AN EXAMINATION OF INTERNATIONAL TRADE DATA IN THE 1980s

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Introduction

During the 1980s, the United States has experienced tremendous volatility in its exchange rate and has seen its current account balance move from a surplus to a large deficit position. These vicissitudes in turn have provoked much speculation about their probable causes. In this article I examine three competing hypotheses and their ability to explain events in international trade and financial markets. The alternative hypotheses view the trade figures as outcomes caused by either (1) large U.S. budget deficits, (2) tight U.S. monetary policy, or (3) real shocks to investment caused by changes in the U.S. tax code. Although the hypotheses are not mutually exclusive, one may usefully examine them in isolation. In this regard the analysis is similar in spirit to Blanchard and Summers (1984) who analyzed the rise in real interest rates worldwide. While no entirely consistent explanation emerges, the real-shock hypothesis seems to match the data best. The hypothesis that large U.S. budget deficits caused the current trade deficit and the large appreciation and subsequent depreciation of the dollar receives the weakest support. A tightening of U.S. monetary policy, while consistent with events in the early 1980s, is not overly persuasive either.

Characterization of the Data

Before attempting to isolate theoretically the major factors involved in the recent movements of the trade data, one must characterize those figures as well as others closely related to them, including interest rates, returns on equities, and real output growth.

One important feature of the data is that almost all of the movements in the trade-weighted nominal exchange are real[1] (see chart). The real nature of exchange rate movements is confirmed in Table I on a country-by-country basis. Another important feature is that both nominal and real interest rates[2] have fallen over the period in the United States and its major trading partners (see Table II). Inflation is also seen to be declining worldwide.

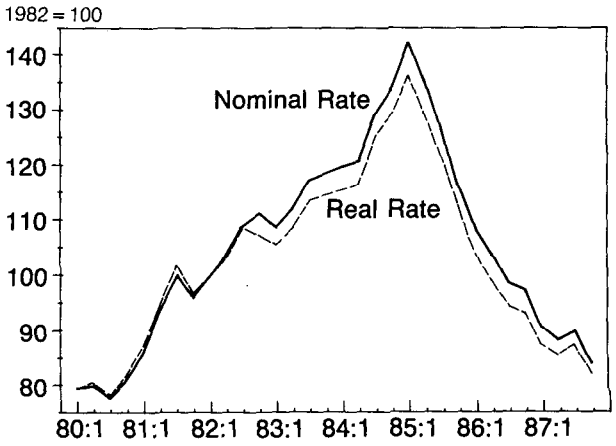
Stock market performance is observed to be highly correlated across the various stock exchanges (Table III). Most countries' stock markets, the exception being Japan, experienced declines in value in 1981 and 1982. Other than 1984, the rest of the sample

* I wish to thank Alan Stockman and Marvin Goodfriend for helpful comments and discussions. Robert Hetzel and Thomas Humphrey contributed expert editorial assistance, while Gordon Watkins provided valuable research assistance.

[1] The real exchange rate is the nominal exchange rate adjusted for different price level movements in various countries and, therefore, measures the amount of foreign goods that are needed to buy U.S. goods. Formally, the real exchange rate, $E = e(P/P^*)$, where e is the nominal exchange rate (i.e., units of foreign currency per dollar), P is the U.S. price level, and P^* is the foreign price level.

[2] The real interest rate is the nominal interest rate adjusted for inflation and represents the number of goods that must be sacrificed next year in order to consume one more unit of goods today. That is, the real rate is approximately the nominal rate minus the rate of inflation.

NOMINAL AND REAL TRADE-WEIGHTED EXCHANGE RATES



Source: Board of Governors of the Federal Reserve System.

Table I

Nominal Exchange Rate

	Trade-Weighted	United Kingdom	Germany	Japan	Canada
1980	87.385	2.326	1.818	226.528	1.169
1981	103.261	2.028	2.261	220.451	1.199
1982	116.498	1.751	2.428	249.051	1.234
1983	125.325	1.517	2.555	237.446	1.233
1984	138.343	1.336	2.848	237.588	1.295
1985	143.235	1.296	2.944	238.472	1.366
1986	112.270	1.467	2.171	168.498	1.390
1987	96.947	1.639	1.798	144.631	1.326
			Real Exchange Rate		
1980	31.125	2.326	1.818	226.528	1.169
1981	37.001	2.063	2.400	232.314	1.186
1982	40.765	1.801	2.693	267.645	1.196
1983	43.020	1.581	2.920	256.653	1.181
1984	47.229	1.398	3.340	261.559	1.250
1985	48.535	1.385	3.526	266.298	1.324
1986	37.999	1.594	2.603	186.114	1.340
1987	33.305	1.795	2.238	162.138	1.273
			Nominal Indexed to 1982 = 100		
1980	75.010	132.893	74.869	90.956	94.775
1981	88.638	115.847	93.100	88.516	97.166
1982	100.000	100.000	100.000	100.000	100.000
1983	107.577	86.661	105.206	95.340	99.897
1984	118.751	76.338	117.304	95.397	104.967
1985	122.951	74.053	121.257	95.752	110.701
1986	96.371	83.805	89.414	67.656	112.636
1987	83.217	93.625	74.034	58.073	107.476
			Real Indexed to 1982 = 100		
1980	76.354	129.194	67.505	84.638	97.789
1981	90.767	114.590	89.112	86.799	99.196
1982	100.000	100.000	100.000	100.000	100.000
1983	105.533	87.808	108.425	95.893	98.762
1984	115.858	77.643	124.019	97.726	104.538
1985	119.062	76.920	130.936	99.497	110.699
1986	93.216	88.510	96.648	69.538	112.094
1987	81.700	99.692	83.087	60.580	106.481

period showed rather strong performance. The fourth quarter of 1987 shows the worldwide scope of the October crash.

Regarding current account balances, only the United States has consistently run a deficit (Table V). This fact suggests anomalous behavior of some important policy or exogenous variable in the United States. One also observes that after 1982 real output growth has been fairly strong for all countries (Table V).

The relevant variables central to the three hypotheses, namely budget deficits, money growth, and the effective tax rate on capital in the United States are discussed next. In examining budget deficits, I emphasize the behavior of the more meaningful concept of real budget deficit (see Barro [1984] and Eisner [1989]), although data on nominal deficits are also displayed (Tables VIa and VIb). The real deficit is calculated as in Barro (1984) and measures the change in the real value of outstanding liabilities owed by the government.[3] Transforming the national accounts data in this way helps to overcome some of the severe problems associated with measuring the deficit. Ideally, one would like a measure of government deficits based on the kind of accounting used by a typical business. Such business accounting treats capital expenditures differently from current outlays and depreciation. So too should they be treated in government accounting. Moreover, appreciation of the value of government assets, such as the gold stock and publicly held land, should be included. Also, changes in the present value of future obligations such as social security payments or obligations of the deposit insurance corporations in the United States should be taken into account. None of these items seem to be adequately accounted for in current measures of the deficit. Furthermore, the deficits of local governments are omitted.

Serious measurement problems also affect the data on the current account of the balance of payments. For example, these data do not include changes in asset values held by foreign investors in each country. Eisner (1989) indicates that

[3] Specifically the real budget deficit

$$b_t = \frac{B_t + H_t}{P_t} - \frac{B_{t-1} + H_{t-1}}{P_{t-1}}$$

where B is the nominal value of government bonds held by the public, H is high-powered money, and P is the GNP deflator.

Table II

Inflation and Interest Rates

	United States	United Kingdom	Germany	Japan	Canada
1981					
Nominal Interest Rate	14.08	13.03	10.57	7.43	17.72
Inflation Rate	9.63	11.89	4.03	2.69	10.55
Real Interest Rate	4.45	1.14	6.54	4.74	7.16
1982					
Nominal Interest Rate	10.72	11.47	8.02	6.94	13.64
Inflation Rate	6.43	7.60	4.36	1.87	8.65
Real Interest Rate	4.29	3.87	3.66	5.07	4.99
1983					
Nominal Interest Rate	8.62	9.59	5.64	6.39	9.31
Inflation Rate	3.86	5.24	3.26	0.78	5.06
Real Interest Rate	4.76	4.35	2.38	5.61	4.25
1984					
Nominal Interest Rate	9.57	9.30	5.66	6.10	11.06
Inflation Rate	3.87	4.27	1.99	1.25	3.11
Real Interest Rate	5.70	5.03	3.68	4.85	7.95
1985					
Nominal Interest Rate	7.48	11.56	4.96	6.46	9.43
Inflation Rate	3.68	5.89	2.22	1.52	3.26
Real Interest Rate	3.80	5.67	2.74	4.94	6.17
1986					
Nominal Interest Rate	5.97	10.37	3.85	4.79	8.97
Inflation Rate	1.96	3.67	3.08	1.86	2.45
Real Interest Rate	4.01	6.69	0.77	2.93	6.52
1987					
Nominal Interest Rate	5.82	9.25	3.28	3.51	8.15
Inflation Rate	3.58	4.43	2.06	−0.24	4.44
Real Interest Rate	2.24	4.82	1.22	3.75	3.70

Note: Nominal interest rate is 1-year Treasury bill rate, except call money rate for Japan.

Source: *International Financial Statistics*, December 1985 and February 1989.

this oversight may be of such magnitude that in reality the United States is not really a debtor nation. Given these measurement problems, one can only hope that the overall movements in the data reported for both the trade and budget deficits are roughly correlated with magnitudes that are of more economic relevance.

The reported data on budget deficits show that relative to output the real U.S. budget deficit is not particularly large. Nor does the U.S. budget deficit relative to output move in any strikingly different way from the deficits of other countries.

Monetary data are given in Table VII. As measured by M1 growth, the United States experienced a fairly severe monetary tightening in 1981, as did Germany and Canada. After that episode M1 growth strengthened. Looking at M2 growth, one is unable to discern any pattern that distinguishes the United States from other countries.

The last bit of data concerns the effective marginal tax rate on total nonresidential business plant and equipment. These figures are taken from Hulten and Robertson (1982), who attempt to construct an index number that measures the difference between the before and after tax return on capital. Numbers for 1983-1986 are taken from the Hulten-Robertson forecasts of effective tax rates conditional on various rates of inflation. These rates are .33 (1980), .26 (1981), .047 (1982), .01 (1984-1986). The rates do not include the effects that individual tax rates have on the cost of capital and do not go beyond 1986 since tax laws were changed after that date. While no numbers are presented for the post-1986 period, the 1986 tax law is viewed as having significantly raised the effective marginal tax rate on capital.

Confronting the Hypotheses with the Data

Having described the relevant data, I now turn to the three competing hypotheses. First I investigate the financial press's most popular explanation, U.S. budget deficits. But as mentioned above, the real U.S.

Table III

Real Stock Indexes

	United States	United Kingdom	Germany	Japan	Canada
1980					
1	82.0	91.1	99.2	95.1	92.7
2	90.6	96.9	105.3	96.0	104.9
3	93.7	100.4	104.9	98.8	106.5
4	100.0	100.0	100.0	100.0	100.0
1981					
1	96.7	99.2	97.1	108.4	99.5
2	92.5	98.3	102.5	123.4	98.4
3	79.8	85.5	93.9	113.7	77.1
4	82.8	94.6	92.1	117.9	76.4
1982					
1	75.7	95.8	95.9	107.3	61.1
2	73.1	93.8	90.0	107.1	51.2
3	79.6	105.0	92.9	105.5	59.1
4	91.1	107.7	99.0	120.1	69.4
1983					
1	99.6	114.8	115.8	123.2	75.6
2	106.0	127.7	123.1	128.9	85.3
3	105.3	123.4	120.8	136.5	87.9
4	102.9	127.7	133.4	143.3	86.8
1984					
1	97.5	141.6	130.1	165.4	81.2
2	92.3	129.7	127.7	153.2	74.7
3	98.6	143.0	134.5	159.1	81.2
4	100.0	153.6	139.6	174.4	79.9
1985					
1	107.1	159.9	149.1	191.6	86.0
2	112.9	148.4	179.1	193.9	86.6
3	106.1	154.4	196.1	188.5	84.2
4	122.7	171.3	248.3	196.2	91.0
1986					
1	138.9	201.7	266.7	242.3	94.2
2	143.6	196.9	251.4	251.3	92.9
3	131.5	182.7	250.2	305.3	89.7
4	138.4	197.3	264.1	310.1	92.5
1987					
1	161.5	234.5	226.2	376.7	113.4
2	169.2	265.9	235.7	403.3	113.1
3	174.7	273.9	242.7	414.8	117.3
4	133.0	202.1	157.7	333.1	94.1

Note: Price trends on the world's major stock markets, as calculated by Morgan Stanley Capital Perspective, Geneva, and reported in *The Wall Street Journal*. Each index is based on the close of 1980 equaling 100. Price trends are deflated by CPI in which 1980:4 equals 1.

budget deficit, relative to the real budget deficits of other countries, is not particularly large. Nor does it exhibit behavior much different from the deficits of other countries. Therefore, one would not expect it to affect the terms of trade (i.e., the real exchange rate). To the extent that budget deficits crowd out private investment, real interest rates would be expected to rise. If so, investment should fall and equity markets should perform poorly. The resulting lower investment over time would lead to a lower capital stock and reduced output. These events, however, did not occur. Instead, after 1982 investment was strong and output rose. In general, therefore, the experience of the 1980s does not conform to a theory based on the behavior of the U.S. budget deficits.

Another possibility is that the data have been generated by an unexpected monetary contraction in the United States. Indeed, such a contraction did occur in 1981. Given this unanticipated monetary contraction, one would expect output in the United States to fall and real interest rates to rise. Recession would occur if producers confused relative price level movements with movements in the aggregate nominal price level causing a fall in aggregate supply.[4] Real interest rates would rise to equilibrate the demand for goods with the lower output. As misperceptions were corrected, output would rise and real interest rates would fall. Contrary to this hypothetical sequence of events, however, Table II shows that real rates remained high through 1984 even though output was growing strongly.

The initial U.S. monetary contraction would also be associated with both a real and nominal appreciation of the exchange rate. The real exchange rate would appreciate because U.S. goods would become relatively scarcer due

[4] Relative price level movements refer to the change in a particular price or wage rate with respect to all other prices, while a movement in the aggregate price level refers to an equiproportional change in all prices.

Table IV

Nominal Returns on Equity in Local Currency

	United States	United Kingdom	Germany	Japan	Canada
1980	32.6	35.4	4.0	9.5	24.0
1981	-5.0	13.7	4.9	17.3	-10.7
1982	21.6	29.2	19.4	6.0	6.5
1983	27.6	29.1	44.2	25.2	33.8
1984	6.2	31.9	11.2	26.4	-1.4
1985	31.7	20.4	87.1	15.9	22.9
1986	18.4	27.3	8.3	51.0	9.4

Nominal Returns on Equity in U.S. Dollars

1981	-5.0	-9.0	-10.4	8.3	-10.0
1982	21.6	9.3	10.5	-0.8	2.7
1983	22.6	16.0	24.0	26.7	32.2
1984	6.2	5.2	-5.3	16.9	-7.1
1985	31.7	50.4	138.3	45.3	16.2
1986	18.4	29.4	34.1	89.2	11.1

Source: *International Finance Yearbook*. London: Midland Montagu, 1987.

Table V

Current Account Balance

	United States	United Kingdom	Germany	Japan	Canada
1981	6.87	14.50	-3.31	4.77	-5.11
1982	-8.64	8.04	4.99	6.85	2.23
1983	-46.29	5.74	5.40	20.80	2.49
1984	-107.14	2.54	9.75	35.00	2.00
1985	-115.16	4.74	16.98	49.17	-1.43
1986	-138.84	-0.35	39.76	85.33	-7.54
1987	-153.95	-4.26	45.43	87.00	-7.98

Note: Current account in U.S. billions of dollars.

Growth of Real Output

1981	2.52	-1.41	0.00	4.07	3.29
1982	-2.55	1.12	-0.96	3.10	-3.39
1983	3.57	3.55	1.90	3.24	3.70
1984	6.43	2.08	3.28	5.06	6.12
1985	2.73	3.92	1.94	4.71	4.30
1986	3.57	2.93	2.32	2.51	2.96
1987	2.89	3.65	1.76	4.36	4.18

Note: Real growth in GNP, except GDP for United Kingdom.

Source: *International Financial Statistics*, December 1985 and February 1989.

to the decline in output. And the nominal exchange rate would appreciate if policy were expected to remain tight implying that the supply of dollars would be falling relative to other currencies. Finally, equity prices should fall due to lower output and higher real interest rates.

The initial movements in exchange rates, interest rates, and inflation are consistent with an unanticipated tightening of monetary policy. Subsequently, when the effects of the monetary tightening had worn off, and the economy had recovered, one would expect real rates to fall and the real exchange rate to begin returning to its initial level. After all, restoration of these real magnitudes to their natural equilibrium positions following a monetary shock is perfectly consistent with the notion that money is neutral in its effects on real variables in the long run. One would also expect the nominal exchange rate to remain high if U.S. monetary policy remained tight and, therefore, real and nominal exchange rate paths should diverge. Since these longer-run patterns are not evident in the data (see chart), it is reasonable to conclude that the time path of the data was not generated by monetary phenomena—although the initial movements in the data are consistent with the tightening of monetary policy in 1981.

One final hypothesis is based on supply side disturbances due to lower effective marginal tax rates on capital in the United States. This tax cut made investment in the United States relatively more profitable and, therefore, attractive. It seems reasonable that individuals believed that the tax cut would exhibit some degree of persistence. A belief that the tax cut would not be immediately rescinded is consistent with the general sluggishness of tax rate changes. In 1981, the tax on physical capital was lowered in the United States. As a result, the demand to invest in the United States rose and real interest rates rose to bring consumption plus

Table VI (A)

BUDGET DEFICITS

Nominal Government Budget Deficit(−)

	United States (Billions of Dollars)	United Kingdom (Billions of Pounds)	Germany (Billions of DMarks)	Japan (Trillions of Yen)	Canada (Billions of Canadian Dollars)
1981	−72.62	−12.045	−35.86	−12.37	−8.43
1982	−125.7	−9.567	−32.02	−13.29	−20.81
1983	−202.5	−13.372	−32.95	−12.47	−25.16
1984	−178.3	−10.33	−32.29	−12.08	−28.87
1985	−212.2	−11.269	−20.26	−11.32	−28.68
1986	−212.6	−6.949	−16.34	−11.5	−20.51
1987	−156.0	−4.011	−25.44	N.A.	−17.58

Government Budget Deficit(−)/GNP

1981	−0.024	−0.047	−0.023	−0.048	−0.024
1982	−0.040	−0.034	−0.020	−0.049	−0.058
1983	−0.059	−0.044	−0.020	−0.044	−0.064
1984	−0.047	−0.032	−0.018	−0.040	−0.067
1985	−0.053	−0.032	−0.011	−0.036	−0.062
1986	−0.050	−0.018	−0.008	−0.035	−0.042
1987	−0.035	−0.010	−0.013	N.A.	−0.033

Sources: *International Financial Statistics*, December 1985 and February 1989. *Comparative Statistics and Financial Statistics: Japan and Other Major Countries.* Bank of Japan, 1987, p. 85.

Table VI (B)

BUDGET DEFICITS

Real Government Deficit(−)

	United States (Billions of Dollars)	Germany (Billions of DMarks)	Japan (Trillions of Yen)	Canada (Billions of Canadian Dollars)
1981	−7.6	−20.5	−9.2	−1.5
1982	−93.3	−25.8	−12.4	−10.2
1983	−120.0	−22.1	−18.9	−14.9
1984	−123.1	−20.7	−10.5	−17.1
1985	−132.4	−18.4	−12.6	−22.8
1986	−147.3	−10.8	−10.2	−10.9
1987	−56.6	−26.5	−12.6	−10.1

Real Government Deficit(−)/Real GNP

1981	−0.003	−0.014	−0.037	−0.005
1982	−0.034	−0.018	−0.048	−0.034
1983	−0.043	−0.015	−0.071	−0.048
1984	−0.041	−0.013	−0.033	−0.052
1985	−0.043	−0.012	−0.043	−0.066
1986	−0.046	−0.007	−0.034	−0.031
1987	−0.017	−0.016	−0.041	−0.027

Sources: *International Financial Statistics*, December 1985 and February 1989. Bank for International Settlements.

investment in line with output. Because investment in the United States became relatively attractive, capital gradually flowed there. This flow continued until after-tax rates of return were equilibrated worldwide. To balance the capital inflow the United States had to run a balance of trade deficit. Also, because people believed that the tax cut would persist, there were wealth effects. Even though the whole world is made wealthier (since foreigners own assets in the United States), the favorable change in the terms of trade plus the fact that U.S. residents hold proportionately more of their wealth in the United States meant that the United States became relatively wealthier. Hence U.S. consumption demand rose relative to foreign consumption and pushed the U.S. balance of trade further into deficit. The tax cut also caused equity prices to rise since after-tax earnings increased.

As the capital stock in the United States grows, more output will be produced and eventually supply-side effects will dominate causing a reversal in the initial exchange-rate appreciation. Also, the marginal after-tax rate of return on investment and thus the real interest rate will decline as the capital stock increases. Further, since more U.S. goods are being produced relative to foreign goods, the real exchange rate should depreciate to a level below its initial value. Accompanying this depreciation will be a reversal in the balance of trade. Analogously, the 1986 increase in marginal tax rates should have just the opposite effect. That is, one should observe a balance of payments surplus, falling real rates of return, and a real exchange rate depreciation.

The above explanation captures much of the movements in the data, but it obviously suffers from a few deficiencies. The biggest deficiency is the predicted similarity in the timing between real exchange rate depreciation and the movement of the balance of payments into surplus. Also, the mechanism described is not particularly successful at producing a worldwide expansion of output unless the global wealth effects are capable of generating the magnitude of expansion we have recently seen. Presumably appeal to some worldwide advances in technology would be needed to solve this particular piece of the puzzle.

Table VII

MONETARY DATA

M1 Growth

	United States	United Kingdom	Germany	Japan	Canada
1981	2.4*	17.80	-1.56	9.96	-0.32
1982	9.0*	11.31	7.14	5.75	12.21
1983	10.3*	11.14	8.38	-0.12	12.45
1984	5.94	15.42	5.97	6.93	19.97
1985	12.40	18.12	6.68	3.01	33.20
1986	16.46	22.11	8.17	10.34	14.85
1987	2.60	22.82	7.50	4.89	6.05

* These figures are for effective M1 and are taken from Broaddus and Goodfriend [1984].
Note: M1 values are in each country's own currency.

M2 Growth

1981	9.91	34.90	5.98	11.14	27.63
1982	8.93	11.39	6.75	8.51	4.88
1983	11.92	13.86	4.64	10.32	-3.93
1984	8.52	10.58	5.46	6.89	1.02
1985	8.50	7.00	8.60	11.46	-4.24
1986	9.08	22.82	5.82	8.86	3.62
1987	3.55	19.71	5.35	13.75	10.01

Note: M2 values are in each country's own currency. U.S. M2 is national definition.
Source: *International Financial Statistics*, December 1985 and February 1989.

Conclusion

After examining the three competing hypotheses one finds that they all suffer from some deficiencies when held up to the data. The most unlikely candidate for explaining what has occurred in international markets is the one that revolves around U.S. budget deficits. The tax effect story receives the most support but does not represent a complete story. However, the data do seem to be most consistent with an explanation centered on real rather than nominal causes. If that is the case, then monetary policy should not be overly concerned with current changes in the U.S. exchange rate.

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