Deficits, Economic Stabilization, and Growth

by

John B. Taylor

Stanford University

May 1988

Prepared for presentation at the conference, "Tax and Budget Policy for the 1990s," sponsored by the Stanford University Center for Economic Policy Research and Department of Economics, held in Washington, D.C. May 17, 1988. I thank Peter Klenow and Paul Lau for useful research assistance. A grant from the National Science Foundation is gratefully acknowledged.

The effects of budget deficits on economic growth work through their effects on capital formation. A high rate of capital formation provides for higher levels of labor productivity, and, through an impetus to technical change, also increases the growth rate of productivity.[1]

In this paper I look at the effects of budget policy on capital formation in the U.S. economy. The question is an old one, usually referred to simply as the "crowding out" issue in macroeconomic textbooks. But because of the growing importance of international factors on the U.S. economy, so evident in the 1980s, the question requires more than a textbook analysis. A quantitative international focus, which can balance out the effects of both interest rates and exchange rates on domestic versus foreign investment, is needed. I provide this focus in this paper through the use of a multicountry econometric model of the U.S. and its major industrialized trading partners.

Unlike many existing estimated multicountry models, the model used here incorporates both a high degree of capital mobility and forward-looking rational expectations. Temporary wage and price rigidities, modelled through the detailed description of wage setting behavior, allow for the possibility of both short-run Keynesian effects of budget changes and the long-run supply-side effects. Hence, the quantitative framework permits an examination of the effects of budget policy on short run stabilization of the economy as well as long run growth.[2]

The budget deficit is a summary statistic that captures changes in government purchases, transfer payments, and taxes. Each of these have

different macroeconomic effects.[3] To examine the effect of the budget deficit, therefore, requires a separate treatment of each of these components of the deficit. In this paper I put more of the formal emphasis on the effect of budget changes caused by increases or decreases in government purchases holding taxes and transfer payments constant.

The paper is organized as follows. In the first section of the paper I examine the behavior of gross private domestic investment, gross national saving, and net foreign investment during the 1980s pointing to several puzzles about the relationship between budget deficits and investment, particularly during the five year period from 1983 through 1987. In particular, I examine the unusual combination of large budget deficits and extremely robust real investment behavior that has existed during the last 5 years in the U.S. I also compare the mid-1980s to the late 19th century U.S. when net foreign investment was also very high. In the second section of the paper I examine whether macroeconomic theory, as represented empirically in the multicountry model, can explain these puzzles. In the third section of the paper I examine some alternative explanations, and in the fourth section I draw some policy implications for the 1990s.

1. The Investment Boom and Saving Slump of the 1980s.

The relationship between private investment and the government deficit in the 1980s presents a puzzle, at least from the perspective of closed economy macroeconomics. By any reasonable measure, fiscal

policy was very expansionary throughout the 1980s with federal deficits as large as 5 percent of GNP. Federal government purchases rose by 4.5 percent per year in real terms from 1980 through 1987, and defense purchases rose by 6.4 percent per year in real terms over this same period when real GNP grow averaged 2.6 percent. (By comparison during the previous eight year period, neither real federal purchases nor real defense purchases grew at all.) But there was no apparent crowding out of private investment in the 1980s, despite the expansionary fiscal policy. After the slump in 1981-82, investment recovered rapidly and has remained high ever since. A popular interpretation of this result is that the deficit crowded out net exports rather than investment thereby bringing about a large trade deficit. One of the purposes of this paper is to evaluate quantitatively this interpretation that foreign investment in the U.S. can explain the investment boom and large budget deficits in the 1980s.

Figure 1 shows the behavior of real investment, real saving, and real net exports as a fraction of real GNP during the 1970s and 1980s. As is clear from Figure 1, real investment has stayed remarkably high throughout the 1983-1987 period even though government spending was rising rapidly. During this period real capital formation was far above the average of the previous 15 years, and about equal to the average of the two earlier boom periods. The real investment/GNP ratio averaged 17.5 percent over the five year period from 1983 through 1987, about the same as the 17.2 percent average over the five year period from 1976 through 1980 when the economy expanded rapidly following the

1974-75 recession, and also about the same as the 17.4 percent average of the five year period from 1970-74 following the 1970 recession.

If the investment boom during this period was mostly in residential capital, then one might question its value for long term growth and productivity. However, the levels of real business fixed investment relative to real GNP were also higher than recent historical averages for the U.S. Focussing on boom periods alone, the real business fixed investment/GNP ratio was 11.9 percent during 1983-87, slightly higher than the ratio of 11.4 percent in 1976-80 and 11.0 percent 1970-74. To be sure, real business fixed investment did decline for a period in 1986 following a surge due to firms bunching their capital purchases in 1985 before the repeal of the investment tax credit took effect. Currently, however, real business fixed investment is again strong. (Business fixed investment grew by an annual rate of 21 percent during the first quarter of 1988.)

During the 1950s and 1960s, these private investment ratios were generally lower than the values shown in Figure 1. During the long expansion of the 1960s, the real business fixed investment/GNP ratio did not reach the average of the 1983-87 period during any quarter. The private investment ratios we have experienced in the last few years are at the highest level that we have experienced since the post World War II housing boom in the early 1950s. The real business fixed investment ratios over this period are higher than they have ever been through any five year period in the 40 years since the end of World War II.

Figure 1 also shows real gross national saving and real net exports as a fraction of real GNP. Real saving is defined simply as

real GNP less real consumption expenditures less real government purchases. The saving rate excludes all consumer durable purchases, not only the consumption of the services on the durables. The saving rate would, of course, be considerably higher if only the service component of consumption were excluded. Real net exports are defined as real exports less real imports as in the U.S. National Income and Product Accounts. Note that by this definition exports are deflated by a different deflator than imports. Denison (1981) discusses the advantages and disadvantages of this definition compared to some alternatives such as deflating both exports and imports by the import deflator or the GNP deflator, or by not deflating at all. Denison shows how real net exports is a more appropriate concept for measuring the production and employment effects of changes in imports and exports, but is less appropriate for measuring changes in wealth or purchasing power in other countries.

Figure 1 illustrates the large shortfall of U.S. saving relative to investment. The decrease in real net exports traces out this shortfall, as of course it must according to the GNP accounting identity that national saving less investment equals net exports. Real saving is low in the 1983-87 period in comparison to similar boom periods in the 1970s. The real saving rate increased rapidly following the 1981-82 recession as it typically does following a recession, but then began to fall again starting in 1984. Now the real national saving rate is as low as it typically is during recession periods.

To summarize, the key facts about the mid-1980s that emerge from Figure 1 are that the real investment rate was unusually high in the

U.S. and that real saving rate was abnormally low. The low saving rate is not surprising given the large federal deficit, but the high investment rate is a puzzle. One possible explanation of that puzzle is that the deficit drove up the exchange rate as well as the interest rate and thereby crowded out real net exports rather than real investment. Whether this explanation works or not depends on the elasticity of investment to interest rate and the elasticity of net exports to the exchange rate. We address this issue in section 2.

The decline in the price of capital.

It is important to note that the performance of the investment ratio during the last 5 years looks significantly different when measured in nominal rather than real terms. Figure 2 shows gross private investment as a ratio to nominal GNP along with gross private saving and net foreign investment as ratios to nominal GNP. Note that investment as measured by this nominal ratio is not nearly as robust as real investment during the last 5 years. By this measure, investment has been well below the investment performance observed in the two previous expansion periods in the 1970s. Nominal investment in relation to nominal GNP during 1983-87 is well below the average from 1976-80 or the average from 1970-74.

The implication of this large difference is that the price of capital increased much more slowly than the general price level during the 1983-87 period. Figure 3 shows the implicit deflator for gross fixed private investment along with the GNP deflator. Until mid-1982 both price measures increased at the same rate, but starting with the

general reduction in inflation at that time, the investment deflator increased much less than the general price level. By the end of 1987 the price of capital goods had fallen relative to the price of consumption goods by about 15 percent. This is clearly a significant relative price shift and, of course, is the reason for the difference between the nominal and real investment behavior shown in Figure 2.

Almost all of the decline in capital goods prices are in producers' durable equipment. The residential structures deflator increased at the same rate as the GNP deflator, and the non-residential structures deflator increased by only slightly less than the GNP deflator. Within the producers' durable equipment category, "office computing and accounting machinery" prices fell most rapidly followed by photocopy equipment. Together these two items represent over 1/3 of producers' durables, and thereby it is accurate to say that the main source of the decline in capital goods prices in the U.S. is the drop in the price of computers and other high-tech electrical equipment. On the other hand, truck and other large mechanical equipment prices increased at the same rate as the overall inflation rate.

During this period there was also a decline of about the same magnitude in the relative price of capital in Japan. However, in the U.K. and Germany there has been only a very slight reduction in capital goods prices. The decline in the producers' durable equipment deflator relative to the GNP deflator appears to be larger in the U.S. than in Japan: machinery and equipment prices fell by 9 percent relative to overall prices from 1981 to 1986 in Japan compared to 16 percent in the U.S.

Real versus nominal net exports.

Returning now to the behavior of saving in Figure 2, note that the drop in the nominal saving rate is even larger than the drop in the real saving rate shown in Figure 1. The gap between saving and investment relative to GNP is about the same in nominal and real terms, and, therefore, the behavior of real net exports and nominal net exports is very much the same during this period. Nominal net exports are, of course, the primary part of the current account or net foreign investment which is shown in Figure 2. As I will show, this finding that real and nominal net exports behaved very similarly while real investment and nominal investment behaved much differently presents another puzzle that is not so easily explained by macroeconomic factors.

Comparison with events 100 years ago in the U.S.

During the late 1800s the U.S. also supplemented its saving with net foreign investment from abroad. Most of this import of foreign capital came from the U.K. which was also exporting capital to Canada and Australia. Data on U.S. railroad bonds indicate heavy purchases from abroad. About 15 percent of new issues of railroad bonds were purchased by foreigners before 1900 according to Edelstein (1982). Today a similar percentage exists for foreign purchases of U.S. Treasury Bills. From 1983 through 1987 (Sept) foreign purchases were 14 percent of newly issued U.S. privately held debt.

Overall, however, foreign investment played a smaller role in the 19th century U.S. than in the last five years. Because investment

funds are fungible, purchases of a particular type of security do not necessarily indicate the importance of net foreign investment in that industry. For example, exactly 100 years ago from 1884 through 1893 net foreign investment in the U.S. was 1.5 percent of nominal GNP (See Edelstein (1982, p. 234)). This is considerably less than the 3 percent level experienced from 1984 through the present time as shown in Figure 2. The current levels are historically high even with a much longer historical perspective. Edelstein's (1982) data indicate that the 1884-1893 period had a greater net foreign investment ratio than at any other ten year interval from 1834 through 1908. Clearly, recent foreign borrowing in the U.S. is unprecedented historically.

There is another important similarity between the U.S. now and 100 years ago. The relative price of capital goods fell dramatically. David (1977) measures the relative price fall over the latter part of the 19th century as equal to 19 percent, which is the same order of magnitude described above for the last few years. David argues that this relative price drop, which can be identified with drops in production costs in the machine tool sector (see Rosenberg (1976)), stimulated investment in producers' durable goods.

Another similarity with the present period is a debate among economic historians about whether the foreign investment was due to "push" factors in the U.K. or to "pull" factors in the U.S. According to Edelstein (1982), "U.S. secular forces appear to have been an important determinant of the shape of U.K. lending in the 1850s and 1860s, but there is strong reason to doubt their force at other times before 1900 and very definitely thereafter." The strong secular pull

in the 1850s and 1860s was due both to population sensitive investment responding to immigration and urbanization, and to productivity sensitive investment responding to sharp falls in the relative price of capital. Both domestic and foreign savers evidently responded to the increased interest rates associated with this increased investment demand. During other years, however, the determinants of U.S. saving moved together with the determinants of U.S. investment. This suggests that U.K. savings in the U.S. were not responding to pressures originating in the U.S. during these other years.

2. Estimates of the Impact of Deficits on Investment and Saving.

Can the facts described in the previous section, high real investment and low real saving, along with an expansionary fiscal policy, be explained with current macroeconomic theory with empirically realistic parameter values? If so, is the implied behavior of the trade deficit in real and nominal terms consistent with the facts of the mid-1980s?

Consider a counterfactual change in fiscal policy in which 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, assume that by 1986.1 this cut results in real government purchases lower than reality by an amount equal to 3 percent of historical real GNP. Suppose also that the full amount of the cut does not occur immediately, but is phased in gradually from 1982.1 through 1986.1 in equal increments. The gradual phase-in is much like the

Gramm-Rudman-Hollings type of phase-in for budget deficit reductions. 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.

Theoretical Considerations.

What are the theoretical long run effects of a cut in government purchases equal to 3 percent of real GNP? If the natural rate property holds, the long run effects on output will simply be the change in potential GNP. As long as investment increases, potential GNP will increase. However, over a short time period like 5 years, the effect on the level of potential will be quite small. Most of the effects 5 years out will be compositional. The decrease in government purchases should lead to an increase (crowding in) for durable consumption, investment, and/or net exports. 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 percent of real GNP),

domestic saving could rise by 3 percent of real GNP (if the interest rate elasticity of consumption were zero), and investment could remain unchanged (if the interest rate elasticity of investment were 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.

The Model.

It is beyond the scope of this paper to describe the multicountry model in any detail, but a very brief outline will be helpful. (See the references in footnote 3 for more detail). The econometric model is of 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.

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 modelled 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. 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 aggregate 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 U.S., Canada, France, and Japan, for nondurables in the U.S. 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 U.S., fixed investment is disaggregated into equipment, nonresidential structures, and residential structures. For France, Japan and the U.K., 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. 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 wage annual 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 U.S., Canada, and France, the impact of foreign prices on export

prices was small and insignificant and was omitted from these equations.

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).

Simulation Results.

The simulation results are shown in Table 1. Even though the model is quarterly, only the first quarter of each year from 1982 through 1987 is reported. The variables in the table are selected because they are key to explaining the behavior of the trade deficit, investment, and consumption. For simplicity I focus on only two other countries, Germany and Japan, in addition to the U.S.

Consider first the behavior of real GNP and inflation. Table 1 shows how real output and prices fall in the U.S. relative to their historical values. The real output decline is the Keynesian effect and is due to the slow adjustment of wages and prices. Note that the

government spending multiplier is very small (between .3 and .5). This is because the bulk of the spending cut is anticipated in advance. In fact, the output effects of a fully unanticipated 3 percent decrease in government spending would be much larger. 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.

Consider now the effects on real investment, saving, and the trade deficit. As shown in Table 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 .8 percentage points.

Stated differently, virtually all of the cut in government purchases has generated a rise in saving, and the rise in saving has crowded in much more net exports than investment.

Also shown in the last row of Table 1 are the changes in nominal net exports. As is clear in Table 1, the change in current dollar net exports (measured as a fraction of nominal GNP) is very small in comparison with real net exports. The reason is that import prices rise more than export prices. 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 cut in government purchases increases nominal net exports and the current account by only .5 percentage points as a percentage of nominal GNP. The ratio of nominal 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 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.

Discrepancies between the theory about performance.

Now compare the results of these simulations with the empirical puzzles. Does the theory as implemented empirically by this model explain why investment is so strong and government spending was rising in the 1980s? Only partially. In real terms, the model shows now a slower rate of increase in government purchases would have led to a much smaller real trade deficit and a higher level of real national savings. But the model also predicts that real investment would be higher (though not as much as in a closed economy) if government spending had not increased so rapidly. Hence, except for showing why the negative effects of these deficits on investment are small, the model does not explain why investment was far above normal levels in the mid-1980s.

In nominal terms the simulation gives mixed results in explaining the puzzles of the mid 1980s. It is successful in showing that nominal investment falls more than real investment when the budget deficit rises, but it does not explain why nominal saving falls more than real saving. On the contrary the model predicts a smaller fall in the nominal saving rate than in the real saving rate. This difference also shows up in the real net export results, as it must because of the accounting identity. Regarding to the model, nominal net exports should have fallen more than real net exports in response to the budget deficits. Accordingly, both nominal and real net exports fell by the same amount. There has been some very recent evidence that as the dollar has depreciated, real net exports have improved by a larger amount than nominal net exports as the model would predict,

but the effects are still rather small and it is not clear that the decline in the dollar is related to a tightening of fiscal policy.)

3. Alternative Explanations.

The counterfactual fiscal policy simulation I used for comparing the theory with the recent facts is very special in its focus on the U.S. For example, many economists have argued that the large U.S. nominal trade deficit was as much due to insufficiently expansionary fiscal policies in Japan (until last year) and in Germany. (See Bryant and Holtham (1987) for example). More expansionary fiscal policies in these countries would have reduced the U.S. trade deficit. It turns out, however, that the impact of a more expansionary fiscal policy in Japan and Germany has a relatively small effect on the U.S. trade deficit. Simulations (not reported here) show that more expansionary fiscal policies in Japan and Germany caused by 3 percent increases in government purchases in those countries have a very small effect on the nominal trade deficit. They have a bigger effect on the real U.S. trade deficit, but that only makes the discrepancy between the real and nominal trade deficit bigger.

The most plausible explanation for the similar movements in real and nominal net exports is that relative price changes were not the only factor in explaining the behavior of imports and exports. Of course income effects in exports and imports are taken account of in the theory and in the empirical model, but there are potentially many other sources of shifts in the export and import equations. For example, an exogenous shift in demand for foreign goods by the U.S.

would increase real imports at a given price level and thereby increase both real and nominal imports by the same amount. Similarly, a shift in the U.S. export equation at any given price ratio would change both real and nominal exports. A successful explanation for the movement in real and nominal net exports during the mid-1980s, must therefore rely on some shift in the export and import demand function rather than on other variables in the model (such as macroeconomic policy variables in other countries) which only affect exports and imports by movements along the demand functions.

One such shift, which is quite appealing as an explanation given that the other puzzle in the data is the very robust investment behavior, is that attractive investment opportunities in the U.S. pulled in foreign investment, and thereby required a shift in the export or import demand functions. There is considerable anecdotal evidence of such a shift in preferences. For example, a recent Fortune article entitled "The Selling of America (Cont'd)" boldly states, "Foreigners want things American. Their tastes for the tangible extend across the map, from Kentucky racehorses and Texas refineries to New England factories and Sonoma Valley vineyards." (May 23, 1988, p. 55). The first of these two quoted sentences sounds dead wrong given the trade deficit, until one finds in the second sentence that "things American" are not goods exported from the U.S. but rather goods that stay in the U.S. Evidently foreigners prefer to buy personal computers if they stay in the U.S., perhaps by buying a firm which uses personal computers intensively, rather than importing the personal computers. Although apparently similar, the first type of purchase increases the

trade deficit, while the second type of purchase reduces the trade deficit.

The drop in the relative price of capital in the U.S. that I noted above could be one of the causes for the increased demand for U.S. capital. Given that the price drop is concentrated in computers and electronic equipment, it is most likely due to technological advances, much like the technical advances noted by Rosenberg (1976) in the 19th century producers durables. There is some evidence that the drop in relative capital goods prices has been larger in the U.S. than in other major trading countries, but the evidence cited here is based on implicit price deflators for highly aggregated categories. Even if there were not a larger drop in the relative price of producers' durables such as computers in the U.S. compared to other countries, the U.S. might have an advantage in using this equipment more efficiently than in other countries. For example, software development to exploit advances in personal computers may occur at a more rapid pace in the U.S. As a potential explanation for these puzzles, the technologically induced drop in the relative price of capital goods in the U.S. has a second advantage of explaining the sharp difference between real investment behavior and nominal investment behavior in the mid-1980s. Finally, since the price drop is concentrated in shorter-lived capital, the substitution form longer-lived to shorter-lived capital may help explain the growing amount of depreciation (as a share of GNP) and the resulting slower growth of net investment compared to gross investment in recent years.

4. Concluding Remarks.

While aimed at the general implications of budget policy for economic growth and stabilization, this paper has concentrated on one of the central macroeconomic budget policy issues in the mid-1980s: the effect of budget deficits, and in particular government spending on domestic and foreign investment in the U.S. According to the results reported above, standard macroeconomic analysis adjusted for international factors can explain only part of the surprising investment boom and saving slump that accompanied the fiscal expansion of the 1980s. Accordingly, the budget deficit of the U.S. is not likely to be the sole reason for the current account deficit in the U.S. Budget stringencies in other countries have an even smaller role to play. Other explanations are necessary, and the one offered here is that the U.S. exerted a pull on foreign investors as a result of a decline in the price of capital goods in the U.S. and perhaps as a result of a U.S. comparative advantage of exploiting new technological advances in computers, electronic equipment and other producers' durables on its own territory.

One implication of these results is that reductions in the federal budget deficit may not make significant inroads into the current account deficit. Such reductions in the budget deficit are of course desirable as part of a general policy program to increase national saving. Increased tax incentives for saving have an important role to play as well. But rather than reduce the current account deficit by a large amount these changes might simply raise the rate of real investment in the U.S. If the current account deficit is, in fact,

financing domestic capital formation in the U.S., then the current account deficit itself would be less of a problem.

Given that this paper was prepared for part of the Stanford Centennial Celebration, it is worth concluding by reemphasizing the similarities between macroeconomic events today and macroeconomic events 100 years ago. Because of technological advances, the price of producers' durable equipment fell in the late 19th century as it is falling now. Foreigners found investment opportunities in the U.S. attractive and the U.S. ran a current account deficit, as is occurring now, although today's trade deficit is larger than it was 100 years ago as a share of GNP. Some of the foreign investment in the U.S. went to finance the building of Leland Stanford's railroad which, of course, was the original financial support of the event we are celebrating. Perhaps some of the foreign investment in the U.S. today is financing capital formation that will permit similar undertakings in the future.

FOOTNOTES

1. Recent research in macroeconomics has begun to reexamine the growth rate effects of saving and investment as well as the level effects. The overall emphasis of this work is that the growth rate effects can be very important unlike in Solow-type neoclassical models. See Jones and Manuelli (1988) or Lucas (1988), for example.

2. It is, of course, beyond the scope of this paper to describe the multicountry model in detail. Extensive comparisons of the effects of this model with those of other models (such as the Federal Reserve Board's MCM model, the OECD interlink model, and the Japanese EPA model) have been made in several model comparison exercises. The results of several of these comparisons are available in various publications. See Bryant, Holtham, and Hooper (1988), Bryant, Henderson, Holtham, Hooper, and Symansky (1988) and Helliwell et al (1988), for example. An earlier version of the model is described in Taylor (1988a). The most recent version of the model is described in Taylor (1988b).

3. Durlauf and Staiger (1988) also emphasize that different types of government purchases have different effects.

REFERENCES

Bryant, Ralph C. and Gerald Holtham, "The External Deficit: Why? Where Next? What Remedy?" The Brookings Review, Vol. 5, No. 2, Spring 1987

Bryant, Ralph C., Gerald Holtham, and Peter Hooper (Eds), External Deficits and the Dollar: The Pit and the Pendulum, Brookings, 1988.

Bryant, Ralph C., Dale Henderson, Gerald Holtham, Peter Hooper and Steven Symansky, Eds (1988) Empirical Macroeconomics for Interdependent Economies Brookings Institution, Washington, D.C.

Christiano, Lawrence J. (1884) "A Reexamination of the Theory of Automatic Stabilizers," Carnegie-Rochester Conference Series on Public Policy, 20, pp 147-206

David, Paul (1977), "Invention and Accumulation in America's Economic Growth: A Nineteenth Century Parable," in K. Brunner and A. Meltzer (Eds), Carnegie -Rochester Conference Series on Public Policy,Vol 6, North-Holland, Amsterdam.

Denison, Edward F., "International Transactions in Measures of the Nation's Production," Survey of Current Business, May 1981.

Durlauf, Steven N. and Robert W. Staiger (1988), "Compositional Effects of Government Spending in a Two country Two-Sector Production Model," Center for Economic Policy Research Discussion Paper No. 120. December 1987.

Edelstein, Michael (1982), overseas Investment in the Age of High Imperialism: The United Kingdom, 1850-1914, Columbia University Press, New York.

Fair, Ray C. and John B. Taylor, "Solution and Maximum Likelihood Estimation of Dynamic Nonlinear Rational Expectations Models," Econometrica, Vol. 51, No. 4, July 1983.

Feldstein, Martin, "Correcting the Trade Deficit," Foreign Affairs, Vol. 65, No. 4, Spring 1987.

Hall, Robert E. and Taylor, John B. (1988), Macroeconomics: Theory Performance and Policy, Second Edition, W.W. Norton, New York.

Helkie, William L. and Peter Hooper, "The U.S. External Deficit in the 1980s: An Empirical Analysis," in Bryant, Ralph C., Gerald Holtham, and Peter Hooper (Eds), External Deficits and the Dollar: The Pit and the Pendulum, Brookings, 1988.

Jones, Larry and Manuelli, Rodolfo (1988), "A Model of Optimal Economic Growth," unpublished paper, Stanford University.

Krugman, Paul R. and Richard Baldwin, "The Persistence of the U.S. Trade Deficit," Brookings Papers on Economic Activity, No. 1, 1987.

Lucas, Robert E. Jr., (1988) "On the Mechanics of Economic Development," Journal of Monetary Economics, forthcoming.

McCallum, B. T. and J.K. Whitaker (1979), "The Effectiveness of Fiscal Feedback Rules and Automatic Stabilizers," Journal of Monetary Economics, 5, pp171-186.

McKinnon, Ronald I. and Ohno, Kenichi, "Getting the Exchange Rate Right: Insular versus Open Economies," paper presented at the American Economic Association Meeting, New Orleans, December 1986.

Rosenberg, Nathan (1976), Perspectives on Technology, Cambridge University Press, Cambridge.

Taylor, John B. (1988a), "The Treatment of Expectations in Multicountry Econometric Models," in Bryant, Ralph C., Dale Henderson, Gerald Holtham, Peter Hooper and Steven Symansky, Eds (1988) Empirical Macroeconomics for Interdependent Economies Brookings Institution, Washington, D.C.

Taylor, John B. (1988b) "The U.S. Trade Deficit, Saving-Investment Imbalance and Macroeconomic Policy: 1982-1987 in The U.S. Trade Deficit--Causes, Consequences, and Cures, Federal Reserve Bank of St. Louis.

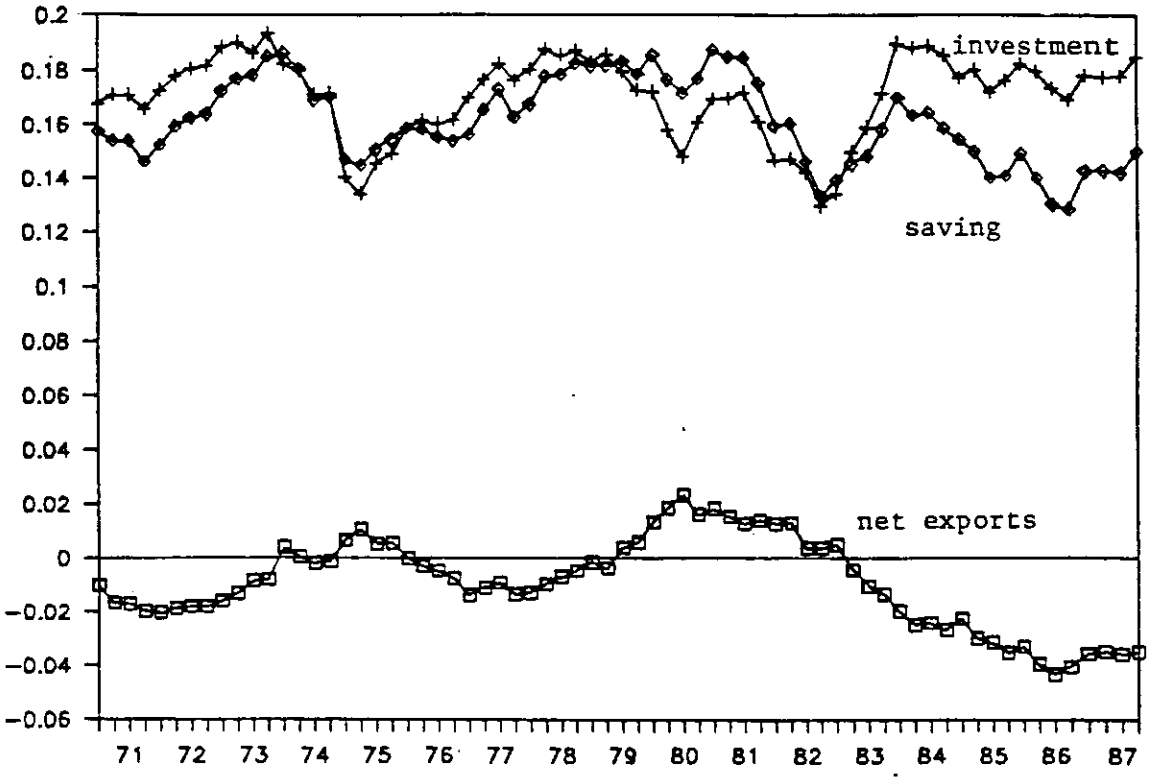

Figure 1. U.S. real net exports (X), real investment (I), and national saving (S=Y-C-G) as a fraction of real GNP (Y).

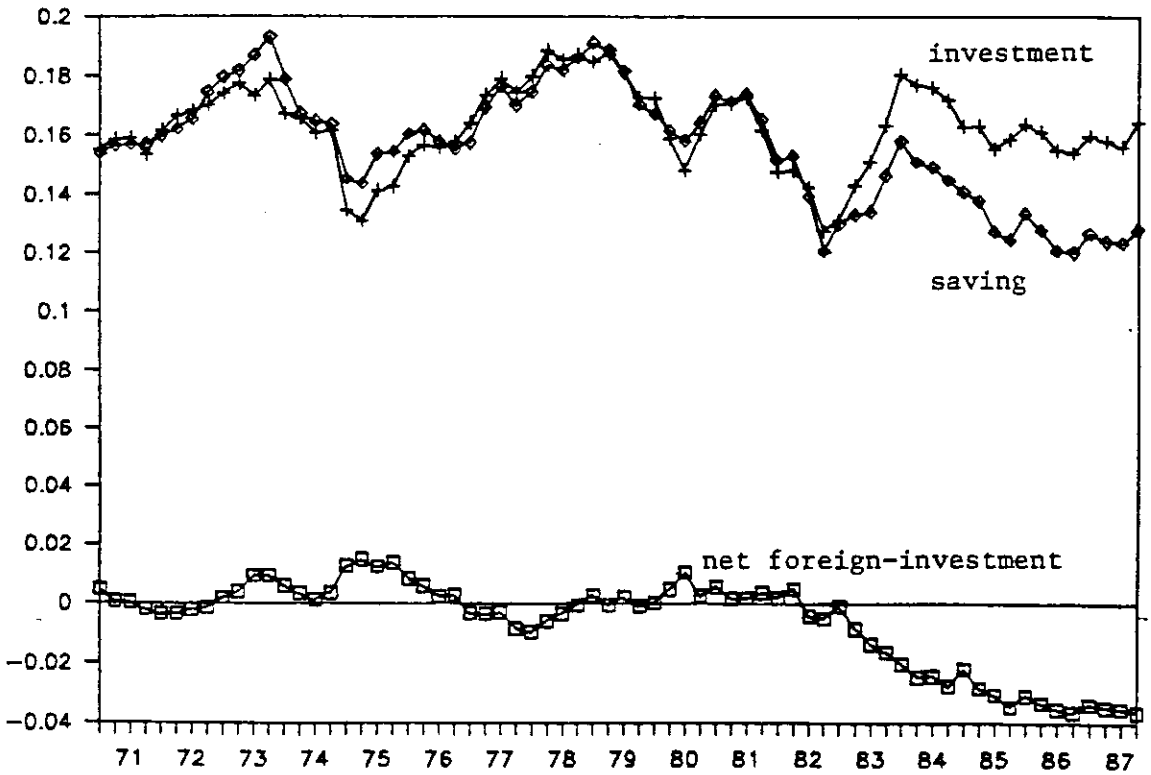

Figure 2. U.S. current dollar net foreign-investment ($X), investment ($I), and gross saving ($S) as a fraction of nominal GNP ($Y).

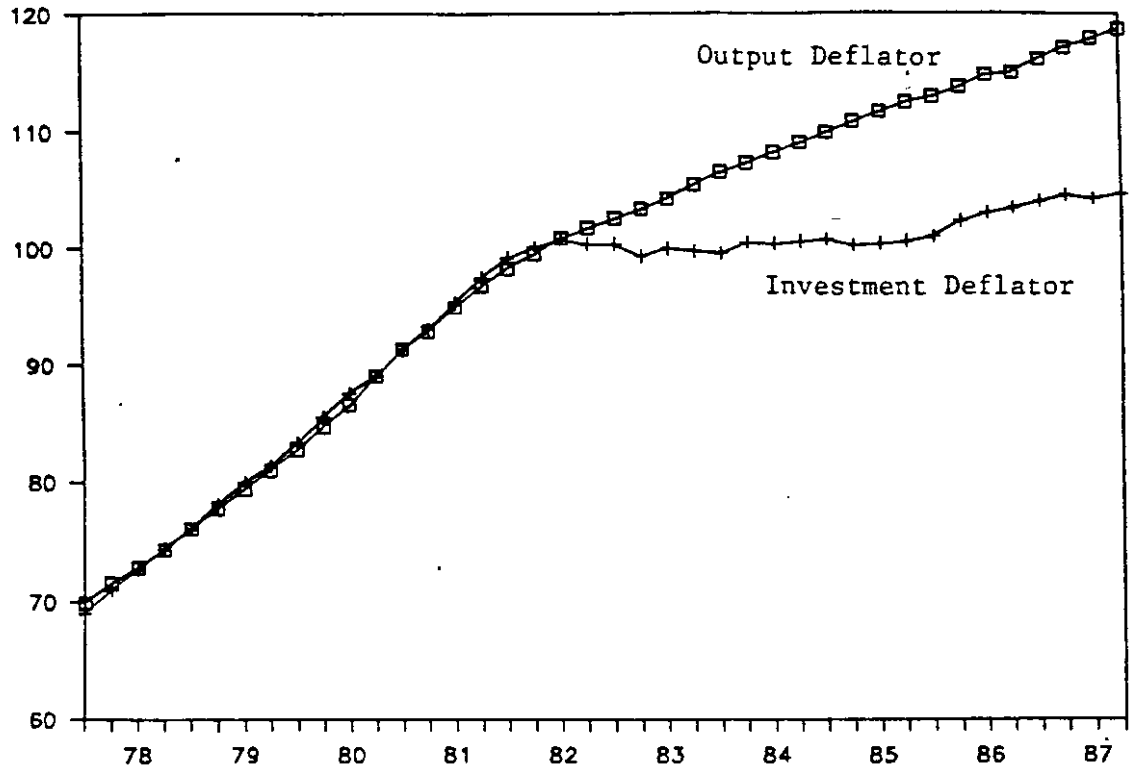

Figure 3. U.S. Output Deflator and Investment Deflator

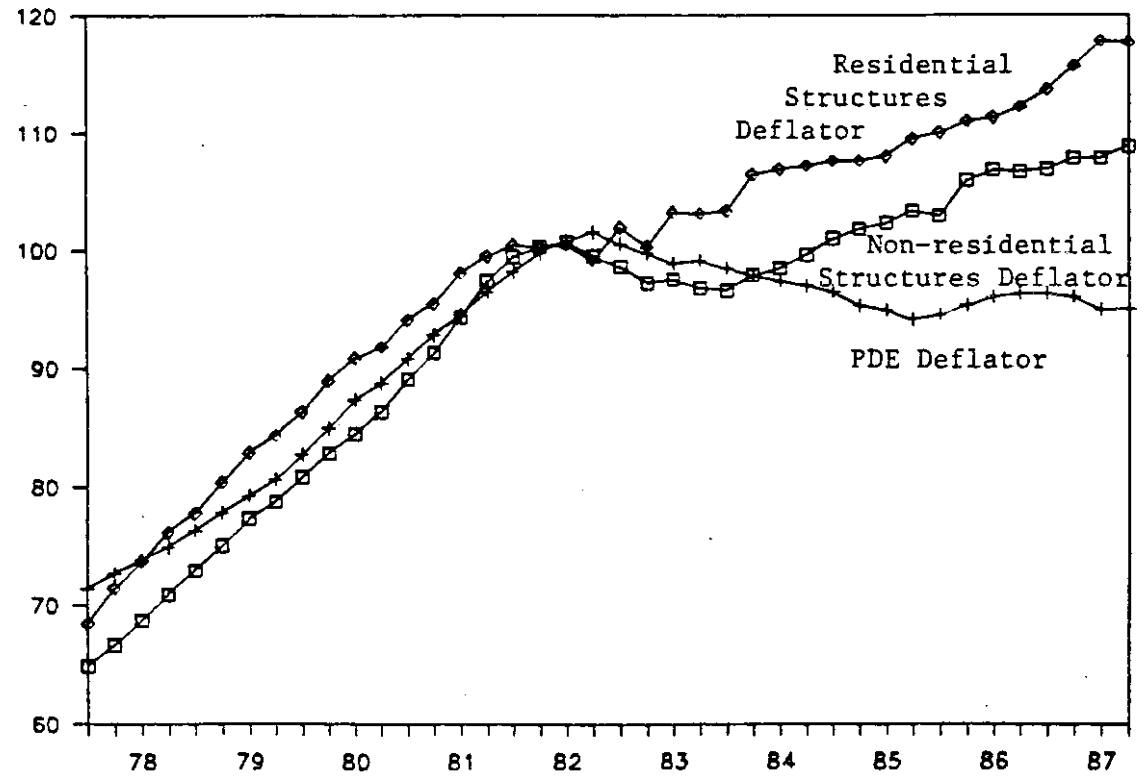

Figure 4. U.S. Investment Deflators

TABLE 1. EFFECTS OF A REDUCTION IN U.S. GOVERNMENT PURCHASES. In the simulation real government purchases declines by an amount 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