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Dixit-Lambertini (JIE, 2003a), Inflationary Bias, Fiscal Policy and Expropriation

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Abstract

This paper studies the impact of fiscal policy and expropriation on the time-inconsistency problem. Contrary to Dixit and Lambertini's (2003a) symbiosis result, it is argued that fiscal policy alone does not suffice to eliminate the inflationary bias of monetary policy. Ironically, it is only when fiscal policymakers are modelled to "cheat" the public (by expropriating wealth) that monetary policymakers are constrained in their "cheating" of the public (by reneging on a promise to the public). The political economy model presented nests the standard monetary-fiscal interaction logic without expropriation as well as the argument by Dixit and Lambertini.

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Keywords: monetary policy, fiscal policy, time inconsistency, rent seeking, grand corruption, political economy.

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1 Introduction

There has been a renewed discussion of the time-inconsistency problem of monetary policy: is there really an inflationary bias of monetary policy? Under which conditions are monetary policymakers constrained in their "cheating" of the public? The interaction between fiscal and monetary policy as well as the impact of the inflation-averseness of central banks (central bank conservatism) are important ingredients in this discussion. While relating to two recent articles published in the Journal of International Economics (JIE) this paper develops a political economy model of fiscal-monetary interdependence with two purposes. First, it argues that fiscal policy alone cannot avoid the inflationary bias of monetary policy, thereby disputing Dixit and Lambertini's (JIE, 2003a) "symbiosis" result. Dixit and Lambertini claim that an inflationary bias cannot occur, if policymakers agree on their bliss points. Second, this paper contends that rent-seeking in fiscal policy can limit the inflationary bias, thereby complementing the discussion by Huang and Wei (JIE, 2006). They maintain that institutional quality (or petty corruption) affects the inflationary bias and determines the optimal degree of central bank conservatism.[1]

It all started with Kydland and Prescott's (1977) seminal paper. They analyse the phenomenon that policymakers may wish to deviate from pre-announced policies once private agents have based their decisions on policymakers' promises. By reoptimising, policymakers can benefit while exploiting private agents' trust. If agents anticipate, the advantage is lost and both parties are trapped in a suboptimal outcome. This is called the policy time-inconsistency problem. It was already Kydland and Prescott (1977), who applied the time-inconsistency problem to monetary policy and the exploitation of the short-run Phillips curve. The argument is that an increase of pre-announced inflation (leading to reduced real wages) can be used to reduce unemployment below the natural rate of unemployment. Barro and Gordon (1983a and 1983b) developed this idea more explicitly in static and dynamic

[1] Surprisingly, Huang and Wei (2006) do not even quote Dixit and Lambertini (2003a), even though both papers are based on Barro-Gordon (1983a) type models and discuss how to reduce or avoid the inflationary bias.

frameworks. They argue that a commitment device is required to prevent deviating policies, restore private agents' trust in the policymaker, and thus ensure an optimal outcome. Rogoff (1985) posits that an independent, conservative (i.e. inflation averse) central bank can establish the reputation for non-inflationary monetary policy and thus act as such a commitment device.[2]

A major limitation of the aforementioned line of reasoning is that it ignores fiscal policy. Alesina and Tabellini (1987) argue that policymakers would not need to use time-inconsistent policies in order to achieve the desired level of unemployment, if taxes were non-distortionary and could be used to subsidise firms so that they can provide the desired level of employment. Based on a Barro-Gordon (1983a) type model (including micro-foundations) of distortionary taxation, they then show that the "fiscal authority is made better off by having an independent [Rogoff(1985)-style conservative] central bank". Using a similar model, Huang and Wei (2006) argue that Rogoff-conservatism is not necessarily a good thing. If government and central bank base their respective fiscal and monetary policy decisions on a similar loss function, central bank conservatism should be limited, if the institutional quality of the government is rather poor.[3] In another Barro-Gordon type model, Demertzis, Hughes Hallett and Viegi (2004) go even further. They argue that the conflict between monetary and fiscal authorities increases when preferences become more divergent. This also implies a larger inflationary bias, the more conservative the central bank becomes. Unlike Alesina and Tabellini (1987), the two more recent papers describe circumstances in which a Rogoff(1985)-style conservative central banker is not necessarily helpful for reducing the inflationary bias.

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[2] Central bank conservatism can be achieved in various ways. First, central bank governors are penalised for inflation as proposed by Persson and Tabellini (1993) and Walsh (1995). Their idea of optimal central banker contracts is developed, for instance, by Candel-Sánchez and Campoy-Miñarro (2004) and Chortareas and Miller (2004 and 2007). Second, inflation targets are imposed as suggested by Svensson (1997) and discussed by Beetsma and Jensen (1999). Third, in Fatum (2006) conservatism results from central bank council decisions, if national delegates are strategically selected.

[3] The intuition is that conservatism makes (expansionary) monetary policy painful. So, policymakers would normally avoid monetary policy. But poor institutional quality makes fiscal policy also painful. Therefore, society would be better off with less conservatism.

Dixit and Lambertini (2003a) obtain quite a different result. They analyse policy interaction when there are a union-wide monetary authority and a multitude of fiscal policymakers (thus resembling the situation in Euroland). In their model, monetary and fiscal policy can become symbiotic, if policymakers agree on their bliss points, irrespective of disagreement on weights, non-coordination, order of moves, etc. Unlike all other papers, conservatism of the central banker does not matter at all. In stark contrast to Alesina and Tabellini (1987) and all the others, they emphasise that the presence of fiscal policy variables alone eleminates the time-inconsistency problem.

Such a general result seems surprising and prompts me to comment on Dixit and Lambertini (Journal of International Economics 60, 2003a, pp. 235-247) in section 2 of this paper. In essence, the argument goes as follows. In their appendix, Dixit and Lambertini (2003a) develop a microfounded model, obtain the steady state, and derive some policy implications from perturbation results. Then they construct a macromodel based on the steady state results of their micromodel and derive far-reaching conclusions.[4] By construction, fiscal policy in their macromodel is totally unconstrained and fiscal policymakers can always choose a costless, even beneficial, way to expand output. My critique of Dixit and Lambertini (2003a)[5] is presented from two angles. First, their paper is criticised from a conceptual and economic point of view within section 2. While doing so, it is also pointed out that their symbiosis result is merely a special case of a general result by De Bruyne (1979), who proves that a non-cooperative equilibrium is Pareto-optimal, if there is no conflict of interest. Second, the argument of a missing cost for fiscal policy is taken up again at the end of section 4. The political economy model presented there can emulate the Dixit and

[4] Dixit and Lambertini say: "We interpret our results - ... - in a normative way. If the authorities' preferences can be chosen in advance and can be made to coincide, the ideal inflation and output levels can be attained independently of the details of the institutions." Such a general interpretation is astonishing since they realise (though only briefly mentioned on p. 239) that their results are only relevant close to the steady state.

[5] Which is, however, not intended to diminish their other work on the inflationary bias and monetary and fiscal policy interaction, for instance Dixit and Lambertini (2001 and 2003b). In fact, in their (2003b) paper they do what they do not do here, i.e. assign a cost to fiscal policy by capturing the deadweight loss of fiscal policy in the social and fiscal authority's loss functions.

Lambertini (2003a) assumption as well as their result by restricting one of the section 4 model parameters.

The basis for this discussion is laid in section 3, with an extension in section 4. Elements from some of the aforementioned papers are incorporated. The parsimonious model presented in section 3 does not require an (unrealistic) balanced budget constraint for each period. Fiscal policy is, nonetheless, constrained in that a budget deficit or surplus produces a loss for the policymaker. This is so because borrowing does not come free of charge. Similarly, a budget surplus would have allowed the government to spend more on public goods and, therefore, also carries a cost. In that regard the model is similar to, for instance, Demertzis, Hughes Hallett and Viegi (2004) or Agell, Calmfors and Jonsson (1996). Since fiscal policy leading to an unbalanced budget is now costly, it is not surprising that the inflationary bias is back. Note, however, that we obtain this result – in contrast to Alesina and Tabellini (1987) – without introducing distortionary taxes.

Section 4 introduces and analyses the model extension. Similar to the spirit of Huang and Wei (2006), corruption (or, more generally, rent-seeking) is allowed. However, this is not modelled as an inefficiency in the tax collection process as in their paper. Instead, there is grand corruption: expropriation is an explicit objective of the policymaker. It is shown that this affects the time-inconsistency problem. Ironically, acknowledging that fiscal policymakers may try to "cheat" the public (by expropriating wealth) results in monetary policymakers being constrained in their "cheating" of the public (by reneging on a promise to the public). In this model, the inflationary bias is not eliminated due to the fiscal policy extension per se as claimed in Dixit and Lambertini (2003a), but limited because authorities can also expropriate wealth. With just a small degree of grand corruption the inflationary bias of monetary policy is constrained, but can only be avoided altogether, if the central bank is extremely conservative. By restricting the expropriation parameter the model also allows us to emulate the Dixit and Lambertini (2003a) case: fiscal policy can be used costlessly to expand output. Then, as in Dixit and Lambertini, there is no conflict of interest between

the monetary and the fiscal authority. Once again, we obtain the Dixit and Lambertini symbiosis result: the inflationary bias is gone. Section 5 concludes.

2 Some Comments on Dixit and Lambertini

Commenting on Dixit and Lambertini (2003a) requires to look at the way they combine an underlying micro model with a separate macro model used for obtaining their key result. The underlying model is their own version[6] of Obstfeld and Rogoff's (1995) two-country general equilibrium model with monopolistic competition, the so-called redux model, which itself is based on Blanchard and Kiyotaki (1987). Within the model, they obtain perturbation results around the steady state - as you would typically expect. Then, however, the log-linearised steady state conditions enter into a different model which also contains new objective functions for the authorities. This new macro model is the one that is used for analysing the time-inconsistency problem. Even though they note early in the text that "our analysis and its results can [only] be justified as long as the economy is not far from the steady state", they draw far-reaching conclusions in the end: "... when they [the fiscal policy variables] are present the monetary policy can avoid the time-inconsistency problem."[7] Here, it is argued from both a conceptual and an economic point of view that their way of combining a micro and a macro model is problematic and explains their stunning result.

Dixit and Lambertini's (2003a) underlying microfounded 2-country model contains individual optimisation and a government that effectively maximises government consumption under a balanced budget constraint.[8] The steady state output obtained is below optimal out-

[6] Outlined in their appendix A which can be downloaded from Luisa Lambertini's webpage at http://www.claremontmckenna.edu/econ/llambertini/.

[7] In their conclusion, they mention "special assumptions" for obtaining their results, but none of them refers to their main caveat, i.e. their way of combining results from separate micro and macro models.

[8] Which is justified "without loss of generality" (according to Obstfeld and Rogoff, 1995) because the model setup implies Ricardian Equivalence.

put due to the distortions caused by monopolistic competition and, it can also be included, by distortionary taxation. Perturbation results around the steady state show that output (not individual utility though) could be increased under various fiscal policy measures, for instance: (i) paying production transfers raised by lump-sum taxes; or (ii) reducing distortionary taxation while lowering government consumption (thus observing the balanced budget constraint). Thus far their micro model. But how do they then use their micro model and its policy interpretation within their macro model? The ingredients of the macro model are simple: log-linearisations of the steady state conditions of the micro model and Barro-Gordon (1983a) type loss functions for the fiscal and monetary policymakers. Natural output could be seen – they suggest – as the (inefficient) steady state output determined in the micro model due to monopolistic competition. Authorities desire output above natural output, which is assumed to be identical for monetary and fiscal policymakers, but also for the representative agent according to Dixit and Lambertini's (2003a) model assumptions. Aforementioned fiscal policy effects are encapsulated in the log-linearisations. They are exogenously given, either these fiscal policy effects are positive or they are negative. This means that any government can always choose its fiscal policy to be expansionary, either by altering its fiscal policy stance in one direction or the other. Irrespective of the magnitude of the expansion, there is no cost in any way, be it in terms of deficit finance, distortions or otherwise.

The description of Dixit and Lambertini's (2003a) micro and macro models reveals several problems. First, objectives of private agents and policymakers in the two models are contradictory. In the micro model private agents maximise utility and governments effectively maximise government consumption. The equilibrium levels for output and inflation are obtained on that basis, but then they are used as input for the macro model. Here, however, it is suddenly desired levels of output and inflation, which form the new objectives of private agents, government and central bank. Second, the log-linearisations apply only close to the steady state. But Dixit and Lambertini (2003a) obtain as result that any desired level of

output, no matter how far away from natural output can be achieved through fiscal policy. Of course, they mention (and only just mention) that we must be near the steady state conditions, but then their claim that the presence of fiscal policy alone eliminates the time-inconsistency problem cannot be taken seriously. Third, let us consider the economic issues at stake for the two types of fiscal policy discussed by Dixit and Lambertini (2003a). As for the first type, can a government pay production transfers raised by lump-sum taxes?[9] Yes, but the magnitude must obviously be limited. There is no excess burden associated with such taxes, but high levels of lump-sum taxes may affect agents' ability to pay and thus influence their economic behaviour. However, in the Dixit and Lambertini's (2003a) model such policy can be used without limit. As for the second type, what happens when the government reduces distortionary taxation while lowering government consumption (and, thereby, observing the balanced budget constraint)? Lower government consumption, be it public consumption or investment, affects private agents utility. So there would be an effect in the micro model with influence on the steady state conditions. The problem is that the log-linearised conditions in terms of inflation and output equations of the macro model should be changed. And results would, obviously, change as well.

Let us recall Dixit and Lambertini's (2003a) claim: if monetary and fiscal authorities agree on the output and inflation bliss point, then fiscal policy alone suffices to avoid the time-inconsistency problem, irrespective of weights, non-coordination, order of moves, etc. This finding also implies that there in no need for Rogoff(1985)-type conservatism to alleviate the inflationary bias. Based on the discussion above it can be shown that their result hinges crucially on the assumption of costless fiscal policy. We proceed in three steps: (i) fiscal policy in Dixit and Lambertini (2003) is quasi unconstrained; (ii) the cooperative outcome must be Pareto-optimal due to their setup, and (iii) by construction, their non-cooperative outcome must also be Pareto-optimal, which was already shown long ago by

[9] In principle, this is Alesina and Tabellini's (1987) argument: if fiscal policy (in their case, a fiscal subsidy) could be used unconstrained and costlessly, then the desired level of employment could be reached, thus eliminating the rationale for time-inconsistent monetary policies.

de Bruyne (1976) in a more general setting. As for point (i), our key concern with Dixit and Lambertini (2003a) is that their macro model is based on the equilibrium obtained in the micro model. As a result, the macro model does not capture the distortionary nature of taxation appropriately. Government can always choose a costless way to expand output. Increasing distortionary effects and trade-offs between alternative instruments are ignored. Effectively, fiscal policy is made unconstrained. For instance, Dixit and Lambertini (2003a) model unlimited access to lump-sum taxes so that the government can achieve any level of output. This is in denial to Alesina and Tabellini's (1987) insight, that it is the costlyness of fiscal policy which preserves the inflationary bias. Why do Dixit and Lambertini (2003a) model fiscal policy without constraint? That is not clear. The literature offers at least two ways of capturing restrictions for fiscal policy. A period budget constraint can be used - as done, for instance, in Huang and Wei (2006) and Alesina and Tabellini (1987).[10] The drawback is that budget deficits and thus intertemporal adjustments are totally ruled out. As an alternative, budget deficits (or more generally, an unbalanced budget) can be captured as a loss in the objective function - as done in Agell et al. (1996) or Demertzis et al. (2004).[11] In another paper published in 2003, even Dixit and Lambertini (2003b) capture the deadweight loss of fiscal policy in the social and fiscal authority's loss functions.[12]

In step (ii) we use the logic of the time-inconsistency literature to argue that the cooperative outcome is always Pareto-optimal because of how Dixit and Lambertini (2003a) set up their model. If monetary policy were the only instrument, then private agents would expect the central bank to renege on its promise because monetary authorities would be tempted to surprise agents and, thereby, achieve a higher level of output. Hence monetary policy

[10] In Alesina and Tabellini (1987), there is a contemporaneous government budget constraint and the loss function includes the deviation from a desired level of public goods. As a result, there is an inflationary bias of monetary policy. In Huang and Wei (2006), too, the inflationary bias is always present, if we undo their extension to the Alesina-Tabellini (1987) model by setting their institutional quality parameter to 1 (i.e. there is no longer a tax collection inefficiency).

[11] The latter argue that this "implies a policy feedback rule that satisfies the long-run solvency and 'cash in advance' constraints (Canzoneri, Cumby and Diba, 2001)".

[12] As a result, their (2003b) model is similar to the ones used in sections 3 and 4 of this paper as well as in Demertzis et al. (2004).

would have to validate private agents' expectations of higher inflation in order to avoid an output reduction. With both monetary and fiscal policies available, private agents will rationally expect the authorities to try to achieve the desired output increase at lowest possible costs. In the Dixit and Lambertini (2003a) setup, fiscal policy can always be chosen to be expansionary to any degree and without costs or limitations to the fiscal policymaker. Under perfect coordination between both policymakers, private agents will expect costless fiscal policy, not costly monetary policy, to be used. As a result, desired output and desired inflation can be reached. Thus, given the assumptions of the model, the cooperative outcome must be the bliss point, which is also Pareto-optimal.

In step (iii) we would like to explain why any non-cooperative outcome is also Pareto-optimal in Dixit and Lambertini (2003a). This is actually a long-standing result shown already by de Bruyne (1976).[13] It suffices to quote his verbal summary of the technical analysis conducted in his paper: "... the non-cooperative equilibrium will be Pareto-optimal if and only if the cost functional of any player is not influenced, ..., by the controls pursued by the other players." In other words, the non-cooperative equilibrium is Pareto-optimal, if there is no "conflict of interest" between the players. Following Dixit and Lambertini's (2003a) assumptions that policymakers agree on the bliss point and fiscal policy is quasi unconstrained, there is no conflict of interest between policymakers. Fiscal authorities can ensure the desired level of unemployment costlessly and will always do so, irrespective of non-cooperation or the order of moves. Graphically, the reaction function of fiscal policymakers will always pass through the bliss point (which is also noted by Dixit and Lambertini, 2003a). Knowing this the central bank can always achieve the optimal outcome by choosing zero inflation (i.e. not cheating the public). Hence a non-inflationary policy is also credible. As a result, the non-cooperative outcome must be at the bliss point given the setup in Dixit and Lambertini (2003a). This is Pareto-optimal and there is no inflationary bias.

[13] His paper refers to a very general setting: intertemporal setting described by a system of difference equations, N players with intertemporal linear-quadratic loss functionals, n state and m control variables.

3 A Parsimonious Monetary-Fiscal Interaction Model

Unconstrained fiscal policy produced Dixit and Lambertini's (2003a) symbiosis result and, in fact, lead to the absence of a conflict of interest between monetary and fiscal authorities. Properly accounting for fiscal policy means introducing some form of a constraint and, thereby, reestablishing the conflict of interest. The inflationary bias will be back, even if we strengthen the Dixit-Lambertini approach in two respects. First, we consider the interaction between the central bank and just one fiscal authority (instead of Dixit-Lambertini's n fiscal authorities and their general matrix of spillover effects). We also give monetary and fiscal authorities identical loss functions, not just the same bliss points. However, fiscal policy will be constrained in our model by capturing deviations from a balanced budget as a loss in the loss function, similar to Demertzis, Hughes Hallett and Viegi (2004) and the other Dixit and Lambertini (2003b) paper. Note, however, that we obtain this result – in contrast to Alesina and Tabellini (1987) – without introducing distortionary taxes. The crucial issue is that fiscal policy is costly, not only because of the distortionary nature of taxation. On the basis of this parsimonious setup, we can then show in the next section that the inflationary bias is limited once we introduce grand corruption.

Here is the model. The government's linear quadratic loss function is assumed to comprise the standard components, deviations of inflation π from desired (zero) inflation and of output y from desired (above trend) output $(1+\kappa)\bar{y}$, but also a fiscal policy component (and expropriation in the next section):

$$L = \frac{1}{2}\alpha\pi^2 + \frac{1}{2}\theta((1+\kappa)\bar{y} - y)^2 + \frac{1}{2}(T - \bar{G})^2 \qquad \text{with } \alpha > 0, \theta > 0. \tag{1}$$

The third term captures the loss incurred from missing the balanced budget target.[14] T and

[14] The formulation is similar to Demertzis, Hughes Hallett and Viegi (2004) as well as Dixit and Lambertini (2003b). $(T - \bar{G})$ here, the difference between tax receipts and government spending, corresponds to τ and $(T - \bar{G})$, if positive, corresponds to x in their models, respectively. A budget surplus carries a penalty due to presumed negative political implications. Not spending all the money means, for instance, providing less public goods, thereby affecting the government's reelection chances. A budget deficit has negative effects

G are specified separately in order to distinguish G from government expropriation (or grand corruption) E which will be introduced in the next section. For simplicitly, we assume that G is exogenous and only T can be changed by the government. (The opposite assumption, T exogenous, does not change the findings.) Output is determined by a modified short run expectations-augmented aggregate supply curve:

$$y = \bar{y} + \phi(\pi - \pi^e) - \tau(T - \bar{G}) \qquad \text{with } \phi > 0, 0 < \tau < 1. \tag{2}$$

For simplicity, we consider an economy without shocks or tax distortions. Output y deviates from trend output $\bar{y}$ for two reasons: (i) surprise inflation (based on the standard argument that lower expected inflation produces expansionary real wage cost reductions); and (ii) fiscal policy (which is expansionary, if $T < \bar{G}$). Coefficient τ captures the crowding-out or crowding-in effect. This cannot be interpreted as a tax distortion because $(T - \bar{G})$ can be positive or negative. We consider a setup in which the central bank and the fiscal authority control a policy instrument each, inflation and tax revenue, respectively. But they share the same aforementioned objective function (although the inflation objective is irrelevant for the fiscal authority and the balanced budget objective does not affect the monetary authority). The non-cooperative Nash equilibrium is derived from the two first order conditions for each of the three cases: (i) commitment [COM] (which, of course, implies that the central banks set $\pi = 0$); (ii) reneging [REN] (and thus cheating private agents who assume $\pi^e = 0$); and (iii) the time-consistent equilibrium [TCE] (which requires that the central bank validates private agents' rational inflation expectations, i.e. $\pi = \pi^e$). Here are the three equilibria:

$$\pi^{COM} = 0 \qquad T^{COM} = \bar{G} - \frac{\tau\theta}{\tau^2\phi + 1}\kappa\bar{y} \tag{3}$$

$$\pi^{REN} = \frac{\phi\theta}{\alpha(\tau^2\phi + 1) + \phi^2\theta}\kappa\bar{y} \qquad T^{REN} = \bar{G} - \frac{\alpha\tau\theta}{\alpha(\tau^2\phi + 1) + \phi^2\theta}\kappa\bar{y} \tag{4}$$

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because it restrains the government's possibilities in the future. As an alternative to the balanced budget proposition the model could equally be specified in terms of a desirable level of deficit – without affecting the results.

$$\pi^{TCE} = \frac{\phi\theta}{\alpha(\tau^2\phi+1)+\phi^2\theta-\phi\theta}\kappa\bar{y} \qquad T^{TCE} = \bar{G} - \frac{\alpha\tau\theta}{\alpha(\tau^2\phi+1)+\phi^2\theta-\phi\theta}\kappa\bar{y} \quad (5)$$

Comparing the three equilibria leads to the following ordering:

$$\pi^{TCE} > \pi^{REN} > \pi^{COM} \quad (6)$$

$$T^{TCE} < T^{REN} < \bar{G}, \quad (7)$$

$$T^{COM} < T^{REN} < \bar{G},$$

$$T^{TCE} < (=,>)\, T^{COM}, \text{ if } \phi < (=,>)\, 1. \quad (8)$$

Most results confirm our intuition, but not all. The ranking of optimal inflation outcomes (equation 6) is as it would be in the situation without fiscal policy. However, changes in ϕ, the slope parameter of the Lucas supply hyperplane, affect π^{TCE} and π^{REN} (the two optimal inflation rates, which may vary) quite differently compared to the (two-dimensional) case without fiscal policy. In the standard Barro-Gordon (1983a) model, a flatter supply curve (higher ϕ) implies a higher TCE-equilibrium (though it does typically not lead to a higher inflation rate for the reneging equilibrium). Here, increasing ϕ above a certain value actually produces a counterintuitive result. As the expansionary *effect* of a surprise inflation on output increases (higher ϕ, flatter supply hyperplane), the optimal inflation rate π^{TCE} (as π^{REN}) goes down, not up. At the same time, T^{TCE} (and T^{REN}) increase, which means that expansionary fiscal policy is used less, not more as we might have expected as a compensation for the reduction in the use of monetary policy.

Optimal fiscal policy is always expansionary ($T < \bar{G}$) because there is a benefit from stimulated output (with its marginal benefit – in the optimum – being equal to the marginal loss from missing the balanced budget objective). This is a standard result in the literature.[15]

[15] For instance, Agell, Calmfors and Jonsson (1996) and Demertzis, Hughes Hallett and Viegi (2004). Similar to this paper, they model centralised fiscal and monetary policy. By contrast, there is disagreement, if fiscal policy is decentralised. Aizenman and Isard (1993) claim that a monetary union with decentralised

Of course, the fiscal policy instrument is used in the COM case where the monetary instrument is not available (with inflation being constrained to 0) and in the TCE equilibrium where inflation corresponds to the rationally expected π^e. In the REN case, we are more flexible and can use both instruments. Graphically this means that we move on the supply hyperplane closer to the bliss point (where the curvature of the loss sphere is greater). Since we can use both instruments to expand output in the REN scenario, it is optimal to use expansionary fiscal policy only to a lesser degree – as shown by both equations in (7). The flatter the supply hyperplane (ϕ increases), the closer we get to the bliss point, ie. T^{REN} goes up which means getting closer to the balanced budget. If output responded infinitely ($\phi \to \infty$), we would be on the bliss point, ie. $T^{REN} = \bar{G}$.

But why does the ordering of T^{TCE} and T^{COM} change with variations in ϕ (8)? If ϕ were zero, i.e. no beneficial *effect* of a surprise inflation on output at all (the supply hyperplane would be vertical), all three equilibria would be at the same point. As ϕ goes up, T^{COM} increases, but only slightly, because the COM equilibrium is severely constrained.[16] T^{TCE} and T^{REN} increase more significantly though, when the supply hyperplane becomes flatter (though there is a reduction of T^{TCE} at first). It is optimal to use less and less expansionary fiscal policy, when the expansionary *effect* of a surprise inflation increases (ϕ up). This makes sense. The counterintuitive issue is only that the corresponding optimal inflation rate rises by less and less and then goes down as well. In other words, for a sufficiently flat supply hyperplane, both monetary and fiscal policy turn less and less expansionary.

The key result here is, however, that the inflationary bias is always present ($\pi^{TCE} > 0$) and increases with the desired output gap $\kappa\bar{y}$. Authorities facing rational agents cannot

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fiscal policy produces a budget deficit (and an inflationary bias), whereas Beetsma and Bovenberg (JIE, 1998) argue that fiscal discipline may be achieved, if fiscal policy is decentralised and uncoordinated. The deficit issue is ignored in Huang and Wei (2006) and Alesina and Tabellini (1987).

[16] The commitment equilibrium represents a point of tangency in the two-dimensional $T-y$ space between the authorities' indifference curves (ignoring the π dimension) and the intersection of the supply hyperplane with the $T-y$ space. As the latter rotates slightly when the supply hyperplane becomes flatter, T^{COM} increases.

avoid being trapped in an inefficient equilibrium. Dixit and Lambertini (2003a) obtain their non-inflationary bias result under non-restrictive assumptions. In fact, they say that the "ideal [bliss point] is attained despite disagreements about the weights of the objectives, ... , without fiscal coordination, ..." Here we strengthen these assumptions even further: there is perfect fiscal coordination, i.e. only one fiscal authority; and monetary and fiscal authorities are in perfect agreement about the weights for their objectives. We do, however, require that fiscal policy comes at a price. Under this more realistic assumption, the inflationary bias does *not* go away. Note, however, that central bank conservatism (increased α in equation 1) would reduce the inflationary bias in the model here.

4 Political Economy Extension: Grand Corruption and Dixit-Lambertini (2003a) Once Again

Allowing expropriation by the fiscal policymaker can be captured by changing the objective function as follows:

$$L = \frac{1}{2}\alpha\pi^2 + \frac{1}{2}\theta((1+\kappa)\bar{y} - y)^2 + \frac{1}{2}(T - \bar{G} - E)^2 - \delta E. \tag{9}$$

The gain from expropriation relative to the other components depends upon exogenous coefficient δ and is modelled linearly for simplicity. The third term of equation (9) must be changed as well because expropriation is like additional expenditures. We do not change output function (2), even though expropriated wealth may positively affect the economy to some degree. One could justify this simplification by assuming that the expropriated wealth is hoarded or taken abroad or used for buying imported luxury goods.

We now obtain first order conditions with respect to three instruments, inflation π, taxation T, and expropriation E. The corresponding Hessian is still positive semi-definite, thus confirming that it is a well-defined minimisation problem. The Nash equilibria in the three

cases change dramatically:

$$\pi^{COM} = 0 \qquad T^{COM} = \bar{G} - \frac{1}{\tau}\kappa\bar{y} + \frac{\delta}{\tau^2\theta}$$

$$E^{COM} = -\frac{1}{\tau}\kappa\bar{y} + \frac{\delta}{\tau^2\theta} + \delta \tag{10}$$

$$\pi^{REN} = \frac{\phi\delta}{\alpha\tau} \qquad T^{REN} = \bar{G} - \frac{1}{\tau}\kappa\bar{y} + \frac{\delta}{\tau^2\theta} + \frac{\phi^2\delta}{\tau^2\alpha}$$

$$E^{REN} = -\frac{1}{\tau}\kappa\bar{y} + \frac{\delta}{\tau^2\theta} + \frac{\phi^2\delta}{\tau^2\alpha} + \delta \tag{11}$$

$$\pi^{TCE} = \frac{\phi\delta}{\alpha\tau} \qquad T^{TCE} = \bar{G} - \frac{1}{\tau}\kappa\bar{y} + \frac{\delta}{\tau^2\theta}$$

$$E^{TCE} = -\frac{1}{\tau}\kappa\bar{y} + \frac{\delta}{\tau^2\theta} + \delta \tag{12}$$

Let me begin with commenting the results for inflation in four respects. First, inflation outcomes can now be ranked as follows:

$$\pi^{TCE} = \pi^{REN} > \pi^{COM} \tag{13}$$

If the central bank can fool private agents and renege on its previous promise, it immediately achieves the time-consistent inflation rate. By itself, this does not imply that the result of the fully rational outcome (TCE) is now any better. Second, however, π^{TCE} and π^{REN} no longer depend on the desired output gap $\kappa\bar{y}$. Inflation rates only depend on the weights of the loss function (9) and the coefficients of the supply function (2). This is good news and bad news. If the central bank tried to achieve a large output increase ($\kappa > 0$ and large), inflation would not be affected. However, even if the monetary authorities did not want to exploit agents at all ($\kappa = 0$), there would still be an inflationary bias. In other words, no matter how much the central bank wants to achieve by its cheating, inflation is not affected. Third, this result is produced by incorporating expropriation, but inflation rates are not affected by the weight expropriation receives in the loss function. (This is

not surprising since expropriation is not a central bank instrument.) Fourth, as in the case without expropriation only central bank conservatism (increased α in equation 9) could eliminate the inflationary bias.

The ranking of the three equilibria with respect to tax outcomes changes as well:

$$T^{TCE} < T^{COM} = T^{REN}. \tag{14}$$

Optimal tax revenues in the TCE equilibrium are now unambiguously smaller than those in the commitment equilibrium. It is not clear, if any of those tax equilibrium values are smaller (as in the case without expropriation) or larger than government spending $\bar{G}$. In other words, we cannot say, if fiscal policy is expansionary ($T < \bar{G}$) or not because of expropriation. What we know is that tax revenue net of expropriation is always smaller than government spending and all equilibria produce the same budget deficit:

$$T - E < \bar{G} \tag{15}$$

$$T - \bar{G} - E = -\delta < 0 \tag{16}$$

An interesting special case is $\delta = 0$. This means that the government can expropriate, but does not gain from it directly. The government does, however, use expropriation for balancing the budget and thus eliminate one of the sources for a loss in objective function (9). Looking at this special case from a different angle shows that this is exactly what happens in the Dixit and Lambertini (2003a) model (except that a suitably chosen deficit or surplus even has an additional beneficial effect on output in their model). For $\delta = 0$, the government optimally chooses a negative E to balance the budget despite expansionary fiscal policy. Of course, this is not a realistic scenario, but it illustrates the case of a government, which can produce any budget deficit without incurring a loss. Not surprisingly, the inflationary bias is gone under these conditions.

5 Conclusion

The question in the title is: can cheating policymakers prevent policymakers from cheating? This paper argues that cheating fiscal policymakers can have a significant impact on the cheating of monetary policymakers. If we include grand corruption as an objective of fiscal authorities, the inflationary bias does no longer depend on the desired level of output, but only on the underlying weights and coefficients of the model. Modelling expropriation does not prevent the central bank from reneging on its promises, but the inflationary effect is limited. Furthermore, the outcome does not depend on whether (i) private agents are seen as rationally anticipating central bank behaviour (time-consistent equilibrium); or (ii) the central bank can renege on promised policies which the private sector actually believes (reneging equilibrium).

This paper implicitly argues that reducing the inflationary bias even further always requires a conservative central bank. This was suggested by Rogoff (1985) and others, but is not unambiguously supported by some of the recent papers incorporating fiscal policy, for instance by Huang and Wei (2006) or by Demertzis, Hughes Hallett and Viegi (2004). All these papers show that fiscal policy affects the inflationary bias. But fiscal policy alone does certainly not suffice for eliminating the inflationary bias as suggested by Dixit and Lambertini (2003a). This paper shows that their "symbiosis" result could only be obtained because fiscal policy is totally unconstrained in their model. The model presented in section 3 also shows that contrary to Alesina and Tabellini's (1987) claim distortionary taxation is not required to obtain the standard inflationary bias result. It is the costlyness of fiscal policy, which produces the time-inconsistency problem when monetary and fiscal policy are both available.

There are two ways of thinking about the findings in this paper. First, suppose the model actually described reality. In particular, it can be argued that grand corruption is always present, at least to some degree, not just in developing countries, but even in advanced

Western economies. Giving the model a positive interpretation we could then argue that the inflationary bias may not be as bad as feared. From a normative point of view, we are still stuck with a number of questions. Should we really try to eradicate grand corruption? What are the welfare implications? Central bank conservatism may be helpful for reducing inflation under most circumstances, but is the effect on welfare positive or negative?

Secondly, the findings actually raise even more questions and suggest future research. Grand corruption may have an effect on the inflationary bias, but what happens, if we include tax distortions in our model. Similarly, what happens if we allow both for petty corruption and for grand corruption. Huang and Wei (2006) argue that we may want to limit central bank conservatism when there are inefficiencies in the tax collection process. All in all, there are still many open questions and numerous avenues for future research, especially those combining monetary and fiscal policy with public choice arguments.

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