Exchange Rates and U.S. Import Prices: Bilateral and Aggregate Price Effects

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Abstract:

An important issue for U.S. trade and domestic pricing is the extent to which exchange rate changes affect the prices of imported goods. In theory, a change in the value of the dollar should raise or lower the cost of foreign goods, thereby reducing or increasing U.S. demand for imports. However, numerous economic studies have shown that when the dollar fluctuates against foreign currencies, U.S. import prices tend to show much less change. This paper reviews some of the recent economic literature, such as pricing-to-market, currency invoicing, and cross-border production, which explains why U.S. import prices tend to show little change. Using data for 1999 to 2008, the paper estimates exchange rate pass-through to U.S. import prices for aggregate U.S. imports (all imports excluding oil and consumer goods), and for prices of imports from Japan, the European Union (EU), Canada, the NIEs (Taiwan, Singapore, South Korea, and Hong Kong), and Latin America (largely Mexico). The exchange-rate pass-through estimates were found to be low (0.38 for all imports excluding oil and 0.20 for consumer goods). Estimates of bilateral exchange- rate pass-through range from 0.63 for Latin America to 0.0 for the NIEs. These estimates may be useful to gage the effects of future changes in the dollar on U.S. inflation and international trade.

I. Introduction

The relationship between exchange rates and U.S. import prices is important to understand the nature of U.S. import flows as well as the behavior of U.S. consumer prices. For example, a weaker dollar is usually considered to be a key mechanism for increasing the international competitiveness of U.S. producers. However, economists have generally found that prices of imported goods do not usually respond with one-to-one to changes in the exchange rate. For example, between February 2002 and July 2008, the dollar fell by almost 35 percent against a broad index of foreign currencies, while U.S. Department of Labor (DOL), Bureau of Labor Statistics (BLS) price index for all imports excluding petroleum rose by 20 percent, and the price index for imported consumer goods rose by a mere 6 percent.[1] Moreover,

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[1]DOL, BLS import price indexes. http://www.bls.gov/mxp/ (accessed January, 2009).

The Federal Reserve has incorporated the lack of strong relationship between the dollar and import prices into its analysis of inflation. For example, according to Federal Reserve Board research, the low pass-through of exchange rate changes to import prices is expected to result in a relatively small effect when the dollar depreciates on broad measures of core inflation.[2]

This paper explores some of the reasons why some import prices change so little relative to a change in the value of the dollar. In theory, a weaker dollar should raise the cost of foreign goods for U.S. consumers, thereby reducing U.S. demand for imports, while boosting foreign demand for U.S. goods by making exports more price-competitive abroad. However, economic research suggests that the link between the exchange rate and the prices of imported goods is more complex, with fluctuations affecting U.S. import prices to varying degrees, depending on the industry. These studies show that the effect of an exchange rate change depends on firms' price-setting behavior.

Exchange rate studies usually focus on the rate of exchange-rate pass-through--the impact of a change in the exchange rate on prices in the importing country. A number of exchange-rate pass-through studies have shown that pass-through to U.S. import prices[3] is quite low, and some argue that it has declined in recent years.[4] There are three prominent explanations of why exchange-rate pass-through to U.S. import prices might be low:[5] (1) exporters "price to market" by lowering or raising their profit margins to offset the effects of the exchange rate change; (2) exporters set their prices in the local currency of the importing country and these prices do not fluctuate with the exchange rate, at least in the short run; and (3) cross-border production which leads to lower pass-through when production costs are denominated in different currencies. In addition, Marazzi and Sheets (2007) found a decrease in exchange rate pass-through for product markets in which Chinese exports gained market share, at least through 2004, when the Chinese yuan was pegged to the dollar.

In addition to discussing pass-through behavior, the paper provides econometric estimates of exchange-rate pass-through to the U.S. market both for aggregate U.S. import prices and for the prices of imports from bilateral trading partners. The paper takes advantage of the locality price indexes that have been collected by the BLS since 1999 to estimate how exchange-rate pass-through behavior differs among U.S. trading partners. Exchange-rate pass-through estimates are for U.S. aggregate imports (imports excluding oil and consumer goods) and for U.S. imports from Canada, the European Union (EU), Japan, the Newly Industrializing Economies (NIEs–Hong Kong,

[2]Wall Street Journal, "Slack Labor Markets Will Hold Down Prices," June 24, 2009, p. 15.

[3]The price indices examined usually exclude the price of oil, due to its volatility. Some studies also exclude semiconductors and computers, arguing that price determination is different for these industries relative to other consumer goods.

[4]Mishkin (2008). Mishkin's analysis is based on the work of Marazzi, Sheets, and Vigfusson (2005) and Marazzi and Sheets (2007). On the other hand, Hellerstein, Daly, and Marsh (2006) argue that, although declining, the change has not been very significant.

[5]These are the three main explanations cited by Mishkin (2008). See also Campa and Goldberg (2002) and Marazzi and Sheets (2007).

Singapore, Taiwan, and South Korea), and Latin America. The estimates of exchange-rate pass-through are found to be low, well less than 1, and are consistent with other estimates obtained from the literature. However, a major finding is that exchange-rate pass-through does vary by country or origin, with NAFTA partners Mexico and Canada having the highest estimated exchange rate pass-through, and Japan and the NIEs having the lowest.

This paper is organized as follows. First, the review of literature discusses the economic factors determining the extent of exchange-rate pass-through, such as pricing-to-market, currency invoicing, and cross-border trade, and provides a survey of recent economic studies that estimate exchange-rate pass-through and examine exporter behavior. The next section provides the methodology used to estimate exchange rate pass-through to the U.S. market using recent data from 1999 to 2008 for U.S. aggregate imports and U.S. imports from various U.S. trading partners. The final sections of the paper discuss the results and provide conclusions.

II. Literature Review

Pricing- to-Market

In the exchange-rate pass-through literature, pass-through is considered "complete" when the response is one-for-one–e.g., when a 1 percent change in the exchange rate results in a 1 percent change in the import price. Krugman (1987) was one of the first economists to suggest that exchange rate changes could be passed through to traded goods prices, or absorbed in producer profit margins or markups (pricing-to-market). Krugman suggested that following a depreciation of an importer's currency, which would otherwise raise the cost of imported goods, the foreign exporter might cuts his domestic currency export price to stabilize the price in the importing country's market. This type of strategy could be a temporary one, or a more long-term effort to maintain market share.

According to Krugman, markup rates are industry specific and depend on the demand curve facing the exporter in a specific country. Exporters facing highly elastic demand curves and competition might reduce their markups in the event the importer's currency depreciates in order to keep importer prices constant and preserve market share. On the other hand, an exporter facing few competitors and inelastic demand might pass-through the exchange rate change to maintain his profit margin (markup over cost). However, firms with a high degree of market power might cut into their profit margins (markups), rather than raise prices to prevent new suppliers from entering the market and to avoid the risk of losing market share. The exchange-rate pass-through therefore depends on the structure of demand and competition in the industry.

Cross-Border Production

The role of cross-border production in exchange-rate pass-through is also evident from equation (2).[6] If firms are using imported inputs, then the exchange rate is also an argument in the exporter's cost function.. For example, assume an exporter imports raw materials in dollars that account for 50 percent of production costs, the rest of the production cost is denominated in the exporter's currency, and the dollar depreciates relative to the exporter's currency by 5 percent. The exporter would only have to raise his price by 2.6 percent to generate enough local currency to cover the

[6]Campa and Goldberg (2002) discuss the role of cross-border production and the exporter's markup.

local costs– an exchange-rate pass-through of .52—because the cost of the raw material is fixed in dollars. If production occurs in several stages in a number of different countries, then production costs are incurred in different currencies. The exchange rate pass-through can be less than 1 as long as all the currencies do not experience the same appreciation/depreciation against the currency of the exporter.[7]

Currency Invoicing and U.S. Imports

A closely related phenomenon to the principle of pricing-to-market is local currency pricing (LCP). Exporters can invoice in their own home currency (producer currency pricing–PCP), in the currency of the importer (LCP), or in a third-party currency ("vehicle"currency pricing–VCP).[8] There is a close relationship between PTM and LCP. In the short-run, import prices will stay the same when the exchange rate changes if they are priced in local currency. Thus, invoicing in LCP reduces exchange-rate pass-through, at least in the short run. However, foreign producers could resist increasing the local-currency-denominated prices of their goods in the long term to remain competitive in foreign markets. According to Kamps (2006), a key reason to use LCP is to keep prices stable in the importing market, but exporters then face uncertainty in the actually price they receive (in their own currency).

In theory, if the exporter using LCP adjusts the importer's price to an exchange rate change in the longer run, there should be no difference in exchange-rate pass-through using PCP or LCP, and the pass-through should equal one. However, Gopinath, Itshoki, and Rigobon (2007) suggest that currency invoicing does matter. Using unpublished monthly BLS data for 1994-2005, they estimated the average long-term pass-through for imports priced in dollars to be 0.25, whereas for import goods not priced in dollars, the average pass-through was .95, or almost 1. Gopinath, Itshoki, and Rigobon further report that in 2004, 93 percent of U.S. imports were priced in dollars, up from 88 percent in 1994. This indicates the strong presence of LCP in U.S. imports.

Vehicle Currencies and Commodity Prices

In cases where goods are very close substitutes and consumers can easily shift among suppliers, an exporter may prefer to price in the same currency as his competitors (vehicle currency). The dollar is the most common "vehicle" currency in international trade (see data in Figure 1). Homogeneous commodities, such as metals, minerals, and agricultural commodities, are typically priced in dollars. In addition, countries such as Korea, Thailand, and other Asian countries often price most of their exports in dollars, using the dollar for a large part of their exports, regardless of the U.S. share.

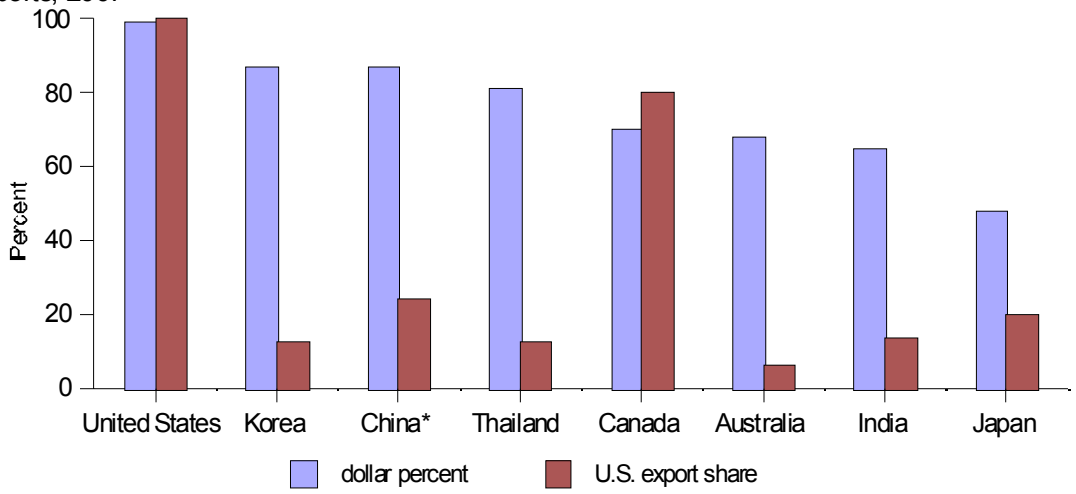
Due to dollar pricing, commodity prices are highly correlated with changes in the dollar, and are expected to rise when the dollar declines and vice versa. Thus, it has been common to report pass-through estimates for U.S. imports less oil, or consumer goods alone. More recently, Mazzani, Sheets, and Vigfusson (2005) included commodity prices as a variable in estimated pass-through equations to control for the indirect effect of the dollar. Aggregate exchange-rate pass-through holding commodity prices constant is expected to be lower compared to estimates that do not control for

[7]Mazzani and Sheets (2007).

[8]For a discussion of currency invoicing see Kamps (2006) and Goldberg and Tille (2007).

commodity effects.[9]

Figure 1 Exports: Dollar invoicing, various countries , 2003-2007 and U.S. share of exports, 2007



*Data are for Chinese exports of textiles only

Source: Goldberg and Tille; Bank of Thailand; Kamps; Bernard; and GTIS, Global Trade Atlas Database.

Estimates of Exchange-Rate Pass-Through–United States

Numerous economic studies have examined the extent of exchange-rate pass-through to import prices both in the United States and in foreign countries. These studies measure the sensitivity of movements in merchandise import prices to changes in the U.S. dollar (for exchange-rate pass-through in the U.S. market), after controlling for other factors that influence the evolution of import prices, such as foreign production costs, and in some cases, commodity prices.

The study by Marazzi, Sheets, and Vigfusson (2005), using a data sample from 1972 to
2004, found a U.S. pass-through rate of 0.12 for the sample ending in the last ten years of the
study, based on U.S. prices for imports less energy products, computers, and semi conductors,
holding commodity prices constant.[10] The exchange rate pass-through including the commodity price effects was estimated to be 0.3. The authors also found that exchange rate pass-through tends to occur quite rapidly, with the contemporaneous coefficient and one lag accounting for most of the exchange rate pass-through. The authors cite the increasing role of China in the U.S. market as one of the factors likely contributing to

[9].Hellerstein, Daly, and Marsh (2006), and Mazzani and Sheets (2007).

[10]The authors eliminated petroleum products due to high price volatility, and computers and semiconductors due to arguments that their prices behave differently due to hedonic price adjustments. However, they note that excluding computers and semiconductors did not significantly affect the results as compared to including these products.

the low exchange-rate pass-through in recent years. Hellerstein, Daly, and Marsh (2006) estimated aggregate-level exchange-rate pass-through into U.S. prices to be 0.51 using data on imports less petroleum products from 1985 to 2005 (quarter 2), and 0.36 holding commodity effects constant.

Estimates of Exchange Rate Pass-through–Foreign Exporters

If pass-through is low, exporters are absorbing changes in exchange rate adjustments in their profit margins by adjusting their export prices to offset the effects of the exchange rate change. A number of studies have analyzed the behavior of exporters and how they react to exchange rate movements in the U.S. market. These studies have generally found that export prices are tend to be more sensitive for exports to the U.S. market, thus indicating that PTM or LCP behavior.

Marazzi, Sheets, and Vigfusson (2005) estimated the impact of the U.S. dollar exchange rate on export prices (denominated in the exporter's currency) charged in the U.S. market and found that export prices tend to be relatively more sensitive for exports to the U.S. market. Analyzing export prices for the EU, Canada, Japan, the United Kingdom, and the Asian NIEs, the study found that a 10 percent appreciation of the exporter's currency against the dollar was associated with a 7 percent to 8 percent decline in export prices charged in the U.S. market. This means that U.S. import prices increase 2 to 3 percent–or a pass-through of 0.2 to 0.3. In contrast, the study found that the same exporters vary their export prices to all markets on average 3 percent to 5 percent in response to an exchange rate change. This result means that import prices increase 5 to 7 percent, on average, to all markets in the event of an appreciation of the exporter's currency–a pass-through of 0.5 to 0.7.

Parsons and Sato (2008) investigated exchange rate pass-through by Japanese exporters for three destinations: the United States, the EU, and East Asia using Japanese 9-digit HS data for 27 manufactured products. They examined the change in the Japanese export price (in yen) in response to a bilateral change in the exchange rate using data from 1988 to 2005. The currencies used by Japanese exporters for invoicing exports affected the estimated pass-through coefficients. They noted that the United States largely imports in dollars, but the EU tends to import from Japan in euros, with the yen and dollar occupying smaller shares. In East Asia, approximately 50 percent of Japanese exports are denominated in yen, but exports in U.S. dollars are also common.

Regression results showed PTM behavior to be more common in Japanese exports to the United States, and to a lesser extent the EU. In contrast, they found exchange-rate pass-through to be relatively high in East Asia, meaning that Japanese exporters did not tend to vary their export prices to this group in the event of a bilateral exchange rate change. Parsons and Sato hypothesized that while PTM may not be occurring in the destination currencies in East Asia, Japanese exporters may set their export prices in the region in relation to world prices denominated in dollars. They found PTM in automobiles, and transportation and related parts exports both in the EU and the United States. In addition, they found PTM behavior in steel in the U.S., EU, and the East Asian market.

Fukuda and Ono (2004) investigated the stability of Korean export prices for 19 commodities against changes in the U.S. dollar, Japanese yen, and euro versus the Korean won from 1998 to 2002 using regression analysis. The purpose of this study

was to show how the use of a dominant vehicle currency (the dollar) for invoicing exports affects Korean export prices. As noted earlier, payments in U.S. dollars are dominant in East Asian trade. Fukuda and Ono's results showed that export prices in Korea have high correlation with the U.S. dollar (0.837 meaning that a 1 percent change in the won/dollar exchange rate is associated with a 0.8 percent change in won export prices), and modest correlation with the yen and the euro. Moreover, they showed that Korean export prices were highly correlated in terms of the U.S. dollar even in commodities for which Japan had the largest export market share.

Fukuda and Ono's results are consistent with LCP and low ERPT to the U.S. market.[11] They also argue that Korean exporters may choose to sell their products in U.S. dollars since their products are less differentiated and competitive pressures may lead to exporting firms choosing to invoice in dollars, even if the United States is not a trade partner.

Exchange-Rate Pass-Through--China

Bernard (2008) examined the role of exchange rates on Chinese firms, specifically, textile and apparel exporters based on an original survey of over 230 firms in 2006. This study found that Chinese exporters of textiles and apparel receive the majority of their export revenues in dollars (88 percent), while the United States accounts for roughly 24 percent of sales.[12] According to Bernard, the intense competition in textile and apparel markets makes the dollar an attractive vehicle currency, but combined with low margins on exports, places many Chinese firms in a position of substantial exchange rate risk. The study suggests that the most likely response of Chinese textile and apparel exporters in the event of an appreciation of the yuan is to raise export prices due to the lack of alternatives to minimize exchange rate risk.

III. Methodology

Estimation of exchange-rate pass-through has typically been based on the law of one price, combined with the pricing-to-market literature. According to standard economic trade theory, if we ignore transport and other border costs, the dollar price of U.S. imports equals the foreign currency export prices converted into dollars (E = $/foreign currency) for sale in the U.S. market as shown in equation 1 below:

(1) $P_t^m = E_t P_t^x$

where P_t^m is the domestic price in the importing country;

E_t is the nominal exchange rate (domestic currency per unit of foreign exchange); and

P_t^x is the foreign price (in units of foreign currency).

As denoted above, a depreciation of the dollar (increase in E_t) must result in a rise in U.S. import prices of the same magnitude, unless there is a decline in the prices foreign producers receive, and vice versa.

The impact of an exchange rate change on import prices is usually defined as the percent change in the local currency import price (P_t^m) resulting from a one percent change in the exchange rate between the exporting and importing country (E_t). For

[11]For example, assume the dollar depreciates against the Korean won. If Korean prices are set in U.S. dollars, then we would expect that Korean export prices in won to fall with the dollar depreciation.

[12]Bernard (2008), pp. 6-7.

example, if the dollar falls by 10 percent, equation (1) implies that the import price in the United States in dollars should increase by 10 percent–a pass-through equal to one. If this does not occur, equation (1) suggests that foreign producers must be absorbing some of the decline in the value of the dollar. This is labeled as "incomplete" pass-through of exchange rates to import prices. For example, exporters could lower their export prices by 5 percent. This means that import prices will increase by 5 percent–an exchange rate pass-through of 0.5.

The analysis of pricing-to-market considers the following relationships among prices, exchange rates, and costs for differentiated products characterized by monopolistic competition:[13]

(2) $P_t^m = E_t P_t^x = E_t Mkup^x C_t^x$

and

(3) $Mkup_t^x = P_t^x / C_t^x$

where (C_t^x) is the exporters marginal cost, and $Mkup_t^x$ is the exporter's markup over marginal cost. The markup rate could be 2, for example, giving the exporter a profit of 200 percent over marginal cost.

Based upon equation (2) and the pricing-to-market literature, the following equation was used to estimate the pass-through of exchange rates to U.S. import prices:

(4) $Pt^m = \alpha + a_{t-i} E_{t-i} + c_{t-j-} wp_{t-j} + d_t(U.S.\ GDPt) + \varepsilon_t$

where: P_t^m is an index of U.S. import prices in period t; is a constant; E_{t-i} is the U.S. exchange rate (broad-based or bilateral with the specific country, in dollars per foreign currency unit) at time t minus i; wp_{t-j} is a control for price (cost) movements that affect import prices independently of the exchange rate in period t-j. In addition, Campa and Goldberg (2002) suggest that exchange-rate pass-through equations should control for the effects of U.S. demand on import prices, thus U.S. GDP_t (U.S. gross domestic product [volume basis] in period t) is included in the equation. Finally, ε_t is a regression error term.

In equation (4), the estimated coefficient on E_t, a_i, is the pass-through coefficient, and is expected to be between 0 and 1:

a_i = 1, import prices change with exchange rates on a 1 to 1 basis, and pass-through is complete;

a_i = 0, denotes import prices do not change with exchange rates, and there is no pass-through;

$0 < a_i < 1$, import prices change with exchange rates, but less than the change in the exchange rate, and pass-through is incomplete.

The equation was estimated for aggregate U.S. import prices, and for import prices from Canada, Japan, the NIEs (Taiwan, South Korea, Singapore, and Hong Kong), the EU, and Latin America. The aggregate price indexes are the import price

[13]See, for example, Campa and Goldberg (2002). Pricing-to-market requires differentiated goods so that exporters have a markup over cost to vary with the exchange rate.

index for all commodities excluding oil, and the import price index for consumer goods from the BLS. The bilateral import price indexes are the BLS locality price indexes. Exchange rates are from the Federal Reserve Board.[14]

The exchange rate used in the aggregate price equations is a weighted average of exchange rates of major U.S. trading partners. The exchange rate in the bilateral equations is the dollar exchange rate relative to the bilateral trading partner, or the euro, in the case of the EU. The variable wp_{t-j} is measured as foreign wholesale (producer) prices in all equations except the U.S. aggregate import equations (all commodities except oil and consumer goods) where wp_{t-j} is measured as the percent change in the average world consumer price index. The foreign price indexes and the U.S. GDP data are from the International Monetary Fund, International Financial Statistics. All variables are in logarithm first differences, except the world consumer price, which is on a percentage change basis.

The use of the BLS locality price indexes limited the length of time over which the exchange-rate pass-through could be estimated since the locality price series was instituted in 1999. However, the use of actual prices collected by BLS, rather than unit value import data, helps to correct for the well-known deficiencies of import unit value data, which are often poor and do not reflect changes in products and product composition. The equations were estimated using quarterly data from 1999 to 2008. To control for commodity effects, the import prices indices for Canada, the EU, and Latin America are for manufactured goods only. For Japan and the NIEs, the import price indices are for all commodities (which are heavily weighted toward imports of manufactures).

The BLS locality price index for the NIEs includes import prices for four countries (South Korea, Taiwan, Hong Kong, and Singapore). Therefore, the exchange rate and the domestic price variables for the NIEs are trade-weighted averages based on U.S. Customs import value data, with the weights adjusted every year. Similarly, the locality index for Latin America includes Mexico and countries in Central America, the Caribbean, and South America. However, an analysis of manufactured goods imports from these countries indicated that, in recent years, approximately 85 percent of these imports are from Mexico and Brazil, with Mexico accounting for the preponderance. Thus, the exchange rate and domestic price variables for Latin America are weighted averages, with the weights based on Brazilian and Mexican U.S. import data.

An additional limitation of the locality import price data is that the EU index includes all of the EU countries–including the United Kingdom. The EU regressions were estimated relative to changes in the euro–no correction was made for the effect of the UK pound.

The exchange rate and foreign price variables are entered in the equations for the current period and with up to 3 lags, except for the Latin America equation, where 4 lags were used for the exchange rate variable. Thus, the estimated exchange-rate pass through is long-term and takes into account the amount of time that it often takes for exchange rates to affect import prices. The equations were estimated using ordinary least squares with a correction for serial correlation.

[14]Board of Governors of the Federal Reserve System, Foreign Exchange Rates.

IV. Findings/Discussion

The data showing the graphical relationships between U.S. dollar exchange rate changes, aggregate import prices, and import prices for Japan, the NIEs, the EU, and Japan are shown in Appendix Figures A.1 to A.6. The exchange rate is denoted as dollars per foreign currency unit so that an increase in the exchange rate represents a depreciation of the dollar. One would expect a positive correlation between the exchange rate and import price changes. All data are in natural log first differences, reported on a quarterly basis. The figures show how import prices have changed with the exchange rate from 1999 to 2008. The data as graphed do not take account possible lags in the effect of exchange rate changes on import prices and they do not control for movements in import prices that are unrelated to changes in the exchange rate.

Appendix Figure A.7 shows BLS import price and exchange rate changes for China, which allowed the yuan to fluctuate against the dollar starting in July, 2005. The data show an upward trend in the dollar/yuan exchange rate and in U.S. import prices, particularly starting in 2006. The available data did not support econometric estimation of exchange-rate pass-through for U.S. imports from China due to the small number of observations available after the yuan was allowed to fluctuate.[15] However, due to the importance of China in U.S. trade, the extent to which import prices for Chinese goods increase with the dollar exchange rate will have a large effect on the overall estimate of U.S. exchange rate pass-through.

The OLS coefficients estimated for the exchange-rate pass-through are shown in Table 1. The actual regression results are in Appendix Table 1. All of the estimated exchange rate coefficients are statistically significant at the 1 percent level, except for the NIEs.

The estimated exchange-rate pass-through for aggregate U.S. imports less oil is slightly higher than the estimate of Marazzi, Sheets, and Vigfusson (2005), but lower than the estimate of Hellerstein, Daly and March (2006), both of which were estimated for different time periods. The estimated pass-through of 0.38 for aggregate imports less oil means that 38 percent of a change in the value of the dollar against the currencies of major trading partners, on average, is passed-through to U.S. import prices over a 3-quarter period. The estimated exchange rate pass-through of 0.20 for consumer goods is slightly higher than the previous studies and includes a period when the Chinese yuan was appreciating against the dollar.

The exchange-rate estimates show the highest pass-through for manufactured imports from Latin America (0.63) and Canada (0.33). As noted earlier, the results of the Latin America equation largely reflect the influence of Mexico, which accounts for the largest part of U.S. imports from this region. The relatively high estimated exchange-rate pass-through for these countries is an interesting result, as it is generally considered that the United States economy and trade are highly integrated with these countries due to the NAFTA. The

[15] OLS estimation with just 14 quarterly observations resulted in a 0.41 exchange-rate pass-through, statistically significant at the 10 percent level. The estimation period included China's elimination of some export rebates, which likely affected the estimate. In addition, the quality of China's producer price data affected the estimate.

high exchange-rate pass-through, particularly for Latin America, might indicate that exchange rate costs are included in intrafirm pricing and accounting practices. The actual effects on wholesale and consumer prices
might be different once the pricing strategies of parent firms in the United States are taken into
consideration. But, this result certainly suggests some future research.

TABLE 1. U.S. imports: Exchange-rate pass-through, 1999-2008

Imports from:	Products	Exchange-rate pass-through estimate[1]	Standard error
All countries	Imports less oil [2]	0.38***	0.133
All countries	Consumer goods	0.20***	0.064
Japan	All products	0.12***	0.038
EU	Manufactures	0.24***	0.066
Canada	Manufactures	0.33**	0.125
NIEs	All products	0.00	0.011
Latin America	Manufactures	0.63***	0.153

Source: Estimated using data from DOL, BLS and the Board of Governors of the Federal Reserve.

[1] Quarterly observations. Estimates are long-run. Coefficients give the percent change in import price for a 1 percent change in the exchange rate.
[2] Excludes petroleum and petroleum products.
* = significant at the 10 percent level
** = significant at the 2 percent level
*** = significant at the 1 percent level

The relatively low estimated exchange-rate pass-through for imports from Japan is consistent with the study by Parsons and Sato (2008), which found that PTM behavior among Japanese exports is common for exports to the United States. Most of the exchange rate pass-through for Japan is was found to take place in the first and third quarters. The non-existent exchange-rate pass-through found for the NIEs is consistent with the study by Fukuda and Ono (2004) which showed that East Asian countries tend to set their export prices in dollars across export markets. The estimated exchange-rate pass-through of 0.24 for the EU makes sense–the coefficient is lower than that of Latin America (Mexico) and Canada, whose economies are highly integrated with that of the United States, but higher than the estimates for Japan and the NIE's where PTM behavior is common.

V. Conclusions

This paper has examined some of the reasons why changes in the value of the

U.S. dollar could result in low pass-through to U.S. import prices. This is an important issue for U.S. trade competitiveness because if exchange rate changes are fully passed through to U.S. import prices, such exchange rate changes could result in increased costs (exchange rate depreciation) or increased competitiveness (dollar appreciation) of domestic producers relative to foreign suppliers. In addition, as the United States spends its stimulus dollars and runs budget deficits, it is useful to have some understanding as to how the U.S. exchange rate effects import prices.

Some of the economic explanations for low exchange-rate pass-through include pricing-to-market, dollar invoicing, and global sourcing. Both the economic literature, and the data compiled in this report, indicate low exchange-rate pass-through to U.S. import prices, particularly for consumer goods.

The estimates in this paper indicate that exchange-rate pass-through is low, but not insignificant, and varies by import source. The lowest exchange-rate pass-through was found for imports from Asian countries--the NIEs and Japan. Exchange-rate pass-through appears to be highest for the Latin America (Mexico) and Canada, with the EU in between.. The higher rate of exchange-rate pass-through for Latin America and Canada, may be linked to the interrelated manufacturing processes between these countries and the United States, although this is not explored in the paper.

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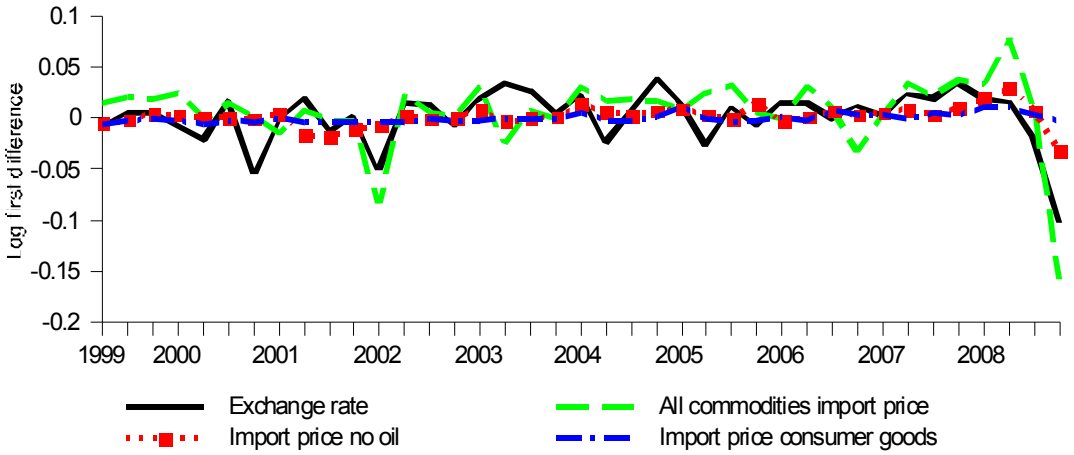
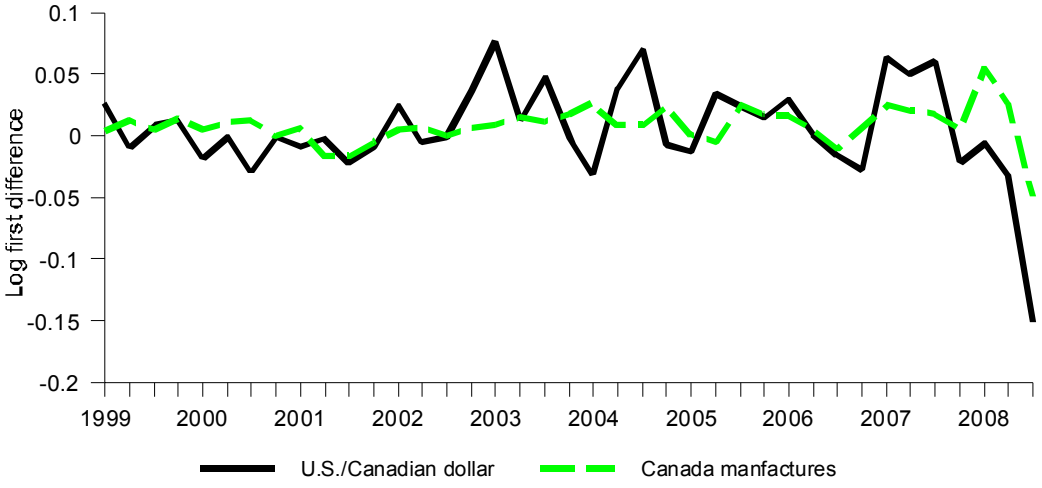
Figure A.1 Change in U.S. exchange rate and U.S. import prices, 1999–2008



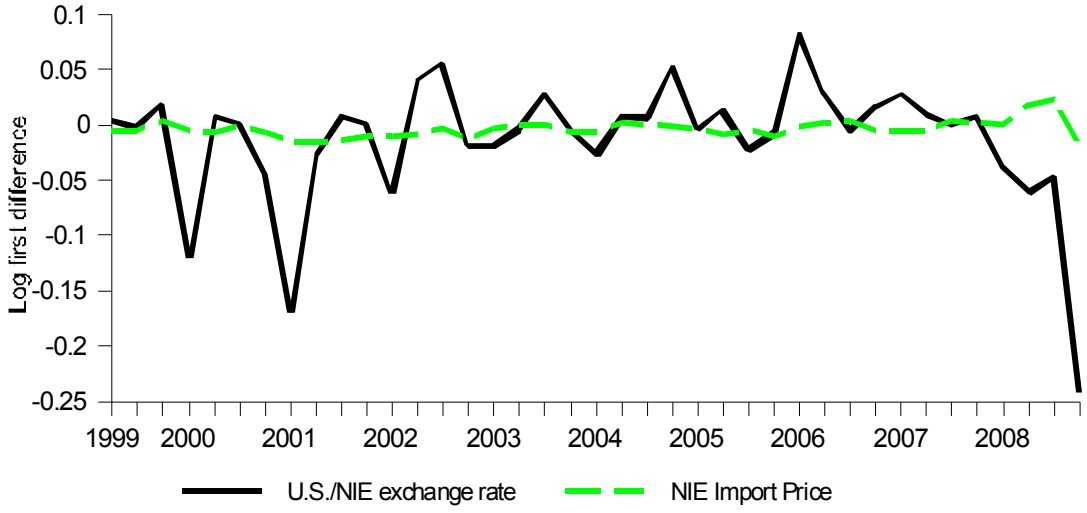
Source: DOL, BLS and Federal Reserve Board. U.S. dollars per foreign currency in terms of a broad basket of currencies.

Figure A.2 U.S.Canadian Dollar exchange rate and Canadian import prices, 1999–2008



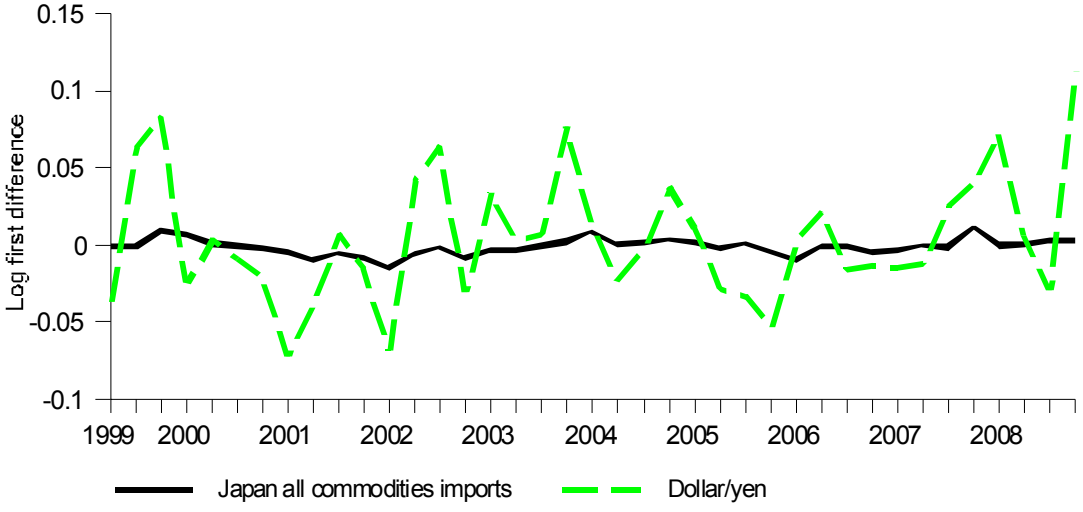
Source: DOL, BLS and Federal Reserve Board.

Figure A.3 Change in U.S./Asia NIEexchange rate and NIE import prices, 1999–2008



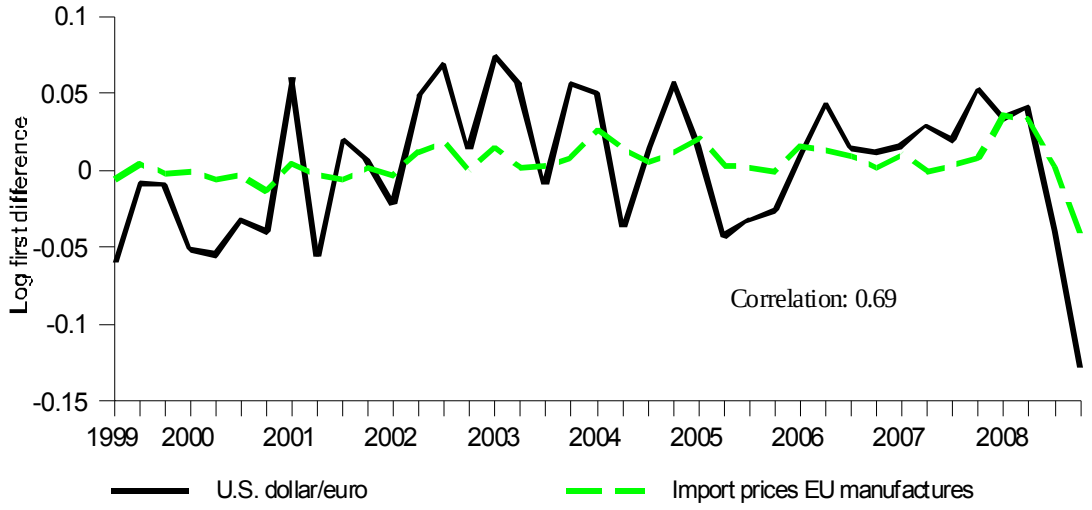
Source: DOL, BLS and Federal Reserve Board. NIEs include South Korea, Taiwan, Singapore, and Hong Kong. Exchange rate is trade-weighted average using one-year lagged chain.

Figure A.4 Change in U.S. dollar/yen exchange rate and U.S. import prices from Japan, 1999–2008



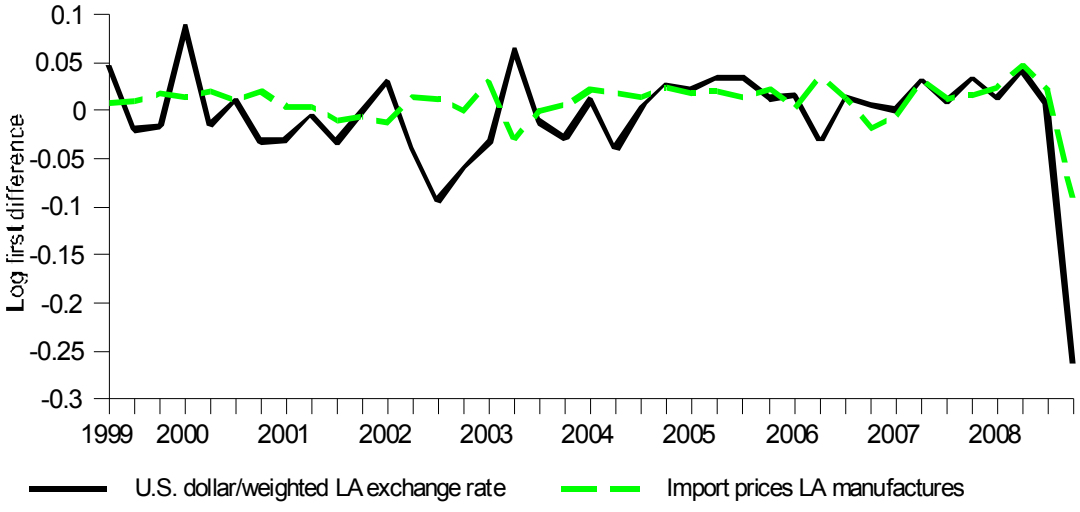
Source: DOL, BLS and Federal Reserve Board. U.S. dollars per yen.

Figure A.5 Change in dollar/euro exchange rate and U.S. import prices from the EU, 1999–2008



Source: DOL, BLS and Federal Reserve Board.

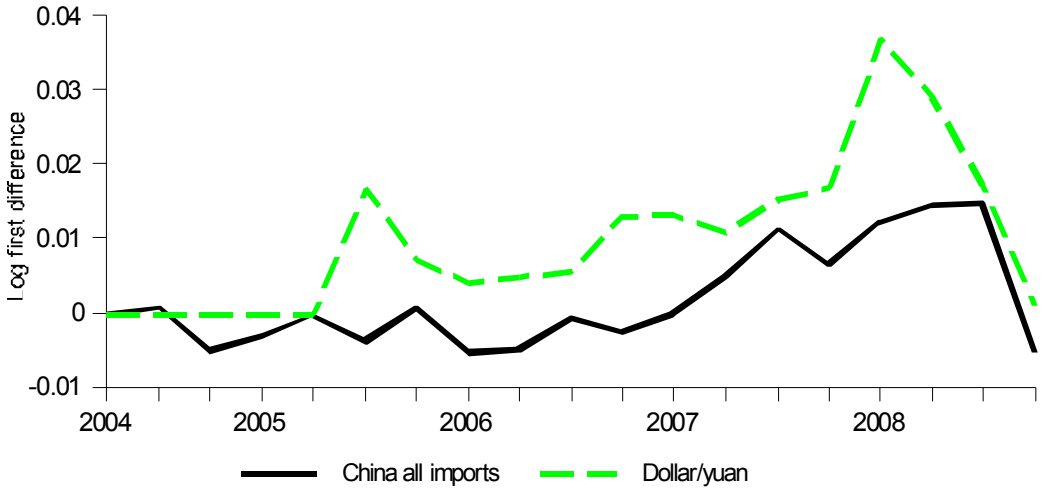
Figure A.6 Change in dollar/Latin America exchange rate and U.S. import prices from Latin America, 1999–2008



Note: LA exchange rate is a weighted average of Brazil's and Mexico's exchange rates relative to the dollar.

Source: DOL, BLS and Federal Reserve Board.

Figure A.7 Dollar/yuan exchange rate and U.S. import prices from China, 2004–2008



Source: DOL, BLS and Federal Reserve Board.

Appendix Table 1 Estimation results: Exchange-rate pass-through to U.S. import prices:[1]

	Imports less oil[2]	Consumer goods	Imports From:				
			Canada	Latin America	EU	Japan	NIEs
U.S. GDP	0.153	-0.143	-0.047	0.748	-0.017	0.756	0.055
	(0.306)	(0.120)	(0.327)	(0.590)	(0.275)	(0.141)	(0.041)
Foreign	0.008	0.004	1.203***	1.532***	0.434	0.281*	0.173***
price	(0.006)	(0.003)	(0.304)	(0.364)	(0.298)	(0.151)	(0.035)
Exchange	0.382***	0.205***	0.331**	0.633***	0.238***	0.118***	0.001
rate	(0.133)	(0.064)	(0.125)	(0.153)	(0.066)	(0.038)	(0.011)
Constant	0.000	0.001	0.001	-0.016**	0.000	-0.002	-0.002***
	(0.002)	(0.001)	(.003)	(0.006)	(0.004)	(0.001)	(0.000)
N= 39							
R-sq	0.71	0.58	0.82	0.71	0.78	0.60	0.77
R-sq adj	0.59	0.44	0.74	0.64	0.69	0.44	0.68

Source: Author's calculations using OLS regression.

[1] Quarterly observations. Estimates are long-run. Exchange rate coefficients give the percent change in import price for a 1 percent change in the exchange rate. Standard errors are in parentheses. Data are in log differences or percent change.

[2] Excludes petroleum and petroleum products.

* = significant at the 10 percent level

** = significant at the 2 percent level

*** = significant at the 1 percent level