

Nominal debt as a burden on monetary policy

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Abstract

We characterize the optimal sequential choice of monetary policy in economies with either nominal or indexed debt. In a model where nominal debt is the only source of time inconsistency, the Markov-perfect equilibrium policy implies the progressive depletion of the outstanding stock of debt, until the time inconsistency disappears. There is a resulting welfare loss if debt is nominal rather than indexed. We also analyze the case where monetary policy is time inconsistent even when debt is indexed. In this case, with nominal debt, the sequential optimal policy converges to a time-consistent steady state with positive—or negative—debt, depending on the value of the intertemporal elasticity of substitution. Welfare can be higher if debt is nominal rather than indexed and the level of debt is not too high.

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1. Introduction

Fiscal discipline has often been seen as a precondition for price stability. Such is, for example, the rationale behind the Growth and Stability Pact in Europe. The underlying policy debate shows the concern regarding a time-inconsistency problem associated with high levels of nominal debt that could be monetized. In this paper we analyze the implications for the optimal sequential design of monetary policy when public debt is nominal and when it is

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indexed. We characterize the optimal sequential policy choices with both nominal and indexed debt and assess the relative performance of the two in terms of welfare.

The model is a cash-in-advance production economy where agents start the period with predetermined money balances, which are used for transactions during the period, as in Svensson (1985). The government's problem is to finance exogenous government expenditures in the least distortionary manner. In this economy, an increase in the price level decreases the real value of outstanding money and nominal debt and therefore reduces the need for distortionary taxation. However, this also induces a fall in present consumption because of the cash-in-advance constraint. As shown by Nicolini (1998), who analyzes the same class of economies, the incentives to inflate, or deflate, depend on preferences and on whether debt is nominal or real.

If debt is indexed, the decision on whether to use the inflation tax, to tax today or tomorrow, hinges on the intertemporal elasticity of substitution. If the elasticity is one then it is equal to the implicit elasticity of the cash-in-advance constraint and the optimal plan is time consistent. However, with nominal debt, there is a reason to monetize the debt, and the optimal policy plan is no longer time consistent. We show that in a Markov-perfect equilibrium path the debt is asymptotically depleted, and therefore the path for the nominal interest rate is decreasing. In this case of unitary elasticity, the fact that debt is nominal rather than indexed introduces a dynamic distortion that lowers welfare unambiguously.

For the general case of non unitary elasticity, the optimal policy plan is time inconsistent even with indexed debt. Optimal taxation principles dictate whether current or future consumption should be taxed more. In particular, if the intertemporal elasticity of substitution is higher than one—that is, higher than the implicit elasticity of the cash-in-advance constraint—it is efficient to tax more current consumption; along a sequentially optimal path, indexed debt is depleted all the way to the first best, where it is negative and large enough in absolute value to finance all expenditures without the need to collect distortionary taxes. If the intertemporal elasticity is, instead, lower than one, future consumption is taxed more and debt increases asymptotically.

With nominal debt, the incentives to inflate when debt is positive can compensate the incentives to deflate when the intertemporal elasticity is lower than one. Similarly, the incentives to deflate when debt is negative can compensate the incentives to inflate when the intertemporal elasticity is higher than one. At the debt level where these conflicting incentives cancel out there is a steady state. This stationary level of debt is negative for elasticity higher than one, and positive for elasticity lower than one. For different levels of initial debt, optimal sequential paths of nominal debt converge to this steady state.

When the elasticity is different from one, in contrast with the unitary elasticity case, nominal debt solves—in the long-run—a time-inconsistency problem present in the indexed-debt case; in particular, if the elasticity is higher than one, there is no need to accumulate so many assets in order to achieve the first best, as in the indexed-debt case; if the elasticity is lower than one, debt does not increase asymptotically.

A central contribution of this paper is the welfare comparison of the two regimes, nominal or indexed debt. If the intertemporal elasticity of substitution is one, indexed debt unambiguously dominates nominal debt in terms of welfare. In contrast, if the elasticity is non-unitary, the fact that the incentive to monetize the debt can compensate the distortions present with indexed debt can result in nominal debt dominating indexed debt. In particular, as our computations show—when debt is relatively low—nominal debt can be a blessing, rather than a burden, to monetary policy.

Related work includes Calvo (1988), Obstfeld (1997), Nicolini (1998), Ellison and Rankin (2007), Martin (2006), Persson et al. (2006), and Reis (2006). Calvo (1988) addressed the question of the relative performance of nominal versus indexed debt, considering a reduced form model with two periods, where nominal debt creates a time inconsistency. There is an ad hoc cost of taxation and an ad hoc cost of repudiation that depends on the volume of debt. The focus of Calvo (1988) is on multiple equilibria, which result from his assumption on repudiation costs. With such a model, it is not possible to understand how debt, either nominal or indexed, can be used as a state variable affecting future monetary policy; how optimal equilibrium paths should evolve, or why different welfare rankings of indexed versus nominal debts are possible.

Obstfeld (1997) and Ellison and Rankin (2007) assume that debt is real, and focus on monetary policy. They compute Markov-perfect equilibria when the source of the time inconsistency of monetary policy is related to the depletion of the real value of money balances. Obstfeld (1997) uses a model where money balances are not predetermined and therefore must consider an ad hoc cost of a surprise inflation. Ellison and Rankin (2007) use the model in Nicolini

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