2 THE CURRENT ACCOUNT AND MACROECONOMIC POLICY: AN ECONOMETRIC ANALYSIS*

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Introduction

Beginning in late 1982, a huge gap between domestic saving and domestic investment began to develop in the U.S.; and this gap has remained large through 1987. Investment recovered rapidly after the 1981–1982 recession and has remained abnormally high by U.S. standards in the five years since the recession ended. Domestic saving also recovered rapidly after the 1981–1982 recession, but starting in late 1982, saving fell as a ratio to income. Paralleling this saving-investment gap has been the much-discussed U.S. trade deficit. At the same time, trade surpluses and corresponding saving-investment surpluses developed and persisted in Germany and Japan. (See figures 2–1 through 2–4).

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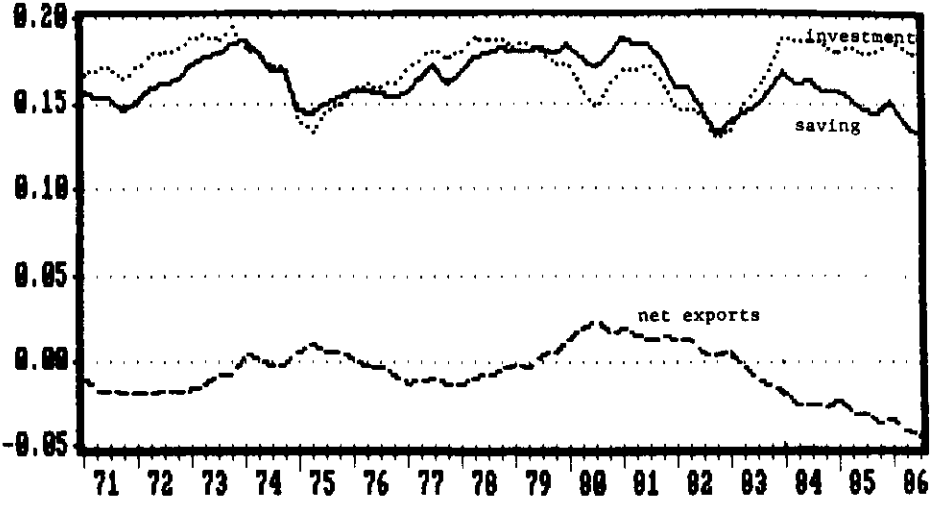

Figure 2–1. U.S. real net exports (X), real investment (I), and national saving ($S = Y - C - G$) as a fraction of real GNP (Y)

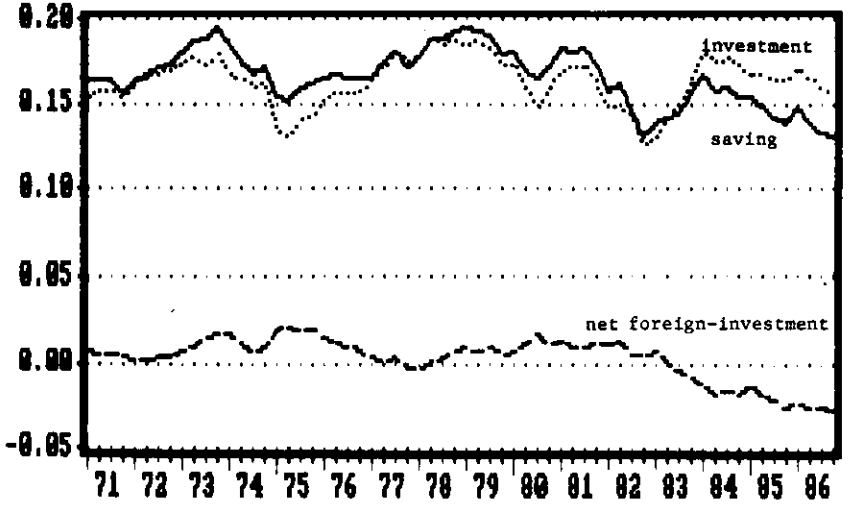

Figure 2–2. U.S. current dollar net foreign-investment ($\$X$), investment ($\$I$), and gross saving ($\$S$) as a fraction of nominal GNP ($\$Y$)

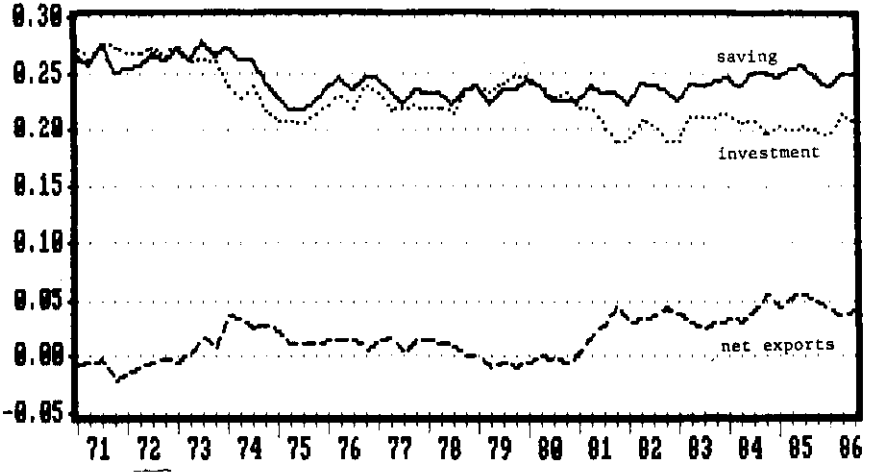

Figure 2–3. German real net exports, real investment, and real national saving as a fraction of real GNP

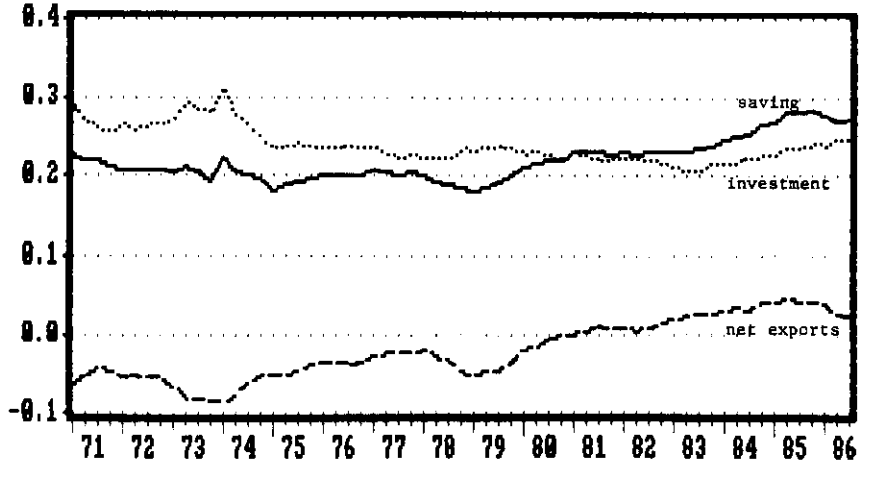

Figure 2–4. Japanese real net exports, real investment, and real national saving as a fraction of real GNP

My purpose here is to examine what would have happened to saving and investment in the United States if the United States had followed policies that would have prevented the trade deficit from growing as rapidly as it did in the post-1982 period. The simple accounting identity that the trade deficit is equal to the difference between domestic saving and domestic investment tells us that saving would have been higher compared to investment if the trade deficit had been reduced. But whether the levels of saving and investment would have been higher or lower depends on the source of the change in the deficit as well as on a host of empirical magnitudes such as interest rate elasticities of investment, exchange rate elasticities of exports and imports, the degree of international capital mobility, and the impact of a change in U.S. interest rates on interest rates in the rest of the world.

I measure the impact of the trade deficit on saving and investment by performing counterfactual simulations of smaller trade deficits using a multicountry econometric model. The model incorporates the high degree of international capital mobility characteristic of the 1980s and uses econometric estimates of the elasticities and lags based on data from the 1970s and 1980s. By using the rational-expectations assumption, the model permits real interest rates to differ among the advanced industrial countries by the amount of the expected changes in real exchange rates. The model also permits long-term interest rates and exchange rates to move in anticipation of future changes in monetary and fiscal policy. There is wide agreement that these interrelationships between real interest rates, real exchange rates, and expectations are a key feature of any explanation of the trade deficit during the 1980s (see, for example, Feldstein [1987] and McKinnon and Ohno [1986]). Hence, an econometric model that is fit to the data *and* incorporates capital mobility with rational expectations seems particularly suited to assessing the quantitative impact of the trade deficit on saving and investment, and the real economy in general.

Because the trade deficit itself is an endogenous variable, it is misleading to provide counterfactual simulations of what the world would have looked like without the trade deficit by simply manipulating the trade deficit as if it were exogenous. Rather, it is necessary to first retreat a step and provide an explanation for the trade deficit in terms of more fundamental exogenous causes. Once these causes are identified, then counterfactual simulations of alternative scenarios for the trade deficit, as generated by these exogenous factors, are possible.

Several studies have been reported during the last year concerning the "proximate" causes of the U.S. trade deficit. These studies have explored whether movements in exchange rates, U.S. GNP, or foreign GNP can

explain the movement in the U.S. trade deficit (see Bryant and Holtham [1987]) who summarize of the partial equilibrium results from the trade sectors of several large econometric models, and Krugman and Baldwin [1987] and Hakkio and Roberts [1987] who focus on more rudimentary models). However, these "proximate" factors, such as exchange rates and GNP, are just as endogenous as the trade deficit. They are certainly endogenous to saving and investment behavior, which is the issue examined here. Hence, it is necessary to look for more fundamental causes in order to address these issues.

The focus of this chapter is on U.S. fiscal policy as the exogenous forcing variable behind the trade deficit. In particular, the chapter examines the effects of a counterfactual fiscal policy in the United States during the 1982–1986 period, in which government purchases are reduced relative to their historical path so as to eliminate the government deficit. According to the model, this counterfactual change in U.S. fiscal policy results in smaller trade deficits and hence generates the kind of counterfactual trade balance needed to address the above question.

Most of the following analysis focuses on the real trade deficit (real net exports), as well as on real investment and real saving—the latter simply defined as the excess of real GNP over real consumption and real government purchases. For the purpose of looking at the effects of the trade deficit on the real economy, real net exports is the appropriate measure, as emphasized by Bryant and Holtham [1987]: "it is the deficit in constant prices that is relevant for assessing influences on real GNP and jobs, both in the U.S. economy and abroad." But it should be emphasized that the trade deficit in current dollars is more relevant for assessing future burdens of the deficit (see Denison [1981]). As will be clear below, the model suggests that changes in government purchases have a much larger effect on the real deficit than on the current dollar deficit and the current account.

For the purpose of this exercise, there are two potential problems with identifying fiscal policy as the cause of the trade deficit. First, fiscal policy may be endogenous and simply responding to developments in the economy that make it appear to have a role in causing the trade deficit. It is assumed that this is not the case for U.S. government purchases during 1982–1986. The shift in government purchases that began in 1982 is largely identified with an exogenous increase in defense expenditures, and U.S. government purchases show almost no counter-cyclical behavior in the entire post-war period. The second problem is perhaps more serious. Focus on fiscal policy ignores the possibility that some other forces may have been responsible for the trade deficit. For example, some have argued

that attractive investment opportunities in the United States compared to Germany and Japan are the cause of the U.S. trade deficit. This possibility is not examined here. Similarly, I do not try to address questions about what would have happened had the United States run a large fiscal deficit and there was no trade deficit, perhaps because of restrictive trade legislation. It is possible that as part of the political process of trading off one special interest against another, Congress would have been able to enact more spending cuts if it had given in to more restrictive trade bills, and thereby reduced the fiscal deficit. In this round-about way, fiscal policy could become endogenous to the trade deficit. It is also possible that interest rates would have risen, choking off investment and eliminating the saving-investment deficit by another route. These possibilities are not examined here, but they are clearly good subjects for future research.

This chapter is organized as follows: Section 2.1 describes the counterfactual simulation experiments. Section 2.2 briefly describes the model, which is listed in detail in the appendix (tables 2A–1 through 2A–4). Section 2.3 describes the results of the simulations, detailing how much of the change in the trade deficit results in a change in investment and a change in saving in both the short run and the long run. Section 2.4 steps back from the particular model used here and examines the robustness of the key results to different modeling assumptions. Section 2.5 discusses the policy implications.

2.1 A Description of the Counterfactual Hypotheses

U.S. real net exports began to turn negative in early 1983. In order to bring about a counterfactual reversal of this decline, it is supposed that real U.S. government purchases of goods and services grew less rapidly than the historical record starting in the first quarter of 1982. In particular, it is assumed that by 1986:1 this cut resulted in real government purchases lower than reality by an amount equal to 3% of historical real GNP. The full amount of the cut does not occur immediately, however. It is phased in gradually from 1982:1 through 1986:1 in equal increments. The gradual phase-in, much like the Gramm-Rudman-Hollings type of phase-in for budget deficit reductions, is meant to mitigate the real output effects of a cut in government purchases. Three percent of real GNP gives a cut in government expenditures that approximately balances the combined fiscal deficit at the federal, state, and local levels. No changes in taxes or other components of government expenditures are assumed. Instead, the cut in

government purchases results in a counterfactual reduction in the outstanding stock of government bonds, as the government needs to borrow less to finance the smaller budget deficit.

With a forward-looking model it is important to describe the counterfactual-expectations assumption that underlie this counterfactual change in government spending. The implicit assumption made here is that as of 1982:1 (but not before) people became aware of the cut in government spending. They knew, that, starting in that quarter, real government spending would be eventually lowered by 3% of real GNP, and they knew that the cut would be phased in gradually. As we will see, this expectation begins to have immediate and large effects on interest rates and exchange rates as soon as the cut is announced and before most of the cut takes place.

An important policy controversy relating to the trade deficit/saving-investment deficit identity has arisen during the last few years. As discussed in Krugman and Baldwin [1987] and McKinnon and Ohno [1986], the debate is over whether exchange rate adjustments are necessary to bring about adjustments in the trade deficit, or whether shifts in the saving-investment balance (perhaps brought on by a decrease in government spending) can bring about the adjustments without exchange rate adjustments. In order to investigate the empirical significance of these issues, three alternatives to the simple reduction in government purchases in the United States were also examined. All these alternatives assume that U.S. government purchases are cut by 3% of real GNP as in the scenario described above. They differ in the degree of monetary accommodation by the Fed or the other central banks or in the degree to which the trade surpluses are reduced in Germany and Japan. These alternatives along with the scenario (scenario 1) described above are summarized as follows:

1. No other change.
2. Expansionary U.S. monetary policy (U.S. money supply increased by 8%).
3. Expansionary foreign monetary policy (money supply is increased in all the non-U.S. G-7 countries by 8%).
4. Expansionary fiscal policy in Japan and Germany (government purchases are raised by 2% of baseline GNP in Germany and Japan).

As will be seen below, the 8% money supply expansion (which is also phased in gradually) was chosen to roughly offset the deflationary effects of the cut in U.S. government purchases. Whether this occurs in the United States or abroad has implications for exchange rate behavior. The

expansionary fiscal policy (scenario 4) is meant to examine the effects of reducing the trade deficits in Japan and Germany.

2.2 Brief Description of the Model

The econometric model is built to explain short-run economic fluctuations in the Group of Seven countries: the United States, Canada, France, Germany, Italy, Japan, and the United Kingdom. It is a quarterly model fit to data mostly from the quarterly OECD national income accounts. The parameters of the model are based on quarterly observations from 1971 through 1986 with the exact starting and ending quarters depending on the type of equation (number of leads and lags).

The definition of the variables used in the model and the notation is described in appendix 2A. A listing of the model equations is found in appendix 2B. The estimated coefficients are found in appendix 2C, and summary elasticities are found in appendix 2D.

Although a multicountry model necessarily involves many equations and variables, this particular model is quite simple in structure and the size of the model for any one country is quite modest. The model is simply an empirical multicountry version of a Mundell-Fleming two-country model with rational expectations and sticky wages as modeled via the staggered wage-setting hypothesis.

The rational-expectations assumption is a highlight of the model. Expectations are assumed to be rational in all markets—labor markets as well as financial markets. Hence, wages are both "sticky" and "forward-looking." Monetary policy has an effect on real output, though of a qualitatively different type than in Keynesian models without rational expectations.

The financial side of the model is a disaggregated version of the Mundell-Fleming approach to international financial markets with perfect capital mobility and with perfect substitution between assets. The nominal interest rate spread between each pair of countries is equal to the expected rate of change in the exchange rate between the same two countries. In the classic Mundell-Fleming model, the interest rates are equalized because expectations of exchange rates are not considered. In this model, expectations of exchange rate changes are forward looking—computed using the entire model—and permit interest rate differentials between countries as discussed in the introduction. Although capital flows between countries may be quite large, with the perfect capital mobility approximation, the accumulated capital stocks need not be calculated explicitly. According to the model, aggregate demand determines output in the short run, as the aggre-

gate wage and price level are essentially predetermined in each quarter—only a fraction of the workers adjust their wages each quarter. Aggregate demand is built up from disaggregated spending decisions—consumption, investment, government, and net exports. The important price variables in these demand equations are the real interest rate (rational expectations of future inflation are a factor here) and the relative price of domestic goods to foreign goods (the exchange rate is a factor here).

Consumption is disaggregated into durables, nondurables, and services in most of the countries, and is assumed to depend on expected future income and on the real interest rate. A lagged dependent variable in these equations captures the partial adjustment of consumption to changes in these variables. Negative real interest rate effects are found for durables in the United States, Canada, France, and Japan; for nondurables in the United States, Canada, and the U.K.; and for total consumption in Germany and Italy.

Investment depends, with a lag, on expected demand and on the real interest rate. For the United States, fixed investment is disaggregated into equipment, nonresidential structures, and residential structures. For France, Japan and the United Kingdom, total nonresidential is considered separately from total residential. Only total fixed-investment equations were estimated for Canada, Germany, and Italy. The real interest rate has a negative impact on fixed investment for every country except France, and a negative impact on inventory investment in all countries.

Real exports depend on the ratio of the price of imports to the price of exports, and real imports depend on the ratio of import prices to the domestic deflator. In addition, imports depend on domestic output, and exports depend on a weighted average of output in the other countries. Imports and exports are not disaggregated by type of good; they correspond to the definition of exports and imports in the NIPA accounts. The equations are in logarithmic form for each country. For each country, an increase in the relative price of exports to imports decreases real net exports. These equations are dynamic (lagged dependent variables are included in the estimated equations). In the short run, the elasticities are much less than in the long run.

Wages in the model are determined according to the staggered-contract approach. That is, wages are assumed to be bid up relative to expected future wages and prices if aggregate demand (as measured by actual output) is above potential output. The distribution of contracts by length is assumed to vary by country and is estimated using aggregate data. In Japan synchronized wage setting is permitted and the estimates suggest that a relatively large fraction of workers have annual wage adjustments at the time of the Shunto. Potential output is assumed to grow at a constant rate,

and there is no impact of increases in the capital stock on potential output.

Output prices are set according to a markup over wages and import prices with an allowance for trend increases in productivity and demand effects in some countries. A lagged dependent variable allows for slow adjustment so that margins fall in the short run after an increase in wages or import prices. Eventually the full wage and import price increase is passed through.

For each of the seven countries, import prices are assumed to depend directly on an average of prices in the rest of the world converted into domestic currency units using the exchange rate between each country. The effect of exchange rates on domestic prices occurs through this channel in that domestic prices are affected by import prices as described above. Export prices, on the other hand, are assumed to move in response to domestic prices and foreign prices. In the United States, Canada, and France, the impact of foreign prices in export prices was small and insignificant and was omitted from these equations.

To see how interest rates are determined in the model, suppose that the money supply is exogenous in each country. The partial adjustment money demand equations for each country are inverted to give an equation for the short-term interest rate. The short-term interest rates are then used to determine long-term rates through a forward-looking term structure equation: the long rate is assumed to be a geometric distributed lead of the short rate. Finally, the exchange rate is related to the differential between interest rates in each country according to uncovered interest rate parity.

Taking the money supply and government spending in each country as exogenous, the model consisting of the above equations can be solved in each period for the endogenous variables. Rational expectations of future variables appear throughout the model: expectations of future prices and income appear in the consumption equations, expectations of future output and prices appear in the investment equations, expectations of future exchange rates appear in the exchange rate equations, expectations of future interest rates appear in the term structure equations, and expectations of future wages, prices, and output appear in the wage equations. The solution is performed numerically using the extended-path algorithm discussed in Fair and Taylor [1983].

2.3 Results

The simulation results are summarized in tables 2–1 through 2–4. These four tables correspond to the four different scenarios described in section 1. Of course much more information can be extracted from the simulations

Table 2–1. Effects of a Reduction in the U.S. Trade Deficit Induced by a Reduction in U.S. Government Purchases—1982–1987.

The counterfactural decline in real government purchases is equal to 3 percent of real GNP. The decline is phased in gradually in equal percentage increments each quarter starting in 1982.1 and finishing in 1986:1. Although the model is quarterly, only the first quarter of each year is reported. Figures are in percent difference from historical values (or percentage point difference for interest rates and ratios).

	82:1	*83:1*	*84:1*	*85:1*	*86:1*	*87:1*
SHORT-TERM RATES						
US-Fed. funds	−.45	−1.67	−2.12	−2.40	−2.48	−2.35
Germany-call money	.15	−.65	−.79	−.80	−.70	−.58
Japan-call money	−.05	−.55	−.99	−1.19	−1.10	−.84
EXCHANGE RATES						
D-Mark	13.10	12.50	11.20	9.61	7.80	5.92
Yen	11.10	10.30	9.08	7.85	6.48	4.96
LONG-TERM RATES						
US-gov't bonds	−1.10	−1.93	−2.26	−2.43	−2.41	−2.31
Germany-gov't bonds	−.38	−.71	−.79	−.77	−.66	−.54
Japan-gov't bonds	−.34	−.80	−1.09	−1.12	−.94	−.69
REAL SPENDING						
US consumption	−0.05	−0.21	−0.38	−0.54	−0.57	−0.51
US investment	0.00	0.48	1.00	1.56	2.38	3.89
German investment	−0.19	0.10	0.98	2.10	2.86	2.88
Japan investment	−0.13	−0.43	0.05	1.18	2.38	3.42
US exports	0.13	1.58	3.61	5.47	6.87	7.73
US imports	−0.47	−3.86	−6.27	−8.13	−9.34	−8.77
US real GNP	0.03	−0.26	−0.39	−0.72	−0.97	−0.58
German real GNP	−0.20	−0.44	−0.39	−0.25	−0.06	0.07
Japan real GNP	−0.10	−0.48	−0.51	−0.24	0.16	0.38
PRICES						
US GNP deflator	−0.10	−1.12	−2.50	−3.85	−5.02	−5.95
German GNP deflator	−0.02	−0.51	−0.95	−1.24	−1.37	−1.35
Japan GNP deflator	−0.01	−0.42	−1.10	−1.72	−2.02	−1.93
US import price	1.21	4.72	6.38	6.73	6.24	5.26
US export price	−0.04	−0.78	−2.06	−3.41	−4.65	−5.65
RATIOS TO REAL GNP						
US real nat. saving	0.06	0.67	1.42	2.01	2.58	2.85
US real investment	−0.00	0.10	0.26	0.42	0.63	0.78
US real net exports	0.06	0.57	1.16	1.59	1.94	2.07
RATIO TO GNP						
US net exports	−0.07	0.03	0.15	0.35	0.48	0.46

Table 2–2. Effects of a Reduction in the U.S. Trade Deficit by a Simultaneous Reduction in Government Purchases and an Increase in the Money Supply—1982–1987.

The decline in purchases is 3 percent of real GNP and is phased in gradually starting in 1982:1 and ending in 1986:1. The money increase is 8 percent, phased in the same way. Figures are in percent differences from historical values.

	82:1	*83:1*	*84:1*	*85:1*	*86:1*	*87:1*
SHORT-TERM RATES						
US-Fed. funds	.63	−0.30	−1.19	−0.23	−3.41	−1.79
Germany-call money	−0.11	−0.52	−0.61	−0.61	−0.55	−0.49
Japan-call money	−0.05	−0.54	−0.87	−1.01	−0.90	−0.01
EXCHANGE RATES						
D-Mark	19.80	19.90	19.90	18.70	16.20	14.40
Yen	17.50	17.60	17.70	16.90	14.80	13.40
LONG-TERM RATES						
US-gov't bonds	−0.27	−0.80	−1.84	−2.54	−2.17	−1.90
Germany-gov't bonds	−3.19	−0.56	−0.61	−0.59	−0.53	−0.46
Japan-gov't bonds	−0.00	−0.01	−0.01	−0.01	−0.01	−0.01
REAL SPENDING						
US consumption	0.55	1.53	1.56	1.21	0.74	0.42
US investment	4.96	13.30	9.77	9.85	7.45	6.22
German investment	−0.23	0.07	0.87	1.80	2.41	2.39
Japan investment	−0.13	−0.35	0.17	1.19	2.17	2.96
US exports	0.22	2.14	4.15	5.69	6.72	7.24
US imports	0.80	1.43	−0.50	−2.79	−5.43	−6.46
US real GNP	1.02	2.12	1.84	1.25	0.29	0.05
German real GNP	−0.16	−0.25	−0.21	−0.12	−0.03	0.01
Japan real GNP	−0.10	−0.43	−0.40	−0.14	0.18	0.30
PRICES						
US GNP deflator	0.10	1.40	2.48	2.83	2.60	2.06
German GNP deflator	−0.01	−0.52	−0.86	−1.06	−1.12	−1.08
Japan GNP deflator	−0.01	−0.43	−1.03	−1.53	−1.72	−1.61
US import price	1.83	7.49	11.10	13.00	13.50	13.00
US export price	1.03	1.05	1.08	1.14	1.18	1.18
RATIOS TO REAL GNP						
US real nat. saving	0.50	1.54	1.99	2.49	2.76	2.76
US real investment	0.57	1.47	1.47	1.53	1.34	1.06
US real net exports	−0.07	0.07	0.53	0.96	1.42	1.70
RATIO TO GNP						
US net exports	−0.27	−0.56	−0.47	−0.19	0.10	0.25

Table 2–3. Effects of a Reduction in the Trade Deficit by a Simultaneous Reduction in U.S. Gov't Purchases and a Rise in the Money Supply in 6 Other Countries (1982–1986).

The decline in purchases is 3 percent of real GNP and is phased in gradually starting in 1982:1 and ending in 1986:1. The money increase is 8 percent, phased in the same way. Figures are in percent differences from historical values (or percentage point difference for interest rates and prices).

	82:1	*83:1*	*84:1*	*85:1*	*86:1*	*87:1*
SHORT-TERM RATES						
US-Fed. funds	−0.34	−1.28	−1.60	−1.79	−1.82	−1.64
Germany-call money	0.48	0.51	0.70	0.42	−0.33	−0.15
Japan-call money	0.22	−0.08	0.71	0.90	0.12	0.12
EXCHANGE RATES						
D-Mark	12.00	10.90	8.63	6.13	4.03	2.33
Yen	9.42	8.79	6.89	4.20	1.67	−0.42
LONG-TERM RATES						
US-gov't bonds	−0.84	−1.46	−1.70	−1.79	−1.72	−1.60
Germany-gov't bonds	0.34	0.61	0.61	0.21	0.16	−0.25
Japan-gov't bonds	−0.01	0.40	0.80	0.61	0.18	−0.42
REAL SPENDING						
US consumption	−0.04	−0.17	−0.33	−0.49	−0.53	−0.46
US investment	0.04	0.33	0.66	0.94	1.52	2.70
German investment	0.89	4.90	6.61	7.49	6.63	4.02
Japan investment	0.99	5.80	8.31	7.89	5.10	1.84
US exports	0.29	2.73	5.47	7.61	8.90	9.35
US imports	−0.34	−3.19	−5.54	−7.67	−9.35	−9.26
US real GNP	0.05	−0.20	−0.32	−0.64	−0.89	−0.51
German real GNP	0.53	1.76	1.93	1.63	1.05	0.23
Japan real GNP	0.41	1.80	2.09	1.34	0.11	−1.16
PRICES						
US GNP deflator	−0.08	−0.86	−1.91	−2.91	−3.76	−4.38
German GNP deflator	0.10	1.05	2.91	4.80	6.22	7.00
Japan GNP deflator	0.05	1.21	3.73	6.56	8.51	8.91
US import price	0.97	4.03	6.11	7.43	8.12	8.28
US export price	−0.03	−0.60	−1.58	−2.59	−3.49	−4.18
RATIOS TO REAL GNP						
US real nat. saving	0.07	0.69	1.45	2.04	2.61	2.87
US real investment	−0.00	0.07	0.19	0.29	0.46	0.56
US real net exports	0.07	0.62	1.26	1.76	2.15	2.32
RATIO TO GNP						
US net exports	−0.04	0.16	0.34	0.53	0.61	0.52

Table 2–4. Effects of a Reduction in the Trade Deficit by a Simultaneous Reduction in U.S. Gov't Purchases and an Increase in German and Japanese Gov't Purchases 1982–1987.

The decline in U.S. purchases is 3 percent of real GNP. The increase in Germany and Japan is 2 percent of GNP. All are phased in gradually starting in 1982:1 and ending in 1986:1.

	82:1	*83:1*	*84:1*	*85:1*	*86:1*	*87:1*
SHORT-TERM RATES						
US-Fed. funds	−0.30	−1.02	−1.37	−1.63	−1.73	−1.66
Germany-call money	−0.09	−0.24	−0.00	0.25	0.52	0.54
Japan-call money	−0.04	−0.41	−0.37	−0.05	0.42	0.57
EXCHANGE RATES						
D-Mark	19.40	19.00	17.80	16.00	13.60	11.10
Yen	18.60	18.20	17.30	15.90	13.80	11.30
LONG-TERM RATES						
US-gov't bonds	−0.67	−1.22	−1.51	−1.68	−1.69	−1.67
Germany-gov't bonds	−0.20	−0.14	0.11	0.35	0.52	0.53
Japan-gov't bonds	−0.24	−0.37	−0.17	0.20	0.50	0.54
REAL SPENDING						
US consumption	−0.01	−0.09	−0.22	−0.35	−0.36	−0.30
US investment	0.16	0.40	0.67	0.94	1.56	2.80
German investment	−0.16	0.37	0.82	0.80	0.13	−0.58
Japan investment	−0.11	−0.07	0.56	1.19	1.18	0.59
US exports	0.20	2.21	4.80	7.09	8.78	9.69
US imports	−0.49	−4.04	−6.58	−8.58	−9.93	−9.48
US real GNP	0.09	−0.11	−0.19	−0.49	−0.71	−0.32
German real GNP	−0.18	0.05	0.14	0.27	0.44	0.27
Japan real GNP	−0.14	−0.26	−0.04	0.32	0.69	0.25
PRICES						
US GNP deflator	−0.07	−0.68	−1.58	−2.51	−3.37	−4.07
German GNP deflator	0.01	−0.35	−0.29	−0.01	0.33	0.64
Japan GNP deflator	−0.00	−0.36	−0.58	−0.44	0.05	0.59
US import price	1.51	6.10	8.77	10.00	10.20	9.70
US export price	−0.03	−0.47	−1.29	−2.21	−3.09	−3.84
RATIOS TO REAL GNP						
US real nat. saving	0.08	0.72	1.48	2.08	2.65	2.93
US real investment	0.01	0.07	0.16	0.26	0.43	0.54
US real net exports	0.07	0.65	1.32	1.82	2.22	2.39
RATIO TO GNP						
US net exports	−0.09	0.01	0.15	0.37	0.50	0.47

than is reported in these tables. Even though the model is quarterly, only the first quarter of each year from 1982 through 1987 is reported. The variables in the tables are selected because they are key to explaining the behavior of the trade deficit, investment, and consumption. For simplicity, the focus here is on only two other countries, Germany and Japan, in addition to the United States. Figures 2–5 and 2–6 give some plots for the major variables in each quarter for scenario 1. It is apparent from these quarterly charts that the yearly summaries in tables 2–1 through 2–4 are sufficient for assessing the effects on these alternative scenarios.

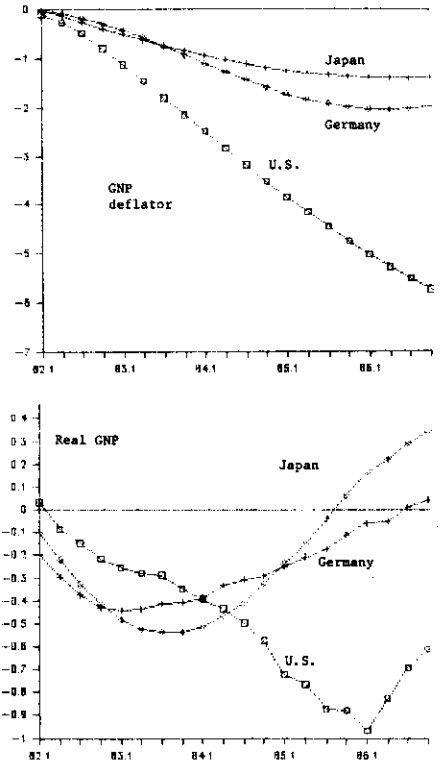

Figure 2–5. Effects on real GNP and GNP deflators in U.S., Germany, and Japan of a reduction in U.S. government purchases (percent deviation from historical value). Simulation corresponds to that reported in table 2–1.

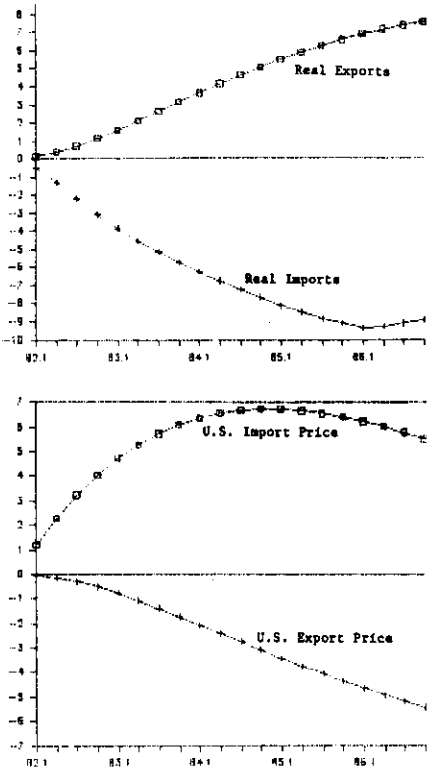

Figure 2–6. Effects of exports, imports, export prices, and import prices of a cut in U.S. government purchases (percent deviation from historical values. Simulation corresponds to that reported in table 2–1.

2.3.1 Theoretical Prediction

What are the theoretical long-run effects of a cut in government purchases equal to 3% of real GNP in a model like this? The model satisfies the natural rate property so that the long-run effects on output should be zero. Hence, the decrease in government purchases should lead to a increase (crowding in) for consumption, investment, and/or net exports (recall that durable consumption depends on interest rates in this model). In the long run, prices and exchange rates will have settled down to a new equilibrium so that real interest rates in all countries must be equal. Thus, the amount

by which investment, consumption, and net exports change depends on how much the world real rate of interest declines, on the interest rate elasticities of investment and consumption, and on the elasticities of import and export demand. In theory, real net exports could rise by the full amount of the cut in government expenditures (3% of real GNP), domestic saving could rise by 3% of real GNP (if the interest rate elasticity of consumption was zero) and investment could remain unchanged (if the interest rate elasticity of investment was zero). With high interest rate elasticities there might be a very small increase in net exports. Hence, even in the long run, the theoretical implications are ambiguous. In the short run, where output can change as a result of the spending cut, the results are even more ambiguous.

2.3.2 Simulation Results

Consider first scenario 1, the cut in U.S. government spending with no other changes. Table 2–1 shows how real output and prices fall in the United States relative to their historical values (see also figure 2–5). Note that the government spending multiplier is very small (between 0.3 and 0.5), because the bulk of the spending cut is anticipated due to the fact that it is known to be phased in gradually. In fact, the output effects of a fully unanticipated 3% decrease in government spending would be much larger. In scenario 1, long-term interest rates fall immediately with the start of the budget cuts, and this begins to stimulate investment and consumer durables. Note how long-term rates drop more than short-term rates in the first years of the simulation. This is due to the forward-looking term structure assumptions of the model. In addition, the dollar exchange rate depreciates by a fairly large amount in the first quarter and then appreciates slowly, permitting a differential to exist between U.S. interest rates and foreign interest rates. Prices fall throughout the simulation forcing nominal interest rates to fall and stimulate investment given the unchanged U.S. money supply. Because of the slow adjustment of wages, however, prices do not adjust instantaneously.

Surprisingly, the output effects in Germany and Japan are larger than in the United States in the first few years of the simulation. Again, this is because of the anticipated aspects of the policy change: the exchange rates in Japan and Germany appreciate by a large amount and this reduces exports and increases imports in these countries. Moreover, with the dollar expected to appreciate after the initial fall, interest rates do not fall as much abroad as in the United States. A fully unanticipated increase in

government spending in the United States has much larger effects on United States output than on foreign output.

Consider now the effects on the trade deficit and the saving-investment deficit. As shown in table 2–1, by 1987, five years after the start of the cut in government purchases and one year after the cut has reached the new steady level in terms of real GNP, the level of real net exports has risen by 2.1 percentage points as a fraction of real GNP. This improvement in the real trade deficit has resulted in an increase in saving ($Y - C - G$) of 2.9 percentage points and a rise in real investment of 0.8 percentage points. Stated differently, virtually all of the cut in government purchases has generated a rise in saving, and about 3/4 of this rise in saving has been an increase in net exports. In "crowding out" language, the government spending cut has crowded in much more net exports than investment.

Note that the long-run effects of the government spending change have not yet been reached, however. The real lont-term interest rate in the United States is still greater than the real long-term interest rate in Japan and Germany, because the real dollar exchange rate is still appreciating. In real terms, the U.S. long interest rate is about 1.5 percentage points below history and the long yen interest rate is about 0.8 percentage points below history, leaving a differential of about 0.7%. After a further period of time, the U.S. interest rate will rise a bit and the Japanese interest rate will fall a bit, until they reach equality (in terms of deviations from the baseline). This will tend to raise the measured saving rate (as consumption falls), and lower the investment ratio.

2.3.3 The Role of the Exchange Rate

Now consider what happens if this same change in government purchases is matched by an increase in the money supply in the United States, as in scenario 2. The increase in the money supply is approximately the same order of magnitude as the decline in prices in scenario 1. In this case the dollar depreciates much more than in scenario 1—about 20% against the Mark and 18% against the yen. The reason is that the expansionary monetary policy tends to raise prices in the United States, and this requires a depreciation of the dollar.

In this scenario, the increase in net exports in the short run is much smaller than in scenario 1 because the expansionary effects of money on U.S. output increase imports more than the depreciation of the dollar decreases imports. Note that this is an example where a depreciation of the dollar can actually make the trade deficit worse.

Eventually the short-run output effects wear off, however, and the effects on the trade deficit are much like those in scenario 1. (In the very long run the effects should be the same because money is completely neutral in the long run in this model.) It is important to note, however, that there is a large difference in the nominal exchange rate although the change in the real trade deficit is about the same in scenarios 1 and 2. In nominal terms the dollar is about 8% lower in scenario 2 than in scenario 1, but in real terms the dollar is almost identical in the two scenarios. In scenario 1, U.S. prices fell by about 6% and the dollar depreciated by 6% against the D-Mark; in scenario 2, the dollar fell by 14% against the D-Mark and U.S. prices rose by 2%. Since German prices are about the same in both scenarios, the change in the real exchange rate is about the same.

Can we say which of the two scenarios is better on policy grounds? In terms of domestic price stability, scenario 2 is better in that the GNP deflator does not fall as much (note that an even better policy in terms of price stability could be designed). Moreover, in terms of output, scenario 2 seems better. The decline in output is less in Germany and Japan, and there is no output decline in the United States. In terms of nominal exchange rate stability, scenario 2 is worse, however, in that the nominal exchange rate has fluctuated more. However, this fluctuation in the nominal exchange rate has relatively small effects on the economy. This seems to be a case where one would prefer that the nominal exchange rate rather than domestic prices absorb the burden of the adjustment to a higher level of net exports.

Scenario 3 provides another perspective on the role of the exchange rate in the adjustment of net exports, investment, and saving to a change in government expenditures. In this case the foreign central banks (all the non-U.S. G-7 countries) increase their money supplies by 8%, again phased in over a four-year period. In other words, the foreign central banks rather than the Fed provide the expansion to offset the downward pressure on prices caused by the fiscal contraction in the United States. In this case, the longer-term effects on the real U.S. trade deficit are about the same as in scenarios 1 and 2. In this case, however, the nominal dollar exchange rate depreciates by less than in scenario 1. In effect, this type of policy is what would be required to keep the dollar in a target zone during a fiscal contraction. By 1987:1, the adjustment to the improved trade balance has occurred with a smaller fluctuation in nominal exchange rates than in scenario 1 and especially scenario 2. Note that the real exchange rate has moved about the same amount as in scenarios 1 and 2 by 1987:1 (11%). In this case, price level has been less stable in Germany than in scenarios 1

and 2, increasing by 8% rather than falling slightly. There has been more price stability in the United States than in scenario 1 but less price stability than in scenario 2. There is clearly less output stability in the rest of the world in scenario 3 compared with scenarios 1 and 2. Compared to scenario 1, the attempt to keep exchange rates within a narrower band in scenario 3 has led to much less output and price stability abroad. The effects in the U.S. have been rather small.

2.3.4 Fiscal Expansion Abroad

As noted in the introduction, there has been a saving-investment surplus in Germany and Japan during the period that there has been a saving-investment deficit in the United States. Scenario 4 attempts to look at the impact on the U.S. deficit of a fiscal expansion in these two countries of 2% of their real GNP, again phased in gradually, and on top of the contraction in the United States. As is clear in table 2–4, the impact of the fiscal contraction in these two countries on the U.S. trade deficit and the saving-investment deficit is very small. Comparing tables 2–1 and 2–4 shows how a fiscal expansion in Japan and Germany of this magnitude only improves the U.S. trade balance by a few tenths of a percentage point in 1987:1. It is unlikely that the pressure on these governments to expand fiscal policy will have an effect on the U.S. trade deficit, though it does have a significant effect on the trade surplus in those countries (not shown in table 2–4).

2.3.5 Real versus Nominal Net Exports and the Current account

Thus far focus has been entirely on real net exports. Also shown in tables 2–1 through 2–4 are the changes in nominal net exports, as well as the changes in export prices and import prices which are the source of the different between real and current dollar measures of net exports. As is clear in tables 2–1 through 2–4, the change in current dollar net exports (measured as a fraction of nominal GNP) is very small for all the scenarios when compared with real net exports. The reason for this is that for all scenarios, import prices rise more than export prices. As a close approximation, the fall in the ratio of export prices to import prices is about the same for all scenarios, around 11% by 1987:1. The fall in the terms of trade is, of course, what stimulates real net exports, but this same fall offsets this increase when computing current dollar net exports. The

offset is made worse in this scenario by the fact that for the historical values imports are much larger than exports.

The fact that current dollar net exports fall much less than real net exports has pessimistic implications for the ability for the United States to make significant inroads into the current account simply by reducing government expenditures. In fact the actual change in the trade deficit since mid-1986 is consistent with this finding. The dollar appreciation has changed import prices by enough that the large decline in real net exports since 1986 has not led to any decline in current dollar net exports (through the second quarter of 1987).

2.3.6 The Saving-Investment Imbalance in Current Dollars

What is the effect of the change in current dollar net exports on current dollar investment and current dollar saving? The answer depends on the behavior of the prices of investment, consumption, and government purchases in comparison with the GNP deflator. The behavior of investment and consumption deflators in response to changes in the exchange rate has been difficult to analyze during the last five years because the change in exchange rates has occurred at the same time that technological change affected the prices of many durable goods. Rather than estimating equations for investment and consumption goods deflators, I provide some simple alternative calculations in table 2–5. The effects of the increase in current dollar net exports are calculated under the assumption that in scenario 1 the government purchases deflator moves along with the GNP deflator and that the investment deflator moves 50% with the GNP deflator and 50% with the import deflator. Changes in the consumption deflator can then be calculated implicitly. These rough calculations are based on the behavior of investment deflators and consumption deflators during the 1982–1986 period. The 50-50 split, for example, corresponds to what happened in the 1982–1986 period when producer durable deflators followed the import deflator essentially 1 to 1, the residential structures deflator followed the GNP deflator, and the nonresidential structures deflator was somewhere in between.

Table 2–5 shows that although the cut in government purchases increases nominal net exports and the current account by only 0.5 percentage points as a percentage of nominal GNP, the ratio of investment to nominal GNP increases by a relatively large amount, 1.7 percentage points. And the domestic saving ratio increases by 2.2 percentage points. In other words, the reason that the cut in government purchases does not

Table 2–5. Investment and Saving Effects in 1987:1 of a Reduction in U.S. Government Purchases[a]

	Actual 1987:1	*Change*	*Predicted 1987:1*
	Billions of Constant 1982 Dollars		
National saving ($Y - C - G$)	536.6	103.8	640.4
Investment (I)	671.8	25.4	697.2
Net exports ($EX - IM$)	−135.2	78.4	−56.8
Gov't purchases (G)	759.6	−113.2	646.4
Real GNP (Y)	3772.2	−21.9	3750.3
RATIOS TO REAL GNP			
National saving ($Y - C - G$)/Y	14.2	2.9	17.1
Investment (I/Y)	17.8	0.8	18.6
Net exports ($EX - IM$)/Y	−3.6	2.1	−1.5
	Billions of Dollars		
National saving	554.4	55.0	609.4
Investment[b]	699.9	26.4	726.3
Net exports	−112.2	26.1	−86.1
Transfers + gov't int.	−35.5	2.5	−33.0
Stat. discrepancy	−2.2	0.0	−2.2
Current account	−147.7	28.6	−119.1
Gov't Purchases*	896.2	−169.6	726.6
GNP	4377.7	−282.7	4095.0
RATIOS TO GNP			
National saving	12.7	2,2	14.9
Investment	16.0	1.7	17.7
Net exports	−2.6	0.5	−2.1
Memo items (billions of dollars):		1987:1	
Government deficit		−129.5	
Transfers to foreigners (net)		12.4	
Interest payments by governments to foreigners		23.1	

Note: National saving in current dollars is identical to the BEA definition of gross saving in the NIPA accounts, and equals investment plus the current account minus the statistical discrepancy.

[a] The spending cut is described in table 2–1.

[b] These projections assume that the investment deflator is unchanged and that the gov't purchases deflator moves with the GNP deflator.

raise nominal net exports by more than a fraction of a percentage point, is not that private saving falls to offset the increase in government saving. To be sure, there is a drop in private saving as consumption prices rise a bit relative to the GNP deflator, but not nearly enough to completely offset the increase in government saving. Instead, investment increases as a share of GNP. The reason for the increase is that investment good prices do not fall as much as the GNP deflator. The depreciation of the dollar raises the relative price of tradables compared to nontradables. In the GNP accounts this means an increase in the price of durable goods relative to the price of nondurable goods and especially the price of services.

It is possible that this deterioration of the terms of trade will reduce real consumption, and thereby increase national saving and the trade deficit more than estimated in these simulations. This possibility is not incorporated in the model. An alternative specification that deflates income by the consumption deflator rather than by the GNP deflator in the consumption equation, and which deflates expected output by the investment deflator rather than by the GNP deflator in the investment equation, would (if the estimated coefficients were similar) imply a smaller increase in both real investmant and real consumption in response to the cut in government spending. Real income by these measures would fall as a result of a real depreciation of the dollar and the deterioration in the terms of trade.

2.4 Robustness of the Results

One of the most striking features of the simulation results is that real net exports improve much more than nominal net exports following a reduction in U.S. government spending. This finding does not appear to be unique to the particular formulation of this model, as is suggested by partial simulation exercises conducted for a Brookings conference in January 1987. Partial simulations of the effects of a depreciation of the dollar on the U.S. trade deficit using the trade sector of six econometric models (DRI, Japanese EPA, Federal Reserve MCM, National Institute for Economic and Social Research GEM, the OECD interlink model, and an earlier version of the model used for the analysis here (TAYLOR)) showed that real net exports improved far more than net exports in current dollars. Averaging over the six models gives a 2.2-percentage point improvement in real net exports as a ratio to real GNP five years after the 20% depreciation of the dollar. On the other hand, the current account improves by only 1.0% on average over the six models for the same

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depreciation over the same span of time. (See "Workshop on the U.S. Current Account Imbalance: Comparative Tables and Charts," Table II–6, Brookings Discussion Papers in International Economics, no. 58.) By comparison, the full simulation results reported above give a real improvement of about 2 percentage points and a nominal improvement of about about 0.5 percentage point.

All the models with the exception of the EPA model showed substantial improvements in real net exports. The MCM and GEM models show a bigger improvement in nominal net exports than the OECD and DRI models, or the model used here. The difference is not due entirely to different elasticity assumptions. Indeed the fact that these models give similar results on real net exports indicates that the elasticities are not the whole story. Another reason that the MCM and the GEM models give a more optimistic result is that import prices move by only a small amount in response to the depreciation—even in the long run. For the GEM model, import prices increase by only 5% five years after a permanent 20% depreciation; in the MCM model the increase is 12%. On the other hand, for the OECD model, import prices increase by 19% after five years.

There is, of course, an apparent inconsistency in models that show only a small change in the terms of trade for valuation purposes and a large change in relative prices in the real import and export demand equations. Helkie and Hooper [1987, p. 21] discuss this inconsistency and attribute it to lags and to the fact that the price variables in import and export demand equations are different than the terms of trade (the ratio of export to import prices). However, in the long run (five years), the behavior of the terms of trade should be very similar to any reasonable measure of relative price (import price relative to domestic price, as in the model used here, or the real exchange rate, or export prices relative to world prices). Hence, it appears that with conventional empirical estimates of import and export elasticities, and with the assumption that import prices eventually rise by about as much as the depreciation, that nominal net exports should be reduced much less than real net exports, much as in the simulations in tables 2–1 through 2–4.

2.5 Concluding Remarks

Three central conclusions emerge from this analysis of the relationship between the trade deficit and the behavior of investment and saving in the United States during the last five years. All have important implications for exchange rate policy and for prospects for a reduction in the trade deficit during the next several years.

1. A reduction in U.S. government purchases by about 3% of real GNP results in an increase in real net exports as a ratio to real GNP of about 2 percentage points, an increase in the real investment ratio of 0.8 percentage points, and an increase in domestic real saving of about 2.8%. In real terms, the major impact of a cut in government purchases is on net exports, rather than on investment.

2. The same reduction in government purchases affects current dollar net exports and investment in reverse proportions: nominal net exports rise by a very small amount, and nominal investment rises by a large amount. The small effect of a government spending cut on the current account occurs because the investment effect is large, rather than because the savings effect is small. This result is a direct empirical implication of the model used in this study, but it is likely to be true for a wider variety of empirical models with consistent modeling of the terms of trade in valuation effects and substitution effects.

3. The process of adjustment of net exports to a change in government spending requires a change in the terms of trade. In real terms, the exchange rate must eventually fall if the trade deficit is to be reduced. This behavior of the real exchange rate occurs regardless of the nominal exchange rate policy followed by the Fed and other central banks. However, a policy that keeps the exchange rate in target zones requires more domestic price instability in order to achieve the real exchange rate change. In the short run, such a policy also requires more output instability as part of the process of adjustment to a smaller trade deficit.

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