taylor rule. However, one could still raise the question whether more interest rates cuts should have been made as extra insurance against the risk of deflation in those economies that still have any inflation.

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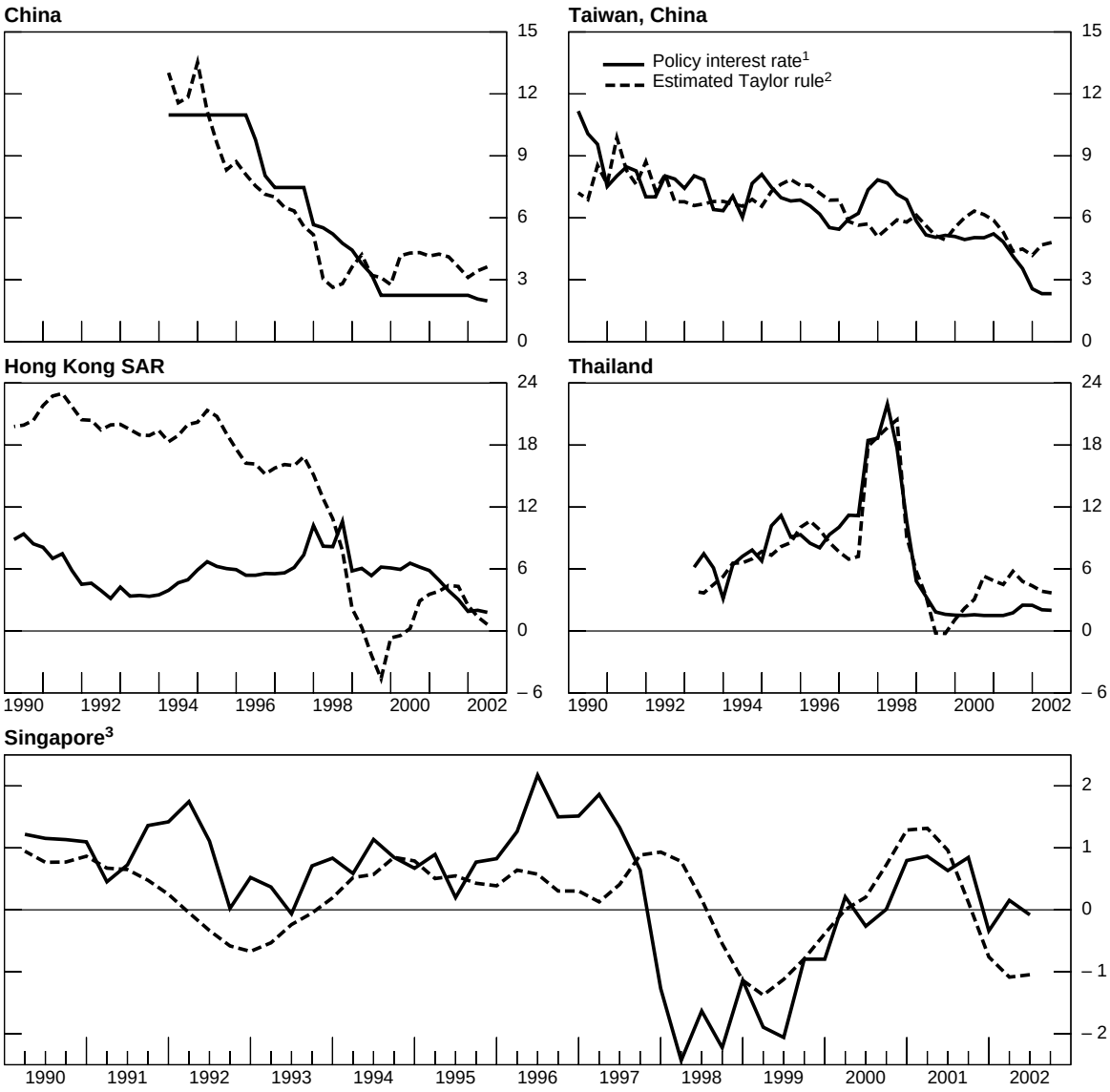
[26] An important issue related to the estimation of a Taylor rule for East Asian economies is the role of the exchange rate. Although China, for example, has a fixed exchange rate, capital control allows independent monetary policy. For Singapore, which adopts a managed float exchange rate system, we employ the NEER as the policy variable instead of the interest rate. For other small open economies, Armour, Fung and Maclean (2002), for example, found that the gains from using open-economy rules that include an exchange rate term seem to be limited for Canada. Thus, estimating a simple Taylor rule appears to be a useful first pass to evaluate monetary policy stance in these East Asian economies.

[27] The interest rates used are: one-year deposit rate for China, 14-day repurchase rate for Thailand and 91-180 day commercial paper rate for Taiwan. The potential output was estimated using a HP filter. In the case of China, the potential growth rate was set at a constant of 8%.

[28] See for example, Flint (1999) and the discussion in McCauley (2001)

[29] The equilibrium nominal interest rate was set at the average nominal three-month rate from 1986 and the output gap was computed by fitting a HP filter.

Graph 17 **Taylor rules for East Asia**



[1] For Singapore, nominal effective exchange rate. [2] For Hong Kong, simulated using Taylor's coefficients for inflation and output gaps; for other countries, simulated using the policy variable. [3] Four-quarter moving averages.

Sources: CEIC; IMF; BIS calculations.

In some economies such as China and Taiwan, it may be too late to take out a major insurance policy against deflation. However, the monetary authorities in these economies appear recently to have provided somewhat more monetary stimulus to the economies than suggested by their respective Taylor rules. In China, the one-year deposit rate was lowered four times from 1998 to mid-1999, as the economy slipped into deflation in mid-1998. While the rate remained unchanged until early 2002, it was generally lower than suggested by the estimated Taylor rule. With the Taiwanese economy experiencing deflation on and off in 2001 and 2002, short-term interest have been falling rapidly, and the decline tended to be slightly faster than prescribed by the estimated Taylor rule.

The monetary policy responses in Thailand seem to be about right when compared to the Taylor rule. After falling sharply after the Asian crisis, the short-term interest rates in Thailand have remained low since 1999. While the estimated Taylor rule suggested a lower rate than actual in 1999, the most recent level of the short-term interest rate seems to be consistent with that prescribed by the Taylor rule.

The Singapore dollar has shown less consistent appreciation against the currencies of its major trading partner since 1998. The Monetary Authority of Singapore adopted a neutral stance, that is, a flat NEER, in July 2001 and has re-affirmed this stance three times at half-yearly interval (with a minor

downward adjustment of the base in January 2002). With prices facing more downward than upward pressures and the economy still growing below potential, a downward trend in NEER for 2001 onwards is suggested by the Taylor rule. This suggests that the actual changes in NEER are less than the depreciating trend prescribed by the estimated Taylor rule. Recently, some private sector analysts have called for a downward tilt of the NEER given the high unemployment and slower growth than potential (Flint (1999 and 2003)).

Given the exchange rate peg, interest rates in Hong Kong have moved in tandem with US rates, so it would not be very informative to estimate a Taylor rule for Hong Kong. Instead, we apply the original Taylor rule to generate the interest rates that would have been warranted if Hong Kong had been setting its own interest rates. Following the Asian crisis, output growth in Hong Kong slowed sharply and inflation fell rapidly and then turned negative in late 1998. The Taylor rule recommended cutting interest rate drastically to zero. However, with US interest rates staying at around 5-6% until end-2000, Hong Kong interest rates remained at a level higher than that warranted by the Taylor rule. After the US Federal Reserve began cutting interest rates aggressively in early 2001, interest rates in Hong Kong have come down to a level more consistent with the rate of deflation and the slower economy.

Table 6

Estimated parameters of the Taylor rule
(t-statistics in parenthesis)

	Sample	Constant	Inflation	Output
China	1994:1-2002:2	4.84	1.28	0.13
		(12.31)	(2.41)	(1.60)
Singapore	1975:1-2002:2	0.22	0.17	0.29
		(1.24)	(2.42)	(4.06)
Taiwan	1990:1-2002:2	6.52	0.68	0.12
		(34.31)	(5.8)	(0.88)
Thailand	1993:1-2002:2	5.12	1.17	0.17
		(13.24)	(9.04)	(2.11)

Note: 1. The regressions were based on quarterly data using the following specifications (except Singapore), where *i* is the policy rate, *pgap* is the deviation of CPI inflation from target, and *ygap* is the output gap (a dummy is used for the crisis period for Thailand):

$$i_t = c + \alpha pgap + \beta ygap$$

2. The equation estimated for Singapore is as follows, where *NEER* is the nominal effective exchange rate:

$$NEER_t - NEER_{t-1} = c + \alpha pgap + \beta ygap$$

Source: CEIC and BIS calculations

4.2 Monetary policy at zero nominal interest rates

As noted, an important distinction must be drawn at the outset between various responses to the operational problems that can set in at zero short-term rates and strategic choices that attempt to affect or even to fix financial prices other than the short-term interest rate. Confusion can easily arise between the choice to operate in a given asset for practical reasons, and the quite different choice to set monetary policy's sights on the same asset's price. Central banks can conduct operations to affect the price of government bonds and private assets like corporate bonds and equities. In addition, central banks can operate in the foreign exchange market with a view to affecting the exchange rate.

Monetary policy operating procedures at zero interest rates

Deflation can make problems for monetary operating procedures developed with positive inflation levels and positive short-term interest rates. In particular, a central bank used to operating largely through operations in short-term instruments, such as repos, may find that private market participants are uninterested in bidding for near-zero-cost funds when they already have an ample supply. In fact,

the Bank of Japan experienced chronic undersubscription in its auctions of money between February 1999 and August 2000 (Shirakawa (2001), Figure 11).

Given this possible break-down of the repo or similar procedure of monetary operations involving short-term funds, a central bank running a policy of zero short-term interest rates that is intent on expanding its balance sheet might consider changing its modus operandi. In particular, it might consider operations in:

- Government bonds: To the extent that government notes or bonds carry positive interest rates, private market participants will offer to sell them outright to the central bank when asked to submit bids in a reverse auction. To the extent that such outright purchases of coupon securities are already part of a central bank's operational repertoire, their scale might be stepped up at zero short-term interest rates, as in Japan.
- Other private assets: In the unlikely event that government debt securities' yields were to fall to near zero all the way out the yield curve, the technical problems with short-term operations might recur and require operations in risky assets. These could take the form of discount window advances to banks against collateral, or outright purchases of risky private securities. In fixed income markets, risk premia would assure positive interest rates on risky debt even in an environment of zero interest rates on government securities or interbank placements.
- Foreign exchange: With floating exchange rates, a central bank should always be able to expand its balance sheet by buying foreign exchange. The proceeds can be invested in foreign government bonds or other foreign-currency denominated instruments.

Such operations in government bonds, private assets or foreign exchange could be undertaken for essentially technical reasons as a substitute for more accustomed operations in short-term instruments. In this case, the central bank would enter the market as a price-taker. To be sure, monetary operations would tend to impart greater liquidity to the chosen asset(s), but, in principle, monetary operations would expand the central bank's balance sheet and leave pricing to the market. In the foreign exchange market, for instance, operations could take the form of swaps, which represent no net demand for, or supply of, foreign exchange (as currently practiced by central banks in Australia, Singapore and Thailand, and as formerly practiced in Switzerland).

Monetary policy strategy once short-term interest rates are zero

The discussion above assumed that the central bank setting short-term interest rates wished to expand its balance sheet but faced technical difficulties using operations in short-term instruments to do so. In effect, a goal beyond the achievement of zero short-term interest rates was assumed, and technical measures to achieve this goal, that is, operations in other assets, were discussed. Now, let us consider a variety of other goals that have been adopted or proposed in the context of zero short-term interest rates. These start with the "quantitative" policy just assumed, that is, the goal to increase the size of the central bank's balance sheet and in the process provide excess reserves to the banking system. In addition are the goals of affecting the price of government bonds, either through expectations of short-term policy rate or direct purchases. There is also the possible goal of affecting the price of private assets or of foreign exchange through direct purchases.

Quantitative easing

The Bank of Japan has embraced quantitative easing in the sense of targeting and attaining a level of excess bank reserves, but questions remain over its effectiveness per se. In March 2001, the Bank of Japan adopted a target for reserves, that is, financial firms' current account balances at the BOJ, over and above those needed for required reserves or clearing operations. In October 2002, the BOJ raised the target current account balance to around 15 to 20 trillion yen (as well as increasing the purchase of government bonds to 1.2 trillion yen per month). In strictly monetary (or monetarist?) terms the policy seems to have had limited effect: the monetary base rose sharply since then but the growth of broad money did not seem to pick up as bank credit continued to contract.

Lowering bond yields through expected short-term policy rates

Any policy that sets out to lower bond yields presumes that some portions of aggregate demand are determined not by overnight rates but by longer-term rates. For example, housing demand, consumption demand financed with savings from refinancing and investment demand are all likely to be affected more by long-term rates than by short-term rates. One can distinguish two approaches to

trying to lower bond yields: expectations regarding future short-term rates and outright purchases of bonds.

Once interest rates have hit zero, a key question for market participants is, how long will the zero short-term interest rate policy last? A credible commitment not to raise short-term interest rates until prices rise again in a sustainable manner will tend to lower government bond yields to reflect the period over which short-term rates are expected to remain at zero. This effect depends on the expectations theory of interest rate, according to which long-term interest rates are roughly equal to a weighted average of short-term rates.

A credible commitment to holding to the zero interest rate policy until inflation returns has exerted what is called a "policy duration effect" on the Japanese government yield curve (Fujiki and Shiratsuka (2002)). Interest rates at maturities of up to two years have fallen virtually to zero. The policy duration effect also has a useful dynamic element. In particular, if the economy weakens, expectations of the length of zero short-term rates extend outwards, and note and bond yields fall, offsetting the weakness to some extent. With a credible policy commitment working through the expectations theory of interest rates, the Bank of Japan has in effect deputised bond market participants as deflation vigilantes.

Credibility cannot be presumed, however, particularly if the monetary authorities enter the deflationary episode without a track record of clear goals and consistent choice of measures to attain them. Pumping extra reserves into the money market is not in itself a very convincing means for the monetary authority to bind one's hands—such reserves could be removed easily and cheaply from a narrow technical standpoint.

Ironically, the controversy over the interruption of the zero interest rate policy, as well as the clarity of the Bank of Japan's March 2001 statement about the duration of policy rates at zero, has led to market participants' relying on the continuation of the zero interest rate policy over many quarters. It should be recalled that the zero interest policy that began in February 1999 ended in August 2000 with a 25 basis point hike. Although the macroeconomic differences between zero and 25 basis points might not seem huge, the zero interest rate policy had been advertised in April 1999 as lasting "until deflationary concerns are dispelled" and much controversy ensued. Moreover, policy-makers' drawing a distinction in public between good and bad deflation left intentions subject to argument. In the event, in March 2001, an excess quantity of bank reserves (sufficient to ensure practically zero short-term interest rates) was promised until such time as the Japanese economy experiences a non-negative year-on year change in consumer prices (excluding perishables). The demonstrated political risk of a premature increase in the policy rate has joined clarity of purpose in establishing credibility in the marketplace.

Buying bonds to lower yields

Other suggested policies under conditions of zero interest rates would use the instruments considered above for operations. Only now, the central bank would intend purchases of government bonds, private assets and/or foreign exchange to affect prices, or, in the limit, fix prices (Clouse et al (2000)). Let us first consider central-bank purchases of bonds (in the market) with the aim of lowering bond yields, a policy that would not carry most central banks beyond their current range of permitted assets. We will argue that this policy embodies an important element of debt management policy, which is usually associated with the fiscal rather than the monetary authorities. Further, central bank buying of government bonds, and even more buying private assets or foreign exchange (whose prices are typically more volatile than those of bonds), embody fiscal policy in that they carry the possibility of capital losses, the burden of which would be ultimately borne by the government, one way or another.

How would central bank purchases of bonds work to raise the price of government bonds? Purchases of government bonds, argue Clouse et al (2000), can work through changing views on future short-term interest rate policy (the signalling effect) or through changes in the balance between demand and supply in the government bond market. (the portfolio effect). If the central bank puts itself in a position to lose from higher interest rates owing to its purchases of government bonds, perhaps it would thereby signal a stronger commitment to zero short-term interest rates.[30] Shirakawa (2001) questions whether "market participants would anticipate such loss-avoiding behaviour on the part of the central bank" and wonders whether, if "the outright purchase of long-term government bonds were perceived

[30] This "putting your money where your mouth is" has featured in discussions of the effectiveness of intervention in the foreign exchange market.

as the de facto underwriting of government bonds by the central bank or the loss of fiscal discipline, long-term interest rates might well rise".

In terms of the portfolio effect, a central bank may have to undertake large buying operations to achieve the desired effect. Shirakawa (2001) contrasts Japanese government bond purchases by the Bank of Japan (14.4 trillion per year at the rate of 1.2 trillion yen per month) to outstanding long-term bonds of 530 trillion yen. "If we want to take advantage of the effect of relative supply, it would be far more effective for the government to shorten the maturity of newly issued government bonds". In other words, central bank purchase of government bonds to affect yields is properly viewed as a part of the public sector's overall debt management policy.

Conceived in this way, this policy raises the question of coordination or division of responsibility between the central bank and the fiscal authority. It is not obviously consistent for the Japanese Ministry of Finance simultaneously to issue large quantities of 10- and 20-year bonds, and at the same time to call on the Bank of Japan to buy them.[31] Moreover, if the central bank assures zero short-term interest rates, government debt managers are well positioned, not simply to shorten the maturity of the newly issued bonds, but to shorten the duration of the whole stock of outstanding debt. For example, the fiscal authorities could retire long-dated bonds with the proceeds of five-year floating rate notes priced off of 3-month paper.

There are arguments on both sides for the proper division of responsibility between the central bank and fiscal authorities in what is essentially debt management. Expediency may argue for central bank purchases of government bonds, if the central bank can decide today while overall debt management is governed by law. On the one hand, some, but by no means all, observers would claim that the combination of pumping excess reserves into the banking system and bond-buying makes central bank operations in some sense more powerful.[32] On the other hand, the greater room to manoeuvre of the fiscal authorities is suggested by the fact that the stock of government debt typically large in relation to the central bank's balance sheet. This points to the presumption that a change in the supply of government bonds of various maturities could bring longer-term yields down to desired levels more readily than expansions of the central bank balance sheet. There is also a risk management argument for making the fiscal authorities responsible for debt management. In particular, the shortening of the government debt duration in deflation hedges cash flows. That is, if deflation persists, cash flows, including tax receipts, remain weak but interest costs are low; if deflation ends, then cash flows and interest costs both rise. This question of the division of responsibility between ministry of finance and central bank arises with even greater salience with respect to proposals for the central bank to buy corporate bonds or other private assets (or foreign exchange), to which we now turn.

Buying private assets to raise prices

Central bank buying private assets exposes it in effect to equity risk and would intend a reduction of the equity risk premium. Various private assets have been suggested, ranging from private bonds, to equities, to real estate and even non-performing loans. A particularly interesting aim is to affect the spread between safe government securities and risky private securities.

A situation in which private risk spreads over government yields suddenly widen, and the corporate bond market seizes up, would present a particular challenge to a central bank already setting short-term interest rates at zero. In this case, there would be no possibility for the central bank to lower the short-term interest rate in response, as did the Federal Reserve in late 1998. The proximate cause of the widening of risk spreads might be a flight to quality from risky private bank and corporate obligations to government paper. In order to narrow this credit spread, one approach would be for the central bank to accommodate the shift by selling government paper and buying risky private paper or otherwise recycling funds into the banking system. But quite apart from the legal power of the central bank to buy corporate obligations, there is a question of whether the central bank or government debt managers are better positioned to accommodate a flight to quality.

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[31] Operation Twist, an effort by the Federal Reserve to flatten the yield curve in the early 1960s in order simultaneously to defend the dollar and support long-term investment, is often recalled as a story of a failure of the portfolio effect. On closer inspection, however, the Treasruy at the time was lengthening maturities substantially, so that the efforts by the Federal Reserve were overwhelmed by the larger effort of the debt managers.

[32] In circumstances of pervasive excess reserves in the banking system, the substitutability between the central bank liabilities and short-term government debt must be nearly perfect. See Congdon for a monetary argument that the debt management operations by the treasury would be more powerful than those by the central bank.

Government debt managers have the advantage of being able to issue more of the instruments in demand. Recalling the UK experience (in the context of monetary control rather than addressing financial instability) in "overfunding" the public sector borrowing requirement, they could sell more debt than is necessary to finance the deficit and recycle the funds into private instruments. In the face of a flight to quality in the money market that widens the Treasury-eurodollar spread, for instance, the government might step up its issuance of Treasury bills and deposit the (unneeded) proceeds in the banking system directly or via deposits at the central bank and discount window advances.[33] Similarly, in the face of a flight to quality at the medium term, the government might sell medium-term government paper much in demand in the market, and somehow recycle the funds into medium-term private instruments.

The development of the interest rate swap market provides an alternative to such an operation in cash instruments. That is, the government could simply contract to receive fixed at a time of a wide spread between its own funding cost and the swap rate. Various European governments already have the authority to receive fixed in the swap market (Remolona and Wooldridge (2003)) and are said to have used this authority opportunistically when the spread between government rates and swap rates were wide. It is not a long step from such opportunistic use to bidding to receive fixed payments in interest rates swaps as a means to stabilise the private bond market. While this operation involves potential credit exposure, it would involve much less credit exposure than the equivalent cash market operations described above. [34]

Any such operation in private assets involves choosing which instruments to buy and involves credit or equity risk. The Hong Kong Monetary Authority bought the equities contained in the Hang Seng index in 1998, while the Bank of Japan has bought the equities of companies with debt of a certain quality. Both the necessity of making such choices and the risk of loss implied gives a strong fiscal flavour to such operations. This may argue for putting them in a separately authorised body, as did the US Congress when it created the Reconstruction Finance Corporation in 1932 (Jones (1951)).

Combinations of fiscal and monetary operations

While we have argued that there is an increasing fiscal element in government bond buying, private debt buying and equity buying by the central bank, there are also proposals for outright mixes of monetary and fiscal policy. Examples would be a tax cut financed by monetary means, or helicopter drops of cash. For some advocates of a tax cut financed by monetary creation, it is thought to be important that the liability issued by the government to the central bank be non-interest-bearing and perpetual, so as to demonstrate that the long-term budget constraint of the government is not involved. It is not clear whether this is would be convincing, if the public recognises that the fiscal authority is responsible for the long-term solvency of the central bank, and has a claim on its profits. Moreover, such proposals need to be thought through from the standpoint of success in exiting deflation, and how the transition to positive interest rates will be affected by the impairment of the central bank's de facto independence by large potential losses.

Zero nominal interest rates and the role of the exchange rate

It is possible to assign the exchange rate to price stability. With a reasonable degree of capital mobility, of course, this assignment requires the subordination of interest rate setting to the combination of foreign yields and chosen exchange rate policy. Such an approach differs from a pegged exchange rate in that the path of the exchange rate must be managed in a manner consistent with the desired inflation outcome. The channels through which a weaker currency can be expected to counter deflation include helping the traded good sector through rising output and profits and by raising tradable goods prices. In the case of Japan, a weaker yen can increase the value of overseas financial assets to the benefit of the solvency of non-bank financial institutions (as well as the government), while in some indebted economies such balance sheet effects would work in the

[33] If the bank deposits and/or discount window advance were secured, this overfunding would narrow the Treasury-eurodollar spread through increasing the relative supply of Treasury securities rather than through official acceptance of outright private sector risk.

[34] Governments could require collateralisation of subsequent positive market values attached to the swaps. Note that governments would face credit risk in the event of swap interest rates declining, meaning that credit risk would arise in the event of successful stabilisation of private yields.

opposite direction. In general, the combined impacts of these effects of a lower exchange rate on the price level would not be negligible, especially in more open economies at lower levels of income (Ho and McCauley (2003)).

A potentially attractive feature of such an approach is the absence of a zero bound for the policy variable, here an exchange rate rather than a short-term interest rate. In the face of incipient deflation, the nominal effective exchange rate can be guided toward depreciation.

Singapore has chosen the nominal effective exchange rate (NEER) as the main monetary policy instrument aimed at price stability. Every six months the desired slope of the NEER is announced in qualitative terms. Market participants have inferred the weights on various currencies composing the NEER basket, the centre of the desired band and its width with a fair degree of accuracy through a variety of indications from the authorities.

The choice that the Singaporean authorities face, however, suggests that "crossing the zero bound" with exchange rate policy is not without risks. Singapore's record of appreciation has made it, like Switzerland, an interest rate "island", with lower interest rates than its major trading partners. Would announcing a policy of depreciation turn the island into a peninsula? Higher interest rates would offset some of the benefits of a weaker currency, even in highly open Singapore. Moreover, how would trading partners react to such an announcement? Some market observers see as more likely an announcement that the band is temporarily widened, as was done in the Asian crisis.

Consideration of the use of the exchange rate to stabilise prices is much wider. There have been calls for the Bank of Japan to purchase foreign government securities to engineer a lower yen and related calls for it not to sterilise purchases of foreign undertaken at the behest of the Ministry of Finance. Japan's traded goods sector is not all that large, however, and a significant downward move of the yen might well be matched by Japan's neighbours, undermining its effectiveness. In any case, the current pressure in the market is for yen appreciation.

Bernanke (2002) was more careful in discussing the possibility that the US authorities could buy foreign government securities than much of the subsequent reporting would suggest.[35] He spoke of such purchases as a way for the Federal Reserve to inject funds into the economy, the kind of technical use of foreign assets discussed above under monetary operating procedures. Moreover, he was quick to note that the Treasury controls the exchange rate policy for the dollar. He did, however, go on to cite the policy of President Roosevelt and Treasury Secretary Morgenthau, using the Federal Reserve as agent, of bidding up the dollar price of gold, or equivalently, depreciating the dollar against gold-linked currencies. This is a case not of simply using the foreign exchange market as a convenient locus for injecting funds, but of seeking to alter the exchange rate.

For many Asian economies, the adoption of more flexible exchange rate regime since the Asian crisis, in some cases in the context of inflation targeting, makes it possible for the exchange rate to play a role in stabilising prices. In particular, a weaker exchange rate has probably helped to sustain the Taiwanese economy through the technology slump and to avoid deflation but further weakening could pose risks as well. So far, the NT dollar has depreciated over 10% against the US dollar since early 2000. One risk is that further substantial deposit shifts into foreign currency accounts could result in the depreciation getting out of hand (Fung and McCauley (2001)).

In Thailand, the strengthening of the baht from mid-2001 to mid-2002 by about 10% in effective terms put downward pressure on prices. This raised speculation that the Bank of Thailand might have to intervene to stop the baht's appreciation in order to prevent prices from falling. The recent weakness of the baht helped alleviate the deflationary pressure resulting from a strong currency.

Deflation also raises questions about the fixed exchange rates in the region. There has been intermittent discussion, not to mention speculation, about an end to the peg in Hong Kong to ease the painful and ongoing adjustment process (Spencer (2003)). After the Asian crisis, many regional currencies depreciated substantially, leading to an appreciation of the Hong Kong dollar in effective terms. With the peg, the adjustment has been done mainly through falling prices. Were the US recovery to strengthen while Hong Kong's economy remained weak, there would be a risk that the two economies will go out of synchronisation, leading to unneeded interest rate rises in Hong Kong. While depreciation could break inflation through effect on traded goods prices, adjusting the peg would also

[35] See, for instance, Miller (2003).

pose risks. In particular, how exchange rate movement could drive interest rates is very hard to predict, especially in an economy in which almost half the deposits are already in foreign currency. Given floating rates for mortgages, and the high weight of mortgage debt, any sharp rise in interest rates could have very damaging effects, not only on the households but also potentially for the banking system, which holds most of the mortgage debt.

The use of the renminbi exchange rate as an instrument to counter deflation would conflict with its use as an instrument to achieve external balance. A weaker renminbi can help counter incipient deflation, with China's increasing exposure to international trade. A RMB depreciation not only can stimulate exports and raise import prices but also ease China's transition to the lower tariffs agreed as part of the terms for entry into the WTO. However, as noted above, there are now increasingly outspoken international calls for a revaluation of the RMB, citing China's build-up of over $300 billion in foreign currency reserves, the large inflow of capital and current account surpluses. But a stronger renminbi could only add to the deflationary pressure.

An important implication of the observation that deflation is a challenge to a number of economies in East Asia is that depreciation of one currency to counter or forestall deflation could have knock-on effects in the form of depreciation of other currencies in the region. This is most obvious for the largest economies like those of Japan and China. The Prime Minister of Malaysia has publicly conditioned Malaysia's continuation of a fixed exchange rate on the exchange rate of the RMB, while downward movements of the yen against the dollar have at times led senior officials in China to suggest that the RMB's stability against the dollar should not be taken for granted. Even the Singaporean authorities would need to consider the response of regional trading partners to any announcement of a path of effective depreciation.

5 Conclusion

Inflation has been very low in East Asia in recent years and several economies have already recorded some negative figures. Two economies – Hong Kong and Japan – have experienced persistent deflation while three other economies – those of China, Singapore, Taiwan – have experienced episodic deflation. Given the uncertainties in global economic prospects, the risks of slipping into deflation for other Asian economies are not insignificant.

Deflation must be avoided because of its interaction with the zero lower bound on interest rates and the behavioural zero lower bound on nominal wages. While real interest rates are uncomfortably high in Japan and Hong Kong, neither is currently afflicted with double digit real interest rates that obtained for substantial periods of time in the 1930s. The available evidence points to greater downward stickiness in nominal wages in Hong Kong than in Japan, although downwardly flexible wages are a double edged sword.

No definitive answer can be given to the question of why deflationary economies are concentrated in East Asia. Their openness and concentration on manufacturing leave them particularly vulnerable to global deflation in traded goods prices. The hangovers and overhangs from the asset boom of the mid-1990s plays an important role in some economies, especially where bank restructuring has lagged. The weight of these factors differs, with deflation more rooted in the traded goods sector in China and Japan, and more in the nontraded goods sector in Hong Kong, Singapore and Taiwan.

The lesson that many observers draw from Japan's experience is to err on the side of low policy rates in the approach to zero interest rates. A number of Asian economies have evidently not been afraid to lower interest rates in line with their own previous responses to inflation and growth, but retain quite limited room for pre-emptive action at this stage. Moreover, the advice to err on the low side may not be so easy to take if very low interest rates deprive banks of their profits, quite apart from the political difficulty of very low interest rates when household savings are very concentrated in bank deposits. Central banks need to give thought now to what measures can be taken once policy rates have already been brought down to very low levels.

References

Ahearne et al (2002): "Preventing deflation: Lessons from Japan's experience in the 1990s" *International Finance Discussion Papers* No 729*,* Board of Governors of the Federal Reserve System.

Akerlof, G, W Dickens and G Perry (1996): "The macroeconomics of low inflation", *Brookings Papers on Economic* Activity, 1, pp. 1-59.

Anderson, J (2002): "The five great myths about China and the world (part 4): Structural imbalances are driving deflation at home and abroad", Goldman Sachs *Greater China Analyst*, Issue No 2002/18, 17 September.

Armour, J, B Fung and D Maclean (2002): "Taylor rules in the quarterly projection model", Bank of Canada working paper 2002-1, January.

Bank for International Settlements (1999): *69th Annual Report*.

Bank for International Settlements (2002): *72nd Annual Report.*

Bean, C (2002): "The MPC and the UK economy: should we fear the D-words?", speech before the Emmanuel Society, London, 25 November (www.bankofengland.co.uk/speeches/speech182.pdf).

Bernanke, B (1983): "Nonmonetary efects of the financial crisis in the propagation of the Great Depression", *American Economic Review*, 73 (3), pp. 257-276.

Bernanke, B (2002): "Deflation: Making sure "it" doesn't happen here", remarks before the National Eonomists Club, Washington, D.C., 21 November.

Clouse, J et al (2000): "Monetary policy when the nominal short-term interest rate is zero", Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series no 2000-51, November.

Congdon, Tim (2003): "Debt management and deflation 1", Lombard Street Research Ltd, *Monthly Economic Review*, March, pp. 2-19.

De Long, J B (1999): "Should we fear deflation?" *Brookings Papers on Economic* Acitvity, 1, pp. 225-252.

"Developments in the banking sector" (2002): Hong Kong Monetary Authority *Quarterly Bulletin,* February, pp. 79-86.

English, W (2002):"Interest rate risk and bank net interest margins", BIS *Quarterly Review,* December, pp. 67-82.

Epstein, G ((1995): "The illiquidity trap", *Eastern Economic Journal*, vol 21, no 3 ((Summer), pp. 309-18.

Epstein, G and T Ferguson (1984): "Monetary policy, loan liquidation, and industrial conflict: the Federal Reserve and the open market operations of 1932", *Journal of Economic History,* vo. 44, no 4 (December).

Fan, Gang and Zhang Xioujing (2003), "The Chinese reform agenda", paper presented to a conference on "China's role in fostering financial stability and growth in the Asian region and the world economy", Seoul, Korea, 27-28 March.

Fan, Jianping (2002): "Why CPI is falling at a time of accelerating economic growth?" *China Economic Information*, China Economic Information Centre, Beijing, 10 October 2002.

Feldstein, Martin (2002) "Deflation", presentation to a bimonthly meeting of central bank governors, Mexico City, 11 November.

Fisher, I (1933): "The debt-deflation theory of the Great Depression", *Econometrica*, 1, March, pp337-57.

Flint, S (1999): "SGD appreciation: Taylor-made in 2000", Bank of America *Country Alert*, 22 November 1999.

Flint, S, S Goel, and X Xie (2003): "Strategy Alert: Singapore", Bank of America *Global Interest Rate and Currency Strategy*, 24 January.

Fujiki, H and S Shiratsuka (2002): "Policy duration effect under the zero interest rate policy in 1999-2000: evidence form Japan's money market data", ", Institute for Monetary and Economic Studies, Bank of Japan, *Monetary and Economic Studies*, Jaunuary, pp. 1-32.

Fukao, M (2002): "Financial sector profitability and double-gearing", NBER Working Paper no 9368, December.

Fukao, M (2003): "Financial strains and the zero lower bound: the Japanese experience", paper presented to a BIS conference, "Monetary stability, financial stability and the business cycle", March.

Fung, B and R McCauley (2001): "Analysing the Growth of Taiwanese Deposits in Foreign Currency", BIS *Quarterly Review,* September, pp. 49-56. Translated into Chinese and published in Central Deposit Insurance Corporation, *Quarterly Review*, June 2002, pp. 95-104.

Gerlach, S and W Peng (2003): "Deflation in Hong Kong and East Asia: common patterns, common causes?" Hong Kong Monetary Authority working paper.

Goyal, R and R McKinnon (2002): "Japanese negative risk premium in interest rates: the liquidty trap and fall in bank lending", *mimeo*.

Goodhart, C and B Hofmann (2002): "Deflation, Credit and Asset Prices", *mimeo*.

Ghose, Tatha and Koray Yesildag (2002): "China's impact on growth elsewhere", Dresener Kleinwort Wasserstein Global Economic Research, December 2002.

Ghose, Tatha and Koray Yesildag (2003): "Measuring China's deflationary impact", Dresener Kleinwort Wasserstein Global Economic Research, February 2003.

Ha, J and C Leung (2001): "Estimating Hong Kong's output gap and its impact on inflation", Hong Kong Monetary Authority Research Memorandum, 5 November.

Ha, J (2002): "Price convergence between Hong Kong and the Mainland", Hong Kong Monetary Authority Research Memorandum, July 2002.

Ha, J (2003): "The causes of inflation and deflation in China", paper presented at the Hong Kong Institute of Monetary Research seminar, June 2003.

Hayakawa, H and E Maeda, "Understanding Japan's financial and economic developments since autumn 1997", Bank of Japan, Research and Statistics Department, Working Paper 001, January.

Ho, C and R McCauley (2003): "Living with flexible exchange rates: issues and experience of inflation-targeting emerging market economies" BIS Working Paper no 130 (February).

Hofmann (2002): "Bank lending and property prices: Some international evidence", *mimeo*.

Kamada, K and N Hirakata (2002): "Import penetration and consumer prices", Bank of Japan Research and Statistics Department Working Paper 02-1.

Jones, J (1951): *Fifty billion dollars,* Macmillan, New York.

Kim, S-B (2002): "Assessing deflation risk in Asia", Goldman Sachs *Asia-Pacific Economic Analyst*, Issue No 2002/21, 29 November.

King, M (1994): "Debt deflation: theory and evidence", *European Economic Review*, vol 38, pp 419-445.

Kuroda, H (2002): "The yen's fundamental weakness", *Financial Times*, 22 January 2002.

Kuroda, H and M Kawai (2002): "Time for a switch to global reflation", *Financial Times*, 1 December 2002.

Latter, T (2002): "Hong Kong's currency board today: the unexpected challenge of deflation," *Quarterly Bulletin*, August, pp 48-53.

Li, Yang (2002): "Understanding the trend of falling prices", *China Securities Daily*, Beijing, 22 November 2002.

Ma, G and B Fung (2002), "China's asset management corporations", BIS Working Papers No 115, August 2002.

McCauley, R (2001): “Setting Monetary Policy in East Asia: Goals, Developments and Institutions,” in *Future Directions for Monetary Policies in East Asia* (Sydney: Reserve Bank of Australia, 2001), pp. 7-55.

Miller, R (2003): “If deflation sets in, the Fed has a problem”, *Business Week (Asian edition)*, 3 February, p. 29.

Monetary Authority of Singapore (1999): “Interbank interest rates determination in Singapore and its linkages to deposit and prime rates,” Occasional paper No. 16.

Morimoto, Yoshikazu, Wataru Hirata and Ryo Kato (2003): “Global disinflation”, *Bank of Japan Research Paper*, June 2003.

Nolan, M and A Posen (2002): “The scapegoat for Japanese deflation”, *Financial Times*, 5 December 2002.

Okina, K, M Shirakawa and S Shiratsuka (2001): “The asset price bubble and monetary policy: Japan’s experience in the late 1980s and the lessons”, Institute for Monetary and Economic Studies, Bank of Japan, *Monetary and Economic Studies*, pp. 395-450.

Osawa, N et al (2002): “An examination of structural changes in employment and wages in Japan”, English translation of an article published in the Bank of Japan *Monthly Bulletin*, August.

Peng, W, L Cheung and C Leung (2001): “The property market and the macro-economy”, Hong Kong Monetary Authority *Quarterly Bulletin*, May, pp. 40-49.

Petersen, W M (1986): “The effects of inflation on bank profitability”, in R Davis, ed., *Recent trends in commercial bank profitability: A staff study* (New York: Federal Reserve Bank of New York), pp. 89-114.

Qiu, Xiaohau (2002): “Principal factors behind China’s falling price levels”, *Beijing Youth Daily*, Beijing, 1 November 2002.

Reifschneider, D and J Williams, “Three lessons for monetary policy in a low-inflation era”, *Journal of Money, Credit and Banking*, November, part 2, pp 936-66.

Remolona, E and P Wooldridge (2003): “The euro interest rate swaps market” BIS *Quarterly Review*, March, pp. 47-56..

Rotemberg, J and M Woodford (1999?), “The cyclical behavior of prices and costs,” in J Taylor and M Woodford, eds, *Handbook of Macroeconomics*, vol. 1B (: North-Holland).

Sachs, Jeffrey (1979): "Wages, Profits, and Macroeconomic Adjustment: A Comparative Study," *Brookings Papers on Economic Activity*, 1979:2, 269-319.

Samuelson, P (1945): “The effect of interest rate increases on the banking system”, *American Economic Review* (March), pp 16-27.

Schellekens, P (2002): “Deflation in Hong Kong SAR”, IMF paper.

Shirakawa, M (2001): “Monetary policy under the zero interest rate constraint and balance sheet adjustment”, English translation of a paper published in *Economics (*Toyo-Kezai Shinpou-sha, May 2001).

Shiratsuka, S (2001): “Is there a desirable rate of inflation: a theoretical and empirical survey”, Institute for Monetary and Economic Studies, Bank of Japan, *Monetary and Economic Studies*, May, pp. 49-84.

Spencer, Michael (2002): “Why the peg should go”, Deutsche Bank Global Market Research, Emerging Markets, 29 January.

Stevens, G (2002): “Deflation and all that”, Reserve Bank of Australia *Bulletin*, December, pp. 10-18.

Svensson, L (2001): “The zero bound in an open economy: A foolproof way of escaping from a liquidity trap”, *Monetary and Economic Studies* 19(S1), February 2001.

Ueda, K (2003): “Japan’s deflation and policy response”, based on a speech to a meeting on economic and financial matters in Nara City, 24 April.

Wallich, H C (1977): “Inflation is destroying bank earnings and capital adequacy”, *Bankers Magazine* (Autumn), pp. 12-16.

Yam, J (2002a): “Deflation (1): causes”, Hong Kong Monetary Authority *Viewpoint*, 14 November 2002, www.info.gov.hk/hkma/eng/viewpt/index.htm.

Yam, J (2002b): “Deflation (2): microeconomic responses”, Hong Kong Monetary Authority *Viewpoint*, 21 November 2002, www.info.gov.hk/hkma/eng/viewpt/index.htm.

Yam, J (2002c): “Deflation (3): macroeconomic responses”, Hong Kong Monetary Authority *Viewpoint*, 28 November 2002, www.info.gov.hk/hkma/eng/viewpt/index.htm.

Yamaguchi, Yutaka (2002): “Monetary policy in a changing economic environment”, remarks at Jackson Hole symposium, 30 August.

Zimmer, S A and Robert N. McCauley (1991): "Bank Cost of Capital and International Competition", Federal Reserve Bank of New York *Quarterly Review*, vol. 15 (Winter), pp. 33-59