Implications of dynamic optimal taxation

for the evolution of tax structures*

A comment

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The paper by James Alt (1983) lists several interesting observations in relation to the evolution of tax structures in many developed countries. The share of tax revenues collected as direct taxes has been increasing over the past century, although the timing of the major increases has varied among the countries. On page 201 he says: "The growth of the business share of direct taxes was the most striking feature of Figure 1." The figure compares seven countries in the years 1880 and 1979. Some of that growth took place between 1955 and 1979 as Figure 4 indicates. Direct taxes on households have become more progressive over time.

In attempting to explain these and other observations, Alt pays little or no attention to economic efficiency considerations. This is perhaps understandable since most of the taxation literature has dealt with static models. Recently, however, several papers have

emphasized dynamic aspects of the optimal taxation problem. Dynamic considerations are indeed of great relevance for the evolution of tax structures. I shall argue that some simple abstractions emphasizing the key elements for understanding the evolution of tax structures from a *dynamic* optimal taxation point of view provide valuable insights and help us explain the above observations.

A standard result in the taxation literature is that economic distortions associated with a given amount of tax revenue are minimized by taxing price-inelastic commodities relatively more heavily.[1] The extension to dynamic models is not immediate, however. In dynamic models of optimal taxation, there are some important issues that do not play a role in static models. These issues have only recently received attention in the literature and are described briefly in the first part of this comment. Then the potential positive implications are considered.

Dynamic optimal taxation

For our immediate purpose, it should be sufficient to restrict ourselves to representative consumer models and ignore distributional considerations. A natural abstraction, then, is one in which the government is assumed to behave so as to maximize the utility of the representative agent. Thus, the government maximizes the same function as the one being maximized by each individual in this economy. Public goods enter into the utility function, and the purpose of the government is to provide these goods whose demand may fluctuate over time. Assuming that lump-sum taxation is not feasible, ample insight can be gained by simplifying to two possible sources of tax revenues. We may think of them as taxes on labor and capital income. The government chooses how much public goods to provide along with the tax rates. Taking these as given, the individuals choose things like private consumption, labor supply, and investment (through ownership of shares in firms).

Once capital accumulation is considered, it generally becomes essential to analyze a dynamic model. Current-period decisions of the individual now depend not only upon this period's tax rates but also upon expected tax rates.

The optimal tax policy over the horizon must take into account the effects of

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1. For an introductory survey of the literature as well as an elaboration of this result, see Sandmo (1976).

future policies on aggregate behavior in earlier periods. As pointed out in Kydland and Prescott (1977), however, such a plan is generally not time consistent.[2] Once the current period is history, the effects of policies on behavior in that period are of little or no interest. Thus, the optimal policy from then on is different from the original plan for that part of the horizon.

Implications for the evolution of tax structures

Determining the optimal tax policy in the manner described above has little practical relevance unless the government can commit future policymakers. If not, the tax policy will not even lead to the desired behavior of the economy in the current period. There is no reason to believe that the government can make believable commitments of this type. Even if the policy has been announced, economic agents will most likely think there is a high probability that it will be changed. Regardless of whether the policymaker is in fact sincere, this assessment by the public leads to behavior that is different from what the policymaker expected. Unless he is determined to build up credibility, this will certainly induce him to change his plan.

Assume now that, at some stage, an optimal tax structure has been designed. Business taxes, which can be viewed as taxes on capital income, would take into account the effects on future capital accumulation. At a later point, perhaps in a period with high demand for public goods (say, due to a war or for other reasons), the government may decide that the optimal plan from then on involves taxing more heavily what is supplied inelastically, in particular, the capital stock already in place.[3] This may be the main explanation for the evolution in the direction of heavier reliance on business taxation that has been observed in most countries covered by Alt's study.

In a more elaborate model of the economy one might also allow labor-supply decisions to have an investment aspect in the form of accumulation of human capital. Comparing two income-tax schedules, one which is relatively flat and one which is more

2.   For further references, see Calvo (1978), Kydland and Prescott (1980), Fischer (1980), Turnovsky and Brock (1980), Barro and Gordon (1981), and Taylor (1982).
3.   See Kydland and Prescott (1980) for further discussion.

progressive, but both of which, at least in the short run, yield roughly the same tax revenues, the former would in all likelihood provide more incentive for human capital accumulation. Once such investment has taken place, however, the government would be tempted to make taxes more progressive. Such a development is consistent with another of Alt's empirical observations.

If the government thinks it can change the tax structure to optimal, given the current situation, without affecting expectations of further changes in the future, then the perceived benefits are likely to far outweigh the costs of changing tax structures that Alt and others refer to. It is inconceivable, however, that such a change would not affect expectations and make the results unpredictable. This effect could be viewed as the major cost associated with changing the tax structure.

In practice, especially when we get down to the fine detail of the tax structure, the government will of course also be influenced by redistributional considerations and administration costs. For example, to the extent that many low-elasticity commodities are viewed as necessities, the inverse-elasticity rule will certainly be modified. Administration costs make some forms of taxation infeasible and also preclude much deviation from uniformity in the taxation of commodities. Taking account of such considerations is not likely, however, to lead to any fundamentally different conclusions. As long as there are important dynamic elements, the basic problem discussed above will persist.

While this theory appears to provide insights on several qualitative characteristics of the evolution of tax structures, I make no claims with regard to more detailed features of the evolution, such as quantitative magnitudes of the changes or their timing. Developing a reliable descriptive theory is quite a challenging task. It is obvious from my discussion that I do not believe the optimal dynamic tax policy as of some time period t will represent a good description of what will happen over a long horizon. There does not appear to be any mechanism by which the government can commit itself to a given policy for very long. An alternative is to assume no attempts at commitment and instead use the time-consistent policy as a basis for a descriptive theory. The range in between these extremes is hard to get a firm handle on. It might involve having the government basically striving to reduce deadweight loss but every now and then deviating from the policy then prevailing

for reasons discussed above. In either case, the result is overtaxation of physical capital and other things that have a capital-like element to them.[4]

Since the government would like any change of policy to be considered a once-and-for-all change, it is natural that it would find an excuse (for example, an emergency such as a war) or another explanation in an attempt to make the new policy credible for the long run. In this sense, the above framework for thinking about changes in tax structures is complemented well by Alt's discussion on pp. 199-200. Policymakers might also argue that our understanding of the economic structure has changed and that a change of policy is necessary for that reason. It is hard to believe, however, that this could be done more than a couple of times and still achieve the intended "optimal" effects of the new policies. A likely eventual outcome is the time-consistent policy, which Kydland and Prescott (1977) showed could be quite suboptimal.

A possible way out is for the government to create an independent organization to carry out the policies. The Federal Reserve Board is an example of a supposedly independent policymaking body. Regardless of what Alt says, inflation is clearly a tax.[5] A way to interpret the Fed's existence is that the Administration or Congress realized that it was impossible to commit future governments. Any attempts at carrying out an optimal monetary policy would therefore be futile. Instead, it was in their interest to create an organization as isolated as possible from political pressure to carry out stable and well-understood monetary policy with good operating characteristics. Casual observation of the Fed's behavior suggests that its creators would have been disappointed in how things worked out. The fact that the Fed has a large group of econometricians and control theorists working on large models of the economy suggests that there is little hope for improvement in its operating procedures in the near future.

Without mechanisms for committing future governments, the effects of government policies are likely to be unpredictable and undesirable. An important avenue for further research, then, is in searching for such mechanisms. The recent paper by Lucas and Stokey (1982) represents an important step in that direction.

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4.   This may create incentives for the government to subsidize investment in physical capital as well as education and training. To the extent that people anticipate that, once the capital is in place, the income will be heavily taxed, such subsidies will have little effect on capital accumulation.
5.   I view his argument to the contrary as a matter of semantics.

REFERENCES

Alt, J.E.

    (1983)   The Evolution of Tax Structures. Carnegie Papers on Political Economy, 3. (Eds.) A.H. Meltzer, P. Ordeshook, and T. Romer, *Public Choice*. The Hague: Martinus Nijhoff.

Barro, R.J. and Gordon, D.

    (1981)   A Positive Theory of Monetary Policy in a Natural-Rate Model. (Working Paper, University of Rochester).

Calvo, G.A.

    (1978)   On the Time Consistency of Optimal Policy in a Monetary Economy. *Econometrica,* **46**: 1411-28.

Fischer, S.

    (1980)   Dynamic Inconsistency, Cooperation and the Benevolent Dissembling Government. *Journal of Economic Dynamics and Control,* **2**: 93-107.

Kydland, F.E. and Prescott, E.C.

    (1977)   Rules rather than Discretion: the Inconsistency of Optimal Plans. *Journal of Political Economy,* **85**: 473-91.

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    (1980)   Dynamic Optimal Taxation, Rational Expectations and Optimal Control. *Journal of Economic Dynamics and Control,* **2**: 79-91.

Lucas, R.E., Jr. and Stokey, N.L.

    (1982)   Optimal Fiscal and Monetary Policy in an Economy Without Capital. (Working Paper, Northwestern University).

Sandmo, A.

    (1976)   Optimal Taxation: An Introduction to the Literature. *Journal of Public Economics,* **6**: 37-54.

Taylor, J.B.

    (1982)   Establishing Credibility: A Rational Expectations Viewpoint. *American Economic Review (Papers and Proceedings)*, 72: 81-85.

Turnovsky, S.J. and Brock, W.A.

    (1980)   Time Consistency and Optimal Government Policies in Perfect Foresight Equilibrium. *Journal of Public Economics*, 13: 183-212.