Government Spending, Budgetary Rent Seeking, and Economic Growth

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2003

First Draft

Introduction

Perceptions regarding the role of fiscal policy in development finance and economic growth has changed considerably over the last four decades. In the early post WW II decades development policy was primarily focused on ways to boost the national saving rate to finance capital accumulation. Raising the share of taxes in GDP was a strategy to mobilize resources to finance a higher investment/GDP rate and launch a public-investment led growth process. This Keynesian "big-push" thinking could be easily knotted to a neo-classical growth model to show the positive impact of a higher tax-financed rate of capital accumulation on the transitional dynamics of per capita output.[1] The insight some pioneers in development finance had in mind (Nurkse 1953) was to show that taxation can substitute an underdeveloped credit/money market to fund more investment. Under funding and rationing by a rudimentary financial market with costly information was later shown to be pervasive (Stiglitz and Weis 1981, Stiglitz 1994).[2] The implied market failure and under-funding of investment projects were thought to be rectifiable by reallocation of savings to the public sector through a higher tax ratio. It was implicitly assumed that positive externalities of a higher investment rate (Rosenstein-Rodan 1943) financed in this fashion outweighed distortion effect of taxes. Development thinking up to the early 1970s reflected this general view but did not have the policy-friendly endogenous growth models in their arsenal to deliver the point more convincingly.

[1] In the context of a simple Phelps-Shell type growth model, it can be shown that an increase in the tax ratio to finance a higher government investment rate will result in a higher capital per worker and per capita income (Bartsch and Tolkemitt 1989).
[2] When asymmetric information exists, moral hazard and adverse selection problems can result in credit rationing, because the riskiness of projects and individual borrowers cannot be determined a priori.

The emergence and popularity of AK and endogenous growth models (Lucas 1988, Romer 1986) have made the case for raising saving, government spending, and policy activism more potent.[3] Amongst the early endogenous growth models that provided a theoretical basis for the analysis of government spending through a higher tax ratio is Barro (1990).

1. Government Spending and Endogenous Growth

The Barro (1990) and Barro and Salai-martin (1992) class of models consider government expenditures (on physical capital and social infrastructure investment) to be complementary, not a substitute, for private investment and examine the effect of government on growth in this light. With this backdrop, the effect of government on the private economy can be approached in two ways. One approach assumes that government expenditure (G) finances the provision of nonrivalrous and nonexcludable public services to the economy and complementary to private factor inputs--investment in physical and social infrastructure (capital). The other approach assumes congestable public goods (Cashin 1995). The effect of G can be modeled within a competitive endogenous growth model.[4] Each firm utilizes services financed by government expenditure (G) in its production function: $Y_i = AL_i^{1-\alpha} K_i^{\alpha} G^{1-\alpha}, 0 \prec \alpha \prec 1$. Given the restriction on the parameters of the production function, production for each firm exhibits constant returns to scale in private inputs. With a fixed G, the economy experiences diminishing returns with respect to the aggregate capital stock (K). However, when G rises with K, the production function exhibits

[3] Structural adjustment policies disfavored government-financed "big-push" strategy. This was partly a reaction to over expansion of government activity and huge budget deficits during the early 1970-mid 1980s and inferior growth and inflation performance compared to the previous two decades. Policy targets for the tax ratio became a part of IMF supported stabilization (Tanzi 1990). Higher tax/GDP ratio became of interest for a different reason: monetary stability and control of inflation.

[4] The results are obtained by a standard CRRA utility function

constant returns in K_i and G for a constant L_i. A balanced budget implies $G=\tau Y$, where τ is a fixed tax rate on output. It can be shown that the effect of government expenditures on the rate of growth is positively related to the ratio G/Y and negatively related to τ. At low values of G/Y the positive effect of a higher G on the marginal product of capital dominates the negative distortionary effect of taxes. As G/Y increases the distortive effect of taxes becomes larger. Thus growth rate reaches a peak and then declines. The maximum growth rate is given by the efficiency condition $G/Y=1-\alpha$. Since public expenditure (in physical and social infrastructure) is assumed to be complementary to private investment, the marginal product of private capital increases and so does the rate of economic growth, up to a maximum. Thus growth is negatively influenced if G is relatively too large and has no effect when G is at the optimal level.

Cashin (1994 and 1995) extends the endogenous growth model of Barro and Salai-Martin 1992 by including the effect of the *stock* of public capital on growth, which is determined endogenously in this model. This model bears features similar to Barro and Salai-Martin (1992).[5] With congested public services, it is assumed that for a given quantity of aggregate public services (G), the quantity accessible to an individual producer declines as other users congest the facilities (e.g. highway and water systems). Cashin considers the *stock* of public inputs and in his model the growth rate of output is increasing in public investment and transfer payments per unit of output and decreasing in the ratio of current (non-lump sum taxes) revenue to GDP. In addition to the effect of taxes, this model delivers some results similar to Barro (1990). For instance, for a Cobb-Douglas production technology, the size of G and T that maximizes the growth rate is equal to their respective share in output, if they were

[5] A constant intertemporal elasticity of substitution utility and a congestion model of public goods.

private inputs in a competitive market. If some public goods are not directly productive then the size of the government should be less than its share in aggregate income. Moreover, if the production function is not approximated by a CD technology, the utility maximizing government will set a rate of growth which is less than the maximum, and hence one would expect to see a positive effect by government investment on growth.

2. Public Goods, Rent-seeking and Economic Growth

The above mentioned class of models implicitly assume a "benevolent" government. As indicated by Hall and Jones (1997) a bureaucracy beset by rent seeking (and corruption) acts as a tax on productive activities of the economy. Our theoretical contribution in this paper is to relax the benevolence assumption by recognizing that bureaucracies and individuals may pursue their selfish interests. The issue we raise here is that, what happens if the process of the provision of public goods involves rent-seeking, an issue not raised in the context of the above models. It is fairly well established that if the government becomes big relative to the market, interest groups inside and outside the government grow in number and the potential for rent seeking increases, what happens to the endogenous-growth effect of public goods in this case. There are many different ways to model rent seeking into the discussion but in order not to make the model overcomplicated and to get specific results from the model we need to make a choice between the various schemes. In this paper we focus on budgetary rent seeking. The way we proceed is to take a model in the form of Barro (1990) and allow for budgetary rent seeking into it. We will try to keep the main structure of the Barro model to facilitate comparison between our results and his. In our model public goods still remain nonrivalrous and nonexcludable. However, that fraction of budgetary resources which become subject to rent-seeking is rendered excludable and rivalrous to the economy at large. Thus, rent-seeking reduces the potential public good supply in the economy. Once rent-seeking is allowed a fraction of public services subject to rent-seeking is no longer nonrivalrous and nonexcludable public goods. We will examine this effect within a simple endogenous growth model. The main elements of the model are the household and the firm sectors, a production function allowing for the effect of government procured public goods, and a fixed number of small number of government sector workers.

2.1. Household Behavior

There are a large number of households, a fixed number of them are employed by the public sector, and the remainder is in the private sector. Each household supplies capital to the firms. Each member of the private household supplies one unit of labor at every time. The public sector workers (bureaucrats) are engaged in the allocation of government budget. The bureaucrats do not accumulate capital and their consumption in each period is equal to their fixed wage plus payments from rent-seeking firms (more on this in section 2.2). We retain the standard approach of the class of optimal-growth models with regards to household utility maximization problem for the private economy. Each private household divides its income (from the labor and capital supplied) at each point in time between consumption and saving so as to maximize lifetime utility. The household's utility function is given by

$$U = \int_{t=0}^{\infty} e^{-\rho t} \left[\frac{C_t^{1-\theta}}{1-\theta} \right] \frac{L(t)}{H} dt \qquad (1)$$

Where C_t is consumption of each member of private household at time t. u(.) is the instantaneous utility function. L_t is total population of the private sector of the economy, L_t/H is therefore the number of members of the private households. Utility takes a CRRA, and ρ is the discount rate. The Private households' total instantaneous utility is given by

$$U(C_t) = \left[\frac{C_t^{1-\theta}}{1-\theta}\right] \qquad (2)$$

The private households maximize their lifetime utility subject to their budget constraint. Since the household has L_t/H members, its labor income at t is w_t. L_t/H, and its consumption expenditures are C_t. L_t/H. The household's budget constraint is therefore (Romer, 1996)

$$\int_{t=0}^{\infty} e^{-R(t)} C(t) \frac{L(t)}{H} dt \leq \frac{K(0)}{H} + \int_{t=0}^{\infty} r^{-R(t)} A(t) w(t) \frac{L(t)}{H} dt \qquad (3)$$

To account the fact that r (the real interest) may vary over time (as in Romer 1996), we define R_t as $\int_{\tau=0}^{\infty} r(\tau).dt$. One unit of the output good invested at time 0 yields e^{R_t} unit of the good at t. K_0 is the initial amount of capital in the economy. This inequality implies that the present value of private household's lifetime consumption cannot exceed its initial wealth plus the present value of its lifetime labor income. The standard Euler condition for equilibrium consumption is

$$\frac{\dot{c}(t)}{c(t)} = \frac{r(t)-\rho}{\theta} \qquad (4)$$

2.2. Firm Behavior and Returns to Rent-Seeking

We assume competitive firms with a production function for the representative firm (i) as in (5) and the corresponding restrictions on the elasticities.

$$Y_{ni} = AL_i^{1-\alpha} K_{pi}^{\alpha} g^{\upsilon} = F_i(L_i, K_{pi}, g), \upsilon = 1-\alpha \qquad (5)$$

For simplicity we disregard the subscript i, hence Y_n is the non-oil output, K_p is the productive capital, L stands for (productive) labor, g is the effective government expenditure and is equal g=(1-m)G. The Only a fixed number of the work force is employed by the government for allocation of budgetary resources (L_g) and the rest are engaged in productive activities (L). Where G is the total government expenditure, and the balanced-budget-condition is given by $G = T^{\varphi} Y_r^{(1-\varphi)}$ which indicates that the elasticity of G with respect to taxes is given by φ and the elasticity with respect to net natural resource (e.g. oil) revenue is 1-φ. Net natural resource revenue is defined as total natural resource revenue minus the lump-sum salary paid to a fixed number of bureaucrats. Moreover, m is the equilibrium proportion of rent-seeking resources received by the firms (see below for details). Since budgetary rent seeking results in rendering a fraction of public goods excludable the effective quantity of G is reduced to g.

In this paper we focus on a particular form of appropriating rent, that is budgetary rent seeking, so we can make a specific test for its effect. It is assumed that the government has a budget for procuring public goods and services (G). Following Katz and Rosenberg (1989) we stipulate that a part of G is subject to rent-seeking activities and the firms have an incentive to capture a part of G for their own. Thus we assume that the i-th firm allocates its capital expenditures to two different activities, a part is allocated to the acquisition of productive capital (K_{pi}) and the other to rent-seeking activities (K_{rsi}). Thus total capital for the ith firm is $Ki=K_{pi}+K_{rsi}$. Although the expenditure of K_{rsi} enters into the profit function of a firm it does not enters into its production function. Note that the nature of K_{rs} is like a one period capital, it is like an expenditure expensed by the firms in each period to get rent from the budget, while K_p is a long-term capital which depreciates at the rate of δ.

Following (Tullock 1981), we assume that the probability of rents appropriated by the ith firm is proportional to the ratio of its expenditure on rent-seeking activities to the aggregate rent-seeking expenditures. Thus, if we have n firms in the economy, the payoff (PF) to the ith firm is given by

$$PF_i = \frac{K_{rsi}}{\sum_n K_{rsi}} R = \left[\frac{R}{\sum_n K_{rsi}}\right] K_{rsi} \qquad (6)$$

Where the term in the brackets is the "rent-dissipation ratio" and we designate it as p, and hence PFi=pK_{rsi}. In long-run equilibrium and for a given value of exogenously determined resource revenue, the share of the budgetary expenditures subject to rent seeking is equal to determined by (1+p) $\sum K_{rs}/G$, which is a constant. Since the amount of rent paid out is equal to the sum of rents acquired by the firms that ratio in equilibrium is equal to m.

Total rent in the economy is given by $\sum K_{rs}$, and it is the amount paid to the bureaucrats who participate in the budgetary rent giving. We assume a government that purchases public goods and in so doing it employs a simple technology, that is, it has a given number of bureaucrats that oversee the distribution and allocation of resources, L_g. Their salary, as mentioned previously, is set administratively as a lump sum paid out of natural resource revenue by the government. However, the bureaucrats earn additional income via budgetary rent-seeking activities. The total rent paid in this way is equal to $\sum K_{rs}$ and the manner of its distribution does not affect the pattern of budgetary allocation.

Aggregating the identical firms yields the aggregate production function

$$Y_n = F(L, K_p, g) = AL^{1-\alpha} K_p g^{1-\alpha} \qquad (7)$$

which in the intensive form is

$$y_n = f(k_p, g) = Ak_p^{\alpha} g^{1-\alpha} \qquad (8)$$

Where y_n is output per worker, k_p is productive capital per worker that $y_{ni}=y_n$ and $k_{pi}=k_p$ (because of the all firms are equal). By writing g in terms of k_p (because of $g = (1-m)G = (1-m)T^{\varphi} Y_r^{(1-\varphi)} = (1-m)(\tau Y_n)^{\varphi} Y_r^{(1-\varphi)}$) we have:

$$g = [(\tau AL)^{\varphi} (1-m)^{1-\alpha} Y_r^{1-\varphi})]^{\frac{1}{1-\varphi(1-\alpha)}} . k_p^{\frac{\alpha\varphi}{1-\varphi(1-\alpha)}} \qquad (9)$$

The representative firm maximizes an intensive profit function as in the following

$$Max_{k,k_{rs}} \pi = (1-\tau) f(k_i - k_{rsi}, g) + pk_{rs} - (r+\delta)k_i - \omega \qquad (10)$$

π is the total profit for the ith firm, τ is the tax rate, δ is the rate of depreciation of the total capital stock, p is the rate of return on rent-seeking activity, r is the net rate of return on total capital, and ω is the real wage rate. The first order condition yields[6]

$$r + \delta = p = (1-\tau) f_{kp} \qquad (11)$$

Where $(1-\tau)f_{kp}$ is the marginal product of productive capital and the after-tax rate of return on this type of capital, according to (11), is equal to ρ. From the production function we have

$$f_{kp} = \alpha A k_{pi}^{-(1-\alpha)} g^{1-\alpha} \qquad (12)$$

By substituting (12) into (11) we get the F.O.C in terms of the marginal product of k_p

$$r + \delta = \alpha(1-\tau) A k_{pi}^{-(1-\alpha)} g^{1-\alpha} \qquad (13)$$

When $k_p = k_{pi}$

$$r + \delta = \alpha(1-\tau) A k_p^{-(1-\alpha)} g^{1-\alpha} \qquad (14)$$

By substituting (9) into (14)

$$r + \delta = \xi k_p^{-\frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)}} \qquad (15)$$

where $\xi = \alpha.(1-\tau).A^{\frac{1}{1-\varphi(1-\alpha)}}.\tau^{\frac{\varphi(1-\alpha)}{1-\varphi(1-\alpha)}}.(1-m)^{\frac{1-\alpha}{1-\varphi(1-\alpha)}}.L^{\frac{\varphi(1-\alpha)}{1-\varphi(1-\alpha)}}.Y_r^{\frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)}}$

Equilibrium:

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6 $$(1-\tau) f_{kp} . \frac{\partial k_p}{\partial k} - (r+\delta) = 0 \rightarrow (1-\tau) f_{kp} = r + \delta$$

$$(1-\tau) f_{kp} . \frac{\partial k_p}{\partial k_{rs}} + p = 0 \rightarrow p = (1-\tau) f_{kp}$$

To get the general equilibrium growth rate, we insert the after tax marginal product of capital obtained from the equilibrium condition for firms into consumer equilibrium condition—that is, by substituting (15) into (4). Thus we have

$$\gamma = \frac{c}{c} = \frac{1}{\theta}[r-\rho] = \frac{1}{\theta}\left[\xi k_p^{-\frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)}} - \delta - \rho\right] \qquad (16)$$

In the next three sections we will continue by examining the effect of different assumptions regarding the source of government income and budgetary rent seeking on the rate of economic growth.

2.3. Base Case Model

In the base case model we consider a situation where the government does not have access to natural resource revenue, that is in the definition of G, φ=1. This adjustment changes the definition of net of rent government expenditure (g), hence g=(1-m)G=(1-m)T=(1-m)τY_n. The solution for the growth rate of output is obtained by inserting the marginal product of capital condition into the expression for per capita consumption growth (6). Thus, we obtain

$$\gamma = \frac{1}{\theta}\left[\alpha.(1-\tau).A^{\frac{1}{\alpha}}.(L\tau)^{\frac{1-\alpha}{\alpha}}.(1-m)^{\frac{1-\alpha}{\alpha}} - \rho - \delta\right] \qquad (17)$$

That is, compared to the Barro (1990), where there is no rent seeking, the growth rate is reduced in (17) by (1-m). However, it should be noted that, the essential property of Barro's model, where government spending can still induce endogenous growth, remains intact.[7] The higher is m the lower will be the growth rate. In the extreme case where all budgetary expenditures are dissipated as rent (m=1) and public goods provision

[7]For a similar approach see Poltrovich (2000).

vanishes, the growth rate of per capita consumption is zero, which is the result in a finite growth model with no exogenous productivity growth.

2.4. The Extended Model

Now we go back to a situation where the government receives natural resource revenue and 0<φ<1. For a given amount of resource revenue, we do not obtain an endogenous growth result. In this case, the marginal product of capital becomes decreasing in $k_{p:}$

$$r = \xi k_p^{-\frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)}} - \delta \qquad (18)$$

The steady state consumption per worker is constant, hence for dc/dt=0 from (16), we have

$$\xi k_p^{-\frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)}} = \delta + \rho \qquad (19)$$

By stipulating that productive capital (and not k_{rs}) enters into the production function of the firms, and that the returns to rent seeking are consumed, the equation of motion is given by $\dot{k}_p = Ak_p^{\alpha} g^{1-\alpha} - c - (n+\delta)k_p$.

By substituting for g in terms of k_p and in the steady state ($dk_p/dt=0$), we have

$$\dot{k}_p = \eta k_p^{\frac{\alpha}{1-\varphi(1-\alpha)}} - c - (n+\delta)k_p \qquad (20)$$

Where $\eta = A.[(\tau AL)^{\varphi}.(1-m).Y_r^{1-\varphi})]^{\frac{1-\alpha}{1-\varphi(1-\alpha)}}$

Let us consider the solution of the system (19) and (20) in the steady state. From (19) we get

$$k_p = \bar{k}_p = (\frac{\xi}{\delta+\rho})^{\frac{1-\varphi(1-\alpha)}{(1-\varphi)(1-\alpha)}} \qquad (21)$$

The value of k_p is shown in the diagram (1) as a straight line and the value of c from (20) is shown in the same diagram. The concavity of (20) is obtained from (21) to (23), which indicates the standard behavior since the evaluation of the derivative at k_p=0, ∞ are consistent with this behavior. Moreover, the second derivative of (20) is also negative (equation 23).

$$\frac{\partial c}{\partial k_p} = \frac{\alpha\eta}{1-\varphi(1-\alpha)} k_p^{\frac{(1-\alpha)(1-\varphi)}{1-\varphi(1-\alpha)}} - (n+\delta) \quad (21)$$

$$k_p \to 0 \Rightarrow \frac{\partial c}{\partial k_p} > 0 \qquad (22.1)$$

$$k_p \to \infty \Rightarrow \frac{\partial c}{\partial k_p} < 0 \qquad (22.2)$$

$$\frac{\partial c^2}{\partial k_p^2} = -\frac{\alpha\eta}{1-\varphi(1-\alpha)} . \frac{(1-\alpha)(1-\varphi)}{1-\varphi(1-\alpha)} k_p^{-\frac{3-(1+2\varphi)(1+\alpha)}{1-\varphi(1-\alpha)}} < 0 \qquad (23)$$

The elements of the Jacobian matrix of the system (19) and (20) are

$$\partial \dot{k}_p / \partial k_p = \alpha A k_p^{\alpha-1} g^{1-\alpha} - (n+\delta) = r > 0 \qquad (24.1)$$

$$\frac{\partial \dot{k}_p}{\partial c} = -1 < 0 \qquad (24.2)$$

$$\frac{\partial \dot{c}}{\partial k_p} = \frac{\partial}{\partial k_p}\left[\xi k_p^{-\frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)}} - \delta - \rho\right] = -\xi . \frac{(1-\varphi)(1-\alpha)}{1-\varphi(1-\alpha)} k_p^{-\frac{3-(1+3\varphi)(1+\alpha)}{1-\varphi(1-\alpha)}} < 0 \qquad (24.3)$$

$$\partial \dot{c} / \partial c = 0 \qquad (24.4)$$

For simplicity we designate (24.3) as D and the above Jacobian Matrix is

$$\begin{bmatrix} r & -1 \\ D & 0 \end{bmatrix} \qquad (25)$$

For the solution D we have a locally stable saddle point steady state. The reason for obtaining a finite growth result is that we have a given resource revenue and given the property of the production function if G does not increase with K_p, we get a diminishing marginal product with respect to the aggregate capital stock.[8] *It is the presence of this factor that removes the endogenous growth effect, hence the existence of a steady state and finite growth.* If the budgetary supervision is so tight as to reduce the value of rents to zero, the system reverts to an endogenous government growth case.

2.5. Model with Natural Resource Revenue Growth

In the previous section growth in natural resource (Y_r) was not allowed. In this section we allow for it. More specifically we assume $Y_r = \beta Y_n$. That is, we let the natural resource revenue to grow at a rate equal to non-resource output. At the first sight this may be a strong assumption. However, in a few of the oil-exporting countries the share of oil in GDP, particularly when the exchange rate from the oil sector is evaluated properly, has fluctuated around a long-run trend over the last three decades. When the quantity of oil revenue declines in foreign currency, its effect is compensated by a higher relative price of the exchange rate and vice versa. In this case government expenditures are given by $G = \tau^{\varphi}\beta^{1-\varphi}Y_n = \tau^{\varphi}\beta^{1-\varphi}.AL^{1-\alpha}K_p{}^{\alpha}g^{1-\alpha}$ and effective government expenditures are given by $g = (1-m)\tau^{\varphi}\beta^{1-\varphi}AL^{1-\alpha}K_p{}^{\alpha}g^{1-\alpha}$. By substituting g from the former into the latter expression, we obtain:

$$g = (AL)^{1/\alpha}\tau^{\varphi/\alpha}\beta^{1-\varphi/\alpha}(1-m)^{1/\alpha}K_p \qquad (26)$$

The after tax marginal product of capital is obtained as

$$r + \delta = \alpha(1-\tau)A^{\frac{1}{\alpha}}L^{\frac{1-\alpha}{\alpha}}(1-m)^{\frac{1-\alpha}{\alpha}}\tau^{\varphi\frac{1-\alpha}{\alpha}}\beta^{\frac{(1-\varphi)(1-\alpha)}{\alpha}} \qquad (27)$$

[8] This is consistent with a situation where budgetary rent-seeking activities are strong and as a consequence the "rent dissipation" effect is strong enough to more than compensate the positive external effect of government expenditures on public goods.

The above is a constant marginal product, hence an endogenous growth case. By substituting this expression into (4) we get the per capita consumption growth rate as in (28).

$$\gamma = \frac{1}{\theta}[\alpha(1-\tau)A^{\frac{1}{\alpha}}L^{\frac{1-\alpha}{\alpha}}(1-m)^{\frac{1-\alpha}{\alpha}}\tau^{\varphi\frac{1-\alpha}{\alpha}}\beta^{\frac{(1-\varphi)(1-\alpha)}{\alpha}} - \delta - \rho] \qquad (28)$$

This rate is may or may not be higher than the growth rate result obtained in section (2.3). It depends on the values of α, β. To evaluate the results of the two cases we compare their marginal product of capital. With the same the tax rate in the two cases, the marginal product of the model in section (2.3 with no natural resource income) is $MPK_p(1)= r + \delta = \omega\tau^{\frac{1-\alpha}{\alpha}}$ and that for (2.5 with a proportionate Y_r) is $MPK_p(2)= r + \delta = \omega\tau^{\frac{\varphi(1-\alpha)}{\alpha}}\beta^{\frac{(1-\varphi)(1-\alpha)}{\alpha}}$, where $\omega = \alpha(1-\tau)A^{\frac{1}{\alpha}}L^{\frac{1-\alpha}{\alpha}}(1-m)^{\frac{1-\alpha}{\alpha}}$. Dividing these two expressions we have

$$\frac{\text{MPKp(1)}}{\text{MPKp(2)}} = \left(\frac{\tau}{\beta}\right)^{\frac{(1-\alpha)(1-\varphi)}{\alpha}} \qquad (29)$$

If $\beta > 1 \ then \ 0 < \frac{\tau}{\beta} < 1 \Rightarrow 0 < (\frac{\tau}{\beta})^{\frac{(1-\alpha)(1-\varphi)}{\alpha}} < 1$, hence growth rate in the model 2.5 exceeds the 2.3 model. *This means that, if the share of resource revenue in GDP is higher than non-resource value-added (for a constant τ) the growth rate will exceed the base case model (2.3).* The reason is, more resources are available to fund purchase of public goods without an increase in the tax revenue. Note that in the context of the above class of models it is the distortionary effect of taxes which puts a cap on the positive effect of G on growth. If 0<β<1, and β>τ, then model 2.5 growth rate exceeds model 2.3. *That is, if resource income is less than non-resource value added (e.g. an economy with a large non-resource value-added) but with a larger share of* *resource income than taxes in the government budget, the growth rate is greater than the base case model (2.3).* However, if $0<\beta<1$, and $\beta<\tau$, then model 2.3 growth rate exceeds model 2.5. *If the share of resource revenue in GDP is less than non-resource value-added and the share of resource revenue in G is smaller than that of taxes, then the rate of growth is smaller than the base case model.*

3. Empirical Tests of Policy Variables and Growth

3.1. Empirical Indices of Budgetary Rent Seeking

In this section we present our estimates of budgetary rent seeking and use pooled regression to test its effect on economic growth along with the fiscal policy variables and the usual growth correlates. Katz and Rosenberg (KR, 1989) conjecture that developed economies have an established social hierarchy and institutional setup, therefore they tend to be less wasteful compared to the developing countries. Due to social and structural transformation in the latter new groups vie for power and there is shift in the relative strength of political pressure groups. These shifts are reflected in the continued struggle amongst different social group to have a larger share in the government budget, and hence the potential for budgetary rent seeking.

The index calculated by KR (1989) is an attempt to empirically measure how prone are governments to pressure groups for getting budgetary resources. The index (KR_t) is based upon absolute changes in the proportion allocated to different budgetary categories in year(t) over year(t-1) as follows:

$$KR_t = \frac{1}{2}\sum_{i=t}^{n} / S(t)_i - S(t-1)_i /$$

where $S(t)_i$ and $S(t-1)_i$ are the proportion of the budget going to section i in year(t) and (t-1) respectively, n is equal to number of categories in the budget and the division by 2 is done to avoid double counting. The average value of R_t during a certain period for each country is

$$KR_c = \sum_{i=t}^{n} KR(t)/T$$

T is the number of years and KR_t can be interpreted as representing the average rent seeking.

An alternative way to measure waste induced by rent seeking (*Wc)*, is to adjust *KRc with* and the ratio of government expenditure (G) to GNP, (G/GNP). Even if *KRc* gauges inefficiency in government spending correctly, it may be of limited significance if the government is small relative to the economy. Therefore, the measure $Wc = KR_c(\frac{Gc}{GNP_c})$ is useful if we wish to make a judgment about the social cost of rent seeking. In the above definition G_c is the average (mean) of government expenditure over a certain period and *GNPc* is the average national income in each country.

KR (1989) covered 20 countries and the 1970-1985 period. Demirbas (1999) study covered the 1974-1994 period and found support for KR findings that the degree of rent seeking in developing countries is greater than in the industrial countries. In this paper we report our calculations for two measures of rent seeking. One is the KR measure of rent seeking and the other is the KR measure weighted by the size of the government relative to GDP. Table (1) shows how our selected countries in both industrial and developing (including MENA) countries are ranked according to the above indices of budgetary rent seeking. Those with the least degree of rent seeking are ranked at the top. Data was not available for much of the sample period (1979-2000) for a large number of MENA countries and hence they are excluded. Note that, MENA countries are ranked at the bottom of the table, indicating fairly high budgetary rent seeking activity in them. Oil exporting countries like Iran and UAE show higher degrees of rent seeking. As argued by Gelb (1989) and Gylfason (2000) increased oil revenue has helped to create bigger governments and more rent-seeking activity. Oil revenue unlike tax income, which is a transfer income, belongs to the government and allows more financial independence. Table (2) shows that in most MENA countries the average index of rent seeking declined during the 1990s compared to the 1980s. During the 1990s Egypt, Tunis, and Morocco introduced significant measures to open up their economy and introduced market friendly reforms. In Egypt the index does not show a significant change but for Morocco and Tunis the reduction is substantial. It is possible that that the reduction in the index could be partly due to these economic reforms. The index for EUA also shows a large decline, however, for Iran the index rose slightly.

The Empirical work by Demirbas (1999) and Karimi (2002) also indicates that there is a cointegrating relationship between the proportion of rent in the budget and the size of the government relative to GDP. This indicates that, at least for some countries, a bigger government tends to be associated with a higher degree of rent seeking. Demirbas (1999) finds that the degree of rent seeking is increasing in per capita income in Turkey, while in Iran, budgetary rent seeking is increasing in oil revenue.

3.2. Government, Rent Seeking and Growth

Based on the models of the previous section, a larger government spending for procuring public goods, up to its optimal size, has a positive effect on growth a la Barro, while rent-seeking negatively affects growth.

There is a fairly large literature on the effect of fiscal policy on economic growth and the empirical approach follows the literature on the determinants of economic growth (Barro 2001, 1997, 1995, Easterly and Levine 2001).[9] The Empirical studies of the impact of fiscal policy on growth can be divided into several groups. Those studies that focus on the effect of the size of the government on growth. The studies that examine the effect of the composition of government expenditures (consumption and investment) on growth, and those that consider the effect of the type of expenditures and taxes (infrastructure, education, health, communication, transportation spending, and income, corporate, trade taxes) on growth. Much of the empirical works on economic growth and fiscal policy is of cross-country regression variety. A large number of variables have been used as explanatory variables. A positive relationship between the investment rate and the growth rate is cited quite frequently in the published studies. The composition of government spending has important implications on economic growth (Tanzi and Zee 1997). When expenditures are disaggregated there is a stronger evidence of a negative relationship between public consumption and growth. Fiscal measures to boost public savings are the most effective way to raise national savings (Easterly, Rodriguez, and Schmidt-Hebbel 1994). For instance, reducing government consumption expenditures can leave more resources for capital formation, hence the rationale for a negative relationship between government consumption expenditures and growth rate (Balassa 1990, Barro 1995).[10]

[9] The main growth correlates identified in the literature can be classified as, fiscal variables, monetary variables, population variables, structural and institutional variables, legal and country-risk variables.
[10]Reducing government consumption expenditure, hence a higher domestic saving rate, lifts the transitional growth rate but only a level-effect in the long-run in the Mankiw, Romer, and Weil (1992) version of the Solow (1956) model. In the context of endogenous growth models a reduction in current expenditures and a higher public investment can generate long-run growth effect.

The empirical evidence regarding the effect of taxes on economic growth is mixed (Tanzi and Zee 1997). Martin and Fardmanesh (1990) show that, amongst the least developed countries, there is a negative relationship between the tax level and economic growth. Engen and Skinner (1992) show a negative relationship between the rate of change in the tax level and economic growth. Easterly and Rebelo (1993) found that amongst a relatively large number of tax measures, only an estimate of marginal income tax was negatively related to growth.[11] Mendoza, Milesi-Ferreti and Asea (1998) show that based on panel regressions for 18 OECD countries, a lower income tax has a statistically significant and positive impact on investment.[12] However, the positive investment effect was not of the order to have a significant long-run growth effect.

In MENA countries government financed public goods and services are a large fraction of GDP. Also government investment constitutes a large proportion of aggregate gross investment. As shown by Khan and Kumar (1993), private investments are usually more productive than public investment, so a large reallocation away from the private sector might negatively affect growth. [13] Eken, Helbling and Mazarei (1997) show that, for non-oil exporting countries, the share of government revenue in GDP and the share of current expenditures in GDP, had a negative level effect on economic growth in MENA countries. However, there is a positive relationship between growth and overall budget balance. The share of private investment was positively correlated with economic growth. In sharp contrast, for a panel of oil-exporting MENA countries, economic

[11] The estimate of the marginal income tax was obtained by regressing income taxes on GDP.
[12] A lower consumption tax had a negative impact on investment.
[13] Balassa (1990) finds a negative correlation between public investment, private investment, and economic growth. Concerning the negative impact of government consumption on growth the weight of evidence is in her favor, however, the same cannot be said about the issue of the relative size of public investment. See Knight, Loayza, and Villanueva (1993).

growth was found (surprisingly) to be positively correlated with the ratio of total government revenue (including oil) in non-oil GDP, and the ratio of current expenditures in non-oil GDP. The general empirical model for identification of growth correlates for our sample of countries is given below.

$$\log y_t = \alpha \log y_{t-1} + \beta' X_t + \varepsilon_t$$

Where y is GDP per capita and X is a vector of state and policy variables. Deducting the logarithm of y from both sides of the equation we have

$$\Delta \log y_t = (1-\alpha) \log y_{t-1} + \beta' X_t + \varepsilon_t$$

The log of the lagged value of GDP per worker is included in this equation to capture the tendency for short-run growth rates to converge to the long-run growth rate. The variables representing the growth correlates are selected based on the literature discussed in the previous section. They include the government's size as measured by G/Y, the ratio of government consumption to GDP indicating how the government allocates its resources between investment and consumption. They also include the rate of inflation, the black-market foreign exchange premium reflecting the degree of macro imbalance, measures of openness, financial "depth", and private investment/GDP ratio.

Tables (2) shows the results. The sign of the convergence (or the catch up) term, as expected, is negative and statistically significant. The sign of the ratio of government consumption expenditures to GDP is negative indicating the expected negative effect of over-sized government. A number of studies (Aschauer 1989, Knight et al 1993, and Skinner 1987) show that public investment positively affects growth. Empirical evidence cited in Barro (1991) points to a weak correlation between public investment and growth. He interprets this as either government investment are not a significant determinant of growth or that governments are optimizing and invest up to the point where the marginal effect of such investments on growth is close to zero. To test for the effect of public investment, aggregate investment is broken into private and public investments. The private investment ratio, as expected, has a positive sign. However, the ratio of public investment to GDP while positive was highly insignificant and hence was dropped.[14] The effect of rent seeking on growth is negative. This is consistent with the interpretation of our theoretical model. Note that, due to limited and/or discontinuity of data (mainly relating to the calculation of KR index in a number of MENA countries) our sample is fairly small hence a stronger and more robust test was not possible with the data we were able to obtain.

More developed financial institutions and financial deepening are generally regarded as conducive to growth. We tested for the impact of financial depth, measured by M2/GDP, but this variable was not statistically significant. High rates of inflation reflect macroeconomic instability hence economic uncertainty. A number of large sample studies show that instability and uncertainty negatively influence growth. The level of threshold effect above which inflation significantly influences economic growth for industrial countries is estimated to be between 1-3 per cent and that for developing countries 7-11 per cent (Khan and Senhadji 2000). The average annual inflation rate (measured by CPI) in Iran during the 1974-2000 period was near 20 percent per annum. In fact the coefficient of the inflation rate is negative and significant in both estimations.

[14]Easterly and Rebelo (1993) argue that government expenditures do not affect growth in the same way and certain categories of government expenditures may have stronger effect on growth. growth.

4. Summary and Policy Conclusions

In this paper we introduced budgetary rent seeking to an endogenous model of government and growth. It was shown that the effect of rent seeking is to reduce the rate of economic growth. We considered three different cases. In the base case model, it was shown that introduction of rent seeking to Barro (1990) model reduces the rate of per capita consumption growth, though it is steal a positive constant growth rate. In the second model we allowed the government to have natural resource revenue—the resource revenue was considered to be a given sum. In this case we have a steady state (constant per capita consumption) solution. In the third version of the model, resource revenue was assumed to grow in par with non-oil GDP. Whether we get a higher long run consumption per capita growth rate in this case compared to the base case model, depends on the share of natural-resource income in total income and the share of taxes in government expenditures.

We also presented evidence regarding the extent of budgetary rent seeking in a sample of countries including some selected MENA countries. The evidence indicates the KR index tends to be higher in MENA and oil-exporting countries. The results of growth regressions indicate that the index of rent seeking has a negative effect on economic growth in a small sample of MENA countries.

The main policy conclusion suggested by our finding is that measures should be implemented to reduce the extent of rent seeking. Specification of the strategic budgetary priorities by fiscal authorities limits the potential for drafting rent-seekers' priorities into the budget. Fiscal transparency helps to reduce the extent of budgetary rent seeking. More fiscal discipline and a more streamlined government budget can induce the same result. The evidence (for Iran and Turkey) shows that a higher G/GDP ratio tends to be associated with a higher index of budgetary rent seeking. A smaller and more efficient government spending program supervision on the budget process more manageable. Better and tighter supervision and more transparency in the budget process is especially more important for the oil exporting countries which have large development expenditure programs.

Table 1. Rent Seeking Ranking for Selected Countries

Country	Rank Based on Wc	Rank Based on Rc
Holland	1	1
Australia	2	2
USA	3	4
Austria	4	3
South Korea	5	12
UK	6	6
Denmark	7	5

Spain	8	11
Canada	9	7
Phillipine	10	16
France	11	9
Finland	12	8
UAE		15
Egypt	13	14
Turkey	14	18
Kenya	15	17
Indonesia	16	20
Tunis	17	13
Sweden	18	10
Iran	19	19
Brazil	20	21

Source: Karimi (2003).

Table 2. Average KR Index for Selected MENA Countries

Period	**Egypt**	**Iran**	**Morocco**	**Tunis**	**Turkey**	**UAE**
1980s	6.94	8.36	7.87	8.16	9.77	8.13
1990s	6.98	10.12	4.29	3.85	11.84	4.95

Table 3. Growth and Rent-Seeking in Selected MENA Countries
Total panel (unbalanced) observations: 113
Number of cross-sections used: 6, One-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Rent-Seeking Index	-0.137741	0.076594	-1.798324	0.0749
Investment/Output	0.123861	0.037410	3.310944	0.0013
GDP(-1)	-1.92E-15	6.93E-16	-2.773828	0.0065
Government Consumption/output	-0.090822	0.029302	-3.099465	0.0025
Export/Output	0.033498	0.031870	1.051082	0.2956
Inflation (-1)	0.051102	0.028448	1.796329	0.0753
Weighted Statistics				
R-squared	0.269837	Mean dependent var		1.780594
Adjusted R-squared	0.235717	S.D. dependent var		5.993343
S.E. of regression	5.239576	Sum squared resid		2937.488
Log likelihood	-323.2976	F-statistic		7.908527
Durbin-Watson stat	2.265704	Prob(F-statistic)		0.000002
Unweighted Statistics				
R-squared	0.190340	Mean dependent var		0.521452
Adjusted R-squared	0.152505	S.D. dependent var		5.995058
S.E. of regression	5.519019	Sum squared resid		3259.174
Durbin-Watson stat	2.236016			

Table 4. Growth and Rent Seeking, Iran

Dependent Variable: Per Capita Real GDP Growth Rate				
Method: Least Squares				
Sample(adjusted): 1351 1379				
Included observations: 29 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG Per Capita Real GDP(-1)	-0.44969	0.081249	-5.53474	0
LOG Private Investment/Non-oil GDP	0.113471	0.042321	2.681188	0.014
LOG Imported Intermediate Goods/GDP	0.020863	0.008791	2.373245	0.0273
LOG(Government/GDP)	0.080646	0.041421	1.946993	0.065
INFLATION	-0.05225	0.015196	-3.43862	0.0025
LOG(Index of Rent Seeking)	-0.03952	0.01364	-2.89723	0.0086
C	0.892403	0.146591	6.087712	0
DUM1974	0.08302	0.03598	2.307384	0.0313
R-squared	0.814602	Mean dependnt var		0.011171
Adjusted R-squared	0.752802	S.D. dependnt var		0.069373
S.E. of regression	0.034491	Akaike info riterion		-3.66726
Sum squared resid	0.024983	Schwarz criterion		-3.29008
Log likelihood	61.1753	F-statistic		13.18139
Durbin-Watson stat	2.315537	Prob(F-statistic)		0.000002

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