

[Barro \(1990\)](#) adds a surprisingly benevolent government to an endogenous “AK” growth model. Rather than government consumption financed by distortionary taxes as in [Easterly \(2005\)](#) government spending on public investment in roads, ports, sanitation, schools, etc. is financed by uniform income tax. The public sector budget is always balanced and public investment complements private investment so higher taxes and more government spending may be associated with an increase or a decrease in growth. In fact the public sector must tax and invest or growth will be very low. The only problem is that the private sector ignores the additional tax revenues and public investment generated by its private investment, so it may invest too little. Because this is basically an AK model, it provides a very tractable framework modeling imported investment goods for example, as in [Basu and McLeod \(1992\)](#) or imported workers for example. [Barro \(1990\)](#) adds public investment or capital g to the AK model where y is GDP

per person, $y = Ak^{1-\alpha}g^\alpha$ and spending equals tax revenues $g = \tau y$, where g is government spending per capita is determined by the tax rate τ since the budget is always balanced. Using the government

budget constraint we replace g in (1A) with τy to obtain, $y = A(\tau y)^\alpha k^{1-\alpha} = A\tau^\alpha y^\alpha k^{1-\alpha}$. Bringing y^α

over to the LHS we have $y^{1-\alpha} = A\tau^\alpha k^{1-\alpha}$. Raising both sides by $1/(1-\alpha)$ yields

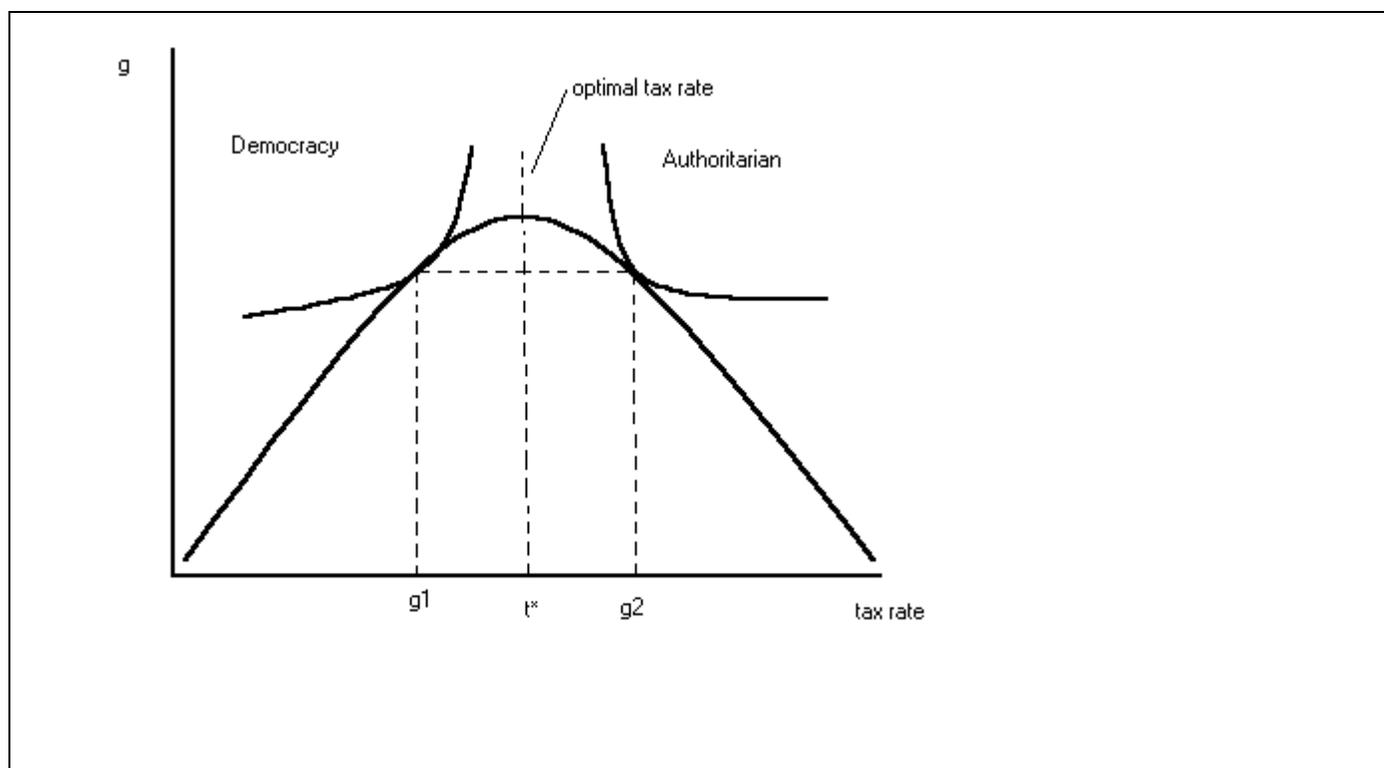
$$y = \left(A^{\frac{1}{1-\alpha}} \tau^{\frac{\alpha}{1-\alpha}} \right) k = A^*(\tau)k$$

where the new MPK in brackets $A^*(\tau)$ plays a role analogous the A in the

AK model, except that A^* depends on the tax rate τ . One might think that as before the growth rate $\gamma = 1/\theta [A^* - \rho]$ where the intertemporal elasticity of substitution is $1/\theta$ and ρ is the discount rate. But recall that the private sector only receives after tax income on capital investment, or $(1-\tau)(1-\alpha)A^*(\tau)$. Note that government has two effects on private income: it reduces after tax private income $(1-\tau)$ and up to a point greater g raises the marginal product of capital $A^*(\tau)$ for any given private capital stock k . At some point these two effects balance out and we obtain the growth maximizing tax rate τ which turns out to be α , the optimal share of g implied by our Cobb-Douglas production function, see Figure 1 below. This is analogous to the golden rule savings rate $s = \alpha$. The growth maximization problem has another twist however. Since the private sector does not take into account that the taxes it pays income generated by its investment increases g , the private sector will under invest and growth will be too low. The socially optimal growth rate is $(1-\alpha)A^*(\tau) > (1-\tau)(1-\alpha)A^*(\tau)$ so the decentralized private sector determined growth rate is lower than the “central planners” optimal growth rate. Note also that if $\tau = 0$, $g = 0$ and we have a public investment poverty trap as the private $MPK = 0$ and the growth rate is negative. Of course if the government takes the whole national product ($\tau = 1$) the growth rate also goes to zero since there is no private investment. The optimal tax rate is obviously somewhere in between 0 and 1, as shown in Figure 1 below. We cannot say *a priori* whether a small government or a large government is good for economic growth, it depends on given technology parameter α .

A note on Democracy and Economic Growth

There is a large and inconclusive literature on whether democracies have higher growth rates (see Barro, 1999 and Rodrik, 1999). Assuming taxpayers vote and paying taxes is painful (distortionary) the optimal tax rate for a democracy is likely to be a bit lower than with no frictions (lower than α in the above example). If voters (taxpayers) have no influence on the other hand, and authoritarian rulers benefit directly from higher tax revenues (e.g. higher rents or salaries) the optimal tax rate for an authoritarian regime is likely to be higher than α . The implication of these arguments is summarized in the diagram below, the democratic and authoritarian regime and may have similar growth rates, but the government sector is likely to be smaller with a democratic regime. This would be an interesting hypothesis to test, all else equal.



Further Reading:

Barro, R. (1990) [Government Spending in a Simple Model of Endogenous Growth](#) *Journal of Political Economy* 98, October, S103-S125.

Barro, R.J. (1991) ["Economic Growth in a Cross Section of Countries"](#) *Quarterly Journal of Economics*, 106, 1991.

Basu, P. and D. McLeod (1992) ["Terms of Trade Fluctuations and Economic Growth](#) in Developing Economies" *Journal of Development Economics* 37:1.

Fischer, S. (1991) *Growth, Macroeconomics and Development*, NBER Working Paper #3702, May.

Easterly, W. et. al. (1994) "Good Policy or Good Luck? Country Growth Performance and Temporary Shocks" *Journal of Monetary Economics*.

Rodrik, Dani 1999 [Institutions For High-Quality Growth: What They Are and How to Acquire Them](#)'.

IMF Conference on 2nd Generation Reforms, Washington DC. <http://www.imf.org/external/pubs/ft/seminar/1999/reforms/rodrik.htm>