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The Underground Economy in the United States: Annual Estimates for 1930-80

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During the past two or three years, the underground economy has gradually moved its center of attention from the pages of newspapers into the pages of scholarly reviews. Reflecting this scholarly interest, several books have recently been published and conferences have been organized. 1/ The reason for studying the underground economy is self-evident, because of the possible influence on economic policies of the distortion of official estimates of such macroeconomic variables as the national accounts, the employment rates, the rate of inflation if the underground economy is large. 2/

There is still disagreement on the definition of the underground economy--and, perhaps even more, on its measurement--but progress is being made. As the present article is not intended to be a survey, it does not review that progress. Rather, using a method developed by the author a few years ago (and by now applied to a large number of countries), it presents yearly estimates for the underground economy in the United States for the 1930-80 period.

Researchers have shown their resourcefulness by developing several alternative approaches to the measurement of the underground economy. Some have attempted a direct measurement of the various activities that make up this phenomenon (Internal Revenue Service, 1979; Simon and Witte, 1980). Some have used questionnaires to elicit answers from persons interviewed as to whether they had participated in these activities either as buyers or as sellers (Isachsen, Klovland, and Strom, 1982; Hansson, 1982). Some have used employment statistics to attempt to estimate the number of those who were officially or unofficially unemployed while they were actually working "underground" (Contini, 1982; Pettinati, 1979). Others have attempted to estimate the "underground" economy from the differences between the consumption and the income side

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1/ As to books, see Bawly, Burkett, Ray, Simon and Witte, and Tanzi (1982).

2/ International organizations have also started paying attention to the underground economy--obviously an important phenomenon. See, for example, Blades, De Grazia, Smith, and Tanzi (1980b).

of the national accounts (Macafee, 1980) while still others have utilized the information on income and consumption contained in household budget studies (Dilnot and Morris, 1982). Finally, there has been the monetary approach, of which the method used in this article is a variant.

I. The Monetary Approach: A Brief Review

The monetary approach can itself be distinguished by (a) the fixed-ratio variant; (b) the currency-denomination variant; and, finally (c) the currency-equation variant.

The fixed-ratio variant relies on two key assumptions. First, it assumes basically that there is a monetary ratio which, except for the effect of the underground economy, would have remained constant over time. Second, it assumes that there was a golden period in the past when no underground economy existed. This monetary ratio is C/D for Guttman (1977) and MV/GNP for Feige (1979), where C is currency in circulation, D is demand deposits, M is money supply (made up of currency and demand deposits), V is transaction (not income) velocity of money, 1/ and GNP is the officially estimated gross national product. Through the changes over time in these ratios, Guttman and Feige estimate the size of the underground economy. In Guttman's method the estimation is indirect, in the sense that he first calculates "excessive" currency in circulation (induced by the existence of underground activities) and then, by making assumptions about its income velocity, estimates the underground economy. In Feige's method the estimation is direct, as the change in the MV/GNP ratio over time allows a direct estimation of underground GNP. The golden period, when the underground economy was zero, is the late 1930s for Guttman while for Feige it is either the late 1930s or the mid-1960s.

The currency-denomination variant is based on the assumption that underground economic activities are associated mainly with the use of bills of certain denominations. In the United States, bills of $100 and above have been considered to be mainly used, and serious proposals have been made to withdraw them from circulation (Henry, 1976). Thus, by analyzing the change in the composition of total currency holdings in circulation, some analysts have attempted to measure the underground economy (Henry, 1975).

The fixed-ratio approach, regardless of whether it is used in Guttman's version or in the more sophisticated Feige's version, is open to the criticism that there is no obvious reason why those ratios should remain constant over long periods of time. Although, at least for the United States, there may be "great ratios" in the economy that, for some

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1/ In the actual calculations, the velocity of currency and that of demand deposits are calculated separately.

poorly understood reasons, remain relatively unchanged (Klein and Kosobud, 1961), it is not clear why Guttman's and Feige's ratios should be among those. Another criticism is that the results are sensitive to the choice of the initial period. For these two reasons, there has been considerable reluctance to accept the very high estimates of the underground economy that have been derived by Guttman and the even higher ones that have been derived by Feige.

The currency-denomination approach is open to the criticism that--with real growth and relatively high rates of inflation--it would be expected that the composition of currency holdings would change over the years. Over time, large bills do not appear to be as large any more. When the normal daily wage was a few dollars, a $100 bill was a small fortune; but today, when the wage of many workers exceeds $100 a day, $100 no longer reflects a large purchasing power. Furthermore, as the author has argued elsewhere, many $100 bills are probably being used for transactions or for storing wealth in foreign countries. An unknown but probably high amount of currency substitution (with U.S. currency replacing the currencies of many countries) has certainly been taking place over the years. This substitution or "dollarization" is likely to have been particularly significant in countries experiencing high rates of inflation. 1/

Before moving to the more substantive part of this paper, it may be worthwhile to provide in a summary fashion some of the basic monetary data that have been utilized in the monetary approach.

Figure 1 depicts the behavior of total currency on a per capita basis for the 1933-80 period. It shows that a remarkable increase has taken place over the period and that, by 1980, there was almost $700 of currency outstanding for each person living in the United States. The increase was particularly significant in 1941-45 and the period after the mid-1960s. Figure 1 shows also the behavior of currency in denominations smaller than $100, equal to $100, and greater than $100. The remarkable increase in per capita currency, combined with the high per capita figure of currency in circulation and the large increase in $100 bills, has given credence to claims about a phenomenal growth in underground economic activities.

Figure 2, however, gives a somewhat modified picture simply by adjusting for changes in prices. In fact, when per capita currency in circulation is expressed in 1972 prices, it appears that, in spite of the substantial growth in real income since World War II, per capita currency was much higher during World War II than it was in 1980. Between that early period and the early 1960s, real per capita currency

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1/ For a more detailed discussion of this point, see the author's paper, "A Second and More Skeptical Look at the Underground Economy in the United States," in Vito Tanzi, editor, The Underground Economy in the United States and Abroad (Lexington, Mass.: Lexington Books, 1982).

holdings fell by almost one half. They then started rising again, with the increase attributed mostly to $100 bills. But as a proportion of per capita income in real terms, the holdings have continued to fall up to the present time.

In addition to total currency per capita and to total $100-denominated currency per capita, the ratio that has attracted most attention in connection with underground economic activity is that of currency to demand deposits. That ratio, shown as C/D in Figure 3, has fluctuated considerably over the years. It rose sharply during the Great Depression, when eroding confidence in the banking system induced individuals to substitute currency for demand deposits, and it increased sharply during World War II for a variety of reasons detailed in Cagan's well-known study (1958). From 1945 to the early 1960s, the C/D ratio fell but it then rose again. The behavior of the C/D ratio indicates that (a) this ratio can hardly be taken as constant, and (b) if one bases estimates of the underground economy on that ratio, the results obtained will be highly influenced by the beginning period.

Figure 3 also shows that, while the C/D ratio fell between 1945 and 1961 and then rose, the C/M2 ratio fell continuously from 1945 to the early 1970s and then remained roughly constant. This pattern seems to indicate that the increase in the C/D ratio of the past two decades may be due to shifts by individuals from checking accounts into other financial assets (comprised in M2) that paid interest, rather than due to sharp increases in currency holdings. In other words, the C/D ratio may have risen because of a fall in D rather than an increase in C (see also Garcia and Pak, 1979). This conclusion is strongly supported by Figure 4, where various measures of the money supply are shown as percentages of GNP. This figure shows a substantial fall in D/GNP, while the fall in C/GNP appears as very gradual over the post-World War II period.

II. Method and Data Description

The method that is used here to derive the yearly estimates of the underground economy in the United States has been explained in detail in an earlier study in which estimates for 1976 were derived. 1/ The

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1/ That method was first suggested and utilized in an unpublished paper (Tanzi, November 1979). A substantially revised version of the unpublished paper was published in Tanzi (1980). Of related interest are also Cagan's paper on The Demand for Currency Relative to Total Money Supply, National Bureau of Economic Research, Occasional Paper No. 62 (New York: The Bureau, 1958) and J. S. Henry's unpublished paper on "Cash and Crime: A Modest Proposal" (December 1975). Henry's paper was written while he was a graduate student at Harvard University and appreciation is due to him for bringing the paper to the author's attention.

FIGURE 1

U.S. CURRENCY IN CIRCULATION

(Per capita, current prices)

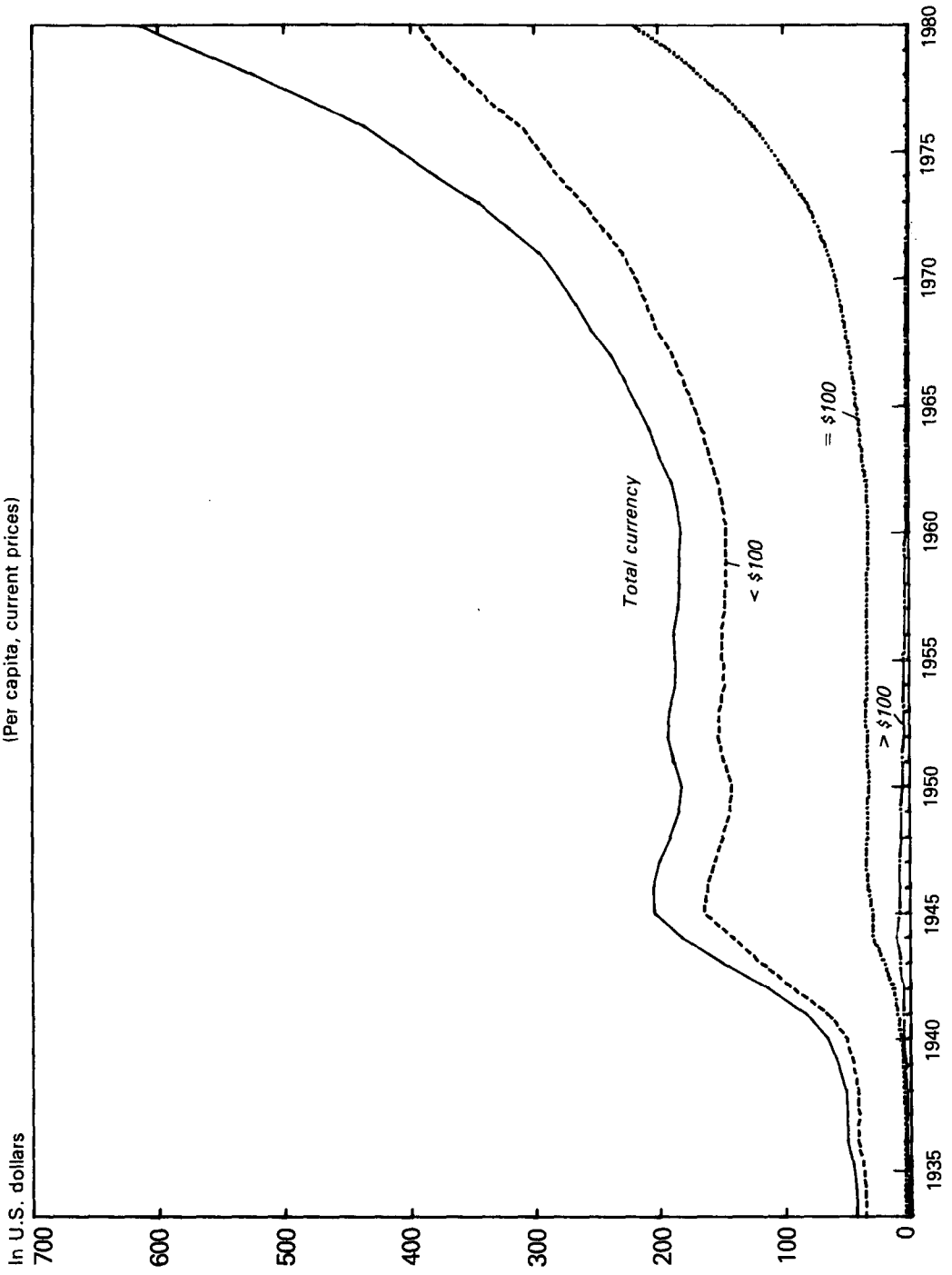


FIGURE 2

U.S. CURRENCY IN CIRCULATION

(Per capita, 1972 prices)

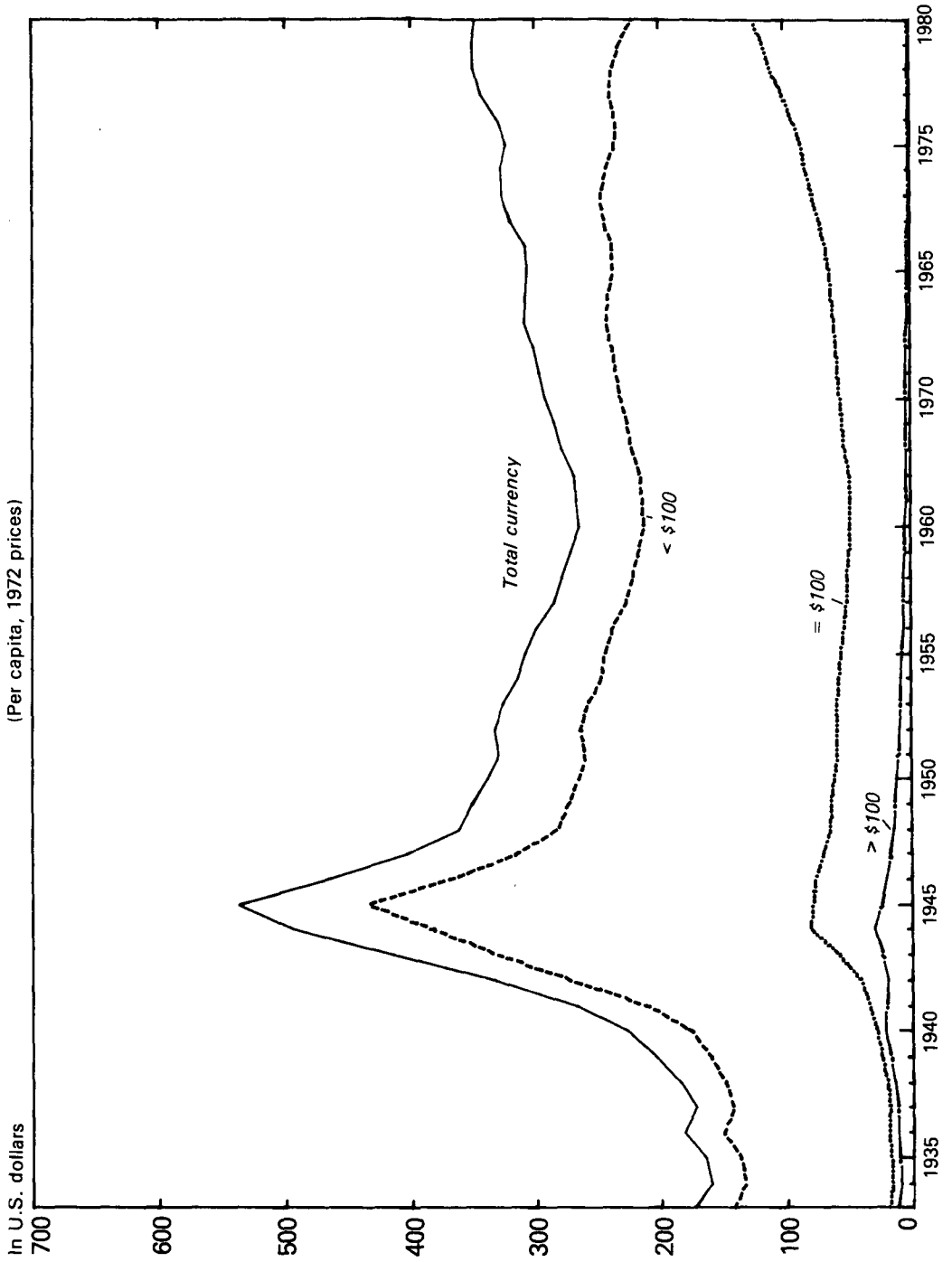


FIGURE 3

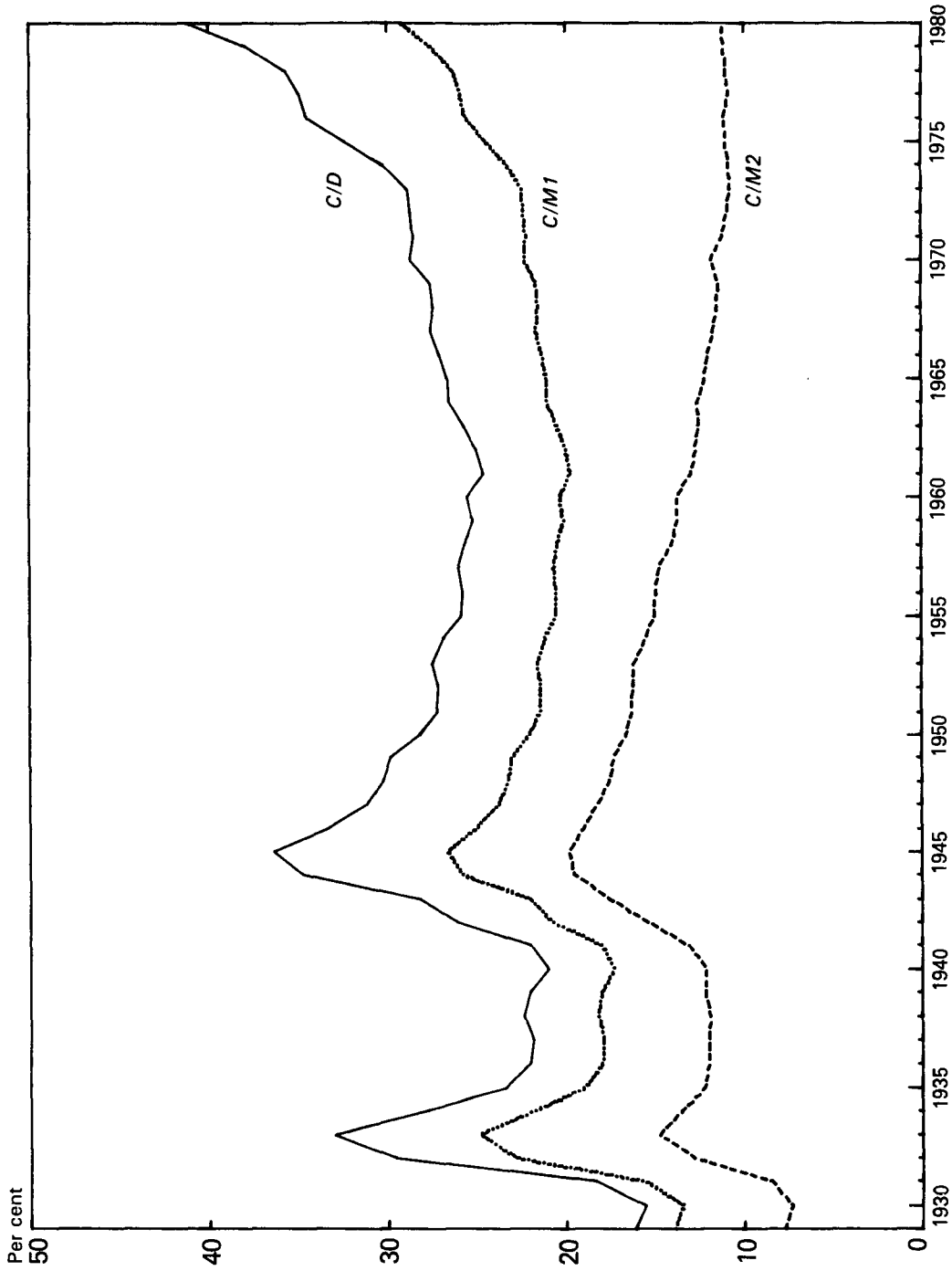
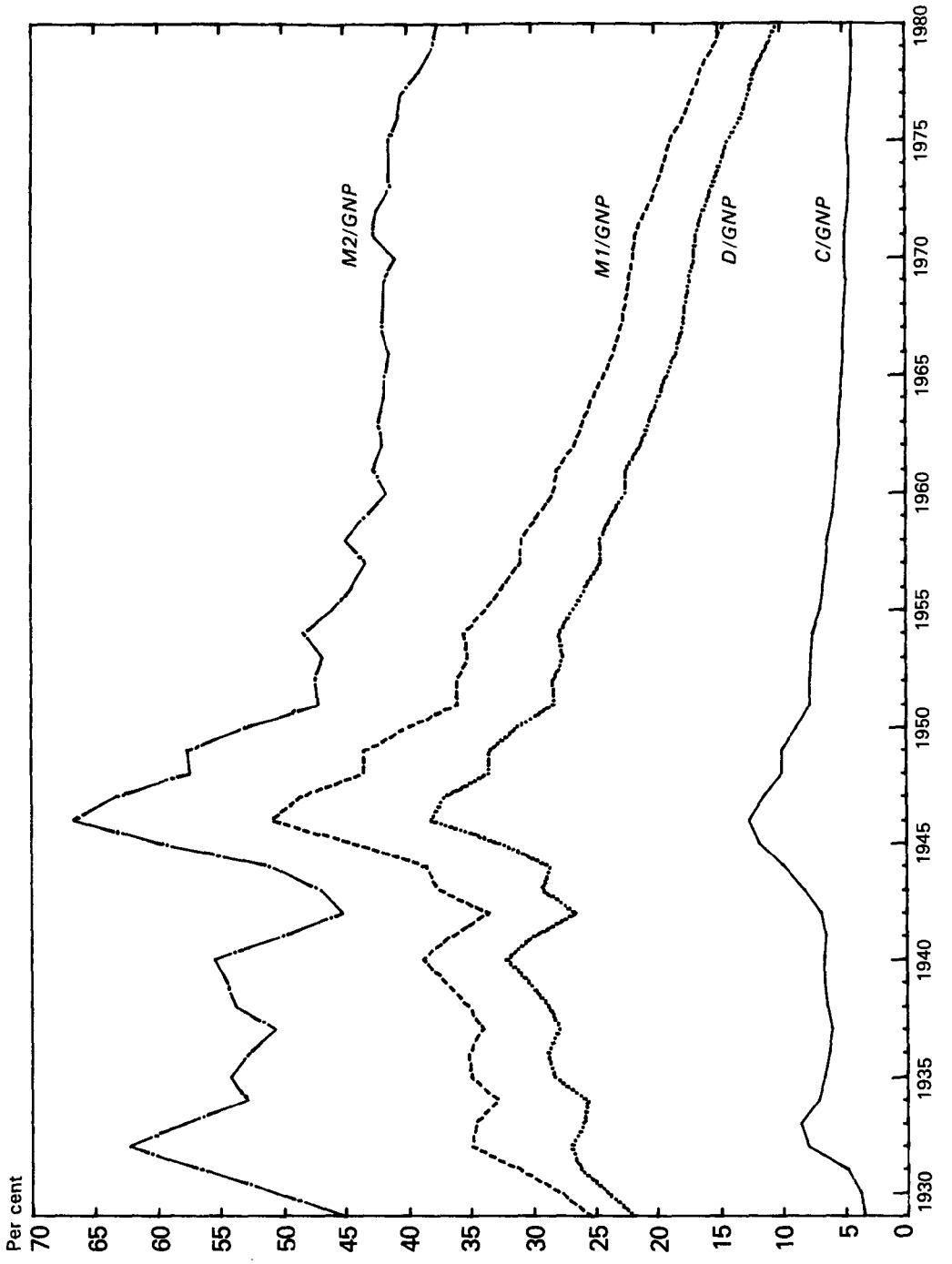

Per cent
50
40
30
20
10
0
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
C/D
C/M1
C/M2

FIGURE 4


Per cent
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
M2/GNP
M1/GNP
D/GNP
C/GNP

approach consists in specifying a demand-for-currency equation in order to be able to infer the effect of a change in the tax level on that demand. The key assumptions are, first, that underground economic activities are the direct consequence of high taxes; 1/ and, second, that currency is mainly used for carrying out such transactions or for storing wealth. In the equation, the ratio of currency holdings, C, to money, defined as M2, is the dependent variable. The independent variables are (a) Y, real per capita income; (b) R, the rate of interest paid on time deposits; (c) WS/NI, the ratio of wages and salaries in national income, and, (d) T, an income tax variable. Thus, it follows that

$$\ln C/M2 = a_0 + a_1 \ln T + a_2 \ln WS/NI + a_3 \ln R + a_4 \ln Y + \varepsilon \quad (1)$$

where ε is an error term.

Once equation (1) has been estimated for the 1930-80 period, it can be utilized to estimate currency holdings by making the assumption that the tax variable assumes a value of zero. Once currency holding at zero taxes is estimated, it can be used to determine the extent of the underground economy by multiplying excessive currency by the income velocity of money, as discussed below in more detail.

The expected sign for both per capita income and interest rate is negative, while the expected sign for both taxes and the ratio of wages and salaries in national income is positive.

A detailed discussion of why these signs are expected can be found in Tanzi (1980a). Briefly, as the level of taxation rises, individuals are encouraged to engage in tax-evading activities that are facilitated by the use of currency, as this leaves no traces; therefore, the use of currency rises. Because wages are often paid in currency, especially for daily workers, and other types of income (interest, dividends, etc.) are almost always paid with checks, an increase in the ratio of wages in total income paid will require more currency. On the other hand, economic development, as proxied by per capita real income, is assumed to lead to the replacement of currency by checks, thus leading to a fall in C/M2. Equally, as an increase in the rate of interest increases the opportunity cost of currency holdings, C/M2 and R can be expected to be negatively correlated because M2 includes time deposits.

1/ Obviously, some underground activities are not the result of taxes; therefore, estimates will not capture these activities. Convention, however, excludes the incomes generated from illegal activities from national accounts; it is likely that these incomes would vanish if they could be discovered and taxed. It should also be realized that the opportunity cost of the resources used for these activities is likely to be very low.

The data used are presented in Table 1, which covers the 1929-80 period. It must be noticed that currency and M2 are based on June 30 of each year. R is the interest rate paid on time and savings deposit. T and TW are two alternative measures of the tax variable. T is the ratio of total income tax payments after credit to adjusted gross income; TW is a weighted average tax rate on interest income. TW is described in detail in Tanzi (1980a).

III. Results

Using the data shown in Table 1, equation (1) was solved alternatively with both measures of the tax variable. It must be noticed than a logarithmic specification has been used; given that specification, in order to solve the equations for a situation where the tax variable is assumed to be zero, that variable has been replaced in each case by unity plus the yearly figure. In other words T and TW have been replaced for each year by 1 + T and by 1 + TW.

The estimated equations are: 1/

$$\ln C/M2 = -5.0262 + 0.2479 \ln (1 + TW) + 1.7303 \ln (WS/NI) \quad (1a)$$
$$(3.61)^{**} \quad (5.81)^{**} \quad (5.33)^{**}$$

$$-0.1554 \ln(R) \quad -0.2026 \ln (Y)$$
$$(3.66)^{**} \quad (1.90)$$

$$R^{-2} = 0.950 \quad DW = 1.576$$

$$\ln C/M2 = -4.2005 + 0.3096 \ln (1 + T) + 1.5791 \ln (WS/NI) \quad (1b)$$
$$(2.93)^{**} \quad (5.26)^{**} \quad (4.76)^{**}$$

$$-0.1603 \ln (R) \quad -0.2804 \ln (Y)$$
$$(3.37)^{**} \quad (2.22)^{*}$$

$$R^{-2} = 0.947 \quad DW = 1.677$$

In both cases, the R^{-2} is very high, implying that most of the variation in ln C/M2 is explained by the estimated equation. In all cases except two, the t values for the coefficients are significant at the 1 per cent level. The exception is the coefficient of Y, which in one case is significant at the 5 per cent level and, in the other case, just misses being significant at the 5 per cent level. 2/ The signs are as expected--positive for the tax variable and the WS/NI variable and negative for the rate of interest and per capita income.

1/ The equations have been corrected with a first-order Cochrane-Orcutt correction for serial correlation. The coefficients in parentheses are t values. Two asterisks indicate significance at the 1 per cent level. One asterisk indicates significance at the first percentage level.

2/ It is significant at the 6 per cent level.

Table 1. United States: Basic Data

(In billions of U.S. dollars)

Year	Currency 1/	M2 1/	Y 1972 dollars per capita	Wage and Salary National income	R 2/	TW 3/	T 4/
			(In thousands of U.S. dollars)	(In per cent)			
1929	3.64	46.60	2.58	59.50	3.34	5.00	4.04
1930	3.37	45.70	2.31	62.62	3.31	3.54	2.63
1931	3.65	42.70	2.11	66.83	2.99	2.71	1.81
1932	4.62	36.10	1.81	71.96	2.80	5.01	2.83
1933	4.76	32.20	1.76	72.76	2.56	4.82	3.40
1934	4.65	34.40	1.89	69.26	2.37	7.34	4.00
1935	4.78	39.10	2.04	64.99	1.93	7.60	4.41
1936	5.22	43.50	2.30	65.24	1.64	8.85	6.31
1937	5.49	45.70	2.39	63.82	1.55	10.29	5.38
1938	5.42	45.50	2.28	65.17	1.48	7.38	4.05
1939	6.01	49.30	2.43	64.52	1.36	8.55	4.00
1940	6.70	55.20	2.59	62.56	1.22	8.90	4.09
1941	8.20	62.50	2.98	60.52	1.12	18.58	6.63
1942	10.94	71.20	3.40	60.50	1.03	27.22	11.32
1943	15.81	89.90	3.87	62.44	0.87	28.78	14.65
1944	20.88	106.80	4.10	64.29	0.84	47.35	13.89
1945	25.10	126.60	3.99	65.05	0.85	48.61	14.17
1946	26.52	139.00	3.36	62.84	0.82	40.70	11.97
1947	26.60	146.00	3.23	63.25	0.85	39.95	12.03
1948	26.00	147.80	3.31	61.87	0.87	43.27	9.41
1949	25.60	147.70	3.27	63.36	0.90	40.92	9.01
1950	25.10	151.00	3.49	62.24	0.92	43.61	10.22
1951	25.40	155.50	3.72	62.90	1.02	43.79	11.93
1952	26.70	164.50	3.80	64.86	1.14	46.46	12.87
1953	27.70	171.10	3.88	66.27	1.30	45.17	12.80
1954	27.50	176.70	3.76	65.80	1.30	42.98	11.58
1955	27.60	183.60	3.95	64.54	1.36	33.61	11.87
1956	27.90	186.70	3.96	65.83	1.58	33.89	12.19
1957	28.30	191.70	3.96	66.04	2.08	33.76	12.23
1958	28.30	201.60	3.89	66.07	2.20	33.56	12.17
1959	29.00	211.00	4.05	64.61	2.36	33.75	12.60
1960	29.00	210.80	4.08	65.41	2.58	33.04	12.47
1961	28.90	223.40	4.11	65.17	2.73	32.99	12.76
1962	30.00	236.60	4.28	64.51	3.23	32.51	12.83
1963	31.50	251.40	4.39	64.15	3.34	31.85	13.02
1964	33.50	266.40	4.56	64.04	3.47	29.89	11.84
1965	35.00	287.40	4.77	63.24	3.73	28.23	11.50
1966	37.40	312.10	4.99	63.43	4.12	28.23	11.93
1967	39.20	335.10	5.07	64.48	4.32	28.91	12.42
1968	41.80	364.00	5.24	65.00	4.36	28.84	13.78
1969	44.70	391.80	5.32	66.17	4.57	29.25	14.30
1970	47.60	402.40	5.25	67.68	4.98	30.01	13.26
1971	51.00	454.80	5.35	66.66	4.77	30.53	12.65
1972	54.30	498.00	5.61	65.92	4.62	31.30	12.52
1973	59.20	548.10	5.96	64.69	5.82	32.10	13.04
1974	64.50	594.20	5.89	65.97	7.14	33.03	13.64
1975	71.00	642.20	5.78	65.06	5.96	32.87	13.13
1976	77.70	698.20	6.04	64.52	5.32	34.16	13.36
1977	84.30	775.50	6.32	63.61	5.24	33.36	13.68
1978	92.80	840.60	6.57	63.32	5.87	33.87	14.33
1979	101.80	915.50	6.72	62.96	7.41	34.24	14.56
1980	111.00	982.60	6.65	63.34	8.52	35.47	15.51

1/ Currency and M2 are based on June 30 each year.
2/ R = interest rate paid on time and savings deposit.
3/ TW = weighted average tax rate.
4/ T = income tax after credit over adjusted gross income.

The estimates of the underground economy are derived as follows. For each year, the predicted level of the currency ratio C/M2 can be calculated by using the above regression equations. Then, given the actual figure of the M2 for that year, the predicted level of currency holding, $\hat{C}$, can be calculated. 1/ Next, the equations are solved in the same way assuming that the tax variable is zero while the coefficients of the other variables remain unchanged. The resulting value of currency is then defined as $\hat{\hat{C}}$. The difference between C and $\hat{C}$ gives an indication of the accuracy of fit of the equations. The difference between $\hat{C}$ and $\hat{\hat{C}}$ gives the estimation of how much currency holding is tax induced; in other words, it indicates by how much taxes induce people to hold larger amounts of currency, presumably because of their attempt to evade them.

The difference between predicted currency holding, $\hat{C}$, and the currency holdings predicted from the equation under the assumption of zero taxes, $\hat{\hat{C}}$, yields an estimation of "illegal money." The difference between total money in circulation--i.e., total M2--and the estimated "illegal money" yields "legal money." Dividing GNP by legal money gives an estimate of the income velocity of legal money. Assuming that the velocity of "illegal money" is the same as that of legal money, an estimate of the underground economy can be obtained by multiplying illegal money by the velocity of money. Because two alternative measures of taxes have been used, two alternative values are derived for $\hat{C}$ and $\hat{\hat{C}}$.

Figure 5 shows graphically (a) actual currency holdings for the 1930-80 period, C; (b) currency holdings predicted by equations (1a) and (1b), $\hat{C}_1$ and $\hat{C}_2$, respectively; (c) currency holdings, when taxes are assumed to fall to zero, predicted by equation (1a) and equation (1b), $\hat{\hat{C}}_1$ and $\hat{\hat{C}}_2$, respectively. The data on which Figure 5 is based are shown in Tables 2 and 3. Table 2 presents the estimates via use of the weighted average tax rate. Table 3 presents the estimates via use of the average tax rate. In both tables the last column contains the estimates of "illegal money." Thus in 1980 "illegal money"--that is, money used to fuel the activities of the underground economy--was $21.75 billion, according to Table 2, or $16.35 billion, according to Table 3.

1/ See Tanzi (1980a) for the detailed procedure.

FIGURE 5

ACTUAL AND PREDICTED VALUES OF CURRENCY HOLDINGS

UNDER ALTERNATIVE AVERAGE TAX RATE

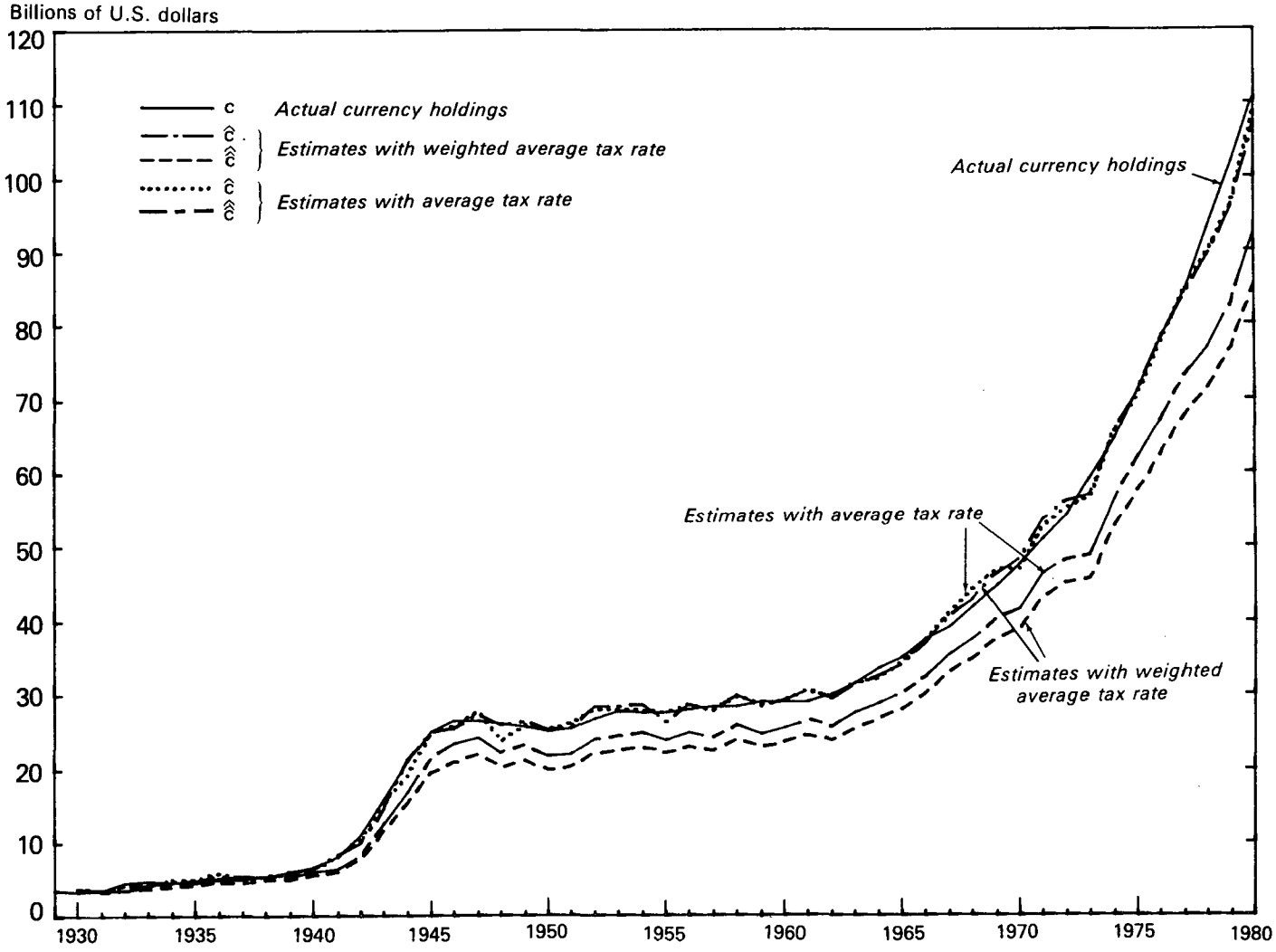


Table 2. United States: Actual and Predicted Values of Currency Holdings, 1930-80

(In billions of U.S. dollars)

Year	Currency			Differences	
	Actual	Predicted with tax 1/	Predicted without tax		
	C	$\hat{C}$	$\hat{\hat{C}}$	$C-\hat{C}$	$\hat{C}-\hat{\hat{C}}$
1929	3.64				
1930	3.37	3.78	3.62	-0.41	0.15
1931	3.65	3.60	3.45	0.05	0.15
1932	4.62	4.23	3.46	0.39	0.77
1933	4.76	4.24	3.83	0.52	0.41
1934	4.65	4.94	4.05	-0.29	0.88
1935	4.78	4.81	4.19	-0.03	0.62
1936	5.22	5.51	4.67	-0.29	0.84
1937	5.49	5.52	4.64	-0.03	0.88
1938	5.42	5.40	5.01	0.02	0.39
1939	6.01	6.00	5.10	0.01	0.90
1940	6.70	6.49	5.60	0.21	0.89
1941	8.20	8.31	6.10	-0.11	2.21
1942	10.94	10.07	7.67	0.87	2.41
1943	15.81	14.48	11.64	1.33	2.84
1944	20.88	21.33	15.36	-0.45	5.97
1945	25.10	24.93	19.53	0.17	5.41
1946	26.52	25.42	20.88	1.10	4.54
1947	26.60	27.42	21.91	-0.82	5.51
1948	26.00	25.91	20.24	0.09	5.68
1949	25.60	26.39	21.20	-0.79	5.19
1950	25.10	25.36	19.86	-0.26	5.51
1951	25.40	25.67	20.31	-0.27	5.36
1952	26.70	28.27	22.07	-1.57	6.20
1953	27.70	28.43	22.59	-0.73	5.85
1954	27.50	28.65	22.92	-1.15	5.73
1955	27.60	26.27	22.10	1.33	4.17
1956	27.90	28.60	22.96	-0.70	5.64
1957	28.30	27.88	22.44	0.42	5.44
1958	28.30	29.74	23.95	-1.44	5.79
1959	29.00	28.43	22.84	0.57	5.59
1960	29.00	29.21	23.62	-0.21	5.60
1961	28.90	30.42	24.51	-1.52	5.91
1962	30.00	29.48	23.82	0.52	5.65
1963	31.50	31.39	25.43	0.11	5.96
1964	33.50	32.53	26.66	0.97	5.87
1965	35.00	34.09	28.00	0.91	6.09
1966	37.40	36.95	30.03	0.45	6.91
1967	39.20	40.73	32.92	-1.53	7.81
1968	41.80	42.90	34.84	-1.10	8.06
1969	44.70	46.47	37.60	-1.77	8.87
1970	47.60	48.28	38.92	-0.68	9.36
1971	51.00	53.58	43.22	-2.58	10.36
1972	54.30	56.17	45.18	-1.87	11.00
1973	59.20	56.94	45.72	2.26	11.22
1974	64.50	65.58	52.54	-1.08	13.04
1975	71.00	71.02	57.26	-0.02	13.76
1976	77.70	78.14	62.37	-0.44	15.78
1977	84.30	83.84	67.77	0.46	16.07
1978	92.80	89.13	71.47	3.67	17.66
1979	101.80	95.70	76.75	6.10	18.95
1980	111.00	107.03	85.28	3.97	21.75

1/ Based on weighted average tax rate.

Table 3. United States: Actual and Predicted Values of Currency Holdings, 1930-80

(In billions of U.S. dollars)

Year	Currency			Differences	
	Actual	Predicted with tax 1/	Predicted without tax		
	C	$\hat{C}$	$\hat{\hat{C}}$	$C-\hat{C}$	$\hat{C}-\hat{\hat{C}}$
1929	3.64				
1930	3.37	3.76	3.82	-0.39	-0.06
1931	3.65	3.54	3.58	0.11	-0.04
1932	4.62	4.19	3.60	0.43	0.58
1933	4.76	4.54	4.06	0.22	0.49
1934	4.65	4.88	4.34	-0.23	0.54
1935	4.78	5.01	4.49	-0.23	0.52
1936	5.22	5.93	4.94	-0.71	0.99
1937	5.49	5.26	4.94	0.23	0.32
1938	5.42	5.49	5.36	-0.07	0.14
1939	6.01	5.86	5.40	0.15	0.46
1940	6.70	6.53	5.96	0.17	0.56
1941	8.20	8.01	6.49	0.19	1.53
1942	10.94	10.59	8.20	0.35	2.38
1943	15.81	15.43	12.55	0.38	2.88
1944	20.88	19.02	16.71	1.86	2.31
1945	25.10	24.94	21.51	0.16	3.43
1946	26.52	25.74	23.42	0.78	2.32
1947	26.60	27.73	24.20	-1.13	3.53
1948	26.00	23.75	22.25	2.25	1.51
1949	25.60	25.96	23.23	-0.36	2.73
1950	25.10	25.34	21.67	-0.24	3.67
1951	25.40	26.18	22.06	-0.78	4.12
1952	26.70	27.99	23.94	-1.29	4.05
1953	27.70	28.02	24.43	-0.32	3.59
1954	27.50	27.85	24.96	-0.35	2.89
1955	27.60	27.52	23.91	0.08	3.60
1956	27.90	28.58	24.80	-0.68	3.78
1957	28.30	27.79	24.24	0.51	3.55
1958	28.30	29.74	25.99	-1.44	3.74
1959	29.00	28.54	24.67	0.46	3.87
1960	29.00	29.18	25.51	-0.18	3.67
1961	28.90	30.61	26.52	-1.71	4.09
1962	30.00	29.47	25.63	0.53	3.84
1963	31.50	31.65	27.45	-0.15	4.20
1964	33.50	32.14	28.74	1.36	3.40
1965	35.00	34.31	30.25	0.69	4.06
1966	37.40	37.37	32.38	0.03	4.99
1967	39.20	41.08	34.49	-1.88	5.59
1968	41.80	44.20	37.42	-2.40	6.78
1969	44.70	46.89	40.26	-2.19	6.63
1970	47.60	47.03	41.63	0.57	5.40
1971	51.00	52.65	46.40	-1.65	6.25
1972	54.30	55.20	48.26	-0.90	6.94
1973	59.20	56.58	48.75	2.62	7.83
1974	64.50	65.55	56.31	-1.05	9.24
1975	71.00	70.39	61.80	0.61	8.59
1976	77.70	77.41	67.00	0.29	10.41
1977	84.30	84.42	72.88	-0.12	11.55
1978	92.80	89.63	76.77	3.17	12.86
1979	101.80	96.00	82.78	5.80	13.22
1980	111.00	108.85	92.49	2.15	16.35

1/ Based on average tax rate.

The yearly estimates of the underground economy are shown in Tables 4 and 5. These two tables again use the weighted average tax rate (Table 4) and the average tax rate (Table 5). The first column of these tables is equivalent to the last columns of Tables 2 and 3, which present the estimates of illegal money. By multiplying column 1 by column 3--which yields the income velocity of money--the estimates of the underground economy, as shown in column 4, are derived. These estimates are also given as proportions of GNP in column 5.

Table 4 shows that the underground economy grew from about $45 billion in 1970 to over $159 billion in 1980. The figure for 1976 is remarkably close to the well-known estimate by the Internal Revenue Service 1/ of $100 billion. Column 5 shows that, as a proportion of GNP, the underground economy exceeded 6 per cent in 1980. The estimate for 1974 ($71 billion) is in the range of the other direct estimate made by Simon and Witte (1980) of between $70 billion and $75 billion of income from legal sources (see Simon and Witte, 1980, p. 74). Perhaps even more significant is the fact that a clear upward trend is noticeable since the mid-1960s, when the underground economy averaged about 3.8 per cent of GNP. This trend, while not as dramatic as that reported by some news accounts or as estimated by Feige, is nevertheless very disturbing, especially as it seems to have accelerated in recent years. As a proportion of GNP, the underground economy reached its highest level in 1944, when it was close to 8 per cent. This is consistent with results reported by other researchers. 2/ From 1944 to the mid-1960s, the share of the underground economy in GNP fell by one half. Table 5 gives the same results but is calculated by using the average tax rate rather than the weighted average tax rate.

The results from Tables 4 and 5 are presented graphically in Figure 6, which shows that the estimates based on the average tax rate are somewhat lower than the others. In 1980 the two estimates varied by about 1 1/2 per cent of GNP. In general, the behavior of the two lines in Figure 6 is very similar, except that one is consistently above the other. The only period when the two lines diverge in behavior is during World War II. In fact while the use of the weighted average tax rate gives the highest figure for the underground economy in 1944, the use of the average tax rate gives the highest figure in 1942.

Tables 4 and 5 show also estimates of income tax evasion (column 6). For 1980, income tax evasion was estimated at about $15 billion in Table 4 and at about $11 billion in Table 5. These figures were derived by assuming that incomes in the underground economy would have been taxed

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1/ See Internal Revenue Service, Estimates of Income Unreported on Individual Income Tax Returns (Washington, D.C.: U.S. Government Printing Office, September 1979).

2/ See, for example, Cagan (1958) and Molefsky (1982).

Table 4. United States: Estimates of Underground Economy and Tax Evasion, 1930-80 1/

(In billions of U.S. dollars)

Year	Illegal Money (1)	Legal Money (2)	Income Velocity of Legal Money (3)	Underground Economy (4)	Underground Economy as Percentage of GNP (5)	Tax Evasion (6)
1930	0.15	24.93	3.63	0.55	0.61	0
1931	0.15	23.33	3.25	0.49	0.65	0
1932	0.77	19.48	2.98	2.28	3.93	0.01
1933	0.41	18.76	2.96	1.22	2.19	0.01
1934	0.88	20.46	3.18	2.81	4.32	0.02
1935	0.62	24.59	2.94	1.82	2.52	0.02
1936	0.84	28.16	2.93	2.47	2.99	0.04
1937	0.88	29.81	3.03	2.68	2.96	0.03
1938	0.39	29.34	2.89	1.13	1.33	0.01
1939	0.90	32.47	2.79	2.51	2.78	0.02
1940	0.89	37.77	2.64	2.35	2.35	0.03
1941	2.21	43.31	2.87	6.37	5.11	0.20
1942	2.41	50.40	3.13	7.54	4.78	0.42
1943	2.84	69.01	2.78	7.89	4.12	0.59
1944	5.97	74.98	2.80	16.74	7.96	1.29
1945	5.41	88.74	2.39	12.91	6.09	1.04
1946	4.54	101.46	2.05	9.32	4.47	0.72
1947	5.51	106.59	2.17	11.96	5.17	0.94
1948	5.68	106.32	2.42	13.75	5.34	0.82
1949	5.19	106.11	2.42	12.55	4.89	0.71
1950	5.51	108.59	2.62	14.44	5.07	0.93
1951	5.36	113.24	2.92	15.62	4.73	1.15
1952	6.20	118.90	2.92	18.12	5.22	1.45
1953	5.85	122.55	2.99	17.46	4.77	1.40
1954	5.73	124.07	2.95	16.92	4.62	1.23
1955	4.17	130.23	3.07	12.79	3.20	0.95
1956	5.64	130.36	3.23	18.19	4.32	1.42
1957	5.44	131.46	3.37	18.33	4.14	1.42
1958	5.79	132.61	3.39	19.59	4.36	1.50
1959	5.59	138.51	3.51	19.63	4.03	1.56
1960	5.60	137.20	3.69	20.64	4.08	1.61
1961	5.91	140.39	3.73	22.05	4.21	1.78
1962	5.65	144.15	3.91	22.11	3.92	1.80
1963	5.96	148.04	4.02	23.95	4.03	1.94
1964	5.87	153.63	4.14	24.30	3.82	1.80
1965	6.09	160.31	4.29	26.16	3.80	1.88
1966	6.91	168.79	4.46	30.85	4.10	2.30
1967	7.81	173.49	4.59	35.85	4.50	2.83
1968	8.06	186.34	4.66	37.55	4.32	3.31
1969	8.87	197.93	4.73	41.93	4.48	3.88
1970	9.36	204.24	4.81	45.01	4.58	3.84
1971	10.36	219.44	4.85	50.22	4.72	4.03
1972	11.00	232.20	5.04	55.45	4.74	4.42
1973	11.22	252.68	5.25	58.88	4.44	4.79
1974	13.04	264.46	5.42	70.72	4.93	6.10
1975	13.76	277.14	5.59	76.92	4.97	6.19
1976	15.78	287.52	5.98	94.26	5.49	7.73
1977	16.07	309.63	6.19	99.56	5.19	8.23
1978	17.66	335.04	6.44	113.62	5.27	9.84
1979	18.95	351.05	6.88	130.29	5.40	11.51
1980	21.75	358.55	7.32	159.31	6.07	15.01

1/ Based on weighted average tax rate.

FIGURE 6

SIZE OF THE UNDERGROUND ECONOMY
UNDER ALTERNATIVE AVERAGE TAX RATE

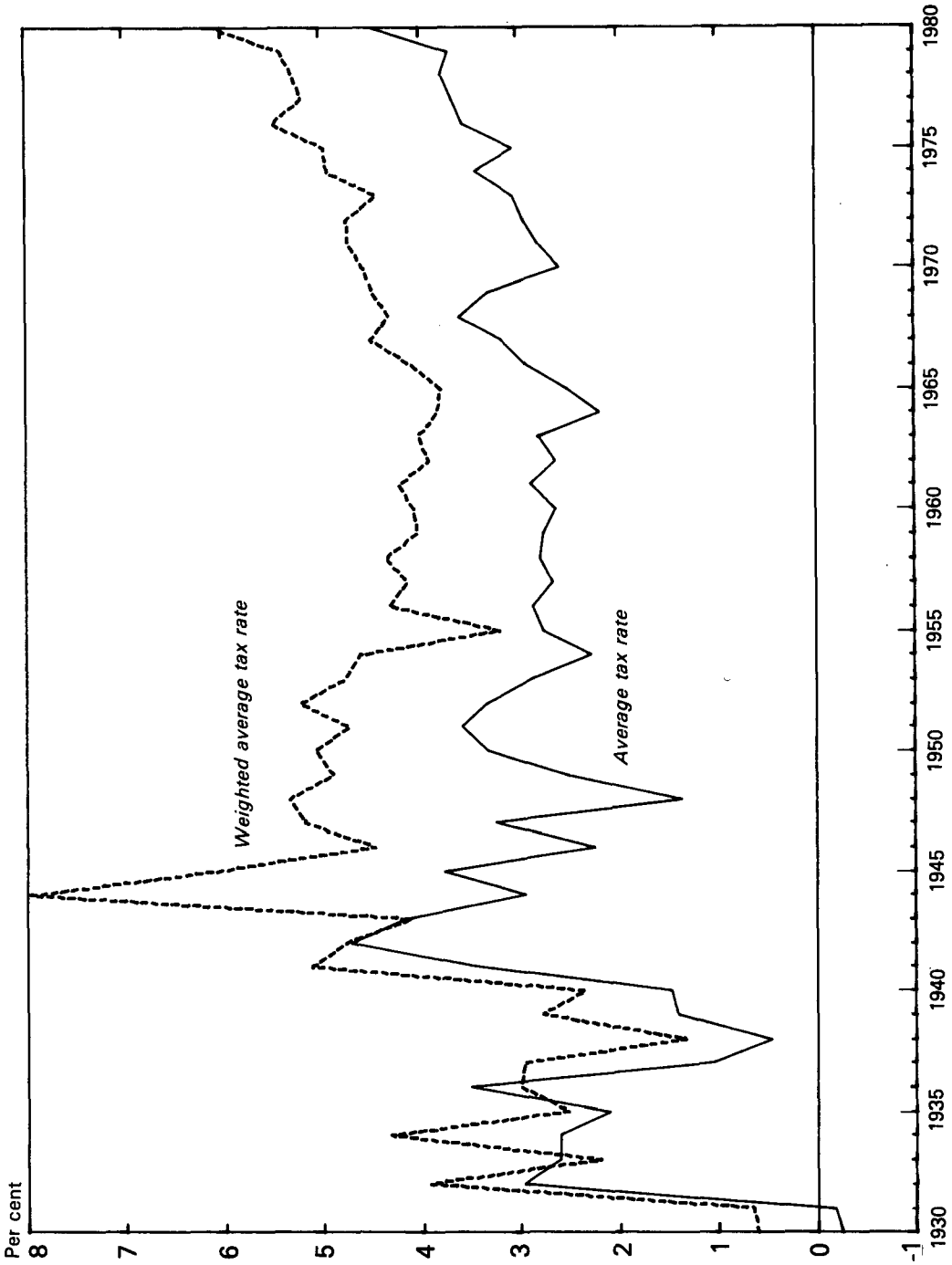

Table 5. United States: Estimates of Underground Economy and Tax Evasion, 1930-80 1/

(In billions of U.S. dollars)

Year	Illegal Money (1)	Legal Money (2)	Income Velocity of Legal Money (3)	Underground Economy (4)	Underground Economy as Percentage of GNP (5)	Tax Evasion (6)
1930	-0.06	25.14	3.60	-0.22	-0.25	0
1931	-0.04	23.52	3.22	-0.13	-0.18	0
1932	0.58	19.67	2.95	1.73	2.97	0.01
1933	0.49	18.68	2.98	1.45	2.61	0.01
1934	0.54	20.80	3.13	1.69	2.60	0.01
1935	0.52	24.69	2.92	1.52	2.10	0.01
1936	0.99	28.01	2.95	2.91	3.52	0.04
1937	0.32	30.37	2.98	0.95	1.05	0.01
1938	0.14	29.59	2.86	0.39	0.46	0
1939	0.46	32.91	2.75	1.28	1.41	0.01
1940	0.56	38.10	2.62	1.47	1.47	0.02
1941	1.53	43.99	2.83	4.32	3.47	0.13
1942	2.38	50.43	3.13	7.46	4.73	0.42
1943	2.88	68.97	2.78	7.99	4.17	0.60
1944	2.31	78.64	2.67	6.17	2.94	0.48
1945	3.43	90.72	2.34	8.01	3.78	0.64
1946	2.32	103.68	2.01	4.67	2.24	0.36
1947	3.53	108.57	2.13	7.52	3.25	0.59
1948	1.51	110.49	2.33	3.51	1.36	0.21
1949	2.73	108.57	2.36	6.46	2.52	0.37
1950	3.67	110.43	2.58	9.47	3.32	0.61
1951	4.12	114.48	2.88	11.89	3.60	0.87
1952	4.05	121.05	2.87	11.62	3.35	0.93
1953	3.59	124.81	2.93	10.52	2.87	0.85
1954	2.89	126.91	2.89	8.33	2.28	0.61
1955	3.60	130.80	3.05	11.00	2.75	0.82
1956	3.78	132.22	3.18	12.03	2.86	0.94
1957	3.55	133.35	3.32	11.79	2.66	0.92
1958	3.74	134.66	3.33	12.48	2.78	0.95
1959	3.87	140.23	3.47	13.43	2.76	1.07
1960	3.67	139.13	3.64	13.33	2.63	1.04
1961	4.09	142.21	3.68	15.06	2.88	1.22
1962	3.84	145.96	3.86	14.84	2.63	1.21
1963	4.20	149.80	3.97	16.67	2.80	1.35
1964	3.40	156.10	4.07	13.85	2.18	1.03
1965	4.06	162.34	4.24	17.22	2.50	1.24
1966	4.99	170.71	4.41	22.00	2.92	1.64
1967	5.59	175.71	4.53	25.33	3.18	2.00
1968	6.78	187.62	4.63	31.38	3.61	2.77
1969	6.63	200.17	4.67	30.98	3.31	2.87
1970	5.40	208.20	4.72	25.47	2.59	2.17
1971	6.25	223.55	4.76	29.73	2.80	2.38
1972	6.94	236.26	4.96	34.42	2.94	2.74
1973	7.83	256.07	5.18	40.56	3.06	3.30
1974	9.24	268.26	5.35	49.38	3.44	4.26
1975	8.59	282.31	5.49	47.16	3.04	3.79
1976	10.41	292.89	5.87	61.08	3.56	5.01
1977	11.55	314.15	6.11	70.50	3.68	5.83
1978	12.86	339.84	6.34	81.59	3.78	7.07
1979	13.22	356.78	6.77	89.44	3.71	7.90
1980	16.35	363.95	7.22	117.99	4.49	11.12

1/ Based on average tax rate.

at the same average rate as incomes in the regular economy. This is, of course, a strong assumption. If incomes in the underground economy would have been marginal incomes and would thus have been taxed at marginal tax rates, the estimates of tax evasion would have been much higher. This is undoubtedly true for many providers of underground services. They may hold regular jobs, on which they pay normal taxes, and may provide underground services during weekends or evenings. Therefore, if they had declared these additional incomes, they would have paid higher taxes than they actually paid on their reported incomes. However, many of the actors in underground economic activities may not declare any income at all, and some (for example, illegal aliens) might pay taxes lower than the average. Furthermore, some of these activities might not take place at all if they could be controlled and taxed. In conclusion, without ascertaining each activity and determining whether the activity would exist if it had to move above ground, it is impossible to establish what the precise loss in tax revenue from the underground activities would be. Therefore, the assumption made probably yields the most reasonable estimates that can be made in view of the information available. 1/

IV. Concluding Remarks

In the present article, yearly estimates for the underground economy for the 1930-80 period have been calculated. The main conclusions can be summarized as follows: (a) in 1980 the underground economy, expressed as a percentage of GNP, was somewhere between 4.5 per cent and 6.1 per cent; (b) the only other period in which it may have been higher than that was during World War II; (c) it has been increasing since the mid-1960s; and (d) over the 1965-80 period, it has grown by over 2 percentage points of GNP or by almost 50 per cent. The recent trend is disturbing as it seems to have accelerated in recent years, especially since the mid-1970s. This trend was probably influenced by the substantial increase in marginal tax rates over the 1975-80 period, caused by inflation and the absence of significant tax cuts. 2/ It is not possible at this point to speculate on whether the tax cuts enacted in 1981 have reversed the trend.

1/ It should be pointed out that these estimates of tax evasion relate only to tax evasion associated with currency use and underground activities. But, obviously, there are many forms of tax evasion (claiming nonexistent exemptions, exaggerating deductions, nonreporting of interest income received, and so forth) that have nothing to do with currency usage or underground economic activities. Thus, these estimates do not measure total tax evasion.

2/ For a recent paper on the relation between high marginal tax rates and tax evasion, see Clotfelter (1983).

The results obtained in this paper cannot be taken as precise measures of the underground economy; they are, at best, broad indications of trends and of orders of magnitude because they are sensitive to the assumptions made as well as to data revisions. However, it is comforting to realize that for 1976 and 1974 they are of the same order of magnitude as direct estimates made by the Internal Revenue Service (1979) and by Simon and Witte (1980).

Perhaps a word on what has been measured here is necessary. The estimates attempt to measure the incomes that were generated through the excessive use of currency and that presumably were not reported to the tax authorities. Whether these incomes were or were not measured by the national accounts authorities cannot be determined. Presumably, part of these incomes not only evaded the tax net but may also have escaped the attention of the national accounts authorities--but, how large this part was cannot be assessed with the information at hand. It should also be emphasized that this measure of the underground economy does not measure illegal "incomes." But, as noted above, if illegal "incomes" were discovered they would vanish and the "legal" incomes that would be generated by the resources so released would probably be very small. 1/ It is then not clear to what extent those illegal incomes represent a loss to the tax authorities or whether they should be measured in the national accounts.

1/ For example, a drug smuggler who makes a large gain from his illegal activity would see his "income" dramatically reduced if (a) he were caught and forced to get a legal job, (b) if he gave up his activity because of improved law enforcement, or (c) if drug consumption were legalized. Therefore these illegal "incomes" are totally arbitrary ones. In the author's view it makes no sense to include them in a definition of underground economy that emphasizes either potentially recoverable tax revenue or the use of resources for activities that should be measured by the national accounts.

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