

Optimal Fiscal and Monetary Policy without Commitment

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“*Optimal fiscal and monetary policy*” is a policy of choosing taxes and transfers or monetary instruments to maximize social welfare. “*Absence of commitment*” refers to inability of a policymaker to make binding policy choices.

Optimal monetary policy without commitment

Most of the results of optimal taxation literature in Ramsey framework are derived under the assumption of commitment. *Commitment* is usually defined as ability of a government to bind future policy choices. This assumption is restrictive. A government, even a benevolent one, may choose to change its policies from those promised at an earlier date. The first formalization of the notion of time-inconsistency is due to Kydland and Prescott (1977) who showed how timing of government policy may change economic outcomes. Furthermore, the equilibrium without commitment can lead to lower welfare for the society than when a government can bind its future choices.

An example that clarifies the notion of time inconsistency in fiscal policy is taxation of capital. A classical result due to Chamley and Judd (Chamley 1986, Judd 1985) states that capital should be taxed at zero in the long run. One of the main assumptions underlying this result is that a government can commit to a sequence of capital taxes. However, a benevolent government will choose to deviate from the prescribed sequence of taxes. The reason is that, once capital is accumulated, it is sunk, and taxing capital is no longer distortionary. A benevolent government would choose high capital taxes once capital is accumulated.

The reasoning above leads to the necessity of the analysis of time inconsistent policy as a game between a policy maker (government) and a continuum of economic agents (consumers). A formalization of such game and an equilibrium concept is due to Chari and Kehoe (1990). They formulate a general equilibrium infinite horizon model in which private agents are competitive, and the government maximizes the welfare of the agents. They define an equilibrium concept – sustainable equilibrium – which is a sequence of history-contingent policies that satisfy certain optimality criteria for the government and private agents.

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Recent developments in solving for the set of sustainable government policies use the techniques of the analysis of repeated games due to Abreu, Pearce, and Stacchetti (1986, 1990). Phelan and Stacchetti (2001) extend these methods to the analyze equilibria of the Ramsey model of capital taxation. Their contribution is to provide a method in which behavior of consumers is summarized as a solution to the competitive equilibrium thus significantly reducing the dimensionality of the problem. They provide a characterization of the whole set of sustainable equilibria of the game. Their methods are especially relevant if the worst punishment to the deviating government is difficult to determine as is the case of an environment with the physical capital.

Benhabib and Rusticchini (1997) and Marcet and Marimon (1994) provide an alternative method to solve policy games without commitment. They use techniques of optimal control in which they explicitly impose additional constraints on the Ramsey tax problem such that a government does not deviate from the prescribed sequence of taxes. Their methods, while easier to use than those of Abreu, Pearce, and Stacchetti (1986, 1990) and Phelan and Stacchetti (2001), are efficient only if the worst punishment to the deviating government can be easily determined.

Klein, Krusell, and Rios-Rull (2004) numerically solve for equilibria where reputational mechanisms are not operative and characterize Markov-perfect equilibria of the dynamic game between successive governments in the context of optimal Ramsey taxation. For a calibrated economy, they find that the government still refrains from taxing at confiscatory rates.

Optimal monetary policy without commitment

The problem of time consistency also arises in monetary economics. Kydland and Prescott (1977) and Barro and Gordon (1983) analyzed a reduced form economy with a trade off between inflation and unemployment. Consider an economy where the growth rate of nominal wages is being set one period in advance. The government can decrease unemployment by having setting the inflation rate to be higher than the wage rate and thus reducing the real wage, but inflation is socially costly. Suppose that a monetary authority chooses the inflation rate *after* nominal wages were set in the economy to maximize social welfare. Such a rate would equalize the marginal benefits of reducing unemployment and the marginal costs of increasing inflation. Now consider wage determination in a rational expectations equilibrium. Agents, in anticipation of government's policy, will choose a positive growth rate of wages to avoid losses from inflation. Therefore, in equilibrium, the monetary authority is not able to affect unemployment, and there is a positive rate of inflation. This outcome is inefficient, since by committing not to inflate *ex-ante*, the monetary authority could achieve the same level of unemployment with zero inflation. Therefore, the lack of commitment by the monetary authority will lead to *inflationary bias*, or inefficiently high level of inflation.

Similar effects are present in many other monetary models. For example, Calvo (1978) showed time inconsistency of the optimal policy in general equilibrium model. Chang (1998) considered a version of Calvo's model to find the optimal monetary policy

without commitment. Similar to Phelan and Stacchetti (2001), he used tools of repeated game theory to describe the best equilibrium in the game between the central bank and a large group of agents.

A substantial amount of work has been done in finding the ways to overcome time consistency problems. One of the first practical proposals was Rogoff's suggestion to appoint a "conservative" central banker (Rogoff 1985), whose private valuation of costs of inflation is higher than social valuation. Such a banker has less temptation to inflate, and the inflationary bias is reduced.

Pre-specifying rules for conduct of monetary policy reduces the discretionary actions a central bank can undertake and improves time consistency. For example, the commonly advocated Taylor rule prescribes that the central bank sets nominal interest rates as a linear function of inflation and output gap with fixed coefficients (see, e.g. Woodford (2003)). On the other hand, it may be desirable to leave some discretion to the central bank, particularly if it has access to information about economic conditions which is impossible or impractical to incorporate into predetermined rules. Athey, Atkeson and Kehoe (2005) consider an example of such an economy where the central bank has private information about the state of the economy, which is unavailable to others. They show that the optimal policy in such settings is an *inflationary cap* that allows discretion to the central bank as long as the inflation rate is below a certain bound.

Following Lucas and Stokey's (1983) analysis, substantial work has been done in determining conditions under which the government can eliminate the time consistency problem by optimally choosing debt of various maturities. Lucas and Stokey pointed out the fundamental difficulty with this approach in monetary economies, since as long as the government holds a positive amount of nominal debt, it is tempted to inflate in order to reduce its real value. Two recent papers described some of the conditions when this problem can be overcome. Alvarez, Kehoe and Neumeyer (2004) consider several monetary models and show that, if it is optimal to set nominal interest rates at zero (i.e., the optimal monetary policy with commitment is to follow the *Friedman rule*), then the time consistency problem can be solved. By issuing a mixture of nominal and real (indexed) bonds in such a way that the present value of the nominal claims is zero, the temptation for inflation can be removed. Persson, Persson and Svensson (2005) consider a model where the Friedman rule is not optimal, but they still are able to characterize the optimal maturity structure of nominal and indexed bonds that achieve the social optimum with commitment even with time inconsistent government.

Bibliography

Abreu, Dilip, 1986, "Extremal Equilibria of Oligopolistic Supergames", *Journal of economic theory*, June 1986.

Abreu, Dilip, David Pearce and Ennio Stacchetti, Toward a Theory of Discounted Repeated Games with Imperfect Monitoring, *Econometrica*, 1990, vol. 58, pp. 1041-1063.

- Alvarez, F., P. Kehoe and P.A. Neumeyer. 2005. The time consistence of optimal monetary and fiscal policies. *Econometrica* 72, 541-567.
- Athey, S. A. Atkeson and P. Kehoe. 2005. The optimal degree of monetary policy discretion. forthcoming, *Econometrica*.
- Benhabib, Jess and Rustichini, Aldo, 1997. "Optimal Taxes without Commitment," *Journal of Economic Theory*, Elsevier, vol. 77(2), pages 231-259.
- Barro, R. and D. Gordon. 1983. A positive theory of monetary policy in a natural rate model. *Journal of Political Economy* 91, 589-610.
- Calvo, G. 1978. On the time consistence of optimal policy in a monetary economy. *Econometrica* 46, 1411-1428.
- Chang, R. 1998. Credible monetary policy in an infinite horizon model: Recursive approach. *Journal of Economic Theory* 81, 431-461.
- Chamley, Christophe. 1986. Optimal taxation of capital income in general equilibrium with infinite lives. *Econometrica* 54 (May): 607-22.
- Chari, V. and P. Kehoe. 1990, Sustainable Plans, *Journal of Political Economy*, 98, 783-802.
- Judd, Kenneth L. 1985. Redistributive taxation in a simple perfect foresight model. *Journal of Public Economics* 28 (October): 59-83.
- Klein, Paul & Krusell, Per & Ríos-Rull, José-Víctor, 2004. "Time Consistent Public Expenditures," CEPR Discussion Papers 4582, C.E.P.R. Discussion Papers.
- Kydland, F. and E. Prescott. 1977. Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy* 85, 473-492.
- Marcet, A. and Ramon Marimon, 1994. "Recursive Contracts," Economics Working Papers 337, Department of Economics and Business, Universitat Pompeu Fabra.
- Persson, M., T. Persson and L. Svensson. 2005. Time consistency of fiscal and monetary policy: A solution. forthcoming, *Econometrica*.
- Phelan, C. and Ennio Stacchetti, 2001. "Sequential Equilibria in a Ramsey Tax Model," *Econometrica*, Econometric Society, vol. 69(6), pages 1491-1518.
- Rogoff, K. 1985. The optimal degree of commitment to an intermediate monetary target. *Quarterly Journal of Economics* 100, 1169-1190.

Woodford, M. 2003. *Interest and prices*. Princeton University Press.