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Bureaucracy and the Shadow Economy: A Macro-Approach

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6.1. Public Bureaucracy, the Legitimate Sector and the Shadow Sector

In recent years, the growth of public bureaucracy was one of the topics receiving most attention within political economy. Many theories have been developed dealing with the relationship of public bureaucracy with the political sector, in particular the models of Niskanen (1971, 1975) and Migué, Bélanger (1974), studying the behavior of individual bureaus vis à vis parliament.

Another question raised in this context has been whether there are any limits to the growth of the number of public bureaucrats, and of the public sector. However, the analysis of the possible checks on bureaucratic and governmental growth has not proceeded very far; so that Buchanan and Tullock (1977, p. 150) conclude that "presumably there is some limit on this process, but it has not been determined either theoretically or empirically". A model is needed showing the macro-relationships of public bureaucracy with the other sectors of society, in particular with the private economy. The private sector is of crucial importance in this connection, because it produces the resources the public sector and public bureaucrats live on.

The economic theory of politics (see Mueller (1979) and Frey (1978a)) and the economic theory of bureaucracy (for surveys see Blankart (1975), Orzechowski (1977) or Roppel (1979)) have so far not developed a macro-theory of bureaucracy¹ but have mainly dealt with the behavior of individuals within the bureaucratic system (e.g. Tullock (1965) and Downs (1967)).

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¹ An exception is Courant, Gramlich and Rubinfeld (1979), who use the median voter model to analyse the voter's reactions to various levels of private and public consumption (and therefore employment). The median voter model is, however, of limited use for those countries and situations in which decisions are not taken in the form of a town meeting, or which do not have two parties competing under perfect conditions (for other limitations of the median voter model see Romer and Rosenthal (1979) and Pommerehne (1978)).

Another sector which is important to consider when analysing the growth of bureaucracy is the shadow economy of which many different forms exist¹, ranging from informal neighborhood help to an illegal black market. What all forms have in common is that growth of the shadow economy can mainly be attributed to the rising burden of taxation in the legitimate private sector which can be circumvented by working and producing in the shadow sector. According to recent studies, in the United States the shadow economy has grown rapidly in the last few years and now amounts to about 10 percent (Gutman (1977)) or even 33 percent of measured GNP (Feige (1979)). Similar figures are reported for other countries such as Italy, Sweden and the United Kingdom (see e.g. Schmölders (1980) and Frey (1981)).

This paper endeavours to develop a macro-model of bureaucracy which concentrates on the external relationships of public bureaucracy with the legitimate private sector and the shadow economy. The model thus consists of three aggregated sectors.

In order to concentrate on the possible checks to bureaucratic growth an extreme assumption is made: Bureaucracy is taken to be a monopoly which has full discretion to set the tax rate. We analyze whether there exist limits *even* under such an extreme assumption. Also this assumption can be safely made because in reality public bureaucracy is at least partly controlled by government. The relationship between bureaucracy and government is not considered here in order to strengthen the argument that there exist limits to bureaucracy other than those imposed by government.

The tax rate is used by public bureaucracy in order to increase their own utility. Following Tullock (1974) and Buchanan (1977), as well as other writers, bureaucrats utilize their power to expand their number and to increase their wage rate. While an increase in per capita income is an obvious source of utility, the benefits gained by increasing their number is attributed to the prestige and influence gained as well as to the possibility of individual bureaucrats to rise in the hierarchy.

After having developed the basic model in Section 6.2., two extreme strategies by public bureaucrats are analyzed: Section 6.3. considers the case in which the public bureaucracy uses all its power to push up public employees' wage rate, i.e. in which the size of bureaucracy yields no utility. Section 6.4. studies the case in which bureaucrats use their power entirely to increase their number, keeping their wage rate constant. In Section 6.5. it is discussed what policy public bureaucracy pursues when both the increase in wages and in numbers yield positive marginal utility. Section 6.6. suggests some worthwhile extensions of the model. In the final section, the model's results are summarized and evaluated.

6.2. The Model

6.2.1. The Legitimate Private Sector

The legitimate private sector is that part of the private economy which is subject to fiscalization through direct and indirect taxes.

For simplicity's sake we assume that the output of that sector X_L is produced by

¹ And any different designations such as subterranean or underground economy (économie souterraine), submerged economy, parallel economy, moonlight industry, illegitimate or irregular sector, informal or unofficial economy, "black work" (lavoro nero, Schwarzarbeit).

labour input L only. The production function is taken to be quadratic¹, with the usual signs of positive first and negative second derivatives:

$$(1) \quad X_L = X_L(L) = aL - \frac{b}{2}L^2 \quad \text{for } dX_L/dL > 0, \quad d^2X_L/dL^2 < 0.$$

The gross wage rate in the legitimate private sector is assumed to be determined by the marginal productivity of labour

$$(2) \quad w_L^g = dX_L/dL.$$

The net wage rate w_L^n is equal to what is left over after paying the average tax rate τ :

$$(3) \quad w_L^n = (1 - \tau) \cdot w_L^g \geq 0.$$

From (1), (2) and (3) it follows that

$$(4) \quad w_L^n = (a - bL)(1 - \tau).$$

6.2.2. The Shadow Economy

The shadow economy is assumed to produce the same goods as the legitimate private sector, the only difference being that the product (income) in the shadow sector is *not* taxed. There are S people working in the shadow economy², producing X_S via a quadratic production function

$$(5) \quad X_S = X_S(S) = aS - \frac{\beta}{2}S^2 \quad \text{for } dX_S/dS > 0, \quad d^2X_S/dS^2 < 0.$$

The production functions in the private legitimate sector (1) and in the shadow sector (5) differ because the production conditions are not the same in the two sectors: In the shadow economy there is "anarchy" in the sense that property rights and contracts are not enforceable by public law which may result in different information and transaction costs connected with productive activity.

The "gross" wage rate in the shadow economy – which is a good example for a competitive sector – is determined by the marginal productivity of the labor employed there:

$$(6) \quad w_S^g = dX_S/dS.$$

As mentioned above, this wage rate is not taxed. The individuals working in the shadow economy will, however, take into account the risk of being detected and punished. They will therefore deduct a risk factor δ from the "gross" wage rate. The net wage rate is

$$(7) \quad w_S^n = (\alpha - \beta S)(1 - \delta).$$

¹ This function can be considered as a Taylor approximation to any production function.

² Most people working in the shadow sector also work part of their time in the legitimate economy so as to pay the minimum necessary to profit from social security benefits and to fool the tax authorities. People thus do not usually belong fully to the shadow economy, i.e. S should be counted as hours worked.

6.2.3. The Choice of Occupation between the Legitimate and Shadow Private Sectors

Workers may move between sectors L and S. They choose to move into the shadow economy when $w_S^n > w_L^n$, and into the legitimate sector when $w_S^n < w_L^n$. An equilibrium distribution of the work force between the two sectors is reached when the net wage rate is the same, $w_S^n = w_L^n$. From (4) and (7) it follows

$$(8) \quad w_S^n = (\alpha - \beta S)(1 - \delta) = (a - bL)(1 - \tau) = w_L^n.$$

For the purposes of the present paper, we assume that the bureaucracy does not change its control over the shadow sector so that the risk factor δ stays constant. As the comparative static equilibria are unaffected, δ is taken to be zero.

Solving equation (8) for the number of shadow workers

$$(9a) \quad S = \frac{a}{\beta} - \frac{a - bL}{\beta} \cdot (1 - \tau),$$

$$\text{with } \partial S / \partial L > 0$$

$$\text{and } \partial S / \partial \tau < 0 \quad \text{for } (a - bL) > 0.$$

Solving (8) for the number of legitimate private workers

$$(9b) \quad L = \frac{a}{b} - \frac{a - \beta S}{b(1 - \tau)}$$

$$\text{with } \partial L / \partial S > 0$$

$$\text{and } \partial L / \partial \tau < 0 \quad \text{for } (a - \beta S) > 0.$$

From (9a) and (9b) it follows that:

- (1) If, for whatever reason, the size of the work force in the total private sector increases, workers distribute according to the relative effect on marginal labour productivities, i.e. *both* S and L increase. An exogenous increase in the number of legitimate workers e.g., drives down the marginal productivity and therewith the gross and net wage rates in the L-sector. This induces workers to move to the shadow economy, which in turn decreases marginal productivity and wages there. This movement takes place until the net wage rates in the two sectors are equalized.
- (2) If the tax rate τ increases, the legitimate private sector L is burdened, i.e. net wage rate w_L^n decreases. In order to reach an equilibrium, marginal productivity or gross wage rate w_L^g must again increase which is brought about by workers leaving the legitimate private sector. The relatively higher wage rate in the shadow sector gives them an incentive to move into it, which pushes down the shadow sector wage rate w_S . Equilibrium $w_L^n = w_S$ is thus brought about by adjustments in both sectors, with respect to both employment and output.

6.2.4. Public Bureaucracy

In order to concentrate on the problems raised, we assume that tax revenue is only to pay public employees¹:

$$(10) \quad T = w_B \cdot B$$

where B is the number of public employees and w_B their wage rate.

The bureaucrats' wage rate is not determined by market forces. If we assume that it is higher than in the private economy, it follows that there will be a waiting line of people wanting to take up public employment (disequilibrium situation), which allows the existing bureaucrats to determine the number of public employees by fixing wage rates.

Taxes are levied on the output (equals income) in the legitimate private sector X_L :

$$(11) \quad T = \tau \cdot X_L$$

From (1), (10) and (11) it follows for public employment:

$$(12) \quad B = \frac{\tau \left[aL - \frac{b}{2} L^2 \right]}{w_B}$$

with $\partial B / \partial \tau > 0$, $\partial B / \partial L > 0$, and $\partial B / \partial w_B < 0$. The first two inequalities indicate that – ceteris paribus – the number of bureaucrats grows when the tax rate τ is increased, and that it also grows when more people are working in the legitimate private sector, because taxable private output X_L is increased. Note that all this only holds when all other influences are kept constant. $\partial B / \partial w_B < 0$ shows the limits imposed on bureaucracy by the requirement to balance the budget: The number of public employees B can ceteris paribus increase only if the bureaucrats' wage rate w_B is decreased.

6.2.5. Resource Constraint

The total work force G limits the manpower available; it is for simplicity assumed to be constant.

$$(13) \quad G = B + L + S.$$

The model can now be solved, assuming first that bureaucrats push up wages (Section 6.3) and then that they push up their number (Section 8.4.) The model derives the distribution of the total labour force between the bureaucracy, the legitimate private and the shadow sectors and the net effect of raising the tax rate on tax revenue, i.e. it derives an analytical solution of the so-called "Laffer curve".

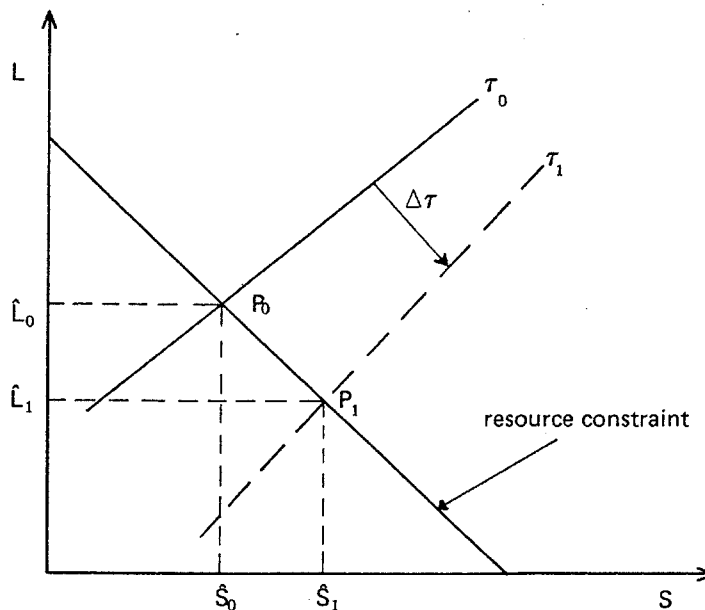
¹ The qualitative results remain unaffected if part of the tax revenue is used to buy goods and services from the private sector or to redistribute income within the private sector.

6.3. Bureaucracy Pushes for Higher Wage Rates

In this scenario public bureaucracy uses its power to set tax rates to push up wage rate w_B , according to (10): $\Delta T = \Delta w_B \cdot \bar{B}$, with the number of public employees \bar{B} being kept constant. We will look at what equilibrium follows from this for the system as a whole. In particular, we will show how an increase in the tax rate $\Delta\tau$ influences the distribution of the work force among the three sectors, and the effect on tax revenues (T).

The resource constraint, equation (13), ensures that there will be a negative relationship between S and L for any given B . From (9b) and its derivatives it follows that L and S are positively related, and that increasing the tax rate τ shifts the L - S curve downwards and to the right. The two relationships and the resulting equilibrium values of employment in the legitimate private sector \hat{L} and in the shadow sector \hat{S} are shown in figure 6.1.

Figure 6.1: Equilibrium employment in the legitimate private and shadow sector



The equilibrium values of employment are

$$(14a) \hat{S} = \frac{a}{\beta} - \frac{a(1-\tau)}{\beta + b(1-\tau)}$$

$$(14b) \hat{L} = \frac{a(1-\tau)}{\beta + b(1-\tau)}$$

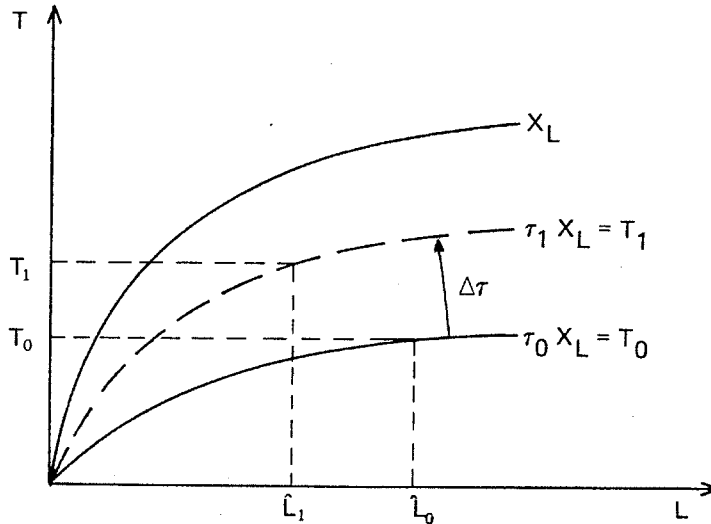
As can be seen from figure 6.1 and equations (14a) and (14b), an increase in the tax rate $\Delta\tau$ (from τ_0 to τ_1) with constant employment B increases equilibrium employment in the shadow economy, and decreases employment in the legitimate private economy. Increasing the tax rate thus induces a movement out of the taxed sector into the untaxed shadow economy, until equilibrium with $(w_L^n = w_S^n)$ is reached.

From equations (1) and (11) it follows that tax revenue T is

$$(15) \quad T = \tau \cdot X_L = \tau \left[aL - \frac{b}{2} L^2 \right].$$

This relationship is shown in figure 6.2.

Figure 6.2: Example of the effect of an increase in tax rate $\Delta\tau$ on tax revenue T



The figure shows that an increase in the tax rate $\Delta\tau$ does not necessarily increase tax revenues T because the increase in the tax rate decreases equilibrium employment \hat{L} (see figure 6.1). Whether T increases (as in figure 6.2) or decreases depends on the relative shifts of the positively inclined L - S curve in figure 6.1, and of the tax equation in figure 6.2. There are thus countervailing effects on tax revenues when the tax rate is raised. This can be shown by differentiating equation (11) with respect to τ :

$$(11)' \quad \frac{dT}{d\tau} = X_L + \tau \frac{dX_L}{d\hat{L}} \cdot \frac{d\hat{L}}{d\tau}$$

with $d\hat{L}/d\tau < 0$, according to figure 6.1. The first term on the right-hand side of (11)' is positive, and the second negative.

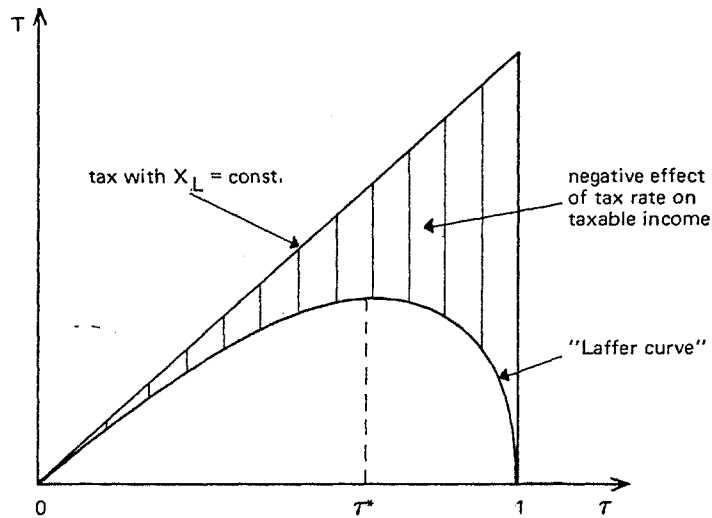
The effect of the tax rate on the tax revenue can be specified by noting that:

- When the tax rate τ is zero, there is no tax revenue, $T = 0$.
- When the tax rate τ is 100 percent, nobody would work in the legitimate private economy because disposable income would be zero. Taxable output X_L would also be zero, and therefore there would again be no tax revenue, i.e. $T = 0$.

The relationship between tax revenue T and the tax rate τ is shown in figure 6.3. The equation

$$(11)'' \quad X_L + \tau \cdot \frac{dX_L}{d\hat{L}} \cdot \frac{\partial \hat{L}}{\partial \tau} = 0$$



Figure 6.3: Effect of tax rate τ on tax revenue T 

determines the tax rate τ^* shown in figure 6.3 which maximizes tax revenue T . According to equations (14b) and (15), there exists a maximum tax rate τ^* lying in between 0 and 1¹.

To find an explicit solution for the optimal tax rate from the point of view of an income maximizing bureaucracy is very complex, given the assumptions of the model. This may be shown by combining equations (11)'', (1) and (14b)

$$(11)''' - b^2 \tau^3 + 3b(b+\beta) \tau^2 - [3b(b+2\beta) + 4\beta^2] \tau + (b+\beta)(b+2\beta) = 0$$

which, in general, is rather awkward to solve. This suggests that given this difficulty even in the case of such a simple model as here developed, in reality bureaucrats will not find it easy to determinate their optimal tax rate in reality.

As may be seen in figure 6.3, for $\tau < \tau^*$, an increase in the tax rate – though diminishing the tax base – increases tax revenue. When $\tau > \tau^*$, the tax base is eroded so much by the movement of workers from the legitimate to the shadow private sector that tax revenue falls.

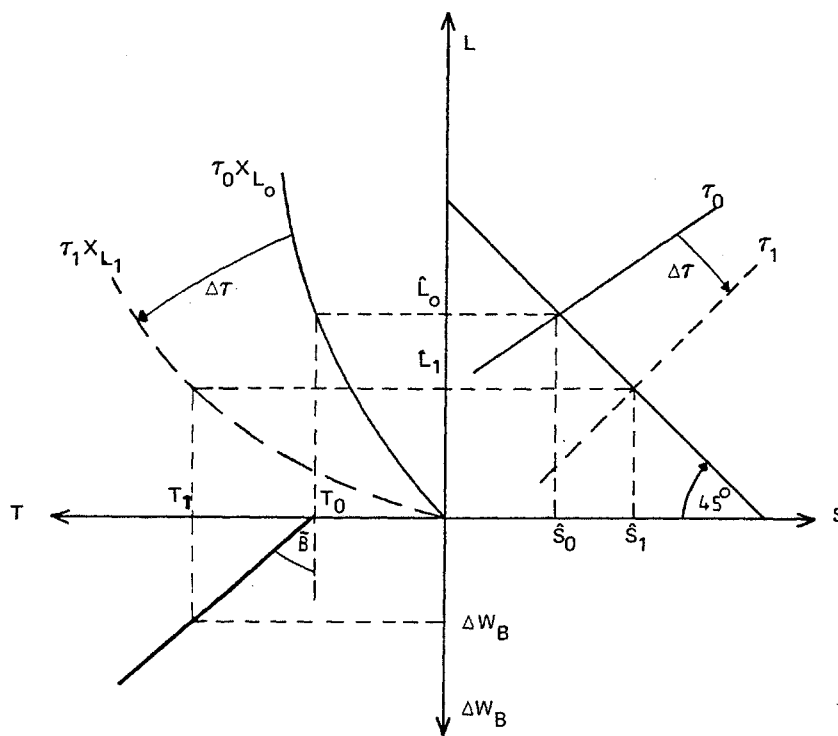
The straight line ON in figure 6.3, showing tax revenue as it would be if there were no negative effects of taxation on private legitimate income, is the "naive" assumption public officials make when projecting the increase in tax revenue following a rise in the tax rate. The figure shows that the actual tax revenue may be considerable lower than that projected on the basis of the "naive" assumption, especially if the tax rate is already high. Conversely, a tax rate reduction does not necessarily reduce tax revenue

¹ The equation $T = \tau \cdot X_L(\tau)$ equals for $\tau = 0$ and $\tau = 1$, and the second derivative $d^2T/d\tau^2 < 0$ for $0 \leq \tau \leq 1$.

at all, or reduce it less than what would be expected following the "naive" projection. As mentioned such projections may appear to be too simple minded. As already indicated, however, to derive an explicit solution for the revenue maximizing tax rate τ^* is a rather complex task, even in the context of the strongly simplified model here developed. If it is recognized that in a more realistic setting there are a greater number of simultaneous influences on the size of, and change in, tax revenues (e. g. inflationary developments), it is no longer easy to discern the influence of a change in the tax rate on tax revenue. "Naive" projections are in fact used quite often in practice, they are the rule rather than the exception.

To show all of the interrelationships within the model, figures 6.2 and 6.3 must be considered jointly. This is done in figure 6.4.

Figure 6.4: Equilibrium of the system; and comparative statics when the tax rate τ is increased (for $\tau < \tau^*$) and public employment B is held constant

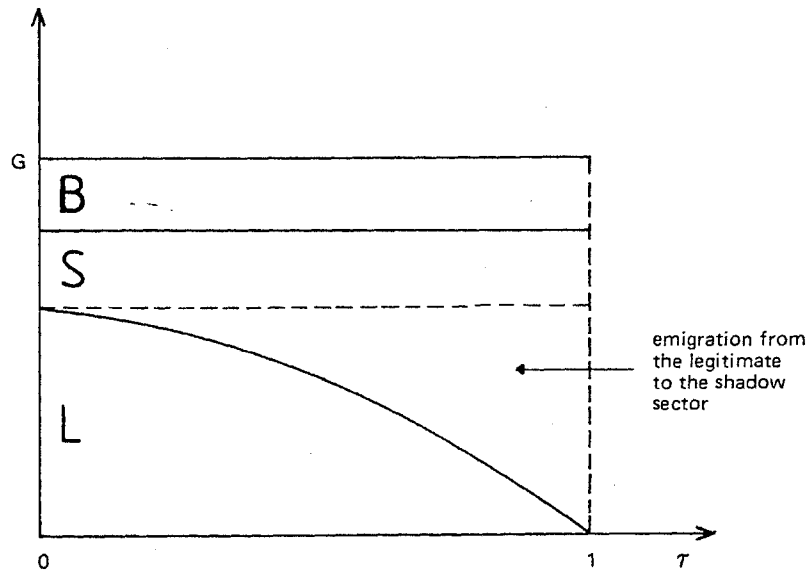


From figure 6.4 it can be seen that an increase in the tax rate $\Delta\tau$ increases employment in shadow economy \hat{S} , and decreases legitimate private employment \hat{L} . The figure is drawn such that the effect of the increase in τ is greater than the effect of decreased legitimate private employment $\Delta\hat{L}$ and decreased taxable output X_L , such that tax revenue increases ($\Delta T > 0$). The figure further shows what increase in the bureaucratic wage rate ΔW_B can be financed by the increase in tax revenue.

The impact of a changing tax rate on the distribution of workers (or rather hours) between the legitimate private sector, the shadow sector and the public sector is shown

in figure 6.5. While the share of bureaucrats in total employment is constant by assumption, a higher tax burden leads to a change in the distribution of the work force from the legitimate private of the shadow sector.

Figure 6.5: The effect of the tax rate on the distribution of employment



If public bureaucracy continually pushes up the tax rate, society develops into two disparate sectors:

- (1) The bureaucratic sector, where relationships among the employees are governed by the *hierarchical* principle;
- (2) The shadow economy (which swallows the legitimate private sector), which is *anarchical* in the sense of government laws being either not applied or not enforced. There are no public rules governing the work process (no security regulations, no restrictions with respect to hiring and firing), no social security and unemployment benefits, and no public insurance against accidents. What rules and regulations there are are based on private contracts only, and they cannot be enforced by law, as mentioned above.

An ever-increasing share of people will be employed in this *anarchical* branch of society if the tax rate is continually increased – with all the concomitant consequences for social welfare in this sector without any public rules.

These results apply to the case in which public bureaucrats use all their power to push their wage rate as high as possible, therefore keeping the number of public employees constant by restricting entry. It has been shown that this strategy is only successful if the tax rate has not yet reached too high a level (if it stays below τ^*), as only in this case an increase in the tax rate will increase tax revenue, making an increase

in the bureaucratic wage rate possible. If τ is already large (i.e. $\tau > \tau^*$), this strategy is *self-defeating*: Increasing the tax rate decreases tax revenue (see figure 6.3) such that bureaucrats must be satisfied with less income per capita. Due to migration into the shadow sector, the tax base (private legitimate income) is eroded. Bureaucracy kills the goose that lays the golden egg. Bureaucrats will push the tax rate up to ever-increasing levels under two conditions:

- (1) If the bureaucrats hold the "naive" assumption that an increase in the tax rate will have little or no effect on the tax base, at least not in the range in which an increase is considered. It can, in fact, not be excluded that at least in some countries tax rates are higher than τ^* , such that a *decrease* in the tax rate would *increase* tax revenue.
- (2) If the bureaucrats are competing among themselves in increasing wage rates. Each group of bureaucrats finds it advantageous to claim as high a wage rate as possible, i.e. to maximize its own share of the tax increase ΔT . The costs of such a policy, the decrease in tax revenue when the tax rate is pushed beyond τ^* , is a *public bad* (negative public good) which has to be shared by all public employees. Due to the free rider effect every group of bureaucrats contributes to an outcome which is Pareto-inferior for bureaucracy as a whole.

Such an outcome does, however, not occur if bureaucratic wage demands are put forward by a *unified* trade union, which takes into account the possible destruction of the tax base.

The two conditions under which the bureaucrats' wage policy leads to a partial erosion of the tax base in the form of the decline of private legitimate economy occur in reality, at least in some countries. It can therefore be concluded that though there are definite limits to the expansion of bureaucratic demands, bureaucratic decision-makers are not necessarily aware of them or act on them. The check upon bureaucratic growth (here ever-increasing wage income) is in this case brought about by a gradual decrease in tax revenue, which sets a financial constraint on bureaucracy.

6.4. Bureaucracy Pushes up Its Numbers

The second scenario is that public bureaucracy may use its power to increase the number of its members. The increase in tax revenue ΔT brought about by raising the tax rate is thus used to pay ΔB bureaucrats the fixed average salary \bar{w}_B , i.e. $\Delta T = \Delta B \cdot \bar{w}_B$.

When the number of bureaucrats is increased in the course of raising the tax rate, it is necessary to include the tax equation (12) in the determination of the equilibrium of the model: The increase of bureaucrats decreases the number of workers available for jobs in the private legitimate and shadow sectors. The reduced number is distributed according to marginal productivities between sectors L and S. The smaller number of workers in the legitimate private sector decreases taxable income, such that tax revenue is *ceteris paribus* lower.

Figure 6.6 gives a graphic solution to the model. The net wage functions determining the distribution of workers between the private legitimate and the shadow sectors,

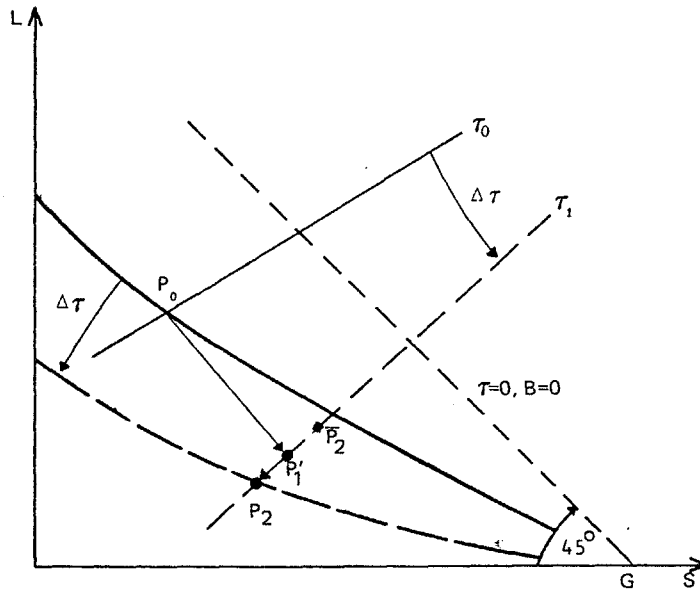
equations (9a) and (9b) remain unchanged (see the positively sloped functions). The resource equation (13) and the tax equation (12) are now combined to give a negatively sloped curve:

$$(16) \quad S = G - L - \frac{\tau}{w_B} \left[aL - \frac{b}{2} L^2 \right],$$

with $\frac{\partial S}{\partial L} = -1 - \frac{\tau}{w_B} \cdot (a - bL) < -1$.

The term -1 on the right hand side indicates the pure resource effect between employment in the two sectors, while the second term on the right hand side shows the additional displacement effect due to the increase in the number of bureaucrats. The second derivative of (16) is $\partial^2 S / \partial L^2 = \tau \cdot b / w_B > 0$.

Figure 6.6: Comparative statics of the model when bureaucrats use their power to increase their number ($\tau \geq \tau^*$)



Two situations should be distinguished:

- (1) The tax share stays below τ^* such that an increase in τ raises tax revenue and therewith the number of bureaucrats. An increase in the tax rate $\Delta\tau$ shifts both curves. If the number of bureaucrats stays constant, there will be movement from P_0 to P_1 which corresponds exactly to the one shown in figure 6.1, from P_0 to P_1 . The displacement of private workers and their distribution between the legitimate and shadow sectors is given by the movement from P_1 to P_2 . It follows that an increase in the tax rate always decreases employment in the legitimate private sector L , and that this decrease is greater than when bureaucrats use their power only to push up their wage rate (scenario 1, shown in figure 6.1). Employment in the shadow economy may rise or fall because of

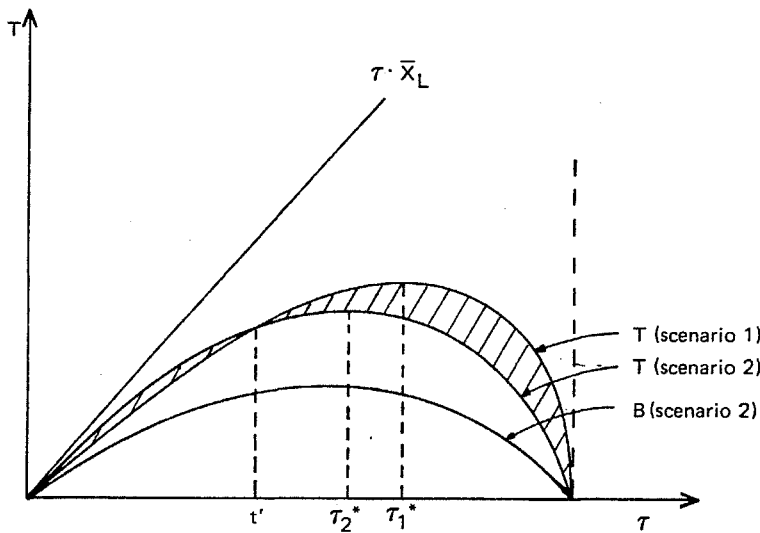
countervailing influences: The increasing burden of taxation leads to more people working in the shadow sector, but the greater employment prospects in the public sector induces some of the potential shadow workers to become bureaucrats.

- (2) If the tax rate is raised beyond τ^* , tax revenue decreases so that a smaller number of bureaucrats can be employed at the given wage rate \bar{w}_B . There is correspondingly more employment in the two private sectors. In figure 6.6 there is a movement from P_0 to P'_1 , the same as before, but then also from P'_1 to P_2 . Scenario 2 leads to emigration from the legitimate private sector but to a lesser extent than in scenario 1, given the same increase in the tax rate. Shadow employment in this case *a/ways* increases (as in scenario 1), and the increase will be even larger than when bureaucrats under the same circumstances use their power to push up their wage rate.

6.5. Bureaucracy's Policy when both Wages and Employment Matter

The last two sections discussed two extreme scenarios for how public bureaucracy uses its power: either to push up its wage rate (keeping its number constant; scenario 1), or to push up the number of public employees (keeping the wage rate constant; scenario 2). Figure 6.7 shows the change in tax revenue brought about by an increase in the tax rate for these two scenarios.

Figure 6.7: The influence of the tax rate on tax revenue under the bureaucratic scenario 1 and 2

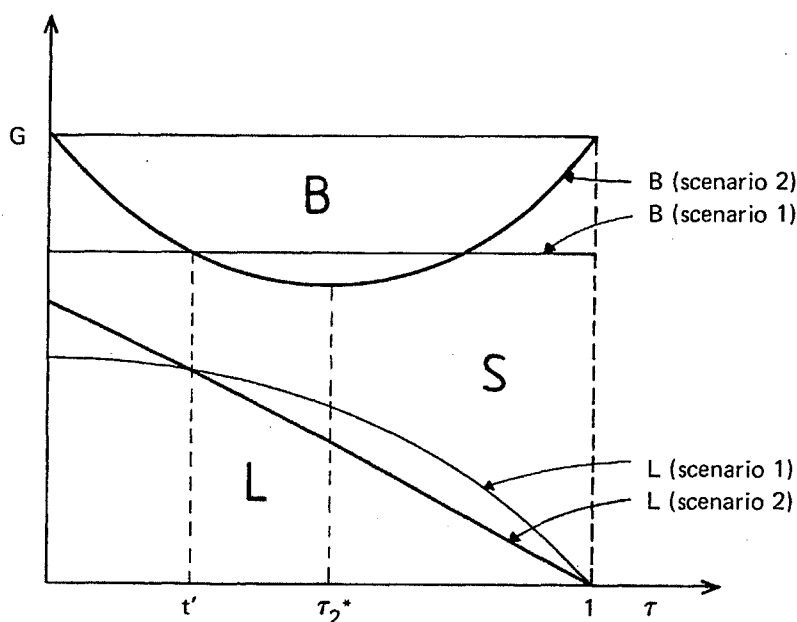


Total tax revenue is larger, and reaches its maximum at a higher tax rate (τ_1^*) when scenario 1 is followed, than if scenario 2 is followed, because increasing the number of bureaucrats decreases the number of workers available in the taxable private sector. (Figure 6.7 also indicates that under scenario 2 the curve of the number

of bureaucrats follows the development of the tax revenue curve). The bureaucrats' policy with regard to how to use their power lies somewhere in between, or on the edges of, the curves traced out by scenarios 1 and 2 (shaded area in figure 6.7), if both wages and employment matter. The relevant optimal tax rate τ_3^* depends then on the relative marginal utility gained by public bureaucrats by having a higher average income compared to the increased influence and prestige thanks to a larger staff. The more bureaucrats are interested in monetary rewards, the more closely their policy approaches scenario 1, implying a higher optimal tax rate and higher tax revenue.

Figure 6.8 shows the *distribution of work force* resulting from an increase in the tax rate, for scenarios 1 and 2, and any policy lying in between (or on the edge of) the two.

Figure 6.8: The effect of the tax rate on the distribution of the work force



It may be seen from this figure that once the tax rate is higher than t' (i.e. once employment in the public sector is larger than the constant number fixed in scenario 1), scenario 2 results in a greater erosion of the legitimate private sector, with workers choosing to work either in the public or in the shadow sector. Thus if bureaucracy uses its power to push up its numbers, the development of society into an hierarchical and an anarchical sector is at first favored. However, due to the erosion of the tax base because of the fall of legitimate private production, the number of bureaucrats must gradually be reduced because tax revenue fall after the tax rate exceeds τ_2^* .

6.6. Extensions of the Model

The private legitimate sector is influenced not only by taxation as assumed so far, but also by the many rules imposed upon it by the public administration. Up to a point, private production is supported by government intervention in particular because this helps to secure the property rights necessary for efficient transactions. However, increasing government interference may lead to a reduction in the legitimate sector's productivity because entrepreneurial freedom to act is impaired¹. From the point of view of bureaucracy there is an obvious analogy between taxation and regulation: In both cases it has an interest not to go too far because this would erode the basis of taxation it lives on.

Public bureaucrats will most likely realise that the limits imposed by taxation are the more severe, the more easily workers migrate to the untaxed shadow economy. They will therefore have a strong interest in *controlling* the shadow sector which results in a higher risk of working in the shadow economy. The factor δ in equation (7) thus increases. Such an effort to control the shadow economy — i.e., to move it back into the legitimate sphere — imposes, however, costs also on the bureaucracy. Public employees must be devoted to policing, which *ceteris paribus* reduces the number of workers available for the private economy, so that the output of, and therefore the tax revenue from, the legitimate private sector is decreased. Taking account of these marginally increasing costs, a utility maximizing bureaucracy will balance the additional tax revenue gained by controlling the shadow economy against the additional costs of controlling. There is an optimal level of policing of the shadow economy, and in general will not go so far as to completely eradicate it.

The model developed has on purpose excluded political decision makers, in particular government proper, in order to concentrate on the limits to public bureaucracy which exist independent of the political process. Having analyzed the nature of these limits, a more realistic model including the control of public bureaucracy by government and parliament may be constructed. This leads to a politico-economic model (for a survey see Frey (1978b)) in which *both* government and public bureaucracy are endogenous decision-makers.

6.7. Concluding Remarks

A three-sector model has been developed to analyze the impact of the bureaucracy's power (which is taken as given) on tax revenue and on the distribution of the work force among the legitimate private sector, the untaxed and unregulated shadow economy, and the public sector. An effort has been made to construct the simplest possible model able to capture the essential relationships.

It has shown that even under the extreme assumptions about the public bureaucracy's power — i.e., that it can set the tax rate as it wishes — there are definite limits to the growth of bureaucracy. When the tax rate is pushed beyond a limit, given by τ^* , tax revenue falls because the effect of workers moving into the shadow economy

¹ For an analysis of the benefits and costs of government regulation see Tabb (1980).

overcompensates for the effect of increasing the tax rate. Regulation of the legitimate private sector and controlling the shadow economy are also subject to definite limits.

It has been argued that limits on taxation will only be observed if the bureaucracy is well informed, and if it acts as a closed unit maximizing the total utility of its members. Only in this case the negative repercussions of taxation and regulation on the tax base will be taken into account. If information is imperfect, and in particular if there are competing groups within the bureaucracy acting independently, the negative effects on the tax base will be disregarded (as if it were a public good), and taxation will be pushed beyond the limits optimal for bureaucracy as a whole. Such behaviour weakens, of course, the power of public bureaucracy, setting a different kind of limit to its expansion.

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COMMENTS

Klaus Mackscheidt

Frey and Weck point out that the shadow economy takes many different forms. It seems worthwhile to focus upon these various forms and to clarify which ones are due to increasing tax burdens and which ones are not. I have made the following distinctions:

- (1) Criminal activities, for example within the drugscene, show only a slight connection with the problem of the tax burden. The sum involved in this particular area is presumed to have risen considerably during the last years. In the case of Florida, for example, officials estimate the yearly turnover at approximately \$ 7 bill¹.

¹ „Immer mehr Drogenhandel bei Banken in Miami“, in: „Handelsblatt“, 6/26/1980, p. 8.

(2) Another "traditional" part of the shadow economy is formed by help-activities within the neighbourhood. These usually take place in the form of barter. In their absence, the economy would suffer a loss of welfare, not provided by the regular economy or at least to a smaller extent. This dimension of the shadow economy has not come into existence because of increased tax burdens and it has not replaced the activity within the legitimate sector. Nevertheless, neighborhood help is not a phenomenon to be regarded lightly. In rural areas particularly, working groups have been created for building and constructing purposes.

This type of neighborhood help, at least in the Federal Republic of Germany, has always been tolerated. The main reason why illicit work, done for the purpose of increasing personal income, is so difficult to detect, is because it often takes place behind the screen of neighborhood help.

(3) Illicit work to make more money seems to be the type of shadow economy, taken as a model by Frey and Weck. To some extent, illicit work of this type has always been practised, as it comprises additional work done after normal working hours or during weekends. On the other hand some of this work is likely to be done during regular working hours. According to Frey and Weck this especially represents a change of economic activities from the legitimate sector to the shadow economy. The factors stimulating this type of shadow economy are certainly those captured by their model.

(4) Moreover illicit work does not only exist in the craftsmen's trade and the service sector but also – and this seems to constitute an ever-increasing part of the shadow economy – in the bureaucratic sector itself. An investigation commissioned by National Research Councils of seven universities in Italy showed double employment widely prevalent amongst those working in the public sector: 68,4% male employees in the bureaucratic sector have a second occupation¹. According to another study, as many as 76% of the top-executives and 80% of the employees in the bureaucratic sector are engaged in double employment².

(5) Another type of the irregular economy exists in the industrial, trade and agricultural sectors. Here, different international characteristics have to be specified. Furthermore the main causal factors determining the size of a shadow economy lie beyond tax burdens and state regulation, namely in such areas as the prevalent general economic conditions, the actual taxation and above all the taxpayers' morale. Similar economic conditions do therefore not lead to the same results everywhere. For example, certain parts of the textile-industry in Italy and in Germany, exposed to foreign competition, have reacted in totally different ways: In Germany this industrial sector has rapidly declined – firms went bankrupt or were transferred to low-wage countries – whereas in Italy a transfer took place from industrial production to domestic work.

The latter is an officially tolerated form of illicit work in Italy and according to estimates given by the Italian textile association in 1978, it accounts for approximate-

¹ Meichsner, F., „In Italien wächst Wohlstand aus der Schwarzarbeit“, in: „Die Welt“, 11/30/1979, p. 1.

² According to the report „Die Italiener sind trotz allem Stachanows“, in: „Frankfurter Allgemeine Zeitung“, 5/16/1979, p. 8.

ly 2/3 of the total textile production and thereby secures 300000 jobs¹. The ability of the Italian market to compete has been maintained by this shift to the irregular economy, since in doing so wage taxes and social security payments have been eliminated. A lax tax morale not only permitted tax evasions, but also the establishment of a specific type of irregular economy. In this case heavy taxation and state regulation did not trigger, but assisted in the emergence of an irregular economy.

Karl-Ernst Schenk

Frey and Weck have characterized their model as a *macro-model of bureaucracy*, tracing the relationship between the public bureaucracy on one hand and the private and the shadow economy on the other hand. At the end of this contribution, the expectations which one would normally have, if one takes the term macro-model seriously, are somewhat dampened.

The authors make clear, that the behavior of the bureaucracy is taken as exogenously given. It is *not* explained by the model but introduced exogenously. The scenarios are chosen to show quantitative implications occurring *outside* the bureaucracy with interesting implications *inside* being neglected. Therefore one has to show, what changes might occur inside the public bureaucracy, following the reasoning of Frey and Weck, when the number of employees or their share in the tax revenue is increased.

I presume that these changes not only affect the *quantitative* (payment and size of labor force) but also the *qualitative* pattern of the bureaucracy, especially its behavioral pattern and efficiency.

These propositions about changes of economic behavior brought about by an institutional change can be developed by using a micro-macro theory of institutional choice, reported elsewhere (see Schenk (1980, 1981)). From this theory, it seems possible to derive, what will happen in the second scenario of their model. In reality, and in this theoretical approach, an increase of the number of bureaucrats is preceded, accompanied or followed by *institutional changes*. Such a change on the macro level may be from a purely competitive to a regulated regime, from a loosely to a more intensely regulated, or from a regulated to a state directed regime. This change may occur in pursuit of an economic policy by one, two or several industries. It will imply a redistribution of property rights between the hierarchies of these industries and the government bureaucracy².

One of the propositions of the institutional choice approach is, that once a distribution of property rights or of macro or micro institutional structures and devices is chosen, a definite pattern of behavior can be predicted under each of these structures. Thus the change in property rights will in turn affect the behavior of the government

¹ A case study of the Italian Economic Research Institute CENSIS points out that in the Italian town Prato, close to Florence, the larger part of the population lives on moonlighting. See: Il caso Prato-Qualità e Stili di vita in una Società Evolutiva, Ricerca a Cura del CENSIS, Rom 1980.

² Examples for redistribution are provided by North and Thomas (1973, 1977).

bureaucrats as well as of the directive, management and executive organs in the industrial hierarchies. So much for the macro line of our argument.

To find out exactly how the behavior will be changed, the effects of the macro-institutional change on micro procedures in the hierarchies have to be traced. These procedures can be portrayed as devices to direct, monitor, and reward the performance of people on different levels of the hierarchy (or hierarchies) in the industry concerned. The linkage between macro and micro choices is part of the model already mentioned. Space does not permit the detailed development except for one example.

We assume a regulated industry in which a change of the number of bureaucrats is combined with a change in the directing, monitoring, and rewarding procedure (dmr-procedure). Prior to the change, the income of the managers in charge of a certain activity depends partly on the number of clients served, with a fixed amount per client. After the change the income is paid if a certain minimum of service hours is fulfilled.

Under the first dmr-procedure, managers competed to enlarge their part of the total number of clients served by their department. Increases in the total number of clients (say students attending lectures and examinations and paying a fee per lecture hour or examination) would pose no problem because of the competitive and adaptive behavior of the lecturers. Thus in principle most departments¹ could to some extent cope with increasing numbers of students. For the higher levels of the university hierarchy there should be no need to interfere except possibly to found new departments where the work load of the teachers exceeded their capacity. Even the bottleneck in the capacity, namely the correcting of the examination papers, could be broken to a considerable extent by assistants hired from outside. Thus the crucial limit would not be to provide this assistance technically, but how to pay for it. There were two possible ways: From the revenue of the lecturers or from the revenue of government taxes. For some reason or other which does not need to be discussed here, the fees for students were abandoned and the second alternative was chosen. This meant of course that the revenues of lecturers were no longer in line with their work load. The next step by the government was, logically, to abolish all student fees and to pay a fixed and equal amount to all professors in order to compensate them for the loss. From now on professors did not seem interested to compete for a large number of attending students. The next logical step, therefore, was to introduce minimum work loads and administrative work load controls, i.e. changing to a new dmr-device.

Property rights of the professors and other teaching personnel, namely the right to define and to control their own work load, were transferred to the government and had to be administered by new divisions at the university level. The crucial feature of the behavior under this new regulating device is that from now on the teachers try to keep their work loads at the regulated minimum level and cease to take an active part in solving the problems of the greatly increased numbers by a self administered and flexible work load adaptation. The more centrally regulated regime in universities with its change in the role of competition means that the government now has to solve

¹ The agreement applies, of course, only to the departments which do not need individual equipment to teach students.

the problem of increasing student numbers. For, it is no longer in their interest to do this on the level of teachers. With this (micro) institutional change from price based dmr-devices to centrally regulated teaching budgets for lecturers, the whole pattern of behavior underwent a change: There is no competitive effort any more to increase ones share of the number of students, no inclination therefore to solve the problem of the large number of students at the lower levels of the government-university hierarchy. By now, in consequence of this policy of institutional change the number of university teachers had increased at a high rate and the patterns of the new regulatory controls and of the behavior of these controlled seem firmly established with no option to reverse the situation.

This example clearly shows how quantitative changes of the kind traced by Frey and Weck's model are insolubly connected with qualitative changes. It is not much use to trace only the aggregating aspect. But this is just what we do in most cases, when we apply propositions of the (macro oriented) theory of economic policy. This seems understandable, to some extent, since it is not clear that each (or nearly each) change of policy implies institutional change as well. If in some rare cases such an institutional change is obvious, the theory of economic policy does not tell us much about the direction and consequences of institutional, behavioral and economic changes to be expected. The reason is that these aspects have never been systematically taken account of and incorporated into the body of theory. Surely this state of affairs in economic science could be a valuable contribution to the growing evidence of the impact of government deficiencies on economic reality.

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