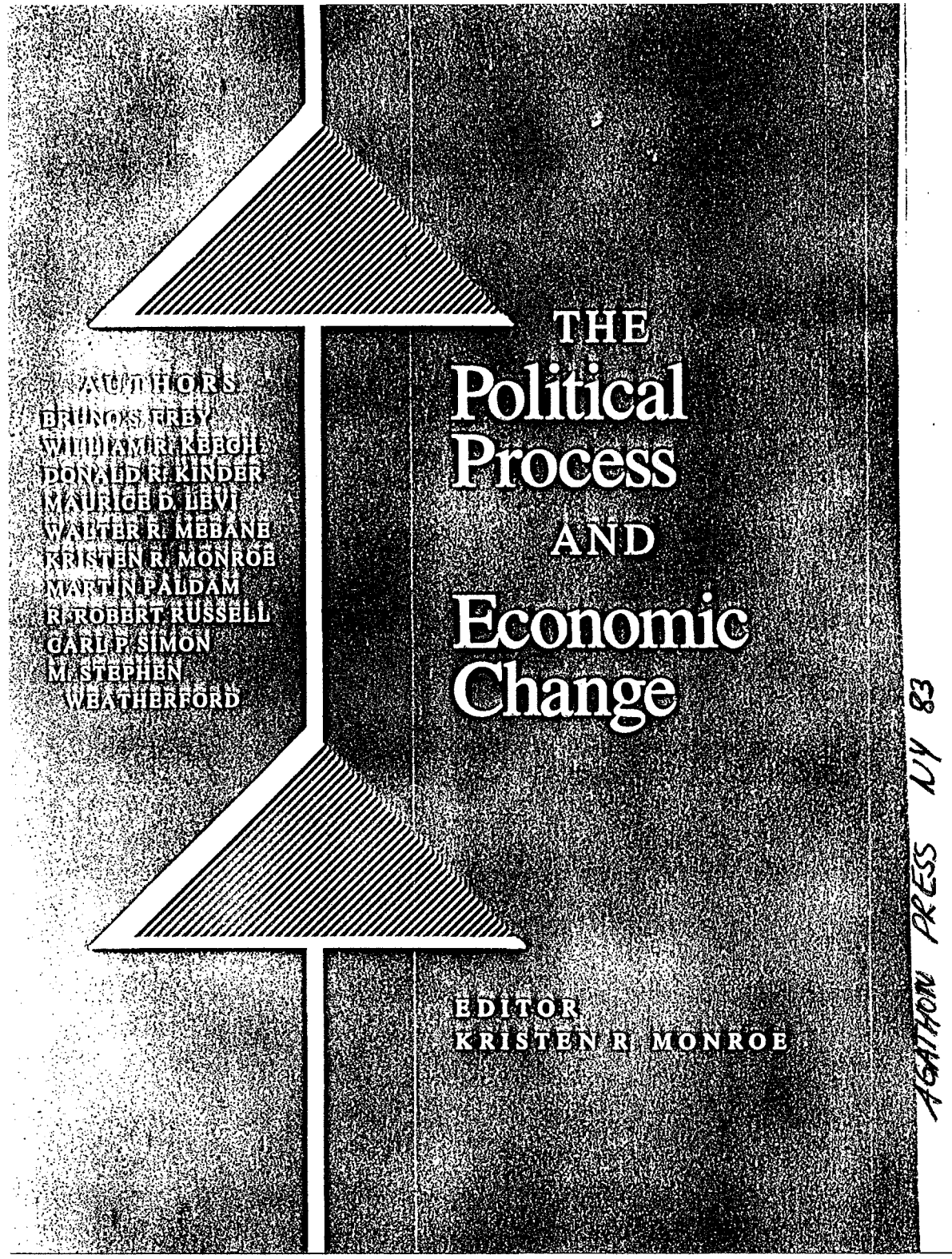

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2: Politics, Economics, and the Underground Economy

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WHY CONSTRUCT POLITICO-ECONOMIC MODELS?

Over the last few years many countries have paid increasing attention to the so-called "underground" or "hidden" economy. The expansion of the underground economy is commonly attributed to an increasing tax burden, which induces people to leave the official economy and take up work in the untaxed underground economy.[1] Another relationship which has attracted great attention in the atmosphere of tax revolt in the United States and some other countries is the so-called *Laffer curve*,[2] which suggests that a decrease in the tax rate leads to an increase in tax receipts because at lower tax rates people are motivated to work and invest more, thus raising the tax base.

Both the underground economy and the Laffer curve are important parts of politico-economic interaction. Indeed, the interrelationships between the economic and political sectors of society can more adequately be dealt with if the underground economy is integrated into politico-eco-

nomic analysis. Politico-economic models[3] composed of the private and government sectors have so far failed to do this. There have been only a few attempts to take into account additional sectors, such as defense,[4] the central bank,[5] and the labor market.[6]

In this chapter, a four-sector model of political economy is developed consisting of (1) the official private economy, (2) the underground economy, and the public sector, which is split into (3) a political (government) sector and (4) an administrative bureaucratic sector. The government sector depends on the political support of other sectors—in particular, the voters. The bureaucratic sector, on the other hand, does not need to be reelected, but it depends on the tax receipts extracted from the official private economy.

The integration of the underground economy and the stress on taxation lead to a shift in emphasis from business cycle movements to allocation and distribution.[7] The model considered here studies in what sectors goods are produced and for what purposes the inputs are used. It deals in particular with the allocation of the work force between the private and the public sectors, and between the official and the underground private economies.

This study has a threefold aim: (1) to develop an outline of the theoretical relationships among the four sectors identified, (2) to introduce the available empirical evidence referring to these relationships, and (3) to show how the econometric estimation of such central aspects as the vote and popularity functions, the size of the underground economy, and the Laffer curve can be improved using the theoretical model developed.

First, we deal with the three kinds of actors (government, public bureaucracy, and private individuals) in the four sectors of society. They are all assumed to maximize their utility, subject to specific constraints, by using the instruments available to them. It turns out that the behavior of individuals in the private sector (their decisions to support the government or the opposition, and to work in the official or the underground economy) can be modeled without any major problems. Much more difficult is capturing the behavior of the aggregate entities called "the government" and the "public bureaucracy."

In order to derive results relevant for the estimation problems considered here, specific behavioral assumptions are made that serve to describe

the government's and the bureaucracy's actions in a particular historical period and country, and with respect to a particular problem. These "scenarios" make it possible to informally derive policy functions that are of crucial importance for econometric testing.

Next, the theoretical model is used to suggest how to improve the estimation of vote and popularity functions, the size of the underground economy, and the Laffer curve. Finally, some concluding remarks are offered.

THE POLITICAL SECTOR: GOVERNMENT

The government is taken to be a homogeneous actor. Previous politico-economic models of representative democracies (Frey and Schneider 1978a, b) have assumed that government gains utility from putting its ideological goals into action. The main constraint on its actions is the need to receive sufficient political support. Because of the complexity of the task and limited knowledge, the government is not supposed to perform a formal maximization of its utility subject to the political support constraint, but rather to grope toward a sufficing solution, concentrating on whether its prospects of staying in power are good or not and how close the next election is. In a representative democracy, the government can usually stay in office if it receives a sufficient share of votes at election time. (Government popularity serves as a convenient indicator of reelection prospects in the period between elections.) Although necessary for political survival, an election victory is not a sufficient condition for retaining power because major interest groups may force a government to resign between elections. One of the most important of these interest groups is the public bureaucracy, on whose support the government depends for a great many reasons, not the least of which is that the government is unable to act if its bureaucracy refuses to collaborate.

Thus the overall support enjoyed by the government depends on its popularity with the public and its acceptance by the government bureaucracy. The government's support from the population at large is

influenced by the following factors:

1. The size of the groups supporting it. The number of workers in the private economy,[8] L_p, is the sum of the official, L_o, and the underground, L_u, work force:

$$L_p = L_o + L_u \tag{1}$$

   The other group distinguished here, the public bureaucrats, number B. Thus we have

$$L = L_p + B \tag{2}$$

   where L is the total labor force (and population) that is exogenously given.
2. The political participation rates π_p and π_B, respectively.
3. The probability that a randomly chosen person supports the government, σ_p and σ_B, for the populace and the bureaucrats, respectively.

Thus the total support received by the government is

$$S = \frac{L_p}{L} \cdot \pi_p \cdot \sigma_p + \frac{B}{L} \cdot \pi_B \cdot \sigma_B \tag{3}$$

There is considerable empirical evidence on the relative size of the two groups' political participation and support propensity. A wealth of data[9] strongly suggests that public bureaucrats have a considerably higher voting participation than other groups in society ($\pi_B > \pi_p$).[10] Wolfinger and Rosenstone (1980) find, for example, that in the 1974 U.S. national elections, state public employees' voting participation was 13 percentage points, and local public employees' participation was 17 percentage points *higher* than that of the rest of the population, with all other influences kept constant.[11]

There is also evidence that bureaucrats more often make their influence felt on government beyond the simple act of voting. This is to be expected because they often have superior information and knowledge, which gives them a relative advantage in using other avenues of influence. Several studies (e.g., see Rubinfeld, 1977; Courant, Gramlich, and Rubinfeld, 1979) also indicate that bureaucratic voters' revealed preferences are different from those of the rest of the population. In particular, bureaucrats favor higher public expenditures, which suggests that they

consistently differ from the general populace in their evaluation of the government's actions, and therefore in their support ($\sigma_B \neq \sigma_p$). The government's need to cover its expenditures by tax receipts will be discussed in the next section.

THE ADMINISTRATIVE SECTOR: PUBLIC BUREAUCRACY

The utility of the people who work in the bureaucracy and of a homogeneous bureaucracy as a whole is assumed to depend on bureaucrats' income and "power." No definition of power will be attempted here: suffice it to note that power has both an internal and an external aspect. The larger a public bureaucracy is in terms of the number of people it employs (B), the better are an individual bureaucrat's chances of rising in the hierarchy, and therefore of gaining influence.[12] The external aspect relates to the domain of bureaucratic influence, which is the official private economy (and the bureaucratic sector itself). The greater the share of the population active in the underground economy (L_u/L), the smaller the bureaucrats' influence because this sector is, by definition, outside their control.[13] This is one reason that bureaucrats abhor the unofficial economy. Another is that they are convinced that "laws must be obeyed."

Bureaucratic support of the government, then, tends to increase the larger the wage rate of the bureaucrats, w_B, the larger the number of bureaucrats, B, and the smaller the relative size of the uncontrolled underground sector, L_u/L:

$$\sigma_B = \sigma_B\left(w_B;\ B,\ \frac{L_u}{L}\right) \tag{4}$$

with

$$\frac{\partial \sigma_B}{\partial w_B} > 0, \quad \frac{\partial \sigma_B}{\partial B} > 0, \quad \frac{\partial \sigma_B}{\partial (L_u/L)} < 0$$

The main constraint on the bureaucracy's actions is the need to finance the expenditures to pay for its members (bureaucratic wage sum):

$$W_B = w_B \cdot B \tag{5}$$

Since bureaucratic wages are not set according to competitive conditions, it is possible that they are higher than wages for similar work in the official economy ($w_B > w_o^B$).[14] Bureaucrats are able to achieve this advantage by restricting entry into the bureaucratic sector (the number of bureaucrats, B, is used as an instrument).

Tax income, T, is not only used by the bureaucracy to cover its wage bill but also by government to finance its expenditures for public goods:

$$T = W_B + G \tag{6}$$

In this simple model, G is assumed to be given.[15] Neither politicians nor bureaucrats can determine tax income, only tax rates.

PRIVATE ECONOMIES: OFFICIAL AND UNDERGROUND

The utility of the individuals in the private economy is derived from their command over (1) private goods (per capita or net wage rate) disposable in both the official (w_o^n) and the underground economy (w_u^n), and (2) publicly supplied (indivisible) goods, G. Thus, the higher the per capita incomes in the two sectors and the larger the supply of public goods, the greater the support for government:

$$\sigma_p = \sigma_p(w_o^n, w_u^n; G) \tag{7}$$

all derivatives being positive.[16]

The Official Private Economy

Disposable income in the regular nonpublic sector is defined by

$$w_o^n = (1 - \tau)w_o \tag{8}$$

where $0 \leq \tau \leq 1$ is the (average and marginal) tax rate (minus the rate of transfers). The gross wage rate, w_o, is assumed to depend on marginal (labor) productivity in the official private economy:

$$w_o = P_o' \tag{9}$$

Both average (P_o) and marginal productivity (P_o') depend on the number of workers in the official economy (L_o) and the amount of regulation

(R):

$$P_o = P_o(L_o, R) \tag{10}$$

with

$$\partial P_o / \partial L_o < 0$$

Although an increase in regulation may increase or decrease productivity ($\partial P_o / \partial R \gtrless 0$), recent American research suggests that under present conditions, productivity is negatively affected by government regulations for the following reasons:

1. Government regulations hamper technical progress because an increasing share of expenditures for research and development is siphoned off to meet safety and environmental standards.[17] Denison (1979a, b) suggests that the average annual impact of environmental regulations imposed after 1967 on the rate of productivity growth was −0.05% in 1967–1969, −0.1% in 1969–1973, −0.22% in 1973–1975, and −0.08% in 1975–1978. Christainsen and Haveman (1981) have found that federal regulations were responsible for between 12 and 21% of the slowdown in the growth of labor productivity in U.S. manufacturing during 1973–1977 as compared to 1958–1965.

2. Government regulations lead to inefficiencies in sectoral allocations (e.g., see Posner, 1975, or Hamer, 1979).

3. The whole private official economy is strongly burdened. According to a well-known estimate by Weidenbaum (1979), the direct and indirect costs of federal regulations alone in the United States amounted to 3.6% of the gross national product (GNP) in 1976; another estimate (Downing and Lawson, 1979) that included state regulations concluded that the figure was 9.4% of the GNP for the same year. One hastens to add that these studies look only at the costs imposed by government regulations; if the benefit side had also been considered, the overall effect might well have been positive.[18]

The issue of whether government regulations in effect today benefit or hamper productivity in the official private economy is thus unresolved; the answer depends on the specific conditions of the country and the period examined. Following the bulk of contemporary American studies,

we will assume here that the overall effect of such regulation is negative, $\partial P_o/\partial R < 0$.

The Underground Economy

The "hidden" or "underground" sector is that part of the private economy that evades taxation and regulation.[19] Since both tax evasion and disregard of regulations are prohibited, those who choose to be active in the underground economy have to take into account the expected costs of being caught. In analogy to the burden of taxation (tax rate), the expected cost is formulated as a rate per dollar earned in the unofficial economy, c. The net wage rate in the hidden economy is

$$w_u^n = (1 - c)w_u \tag{11}$$

with $0 \leq c \leq 1$.

The expected cost, c, is the probability of being detected multiplied by the effective size of the punishment. Cross-section and time-series studies of the economics of crime provide ample evidence that an increase in expected punishment has a deterrent effect on (potential) offenders,[20] that is, it is indeed perceived as a reduction in the (expected) returns (wage rate) of working in the irregular sector. Here, the expected cost of punishment is treated as if it were an implicit tax on activities in the underground economy.

Work in the hidden economy is probably quite close to the economists' model of perfect competition: there is free entry (except possibly into activities that are criminal in and of themselves, e.g., heroin dealing) and there are no governmental restrictions or levies. It therefore can be assumed that the gross wage rate equals marginal productivity:

$$w_u = P_u' \tag{12}$$

Marginal (P_u') and average productivity (P_u) depend only on the number of people employed:

$$P_u = P_u(L_u) \tag{13}$$

with

$$\partial P_u/\partial L_u < 0$$

It is theoretically uncertain whether productivity is higher or lower in the underground economy as compared to the private official economy. On the other hand, since there is no intervention or regulation by

government—for example, no health provisions and no restrictions on hiring and firing[21]—one would expect that $P_u > P_o$. On the other hand, there are the costs of producing clandestinely and evading detection and punishment by the public authorities. Moreover, no legally enforceable contracts are possible, and it is likely that private enforcement (of the Mafia type) leads to considerable cost. These factors suggest a lower productivity in the underground economy ($P_u < P_o$).

The Distribution of Labor

People are assumed to (marginally) choose to work in the official economy or in the hidden private economy according to where the net wage rate is higher. An equilibrium distribution of labor is reached when the net wage rates are equalized:

$$w_o^n = w_u^n \tag{14}$$

Combining Eqs. (9)–(14) yields

$$(1 - \tau) \cdot P_o(L_o, R) = (1 - c) \cdot P_u(L_u) \tag{15}$$

This equation is very useful for purposes of estimation. If one of the five explanatory variables is unknown, it may, under appropriate data conditions, be inferred from the other variables by one of the following methods:

1. If the instruments τ, c, R and labor productivity, P_o, in the official private economy are known (which may well be the case), it is possible to compute productivity in the underground economy, P_u.
2. If the instruments τ and c as well as the two labor productivities, P_o and P_u, are known, it is possible to estimate the output side of regulation, R (compared to the input side).
3. If the instruments τ and R as well as the two labor productivities, P_o and P_u, are known, the expected cost of punishment, c, may be inferred.

Equation (15) is graphically illustrated in Fig. 1, which shows how the equality of net wage rates determines the distribution of labor between the official and underground sectors, and how changes in the tax rate, regulation, and expected costs affect the outcome.

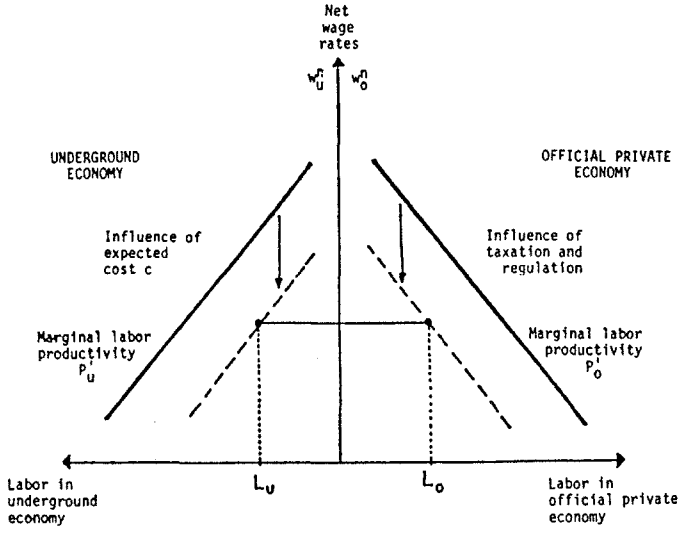

FIG. 1. Determination of the distribution of labor between the official and underground sectors.

Equation (15) may be transformed into

$$\frac{L_u}{L_o} = \phi(\tau, R, c) \tag{16}$$

with

$$\frac{\partial \phi}{\partial \tau} > 0, \quad \frac{\partial \phi}{\partial R} \gtrless 0, \quad \frac{\partial \phi}{\partial c} < 0$$

The higher the rate of taxation and the intensity of regulation (assuming that $\partial P_o/\partial R < 0$), and the lower the expected cost imposed by the authorities for illegal work, the higher the number of workers in the underground as compared to the official private economy.

CLOSING THE MODEL

In our four-sector politico-economic model, labor is the only scarce resource, being constrained by the total labor force, L. Total labor is

distributed among the private official and underground economies and the bureaucratic sector.[22]

Combining Eqs. (1), (2), and (16) leads to

$$L_o = L_o(\tau, R, c; B) \tag{17}$$

Occupation in the private official economy is determined by the instruments given at the right-hand side of (17): the higher the tax rate and the intensity of regulation, the lower the expected costs of working in the underground economy; and the higher the number of employees in the public bureaucracy, B, the lower the number of workers (or hours worked) in the private official economy.

The relevant taxes are imposed only on the private official economy; they are the financial counterpart of the goods and services that the public sector (bureaucracy) needs in order to function. The tax base thus consists of the total output, X_o, and therefore, the total wage income, in the private official sector:

$$T = \tau \cdot X_o \tag{18}$$

Private official output is defined as

$$X_o = P_o \cdot L_o \tag{19}$$

which, taking into account Eqs. (10) and (17), is equal to

$$X_o = X_o(\tau, R, c; B) \tag{20}$$

with

$$\frac{\partial X_o}{\partial \tau} < 0, \frac{\partial X_o}{\partial R} < 0 \quad \text{given } \frac{\partial P_o}{\partial R} < 0$$

$$\frac{\partial X_o}{\partial c} > 0, \frac{\partial X_o}{\partial B} < 0$$

Combining Eqs. (18) and (20) yields

$$T = T(\tau, R, c; B) \tag{21}$$

An increase in the tax rates, of course, does not necessarily result in an increase in tax receipts ($\partial T/\partial \tau \gtreqless 0$), because the fall in the tax base (if $\partial X_o/\partial \tau < 0$) can negate any positive effects of an increase in rates. An increase in regulation causes tax receipts to fall ($\partial T/\partial R < 0$) if the regulation affects productivity negatively ($\partial P_o/\partial R < 0$). The higher the expected costs of working in the underground economy, the higher

the tax receipts will be ($\partial T/\partial c > 0$). An increase in the number of bureaucrats depresses tax receipts ($\partial T/\partial B < 0$) because fewer people are available for work in the private economy.

GOVERNMENT SUPPORT FUNCTION

This and the next two sections of this chapter discuss how the theoretical model developed can be used to improve the econometric (politometric) estimation of some central topics in political economy.

The government support function has often been estimated in the form of vote and popularity functions. There now exists a great many estimates for different countries and periods (for surveys, see, e.g., Monroe, 1979; Paldam, 1981; and for examples, see the studies contained in Whiteley, 1980, or in Hibbs and Fassbender, 1981). Most approaches use all or part of the main macroeconomic measures of the state of the economy; that is, the unemployment and inflation rates, and the growth of real disposable per capita income. Only a few studies, for example, that of Schneider and Pommerehne (1980), explicitly consider the effect of taxes and/or public expenditures on government support.

The theoretical model developed here suggests two major extensions of the empirical estimation of support functions:

1. It may be worthwhile to differentiate between (at least) two groups of supporters, the general population and the bureaucrats, because they are likely to differ strongly from each other.
2. In addition to income gained in the official sector, that is, income that is reported in official statistics, income received from underground activities[23] should also be taken into account, as shown in Eq. (7). Including income not reported to tax and statistical offices may be of great relevance. Feige (1979), for example, estimates that while the official economy grew by 23% over the 2-year period 1976–1978, the underground economy grew by 91% in terms of (nominal) GNP. If the growth of irregular income[24] is indeed sizable, its inclusion in a support function is required to correctly specify that function and to avoid biased estimates of the influence of *all* explanatory variables.

ESTIMATING THE SIZE OF THE UNDERGROUND ECONOMY

The Present State

There are at least five distinct approaches to measuring the size of the underground economy that go beyond pure speculation and guesstimates[25]:

1. Surveys based on samples of voluntary replies of individuals who are directly or indirectly asked to reveal their participation in the hidden sector.
2. Tax auditing and other compliance methods that force individuals to state their overall income.
3. The discrepancy between income (which is measured mainly from tax statistics) and expenditures (if they are independently measured). This method can be used at both the individual and the national levels.
4. The difference between the officially measured and the actual participation rates.
5. The observed additional demand for currency and/or money beyond that needed to fuel the official economy.

Each of these approaches yields quite different results, which is not surprising since each includes different aspects and sections of the overall underground economy.[26] However, even when the same approach is applied to the same country and period, estimates can differ strongly. For the United States, for example, the tax auditing method suggests that the underground sector is rather small, but while the OECD (1981) estimated it was around 1.5% of the official GNP in the 1970s, the U.S. Internal Revenue Service (1980) reported it was between 5.9% and 7.9% of the GNP in 1976. The initial discrepancy approach yielded a share of 9.4% of the GNP in 1948, which decreased to 4.0% in 1977 (Park, 1979). The currency demand deposit ratio approach, which assumes that all underground activities are undertaken in cash, gave a "conservative" estimate of 10% of the official GNP for 1976, and a more "realistic" estimate of 13–14 for both 1976 and 1979 (Gutmann, 1977, 1979b). The effect attributed to taxation alone was estimated to be an underground economy of 8.1–11.7% of the GNP for 1976 (Tanzi, 1980). When the "excess"

demand for money was taken as an indicator of the underground economy, its size was estimated to be as large as 33% of the GNP in 1979 (Feige, 1979), which was later modified downward to 27% by the same author (Feige, 1980).

Using the stated approaches, the following estimates of the size of the underground economy in terms of official GNP were reached for other countries (around 1978): Canada, 3–12%, United Kingdom, 7%; Sweden, 7–17%; Norway, 6–16%; Federal Republic of Germany, 6–13%; Spain, 23%; and Italy, 30% (see Frey and Pommerehne, 1982b).

Most of these studies (and others) do not explicitly consider the *causes* leading to an underground economy (e.g., see Gutmann 1977, 1979b). Only a few authors have made an effort to at least quantify the influence of *one* causal variable, taxation, mainly in the context of the "excess" currency approach. It turns out that the influence of tax rate increases on the demand for currency (which should be positive because people are driven underground where they need more cash for payments) is rather unstable (Tanzi, 1980), and may produce statistically significant wrong signs (Klovland, 1980). Similar problems were encountered by Feige (1980) when he tried to relate taxation to the size of his estimate of the hidden economy.

The wide variance in results of the five approaches to measuring the underground economy and the instability and wrong signs that appear when the influence of taxation is taken into account suggest that the functions used to estimate the size of the underground economy are badly specified and that, indeed, *a theoretical basis is lacking.*

Approach Suggested by Our Model

The theoretical model of politico-economic interdependence that we have developed points to two aspects that should be taken into account when estimating the size of the hidden economy:

1. The existence of an underground economy is due to *various important determinants.* Besides taxation, we have identified the extent and intensity of regulation of the official economy, and the effort of public agencies to punish working in the illegal economy. Using Eq. (16),

$$\frac{L_u}{L_o} = \phi(\tau, R, c) \tag{16}$$

and taking account of the definition of output in the underground economy,

$$X_u = P_u \cdot L_u \tag{22}$$

as well as of Eq. (20), the relationship of underground to official income follows immediately:

$$\frac{X_u}{X_o} = \Psi(\tau, R, c) \tag{23}$$

It is expected that $\partial\Psi/\partial\tau > 0$, $\partial\Psi/\partial R > 0$, and $\partial\Psi/\partial c < 0$. It should be remembered that Eq. (16) and, therefore, Eq. (23) are derived from an equilibrium relationship, and that at a given point in time the net wage rates w_u^n and w_o^n may be unequal, and that a *movement* of labor between the two sectors may take place. This may be accounted for by explicitly modeling an adjustment process to the distribution of labor desired by the individuals. The desired (equilibrium) relationships shown in Eqs. (16) and (23) may be estimated by using four different approaches:

(i) The distribution of labor (L_u/L_o) can be evaluated on the basis of surveys or the analysis of official and actual participation rates. The size of the underground economy compared to the official GNP (X_u/X_o) may then be derived by estimating the productivity functions:

$$P_o = P_o(L_o, R) \tag{10}$$

$$P_u = P_u(L_u) \tag{13}$$

(ii) The use of currency, the total supply of money, the decline in the official participation rate, and the fall in working hours can be taken as (partial) indicators of the existence and development of the underground economy. It is of the utmost importance to take into account *only that part* of the change in these indicators, I, that can be attributed to the underground economy (e.g., working hours also tend to fall because people want more leisure). Therefore it is necessary to separate the two influences by estimating the equation

$$I = I\Big(\underbrace{\tau, R, c}_{\text{due to the underground economy}}; \text{other determinants}\Big) \tag{24}$$

(iii) If the relative size of the underground economy (X_u/X_o) is considered unmeasurable even by indirect indicators, yet another proce-

dure may be envisaged. The *weights* attached to the causal factors (τ, R, c) may be introduced on the basis of outside information, and the change in the size of the hidden economy over time or across regions may then be derived:

$$\frac{X_u}{X_o} = \alpha_1\tau + \alpha_2 R - \alpha_3 c \tag{25}$$

If no reliable outside information on the size of the weights (α_1, α_2, α_3) is available, one may use "unit weighting"; that is, one may attribute the same influence to each (suitably normalized) factor. This procedure[27] may seem naive, but empirical research has shown that it yields quite good *ex ante* forecasts, under appropriate conditions.[28]

(iv) Approaches (ii) and (iii) may be combined. The fall in the participation rate and in working hours and the increased use of currency (compared to "normal use") may be taken as indicators of the *effect* of the unobserved variable underground economy, and the (suitably normalized) variables (τ, R, c) may be taken as the *causes*. This approach yields the equations

$$\begin{array}{l} \tau \\ R \\ c \end{array} \longrightarrow \left(\frac{X_u}{X_o}\right) \longrightarrow \begin{array}{l} \text{fall in participation rate} \\ \text{fall in working hours} \\ \text{increased use of currency} \end{array} \tag{26}$$

This set of equations may be estimated by econometric methods developed for the analysis of unobserved variables.[29]

2. The theoretical model also suggests that the *interdependence* among the various sectors must be taken into account. This interdependence has been completely neglected by all approaches so far. In particular, in addition to the "causal" equations (16) and/or (20), the *reaction* of the political and administrative sectors to the existence and expansion of an underground economy must be introduced. As has been pointed out, it is quite difficult to derive a behavioral equation for government and bureaucracy that would be specific enough for the problem considered here. For that reason, we will develop two behavioral scenarios which show both the estimation problems created by interdependence and the difficulties arising for the statistical identification of the relationships.

SCENARIO A The government notices that its support from the bureaucracy is falling (Eq. 3). It attributes the bureaucrats' dissatisfaction to the fact that their power declines as people shift to the underground sector (Eq. 4). In order to restore its bureaucratic support to the level needed for reelection, the government decides to attack the underground economy by increasing controls and the severity of punishment for illegal work. The government's policy function is

$$c = c\left(\frac{L_u}{L_o}\right), \qquad c' > 0 \tag{27}$$

The empirically observed relationship between the expected punishment, c, and the (relative) size of the shadow economy (in terms of labor), L_u/L_c, or of an indicator thereof, depends on two quite different influences: the cost effect of punishment,

$$\left(\frac{L_u}{L_o}\right) = \phi(c, \ldots), \qquad \partial\phi/\partial c < 0 \tag{16}$$

and, in the opposite direction, the governmental policy function:

$$c = c\left(\frac{L_u}{L_o}\right) \tag{27}$$

The problem consists in separating these two influences. Generally, this is possible by explicitly and simultaneously estimating a *set* of equations containing Eqs. (16) and (27).

SCENARIO B The government notes a decrease in its support and decides to shore it up by increasing taxation[30] in order to satisfy the population with a higher supply of public goods (Equation 7) and/or to satisfy the bureaucracy by granting higher wages (Eq. 4). Provided the fall in support is due to an increase in the underground economy, L_u/L_o, the (implicit) governmental policy function appears to be

$$\tau = \tau\left(\frac{L_u}{L_o}\right), \qquad \tau' > 0 \tag{28}$$

Behind an empirically observed relationship between the tax rate, τ, and the size of the hidden economy, L_u/L_o,[31] there are two quite distinct

relationships: the cost effect of taxation,

$$\left(\frac{L_u}{L_o}\right) = \phi(\tau, \ldots), \qquad \frac{\partial \phi}{\partial \tau} > 0 \tag{16}$$

and the policy equation (28) describing a causation in the opposite direction. Again, the problem is to clearly identify each of these equations.

The two scenarios are intended to illustrate the premise that it is important to consider not only the factors causing the existence and expansion of the underground economy, but also the likely reactions of public decision makers. The scenarios have dealt with likely policies undertaken by the government, but they can also be applied to the bureaucracy's policy. In any case, the conclusion is that the interdependence among the various sectors of the economy must be explicitly modeled in order to allow a sound empirical estimate of the size of the shadow economy.

ESTIMATING THE LAFFER CURVE

Figure 2 shows the general idea of the Laffer curve: Increasing the tax rate, τ, first increases tax receipts. But at $\tau = \tau^*$, a maximum is reached,

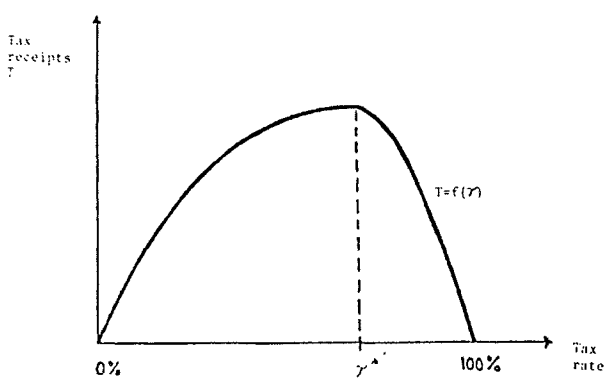

FIG. 2. The relationship between tax receipts and the tax rate according to Laffer.

and further tax increases will cause a decrease in tax receipts. Laffer's own interpretation of reality (for the United States) is that $\tau > \tau^*$, and that, therefore, a reduction in the tax rate raises tax receipts because it increases work incentives. The empirical studies undertaken seek to estimate the tax function,

$$T = f(\tau) \tag{29}$$

with the help of survey methods or formal econometric techniques. The results show a mixed picture. In Sweden, where the marginal tax rate on earned labor income is around 80%, it has been calculated (Stuart, 1981) that the revenue-maximizing tax rate would be approximately 70%. Sweden is thus on the downward sloping portion of its Laffer curve. Studies for the United States using three major macroeconometric models (Data Resources, Wharton, Chase Econometrics) suggest that a decrease in taxes would substantially increase the federal deficit in the forseeable future, and that tax cuts certainly do not pay for themselves (see Kiefer, 1979). An OECD report (1975) that surveyed all studies available at that time found that "variations in taxes do not cause important changes in the supply of work effort" (p. 6). Hemming and Kay (1980) state even more clearly that "the evidence runs strongly against the argument that tax rates in Britain, or any other country, are at levels such that the maximum available tax revenue is close to being obtained" (p. 85). As with estimates of the size of the underground economy, these studies can be criticized on two grounds:

1. Tax receipts depend not only on the tax rate, but also on other determinants, as shown in Eq. (21):

$$T = T(\tau, R, c; B)$$

In particular, the ease with which individuals can switch to the hidden economy and the punishment they expect to incur by doing so (given by τ, R, and c), as well as the labor constraint behind this switch (given by B), must be considered. The problem is not so much whether people stop working when tax rates rise, as Laffer and others argue, but whether they continue working in the official economy or switch to the underground sector.

2. The interdependence between the tax equation (18) and the possible policy reaction by government and bureaucracy must be included in the

estimation model. The scenarios developed in the preceding section apply fully here.

CONCLUDING REMARKS

This chapter seeks to integrate the underground economy into politico-economic relationships. Beyond the intrinsic interest such an integrated model of the political economy may have, the main purpose is to improve the theoretical basis for the empirical estimation of three important and much-discussed topics: the government's support function, the size of the underground economy, and the Laffer curve. It turns out that in all three cases the theoretical background developed helps to identify the multitude of factors determining the phenomena observed, and the links of their interdependence.

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NOTES

1. See, for example, the popular accounts in *Business Week* (1978) and the *Economist* (1979), and the scientific studies by Gutmann (1977), Feige (1979), de Grazia (1980), and Isachsen and Strom (1981).

2. This relationship has been rediscovered by American economists not terribly well versed in the history of doctrines. It was discussed as early as the fourteenth century by the Arabic philosopher Ibn Khaldun in his *Muqaddimah*, and in the second half of the fifteenth century (but not published until 1668) by the Italian economist D. Caraffa. It is known in German-speaking public finance circles as *Swiftsches Steuereinmaleins* (see Lotz, 1916). For a modern discussion, see, for example, Wanniski (1978) and various articles in the reader by Laffer and Seymour (1979).

3. Politico-economic models are theoretically based on econometric or politometric estimates of the relationships between the economy and the polity. The present state of research is well documented by the articles contained in the volumes edited by Whiteley (1980) and by Hibbs and Fassbender (1981); a survey is given in Frey (1978, 1979). It should be noted that politico-economic models have yielded superior *ex ante* and *ex post* forecasts when compared with "pure economic" models; they use the *same* data for estimation. The author's model for Germany (created jointly with Friedrich Schneider) has in this way been compared with the one by Krelle; the German politico-economic model (including central bank behavior) with the ones by Fair and by Cowart, and the United Kingdom model with the one by Chrystal and Alt. (See Frey and Schneider, 1979, 1981a, 1981b.)

4. See, for example, Lambelet (1973) and Luterbacher and Imhoff (1980).

5. See Frey and Schneider (1981a).

6. See Gärtner (1981).

7. The often-used identification of politico-economic models with "political business cycles" is therefore inadequate.

8. For the sake of simplicity, no differentiation is made between the labor force and population in each sector.

9. The data refer, however, almost exclusively to voting. The concept of support used here is wider; it includes other types of activities that improve the government's position relative to the opposition.

10. See Tingsten (1937). The following section is based on the survey by Frey and Pommerehne (1982a).

11. The figures quoted thus indicate what changes in voting participation are to be expected when somebody of a given sex, education, and social background switches from the private to the bureaucratic sector, or vice versa.

12. This idea lies behind many economic theories of bureaucracy; for an example, see Niskanen (1971, 1975).

13. In the discussion, it is argued that the bureaucracy may be better off with some percentage of underground activity than with a zero amount.

14. For empirical analyses of this proposition, see, for example, Smith (1977), Quinn (1979, 1980), and Bartel and Lewin (1981).

15. In this simplified model, there is no need to take account of the bureaucrats' taxes because they constitute a flow that stays *within* the public sector. If bureaucrats' income is taxed more, tax income rises, which, according to Equation (6), increases the bureaucrats' wage sum, W_B, by exactly the same amount

(given G). Thus, the taxation of bureaucrats does not change the relationship between the sectors as a whole.

16. It may be that those workers remaining in the official sector become dissatisfied with the government when the share of workers in the unofficial sector rises. This possibility is disregarded here.

17. The share may amount to 20% of total R & D and may be as high as 40% with the proposed federal fuel economy rules, according to a popular textbook (Gordon 1978: 534).

18. This is, in fact, argued by Tabb (1980) in a reply to Weidenbaum's study.

19. Most people active in the underground economy also hold a job in the official sector, usually to benefit from the social insurance system and to mislead tax authorities. The division of work between the two sectors should therefore be thought of in terms of hours worked.

20. See, for example, Carr-Hill and Stern (1973), Ehrlich (1973, 1979), Heineke (1978), and Goldberg and Nold (1980).

21. This may be unimportant for the United States, but it is of crucial importance for almost all other industrial countries, and many developing countries as well, where it is extremely difficult, or virtually impossible, to dismiss anybody in the official economy, except in cases of bankruptcy.

22. It is assumed that only a negligible number of people are active as professional politicians.

23. The same is true for employment and price developments in the hidden economy that may sizably affect the official data reported. Gutmann (1979a) estimates that the overall official unemployment rate in the United States is overstated by 1.5 percentage points when the official unemployment rate is about 6%.

24. It should be pointed out that other studies find a much smaller increase in the United States hidden economy, and some even note a decrease. For a survey of the results, see Frey and Pommerehne (1982b).

25. The following discussion draws on material contained in Frey and Pommerehne (1982b).

26. Though the concept "underground economy" may be defined in various ways, there is a growing consensus that it includes activities in terms of GNP that are not presently captured by official statistics.

27. See Dawes and Corrigan (1974), Wainer (1976), Dawes (1979), and Einhorn and Hogarth (1979).

28. It has been used to estimate the comparative size of the underground economies of 17 OECD countries; see Frey and Weck (1983).

29. See, for example, Jöreskog and Sorbom (1977).

30. Such a policy function was described as early as the fourteenth century by Ibn Khaldun: "Often, when the decrease in support of the reigning dynasty is noted, the amounts of the individual imposts are increased:" (Cited in Laffer and Seymour, 1979: p. 5).

31. As noted, for example, by Feige (1980), Klovland (1980), and Tanzi (1980).

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