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Why a Dollar Depreciation May Not Close the U.S. Trade Deficit *Linda Goldberg and Eleanor Wiske Dillon*

With the U.S. trade deficit at high levels, many look to a dollar depreciation to curb the U.S. appetite for foreign goods by pushing up the cost of imports. Yet three factors—the use of the dollar in invoicing U.S. trade, the market share concerns of exporters, and sizable U.S. distribution costs—could keep U.S. import prices from rising enough to reduce demand significantly. Evidence suggests that a weaker dollar will boost foreign demand for U.S. exports, but this adjustment by itself is unlikely to close the deficit.

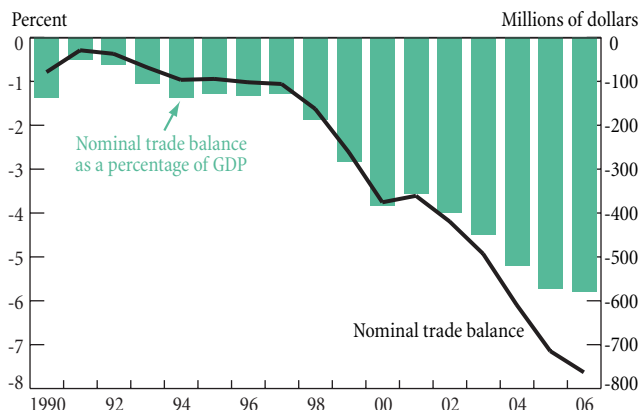
In 2006, the U.S. trade deficit reached \$759 billion—equivalent to almost 6 percent of GDP—as U.S. imports of foreign goods continued to outstrip the nation's exports to other countries (see chart). In the view of many analysts and policymakers, a dollar depreciation remains a key mechanism for addressing this export-import imbalance and restoring the international competitiveness of American producers.¹ Indeed, in theory, a weaker dollar should raise the cost of foreign goods for U.S. consumers, thereby reducing U.S. demand for imports, at the same time that it boosts foreign demand for U.S. goods by making the nation's exports more price-competitive abroad.²

In this edition of *Current Issues*, we take a fresh look at the effectiveness of dollar depreciation as a means of narrowing U.S. trade deficits. We go beyond the standard discussion of relative price and demand to consider three other factors that influence the nation's trade balance adjustment: the special role of the dollar in invoicing international trade transactions, the market share concerns of foreign exporters, and the high U.S. distribution costs (relative to those of the country's trading partners) that form part of the final consumption prices of imported goods.

Our analysis reveals that a dollar depreciation is unlikely to close the trade gap single-handedly. To be sure, foreign demand for U.S. exports should grow, as theory predicts. Because virtually all U.S. exports to other countries are invoiced in dollars, foreign purchasers will derive an immediate benefit from a dollar depreciation as the cost of their purchases declines in foreign currency terms. However, the price of foreign imports for U.S. consumers will be considerably more resilient to exchange rate changes.

Trade invoicing practices, we argue, contribute significantly to the insensitivity of import prices to exchange rates. Because almost all of the goods that the United States imports, like those it exports, are invoiced in dollars, the prices of imported goods remain fixed for a period when exchange rates change. Moreover, even in the longer term—over, say, the year following a dollar depreciation—the desire of foreign producers to remain competitive in the large U.S. market may lead them to resist increasing the dollar price of their goods. Finally, the unusually high marketing and distribution costs added to imports once they enter the United States—costs denominated in dollars—further insulate the final consumption price of imported goods from exchange rate changes.

Nominal Trade Balance



Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Together, these three factors suggest that, all else equal, we may not see the sort of significant escalation in import prices that would prompt U.S. consumers to curtail their demand for foreign goods and switch their purchases to equivalent goods produced at home. Improvement in the trade balance following a dollar depreciation will most likely be achieved instead through increased foreign purchases of newly affordable U.S. goods. Nevertheless, if the nation's consumption patterns are not "rebalanced" away from imports, then the total adjustment in U.S. trade following the depreciation of the dollar could still fall markedly short of expectations.

Exchange Rates and Traded Goods Prices

To understand how exchange rate changes affect traded goods prices and alter demand, consider what happens to a European good marketed to the United States following a dollar depreciation against the euro. First, the European producer who sells the good to the U.S. market must decide what share of the dollar depreciation, if any, to absorb in his or her profit margins and what share to pass on to U.S. consumers in the form of a higher price for the good in dollar terms. This decision will determine how much of the exchange rate change is transmitted to the import price observed at the U.S. border.

Once at the border, the imported good is stored, shipped to its distributor, marketed by a retailer, and ultimately sold to the final consumer. The many steps in this distribution stage within the United States add dollar-denominated costs

to the final price of the good and thus reduce the share of the final price that is affected by exchange rate movements. Moreover, this stage offers distributors and retailers an opportunity to stabilize some of the fluctuations in the price of the imported good by adjusting their markups. If they do so, the final consumption price of the imported good will increase by a much lower percentage than the price observed at the border.

In the next sections, we present empirical evidence that this pricing process has played out differently in the United States than in many of its trading partners. One key finding is how little exchange rate movements are reflected in import prices at the U.S. border, even before the imported goods are distributed to retailers and then consumers. With transmission rates in the United States much below those observed in other OECD (Organisation for Economic Co-operation and Development) countries, the effect of a dollar depreciation on U.S. demand for any particular type of import could be relatively small.

Estimates of Exchange Rate Pass-Through across Countries

The rate of exchange rate "pass-through" is the degree to which a change in the value of a country's currency induces a change in the price of the country's imports and exports. Table 1 presents estimates of pass-through rates into import prices for the United States, Japan, euro-area countries, other advanced economies, and the OECD countries as a group over the 1975-2003 period.³ These estimates are calculated as the cumulative percentage change in a country's aggregate import prices at the border over the year following a depreciation of the country's currency against the currencies of its trading partners.⁴

For all OECD countries, a 1 percent change in the exchange rate will, on average, generate a 0.64 percent change in import prices over the course of a year, although there is wide variation around this mean. For the euro area, the average pass-through rate is substantially higher, at 0.81. Estimates of pass-through for Japan differ considerably, but the rate is usually found to be high and close to complete.

By contrast, for the United States over this three-decade period, a 1 percent change in the exchange rate has, on average, yielded only a 0.42 percent change in import prices. Clearly, the pass-through of exchange rate movements into

¹Feldstein (2006). A recent NBER volume (Clarida 2007) provides a useful overview of some alternative positions in the debate over the trade deficit.

²Following common practice, we assume that exports and imports are sufficiently responsive to exchange rate changes, a requirement known in the economics literature as the Marshall-Lerner-Robinson condition.

³The estimates in Campa and Goldberg (2005) follow a standard approach that uses GDP to control for aggregate demand and a constructed foreign price index to control for changes in the exporting country's production costs.

⁴Different studies have generated varying estimates of pass-through. In the case of Japan, the variation is so great that we report a range of pass-through values; for other countries cited in the table, we present a point estimate that preserves the rank order of country pass-through rates identified in other studies.

Table 1

Exchange Rate Pass-Through to Import Prices after One Year

OECD average	0.64
United States	0.42
Euro area	0.81
Japan	0.57-1.00
Other advanced economies	0.60

Sources: Campa and Goldberg (2005); Faruquee (2006).

Notes: Estimates are based on data from 1975 to 2003. The pass-through rate for Japan is a range, reflecting differences in study findings.

import prices at the border is markedly lower for the United States than for most of the world. This pattern continues to hold, although somewhat less dramatically, in estimates using data only since 1990: the United States exhibits an average rate of exchange rate pass-through into import prices of 0.32, compared with an average across countries of 0.48.⁵

Explaining Low U.S. Pass-Through Rates at the Border

Why is the transmission of exchange rate changes to the import prices observed at the border so much weaker for the United States than for other countries? Two factors— invoicing practices and market share considerations— appear to play an important role.

Invoicing Practices

Producers involved in foreign trade can choose the currency they want to use to express the price of their exports. They can invoice in their own home currency, in the currency of their buyers, or in a third, “vehicle” currency. In selecting an invoicing currency, producers will consider transaction costs across currencies and macroeconomic volatility across countries. They will also consider the competitive structure of the industry in which their goods are being sold: For example, producers in very competitive industries may have strong incentives to keep the price of their goods steady relative to the prices maintained by their rivals in the destination market (Goldberg and Tille 2005).

Cross-country evidence on import and export invoicing in recent years reveals that the dollar is the dominant currency of invoicing across non-European countries (Table 2).⁶ While the exports and imports of European countries are increasingly invoiced in euros (even for trade with countries outside the euro area), a high percentage of

⁵Pass-through estimates for the post-1990 period are drawn from Ihrig, Marazzi, and Rothenberg (2006).

⁶Extensive details on currency invoicing of trade are reported in Goldberg and Tille (2006) and Kamps (2006).

Table 2

Use of the U.S. Dollar in Export and Import Invoicing

	Date	Dollar Share in Export Invoicing	Dollar Share in Import Invoicing	U.S. Share in Exports
United States	2003	99.8	92.8	
Asia				
Japan	2003	48.0	68.7	24.8
Korea	2004	83.2	79.6	17.0
Malaysia	2000	90.0	90.0	20.5
Thailand	2003	84.4	76.0	17.0
Australia	2004	69.6	50.5	8.1
United Kingdom	2002	26.0	37.0	15.5
Euro area				
Belgium ^a	2004	29.6	35.1	17.9
France ^a	2003	33.6	46.9	13.7
Germany ^a	2004	24.1	35.9	15.6
Greece ^a	2003	17.5	24.9	15.3
Italy	2004	51.2	55.3	8.6
Portugal ^a	2004	27.4	32.6	18.3
Spain ^a	2004	29.1	35.5	9.9
EU accession countries				
Bulgaria	2004	35.2	34.1	5.3
Czech Republic	2004	12.0	18.5	2.3
Estonia	2004	9.4	21.9	2.3
Hungary	2004	9.6	18.8	3.5
Poland	2004	21.4	26.1	2.4

Sources: Goldberg and Tille (2006); Kamps (2006).

^aInvoicing data refer only to trade outside the euro area.

the traded goods of Asian countries, Latin American countries, and Australia are invoiced in U.S. dollars. Moreover, for every country, the share of exports invoiced in dollars exceeds, often by a fairly large margin, the U.S. share in the country’s exports—a clear indicator that the dollar is frequently used as a vehicle currency for trade with other countries.

Also notable is the very high percentage of U.S. imports and exports invoiced in dollars in the early 2000s. No other country has had its trade so overwhelmingly invoiced in its own currency. For euro-area countries on average, 54 percent of imports and 59 percent of exports were invoiced in euros; in the case of Japan, 26 percent of imports and 38 percent of exports were invoiced in yen. By contrast, 93 percent of U.S. imports and 99 percent of U.S. exports were priced in dollars.

Data on invoicing currencies over a longer horizon are available only for some countries. This evidence suggests that since the advent of the euro in the late 1990s, dollar use in import and export invoicing has fallen. Nevertheless, the decline is largely confined to euro-area and European Union (EU) accession countries and, even for these countries, direct trade with the United States remains almost exclusively invoiced in dollars.⁷

The widespread use of dollars in invoicing U.S. trade helps explain the weak pass-through of exchange rate changes to the import prices observed at the U.S. border. When foreign producers invoice their exports to the United States in dollars, the price of these goods remains fixed in the buyer's currency if the dollar depreciates against other currencies.⁸ The exchange rate movements affect only the foreign producers' profits and will not increase the dollar price paid by U.S. importers.⁹ After a time, of course, foreign producers may choose to adjust their prices in response to the exchange rate change. But evidence suggests that exporters set prices in dollars well in advance of the delivery of their goods and change those prices only periodically.

Market Share Considerations

While the invoicing of U.S. imports in dollars automatically reduces exchange rate pass-through for a period following a dollar depreciation, foreign producers' desire to preserve market share for goods sold in the United States may keep the pass-through rate low over the longer term. That is, exporters to the United States may accept a lower profit margin when their currency appreciates in order to keep their dollar prices constant against competitors.

Moreover, the incentives to forgo a price markup may be stronger for producers exporting goods to the United States than for producers marketing goods to smaller industrialized countries. The U.S. market is very large, and imports command a lower share of consumption than they do in smaller markets. As a result, foreign producers may be reluctant to raise their prices in the event of a dollar depreciation because for many types of goods, U.S. consumers will be able to turn to domestic sources for comparable products. In smaller countries, consumers will be less able to substitute domestic goods for foreign imports; thus, exporters can more readily pass exchange rate movements into prices without losing market share.

In sum, both the use of the dollar in invoicing U.S. imports and the desire of exporters to keep their dollar prices constant against competitors may help to explain the low pass-through rates into U.S. import prices. Support for this view is provided by Gopinath, Itskhoki, and Rigobon (2006), who show that there is lower pass-through for U.S. imports invoiced in dollars, even a year or more after an exchange rate move.

⁷Goldberg (2007) explores the evidence on the invoicing practices of the accession countries to the euro area.

⁸For U.S. exports, the situation is reversed. By default, the profit margins for U.S. producers remain fixed in their own currency while the foreign currency price of U.S. exports varies with exchange rates.

⁹Bils and Klenow (2004) provide extensive evidence on the degree of price stickiness in U.S. goods.

Explaining Low Pass-Through Rates into Final Consumption Prices

Thus far we have considered the transmission of exchange rate changes into the prices of imports arriving at a country's borders, but other forces come into play between the time a good arrives at the border and the time it is sold to the consumer. As we noted earlier, the imported good must be stored, transported, and marketed by a retailer. The share of an exchange rate movement that appears in the final price of an import observed by consumers will be even smaller than the share passed into the price at the border because the final price includes domestic value added—that is, the dollar costs incurred in distributing the good in the United States.

When consumers purchase a good produced abroad, they are really purchasing a bundle of imported and domestic products, with the domestic portion consisting mostly of transportation, storage, and wholesale and retail trade services. Typically, only the portion of the price that comes from imports is directly affected by exchange rates. The share of distribution costs in the final household consumption price of goods for several industry categories generally ranges between 30 and 50 percent across countries (Campa and Goldberg 2006). Significantly, in every industry category, the share of distribution costs in U.S. goods prices is well above the average share and higher than the share of distribution costs in all other countries. The unusually high share of distribution costs in U.S. goods prices thus has the effect of further insulating U.S. import prices from exchange rate movements.

How Pass-Through Affects Trade Balance Adjustment

In theory, currency depreciations play an important role in trade balance adjustment by inducing "expenditure switching." If the U.S. dollar depreciates against the euro, for example, the dollar price of imports from Europe should rise, prompting U.S. consumers to shift their expenditures to domestically produced alternatives or imports from other regions (holding other exchange rates constant). At the same time, the depreciation of the dollar should lower the price, in euros, of U.S. exports to Europe, with the result that European consumers will begin to buy more U.S. exports.

The magnitude of this expenditure switching, relative to the size of the depreciation, will depend in part on how fully exchange rate movements are reflected in the prices faced by consumers. We have seen that invoicing practices, market share considerations, and high distribution costs may weaken the transmission of exchange rate changes to the prices U.S. consumers pay for imported goods. Exchange rate pass-through to U.S. export prices, however, is likely to be stronger. Given that virtually all U.S. exports are invoiced in dollars, a dollar depreciation produces an immediate drop in the price (in foreign currency terms) that foreign consumers will pay for U.S. goods and thereby increases demand for

these goods abroad. These differences in pass-through between the United States and its trading partners mean that a dollar depreciation will likely elicit more expenditure switching by foreign consumers than by U.S. consumers. In other words, a weaker dollar is more likely to prompt foreign consumers to increase their purchases of U.S. goods than to induce U.S. consumers to shift their purchases from imported to domestic goods.

The extent of import and export quantity changes depends on elasticities of demand, the percentage change in the quantity of a traded good demanded for a given percentage change in the price of that good. Researchers have attempted to estimate the elasticity of demand for individual countries' imports and exports with respect to changes in traded goods prices. Hooper, Johnson, and Marquez (2000) compare trade elasticities across the Group of Seven (G7) countries and find a strong asymmetry in export and import elasticities for the United States. Using data from the 1960s to the mid-1990s, they estimate that demand for U.S. exports reacts more than proportionally to changes in export prices, rising 1.5 percent for every 1 percent drop in export prices. U.S. demand for imports, however, reacts less than proportionally to price changes, rising only 0.3 percent for a 1 percent drop in import prices. While this asymmetry is present in the trade elasticities of most other G7 countries, it is most pronounced for the United States.

Researchers have also found that the responsiveness of demand to changes in export and import prices grows over the course of a year and longer. For example, the price elasticity of trade flows is generally considerably higher in the longer run than in the months immediately following a relative price change on goods (Galloway, McDaniel, and Rivera 2003). Demand may become more responsive in a year's time because in that period, producers are able to reorient their production mix toward goods or varieties that can be profitably produced after the currency depreciation, allowing greater substitution of domestic goods for imports.

The price and quantity adjustments in traded commodities following a dollar depreciation will be reflected in total U.S. export revenues and import expenditures—in other words, the U.S. trade balance. If significant expenditure switching takes place, the real trade balance of the United States, which reflects the relative *quantities* of exports from and imports to the United States, will improve. The *nominal* trade balance, which measures the total *expenditure* on imports and exports, will also improve, but to a lesser extent.

The reason that the nominal trade balance might lag the real balance is straightforward: while the quantity of goods imported by the United States has fallen, the price in dollars of each unit imported has increased. Similarly, the unit price of exports has decreased as the quantity has increased. This

decrease in the ratio of the price of exports to the price of imports, called the terms of trade, partially offsets the improvement in the relative quantities of exports and imports, causing a smaller improvement in the nominal trade balance.

Scenario: The Effects of a 10 Percent Dollar Depreciation

To get a more concrete sense of how exchange rate movements, price adjustments, and demand reactions play out across countries, consider a scenario in which the dollar depreciates 10 percent against a basket of trade partner currencies. For this scenario, we adopt the pass-through rates identified earlier for the 1975–2003 period. That is, we assume that 42 percent of an exchange rate change is passed through to U.S. import prices over the course of a year while the corresponding figure for countries other than the United States is 77 percent—the OECD average excluding the United States. We also assume the demand elasticities calculated by Hooper, Johnson, and Marquez.

In this scenario, a 10 percent dollar depreciation lowers the foreign currency price of U.S. exports by 7 percent, holding other factors constant (Table 3).¹⁰ The same drop generates at most a 4 percent rise in the prices of imported goods at the U.S. border. Incorporating the demand elasticities from Hooper, Johnson, and Marquez, we estimate that foreign demand for U.S. exports would rise 10 percent while U.S. demand for imports from abroad would decrease only 1 percent in the six quarters after the depreciation. Note that the decline in import demand may be overestimated because we omit the distribution services that further cushion the effects of the depreciation on the prices ultimately paid by consumers.

The price and demand movements calculated here highlight the asymmetric effects of a dollar depreciation on U.S. exports and imports. U.S. consumers see only a very modest increase in the price of imports, and their appetite for imports diminishes only slightly. By contrast, U.S. exports become considerably more affordable abroad, prompting a large increase in demand. It is easy to see from this exercise how a dollar depreciation would lead to significant changes in foreign, but not U.S., consumption patterns.

Who bears the burden of this asymmetric trade balance adjustment? When the dollar depreciation is only partially passed on to import prices, the remainder is reflected in declining profits for foreign exporters. For example, if only 32 percent of the dollar depreciation is passed on to U.S.

¹⁰This estimate applies to pass-through into the prices of all OECD country imports, not just the imports that are sourced from the United States. Given that U.S. exports are priced almost exclusively in dollars, the true pass-through of a dollar depreciation into the foreign market price of U.S. exports is probably even higher.

Table 3

Demand Adjustment to a 10 Percent Dollar Depreciation

Percentage Change

	United States	Foreign Markets
Change in home currency price of bilateral imports	+4	-7
Change in bilateral demand for imports	-1	+10

Source: Authors' calculations.

import prices—the average pass-through rate since 1990—the other 68 percent of the dollar depreciation would be reflected in lower unit revenues for the foreign producers. By contrast, American exporters get a boost in dollar-denominated income, since the dollar price of exports rises slightly while still becoming more price competitive in foreign markets.

Trade Balance Adjustment in a Complex Model

Our simple scenario analysis focuses narrowly on the chain of responses that links an exchange rate change to price adjustment and the subsequent demand reaction. More complex models of trade balance adjustment, by contrast, consider the source of the exchange rate movement, recognizing that the ultimate effects of, say, a dollar depreciation will depend on the developments that triggered it. Here we compare the results of our scenario exercise with those generated by a model developed by Federal Reserve Board economists Christopher Gust and Nathan Sheets (2006).¹¹ Interestingly, although the adjustment process described by Gust and Sheets is much more complicated, their findings largely parallel our own, providing confirmation for our broad conclusions.

The authors consider a dollar depreciation that stems from a change in the risk premium required by investors to hold U.S. assets. Gust and Sheets track the effects of this depreciation throughout the full economy under various pass-through assumptions, including the assumption that pass-through is low in the United States and high abroad. The adjustment process incorporates inflationary pressures from a depreciation of the dollar and the monetary authority's response to such pressures, as well as the responses of consumption and investment activity.

Under the assumption that exchange rate pass-through is low in the United States and higher in the nation's trading partners, a change in the risk premium on U.S. assets triggers a 10 percent depreciation of the dollar in the first quarter. Over five quarters—the time horizon we considered in our

earlier exercise—the depreciation rises to about 11.5 percent. With weak pass-through in the United States, the effects on U.S. imports are small. Nominal imports (calculated as the price of imports times the quantity of imports) rise modestly as prices adjust faster than demand, and then fall as demand reacts to higher prices, ending up about 1 percent above steady-state levels after five quarters. The dollar price of U.S. exports changes very little with the depreciation, but the price in foreign currency terms drops the full 10 percent of the depreciation, driving up the quantity of U.S. exports demanded. Nominal exports (the price of exports times the quantity of exports) in dollar terms rise 10 percent above steady-state levels after five quarters, exclusively from the change in quantities.

Gust and Sheets go on to compute the improvement in the real and nominal trade balances that would result from these estimated changes in exports and imports. Specifically, they find that a 10 percent depreciation of the dollar would improve the real trade balance by about 12 percent over five quarters and the nominal trade balance by a somewhat smaller margin, about 10 percent after five quarters.¹²

Although Gust and Sheets' analysis yields a much more detailed and complete account of the effects of a dollar depreciation than our simple exercise, the broad consequences described are very similar. In both cases, the dollar depreciation has markedly asymmetric effects on exports and imports, with import prices and quantities responding much more weakly than the price and quantity of exports. Thus, the complex model bears out the results of the scenario analysis: U.S. imports will play only a minor role in easing the U.S. trade deficit; improvement in the trade balance following a dollar depreciation will be driven largely by exports.

Conclusion

In theory, a dollar depreciation should help narrow the U.S. trade deficit by raising the price of imports for U.S. consumers and lowering the price of U.S. exports for consumers overseas. However, three factors that carry particular force for the United States—the near-exclusive use of dollars in invoicing U.S. trade, foreign exporters' market share concerns, and the unusually high distribution costs added to U.S. imports—blunt the pass-through of the currency depreciation to U.S. import prices. With import prices rising only modestly from their pre-depreciation levels, U.S. consumers have little incentive to reduce their demand for imports significantly or to seek out comparable goods produced at home.

¹¹See also the careful scenario analyses presented in International Monetary Fund (2005, 2006).

¹²Significantly, Gust and Sheets assume price elasticities of demand near unity in their analysis. If the authors were to use trade elasticities like those estimated by Hooper, Johnson, and Marquez—above unity abroad and well below unity in the United States—the dollar depreciation would induce a smaller improvement of the real trade balance.

The unresponsiveness of U.S. import prices to a dollar depreciation suggests that any substantial trade balance adjustment achieved through exchange rate changes must come instead from a reduction in export prices. Invoicing practices may contribute to the adjustment: Since U.S. exports are invoiced in dollars, foreign consumers will see an immediate reduction in the price of these goods—in home currency terms—when the dollar depreciates.

Quantitative analysis underscores the asymmetric response of import and export prices and confirms that U.S. demand for imports will be little diminished by a weaker dollar. A recent study by Gust and Sheets concludes that both the real and the nominal trade balances are likely to improve following a dollar depreciation, but mainly through a rise in the quantity of U.S. exports, with little change in U.S. imports.

Even a marked rise in exports, however, is by itself unlikely to erase the U.S. trade deficit. In 2006, that deficit stood at \$759 billion. If imports and terms of trade remained constant, exports would have to grow 52 percent to single-handedly close this gap. Either import demand will have to become more responsive to exchange rate movements or adjustment will have to take place through other developments that would affect demand. These other developments might include increases in U.S. public or private saving (with related declines in U.S. consumption of all goods) or a rise in global demand driven by economic growth abroad or increased market access for U.S. exporters.

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