

Globalization and U.S. Inflation

Where has all the inflation gone for what is getting to be a long time passing? Estimates of the Phillips curve suggest that the low level of unemployment over the last few years should have produced a fairly significant acceleration in prices, yet inflation has continued to decline. Some, like Robert Gordon (1997) and Staiger, Stock, and Watson (1997), take this occurrence as evidence that the non-accelerating-inflation rate of unemployment, the NAIRU, has declined. Others argue that special factors, such as recent movements of employee health coverage to health maintenance organizations, have temporarily masked the increase in inflation. Yet, perhaps the most widely cited explanation for the surprisingly good inflation performance of late concerns the increasing sensitivity of the U.S. economy to foreign economic conditions; specifically, since capacity utilization abroad has been slack in recent years, U.S. inflation has remained mild. This study uses a variety of approaches to examine whether U.S. inflation depends on foreign, rather than domestic, capacity constraints. It is shown that foreign capacity plays little, if any, role in the determination of U.S. inflation independent of any role it might play in U.S. capacity utilization.

Monetary policymakers must understand the determinants of inflation in order to attain their inflation goal. If foreign capacity constraints help determine domestic price increases, then U.S. policymakers should modify their concerns about domestic capacity utilization. Going beyond, or falling below, some domestic measure of full capacity would not be sufficient to increase, or decrease, inflation, and the concept of a domestic NAIRU might not necessarily be an important or even meaningful policy goal. The rationale for the importance of foreign capacity to U.S. inflation is fairly clear-cut. If, for example, domestic demand exceeded domestic capacity, while foreign capacity remained underutilized, either the excess domestic demand for goods would be absorbed by imports or profits would be squeezed as labor markets tighten and costs rise. Little pressure on prices would result, as attempts by domestic producers to raise prices

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would immediately decrease demand for domestic goods and relieve pressure on costs; all this without monetary policy action. Similarly, if the U.S. economy were below full employment, while the rest of the world was beyond it, U.S. inflation would tend to rise.¹ In such a world, monetary policymakers would be less likely to achieve both their inflation and their output targets, since they would no longer control a key determinant of U.S. inflation.

Estimates of the Phillips curve suggest that the low level of unemployment over the last few years should have produced a fairly significant increase in the rate of inflation, yet inflation has continued to decline.

This article begins with a simple description of how global capacity could affect domestic inflation. Several measures of foreign excess capacity are then constructed in order to test the relationship empirically. As “excess capacity” is not directly measurable, several proxies are calculated. First, Phillips curves are estimated for our major trading partners and their NAIRUs calculated, in order to produce gauges of unemployment rate gaps. Additionally, deviations from trend GDP in those countries are examined. Neither of these measures of excess foreign capacity was found to have a direct effect on U.S. inflation.

Concerns about the precision of these estimates of foreign capacity utilization motivate another approach. Several empirical relationships should hold if foreign capacity affects U.S. inflation: Specifically, foreign capacity should affect U.S. import prices, and U.S. import prices should affect U.S. inflation. There is little evidence in support of either of these two links. In total, the results indicate that the Phillips curve, relating some measure of U.S. capacity utilization to U.S. inflation, is alive, if ailing a bit, even as the world gets more integrated.

¹ The response of the exchange rate to these different capacity utilization rates is usually left rather unclear in these arguments. Exchange rate movements should moderate any effects on domestic inflation. In fact, inflation rates routinely vary across countries, as do changes in these rates, with exchange rate movements helping to offset these differences.

I. Channels Through Which Foreign Capacity Might Affect U.S. Inflation

The posited link between global capacity utilization and U.S. inflation is straightforward. Foreign capacity utilization is assumed to affect the prices of foreign goods. Foreign goods prices, then, help determine U.S. import prices. And, finally, U.S. import prices may affect U.S. inflation through a variety of channels, both direct and indirect.

The direct effect of import prices on U.S. inflation is simple arithmetic. The inflation measure examined throughout this article is changes in the Consumer Price Index less food and energy (core CPI) as it captures the goods most directly related to the public’s welfare.² Many foreign goods prices are included in the CPI. Thus, CPI inflation,

$$\pi_i^{CPI} = \alpha * \pi_i^M + (1 - \alpha) * \pi_i^{NM}, \quad (1)$$

is a weighted average of inflation in domestically produced goods prices, π^{NM} , and inflation in imported goods prices, π^M , where α is the share of imported goods in the CPI. Equation 1 illustrates that any change in the dollar price inflation of foreign goods at the consumer level will be directly captured by the domestic inflation measure. Note that this direct effect makes the CPI more likely than the GDP deflator to exhibit any effects from foreign capacity utilization.³

The inflation of foreign goods prices could also have several indirect effects on U.S. goods price inflation. First, and perhaps most important, price movements of foreign goods should affect the prices of U.S. goods with which they directly compete. In fact, much of the recent debate attributes the surprisingly low current inflation to foreign competition. It has been argued that U.S. producers cannot raise their prices even when cost pressures begin to appear, because doing so when foreign prices remain moderate would seriously diminish their market share. Thus, the smaller the U.S. producers are in this traded goods market, or the more substitutable the goods, the greater the discipline imposed by foreign prices. This greater discipline could manifest itself in lower wage

² Most of the conclusions in this paper do not depend on which price measure is used, however. The exceptions will be discussed as they arise.

³ The GDP deflator does not include imports directly. The effect of import prices on both U.S. input costs and U.S. export prices, which are included in the deflator, might produce some reaction of the deflator to foreign capacity utilization. However, this effect would be much less direct than the effect on CPI inflation.

demands by workers in these domestic firms, in a profit squeeze, or in a decline in U.S. production as a response to rising imports; any of these alternatives would offset or relieve the pressure of U.S. capacity constraints on U.S. prices. Second, movements in foreign goods prices can indirectly affect U.S. goods prices if those foreign goods are important inputs to U.S. goods production. Fluctuations in the prices of foreign goods used as inputs, and particularly permanent changes in these prices, alter

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the costs, and thus the prices, of U.S.-produced goods and services.

Without these two major indirect channels, global capacity constraints would affect only a small subcomponent of U.S. inflation, since imports represent a small share of total U.S. output. If only the direct effect were operative, inflation for U.S. produced goods and services would still essentially be determined by domestic capacity constraints. Thus, a finding that import price inflation affects the U.S. inflation rate need not imply that foreign goods are acting as a constraint on the price inflation of U.S.-produced goods or that foreign capacity determines the rate of U.S. inflation. For foreign capacity utilization to be a significant determinant of U.S. inflation, import prices must affect the price inflation of domestically produced goods, π^{NM} .

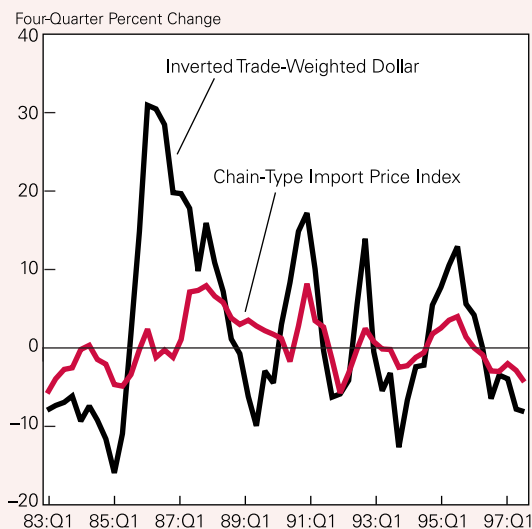
Nevertheless, for several reasons, one might expect foreign capacity utilization to have little effect on U.S. inflation. Movements in the dollar value of the production costs faced by foreign producers, resulting from a change either in their home currency costs or in the value of the dollar, may have little effect on the prices of imported goods in the United States. Several margins—the manufacturer's, the importer's, the retailer's—may be squeezed or expanded by such price changes. For a variety of reasons foreign producers may let profits bear the brunt of any change in the dollar value of production costs. If, for example, the dollar appreciates—reducing the dollar value of for-

eign costs—foreign firms might allow profits to increase rather than cut U.S. prices, either because they are price followers in the U.S. market or because they perceive the appreciation as temporary. Changes in costs resulting from excess capacity abroad may also be offset by movements in the dollar. Finally, even if changes in foreign prices or the value of the dollar did affect import prices, this change in import prices may have little indirect effect on U.S. goods prices. U.S. and foreign goods may be imperfect substitutes, so that domestic firms do not find that foreign prices greatly affect the demand for their products.

In fact, there is abundant evidence that changes in exchange rates, and thus changes in the dollar costs faced by foreign producers, have only a modest effect on the dollar prices foreign producers charge in the United States. The debate over the degree of “pass-through” has received considerable attention since the mid 1980s when, as shown in Figure 1, dollar import prices failed to fluctuate nearly as much as the value of the dollar itself. The experiences in the mid 1980s resulted in several theoretical explanations for only a

Figure 1

Trade-Weighted Dollar and Import Prices



Source: Trade-weighted dollar data, from G.5 release, Federal Reserve Board. Chain-type import price index, from U.S. Bureau of Labor Statistics.

partial pass-through.⁴ This literature emphasized that large foreign players here, firms that face a downward-sloping demand curve, will pass through only part of a change in the dollar value of their production costs to their U.S. prices. Of course, if foreign producers are small players in the U.S. market, they will tend to take dollar prices as given, with very little pass-through. This theoretical work has also received broad

Much of the recent debate attributes the surprisingly low current rate of inflation to foreign competition.

empirical support at the micro level.⁵ The industry-level data suggest that foreign producers are likely to change their U.S. prices significantly only if their U.S. competitors do so also, and U.S. competitors alter their prices when strains in capacity in the United States raise their costs. These results imply that import prices should be correlated with capacity utilization in the United States, not capacity constraints abroad.

Since theory is agnostic about whether global capacity determines U.S. inflation, it is left to empirical analysis to answer the question. Accordingly, the next few sections examine the data. Foreign capacity since the early 1970s is calculated, first by estimating the NAIRU in each of our six major trading partners and, alternatively, by taking a simple trend of real GDP in these countries. It is then shown that deviations from full employment or trend GDP in these trading partners have had no apparent effect on U.S. inflation. Examining the various possible sources of the break in the transmission mechanism could help sidestep the problems with measuring foreign capacity. Either foreign capacity could have little effect on foreign prices, foreign prices could have little correlation with U.S. import prices, or U.S. import prices could have no effect on U.S. inflation. The Phillips curve regressions for the foreign countries in the next section show that the link between foreign capacity utilization and foreign inflation is fairly strong. The subsequent section

reveals that the link is weak between foreign inflation and inflation in U.S. import prices. But perhaps more important, U.S. import price inflation fails to have a significant effect on U.S. CPI inflation, and this last result is not dependent on any particular measure of foreign capacity utilization.

II. Measuring Foreign Capacity

In theory, measuring excess capacity is relatively straightforward. Full capacity is defined as the level of GDP or unemployment at which all of the economy's available resources are utilized voluntarily at stable wages and prices (or stable rates of wage and price inflation). Calculating the output level when all inputs are so utilized, and comparing that level to the actual output level of the economy at any given time, is one way of discerning whether the economy is running at, below, or above full capacity. However, actually ascertaining the amounts of labor and capital available to the economy at full employment and determining their productivities is problematic. Since it is almost impossible to measure capacity in this way, other approaches are usually taken.

One commonly used alternative calculates potential output as an average of past actual values, once allowances are made for stable growth. It is argued that, over the long run, prices and wages adjust to ensure that the economy is at full employment. The economy may occasionally operate above or below its capacity, but on average it should run near its potential level. In reality, output may differ from its full-employment level for a significant length of time, so this method of calculating potential output could produce a serious over- or underestimation of capacity.⁶ Shifts in potential output, or output growth, also confound this approach; including output levels from the period before any such shift will bias the estimate of potential away from its true value. These failings aside, this is one approach used in this study.

Inflation is an important indicator of whether the economy is above or below full capacity, one that the previous approach ignores. If the economy is operating beyond (below) capacity, inflation will tend to rise (fall). Estimating a country's level of full employment by estimating its Phillips curve captures the informa-

⁴ Examples of this theoretical discussion can be found in Baldwin (1988) and Dixit (1989).

⁵ Empirical studies of pass-through can be found in Feenstra, Gagnon, and Knetter (1996), Gagnon and Knetter (1995), and Froot and Klemperer (1989), for example.

⁶ Many countries in Europe have operated well below full employment through most of the 1980s and 1990s. As a result, such estimates of potential output in these countries will tend to be biased down.

Table 1
The Phillips Curve: Six Major U.S. Trading Partners

	Canada	France	Germany	Italy	Japan	United Kingdom
Constant	1.11*	.41*	.18	1.91*	.39	1.41*
Unemployment	-.13*	-.23	-.04*	-.85*	-.47*	-.71*
Lagged Inflation	1.0	1.0	1.0	1.0	1.0	1.0
Estimated NAIRU	8.50* (.35)	6.91* (1.33)	5.10* (1.17)	9.50* (.77)	2.30* (.50)	7.30* (.93)
Log Likelihood	-68.0	-56.4	-55.6	-117.2	-133.3	-151.3

Note: The coefficients on 2 lags of the unemployment rate are summed. The sum of coefficients on 12 lags of inflation is constrained to 1. The sample period is from 1971 to 1996.

Standard errors are in parentheses.

*Significant at the 5 percent level.

Source: Inflation and unemployment data for the six countries were obtained from the OECD, *Main Economic Indicators*.

tion about capacity utilization contained in the inflation numbers.⁷ Defining full capacity by its effect on inflation is also the relevant measure for the focus of this study, since foreign capacity affects U.S. inflation through its effect on foreign inflation. For this reason, estimates of foreign capacity derived from estimates of the Phillips curve for each of our six major trading partners are also used to examine the effect of foreign capacity utilization on U.S. inflation. As a by-product, estimating foreign Phillips curves tests whether foreign capacity affects foreign inflation, which is the first link in the chain between foreign capacity constraints and U.S. inflation.

Data limitations on foreign prices and unemployment rates make it impossible to estimate this relationship for all of our trading partners.⁸ The most reliable data belong to our six major developed trading partners, Canada, France, Germany, Italy, Japan, and the United Kingdom, so capacity utilization in these countries is examined. Although these countries consistently account for roughly 50 percent of all U.S. imports throughout the sample period, it is likely that their capacity utilization would have a disproportionately important effect on U.S. inflation, since imports from these developed economies are more likely to

compete directly with U.S. goods production. Thus, these imports are more likely to have both a direct and an indirect effect on U.S. inflation.

The estimates of a simple quarterly Phillips curve for each of our six major trading partners from 1971 to 1996 are presented in Table 1. The basic specification of the Phillips curve equation,

$$\pi_{tj} = \alpha + \sum \beta_j^* UR_{t-i,j} + \sum \gamma_{t-i,j}^* \pi_{t-i,j} \quad (2)$$

for $j = \text{Canada, France, Germany, Italy, Japan, U.K.}$

was allowed to vary slightly for the six different countries, although imposing the same specification across countries had no effect on the results. In all cases the γ coefficients on the lagged domestic inflation realizations were constrained to sum to one. However, a nonlinear relationship between the unemployment rate and inflation was assumed for Italy, Japan, the United Kingdom, and France; in these countries a log linear specification appeared to fit the data better. Further, the speed of the response of inflation to the unemployment rate was allowed to vary by country; the number of quarterly lags of the unemployment rate ranged from two to three.

The second row of Table 1 reveals that each country's unemployment rate had a strong negative effect on that country's rate of inflation. In all but France, the unemployment rate was a significant determinant of foreign inflation, and even in France the unemployment rate was marginally significant.⁹

⁷ One drawback to a simple Phillips curve is that other forces besides each country's domestic capacity could affect inflation, such as oil price shocks or the sources investigated in this paper, import prices.

⁸ Data on unemployment and inflation rates for some of the currently important exporters to the United States, such as Mexico and China, are unreliable or unavailable for much of the sample. These countries were also much smaller exporters to the United States in the early part of the 1971-96 sample.

⁹ The data show that with more than 90 percent certainty the unemployment rate in France is an important determinant of its domestic inflation.

The next to the last row of Table 1 presents the estimated NAIRUs for each of these countries. They range from a low of 2.3 percent in Japan to a high of 9.5 percent in Italy. These estimates seem to coincide with conventional wisdom; Japan's unemployment rate rarely rose above 3 percent, and the relatively high estimated NAIRUs for France, Italy, Germany, and the United Kingdom are consistent with the diagnosis of Eurosclerosis in the 1980s. The estimate of Canada's NAIRU at 8.5 percent also seems reasonable, as the high unemployment rate that country has experienced over the last several years has reaped a relatively slow payoff in lower inflation.

More important, even for such parsimonious Phillips curves, the NAIRUs are estimated with relative

The NAIRUs for our major trading partners are estimated with relative precision—important since the more precise the estimate of the NAIRU, the more reliable the estimate of foreign excess capacity.

precision.¹⁰ This fact is important since the more precise the estimate of the NAIRU, the more reliable the estimate of foreign excess capacity. Based on the literature hypothesizing hysteresis of the NAIRU in Europe, such as Blanchard and Summers (1986) and Sachs (1986), one might expect the standard errors of the NAIRU estimates for the European countries to be quite large, given the shocks Europe experienced over the sample period. And, in fact, the estimates with the least certainty, France and Germany, are the two countries for which hysteresis in the NAIRU was most seriously discussed in the 1980s. Yet even the NAIRUs for these two countries are estimated fairly reliably. Furthermore, the estimates for Canada and Japan are the most precise, which is not surprising since little has been said about unstable NAIRUs in these countries.

¹⁰ In fact, examining different specifications for the Phillips curve, such as estimates including oil price shocks, did not significantly alter the estimates of the NAIRUs, even though their inclusion often helped lower the standard errors.

Deviations of GDP from estimates of its potential level are used as an alternative measure of excess capacity in these countries. Potential output is calculated simply as the trend GDP over the previous 26 years. The results attained using deviations from potential GDP are robust to the inclusion of different trends over various parts of the sample, although the more parsimonious model is used in the estimation presented in the tables.

III. Foreign Capacity and U.S. Inflation

A standard Phillips curve for the United States,

$$\pi_t^{US} = \alpha + \sum \beta_i * UR_{t-i} + \sum \gamma_i * \pi_{t-i}^{US} + \sum \Theta_i * \pi_{t-i}^{NOM} + \sum \eta_i * \pi_{t-i}^{OIL} + \lambda * Nixon + \tau * Nixoff, \quad (3)$$

variants of which are found in Gordon (1977, 1982, 1997), Motley (1990), Weiner (1993), Tootell (1994), and Fuhrer (1995), is used here to examine the effects of foreign capacity constraints on U.S. inflation. Foreign capacity utilization, $UR_t^* - UR^{*FE}$, should help determine non-oil import prices, π^{NOM} ,

$$\pi_t^{NOM} = \sum \beta_i^F * (UR_{t-i}^* - UR^{*FE}), \quad (4)$$

which could affect the U.S. rate of inflation both directly and indirectly.¹¹ Plugging equation 4 into equation 3,

$$\pi_t^{US} = \alpha + \sum \beta_i * UR_{t-i} + \sum \gamma_i * \pi_{t-i}^{US} + \sum \varphi_i * (UR_{t-i}^* - UR^{*FE}) + \sum \eta_i * \pi_{t-i}^{OIL} + \lambda * Nixon + \tau * Nixoff, \quad (5)$$

produces the base specification examined in Table 2.¹² As is usual, the coefficients on the lagged U.S. inflation variable are assumed to sum to one, to ensure inflation stability at a natural rate.¹³

The NAIRUs used to calculate the foreign excess capacity in equation (5) were derived from the results in Table 1. The measure of foreign excess capacity also

¹¹ Non-oil import prices could also depend on lagged prices and should depend on the exchange rate. Which prices to use—lagged import prices or lagged trade-weighted foreign prices, for example—is unclear. Both of these price measures were also included in this standard specification, along with the trade-weighted value of the dollar, with no effect on the results.

¹² Note that any effect of import prices on U.S. capacity will be captured in the estimation through the unemployment rate. Also, Nixon and Nixoff are dummy variables capturing the quarters when wage and price controls were instituted and released.

¹³ A specification that examined relative price shocks, both import price inflation and oil import price inflation relative to U.S. inflation, was also tested. The results were identical.

Table 2
Foreign Capacity Utilization and U.S. Inflation

	Full Sample: 1973:III–1996:II			Short Sample: 1984:III–1996:II		
	Domestic Capacity	Foreign Capacity Added	Nonlinear Relation	Domestic Capacity	Foreign Capacity Added	Nonlinear Relation
Constant	.72*	.64*	.59	.40*	.28	.28
U.S. Unemployment	–.11*	–.10*	–.09*	–.06*	–.05*	–.05*
Lagged Inflation	1	1	1	1	1	1
Oil Import Price Inflation	.01*	.01*	.01*	.0001	.0003	.0001
Foreign Output Gap		–.05	–.30		–.08	–.56
Nixoff	.64*	.63*	.62*			
Observations	92	92	92	48	48	48
Log Likelihood	–17.88	–16.46	–15.96	42.76	45.89	46.4

Note: The coefficients on two lags of unemployment rate are summed. The sum of the coefficients on 12 lags of inflation is constrained to 1. Foreign Output Gap refers to the trade-weighted deviation of unemployment from the NAIRU in the six countries.
 *Significant at the 5 percent level.

Source: Data for U.S. inflation, unemployment, and import prices are from the *Current Population Survey*, U.S. Bureau of Labor Statistics.

requires aggregation of the six different excess capacities. The weights chosen to aggregate these excess capacities were the shares of U.S. imports from each country.¹⁴

These weights should be a good indicator of the pressure on U.S. import prices and U.S. inflation from a given country's capacity, since that pressure should depend on the country's relative importance in U.S. imports. Both U.S. and foreign capacity are included in the equation. If foreign capacity alone determined U.S. inflation, then measures of U.S. capacity utilization should be insignificant and measures of foreign capacity significant. If foreign excess capacity merely moderates U.S. inflation, particularly since U.S. capacity is an important part of global capacity, then both measures of capacity utilization should be important.

Finally, the effect of oil price movements on U.S. inflation is accounted for separately in these Phillips curve estimations, even though the equations examine the CPI excluding food and energy. The inflation in oil prices must be included because oil is an important input to production of so many goods; it should be included separately from other import prices because, to a large extent, changes in oil prices over this sample period were the result of oligopolistic price-setting

¹⁴ The shares were based on total U.S. imports from these six countries, so they always summed to one. As a result, there is no trend in the foreign excess capacity variable due to any possible trend in the weights, although this share appeared to be relatively constant around 50 percent.

behavior that was primarily a function of global politics, not rates of global capacity utilization. As a result, the effect of foreign capacity utilization on U.S. inflation would occur mostly through non-oil import prices.

The coefficients from the estimation of variants of equation (5) are presented in Table 2. The equation is estimated from 1973 to 1996 because the country-specific import weights required to calculate the foreign capacity utilization rate only go back that far.¹⁵ The base specification includes 2 quarterly lags of the unemployment rate, 12 quarterly lags of the inflation rate, and 4 quarterly lags of oil import price inflation. The first column contains the coefficients from a standard Phillips curve—one estimated without foreign capacity. As expected, U.S. unemployment has a significant negative effect on U.S. inflation, and oil prices affect inflation in the expected direction. Since the sample period includes the end of the Nixon wage and price controls, an indicator variable capturing the effect of removing these controls is also included in the regression; its coefficient is correctly signed and of marginal significance.

The second column of Table 2 presents the coefficients from a Phillips curve estimation that adds two lags of the trade-weighted excess of each country's

¹⁵ A longer sample was used when estimating the foreign NAIRUs since the import weights were not needed. The longer sample provides more information about each country's NAIRU.

unemployment above its estimated NAIRU. If foreign capacity constraints significantly determine U.S. inflation, either directly or indirectly, the coefficient should be negative and significant. It is negative but far from significant.¹⁶ Concerns about collinearity between the U.S. and foreign capacity measures can be assuaged, as the estimates of the other coefficients in the equation are little affected by the inclusion of the foreign unemployment gap. In fact, the estimated effect of U.S. unemployment on U.S. inflation remains essentially unchanged from column 1, as is its level of significance. It is not that we cannot tell the difference between the domestic and foreign capacity measures, but that the foreign measure does not appear to affect U.S. inflation.

The exact functional form of any possible relationship between foreign capacity and U.S. prices is not clear. For this reason, column 3 reestimates the Phillips curve allowing for a nonlinear connection between U.S. inflation and foreign capacity. Estimating a nonlinear specification does not increase the importance of foreign capacity. The size of the coefficient is larger in absolute terms because of the change in the functional form.¹⁷ The insignificance of foreign capacity is unaffected by this change in the specification.¹⁸ Other functional forms were tested, with the same result. There is little compelling evidence that this measure of foreign capacity utilization affects either U.S. inflation or the relationship between U.S. capacity and U.S. inflation.

It has been asserted that the importance of foreign capacity to U.S. inflation increased with the trade gap in the 1980s. If so, foreign capacity utilization may have become significantly more important in the mid

¹⁶ The significance is unaffected by the number of lags of foreign capacity included in the equation. Since two lags of the trade-weighted foreign capacity variable are included, the log likelihood ratio testing whether we can reject that the coefficients on the foreign capacity are equal to zero is distributed as a chi-square with two degrees of freedom. The critical value for this ratio is 7.38. Its actual value is 2.8, providing little support that the coefficients are different from zero. In general, this result holds for other inflation measures. For the preferred specification of the chain GDP deflator, the total CPI, core PPI, and the deflator on personal consumption expenditures, foreign capacity has no statistically significant effect. Only for total PPI does foreign capacity appear significant. However, there is little evidence of a robust relationship between these foreign capacity measures and U.S. inflation.

¹⁷ In column 3, U.S. inflation is estimated as a linear function of the U.S. unemployment rate and a nonlinear function of the trade-weighted foreign unemployment gap; as a result, the coefficients are not comparable. The linear form is maintained for the U.S. unemployment rate, as it appears to fit the data better.

¹⁸ The critical value for the significance of the coefficient on foreign capacity is 7.38, and the log likelihood ratio remains far below that value, at 3.8.

1980s. To ensure that the previous regressions are not masking the effect of foreign capacity on U.S. inflation by including the 1970s, the final three columns of Table 2 present the coefficients from reestimates of the first three columns over a shorter sample period, from 1984 on.¹⁹ Foreign capacity remains insignificant.²⁰ The inclusion of the foreign capacity variable still has

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little effect on the other coefficient estimates. It appears that foreign capacity utilization has no effect on U.S. inflation, and that the relationship has not strengthened since the 1980s.

As mentioned earlier, one's confidence in the measure of foreign excess capacity in Table 2 depends on the reliability of the estimates of the foreign NAIRUs. To examine the robustness of the results to different measures of foreign capacity utilization, Table 3 repeats Table 2 using the deviation of GDP from its trend level for both the United States and, on a trade-weighted basis, the six foreign countries examined in this study. The same six countries are used in order to maintain consistency with the previous table.

The results are identical. The first column of Table 3 shows that estimates of a simple Phillips curve using the U.S. GDP gap are very similar to one using the unemployment rate. The positive and significant coefficient on the U.S. GDP gap indicates that GDP beyond trend significantly increases U.S. inflation, as expected. Oil prices remain significant in this reformulation of the basic Phillips curve. Including the trade-weighted deviation of foreign GDP from its trend,

¹⁹ The NAIRUs of our six major trading partners were reestimated over the shorter sample because of the concerns that the NAIRUs in Europe rose substantially in the shorter period. Only the estimate of the NAIRU in Italy rose significantly. The results are identical when the NAIRU estimates from the longer sample are used.

²⁰ The critical value for accepting the importance of foreign capacity utilization in U.S. inflation in the shorter sample is 7.38. The actual value of the log likelihood ratio is 6.26, rejecting that foreign capacity plays an important role in the determination of U.S. inflation. The rejection is stronger if the sample begins in 1980.

Table 3

The U.S. Phillips Curve, with Trade-Weighted Output Gaps

	Full Sample 1973:III–1996:II		Short Sample 1984:III–1996:II	
	Domestic Capacity	Foreign Capacity Added	Domestic Capacity	Foreign Capacity Added
Constant	-.07*	-.07*	-.08	-.05
U.S. Output Gap	9.17*	8.07*	7.25*	4.1*
Lagged Inflation	1.0	1.0	1.0	1.0
Oil Import Price Inflation	.01*	.01*	0	0
Foreign Output Gap		-0.21		1.30
Nixoff	.90*	.92*		
Log Likelihood	-20.97	-18.93	-16.23	-14.75

Note: Nixoff is a price control for the period 1974:Q2–1975:Q1. U.S. Output GAP refers to the deviation of actual income from its potential, and foreign output gap is the trade-weighted deviation of actual income from potential income in the six countries.

*Significant at the 5 percent level.

Source: U.S. GDP data from the U.S. Bureau of Economic Analysis. Foreign GDP data from the Bank of International Settlements, Switzerland.

column 2, has little effect on the estimates in column 1; the coefficient estimate on the U.S. GDP gap is roughly the same, and the coefficient on foreign capacity utilization is small, insignificant, and incorrectly signed.²¹ The last two columns of Table 3 show that the results, again, do not change if the shorter sample is used.²² There appears to be little evidence that foreign excess capacity, no matter how it is measured, helps determine U.S. inflation.

IV. The Effect of Foreign Capacity on Import Prices

It is still possible that the results reveal more about these two measures of foreign capacity than about the effect of foreign capacity on U.S. inflation. For this reason, a different approach is also taken, one that attempts to sidestep the difficulties of quantifying foreign excess capacity. This section and the next examine the different stages of the transmission mechanism through which foreign capacity should affect U.S. inflation. The first stage of the transmission of foreign capacity to U.S. inflation is the effect of foreign

²¹ The log likelihood ratio is distributed as a chi-square with two degrees of freedom. Its critical value is 7.38, while the ratio's actual value is 4.08.

²² The log likelihood ratio is again distributed as a chi-square with two degrees of freedom. Its critical value remains 7.38, while its actual value over this shorter sample is 2.96.

capacity on inflation in foreign prices. The foreign Phillips curves in Table 1 show that foreign capacity utilization does affect foreign rates of inflation. Thus, the progression from foreign capacity utilization to U.S. inflation is being broken either at the link between foreign inflation and U.S. import prices or at the link between U.S. import prices and U.S. inflation. This section examines the first of the latter two links.

Attempts to explain U.S. import prices are presented in Table 4. These regressions are less grounded in theory or history than the Phillips curve equation, so the results from several specifications

were examined. The basic formulation of U.S. non-oil import price inflation,

$$\pi_t^{NOM} = \alpha + \sum \beta_i * GAPUS_{t-i} + \sum \theta_i * GAPF_{t-i} + \sum \gamma_i * \pi_{t-i}^{NOM} + \sum \eta_i * \pi_{t-i}^{OIL}, \quad (6)$$

includes the U.S. and the trade-weighted foreign capacity gaps, GAPUS and GAPF, measured either as deviations from trend GDP or as deviations from the estimated NAIRU, and π^{NOM} , non-oil U.S. import price inflation. Thus, non-oil import price inflation is explained using lags of itself, oil import price inflation, the trade-weighted foreign GDP or unemployment gaps, and the U.S. GDP gap or U.S. unemployment rate.²³

The justification for including the foreign gap is clear; if foreign excess capacity is holding down foreign costs of production, it might restrain the price inflation of foreign goods to U.S. consumers and producers. Alternatively, the level of U.S. capacity might affect import prices, since foreign goods may be

²³ All the import price inflation regressions were also estimated including the trade-weighted exchange rate. These results are less relevant for this study since it is the total derivative of import prices and foreign capacity utilization that we are concerned about, not its partial derivative holding the change in the exchange rate constant. However, when the exchange rate was included in the import price inflation regressions reported in the text, the foreign capacity variable was more apt to reveal a significant effect on U.S. import prices, although the effect was not very robust to different samples or specifications.

Table 4

Domestic and Foreign Capacity Utilization and U.S. Import Price Inflation

	Full Sample 1974:I-1996:II		Short Sample 1984:I-1996:II	
	Unemployment	GDP GAP	Unemployment	GDP GAP
Constant	-.12	.29	-1.26	.18
U.S. Output Gap	.087	6.825	.21	3.929
Foreign Output Gap	-.29	-6.95	.078	-2.42
Non-Oil Import Price Inflation	.452*	.4849*	.5855*	.494*
Oil Import Price Inflation	.045*	.0552*	.0058	-.01004
Observations	90	90	50	50
Log Likelihood	-143.65	-146.06	-70.2	-65.01

Note: The coefficients on 2 lags of the unemployment rate are summed. The sum of the coefficients on 12 lags of inflation is constrained to 1.

*Significant at the 5 percent level.

priced to market. The lagged oil prices are examined for the same reason as in the U.S. Phillips curve analysis: Inflation in oil prices tends to affect the prices of all goods because oil is such a ubiquitous input to production. The lags of non-oil import price inflation capture the inertia in the inflation rate of these prices, but their inclusion is far less justifiable than that of the lags of the dependent variable in the usual Phillips curve equation, which are usually assumed to capture inflation expectations. As a result, the coefficients on these lagged prices, the γ s, are not constrained to sum to 1, particularly since foreign prices and wages will be determined by the expectations of foreign prices in general, rather than simply the prices of their exports to the United States.

The first column in Table 4 shows that neither foreign nor U.S. capacity adds independently to the explanation of import prices when both are included. The significance tends to be higher for the foreign measure of excess capacity. The second column reveals that the same is true when excess capacity is measured as a GDP gap. The final two columns highlight the fact that this effect did not strengthen over the most recent period. Only the coefficients on the lagged inflation terms are significant in these regressions.

As mentioned above, it is unclear which lagged inflation rate should be included as an explanatory variable for import price inflation. One might argue that, just as in the Phillips curve estimation, foreign inflation in general should be included, since the

determinant of the export prices foreigners charge U.S. customers will depend on the expectation of their own inflation rates; firms care about their real return relative to their domestic currency. In this case, lags of the trade-weighted inflation rate as a whole should be included as an explanatory variable. When lags of non-oil import price inflation are replaced with lags of the trade-weighted foreign price inflation, both U.S. capacity, when measured as a GDP gap, and foreign capacity, when measured as an unemployment gap, tend to have a significant effect on U.S. import prices.

All in all, however, although there is some evidence that foreign capacity has an effect on U.S. import prices, it is not particularly robust to different specifications, samples, or the measure of capacity utilization used.

V. The Effect of Import Prices on U.S. Inflation

Examining the determinants of U.S. import price inflation sheds little light on the insignificance of foreign capacity for U.S. inflation. Thus, the last stage in the transmission of foreign capacity's effect on U.S. inflation is examined in this section. The importance of non-oil import price inflation to U.S. inflation can be directly estimated in the U.S. Phillips curve. If foreign capacity affects U.S. inflation, it must be the case that U.S. import price inflation influences U.S. inflation, either directly or both directly and indirectly. Furthermore, if import prices do significantly affect U.S. inflation, then the weakness of the link between foreign capacity utilization and U.S. import prices would appear to explain the failure of foreign capacity to affect U.S. inflation.

Table 5 presents the coefficients from a simple Phillips curve regression with and without various measures of import price inflation. The first column provides the estimated coefficients of the base specification when oil price inflation is included and non-oil import price inflation is omitted. The sample is extended back to the late 1960s, since the availability of

Table 5
Phillips Curve and Import Prices, 1968–1996

	Oil Import Prices	Oil & Non-Oil Import Prices
Constant	.528*	.458*
U.S. Unemployment	-.0876*	-.084*
Lagged Inflation	1.0	1.0
Oil Import Price Inflation	.0105*	.0086*
Non-Oil Import Price Inflation		.047
Nixon	-.30*	-.35*
Nixoff	.61	.52
Log Likelihood	-18.26	-15.0

*Significant at the 5 percent level.

country-specific import data is no longer a binding constraint.²⁴ The unemployment rate is significant and correctly signed, as is the sum of the coefficients on the oil import price inflation.

The second column of the table presents the coefficient estimates when both oil import price inflation and non-oil import price inflation are included.²⁵ Oil import price inflation still adds significantly to the explanation of U.S. inflation, while non-oil import price inflation does not.²⁶ These results suggest that any effect of import prices on U.S. inflation derives from their oil component. If, however, import prices were having a significant effect on U.S. inflation, either directly or indirectly, both oil and non-oil import prices should influence U.S. inflation. It appears that the only foreign price changes to significantly affect U.S. inflation were oil price changes.

The lack of a significant relationship between

²⁴ The results are identical over the sample examined in Tables 2, 3, and 4, however.

²⁵ The constraint on the coefficients on the lagged price variables in the Phillips curve is invalid if a subcomponent of the index is run independently. However, as will be discussed later, the import deflator prices do differ from the consumer prices, so the import prices are not exactly a subcomponent. Furthermore, examining import price inflation relative to U.S. inflation has no effect on the results.

²⁶ Since four lags of all the import price inflation indexes were examined, the likelihood ratio is distributed as a chi-square with four degrees of freedom, the critical value of which is 11.1. The actual value for the log likelihood ratio for the test of the significance of the coefficients on oil import price inflation is 16.02. The value of the likelihood ratio testing whether non-oil import price inflation adds to the Phillips curve is 6.52, well below the critical value of 11.1.

import price inflation and U.S. inflation is surprising.²⁷ Common sense, and equation 1, tell us that if import prices change radically enough, they must have some effect on U.S. inflation. Table 6 examines this hypothesis by distinguishing episodes when non-oil import

Large increases in non-oil import price inflation do have a significant effect on U.S. inflation, just as foreign oil price changes do, but large declines in these prices do not.

price inflation changed significantly from those when the movements were more benign. Non-oil import price inflation is defined as significant if it is a standard deviation above or below its mean value. The first column shows that large changes in non-oil import prices do have a significant effect on U.S. inflation. Columns 2 and 3 examine whether this effect is symmetric: Do large decreases in import prices have the same effect as large increases in import prices? The last two columns of Table 6 reveal that all the significance of the threshold effects comes from large *increases* in non-oil import price inflation. This result is interesting because it is relevant for today's policy debate since import prices are declining, not increasing. There is no evidence that even large declines in import prices affect U.S. inflation.

As imports are a component of the CPI, one would expect that the coefficient on import prices

²⁷ The tests in Table 5 were performed with other measures of U.S. inflation. The results examining total CPI and the deflator for consumer expenditures were consistent with the results above; a specification with a statistically selected lag length of past inflation rates always rejects the importance of non-oil import price inflation in these other consumer price measures. The importance of the non-oil import prices in the PPI is consistently rejected over various specifications and samples. Over some specifications, there is some evidence that non-oil import prices influenced inflation of the GDP deflators, both the fixed-weight and the chain-weighted deflators. Since GDP inflation measures include no imported goods directly, the result might appear surprising. However, the close correlation between export and import prices could explain the result. Even with the GDP deflators, the importance of non-oil import prices is not robust to different specifications of the lags in the prices used or the sample selected. Other inflation measures do not offer strong evidence of a relationship between non-oil import prices and U.S. inflation.

Table 6
Phillips Curve and Import Prices: Threshold Values

	Large Changes in Non-Oil Import Prices	Large Movements Up in Non-Oil Import Prices	Large Movements Down in Non-Oil Import Prices
Constant	.498*	.57*	.519*
Unemployment	-.087*	-.1011*	-.085*
Lagged Inflation	1	1	1
Oil Import Price Inflation	.0065*	.0065*	.0114*
Large Changes in Non-Oil Import Prices	.0796*		
Large Upward Changes		.0967*	
Large Downward Changes			.0436
Nixon	-.32*	-.33*	-.31*
Nixoff	.397*	.305	.593*
Log Likelihood	-11.28	-11.2	-15.3

*Significant at the 5 percent level.

would at least be equal to their share in the CPI, while coefficient estimates greater than that share would suggest pricing discipline on U.S. producers. Although imports are a relatively small share of the CPI, if those prices consistently moved with import prices, the coefficient may be small, but the effect would be statistically significant. A closer examination of the two price series may explain why it is not. The CPI measures the prices paid by consumers at the retail level. The import price index measures the prices paid by the importer at the docks. The importer charges a different price to the distributor, the distributor charges another price to the retailer, and finally the retailer charges still another price to the consumer. The profit squeeze or profit expansion caused by the differential between import prices and U.S. consumer prices may be borne by any of these links in the chain. In other words, the pricing to market is not relevant

just to the foreign producer's behavior, but it may also be important to the behavior of the domestic importers, distributors, and retailers. For this reason, the behavior of the dock price of imports may differ significantly from their retail price, especially in the short run.

VI. Conclusion

It has been asserted repeatedly that the surprisingly good news on inflation, given the low level of the unemployment rate, is not only good luck but the direct result of increased global competition and excess

global capacity. If this statement is true, then policymakers need not worry about the current low level of unemployment since, given the current level of excess global capacity, inflation will not rise. However, if this assertion is correct, several relationships should be clear in the data. Most obviously, global capacity should directly affect U.S. inflation in a traditional Phillips curve. This paper finds no evidence of such a relationship. Furthermore, if foreign capacity did affect U.S. inflation, U.S. import prices would depend on foreign capacity, and U.S. import prices would have a strong relationship to U.S. consumer prices. Neither relationship appears to occur. The results in this study suggest that anyone who believes in a world where we no longer need worry about domestic capacity constraints will eventually be rudely awakened by data that suggest otherwise.

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