Literature Review

MACS 30000, Dr. Evans

Xinzhu Sun 12147991

My research topic is **The Impact of Postponing Announced Unconventional Fiscal Policy on Consumption Expenditure**. In my research, I'm trying to study the reaction and expectation of consumers when government announces a future sales tax increase but has the option to postpone it. The existing research related to my topic can be divided into two categories. One is on the time consistency and optimal policy design, the other is on the effect of unconventional fiscal policy.

Time consistency and optimal policy design

The most important question addressed by policy design is how to make accurate predictions of people's behavior under alternative policies. In most situations, people's current decisions depend on their expectations of future policies. Forecast on how the expectations may change in response to the change of the current policy is in general difficult. For example, consumer decisions on durable goods such as cars and household appliance depend on consumers' expectations of future price as well as tax rate. If consumers expect future price and tax rate to be high, they'll probably renew their durable goods today or postpone the renewal plan otherwise. Policy designers can't predict how the taxpayers respond to a tax cut today unless they can estimate the changes of people's expectations of future tax rates as a result of the cut.

Lucas (1976) suggests an elegant approach to solving the problem of forecasting changes in expectations that follow from policy changes. He argues that although people's decisions vary systematically with their expectations of future policies, it is reasonable to suppose that some fundamental features of the economy do not change despite the changes in the current and future policies. For example, people don't make decisions arbitrarily; rather, their decisions are made to maximize certain objective functions, given the current and expected future policies. It is now standard practice to assume that the structure of private agents' objective functions is fixed however the policy changes. If policy makers can estimate people's objective functions to maximize and expectations of future policies, they can indeed predict people's subsequent decisions for each potential policy. Because objective functions are assumed not to change, historical data can be used for estimation, see e.g., Hansen and Sargent (1980). The expectations of future policies can easily be predicted when the gov-

ernment announces a sequence of policies today (or possibly, rules describing policy choices in various contingencies) and people do believe those policies will be implemented in the future. Such a sequence of policies is called a policy regime. Given a policy regime, private agents' maximize objective functions to compute their optimal decisions. Policy criteria are applied to compare the outcomes of different regimes and the best policy regime is selected. Note that the best policy sequence are often called Ramsey policies in that Ramsey raised it up first.

On some future day, the policymaker is interested in whether it is optimal to continue with that regime. To reevaluate, he calculates the optimal policies in the same way as he did on the original day. If the optimal policies chosen in the future coincides with the original plan, the policymaker thus sticks to that plan, and the policy regime is time consistent. If otherwise, the policymaker abandons the original plan and the policies of the regime are time inconsistent. In a series of graphic examples, Kydland and Prescott (1977), Calvo (1978) and Fischer (1980) show that Ramsey policies are often time inconsistent. Their examples suggest that time inconsistency problems arise when people's current decisions depend on expectations of future policies and their current choices affect future opportunity sets. Since their decisions have been made when the future arrives, the government has an incentive to abandon the Ramsey policies. If Ramsey policies are time inconsistent, people realize that the preannounced policies will not be followed in the future. Recall Ramsey policies are computed under the assumption that people believe the policies will be carried out. If people expect a different set of future policies, the Ramsey policies may no longer be optimal.

The suboptimality of Ramsey polices is further studied by Chari (1988). He develops two classic models to illustrate the time inconsistency of Ramsey policies and show how sustainable policies and outcomes can be computed. The first model studies capital taxation and the second considers default on government debt. In the capital taxation model, investment decisions depend on expected tax rates whereas in the default model, decisions to purchase government debt depend on expectations of future default. In both models, once private decisions are made, people are vulnerable to policy changes. The author considers both finite and infinite time horizons for the models and shows that when the time horizon is finite, Ramsey policies and sustainable policies are quite different: the Ramsey policies yield higher welfare than the sustainable ones. Thus, if a commitment technology is available, it should be used to prevent governments from deviating from the Ramsey policies. If a commitment technology is unavailable, then the sustainable policies are the best to do. When the

horizon is infinite, the set of sustainable policies and outcomes is much larger. In fact, it is sometimes possible for Ramsey policies to sustain in equilibrium because people believe that if the government has followed the Ramsey policies in the past, it will continue to do so. If, however, the government deviates, then people believe the government will revert to sustainable policies under finite horizon. The government, faced with these beliefs, has no incentive to renege. Such policies are called trigger strategies: small changes in one player's decision trigger large changes of other players' decisions. The author concludes that although the result that the Ramsey policies are sometimes sustainable is appealing, the use of trigger strategies to support such policies implies that people's beliefs about future policies change drastically in response to even small policy changes. In fact, discontinuous changes in beliefs are necessary to support Ramsey policies to be an equilibrium. The discontinuity suggests a difficulty in designing good policies: a policy change that policymakers view to be desirable might lead the public to expect a change in the policy regime, thereby inducing undesirable outcomes.

Properties of Ramsey policy is also studied in stochastic growth models. Zhu (1992) and Chari et al. (1994, 1995) characterize the optimal taxation in the context of stochastic growth. Stockman (2001) studies the properties of optimal fiscal policy in a stochastic growth model in the presence of a balanced budget constraint. He shows that limits on the possibility of the government to run surpluses and deficits have no dramatic effects on the optimal policies when commitment is imposed. However, there is no guarantee that the same result would carry over to the no-commitment case.

All of the papers above assume that the government can commit herself to the policies that will be in place arbitrarily far in the future. It is generally recognized that no real government has access to a perfect commitment technology. Two plausible approaches are developed to analyze optimal fiscal policy. One is to find mechanisms that substitutes for commitment technology. Several mechanisms are proposed in the literature. In a model without capital, Lucas and Stokey (1983) show how to render the optimal fiscal policy time-consistent through a suitable choice of maturity structure for public debt. Persson et al. (1987) use the tool of nominal debt to make optimal monetary policy time-consistent. Finally, Chari and Kehoe (1990) show how to use repetitional mechanisms such as trigger strategies to substitute for commitment in a fully fledged stochastic growth model. The alternative approach is to seek optimal fiscal policies when no commitment technology is available and mechanisms that substitute for commitment are not in place. Klein and Rois-Rull

(2003) force the government to determine her policy based on fundamentals only. They focus on Markov perfect equilibria, which are time-consistent by construction. They contrast the properties of these Markov perfect equilibria with those of an economy where the government can commit to her policies into the infinite future. They provide a quantitative treatment of the positive effect of factor taxation and account for the magnitude of empirical capital income taxes even in the absence of heterogeneity in the wealth distribution. They also give a quantitative assessment of how various constitutional aspects affect the equilibrium level of factor income tax rates.

Later, Debortoli and Nunes (2010) find the research which takes the two different approaches to tackle optimal policy problems - commitment and no-commitment, is both to some extent unrealistic. The commitment approach does not match the observation that governments have defaulted on past promises. The no-commitment approach rules out the possibility that the government achieves the most benefits by making and keeping a promise, even if there is a posteriori incentive to renege on it. The authors develop a third approach by considering that some of the policymakers' promises are fulfilled while others are not. A political economy interpretation is that governments fulfill their own promises, but it is possible that a new government is elected and the last government's policies are repealed. Another interpretation is that a government commits to future plans, but defaulting on past promises becomes inevitable if particular events arise, e.g. political instability, resistance from the society, etc. Another interpretation is that policymakers are often required to re-evaluate policy. They analyze the optimal fiscal policy problem under very loose commitment. They find the optimal policies are sensibly affected by re-optimization and do not necessarily lie in between the policies prevailing under full-commitment and no-commitment. On average, even if the probability to keep promises is high, labor and capital income tax rates are close to the values prevailing under the no-commitment assumption. With full-commitment it is optimal not to tax capital in the long-run while under loose commitment the average capital tax rate is positive.

I'll use the techniques developed in those researches to build my own model under no-commitment and loose commitment situation. But my research is different from theirs in that first, unlike their models which focus on monetary policy or capital income tax and labor tax, mine will focus on the value-add tax(VAT) or more specifically, sales tax. Second, in the sequence of policy in my model, the government won't change the tax rate directly, they'll first make an announcement to allow consumers to adjust their behavior, and then decide whether to keep their announcement. That is,

in my model, the expectation generate first before the next reaction of the government.

Unconventional fiscal policy

Macroeconomists recently propose unconventional fiscal policy measures to stimulate demand by changing inter-temporal prices. Unconventional fiscal policy uses announcements of future increases in consumption taxes to generate inflation expectations and accelerate consumption expenditure. It differs from the conventional fiscal stimulus or tax rebates because it does not rely on income effects, and is time consistent and budget neutral.

Shapiro(1991), Feldstein (2002) and Hall (2011) propose pre-announced increases in value-add tax (VAT) to generate consumer price inflation and stimulate spending via inter-temporal substitution without increasing the federal budget deficit. Farhi et al. (2013) formalize this idea in a framework with a binding zero lower bound on nominal interest rates. An increasing path of consumption taxes and a decreasing path of income taxes generates inflation expectations, negative real interest rates, and stimulates consumption but does not distort the production decisions of firms. The authors find these policies can fully offset the zero lower bound constraint without relying on inefficient commitments on low future interest rates or wasteful government spending.

Pre-announced VAT increases can saliently generate future consumer price inflation. The salience of consumption taxes could be an advantage of using taxes to generate inflation and to engineer negative real interest rates (Wiederholt (2016)). The literature on the effect of sales-tax holidays suggests consumers in the United States change their consumption patterns around temporary changes in sales taxes (Agarwal et al. (2013)). Sales-tax holidays in the United States are announced in advance, and last for short periods during days of peak demand, such as the back-to-school season. These holidays only apply to a small set of goods. The predictability and seasonality of the tax holidays shift consumption over time. The short length of the sales-tax holidays, often two or three days, and the small set of goods involved, make it difficult to assess the macro implications. In addition, the temporary tax cuts reduce tax revenues rather than be budgetary neutral or generate extra revenues. Sales-tax holidays can only be stimulative if they are not pre-announced (see Correia et al. (2013)).

Francesco et al. (2016) conduct a unique natural experiment in Germany to empirically test the effectiveness of unconventional fiscal policy. Their empirical design uses matched households in EU countries that are not exposed to the VAT shock as

a control group opposed to German households. A difference-in-differences identification strategy is adopted. They find after the German government announced in November 2005 an unexpected 3-percentage-point increase in value-added tax (VAT) effective in 2007, not only German's households' inflation expectations during 2006 and actual inflation in 2007 increased, but Germans' willingness to purchase durable goods increased. However, it should be noticed that the German's case is unique for two reasons. First, European Union (EU) imposed the announcement on the German administration to avoid an infringement procedure for the breach of the Maastricht Treaty, thus the VAT increase was unexpected and unrelated to prospective future economic conditions, and qualified as an exogenous tax change due to inherited fiscal deficits. Second, Germany had no monetary sovereignty as a member of the European Economic and Monetary Union. The European Central Bank explicitly excluded any increase in nominal interest rates to counteract the price pressure from a higher VAT in Germany.

I'll use the Japanese data to evaluate the effect of unconventional fiscal policy and test my model empirically. Although constructing natural experiment and surveying the consumers are idea approach to test the effectiveness, it's unrealistic to build a good control group for Japan and survey Japanese people now. So I'll apply the techniques of simulating data in those papers. My research differs theirs in that they only measure the effect of unconventional fiscal policy itself, while mine will measure a sequence of effect of postponing the policy.

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