International Impacts on U.S. Inflation in the 1970s

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The United States experienced the most severe, sustained inflation in the 1970s since the turn of the century. The usual monetarist explanation points to excessive growth in the money supply. Indeed, as measured by M1-B, the domestic money supply grew at an average annual rate of 2.6 percent in the 1950s, 3.8 percent in the 1960s, and 6.4 percent in the 1970s. Nevertheless, there are other explanations for the inflation than the monetary one. This article cites the augmented importance of the foreign sector for the U.S. economy and argues that its impact was larger than previous studies indicate.

Studies estimating the effect of the foreign sector on U.S. domestic inflation usually focus on the 1973–1974 inflationary episode. However, one would expect the impact of the foreign sector on current inflation to be cumulative. Moreover, available studies typically do not control for variations in the relative size of the foreign sector and may thus yield inconsistent estimates of the foreign sectoral influence.

Using regression analysis of post-1972 overlapping quarterly data, we estimate both short-run and long-run impacts of the international area on U.S. consumer price inflation. The foreign sectoral variables in our estimating equations include the relative size of the foreign sector as well as export and import prices. Our results suggest that the international sector contributes the major source of influence on U.S. price behavior in the 1970s. We find the effect of the import sector to be more important than the export sector, and the relative size of the import sector to be nonexogenous, in determining U.S. consumer prices. However, the export sector also exercises a positive short-run influence.

We first discuss the expanded U.S. foreign sector and its implications for domestic inflation. Section II develops an econometric model. The estimation and empirical results are presented in Section III. Section IV concludes the paper.

1. The Expanded Foreign Sector

As shown in Table 1, the combined total of the U.S. export and import sectors in real terms has grown from 7.7 percent of Gross National Product (GNP) in 1950 to 18.2 percent in 1980. This growth has occurred in both sectors but has been particularly pronounced in the export area during the 1970s. The somewhat slower growth of the real import sector is probably attributable to substantially
### TABLE 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Exports plus Imports</th>
<th>Exports</th>
<th>Imports</th>
</tr>
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<tbody>
<tr>
<td>1946</td>
<td>5.7</td>
<td>2.9</td>
<td>8.6</td>
</tr>
<tr>
<td>1950</td>
<td>4.4</td>
<td>3.3</td>
<td>7.7</td>
</tr>
<tr>
<td>1955</td>
<td>4.7</td>
<td>3.6</td>
<td>8.2</td>
</tr>
<tr>
<td>1960</td>
<td>5.2</td>
<td>4.2</td>
<td>9.4</td>
</tr>
<tr>
<td>1965</td>
<td>5.5</td>
<td>4.3</td>
<td>9.8</td>
</tr>
<tr>
<td>1970</td>
<td>6.5</td>
<td>6.1</td>
<td>12.6</td>
</tr>
<tr>
<td>1975</td>
<td>6.6</td>
<td>6.1</td>
<td>12.7</td>
</tr>
<tr>
<td>1980</td>
<td>6.3</td>
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<td>12.5</td>
</tr>
<tr>
<td>1985</td>
<td>6.5</td>
<td>6.5</td>
<td>13.0</td>
</tr>
<tr>
<td>1990</td>
<td>7.8</td>
<td>6.5</td>
<td>14.3</td>
</tr>
<tr>
<td>1995</td>
<td>8.7</td>
<td>6.5</td>
<td>15.0</td>
</tr>
<tr>
<td>1997</td>
<td>8.4</td>
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<tr>
<td>1999</td>
<td>8.5</td>
<td>6.5</td>
<td>15.0</td>
</tr>
<tr>
<td>1973</td>
<td>8.3</td>
<td>6.7</td>
<td>14.9</td>
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<tr>
<td>1999</td>
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<td>7.2</td>
<td>16.0</td>
</tr>
<tr>
<td>1980</td>
<td>10.9</td>
<td>7.3</td>
<td>18.2</td>
</tr>
</tbody>
</table>

* *Term of Export and Import percentages differ because of rounding.*

**Source:** Computed from the National Income and Product Accounts of the U.S., U.S. Department of Commerce.

### II. The Model

We assume that the rate of change of U.S. prices is a function of the rates of change in nominal wages, import prices, expected inflation rates, and a demand-pull factor, expressed as a function of excess domestic and foreign demands in the product market. It reflects domestic and external factors such as world liquidity, the exchange rate, and external real factors. These international factors are presumed to be summarized by the foreign sector price behavior.

On the basis of the above assumptions, we estimate a semi-reduced form price equation of the form:

\[ P_t = b_0 + b_1 P_{t-1} + b_2 M_t + b_3 Q_t + b_4 T_t + U_t, \]

where

- \( P_t \) = the rate of change of U.S. consumer prices in period \( t \);
- \( P_{t-1} \) = the growth rate of U.S. consumer prices, lagged one period;
- \( M_t \) = the rate of change of the money supply for the \( t \)th period;
- \( Q_t \) = the growth rate of real output in period \( t \);
- \( T_t \) = a vector of relevant foreign sectoral variables for the \( t \)th period;
- \( U_t \) = the error term.

### III. Estimation and Empirical Results

In estimating equation \( 1 \) we measure the rate of consumer price inflation (omitting the \( t \) index), \( P \), by the rate of change in the personal consumption price deflator, \( CD \); import price inflation is expressed as the rate of change of the import price deflator, \( MD \); the money stock is measured by \( M1 \) (and \( M1B \)); real output is the gross domestic product in constant dollars; the effect of excess foreign demand is accounted for by introducing the growth rate of the export price deflator, \( XD \). All variables, except those measuring the relative size of the foreign sector, are expressed as overlapping, quarterly changes between successive years.

The above equation was estimated on the basis of 1973-1980:1 data using a combi-
nation of the Hildreth-Lu search and Cochrane-Orcutt iterative procedures to correct for first-order autocorrelation. Because of the presence of a lagged dependent variable, estimating the autocorrelation coefficient, p, and the regression coefficients by direct minimization of the residual sum of squares would produce nonlinear estimating equations. Alternatively, conditional sum of squares minimization could be used by first estimating p. We employed the Cochrane-Orcutt method to obtain values for p, and then applied the Hildreth-Lu procedure to insure global minimization of the error sum of squares. In addition, standard errors of the coefficients were adjusted upward to correct for negative biases due to the presence of the lagged dependent variable. Results of the estimation are presented in Table 2.

With reference to Table 2, coefficients of the foreign sectoral price variables are positive and statistically significant in all equations except equation (4). Equations (1) and (5) show that the import sector has positively impacted on U.S. consumer price inflation. Equations (2) and (6) reveal a similar influence of the export sector.

To assess the relative importance of the two foreign sectors, both the export and import price variables have been included as separate variables in the regression equation. The results are provided in equation (4), Table 2. Unfortunately, the high correlation between the two variables (a simple correlation of .93) makes it difficult to separate the independent influences of the two sectors. Subsequently, the import and export price variables, MD and XD, are weighted to form XMD, which denotes the rate of change of the weighted arithmetic mean of the export and import price deflators, with export and import values serving as the respective weights. Results of the estimation involving the replacement of MD and XD with XMD are presented as equations (3) and (7), Table 2. As expected, the coefficient of XMD is positive and significant in each equation, suggesting a positive impact of the combined foreign sector on domestic price behavior. More important, the larger XMD coefficients (of .092 and .105 from equations (3) and (7), respectively) as compared corresponding with those of MD (equations (1) and (5)) may suggest a positive independent short-run impact from the export sector.

Equations (5), (6), and (7) of Table 2 contain variables measuring the relative size of the foreign sector—MGNP, XGNP, and XMGNP. These denote, respectively, the values of imports, exports, and exports plus imports, as percentages of GNP. We note that while an increasing export sector appears to exercise no influence on CD, an expanding import sector has exaggerated the domestic consumer price inflation in the 1970s. Moreover, in equation containing MD (equations (1) and (5)) significantly improves the “goodness of fit,” as measured by R² and SEE. Furthermore,
while the coefficient of MD is hardly altered by the addition of XMGF, the effect of CDL/ becomes remarkably small in it. However, the “long-run” impact of the import price variable is essentially the same as in the case of equation (7), where the impact of the import price variable on the 1973–1980 period. Similarly, with the combined import and export sector price inflation averaging 13.5 percent over the same period, we estimate from equation (7) a short-run impact of the combined foreign sector as approximately 18 percent of the domestic price inflation. From equations (5) and (7) of Table 2, we calculate, respectively, average “long-run” cumulative (steady state) impacts on domestic price inflation of 0.36 and 0.42 for the import and the combined foreign sector price variables. On the basis of the average behavior of these variables, as given above, these impacts translate into approximately 71 percent and 74 percent of the “long-run” 1973–1980 cumulative (steady state) impacts on domestic price inflation as having been accounted for by the import and the combined import plus export sectors, respectively.

Considering other implications of our empirical results, equations (5) and (7) of Table 2 suggest, with the coefficients of the gross domestic product being positive and significant, that the gap effect outweighs the productivity effect. This result of course is plausible especially in the 1970s. Although oil industries have generally operated with excess capacity, obsolescence of energy-intensive capital in the 1970s may suggest that productive capacity is perhaps much lower than “nominal” capacity. Table 2 shows that the short-run impact of the money supply, as measured by M1, is relatively not significant. This result may seem puzzling at first, especially in the light of the generally accepted importance of monetary variables in affecting commodity price behavior. Nevertheless, other authors have arrived at similar results.

Another explanation for the implied zero short-run monetary impact may be that, especially for the 1970s, the M1 is the more relevant monetary series. Utilizing 1973–1979 data, we experiment with the M1B money variable, obtaining:

\[
\begin{align*}
CD &= 0.822 + 0.11711MB + 0.0317GD \times (1.258) \times (0.061) \times (0.085) \\
&+ 0.067MD + 0.687CDL \times (0.013) \times (0.137) \\
n &= 27 \quad R^2 = 0.958 \\
h < 0 \quad SEE = 43.9 \quad (8)
\end{align*}
\]

As observable from equations (8) and (9), the monetary variable now (M1B) exhibits a significantly positive coefficient, suggesting a positive short-run impact for money supply. However, note the robustness of the import price coefficients, which have remained virtually unchanged from those obtained earlier using M1 (compare with the corresponding equations (1) and (5)). Based on equations (8) and (9), respectively, we estimate a long-run impact of the import price as .21 and .31. These differ only slightly from the corresponding values of .18 and .36 obtained earlier from equations (1) and (5), respectively, where M1 was used instead of M1B. Results from utilizing the M1B series then confirm our earlier finding. That is, while the short-run effect of the import price remains the same, the long-run impact increases considerably when variations in the relative size of the import sector are accounted for. Furthermore, controlling for the relative import sector size improves significantly the goodness of fit of our model. How do our estimates compare with those of previous studies? Unfortunately, most of the relevant studies employ different measures of the dependent variable. Spitalier (1978), however, explains “consumer prices” and obtains, with 1958–1976 overlapping quarterly data, short-run and long-run import price impacts of .04 and .27, respectively (see pages 269 and 271). Since he utilized the M1 series, the more corresponding set of comparable estimates in our study consists of .07 and .36 from equation (5). These are obviously respectively larger than Spitalier’s. Conjecturing that the difference between these estimates may be explained by the possibility that Spitalier’s sample period was dominated by severe inflation.

The 

3Note that these inflation rates are the averages of overlapping quarterly rates and would thus be somewhat lower than those averages computed on the basis of rates of change from the beginning to the end of the year.

4The core inflation rate reflects the effect of the foreign sector on lagged inflation as well. Specifically, steady state is achieved in the limit when the previous period’s inflation rate approaches the current inflation rate.

5“Nominal” capacity is defined as the sum of productive capacity and unproductive capacity.

6See, for instance, Modigliani and Pagendam [1975]. The authors, using 1953–1957 annual data, found that the short-run effect of M1 on domestic price behavior was statistically not different from zero. The same result was obtained when they tried a one-year lag of M1. Our experiment produced similar results.

7Indeed, the exogeneity of the money supply has been questioned. Meese [1979]9 for instance, finds that changes in the money stock are explained significantly by, in particular, previous nominal wage rate changes.

8Lack of analysis now on the import sector, which provides the best fit on the basis of R^2 and SEE. All variables in the equations are as defined earlier. Again, the same estimation procedures described earlier is utilized here.

9The null hypothesis that the short-run impacts are equal, for instance, is rejected at the .01 level with a value of 4.14.
by the pre-1973 period when a different structure might have been more effective, we reestimated equation (5) using 1947-1980:1 data, obtaining:

\[
CD = -0.367 + 0.080MI - 0.007GDP \\
(0.398) (0.049) (0.029) \\
+ 0.067MD + 0.209MGNP + 0.675CDL \\
(0.111) (0.117) (0.059) \\
R^2 = 0.937 DW = 2.06 \text{ } n = 127 \text{ } h < 0 \text{ } SEE = 0.699 \text{ (10)}
\]

Equation (10) yields short-run and long-run import price effects of .07 and .21, respectively. Thus, although there is no change in the former, the long-run impact is reduced considerably when the sample period extends significantly into the pre-1973 era.

IV. Conclusion

We have presented evidence demonstrating that the U.S. international sector, defined to include the export as well as the import sector, has been the major source of consumer price behavior in the 1970s, accounting for over 60 percent of the long-run consumer price inflation during the 1973-1979 period. Our evidence suggests that the post-1972 period is characterized by a larger long-run impact than previous estimates based primarily on pre-1973 sample periods would imply. Furthermore, we find that the increase in importance of the import area appears to have exacerbated the inflationary process of the 1970s. Our results also show that failure to control for variation in the relative size of the import sector understimates the long-run foreign sectoral impact in the 1970s. Although the import sector provides a better explanation, than the export sector, for U.S. consumer price behavior, a positive independent short-run impact from the export area is implied.

Our findings indicate that the international sector was more important than shown by previous studies of price inflation in the 1970s. Should the significance of the foreign sector continue, as is likely at least for the foreseeable future, the current study suggests that the international arena may deserve nontrivial attention, even in the case of the "almost closed" United States.

References


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