FEDERAL RESERVE BANK OF NEW YORK

CURRENT ISSUES IN ECONOMICS AND FINANCE

February 2001 Volume 7 Number 2

The Effects of a Booming Economy on the U.S. Trade Deficit

Stefan Papaioannou and Kei-Mu Yi

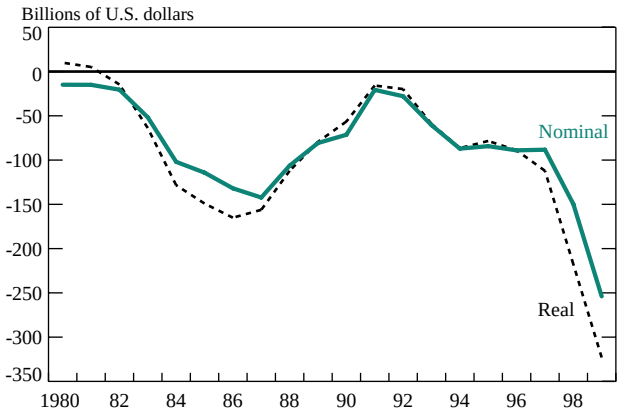
The robust growth of the U.S. economy between 1996 and 1999 spurred U.S. demand for foreign goods and contributed to a surge in the U.S. trade deficit. An analysis of the effects of the expansion on the trade balance suggests that the economic boom can account for roughly a third of the sharp rise in the merchandise trade deficit during this period.

The U.S. trade deficit nearly tripled between 1996 and 1999, rising from $89 billion to a record $254 billion (Chart 1). Regarded by many commentators as a sign of the U.S. economy's vulnerability,[1] this striking increase has prompted considerable discussion of the economic forces behind the trade balance.

Most analysts would agree that the most important immediate, or proximate, cause of the rising deficit in this period was the strength of the U.S. economy relative to the economies of the nation's major trading partners. U.S. GDP growth averaged 4.2 percent per year between 1996 and 1999, while output in Japan and the Euro area grew at average annual rates of -0.2 percent and 2.5 percent, respectively. This disparity in growth rates had a marked effect on the balance of trade flows to and from the United States. Imports rose rapidly as the booming American economy drove up U.S. consumption and investment demand—including the demand for foreign goods. At the same time, exports rose slowly as the sluggish growth of the United States' trading partners curbed the demand for U.S. goods.[2] Together, these trends appear to explain much of the deterioration in the trade deficit. By implication, if the U.S. economy had grown at a slower rate, or if other countries' economies had grown faster, the U.S. trade deficit would surely have been smaller. The question is, how much smaller?

In this edition of *Current Issues*, we develop a useful approximation of the burgeoning U.S. economy's impact on the trade deficit between 1996 and 1999.[3] To do this, we answer a key hypothetical question: What would the U.S. trade deficit have been if the United States and its trading partners were operating at *potential*—rather than actual—output, holding all else equal? We make potential output our benchmark because it can be interpreted as the cyclically adjusted level of output—that is, output adjusted to exclude the effects of an economy's cyclical expansion and contraction. Using this concept, we compute a "potential output" trade balance that

Chart 1
U.S. Trade Balance



Source: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts data.

Note: Real (inflation-adjusted) net exports are expressed in 1996 chain-weighted dollars.

represents the trade balance exclusive of cyclical forces. By calculating the difference between the actual trade balance and the potential output trade balance, we can determine the extent to which cyclical forces contributed to the worsening of the U.S. trade balance.

Our analysis reveals that the above-potential growth of the U.S. economy can in fact explain a sizable portion of the expanding trade deficit. By our calculations, cyclical forces in the United States—in particular, the import surge produced by the economic boom—accounted for $45 billion, or almost one-third, of the $142 billion increase in the deficit between 1996 and 1999.[4] However, this result also suggests that, had the economy dropped back to a potential output level, the deficit would still have risen sharply. Without the contribution of U.S. cyclical forces, the deficit would have grown by $97 billion over the 1996-99 period.

By investigating developments within the period, we conclude that robust economic growth had its greatest effect on the U.S. trade balance between 1996 and 1998. In 1999, however, *noncyclical* forces such as changes in interest rates, exchange rates, and productivity made a vastly larger contribution to the rise in the trade deficit.

The Potential Output Trade Balance

To assess how much of the increase in the U.S. trade deficit over the 1996-99 period was due to the strong economy, we first establish a precise definition of "strong." We interpret strong to be output (GDP) that is above "potential." Potential output is a widely used measure that has been defined as either the full-employment level of output or the maximum output an economy can sustain without generating a rise in inflation.[5] Both definitions are consistent with the view that potential output is a cyclically adjusted measure of output.

We define the potential output trade balance as the trade balance that would occur if the United States and its trading partners were at potential output, all else equal. As we do with potential output, we interpret this indicator as a cyclically adjusted measure. By calculating the difference between the actual trade balance and the potential output trade balance, we can isolate that part of the deficit that is attributable to cyclical forces in the United States and its trading partners. Our measure is analogous to the full-employment budget deficit measure that is widely used to gauge the nation's cyclically adjusted fiscal position.

We note at the outset that the potential output trade balance can vary from year to year not only because of changes in potential output, but also because of other, noncyclical forces, such as changes in interest rates, exchange rates, and other variables. A depreciation in the U.S. dollar, for instance, would tend to improve the U.S. potential output trade balance because a weaker dollar makes U.S. exports less expensive abroad and imports more expensive for U.S. consumers.[6]

Calculating the Potential Output Trade Balance

To calculate the U.S. potential output trade balance, we gather data on three key components. We begin by obtaining measures of potential output or GDP for the United States and its major trading partners. We then select estimates of the "elasticity" (the sensitivity, or responsiveness) of import demand to changes in national income. Finally, we collect data on trade flows with the major U.S. trading partners.

In choosing measures of potential GDP, we bear in mind that economists define and estimate potential output in several ways.[7] Some employ sophisticated statistical methodologies that use time-series data on GDP and other variables (see, for example, Kuttner [1994] or Gerlach and Smets [1997]). By comparison, the International Monetary Fund (IMF) and the Organization for Economic Cooperation and Development (OECD) construct measures based on the productive potential of capital, labor, and technology in the economy. Because the OECD provides broad coverage of countries and time periods, we employ its data, where available, throughout our analysis.[8] For countries with no published measure of potential output, we use a simple econometric technique to generate values for potential output (see box).

For both the United States and its major trading partners, we use the existing empirical literature to select a measure of the elasticity of import demand to changes in national income.[9] The more elastic a country's import demand is to national income, the more imports will rise in response to an increase in national income. Formally, the elasticity gives the percentage increase in import demand in response to a 1 percent increase in income. In our benchmark specification, we assume that a 1 percent increase in national income leads to a 2 percent increase in import demand for the United States (elasticity = 2) and to a 1.5 percent increase for its major trading partners (elasticity = 1.5).

Next, we collect data on U.S. merchandise imports from, and exports to, the country's eighteen largest trading partners. Trade with these nations constitutes roughly 80 percent of total U.S. merchandise trade.[10] Moreover, the merchandise trade deficit with these countries increased by $142 billion between 1996 and 1999, and thus accounted for 83 percent of the increase in the overall (merchandise plus services) trade deficit.

Once we have assembled the three components of the potential output trade balance—potential output measures, elasticity estimates, and trade flow data—we can calculate the value of U.S. imports and exports when all

Construction of the U.S. Potential Output Trade Balance

The following basic expression represents the U.S. trade balance as the sum of U.S. exports to, minus the sum of U.S. imports from, the nation's trading partners:

$$\text{Actual trade balance} = \sum_{c=1}^{n} X_c - \sum_{c=1}^{n} M_c \ ,$$

where $c = 1, 2, \ldots, n$ denotes particular trading partners. We use the following equation to construct our benchmark estimates of the U.S. potential output trade balance (PTB):

PTB = potential output exports – potential output imports

$$= \sum_{c=1}^{n}\left(\frac{X_c}{1+g_c\varepsilon_{r.o.w.}}\right) - \sum_{c=1}^{n}\left(\frac{M_c}{1+g_{u.s.}\varepsilon_{u.s.}}\right),$$

where X_c = actual U.S. exports to country c,

M_c = actual U.S. imports from country c,

g_c = output gap (of country c or the United States), where the output gap is the difference between actual output and potential output, measured as a percentage of potential output, and

ε = income elasticity of import demand in the United States (*u.s.*) or the rest of the world (*r.o.w.*). We set the elasticity to be 2 and 1.5 for the United States and the rest of the world, respectively.

Obtaining Measures of the Output Gap

For countries with no available OECD output gap data, we employ the following methodology on annual data:

1) We regress the natural log of real GDP on a time trend and the time trend squared:

   $ln(y) = \alpha_0 + \alpha_1 {}^{*}T + \alpha_2 {}^{*}T^2 + \varepsilon.$

2) We use the estimated coefficients from the regression to obtain the fitted values for (the natural log of) real GDP. By taking the exponential, we then obtain our estimate of potential real GDP.

3) To obtain each year's output gap, we subtract measured potential real GDP from actual real GDP and divide the difference by potential real GDP.

countries are operating at potential output.[11] (In the box above, we describe the equation used to compute our benchmark estimates of the potential output trade balance.) We then compare the movements of the potential output trade balance with those of the actual trade balance over the 1996-99 period. Note that the relationship of the potential output trade balance to the actual trade balance will depend on the deviations of the United States' and its major trading partners' actual output from potential output and on their respective import demand elasticities. For instance, when actual output is greater than potential output, actual imports will be greater than potential output imports. In addition, the more sensitive U.S. import demand is to the level of national income, the more pronounced the gap between U.S. actual imports and potential output imports will be.

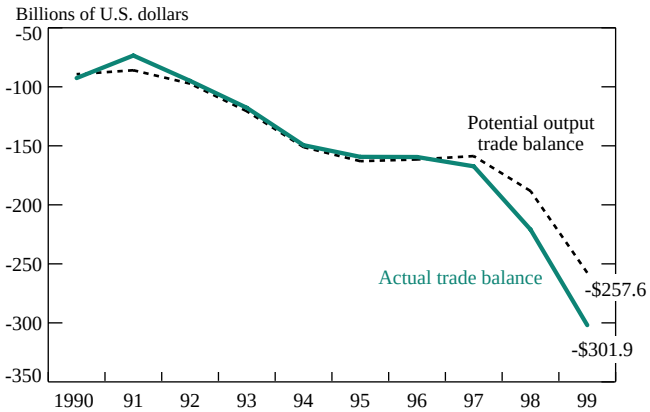
Cyclical Forces' Role in the Trade Deficit Increase

Our calculations reveal that the actual and the potential output trade deficits were virtually the same in 1996, about $160 billion (Chart 2). Over the next three years, both deficits widened, but the actual trade deficit expanded by more. The difference—$46 billion, or one-third of the overall increase in the deficit—can be attributed to cyclical forces.[12] Chart 3 expresses these deficits as shares of actual GDP.

Our analysis also allows us to determine whether higher U.S. imports or lower demand abroad for U.S. exports is chiefly responsible for this increase in the cyclical part of the trade deficit. We find that higher U.S. imports accounted for 97 percent of the cyclical increase: $45 billion of the rise in the U.S. trade deficit between 1996 and 1999 can be attributed to the nation's booming economy, with the low-to-moderate growth of the major U.S. trading partners contributing a mere $1 billion. This result occurred mainly because the trading partners, as a group, had very little net change in their deviation between actual and potential output

Chart 2

U.S. Actual and Potential Output Trade Balances



Source: Authors' calculations, based on data from the International Monetary Fund and the U.S. Department of Commerce, Bureau of Economic Analysis.

Notes: Trade balances are based on merchandise trade with the nation's top eighteen trading partners. The dashed line represents the potential output trade balance consistent with an import demand elasticity specification of 2 for the United States and 1.5 for its trading partners.

during this period. Individual countries experienced large swings in their output gaps—actual output minus potential output—but the swings were largely offsetting. In particular, positive movements in the output gaps for Canada, Mexico, and most European countries countered negative movements in all Asian countries.

Because our estimates of the potential output trade deficit depend partly on our specification of import demand elasticities, we analyze how our estimates would change under alternative elasticity specifications.[13] If we specify the elasticity of U.S. import demand to be 2.5—rather than 2, as in our benchmark estimates—then the potential output trade deficit will show a smaller increase over the 1996-99 period (Chart 4, specification "a").[14] As a result, the gap between the potential output trade deficit and the actual trade deficit widens, so that about $61 billion, or 43 percent, of the overall increase in the U.S. trade deficit can be attributed to cyclical forces. Alternatively, if we substitute an elasticity specification of 1.5 (Chart 4, specification "b") for the benchmark value of 2, the potential output trade deficit will show a larger increase between 1996 and 1999. Under this specification, the gap with the actual trade deficit narrows, suggesting that only about $35 billion, or 25 percent, of the increase in the U.S. trade deficit can be attributed to cyclical forces. This exercise helps us to set upper and lower limits on the importance of cyclical forces; such forces can explain between 25 and 43 percent of the overall increase in the trade deficit.

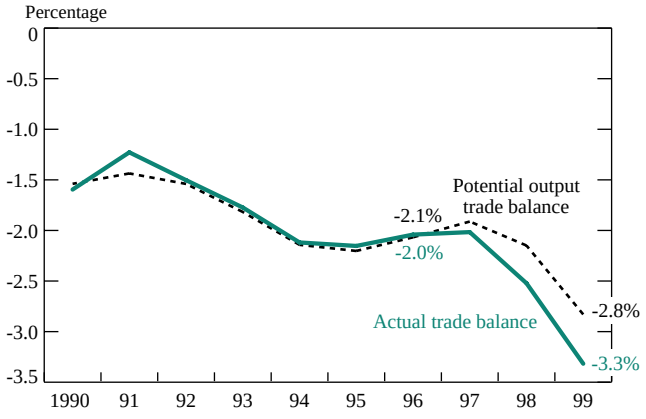
Returning to our benchmark specification and looking more closely at the 1996-99 period, we find that the importance of cyclical forces changed sharply within the period. If we confine our analysis to the first two years, our estimates of the potential output trade deficit show an increase of only $26.7 billion. Since the actual deficit grew by $61.4 billion between 1996 and 1998, we calculate that $34.7 billion of the increased deficit—or 57 percent of the overall rise—could be attributed to cyclical forces. Thus, for these two years, we conclude that the majority of the increase in the U.S. trade deficit would vanish once the United States and other countries returned to potential output growth.[15]

However, when we calculate the change in the potential output trade balance in 1999, we obtain a considerably different result. For that year, we find that only $12 billion, or 14 percent, of the $81 billion increase in the trade deficit can be attributed to cyclical forces. Thus, as the trade deficit continued to grow, the cyclical position of the U.S. economy lost prominence as a determinant of this increase.

One possible explanation for the reduced importance of cyclical forces in 1999 centers on statistical revisions to the data. Estimates of the U.S. potential growth rate have been increasing over time. In June 1999, the OECD estimated the rate to be about 2.9 percent, but by December its estimate had been raised to 3.35 percent.[16] If we use the 2.9 percent potential output growth rate in our calculations—rather than the 3.35 percent rate—the gap between actual output and potential output becomes larger and the share of the increase in the trade deficit attributable to cyclical forces rises from 14 to 22 percent. Nevertheless, even with this adjustment to the data, the contribution of the booming econ-

Chart 3

U.S. Actual and Potential Output Trade Balances as a Percentage of Actual GDP

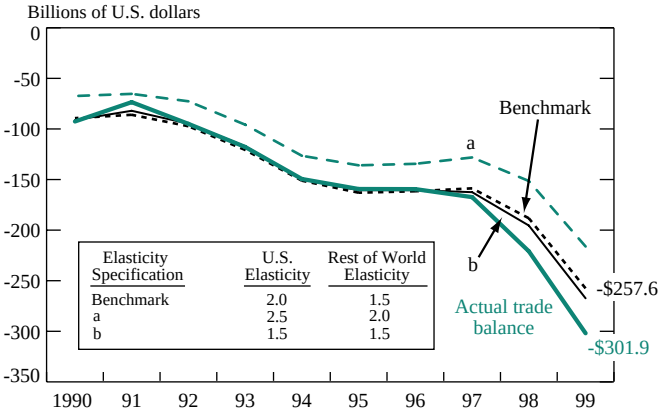


Source: Authors' calculations, based on data from the International Monetary Fund and the U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Trade balances are based on merchandise trade with the nation's top eighteen trading partners.

Chart 4

Sensitivity Analysis of the U.S. Potential Output Trade Balance



Source: Authors' calculations, based on data from the International Monetary Fund and the U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Trade balances are based on merchandise trade with the nation's top eighteen trading partners.

omy to the 1999 expansion of the deficit remains somewhat modest. Consequently, we infer that in 1999 economic forces other than cyclical ones played a much more significant role.

Forces behind the Growing Potential Output Trade Deficit

For the 1996-99 period as a whole, cyclical forces can account for one-third of the increase in the trade deficit. What other factors, then, account for the remaining two-thirds of the deficit increase in these years? This question is equivalent to asking, what explains the growth in the potential output trade deficit? The potential output trade deficit increased, in terms of both level and share of GDP, throughout the 1990s (Charts 2 and 3). In 1999, it made up $258 billion—or about 85 percent—of the actual $302 billion deficit. As suggested earlier, part of the increase in this deficit can be attributed to upward revisions in the OECD's estimates of the U.S. potential output growth rate. Nevertheless, this factor is only a small part of the explanation.

A better understanding of the potential output trade deficit can come from a recognition that the U.S. trade and current account balances are similar, both conceptually and empirically. The current account balance includes the trade balance plus investment income and transfers. The latter two components have been small recently, totaling roughly $10 billion to $15 billion. The current account deficit also represents the excess of U.S. investment over U.S. saving. Hence, to a large extent, the trade deficit has simply been the counterpart to rapidly increasing U.S. investment. Between 1996 and 1999, the nation's real investment grew about 33 percent. The strong investment climate in this period stemmed largely from noncyclical forces such as relatively low interest rates, an appreciating dollar, greater productivity growth, and a stable inflationary environment. These forces likely accounted for much of the increase in the potential output trade deficit.

To finance this investment boom, the United States borrowed abroad; foreign countries invested heavily here. In other words, foreign countries in this period found real and financial U.S. assets more attractive than the assets of other countries.[17] This desire to purchase U.S. assets, in turn, drove up the dollar and kept interest rates low—conditions that contributed to the increase in the trade deficit. Thus, the growing trade deficit in the late 1990s can also be viewed as the outcome of the fact that U.S. assets in this period were in high demand worldwide.

Conclusion

By comparing movements in the nation's actual trade balance with movements in the "potential output" trade balance, we have shown that the U.S. economic boom can account for $45 billion, or about 32 percent, of the 1996-99 leap in the U.S. trade deficit. Nevertheless, most of the increase over the past three years—approximately two-thirds—has likely resulted from other, noncyclical forces, such as relatively low interest rates, a strong dollar, and high productivity growth.

By extension, a reversal of any of these forces could eventually bring down the deficit. If, for example, U.S. GDP fell below potential, the trade deficit would begin to decline, as it has in the past three months. Alternatively, if a savings decline or an investment boom occurred abroad, world interest rates would tend to rise, adversely affecting U.S. investment and curbing U.S. imports. In a third possible scenario, substantial growth in output and productivity in other countries could intensify the demand for U.S. exports and lead, perhaps, to a decline in the prevailing capital inflows. Such developments would put downward pressure on the dollar and upward pressure on interest rates, and thereby help to reduce the U.S. trade deficit.

A final, more subtle factor that might lower the deficit would come into play only over time—that is, beyond the short-term horizon assumed in our analysis. The flip side of the sizable trade deficit is the large capital inflows associated with strong perceived investment opportunities in the United States. If these opportunities generated substantial realized gains, then the country would be in a good position to "pay back" its borrowing. In other words, in the medium and long run, high GDP growth would help lead to smaller trade deficits because it would create the resources needed for the United States to repay its debt.

Notes

1. See, for example, "Economy May Have a Soft Spot," *New York Times*, June 10, 2000, sec. C, p. 1, and "Trade Deficit Could Signal Danger Ahead," *New York Times*, June 8, 2000, sec. C, p. 2.

2. Between 1996 and 1999, imports grew at twice the rate of exports: 9.1 percent as compared with 4.5 percent. In 2000, import growth continued to outstrip export growth. With imports rising 18 percent and exports increasing 11 percent, the deficit climbed to $370.4 billion.

3. Our analysis is not intended to offer a complete explanation for the growing deficit. Such an explanation would require a quantitative evaluation of the importance of a booming U.S. economy, as well as of the other commonly cited proximate causes of the deficit, such as the relatively low interest rates and the relatively strong dollar. It would also require an understanding of the fundamental factors that underlie the proximate causes, such as U.S. monetary and fiscal policy or the U.S. productivity surge. Moreover, an understanding of the linkages between the fundamental factors and the proximate causes would be needed.

4. These calculations are based on U.S. merchandise trade with the country's top eighteen trading partners. Cyclical forces in the rest of

the world accounted for only $1 billion of the $142 billion increase in the deficit.

5. See, for example, De Masi (1997).

6. Note that we are using a short-run framework that is best applied to a horizon of a few years.

7. Barrell and Sefton (1995) review the methods used to estimate potential output.

8. See Organization for Economic Cooperation and Development (1999b). For details on the OECD methodology, see Giorno et al. (1995). The OECD reports potential output in the form of an "output gap"—actual output measured as a percentage deviation from potential output. Thus, a 1 percent output gap indicates that actual output is 1 percent higher than potential output. By this measure, the United States had a 2.0 percent output gap in 1998 and a 2.5 percent gap in 1999. For details on the IMF methodology, see De Masi (1997).

9. Hooper, Johnson, and Marquez (1998) compile existing estimates of income elasticities of import demand. They find that the elasticity is approximately 2 for the United States and roughly 1.5 for its major trading partners.

10. It accounted for 77 percent and 78 percent of total U.S. trade in 1998 and 1999, respectively.

11. We use output as a proxy for income.

12. The weight attributed to cyclical forces in 1996-99 is substantial. By our calculations, during the last episode of increasing trade deficits, the mid-1980s, cyclical forces accounted for only about 17 percent of the increase.

13. We choose our alternative elasticities to be about 1 standard error around our benchmark estimates; we draw on Marquez (1990), whose estimated elasticities for both the United States and its trading partners have standard errors of around 0.5. We do not report results using the lower bound of 1 as the elasticity of the trading partners because the results are virtually the same as those obtained using the benchmark specification.

14. This result may seem counterintuitive. During this period, actual output grew faster than potential output. The more sensitive U.S. import demand is to national income (output), the greater the increase in imports that is generated by the above-potential output growth. This implies that a larger fraction of the increase in actual imports (and the actual trade deficit) can be attributed to cyclical forces. Then it follows that a *smaller* fraction of the increase in actual imports (and the actual trade deficit) can be attributed to changes in the potential output trade deficit.

15. In an earlier study, we performed this calculation using IMF data, in place of OECD data, on U.S. potential output; our results were essentially the same for 1996-98.

16. See Organization for Economic Cooperation and Development (1999a, 1999b). The U.S. potential output growth rate is now estimated to exceed 4 percent (see, for example, Standard and Poor's DRI December 2000 forecast of GDP growth and the GDP gap).

17. See Higgins and Klitgaard (1998) for an analysis of this trend and its connection to the current account deficit.

References

Barrell, Ray, and James Sefton. 1995. "Output Gaps: Some Evidence from the U.K., France, and Germany." *National Institute Economic Review*, no. 151: 65-73.

De Masi, Paula R. 1997. "IMF Estimates of Potential Output: Theory and Practice." *Staff Studies for the World Economic Outlook*, 40-6. Washington, D.C.: International Monetary Fund.

Gerlach, Stefan, and Frank Smets. 1997. "Output Gaps and Inflation: Unobservable Components Estimates for the G-7 Countries." Unpublished paper, Bank for International Settlements, January.

Giorno, Claude, Pete Richardson, Deborah Roseveare, and Paul van den Noord. 1995. "Potential Output, Output Gaps, and Structural Budget Balances." *OECD Economic Studies*, no. 24: 167-209.

Higgins, Matthew, and Thomas Klitgaard. 1998. "Viewing the Current Account Deficit as a Capital Inflow." Federal Reserve Bank of New York *Current Issues in Economics and Finance* 4, no. 13.

Hooper, Peter, Karen Johnson, and Jaime Marquez. 1998. "Trade Elasticities for G-7 Countries." Board of Governors of the Federal Reserve System International Finance Discussion Paper no. 609, April.

Kuttner, Kenneth N. 1994. "Estimating Potential Output as a Latent Variable." *Journal of Business and Economic Statistics* 12, no. 3 (July): 361-8.

Marquez, Jaime. 1990. "Bilateral Trade Elasticities." *Review of Economics and Statistics* 72, no. 1 (February): 70-7.

Organization for Economic Cooperation and Development. 1999a. *OECD Economic Outlook*, June: 197-206.

———. 1999b. *OECD Economic Outlook*, December, Annex Tables 1 and 11.

About the Authors

Stefan Papaioannou, formerly an assistant economist in the International Research Function of the Research and Market Analysis Group, is now a business analyst at VNU, Inc.; Kei-Mu Yi is a senior economist in the International Research Function.

The views expressed in this article are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

Current Issues in Economics and Finance is published by the Research and Market Analysis Group of the Federal Reserve Bank of New York. Dorothy Meadow Sobol is the editor.