Optimal Fiscal and Monetary Policy with Commitment

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Abstract

"Optimal fiscal and monetary policy with commitment" is a policy of choosing taxes and transfers or monetary instruments to maximize social welfare. *"Commitment"* refers to ability of a policymaker to make binding policy choices.

Optimal fiscal policy under commitment

Ramsey approach to the optimal taxation

"Ramsey approach to optimal taxation" is a solution to the problem of choosing optimal taxes and transfers given that only distortionary tax instruments are available.

A starting point of a Ramsey problem is postulating tax instruments. Usually, it is assumed that only linear taxes are allowed. Importantly, lump sum taxation is prohibited. Another assumption crucial to this approach is that all activities of agents are observable.

Given the set of taxes, a social planner (government) maximizes its objective function given that agents (firms and consumers) are in a competitive equilibrium. Usually, it is assumed that government's objective is to finance an exogenously given level of expenditures. It is important to note that, if lump sum taxes were allowed, then the first welfare theorem would hold, and the unconstrained optimum would be achieved.

There are two common approaches to solving Ramsey problems. The first is the *primal* approach, which characterizes a set of allocations that can be implemented as a competitive equilibrium with taxes. By *implementation* we mean: for a set of taxes find a set of (consumption and labor) allocations and equilibrium prices such that these allocations are a competitive equilibrium given taxes. Conversely, a set of (consumption and labor) allocations is implementable if it is possible to find taxes and equilibrium prices such that these allocations are a competitive equilibrium given these prices and taxes. Implementation often makes it possible to simplify a Ramsey problem by reformulating a problem of finding optimal taxes as the problem of finding implementable allocations. This reformulation of the problem is referred to as a *primal approach* to Ramsey taxation.

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Main lessons of Ramsey taxation: uniform commodity taxation, zero capital tax in the long run, and tax smoothing.

One of the central results of the literature on Ramsey taxation is *uniform commodity taxation* (Atkinson and Stiglitz 1972). Consider a model with a finite set of consumption goods that can be allocated between government and private consumption. All of these goods are produced with labor. Assume that each consumption good can be taxed at a linear rate. Then, under certain separability and homotheticity assumptions, commodity taxation is uniform, i.e. the optimal taxes are equated across consumption goods.

Ramsey taxation provides a compelling argument against taxing capital income in the long run in a model of infinitely lived households. The *Chamley-Judd result* (Chamley 1986, Judd 1985) states that in a steady state there should be no wedge between the intertemporal rate of substitution and the marginal rate of transformation, or, alternatively, that the optimal tax on capital is zero. The intuition for the result is that even a small intertemporal distortion implies increasing taxation of goods in future periods in contrast to the prescription of the uniform commodity taxation. Therefore, distorting the intertemporal margin is very costly for the planner. Jones, Manuelli, and Rossi (1997) extend the applicability of the Chamley-Judd result by showing that the return to human capital should not be taxed in the long run. Chari, Christiano, and Kehoe (1994) provide the state-of-the art numerical treatment of optimal Ramsey taxation over the business cycle and conclude that the ex ante capital tax rate is approximately zero.

There has been a long debate on the optimal composition of taxation and borrowing to finance government expenditures. Barro (1979) considered a partial equilibrium economy and argued that it is optimal to smooth distortions from taxation over time, a policy referred as *tax smoothing*. The implication of this analysis is that optimal taxes should follow a random walk. Lucas and Stokey (1983) considered an optimal policy in a general equilibrium economy without capital, and showed that if government has access to state contingent bonds optimal taxes inherit the stochastic process of the shocks to government purchases. Chari, Christiano and Kehoe (1994) extended this analysis to an economy with capital and showed the Lucas and Stokey results remain valid in that set up with or without state contingent debt, as long as the government can use taxes on capital to effectively vary the ex-post after tax rate of return on bonds. Finally, Aiyagari et al. (2002) analysis showed that if ex-post taxation of returns is impossible, the optimal taxes follow a process similar to a random walk. They also showed the conditions under which the tax smoothing hypothesis is valid.

Mirrlees Approach to optimal taxation

The Mirrlees approach to optimal taxation is built on a different foundation than Ramsey taxation. Rather than stating an ad hoc restricted set of tax instruments as in Ramsey

taxation, Mirrlees (1971) assumed that an informational friction endogenously restricted the set of taxes that implement the optimal allocation. This setup allows arbitrary nonlinear taxes, including lump-sum taxes.

The informational friction posed in those models is unobservability of agent's skills: only labor income of agents can be observed. Therefore, from a given level of labor income it cannot be determined whether a high skill agent provides a low amount of labor or effort, or whether a low skill agent works a prescribed amount. The objective of the social planner (government) is to maximize ex-ante, before the realization of the shocks, utility of an agent. This objective can be interpreted as either insurance against adverse shocks or as ex-post redistribution across agents of various skills. An informational friction imposes *incentive compatibility* constraints on the planner's problem: allocations of consumption and effective labor must be selected such that an agent chooses not to misrepresent its type.

In summary, the objective of the Mirrlees approach is to find the optimal incentive-insurance tradeoff: how to provide the best insurance against adverse events (low realizations of skills) while providing incentives for the agents to reveal their types (provide high amount of labor).

Main lessons of Mirrlees approach in a static framework.

Theoretical results providing general characterization of the optimal taxes in the static Mirrlees environment are limited. The central result is that the consumption-leisure margin of an agent with the highest skill is undistorted, implying that the marginal income tax at the top of the distribution should be optimally set equal to zero. Saez (2001) is a state-of-the art treatment of the static Mirrlees model in which he derives a link between the optimal tax formulas and elasticities of income. Mirrlees (1971) was also able to establish broad conditions that would ensure that the optimal marginal tax rate on labor income was between 0 and 100 percent.

Main lessons of dynamic Mirrlees literature: distorted intertemporal margin

Recent literature starting with Golosov, Kocherlakota, and Tsyvinski (2003) and Werning (2001) extends the static Mirrlees (1971) framework to dynamic settings. Golosov, Kocherlakota, and Tsyvinski (2003) consider an environment with general dynamic stochastically evolving skills. An example of a large unobservable skill shock is disability that is often difficult to observe (classical example is back pain or mental illness). Golosov, Kocherlakota, and Tsyvinski (2003) show for arbitrary evolution of skills that, as long as the probability of agent's skill changing is positive, any optimal allocation includes a positive intertemporal wedge: a marginal rate of substitution across periods is lower than marginal rate of transformation. The reason for this is that this wedge improves the intertemporal provison of incentives by implicitly discouraging savings. This result holds even away from the steady state and sharply contrasts with the

Chamley-Judd result that stems from the exogenous restriction on tax instruments. Werning (2001) and Golosov, Kocherlakota, and Tsyvinski (2003) show that, in a case of constant types, a version of uniform commodity taxation holds and the intertemporal margin is not distorted.

Implementation of dynamic Mirrlees models is more complicated than implementation of either static Mirrlees models, which are implemented with an income tax, or than implementation of Ramsey models of linear taxation. By implementation we mean finding tax instruments such that the optimal allocation is a competitive equilibrium with taxes. One possible implementation is a direct mechanism that mandates menus consumption and labor allocations for each date. However, such mechanism can include taxes and transfers never used in practice. Three types of implementations were proposed. In Albanesi and Sleet (2004), wealth summarizes agents' past histories of shocks that are assumed to be i.i.d. and allows us to define a recursive tax system that depends only on current wealth and effective labor. Golosov and Tsyvinski (2006) implement an optimal disability insurance system with asset-tested transfers that are paid to agents with wealth below a certain limit. Kocherlakota (2005) allows for a general process for skill shocks and derives an implementation with linear taxes on wealth and arbitrarily nonlinear taxes on the history of effective labor.

Optimal monetary policy

The theory of the optimal monetary policy is closely related to the theory of optimal taxation. Phelps (1973) argued that the inflation tax is similar to any other tax, and therefore should be used to finance government expenditures. Although intuitively appealing, this argument is misleading. Chari, Christiano and Kehoe (1996) extended the Ramsey approach to analyze optimal fiscal and monetary policy jointly in several monetary models, and found that typically it is optimal to set the nominal interest rate to be equal to zero. Such policy, called a *Friedman rule*, after Milton Friedman, who was one of the first proponents of zero nominal interest rates (Friedman (1969)). To understand intuition for the optimality of Friedman rule, it is useful to think about a distinctive feature of money from other goods and assets. In most models, money play a special role of providing liquidity services to households that cannot be obtained by using other assets such as bonds. Inefficiency arises if the rates of return on bonds and money are different, since households, by holding money balances lose the interest rate. When a nominal interest rate is equal to zero, which in deterministic economy implies that inflation is negative, with nominal prices declining with the rate of households time preferences, the real rates of return on money and bonds are equalized, and this inefficiency is eliminated.

The optimality of the Friedman rule stands in a direct contrast with Phelps arguments for use of the inflationary tax together with other distortionary taxes such as taxes on consumption or labor income. The reason for this is that money, unlike consumption or leisure, is not valued by households directly, but only indirectly, as long as it facilitates transactions and provides liquidity. Therefore, it is more appropriate to think of money as

an intermediate good in acquiring final goods consumed by households. Diamond and Mirrlees (1971) established very general results about undesirability of distortion of the intermediate goods sector, which in monetary models implies that inflationary tax should not be used despite the distortions caused by taxes on the final goods and services.

The intuition developed above is valid under assumption that nominal prices are fully flexible, and firms adjust them immediately in response to changes in market conditions. However, even a casual observation suggests that many prices remain unchanged over long periods of time, and Bils and Klenow (2004) documented inflexibility of prices for a wide variety of goods. Inflexible or *sticky prices* lead to additional inefficiencies in the economy that could be mitigated by monetary policy. For example, an economy wide shock, such as an aggregate productivity shock or a change in government spending may call for a readjustment of real prices. If adjustment of nominal prices is sluggish, the central bank can increase welfare by adjusting nominal interest rates and affecting real prices.

It is important to recognize that a government is also able to affect real (after tax) prices using fiscal instruments instead. In fact, Correia, Nicolini and Teles (2002) show that, if fiscal policy, is sufficiently flexible and can respond to aggregate shocks quickly, then the Friedman rule continues to be optimal even with sticky prices, with fiscal instruments being preferred to monetary ones. In current practice, however, it appears that it takes a long time to enact changes in tax rates, while monetary policy can be adjusted quickly. Schmitt-Grohe and Uribe (2004) showed that as long as tax levels are fixed or government is not able to levy some of the taxes on goods or firm's profits, then the optimal interest rate is positive and variable.

Most of the applied literature on the monetary policy is based on the joint assumption of sticky prices and inflexible fiscal policy. Woodford (2003) provides a comprehensive study of the optimal policy in such settings. This analysis examines how central bank response should depend on the type of the shock affecting the economy, degree of additional imperfections in the economy, as well as choose the policies that would rule out indeterminacy of equilibria. Two common policy recommendations for central banks share many of the features of the optimal policy responses in this analysis. One of such recommendations – a *Taylor rule* (see Taylor (1993)) – calls for the interest rates to be increased in response to an increase in the output gap (difference between actual and a target level of GDP) or inflation. Another recommendation, *inflation forecast targeting*, requires that the central bank commits to adjust interest rate to ensure that projected future path of inflation or other target variables does not deviate from the pre-specified targets.

In addition to the analysis described above, several new, conceptually different approaches to the analysis of monetary policy have emerged in the recent years. For example, da Costa and Werning (2005) reexamine optimal monetary policy with flexible prices in Mirrleesian settings and confirm the optimality of the Friedman rule there. Seminal work by Kiyotaki and Wright (1989) gave raise to a large search-theoretic literature seeking to understand the fundamental reasons that money differs from other

goods and assets in the economy. Lagos and Wright (2005) provide a framework for the analysis of optimal monetary policy in such settings.

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