China & World Economy / 1 – 16, Vol. 16, No. 1, 2008



# Does China have Inflationary Effects on the USA and Japan?

*Necmettin Tarhan Feyzioglu, Luke Byrne Willard* *

Abstract

*With China's share in global trade increasing rapidly, some argued in 2002–2003 that China was exporting deflation to other countries as it was dumping cheap goods in mature markets. Later, others argued that China was causing sharp increases in global prices. This paper uses several econometric techniques to assess the extent of the link between inflation rates between China and the USA and Japan. Only limited empirical evidence at the aggregate level is found for consumer price inflation in China leading to price changes in the USA and Japan. However, there is some evidence that inflation in the USA has an impact on Chinese inflation. The results seem consistent with the Federal Reserve and the Bank of Japan being concerned about inflation and, hence, adjusting policy such that inflation shocks have no significant effect on overall inflation. Recent Chinese price rises are unlikely to have a material effect on the USA or Japan.*

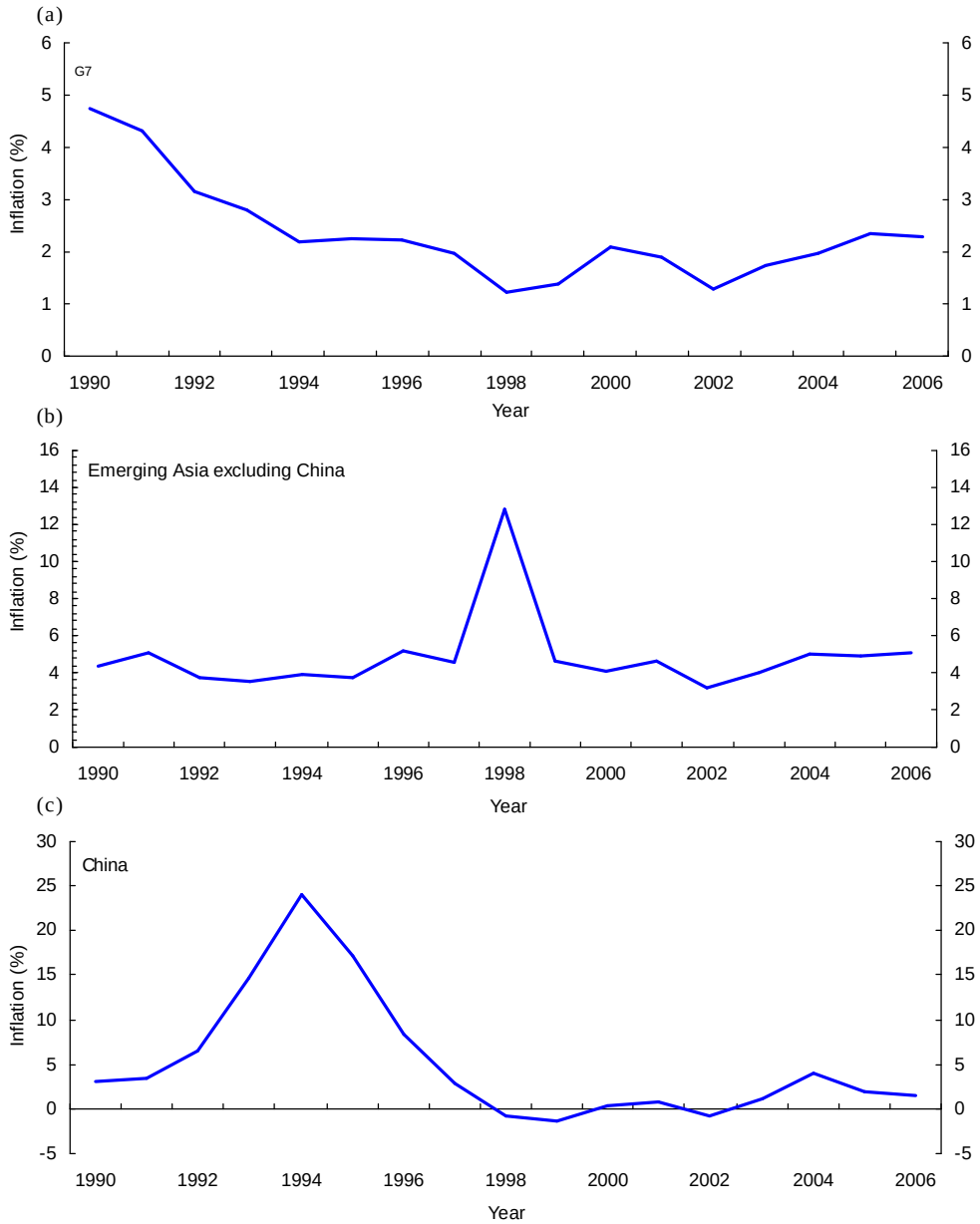
Key words: China, deflation, inflation, trade
JEL codes: E31, F41

## I. Introduction

Inflation rates in many emerging and industrialized countries declined substantially during

* N. Tarhan Feyzioglu, Resident Representative-China, International Monetary Fund, Beijing, China. Email: tfeyzioglu@imf.org. Luke Byrne Willard, Economist, Economics Department, OECD, Paris, France. Email: lukewillard@hotmail.com. The authors would like to thank Jahangir Aziz, Ray Brooks, Robert Flood, Eswar Prasad, and colleagues at the Reserve Bank of Australia for useful comments. This paper was done while the second author was at the International Monetary Fund, Princeton University, and the Reserve Bank of Australia. The views expressed in this paper are those of the authors and should not be attributed to the International Monetary Fund, the OECD, or the Reserve Bank of Australia.

**Figure 1. Inflation for (a) G7, (b) emerging Asia excluding China and (c) China**




Source: IMF World Economic Outlook database.

the 1990s and remained low throughout most of the 2000s (Figure 1), at which time several countries, including Japan and China, experienced deflation. A number of others were at risk of deflation, with evidence of excess capacity and low inflation rates (Kumar *et al.*, 2003).

With the simultaneous emergence of deflationary pressures in several countries, some claimed that China was exporting deflation to the rest of the world (Morimoto *et al.*, 2003; Roach, 2002; Kuroda and Kawai, 2002). One argument was that during the boom–bust cycle of the early 1990s, China had built huge excess capacity in the manufacturing sector and that this excess capacity later placed pressure on manufactured goods' prices to decline, causing deflation in China. With China's share in global trade increasing rapidly, this deflation was propagated to the rest of the world through cheap Chinese exports. Another common argument was that China had linked its exchange rate to the US dollar at a very competitive level and exported goods at prices much lower than those seen in the USA, generating significant downward price pressures in the USA. However, Wu Bangguo, Chairman of the Standing Committee of China's National People's Congress, rebutted these arguments as lacking basis (Kyodo News, 2003) and others have noted that China has only a small share of the world's export market (approximately 6 percent in 2003) and, therefore, could not have a large impact on the global economy.

As deflation in China ended in 2003 and China's import demand for various goods surged, the arguments changed somewhat. Several claimed that China was exporting inflation as it was sucking in goods at such high rates that consumers in other countries had to face higher prices (see e.g. *The Economist*, 2004). In contrast, Robert Mundell believes that China has been used as a scapegoat, at one time being accused of exporting deflation, and at another time being blamed for exporting inflation (Xinhua News Agency, 2004).

It is not unusual to expect some transmission of inflationary pressures between trading partners. During periods of fixed exchange rates (such as during the gold standard era), periods of deflation were not uncommon and, with a fixed exchange rate, it was unsurprising that falling prices in one country would lead to falling prices in others. However, it is less clear why inflation should be propagated between countries such as China and Japan when exchange rates are relatively flexible. Also, despite the fixed exchange rate, capital controls might have limited the transmission of inflationary pressures between China and the USA. Moreover, to the extent that the Bank of Japan and the Federal Reserve can be viewed as acting like inflation targeters, it is likely that the policy response to any inflationary shock from China will be offset such that there will be negligible effects on US or Japanese inflation.

This paper focuses on the question of whether China can export general deflation or inflation to the USA and Japan. This is of interest for a number of reasons. First, as discussed above, there has been speculation regarding the role of Chinese price developments in terms of the rest of the world, and this has influenced discussion concerning several issues, including appropriate exchange rate policy. Second, several authors have pointed out that globalization and economic integration could be important for international price

**Table 1. Sources and Destinations of Imports, 2006 (in percent of total)**

| | Destination | | |
|---|---|---|---|
| Source | China | USA | Japan |
| China | — | 15.9 | 20.5 |
| USA | 7.5 | — | 12.0 |
| Japan | 14.6 | 7.9 | — |

Source: IMF Direction of Trade Statistics Database.

developments (see Ha and Fan, 2004; Razin, 2004). China's increasing integration with the rest of world makes examining the impact of China's behavior on other countries particularly relevant. Moreover, the USA and Japan are two of China's largest trading partners, so it seems likely that if such effects do occur, they should show up in these relationships (Table 1). Finally, examining the interrelationship between price developments in different countries contributes to an existing literature examining issues like price convergence (see Engel and Rogers, 1996; Rogers, 2001).

In most of our discussion and analysis, we focus purely on price developments in China, Japan and the USA. It is possible that developments in other regions (such as Europe or the rest of Asia) could be important determinants of prices developments in these countries. To some extent, we control for this by including in the analysis a variable to capture these determinants (commodity prices). Also, regardless of what might be the original cause of price developments, our results provide information concerning the extent to which monitoring developments in China could be useful for forecasting and understanding inflation developments in Japan and the USA. Our relatively simple statistical analysis provides a useful basis for summarizing the interrelationship between Chinese, Japanese and US inflation.

Some of the existing published literature is reviewed in Section II. In Section III, the empirical models are presented and the results discussed. A simple model that tests whether prices in China predict (i.e. "Granger cause") prices in the USA and Japan is introduced first. More sophisticated models, which allow more structural economic interpretations or allow for relationships to change over time, are then discussed, to obtain a deeper understanding of the links between inflation in China and inflation in the USA and Japan. Using a number of different approaches, we find that Chinese price developments have little effect on US and Japanese prices, and are confident that this result is not being driven by misspecification of the direction of causality between prices of the three countries. Section IV concludes the paper.

## II. Literature Review

Perhaps Kamin *et al.* (2004), by developing a model that allows China to export both

intermediate and final goods, provide the neatest exposition of how Chinese price developments can affect inflation. Their model allows prices in China to affect foreign consumer prices through three channels. The first is the direct effect, where cheaper final goods exports directly lower the foreign price index. The second channel is through lower production costs, as lower foreign inflation depresses foreign nominal wages. Finally, China's cheaper exports could potentially lower foreign prices as they adversely affect demand in the foreign country when producers lose markets and profits.

Kamin's model focuses on the direct links between the two economies under consideration. However, there could be indirect links between these two countries. For example, China's cheap exports to third countries, like those in the EU area, could lower costs there (even if these exports are final goods, because this would help to reduce nominal wage growth), enabling the third country to export cheaper goods to the USA. Also, as China's demand for metals surges, marginal costs for metals around the world could increase, leading to higher marginal production costs for exports that use metals as inputs. This could lead to higher consumer prices in export destination countries.

Not only actual Chinese exports but also the potential to export could create price pressures for trading partners, as producers in trading partner countries might lower prices to maintain their market shares. This could be particularly relevant for the USA, where the markets are generally very competitive, even though the share of imported goods is relatively small.[1]

Although theoretically it is possible for price developments in one country to affect prices elsewhere, as discussed above, empirical work provides a mixed picture regarding the strength of the relationship between inflation rates in trading partners. Crowder (1996) finds that inflation rates in the G7 countries have shown a tendency to converge. In particular, during the Bretton Woods period, inflation was transmitted from the reserve currency nation to the rest of the world, whereas after this period, inflation was transmitted from all countries in the sample. Cheung and Yuen (2002) find that US inflation has a strong impact on inflation in Hong Kong and a much milder impact on inflation in Singapore. Yang *et al.* (2006) find that unexpected changes in US inflation have large effects on inflation in other G7 countries, and shocks to some other countries have statistically and economically significant influence on US inflation. Meanwhile, Bergin (2003) finds that foreign prices

[1] The following back of the envelope calculation highlights the relative small size of the Chinese share of imported goods. Imports constitute around 15 percent of US GDP and around 13 percent of that comes from China (using 2004 data). Therefore, we might expect that an increase in Chinese inflation of 1 percent would lead to an increase in US inflation of approximately 0.02 percentage points, but the actual impact might be larger, depending on the importance of these other channels. If all imports are consumed and we look only at the consumption bundle to assess the effect on inflation, the effect rises to approximately 0.03 percentage points.

have little impact on the Australian economy. Perhaps most relevant to this paper, Kamin *et al.* (2004) estimate a statistically significant effect of US imports from China on US import prices, but find that the impact on US consumer prices has likely been quite small. At a sectoral level, several studies claim that the recent surge in demand from China has led to higher prices from grains to oil and metals (e.g. Merrill Lynch, 2004).

The results below can be viewed as complementary to the results in the existing literature. They examine the effect of developments in China on two significant economies in the world: the USA and Japan. Some of the models allow for China to influence the rest of world both through its demand for commodities and through other price developments. The results give some insight into how developments affect particular prices, including import prices and final consumer prices.

## III. Empirical Results

The theory discussed above suggests that prices of two economies could be linked. We focus on the links between inflation rates, although the theoretical models often discuss the potential link between price levels. One reason for our approach is the interest in inflation rather than the price level as a measure of macroeconomic performance. Another is that cointegration tests do not find any long-run relationship between the aggregate price indices in China and the aggregate price indices in the USA. Also, there is little evidence that Chinese price level movements affect Japanese price levels in the long run (Table 2) (although there is some evidence that Japanese prices affect Chinese prices).

Initially we check whether prices in one country provide useful information about price developments in another by using the bivariate Granger causality test. The advantage of this test is that it imposes minimal structure on the estimates and potentially captures the impact of both direct and indirect effects of inflation in one country on inflation in another country and is, therefore, a suitable starting point for an analysis where inflation in one country can be transmitted to another through many possible channels. Specifically, we estimate two sets of bivariate relationships, where the first set is for the Granger causality tests between inflation rates in China and the USA and the second one is between China and Japan.

The data are seasonally adjusted annualized quarterly inflation rates from the second quarter of 1984 to the second quarter of 2005 and include periods of both rising and falling Chinese inflation.[2] For China, we use retail prices because of data availability and because

[2] Data sources: CEIC, Datastream, International Financial Statistics (IMF), Direction of Trade (IMF), and World Economic Outlook database (IMF).

**Table 2. Cointegration Tests on Price Levels[a]**

| Hypothesized number of CE | Eigenvalue | Maximum eigenvalue Statistic | 0.05 critical value | Probability |
|---|---|---|---|---|
| China and the USA[b] | | | | |
| None | 0.10 | 8.89 | 14.26 | 0.30 |
| At most 1 | 0.00 | 0.36 | 3.84 | 0.55 |
| China and Japan[c] | | | | |
| None | 0.18 | 16.21 | 14.26 | 0.02 |
| At most 1 | 0.04 | 3.16 | 3.84 | 0.08 |
| Adjustment coefficients in ECM[d] | | | | |
| ECM for Inflation in China: –0.04 (–3.59) | | | | |
| ECM for Inflation in Japan: 0.01 (1.47) | | | | |

Source: Authors' calculations.

Notes: [a] : Unrestricted cointegration rank test (maximum eigenvalue). [b] : Maximum eigenvalue test indicates no cointegration at the 0.05 level. [c] : Maximum eigenvalue test indicates 1 cointegration equation at the 0.05 level. [d] : *t*-statistics in parentheses. CE, cointegration equation; ECM, error correction mechnism.

**Table 3. Granger Causality Tests**

| Dependent variable | Excluded variable | $x^2$ | Degrees of freedom | Probability that the excluded variable does not Granger cause the dependent variable |
|---|---|---|---|---|
| US inflation | Chinese inflation | 6.00 | 3 | 0.11 |
| Chinese inflation | US inflation | 11.58 | 3 | 0.01 |
| | | | | |
| Japan inflation | Chinese inflation | 7.79 | 4 | 0.10 |
| Chinese inflation | Japan inflation | 1.65 | 4 | 0.80 |

Source: Authors' calculations.

Note: Lag lengths of 3 and 4 were chosen for the US and Japanese models, respectively, based on the Akaike information criteria.

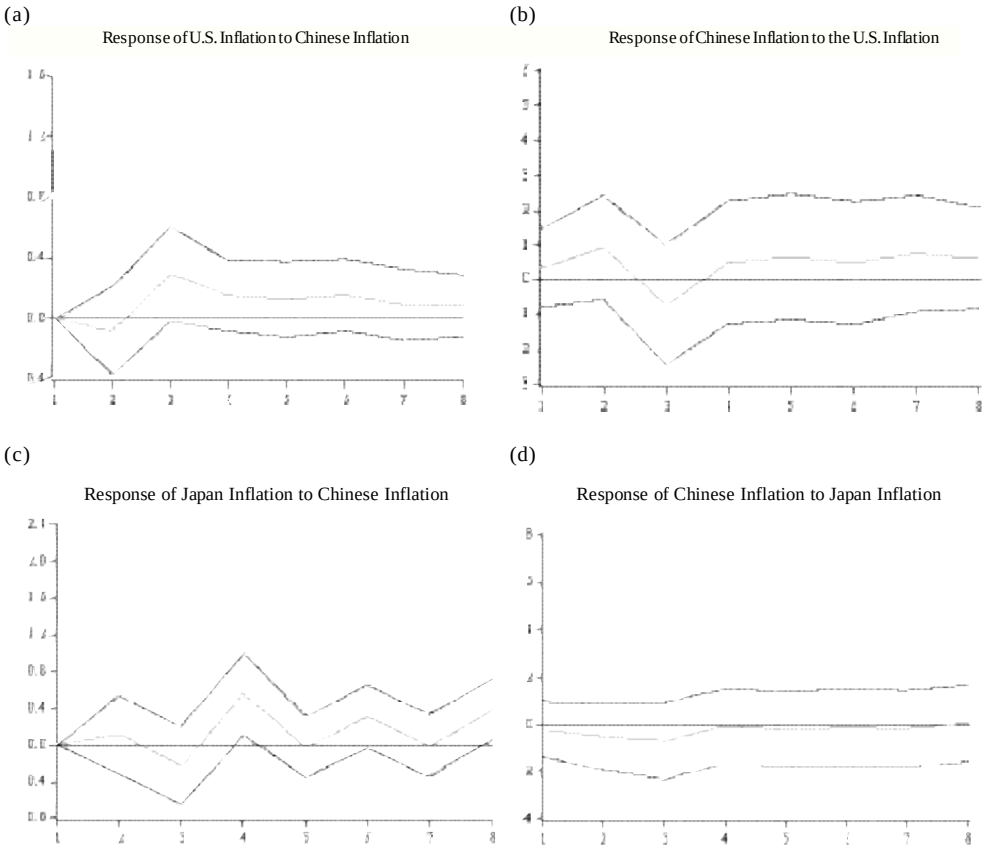
they are likely to be a better indicator of the effect of international price linkages, as they reflect the prices in the tradables sector. Many of the results appear robust to alternative definitions of the data. The results suggest that inflation in China does not Granger cause inflation either in the USA or Japan, although the evidence is not strong (Table 3). The test statistics do not reject the hypothesis of no causality at the 5-percent level, but are close to the boundary of the 10-percent critical level.

Interestingly, the results also indicate that US inflation Granger causes inflation in China. Although not emphasized in the media, this result in some ways is not surprising, as China's imports from the USA have been growing strongly for more than a decade. The finding that inflation developments in the USA affect China (which has a stable dollar for a significant part of the sample) is also consistent with the findings of Crowder (1996) and Cheung and Yuen (2002) that during the fixed exchange rate period, inflation was transmitted from the reserve country (the USA) to the other countries.

To assess the impact of Chinese inflation on the USA and Japan from a different angle, but still using the simple framework discussed above, we combine the equations run for Granger causality tests into a vector autoregression (VAR) and examine the impulse response functions (Figure 2; each period denotes a quarter). The results suggest only a weak link between the inflation rates in China, the US and Japan. A 1 standard error unanticipated increase in inflation in China (approximately 5 percentage points) would lead to a small 0.3 percentage point increase on USA inflation after three quarters and to a 0.5 percentage point increase in inflation in Japan after 1 year. Consistent with the Granger causality test results, a 1 standard error increase in inflation in the USA (approximately 1.3 percentage points) would lead to 1 percentage point increase in inflation in China.

The Granger causality tests and simple two variable VAR, by their simple nature, reveal very little about the transmission of inflation from one country to another. By excluding

**Figure 2. Impulse Response Functions for China, the U.S., and Japan (Response to Cholesky One Standard Deviation Innovation+/-2 Standard Errors)**



potentially important variables, some crucial linkages can be missed.[3] To address this concern, we estimated two larger VAR models for both the USA and Japan. Both are loosely based on the recursive "distribution chain" model developed for industrialized countries by McCarthy (1999). The model has also been used for a number of developing economies (see e.g. Bhundia, 2003; Gueorguiev, 2003). Using this model, we can examine the effect of price developments in one country on different types of prices (e.g. import and consumer prices) in another.

Similar to McCarthy (1999), we assume that commodity shocks and US output shocks can potentially capture supply and demand shocks that can contemporaneously affect all the other variables in the model. For each country, we use quarterly output growth rather than a measure of the output gap, as evidence suggests that output gap measurement is imprecise (see de Brouwer, 1998; Orphanides, 2003). This is particularly likely to be true for China.

A model like this enables the analysis of several different types of developments that could result in Chinese and foreign prices being interrelated. For example, increased Chinese demand could be reflected in either commodity price shocks or Chinese price shocks and either of these could cause Chinese and foreign prices to move together.

For Model 1 (for the USA), we assume that inflation in the USA could be affected contemporaneously by inflation in China and the renminbi exchange rate, but not vice versa. This seems logical if we believe that Chinese prices are affecting US prices through their effect on the price of tradables (but that there is not a similar effect of US prices on Chinese prices). We do not include producer prices, because many Chinese exports are final goods and, hence, Chinese export prices are likely to have little effect on domestic producer costs. Also, by excluding this variable, we reduce the number of parameters we need to estimate, thereby improving the precision of our estimates.

The second model (Model 2) treats the USA as more exogenous than China, which also seems plausible as the USA is a larger economy. US import price inflation and US consumer price inflation can contemporaneously affect Chinese retail price inflation. We also include the growth rate of Chinese industrial production and assume that it contemporaneously affects the Chinese inflation rate. For Japan, we estimate analogous models.

Mathematically, the two models are as follows:

$$\text{Model 1: } Y1_t = A(L)Y1_{t-1} + e_{1t}$$

$$\text{Model 2: } Y2_t = B(L)Y2_{t-1} + e_{2t},$$

[3] For example, Koo and Fu (2004) discuss how Chinese economic developments might affect commodity prices and how this might affect inflation in the USA.

where, A(L) and B(L) are $k^{th}$ order matrix polynomials in the lag operator L, and $Y1_t$ and $Y2_t$ are the vectors containing the variables in Models 1 and 2, respectively. For the model for the USA and China, these vectors contain the following variables in that order:

$$Y1 = [commp, us\_gdp, ch\_rpi, usd\_rmb, us\_ipi, us\_cpi]$$

$$Y2 = [commp, us\_gdp, usd\_rmb, us\_ipi, us\_cpi, ch\_ip, ch\_rpi],$$

where, *commp* is the commodity price index excluding oil, *us_gdp* is US GDP in real terms, *ch_rpi* is the Chinese retail price index, *usd_rmb* is the dollar/renminbi exchange rate, *us_ipi* is the US import price index, *us_cpi* is the US CPI, and *ch_ip* is the Chinese industrial production index. Similar variables are used for Japan, except that Japanese variables replace US ones. All the variables used in the VAR are quarter-on-quarter seasonally adjusted annualized growth rates.[4] To choose the lag length, we used a number of tests: the sequential modified likelihood ratio test, the final prediction error test, the Akaike information criterion, the Schwartz criterion, and the Hannan-Quinn criterion. The test results were not uniform, although more tests chose only one lag over more lags. Nevertheless, to minimize the chance of us choosing a model with insufficient lags, we used two lags in our estimations.[5]

Both models produce fairly reasonable impulse response functions (available from the authors on request). For example, US inflation responds positively to positive shocks to import prices and output growth, and US import prices respond positively to increases in world commodity prices. Also, inflation in Japan increases in response to higher output and import prices and import prices increase with higher commodity prices.

The model finds no significant impact of Chinese inflation on inflation or import prices in the USA. Based on variance decompositions, both models suggest that Chinese developments have a relatively small effect on the variability of US import or consumer prices (Table 4). For example, in Model 1, Chinese retail price shocks explain 3.8 and 5.5 percent of the variability in US import and consumer prices, respectively. This is despite Model 1, if anything, likely to be biased toward finding an impact, as the Chinese price variable is assumed to be more exogenous.[6] There is some evidence that commodity price shocks (or what we might call developments) are moderately important for US prices. To the extent that developments in China might be causing the commodity price shocks our model could be understating the importance of China.

---

[4] The quarterly data in this paper spans the first quarter of 1984 to the second quarter of 2005. More details about the data are available from the authors on request.

[5] Nevertheless, some of the correlograms of the residuals showed signs of serial correlation.

[6] We focus on eight quarter ahead decomposition, to capture the medium-term trends, of most interest to policy-makers.

**Table 4. Variance Decomposition of Models 1 and 2**

(Eight quarter horizon)

Model 1: USA

| | COMMP | US_GDP | CH_RPI | USD_RMB | US_IPI | | Total |
|---|---|---|---|---|---|---|---|
| COMMP | 81.8 | 5.3 | 1.6 | 1.9 | 4.6 | | 100.0 |
| US_GDP | 14.5 | 73.6 | 1.7 | 4.7 | 5.3 | | 100.0 |
| CH_RPI | 7.7 | 9.9 | 76.3 | 4.1 | 1.2 | | 100.0 |
| USD_RMB | 2.5 | 9.2 | 16.5 | 65.4 | 3.2 | | 100.0 |
| US_IPI | 19.4 | 1.5 | 3.8 | 0.5 | 67.4 | | 100.0 |
| US_CPI | 8.8 | 29.8 | 5.5 | 1.5 | 34.2 | | 100.0 |

Model 2: USA

| | COMMP | US_GDP | US_RMB | US_IPI | US_CPI | CH_RPI | Total |
|---|---|---|---|---|---|---|---|
| COMMP | 80.3 | 4.8 | 2.1 | 4.5 | 5.0 | 2.9 | 100.0 |
| US_GDP | 13.8 | 72.5 | 3.0 | 5.6 | 0.4 | 1.8 | 100.0 |
| USD_RMB | 2.5 | 9.3 | 78.9 | 3.3 | 3.0 | 1.5 | 100.0 |
| US_IPI | 19.3 | 1.3 | 1.0 | 70.0 | 7.4 | 0.8 | 100.0 |
| US_CPI | 8.4 | 29.5 | 2.9 | 35.6 | 20.2 | 2.0 | 100.0 |
| CH_IP | 3.0 | 7.8 | 11.8 | 1.8 | 8.2 | 1.2 | 100.0 |
| CH_RPI | 8.4 | 12.4 | 31.5 | 3.6 | 1.0 | 30.0 | 100.0 |

Model 1: Japan

| | COMMP | JP_GDP | CH_RPI | YEN_RMB | JP_IPI | | Total |
|---|---|---|---|---|---|---|---|
| COMMP | 78.5 | 7.7 | 1.8 | 4.7 | 1.4 | | 100.0 |
| JP_GDP | 9.9 | 79.3 | 2.7 | 2.4 | 2.4 | | 100.0 |
| CH_RPI | 10.8 | 3.5 | 74.6 | 8.9 | 2.0 | | 100.0 |
| YEN_RMB | 7.1 | 3.9 | 4.5 | 81.8 | 0.7 | | 100.0 |
| JP_IPI | 3.3 | 5.6 | 2.9 | 39.1 | 47.9 | | 100.0 |
| JP_CPI | 1.9 | 10.7 | 3.3 | 3.2 | 7.3 | | 100.0 |

Model 2: Japan

| | COMMP | JP_GDP | YEN_RMB | JP_IPI | JP_CPI | CH_IP | Total |
|---|---|---|---|---|---|---|---|
| COMMP | 78.1 | 7.5 | 5.0 | 1.5 | 6.4 | 1.0 | 100.0 |
| JP_GDP | 9.7 | 79.0 | 3.0 | 3.0 | 3.1 | 1.4 | 100.0 |
| YEN_RMB | 7.1 | 3.9 | 85.4 | 0.9 | 1.7 | 0.7 | 100.0 |
| JP_IPI | 3.1 | 6.5 | 37.1 | 47.9 | 1.0 | 3.2 | 100.0 |
| JP_CPI | 2.0 | 10.9 | 2.9 | 8.5 | 73.3 | 1.9 | 100.0 |
| CH_IP | 2.4 | 2.0 | 6.7 | 5.0 | 2.5 | 2.8 | 100.0 |
| CH_RPI | 10.8 | 4.3 | 20.5 | 1.5 | 0.9 | 42.7 | 100.0 |

Source: Auther's calculations.

However, developments in China (inflation and industrial production growth) appear to have little effect on commodity prices, suggesting that it is unlikely that developments in China are important for commodity prices.

In contrast, there is some evidence of economic activity in the USA affecting China. Of the variation in Chinese inflation, 10 percent or more is explained by the changes in US GDP

(the contribution of US inflation is very small), and the impulse responses to the shocks to USA output and inflation are positive and statistically significant.

The variance decompositions for Japan indicate that Chinese developments have a small effect on Japanese prices (contributing less than 4 percent of the variability in Japanese import and consumer prices). Again, the results suggest that developments in China are unlikely to be a major contributor to Japanese deflation. The Japanese shocks do not account for much of the variability in Chinese prices, although exchange rate developments are moderately important.

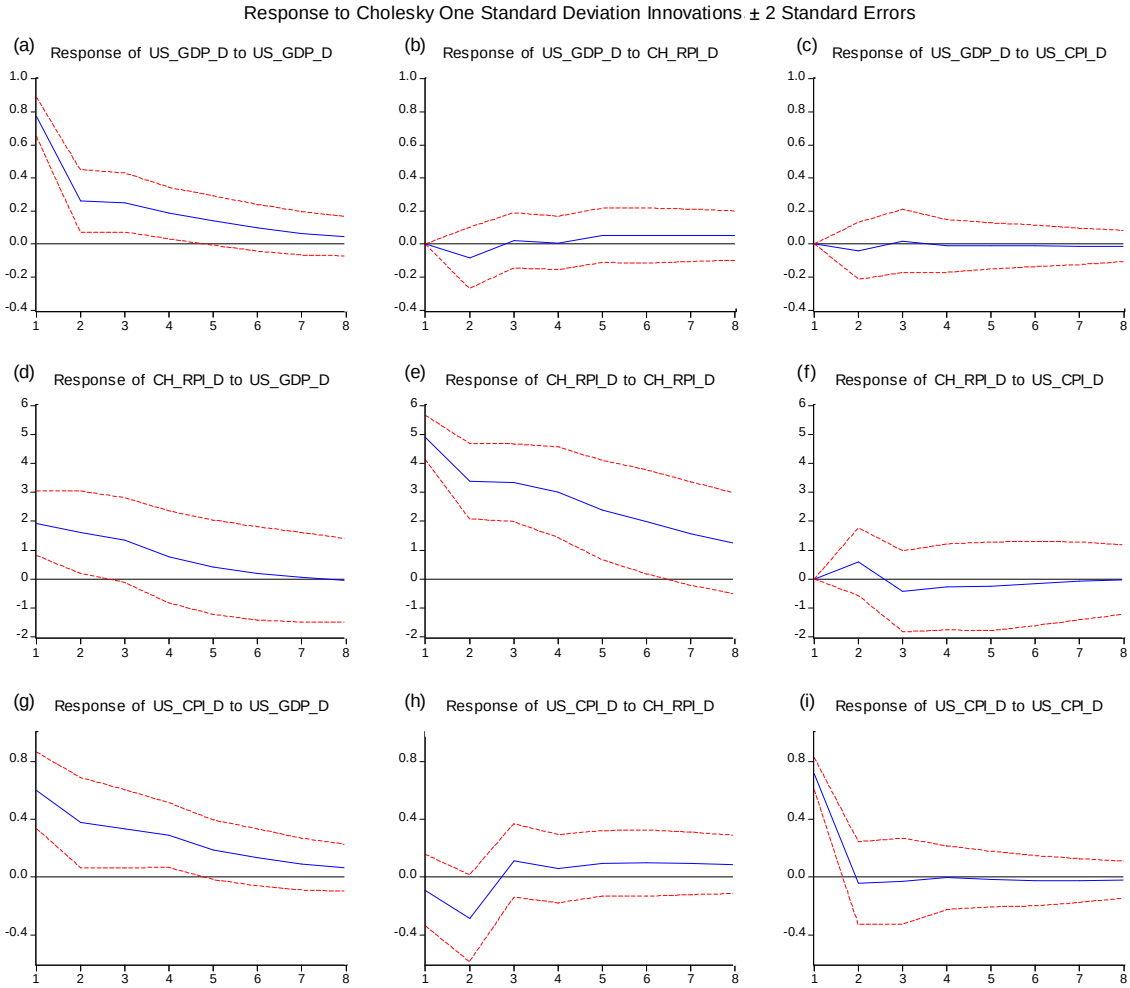
Based on the variance decomposition it looks as if the US GDP shocks are important. Figure 3 reports selected impulse response functions for Model 1 for the USA. The columns report the responses to US GDP growth, Chinese price and US price shocks and the rows report the responses of US GDP, Chinese prices and US prices. The first column suggests that US GDP growth shocks are important for Chinese prices and US prices. However, the bottom middle graph suggests that US prices are not significantly affected by Chinese price shocks, consistent with the variance decomposition results.

To summarize these results, a Chinese consumer price shock that leads to an increase in Chinese prices of approximately 1 percentage point after eight quarters, leads to US consumer prices being approximately 0.005 percentage points higher after eight quarters. The equivalent effect on Japan is 0.05 percentage points.

The standard estimation procedure above could potentially underestimate the current impact of Chinese inflation on the USA and Japan because it uses data that spans two decades, including the period when trade between China and the USA and Japan was relatively small. To address this concern, in this section, we allowed the coefficients to be stochastic and to vary with trade (using a Kalman filter: further details are available from the authors). Contrary to our expectations, incorporating the increasing size of the trade between China and the USA in our model does not help to uncover a stronger relationship between inflation in China and in the USA. The coefficient of the trade share variable has the wrong sign and is statistically insignificant. Results on the link between inflation in Japan and China are quite similar.

One potential reason for the lack of evidence of a stronger link between the inflation rates as China's trade volume increase is that perhaps impacts of the subcomponents are working in opposite directions, canceling each other out. For example, over 2003–2004 Chinese prices of household appliances were declining, possibly depressing global prices of these goods, whereas food prices, which were affected by drought, as well as domestic policies, were increasing. Indeed, there is evidence (Feyzioglu and Willard, 2006) that Chinese household furnishings prices increasingly affect Japanese household furnishing prices. However, to the extent that this is less than 5 percent of the Japanese consumption

**Figure 3. Selected Impulse Response Functions for Model 1 for the USA**




Note: D stands for the annualized growth rate of seasonally adjusted quarterly figures (((X(t)/(X(t-1))^4-1)*100), where t indicates one quarter.

bundle, this is unlikely to be a major inflationary concern.

## IV. Conclusions and Discussion

Overall, the results suggest that Chinese prices have a fairly small and temporary impact on US and Japanese prices. This result is robust across a variety of model specifications.

How do the results of this paper compare to the existing literature? Kamin *et al*. (2004)

use disaggregated prices to see whether prices appear to be more depressed in sectors where Chinese imports make up a larger share. They find that the increasing share of Chinese imports depresses import price inflation by approximately 0.8 percentage points per year. However, it seems unlikely this has had a noticeable effect on consumer prices.

Morimoto *et al.* (2003) claim to have found evidence that increasing capacity in emerging markets, especially in China, has been the main factor subduing inflationary pressures in Japan and the USA since 1994-2001. They determine that US inflation was around 0.8 percentage points lower than it would have been as a result of excess capacity in emerging markets. This was at a time when Chinese prices were falling by something like 2 percent per year. If all of this was due to China, this was indeed a large effect. However, as their model only includes US variables it is difficult to know how much of what they capture is due to events occurring in China.

Another way of assessing the magnitude of our estimates is to do a back of the envelope calculation based on how important Chinese imports are in US imports and the size of imports relative to private consumption (assuming all imports are consumed: see footnote 1 for more details). Based on this, using 2004 data, we would expect that an increase in Chinese inflation of 1 percent would lead to an increase in US inflation of approximately 0.03 percentage points (for Japan it would be 0.04). In light of this calculation, China should have a very modest impact on foreign prices. (This calculation ignores potential third market and behavioral effects, which are difficult to model.) This together with likely noise in the data also makes it in some ways unsurprising that in the VAR analysis we typically found statistically insignificant effects.

The results do not support the claim that inflation declined almost simultaneously in several countries because of China's increasing role in the world economy. Other factors, such as central bank behavior and common shocks, seem likely alternatives. For example, the results seem consistent with the Federal Reserve and the Bank of Japan being concerned about inflation and, hence, adjusting policy such that any inflationary shock (such as one from China) has no detectable effect on overall inflation.

Looking forward, there are several reasons why the recent rise in Chinese inflation is likely to have only limited effects. First, recent Chinese price pressures have been essentially limited to food prices. Without significant price rises in manufactured goods, the effects on the rest of the world are likely to remain well contained. Second, foreign central banks (like the Federal Reserve and the Bank of Japan) remain committed to stable inflation and there is no indication that they would not be able to achieve this objective, regardless of developments in China. Market inflation expectations in the USA are consistent with this. Third, and perhaps most importantly, various factors that are likely to be important in determining the effect of China on the major economies of the world

suggest that China's impact should be small. Based on a back of the envelope calculation using China's share of imports, it is estimated here that something like half of total imports would need to come from China for a 1 percent Chinese price increase to translate into a very moderate 0.1 percent price increase in Japanese and US prices. Third, imports from China, while increasing, still make up only a small share of total consumption in the USA and Japan. This suggests that for any noticeable effect on inflation, China would need to dominate international trade in a large scale.

## References

Bergin, Paul R., 2003, "Putting the 'new open economy macroeconomics' to a test," *Journal of International Economics*, Vol. 60, No.1, pp. 3–34.

Bhundia Ashok, 2003, "Exchange rate pass-through in South Africa," *South Africa: Selected Issues*, IMF Country Report 03/18, International Monetary Fund, Washington, DC.

Cheung, Yin-Wong and Jude Yuen, 2002, "Effects of U.S. inflation on Hong Kong and Singapore," *Journal of Comparative Economics*, Vol. 30, No. 3, pp. 603–19.

Crowder, William J., 1996, "The international convergence of inflation rates during fixed and floating exchange rate regimes," *Journal of International Money and Finance*, Vol. 15, No. 4, pp. 551–75.

de Brouwer G., 1998, "Estimating output gaps," *Reserve Bank of Australia Discussion Paper* RDP9809, Reserve Bank of Australia, Sydney.

*(The) Economist*, 2004, "The end of cheap money—Interest rates," *The Economist*, 24 April.

Engel, Charles and John Rogers, 1996, "How wide is the border?" *American Economic Review*, Vol. 86, No. 5, pp. 1112–25.

Feyzioglu, Tarhan and Luke Willard, 2006, "Does inflation in China affect the United States and Japan?" IMF Working Paper WP/06/36, International Monetary Fund, Washington, D.C.

Gueorguiev, Nikolay, 2003, "Exchange rate pass-through in Romania," *IMF Working Paper* WP/03/130, International Monetary Fund, Washington, DC.

Ha, Jiming, Kelvin Fan, 2004, "One country, two prices? A study of the deflationary effect of price convergence on Hong Kong," *Asian Economic Journal*, Vol. 18, No. 4, pp. 405-21.

Kamin, Steven B., Mario Marazzi and John W. Schindler, 2004, "Is China 'exporting' deflation?" *International Finance Discussion Papers*, No. 791, Board of Governors of the Federal Reserve System, Washington, DC.

Koo, Jahyeong, and Dong Fu, 2004, "Inflation from Asia? Not likely," *Expand Your Insight*, Federal Reserve Bank of Dallas, 14 June. Available from: http://www.dallasfed.org/eyi/global/0406asia.html.

Kumar, Manmohan S, Taimur Baig, Jorg W. Decressin, Chris Faulkner-MacDonagh and Tarhan Feyzioglu, 2003, "Deflation: Determinants, risks, and policy options," *IMF Occasional Paper* No. 221, International Monetary Fund, Washington, DC.

Kuroda, Haruhiko and Masahiro Kawai, 2002, "Time for a switch to global reflation," *Financial Times* (FT.Com), 1 December.

Kyodo News, 2003, "Wu tells business leaders China not exporting deflation," *Kyodo News*, 3 September.

McCarthy, Jonathan, 1999, "Pass-through of exchange rates and import prices to domestic inflation in some industrialized economies," *BIS Working Paper* No 79, BIS, Basel.

Merrill Lynch, 2004, "Hi-ho steel," AsiaPac Steel Sector, 9 September.

Morimoto, Yoshikazu, Wataru Hirata and Ryo Kato, 2003, "Global deflation," *Bank of Japan Research Paper*, Tokyo: Bank of Japan.

Orphanides, Athanasios, 2003, "Historical monetary policy analysis and the Taylor Rule," *FEDS Working Paper* No. 2003-36, Federal Reserve Board, Washington, DC.

Razin, Assaf, 2004, "Globalization and disinflation: A note," *National Bureau of Economic Research Working Paper* No. 10954, National Bureau of Economic Research, Cambridge, MA.

Roach, Stephen, 2002, "The China fractor," Global Economic Forum, Morgan Stanley, 14 October.

Rogers, John, 2001, "Price level convergence, relative prices and inflation in Europe," *International Finance Discussion Paper* No. 699, Board of Governors of the Federal Reserve, Washington, DC.

Xinhua News Agency, 2004, "Nobel laureate opposes fluctuating yuan," Xinhua News Agency, 28 November.

Yang, Jian, Hui Guo and Zijun Wang, 2006, "International transmission of inflation among G-7 countries: A data-determined VAR analysis," *Journal of Banking and Finance*, Vol. 30, No.10, pp. 2681–700.

(Edited by Xiaoming Feng)