Rent-Seeking Distortions, Voluntary Insolvency, and Fiscal Procyclicality

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December, 2006

Abstract

The divergence of the fiscal behavior of developing countries from that of industrialized ones has recently generated much interest. While fiscal policy in most industrialized countries is countercyclical, with countercyclical expenditures and deficits; fiscal policy in developing countries tends to be procyclical. This paper presents a dynamic model of fiscal policy with a political distortion. It demonstrates theoretically, numerically, and empirically that rent seeking within the fiscal process has the potential to explain fiscal procyclicality. This hypothesis is tested against other common explanations, such as borrowing constraints, and a more volatile macroeconomic environment. In the model, fiscal policy may be procyclical because governments’ ability and desire to extract rents through the fiscal process is enhanced in peaks relative to troughs. Moreover, rent seeking in good times may increase borrowing to the extent that a government precommits itself to an inability to fully provide transfer payments during economic downturns, further exacerbating the procyclicality of fiscal policy. The term "Voluntary Insolvency" is proposed for this phenomenon. A cross-country empirical exploration confirms that the heterogeneity in the cyclicity of fiscal policy, normally attributed to differences along income lines, is better explained by institutional differences that are related to rent extraction.

*I am highly indebted to Allan Drazen for his advice and support. I would also like to thank Arpad Abraham, Boragan Aruoba, Guillermo Calvo, Virgilin Midrigan, Peter Murrell, Carmen Reinhart, John Shea, Carlos Vegh, Laura Veldkamp, John Wallis, Steven Yeaple and participants in the University of Maryland’s macroeconomics seminar for their useful comments. All errors are my own.
1 Introduction

The cyclicality of fiscal policy in developing countries is a topic that has recently generated much interest. While fiscal policies in almost all OECD countries are countercyclical\(^1\), reflected in countercyclical government expenditures and deficits and procyclical tax revenues, fiscal behavior in developing countries is quite different. Be it in Latin America (Gavin and Perotti, 1997) or in developing countries overall (Kaminsky, Reinhart and Vegh, 2004: henceforth KRV), governments tend to spend more, and perhaps lower tax rates, as economic conditions improve. That is, they conduct procyclical fiscal policies.

The basic stylized facts are as follows. The most striking difference between fiscal policies in developing countries and those in OECD countries is in government expenditure, as demonstrated in Figure 1\(^2\). The graph plots the correlation between the cyclical component (H-P filtered) of government expenditures and the cyclical component of GDP (between the years 1970 and 2003), against PPP GDP per capita in 1970. Expenditures are countercyclical in all but a handful of OECD countries, but procyclical in almost all developing countries in the sample. Moreover, a clear negative correlation between the degree of procyclicality and income per capita emerges from the data. It is difficult to assess the cyclicality of tax policies, since time series data on tax rates—the relevant policy measure—are unavailable or of questionable quality for most developing countries. While there is anecdotal and indirect evidence (as in KRV) that tax rates may be countercyclical in a number of developing countries, this does not seem to affect the average cyclicality of tax revenues, as reported in Figure 2. This is only a mild correlation between the cyclicality of tax revenues (again measured as the correlation between their cyclical component and the cyclical component of GDP) and GDP per capita. Tax revenues are procyclical in all but a small number of countries. The average correlation between tax revenues and GDP is only slightly less procyclical in developing countries (0.43) than in industrialized countries (0.44)\(^3\).

\(^1\)Throughout this paper, procyclicality or fiscal procyclicality will refer to some combination of procyclical deficits, procyclical government expenditures, and countercyclical tax rates. Countercyclical policies are a combination of countercyclical deficits, countercyclical government expenditures and procyclical tax rates. Note that tax revenues are procyclical in all but a handful of countries, since most tax revenues are generated from proportional taxes.

\(^2\)Created from the Kaminsky, Reinhart and Vegh (2004) dataset. I thank the authors for graciously sharing their data.

\(^3\)It is evident from Figure 2, however, that some developing countries do have countercyclical tax rates. At the very least, the four countries with countercyclical tax revenues would appear to conform to this view.
In OECD countries, the combination of countercyclical government expenditures and procyclical tax revenues generates unambiguously procyclical surpluses (with an average correlation of 0.43 between their cyclical component and the cyclical component of GDP). Developing countries, whose expenditures and revenues are both procyclical show great variance in the cyclicity of their surpluses, as shown in Figure 3, which plots the correlation between the cyclical components of government balances and GDP, against GDP per capita. Surpluses in developing countries are acyclical in average (the average correlation is -0.0003). Another feature separating the fiscal policies of industrialized and developing countries is the correlation between government revenues and government expenditures. As shown in Figure 4, the correlation between the cyclical components of these two variables is decreasing in income per capita. In OECD countries, the average correlation between government revenues and expenditures is much closer to zero (0.16) than the same correlation in developing countries (0.54).

Overall, with revenue patterns not much different, and the cyclicity of government expenditure in developing countries diverging sharply from the industrialized country norm, it appears that the main factor separating the fiscal policies of developing countries from those of their OECD counterparts is the cyclicity of government expenditures. The cyclicity of government expenditures observed in developing countries is counter to Keynesian theory. Most of the neoclassical literature on fiscal policy has focussed on tax policy, relegating the role of government expenditure to that of an exogenous variable. Thus neither Keynesian theory nor the standard neoclassical approach to fiscal policy provide ready explanations for the procyclicality of fiscal policy in developing countries. This paper presents a dynamic model that allows an endogenously chosen path of government expenditures, which helps in analyzing the cyclicity of government expenditure. It then attempts to explain the cross-country differences in fiscal policy by introducing political distortions into the fiscal process.

A number of potential explanations for the phenomenon of fiscal procyclicality have been proposed. Gavin and Perotti (1998) have raised the possibility of

\footnote{Note that these deficit patterns alone are not necessarily evidence of Keynesian fiscal policies. If the stochastic process of government expenditures, assumed exogenous in most of the neoclassical literature, happens to be countercyclical, the patterns observed in Figures 2-3 could conceivably be generated by governments attempting to smooth tax rates. Acyclical tax rates would tend to generate procyclical tax revenues. With countercyclical government expenditures and procyclical tax revenues, deficits would be unambiguously countercyclical.}
binding borrowing constraints in developing countries. When borrowing constraints bind, governments have no choice but to rely entirely on tax revenues to finance expenditures, just as their tax base has contracted, forcing the government to either cut expenditures or raise taxes in bad times, thus yielding fiscal procyclicality. This approach, however, is subject to both theoretical and empirical critiques. Alesina and Tabellini (2005) provide an empirical refutation of borrowing constraints as a cause for fiscal procyclicality. In the theoretical portion of this paper, I question the theoretical soundness of borrowing constraints as an explanation for fiscal procyclicality. Riascos and Vegh (2003) suggest that differences in the completeness of financial markets could explain differences in the cyclicality of fiscal policy. Talvi and Vegh (2005) show that political distortions based on Tornell and Lane’s voracity effect (1999) combined with a higher variability of tax bases in developing countries may be the main culprit for their procyclical policies. I test for this competing explanation, among others, in the empirical portion of this paper. Alesina and Tabellini (2005) present a voting model, in which procyclicality is a side effect of voters’ attempts to discipline rent seeking officials. This paper complements Alesina and Tabellini’s approach in that it shows that fiscal procyclicality may be generated without voter discipline. This contribution is important because both their own empirical work and the empirical evidence provided here indicate that procyclical fiscal policies may not necessarily the domain of democracies alone.\footnote{In the most recent version of Alesina and Tabellini (2005), the correlation between the procyclicality of government expenditures and corruption is positive, even after controlling for corrupt democracies (depending on the specification). Thus, based on their empirical inquiry, it is left to be explained why the phenomenon appers in corrupt non-democracies as well.}

This paper presents a model of fiscal policy, in which government expenditures, tax rates, and deficits are endogenously chosen. The role of fiscal policy in the model is in providing intertemporal insurance for consumers who do not have access to capital markets. In contrast, the government of the small open economy modelled here can borrow and save freely on international capital markets. In providing intertemporal insurance of this sort, fiscal policy would normally be countercyclical. Unlike the general consensus on optimal fiscal policy in the modern macroeconomic literature, tax policy in the model developed here is not acyclical. This is because there is a tension between the desire of a social welfare maximizing government to smooth taxes, on one hand, and to redistribute income intertemporally, on the other. In such a setting, optimal fiscal policy includes countercyclical government expenditures and deficits and
procyclical tax rates, similar to observed fiscal policy in industrialized countries. However, diverging further from the optimal fiscal policy literature, and following the political-economic tradition, the government is not assumed to be welfare maximizing. When the government’s preferences are modified so that it values both citizens’ welfare and rents extracted through the fiscal process, the model predicts that if rent-seeking motivations are strong enough, government expenditures will be procyclical. Simulations of the model show that an economy with the business cycle patterns of either the United States or Argentina match the qualitative (and some quantitative) features of fiscal policy in OECD countries, but match those of developing countries when rent-seeking motivations are sufficiently high. The simulations also demonstrate that borrowing constraints alone do not have the ability to generate similar effects. Finally, an empirical exploration will reaffirm Alesina and Tabellini’s (2005) finding that corruption is the main variable explaining the heterogeneity in fiscal behavior in a cross section of countries. I will, however, question their result that this phenomenon is primarily restricted to democratic countries and will test the theory presented here against additional explanations as well.

The theoretical exploration of this paper is closely related to the modern fiscal policy literature. It differs in that it explores fiscal policy in a small open economy, gives an endogenous rationale for government expenditures, and it relaxes the assumption that governments consider consumer welfare alone in their fiscal decisions. The genesis of the modern fiscal policy literature is in Barro (1979), who studies the optimal tax policy of a welfare maximizing government facing an exogenous path of government expenditures. When a government has only distortionary taxes at its disposal, optimal tax policy is reflected in an attempt to smooth expected taxes by borrowing and saving externally. Lucas and Stokey (1983) use a dynamic model with a complete market for contingent claims to overturn Barro’s result, finding that optimal tax rates would inherit the serial correlation of government expenditures. Chari and Kehoe (1999) analyze optimal tax policies and find that, generally, it is optimal to keep tax rates roughly constant. Aiyagari, Marcet, Sargent and Seppälä (2002), adapting the Lucas and Stokey setup to incomplete asset markets, revive Barro’s results. In their inquiry, optimal fiscal policy would not only exhibit smooth taxes (asymptotically), but also zero tax rates, if risk aversion does not play

\footnote{The rationale is similar to that in Hall’s (1979) theory regarding consumers, who chose consumption and face an exogenous and stochastic stream of income.}
a significant role\textsuperscript{7}. Since the main stylized fact in need of explanation here is the procyclicality of government expenditure, these models cannot suffice, since government expenditures are assumed exogenous. Battaglini and Coate (2006) modify the Aiyagari et al. model and allow government expenditure to enter consumers’ utility function and be endogenously chosen by the government, in a political-economy model of pork barrel spending. In their model, consumers face shocks to their preferences for government services, rather than facing an exogenous path of government expenditures. They show that pork barrel spending increases when the demand for the public good decreases. In their model, while government expenditure is endogenously determined, government expenditure is driven by exogenous shocks to preferences for the public good. These shocks may be procyclical or countercyclical, so that their model does not provide predictions regarding the cyclicality of fiscal policy.

The model presented in this paper builds on the logic of Battaglini and Coate, in that rent extraction is correlated with the demand for the public good. It takes their logic one step further by giving an endogenous reason why the demand for the public good would be countercyclical, and shows that in the presence of rent seeking cycles akin to Battaglini and Coate’s pork barrel cycles, fiscal policy may be procyclical.

The paper proceeds as follows. Section 2 introduces a model of rent seeking and fiscal procyclicality; an analysis of comparative statics is also presented to provide intuition for the dynamic results that follow. Section 3 develops the dynamics of the model through numerical simulations. Section 4 provides empirical evidence that institutional quality, specifically a proxy for rent seeking within the fiscal process, has a better potential to explain fiscal procyclicality than other competing explanations. Section 5 concludes.

2 The Model

The small open economy modeled here consists of 3 types of agents: a continuum of homogeneous consumers, a neoclassical firm, and a government. There are two goods: consumption $c$ and leisure (represented inversely as labor, $\ell$). Consumers face an exogenous wage process ($w_t$), but affect their income endogenously, through their choice of labor contribution in each period. They do not,

\textsuperscript{7}The government would find it optimal to have higher tax rates in earlier periods to accumulate a high enough level of steady state assets to finance all government expenditures from interest income. Distortionary taxes can therefore be set to zero from a certain period on.
however, have access to capital markets. This friction provides the rationale for fiscal policy. The government may use its ability to borrow and save externally to provide intertemporal insurance for consumers. Modeling fiscal policy in such a manner has two advantages. Firstly, there is some evidence that the main reason for the countercyclical patterns of fiscal policy in the U.S. are the automatic stabilizers inherent in welfare programs, which provide, inter alia, similar intertemporal insurance (See Auerbach (2005), for example). Modeling the cyclical component of optimal fiscal policy as being driven by such motivations would appear to be a good point of departure. Secondly, fiscal policy used for this purpose would naturally tend to be countercyclical. This pits the odds of the model against fiscal procyclicality, which the political distortions presented here, as well competing explanations for procyclicality, will need to overcome.

The political distortion is introduced by allowing governments to extract rents through the fiscal process. These rents could be viewed as funds funneled to the personal enrichment of the fiscal agent itself, or transferred to special interest groups. Thus, in addition to the utility it receives from providing intertemporal insurance to consumers, the government also receives utility from the quantity of rents extracted. This paper demonstrates that as the weight the government puts on extracted rents increases relative to the weight it places on public welfare, fiscal policy becomes less countercyclical and eventually procyclical. The rationale for this reversal is as follows. The public demand for the transfer payment is countercyclical. Thus, a government that is entirely benevolent would tend to provide a countercyclical transfer payment. On the other hand, a government that also values rent extraction will prefer to extract rents when the demand for the transfer payment is low, as in Battaglini and Coate (2006). In this model, however, the demand for the public good is countercyclical, so that rent extraction is procyclical. If rent seeking motivations are sufficiently strong, the procyclicality of extracted rents will outweigh the countercyclicality of the transfer payment, making overall government expenditure procyclical.

The model has another interesting result. It predicts that a rent seeking government will borrow in every period to the point that it pre-commits itself to being unable to provide the desired level of the public good in the worst states of nature in the following period. I term this phenomenon Voluntary Insolvency. Although the rent seeking government is not entirely malevolent—it does value consumers’ welfare alongside rent extraction—it extracts rents to the
degree that it voluntarily pre-commits itself to an inability to meet its desired target level of the transfer payment.

This section will present the model and proceed to show a number of comparative statics results. At one extreme, if the government does not place any value on extracting rents, government expenditure increases and tax rates decrease as the business cycle improves, yielding countercyclical fiscal policy. At the other extreme, when rents are extracted, fiscal policy will be procyclical.

2.1 Consumers

The continuum of consumers can be modeled as a single representative consumer, due to their homogeneity. The representative consumer chooses consumption and hours worked in each period to maximize lifetime utility. She has preferences over consumption and hours worked as follows:

$$\sum_0^\infty \beta^t u(c_t, \ell_t)$$

Preferences are such that $u_c > 0, u_{cc} < 0, u_\ell < 0, u_{\ell \ell} < 0$, and the standard Inada conditions hold. It is also assumed that utility is separable between leisure and consumption, so that $u_{c\ell} = 0$. The consumer has no ability to borrow or save. This seemingly restrictive assumption, motivated in the introduction, gives the government a role in providing intertemporal insurance to consumers. All the model’s results would also hold if only a fraction of consumers have no access to financial markets\(^8\). Consumers obtain income from labor earnings, which generate wages $w_t$ per unit of labor supplied, prior to being taxed at a rate of $\tau_t$. The consumer knows the tax and wage rates when facing her decision problem and it is assumed that the government can credibly commit to tax at the announced rate $\tau_t$ after the consumer optimizes. Finally, the representative consumer receives a lump-sum transfer of $g_t$ from the government. Her budget constraint is therefore:

$$c_t = (1 - \tau_t) w_t \ell_t + g_t$$  \hspace{1cm} (1)

\(^8\)A previous version of this paper yielded similar results with more general assumptions about the function of the public good.
Since the consumer has no access to credit markets, her optimization problem of maximizing lifetime utility subject to (1) is static in each period, yielding the following first order condition:

\[(1 - \tau_t) w_t u_c + u_t = 0\]  (2)

2.2 Firms

Neoclassical firms produce the uniform consumption good using labor inputs alone, with the following production technology:

\[f(\ell_t) = e^{zt} \ell_t\]  (3)

Where \(\ell_t\) is the quantity of labor supplied and \(z_t\) is a productivity parameter. The productivity parameter is drawn i.i.d. from a distribution \(\Omega(z)\) with support \([z_{min}, z_{max}]\). In the simulations of the following section, the i.i.d. assumption is relaxed; this assumption is employed here to make the analysis in this section tractable. The first order condition of the firms’ profit maximization problem implies:

\[w_t = e^{zt}\]  (4)

so that there is a monotonic relationship between the wage process and the exogenous productivity shock.

2.3 The Government

The fiscal agent’s preferences over citizen welfare and rent extraction are as follows:

\[\sum_{t=0}^{\infty} \beta^t [u(c_t, \ell_t) + \Phi S_t]\]  (5)

where \(S_t\) are the rents extracted by the fiscal agent at time \(t\) and \(\Phi \in [0, \infty)\) is a parameter representing the relative importance the fiscal agent places on rent extraction compared to citizen welfare. High levels of \(\Phi\) could represent high levels of corruption in the fiscal process, the absence of appropriate fiscal safeguards or fiscal transparency, or a political process governing the fisc that creates large incentives for pork-barrel spending. Extracted rents could
be viewed as being diverted for the personal enrichment of the government, or alternatively could be viewed as rents transferred to special interest groups. Rents enter the government’s objective function quasi-linearly, as is the standard assumption regarding transfers to and from special interest groups in the political economy literature. The results of the model would also hold if the government’s preferences with respect to rents were concave, but would be time variant and would depend on the degree of concavity of preferences. However, linear preferences over rents are a good null hypothesis regarding rent-seeking behavior. A casual observation of rent extraction does not point to any satiation nor to “rent-smoothing” behavior, as would be observed if preferences with respect to rents were highly concave. Finally, to ensure a finite accumulation of assets, it is assumed that the government is impatient, so that $\beta(1 + r) < 1$.

The government generates revenues from distortionary taxes on consumers’ labor income. Tax revenues can be costlessly transformed into a unit of the transfer payment, $g_t$, or into a unit of extracted rents, $S_t$. Rent seeking occurs within the fiscal process, i.e. total government expenditure is given by:

$$G_t = S_t + g_t$$

(6)

The government of this small open economy has access to international capital markets and can borrow and save at interest rate $r$, which is assumed constant and exogenous. The government’s budget constraint is therefore:

$$S_t = \tau_t w_t \ell_t + b_{t+1} - (1 + r) b_t - g_t$$

(7)

where $b_t$ is government borrowing (or saving, when its sign is negative) in the form of one-period bonds, denominated in units of the consumption good. The government’s maximization problem can therefore be represented as follows. In each period, the government faces an exogenous productivity shock, translated monotonically into a wage rate $w_t$, via (4). It chooses a fiscal policy \(\{g_t, b_t, c_t, \ell_t\}, \tau_t (w_t, b_t, c_t, \ell_t), b_{t+1} (w_t, b_t, c_t, \ell_t), S_t (w_t, b_t, c_t, \ell_t)\} to maximize (5) subject to (7), while taking into account that its announced fiscal policy will uniquely determine a consumer allocation \(\{c_t (w_t, g_t, \tau_t), \ell_t (w_t, g_t, \tau_t)\}\) through (1) and (2).

Rents are always weakly positive by assumption. Moreover, it is assumed

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9 See for example Grossman and Helpman (2001).

10 Alesina and Tabellini make a similar assumption in the most recent version of their paper.
that the government has access to distortionary taxation only; government transfers are, however, lump-sum. Finally, the government faces an exogenous borrowing constraint. These points are reflected in the following additional constraints:

\[ g_t \geq 0 \]
\[ \tau_t \geq 0 \]
\[ b_{t+1} \leq b_{\text{max}} \]

and

\[ S_t = w_t \ell_t - c_t + b_{t+1} - (1 + r) b_t \geq 0 \]

where the first equality in (9) is the economy’s overall resource constraint following directly from (1) and (7). The government’s maximization problem is to choose a fiscal policy and a consumer allocation (which it determines uniquely through its chosen fiscal policy) to maximize (5) subject to (1), (2), (8), and (9):

\[
\max_{c_t, \ell_t, g_t, \tau_t, S_t, b_{t+1}} E_0 \sum_{t=0}^{\infty} \beta^t \{ u(c_t, \ell_t) + \Phi S_t \\
+ \lambda_t [w_t \ell_t - c_t - S_t + b_{t+1} - (1 + r) b_t] + \Psi_t [(1 - \tau_t) w_t \ell_t + g_t - c_t] \\
+ \mu_t [(1 - \tau_t) w_t u_c(c_t, \ell_t) + u_c(c_t, \ell_t)] + \gamma_t g_t + \eta_t \tau_t + \theta_t S_t + \delta_t (b_{\text{max}} - b_{t+1}) \}
\]

where \( \lambda_t > 0, \Psi_t > 0, \mu_t \) are the Lagrange multipliers on constraints (9), (1), and (2), respectively. \( \gamma_t, \eta_t, \) and \( \theta_t \), are the multipliers of the the non-negativity constraints on \( g_t, \tau_t, \) and \( S_t \), respectively; \( \delta_t \) is the multiplier of the borrowing constraint. Recall that \( \Phi \) is a parameter of the problem, reflecting the marginal value of extracted rents. With minor manipulation, the first order conditions of the government’s problem yield:

\[
u_c + \gamma + \mu (1 - \tau) w u_{cc} = \lambda \]

\[
u_\ell - (1 - \tau) w \gamma + \mu u_{\ell \ell} = -w \lambda \]
\[ \gamma \ell + \frac{\eta}{w} = \mu u_c \]  

(13)

\[ \lambda = \delta + \beta (1 + r) E_t \lambda' \]  

(14)

\[ \lambda = \theta + \Phi \]  

(15)

where time \( t \) subscripts are suppressed and \( \lambda' \) represents the value of this multiplier in time \( t + 1 \).

It is worth dwelling on the intuition of the last two of these equations, for future reference, given that they govern the dynamics of the model. Recall that \( \lambda \) is the Lagrange multiplier on the economy's overall resource constraint (9), so that it represents the marginal value to the government of the economy's disposable resources. As will become apparent later in the analysis, equations (11) and (12) imply that \( \lambda \) is also the marginal value to consumers of either an increase in the government transfer or a decrease in the tax rate.

Looking at (15), note that whenever the government chooses to seek rents, so that \( \theta = 0 \) (the multiplier on the non-negativity constraint on rents is non-binding), we obtain \( \lambda = \Phi \). The government is using the economy's marginal resources to extract rents, so naturally the marginal value of those resources is exactly equal to the marginal value of rent extraction. Moreover, the government will use any additional resources made available for rents alone. Since (15) implies that \( \Phi \) is the lower bound value that \( \lambda \) obtains, this also implies that when rents are extracted, consumers' lowest marginal value of fiscal policy (lower taxes or higher transfers) is obtained. I will refer to this value of fiscal policy as its "target value": this is the marginal value of fiscal policy that the government attempts to attain when possible.

When the government is not seeking rents, \( \theta > 0 \), the marginal value of the government's income is \( \lambda = \Phi + \theta \). In this case, \( \lambda \) represents the marginal value of either increasing the government transfer to consumers or of lowering taxes. This represents the fact that when the economy is hit by a sufficiently negative shock, the government will cease entirely from extracting rents and use the economy's marginal resources solely to aid consumers through higher transfers.
or lower taxes. Note also that since \( \lambda > \Phi \), the government is unable in these periods to provide the consumer with its target value of fiscal policy. This implies that the government is underproviding the public good (or overtaxing), compared with its target level.

These equations provide the intuition for the cyclicality of fiscal policy in this model. As assumed in (6), government expenditures consist of two components: a transfer to consumers, \( g_t \), and rents, \( S_t \). The purpose of the transfer is to assist the uninsured consumer in smoothing consumption. It will therefore naturally be countercyclical. Extracted rents, however, will be procyclical. As described in the previous paragraphs, the government will refrain from rent extraction when the economy is hit by a sufficiently adverse shock, but will extract rents in good times. Moreover, as economic conditions improve further, the government will extract any additional resources made available as rents, rather than increase the transfer further. Thus, one of government expenditure’s components is countercyclical, while the other is procyclical. The former effect will tend to dominate in economies with governments that tend to place a lower value on rent extraction (lower \( \Phi \)), while the latter will dominate where governments have high degrees of rent-seeking motivations.

Equation (14) gives additional insight. Assume for simplicity that \( \delta = 0 \), so that the borrowing constraint does not bind in the current period. Consider a period, in which the government is extracting rents, so that \( \lambda = \Phi \) and the left hand side of (14) is equal to \( \Phi \). If the government is impatient, so that \( \beta (1 + r) < 0 \), (14) then implies that \( E \lambda' > \Phi \). Considering (15) in the following period, \( E \lambda' > \Phi \) implies that there are states of nature for which \( \theta' > 0 \), meaning that the government refrains from extracting rents. Note that this holds regardless of the magnitude of \( \Phi \). From the discussion above, recall that when \( \lambda > \Phi \), the government does not extract rents and is unable to provide the desired target value of the public transfer. This implies that in every period, the government will always borrow (or dissave) to the point that it pre-commits itself to being unable to provide the target level of the public good in the worst states of nature, in the following period. I term this phenomenon Voluntary Insolvency. The government borrows to the extent that there is an ex-ante positive probability in every period that it will be unable to provide its target level of the public good ex-post.

Let us now turn to analyze the effects of changes in the wage rate (which are perfectly correlated with the business cycle) on fiscal policy. The analytic results presented here are comparative statics results, intended to provide intuition for
the dynamic results in the following section. The results here are comparative statics in the sense that they analyze how government expenditure and tax rates change with changes in the wage rate for a given level of debt. Note that while this analysis does give some intuition for the cyclicality of fiscal policy, it should not be viewed as providing full proof of the cyclical patterns of fiscal policy. (The concept of Voluntary Insolvency, following (14), implies that borrowing patterns of rent seeking governments differ significantly from those of benevolent governments.) The terms "procyclical" and "countercyclical" will be used loosely in this section, referring changes in a certain policy instrument as wages increase or decrease, in a comparative static sense. In Section 3, simulations of the model show that the analytical results also hold in a dynamic sense.

The objective of this section is to show that in a comparative statics sense, fiscal policy is countercyclical in environments where rent seeking motivations are low and procyclical in environments when rent seeking motivations are high. At one end of the spectrum, a benchmark model, in which the government values consumer welfare only \( (\Phi = 0) \), is analyzed. Such a government will obviously never seek rents and will intuitively conduct countercyclical fiscal policy, due to the role of fiscal policy modeled here.

At other extreme, it would have been useful to analyze the fiscal policy of a government that seeks rents in every period. Unfortunately, the analysis of (14) above implies that no such government exists for any \( \Phi \in [0, \infty) \). The concept of Voluntary Insolvency implies that the rent seeking government pre-commits itself to being in a fiscal "crisis" with positive probability in every period. During such a crisis, the government not only under-provides the public good, but also refrains from extracting rents. Thus, in this model, even the most malevolent government will move between periods of rent extraction and periods without rent extraction\(^{11}\). A comparative statics analysis in such a setting is obviously problematic. To circumvent this problem, the comparative statics analysis of rent seeking governments will be limited to a comparison within states of nature, where rents are indeed extracted.

Before turning to this comparison, a first proposition is provided that holds

\(^{11}\)Of course, one could imagine a government that does not value the welfare of consumers at all– only rent extraction. The equilibrium of such a model would be trivial– consumers would never provide labor contributions, knowing that their entire income will be taxed away. They will never consume and have an infinite marginal utility of consumption. Fiscal policy would always comprise of a tax rate of 100% where all revenues are diverted to rents. However, since consumers never work, both government revenues and rents will be equal to zero in every period.
Proposition 1 It is never optimal for the government to tax and transfer in the same period.

This result is intuitive: since taxes are distortionary, it is always more efficient to decrease the lump sum transfer to citizens than to increase taxes.

Thus, it can never be optimal to tax and transfer at the same time. We now turn to analyze the benchmark model, in which governments value consumer welfare alone.

2.4 Benchmark Model ($\Phi = 0$)

In the benchmark model, the government does not value rents, so $S_t = 0 \forall t$. Moreover, the non-negativity constraint on rents always binds, so that $\lambda_t \geq \Phi$, as explained in the introduction to this section. In the analysis that follows, government expenditure and tax policies will be discussed separately. For simplicity, borrowing constraints will be assumed away at first; the effects of borrowing constraints will be later explored.

2.4.1 Government Expenditure

Proposition 1 indicates that the government will either spend on the transfer good or tax in each period, but not do both in a given period. It is therefore convenient to analyze the cyclicality of government expenditure in two steps. First, we shall focus on those states where government expenditure is strictly positive, observing how the state of the economy affects the magnitude of government spending. We will see that government expenditure is decreasing in the wage rate (and therefore in the productivity shock). Then, we determine when it is that the government provides the transfer good, and when it taxes. We will see that there is a cutoff wage, below which the government will provide the transfer good, and above which the government will tax. Since the magnitude of government expenditure is decreasing in wages when it is provided, and it is for low wage realizations that it is not provided, government expenditure can be said to be weakly decreasing in the wage rate. Since the wage rate is monotonically increasing in the exogenous shock, $z_t$, due to (4), government expenditure will be countercyclical.

In periods when the government does transfer, it directly follows that the non-negativity constraint on the government transfer is non-binding ($\gamma = 0$).
Proposition 1 implies that $\tau = 0$. A lemma in Appendix B shows that $\eta = 0$ always, which implies that $\mu = 0$ when the government is providing the transfer good, due to (13). Equations (11) and (14), together with the assumption that the borrowing constraint is not binding in the current period imply:

$$u_c(t) = \beta (1 + r) E [u_c(t + 1)]$$

This states that the government attempts to smooth consumers’ consumption, (in a declining path reflected by $\beta (1 + r)$). The left hand side of this equation is a function of $b_{t+1}$ (borrowing today to be repaid in that period) alone, while the right hand side is a function of $c_t$. The equation gives the optimal allocation of an additional unit of resources between increasing consumption and decreasing the burden of debt. Now note that rewriting (1) when taxes are zero:

$$g_t = c_t - w_t \ell_t$$

Two propositions now follow. Their proofs are provided in Appendix C.

**Proposition 2** For a given level of debt, $b_t$, government expenditures in the benchmark model are (weakly) decreasing in wages, i.e. government expenditure is countercyclical (in the comparative statics sense).

This is intuitive. In the benchmark model, the only rationale for fiscal policy is providing intertemporal insurance. This insurance would naturally imply an increase in transfers as wages decline. Note that since $S_t = 0$, $G_t = g_t$, i.e. total government expenditure is equal to the magnitude of the transfer good, any discussion of the transfer, $g_t$, applies to overall government expenditures, $G_t$, as well.

**Proposition 3** The government transfers when wage realizations are low in the benchmark model. I.e. for a given level of debt, $b_t$, there exists a wage rate $w^*(b_t)$, such that $\forall w_t \geq w^*$, $g_t \geq 0$.

This is very intuitive as well. Since the government transfer is used to help consumers smooth consumption intertemporally, there is a cutoff wage, below which the government will provide the transfer and above which the government will tax to save for future transfers.
2.4.2 Taxes

As follows from Propositions 1 and 3, $\tau \geq 0$ for high wage realizations. $\eta = 0$, due to the lemma in Appendix B. $g = 0$ (and its non-negativity constraint is binding: $\gamma \geq 0$) due to Proposition 1. For further analysis of fiscal policy during a boom, it is useful to assume a specific functional form for the representative agent’s preferences:

$$u(c, \ell) = \log c + A \log (1 - \ell)$$  \hfill (18)

Using these preferences, equations (11) and (12) become:

$$\frac{1}{c} + \gamma - \frac{\mu w (1 - \tau)}{c^2} = \lambda$$  \hfill (19)

$$- \frac{A}{1 - \ell} - w \gamma (1 - \tau) - \frac{\mu A}{(1 - \ell)^2} = -w \lambda$$  \hfill (20)

Plugging in equations (13) and (1) into (19), yields

$$\frac{1}{c} = u_c(t) = \lambda = \delta + \beta (1 + r) E[u_t(t + 1)]$$  \hfill (21)

where the last equality results from (14). Thus the consumption smoothing result holds here as well. Equation (2) now becomes:

$$(1 - \ell) w (1 - \tau) = Ac = A(w \ell (1 - \tau))$$  \hfill (22)

where the last equality is due to (1). Rearranging this equation gives:

$$\ell_t = \frac{1}{(A + 1)}$$  \hfill (23)

Thus, the representative citizen works a fixed amount of hours when taxes are positive. Now note that (1) implies that given (21) and (23), tax rates increase in wages when they are positive. However, since Propositions 1 and 3 together imply that there is a cutoff wage below which the government will not tax, we have the result:

**Proposition 4** For a given level of debt $b_t$, tax rates are (weakly) increasing in wages, i.e. tax policy in the benchmark model is procyclical (in comparative statics).
2.4.3 Borrowing Constraints

Since borrowing constraints have been proposed as an explanation for fiscal procyclicality, it is interesting to consider how borrowing constraints affect fiscal policy in the benchmark model. Specifically, let us look at government expenditure.

In periods when borrowing constraints bind, it is easy to see that (7) implies that for a given level of debt, \( b_t \), government expenditure is not affected by wages and is fixed at \( g_t = \max [b_{\max} - (1 + r) b_t, 0] \). Even in the extreme case that borrowing constraints bind in every period, government expenditure is acyclical at \( g_t = \max [rb_{\max}, 0] \). This is an important result. It implies that when borrowing constraints bind, government expenditure is acyclical. In all other periods, Proposition 2 continues to hold and government expenditure is countercyclical.

These results point to the notion, which will be verified in the dynamics of the following section, that although borrowing constraints may decrease the degree of countercyclicality of government expenditure in this model, they do not cause procyclical government expenditures. A benevolent government facing borrowing constraints would not exhibit procyclical government expenditure in this model. Thus the fact that developing countries may be constrained in their borrowing capacity fails on its own to explain procyclical fiscal policy.

2.5 Rent Seeking \((S_t > 0)\)

We now re-introduce the political distortion, so that \( \Phi > 0 \). However, as previously mentioned, since there is a positive probability in each period that a rent-seeking government will refrain from extracting rents, I restrict the comparative statics to those states when rents are extracted. In the exploration of the model’s dynamics of the following section, simulations will indicate that governments’ behavior will become closer to the results of this section as the degree of rent seeking motivation \((\Phi)\) increases.

In periods when the government extracts rents \((S_t > 0)\), \( \lambda_t = \Phi \), since the non-negativity constraint on rent extraction is non-binding. Note however, that Proposition 1 continues to hold: the government will never tax and transfer in the same period. For simplicity, the preferences of (18) will be assumed throughout this analysis.

2.5.1 Taxes
When taxes are imposed \( (\tau \geq 0) \), \( g = 0 \) and \( \gamma > 0 \), due to Proposition 1. Note that the consumption smoothing result of equation (21) holds here as well (with \( \lambda = \Phi \)). Furthermore, the optimal labor choice of equation (23) also still holds. Thus Proposition 4 continues to hold: tax policy is weakly procyclical. This implies also that there is a cutoff wage below which the government does not tax (and below which the government provides the transfer).

### 2.5.2 Government Expenditure

When the government provides the transfer \( (g \geq 0 , \gamma = 0) \), taxes are zero due to Proposition 1 and \( \eta = 0 \) as shown in the lemma in Appendix B. Note that although rents are being extracted the consumption smoothing result of (16) still holds. Note also that (11) now becomes:

\[
u_c = \lambda = \Phi \tag{24}
\]

This equation gives the highest level of consumption a rent seeking government will allow. As described earlier, the government will always prefer to extract rents than to increase the transfer payment, if the latter allows a higher level of consumption than given by (24). As in the benchmark model, if wages are sufficiently low, the government will provide the transfer and decrease the marginal utility of consumption to make (24) hold. It is apparent from (24) and (1) that the transfer payments remain countercyclical and that all aspects of the proof of Proposition 2 remain the same. However, once the target level of consumption implied by (24) is attained, the government will use all remaining resources as rents. Since these rents are increasing in income and wages, they will be procyclical. It remains to see which of the two forces dominates. It turns out that the result is unambiguous: total government expenditure is not affected by wages when the transfer payment is provided. This result follows from equations (6) and (7):

\[
G_t = S_t + g_t = b_{t+1} - (1 + r) b_t \tag{25}
\]

For a given level of \( b_t \), government expenditure is dependent only on the level of debt chosen to carry over to the following period. The level of indebtedness
in the following period, in turn, is chosen to make (14) hold:

\[ \Phi - \delta = \beta (1 + r) E \lambda' \]

Since the productivity shock is drawn i.i.d. from its distribution in every period, the only variable affecting the right hand side of this equation is the choice of \( b_{t+1} \). While there is no guarantee that there is a unique level of \( b_{t+1} \) that allows (14) to hold with equality, it is easy to see that the impatient government will achieve the highest utility by choosing the highest level of \( b_{t+1} \) that is consistent with (14). Thus, government expenditure is acyclical when the transfer payment is supplied.

We now turn to see that government expenditure is procyclical when the transfer payment is zero and taxes are positive. When \( \tau \geq 0 \) and \( g = 0 \), (6) and (7) now imply:

\[ G_t = S_t = \tau_t w_t \ell_t + b_{t+1} - (1 + r) b_t \]  \hspace{1cm} (26)

Again, the optimal choice of \( b_{t+1} \) is determined by (14) and is not a function of \( w_t \). However, given the previously demonstrated procyclicality of taxes and (23), tax revenues are unambiguously procyclical. This equation also provides the rationale for the high correlation between tax revenues and government expenditures of rent-seeking governments, that will be noted in the model’s simulations.

Thus, total government expenditure is procyclical when the government taxes and acyclical when the government transfers. Government expenditure can therefore be said to be procyclical over the entire range of wage realizations if the (constant) level of government expenditure when the government transfers is lower than government expenditures when the government taxes. This is proven in Appendix D, yielding the following result:

**Proposition 5** When rents are extracted, fiscal policy consists of procyclical government expenditure and procyclical tax rates (in a comparative statics sense).

The cyclical patterns derived in this section appear to match the cross-country stylized facts of fiscal cyclicalality. The benchmark model predicts that benevolent governments exhibit countercyclical government expenditures, while rent-seeking governments may have procyclical expenditures. If it is the case that governments in developing countries have higher degrees of rent seeking
motivations (or institutional structures that allow such behavior), as will be demonstrated in the empirical section of this paper, these results match the stylized fact that government expenditure is procyclical in all but a few developing countries, but countercyclical in industrialized ones.

Data availability restricts the comparison between the cyclicity of tax policy in developing countries with that of tax policy in OECD countries. However, as motivated in the introduction, tax revenues are similarly procyclical in both industrialized and developing countries. The predictions of this model match this stylized fact: the model does not predict a significantly different cyclical pattern of tax policy in the rent-seeking and the benchmark cases.

The results in this section are comparative statics results. As previously noted, they provide an indication of the cyclicity of fiscal policy predicted by the model, but do not prove this cyclicity in a dynamic sense. The dynamics of the model, demonstrated in the following section, will show that the results of this section do indeed hold dynamically.

3 Numerical Simulation

In this section, I provide a quantitative analysis of the dynamics of the model. Simulations of the model indicate that borrowing constraints alone cannot explain fiscal procyclical in the context of the model presented here. This result is robust to calibrating the model to both the business cycle features of the U.S. and to those of Argentina, indicating that another popular explanation—the higher volatility facing emerging markets—fails too to explain the procyclicality of fiscal policy. Finally, the model is simulated across a range of values for the rent-seeking parameter, showing that increases in its value could yield procyclical fiscal policy. These simulations match the stylized facts relatively well, but a last set of simulations, combining rent seeking motivations with borrowing constraints appears to improve the model’s ability to match the stylized facts. These last results imply that while borrowing constraints cannot explain procyclicality on their own, the addition of borrowing constraints to a rent-seeking model brings the model’s results closer to patterns observed in the data. Given the discussion of Voluntary Insolvency in the previous section, this should not be surprising. The model predicts that rent seeking governments pre-commit themselves to a positive probability of being unable to provide the transfer payment during cyclical downturns. The presence of borrowing constraints
intuitively increases the likelihood of such "insolvency". Since the provision of the transfer payment provides the countercyclical component of government expenditure, the government’s inability to provide it would further increase the degree of fiscal procyclicality observed.

### 3.1 Calibration

The business cycle features of this model are calibrated to match those of Argentina, using the specification of preferences in (18). It has been suggested that the higher business cycle volatility of emerging markets and developing countries may, in itself, be the cause for fiscal procyclicality. The choice of an emerging market for calibration controls for this possibility. The simulation of the benchmark case that follows shows that even given Argentina’s volatile business cycle, the model generates fiscal policy that is rather similar to the fiscal policy of industrialized countries. For robustness, all simulations reported here were also conducted when calibrated to the business cycle features of the United States, with results that are qualitatively identical and quantitatively very similar to the ones presented here\(^\text{12}\). Additional unreported simulations with i.i.d shocks were conducted for robustness, to match the assumptions of Section 2; results were similar. Note that the results reported here are asymptotic results. That is, the first 1000 periods of every simulation have been discarded, to reduce the results’ dependence on initial conditions. Similar results hold when analyzing the transition to the steady state.

The business cycle is introduced through the productivity parameter, \(z_t\), assumed to follow an AR(1) process:

\[
z_t - \bar{z} = \rho (z_{t-1} - \bar{z}) + \epsilon_t \tag{27}
\]

\(^{12}\)One interesting difference when calibrating the benchmark model to the business cycle features of the United States does emerge. The model tends to converge asymptotically to one of two equilibria, depending on initial assets and the degree of impatience. In one case, the government accumulates sufficient assets to smooth consumption with the interest proceeds from accumulated assets alone. Thus the tax rate converges to zero. This is consistent with the findings of Aiyagari, et al. In the other case, the government accumulates debts to the degree that the government transfer is always zero, while interest payments are financed with taxes. The model still shows a government with both countercyclical government expenditures and procyclical tax revenues in the transition to these asymptotics and either countercyclical government expenditures or procyclical tax revenues in the asymptotic results. In both the transition to the "steady state" and asymptotically, the addition of rent seeking motivations reverses the cyclicity of government expenditures.

---

\(\text{22}\)
where $\bar{z}$ is the trend level of productivity, which will here be normalized to 0; $\rho$ is the degree of autocorrelation; and $\epsilon_t$ is an i.i.d shock normally distributed with mean 0 and variance $\sigma^2$. For the U.S., the model is calibrated to match $z_t$ to the Solow residual, yielding $\rho = 0.95$ and $\sigma = 0.007$. As is common in the real business cycle literature of emerging markets, following Mendoza (1991), when calibrating the model to match Argentina’s business cycle features, Argentina’s terms of trade are used instead of its Solow residual as the exogenous "technology" shock. Using IMF’s WEO data for the period 1970-2003, Argentina’s business cycle process can be represented as $\rho = 0.91$ and $\sigma = 0.11$.

As should be apparent from section 2, the value of $r$ affects the model’s outcomes only through $\beta (1 + r)$. A value of $r = 0.03$ will be assumed and the model will be tested for a variety of values of $\beta$. The results are not sensitive to the specific values of $\beta$ chosen.

Finally, the value of $A$, the relative marginal value consumers place on leisure compared with consumption, is calibrated to make consumers work 1/3 of their available time in steady state. As may be apparent from Section 2, this will also be the upper bound (but not the lower bound) on the fraction of their available time that consumers ever work, so this can also be viewed as average hours worked in full employment.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value for U.S.</th>
<th>Source</th>
<th>Value for Argentina</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho$</td>
<td>0.95</td>
<td>IMF</td>
<td>0.91</td>
<td>IMF</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>0.007</td>
<td>IMF</td>
<td>0.11</td>
<td>IMF</td>
</tr>
<tr>
<td>$r$</td>
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<td>Assumption</td>
<td>0.03</td>
<td>Assumption</td>
</tr>
<tr>
<td>$A$</td>
<td>2</td>
<td>Assumption</td>
<td>2</td>
<td>Assumption</td>
</tr>
</tbody>
</table>

$\rho$ and $\sigma$ are the autocorrelation and variance of the business cycle process, respectively; $r$ is the interest rate; and $A$ is the relative value consumers place on leisure.

### 3.2 Benchmark Case

Table 1 shows a number of relevant results from the simulation of the benchmark model. It indicates that the benchmark model yields similar fiscal patterns when calibrated to match the U.S. and the Argentine business cycles. In both cases, the benchmark model matches the actual fiscal patterns of the United States rather well, but not those of Argentina. This implies that business cycle volatility alone fails to generate fiscal procyclicality in the model.

Columns (1) - (4) report simulation results. Columns (1), (2), and (3) are calibrated to Argentine data, with a mildly impatient government, a government
with $\beta (1 + r) = 1$, and a mildly patient government, respectively. The results in column (1) appear to match U.S. data, reported in column (5), relatively well. The correlation between government expenditures and GDP are approximately 0.4 in both cases.

Column (4) shows the results of the benchmark model when calibrated to the U.S. business cycle, for $\beta = 1 + r$. A comparison of columns (2) and (4) shows that the model obtains similar results when calibrated to U.S. and to Argentine business cycle features. While government expenditures are slightly less countercyclical in the model calibrated to match Argentina’s volatile business cycle environment, they are far from being procyclical. On the other hand, comparing columns (5) and (6), the difference between the cyclicality of government expenditures in the two countries in the actual data is striking. This difference cannot be matched solely by the differing stochastic environments the two countries face.

Optimal fiscal policy calibrated to the volatility faced by Argentina matches the fiscal patterns in OECD countries much better than does those in emerging markets. It is interesting to note in the last row of Table 1 that the benchmark model, calibrated to the features of the Argentine business cycle, also shows a negative correlation between government expenditures and revenues, as observed in OECD countries, rather than the positive correlation observed in emerging markets, such as Argentina. This is another salient feature of fiscal policy not generated due to the volatile business cycle features of emerging markets. While the model fails to capture the magnitude of this correlation in the United States, it is important to note that the U.S. has a highly negative correlation between revenues and expenditures, compared to other industrialized countries (in the U.K., for example, this correlation is -0.50, much closer to figures generated by the model).

Table 1: Benchmark Model

Provides the cyclicality of a number of features of fiscal policy, as defined by their correlation with GDP, as well as the correlation between government expenditures and revenues. The correlations are provided from simulation results, calibrated to Argentina’s and the U.S.’s business cycles for a variety of degrees of impatience ($\beta$), and as observed in the actual data of the U.S. and Argentina.
### Table

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simulation</td>
<td>Data</td>
<td>Calibrated to Argentina</td>
<td>Calibrated to U.S.</td>
<td>U.S.</td>
<td>Argentina</td>
</tr>
<tr>
<td>β</td>
<td>0.97</td>
<td>$=\frac{1}{1+r}$</td>
<td>0.98</td>
<td>$=\frac{1}{1+r}$</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cyc. of G</td>
<td>-0.40</td>
<td>-0.70</td>
<td>-0.85</td>
<td>-0.78</td>
<td>-0.43</td>
<td>0.23</td>
</tr>
<tr>
<td>Cyc. of Revenues</td>
<td>0.98</td>
<td>0.93</td>
<td>0.69</td>
<td>0.87</td>
<td>0.70</td>
<td>0.81</td>
</tr>
<tr>
<td>Cyc. of Deficits</td>
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<td>-0.89</td>
<td>-0.96</td>
<td>0.57</td>
<td>0.38</td>
</tr>
<tr>
<td>Corr(G,Revenues)</td>
<td>-0.33</td>
<td>-0.46</td>
<td>-0.52</td>
<td>-0.46</td>
<td>-0.78</td>
<td>0.55</td>
</tr>
</tbody>
</table>

### 3.3 Borrowing Constraints

It is a common perception that the procyclicality of fiscal policy in developing countries is caused by borrowing constraints. Let us now turn to test for this possibility in the context of the model presented in Section 2. Pitting the odds in favor of borrowing constraints I assume an extreme constraint: no borrowing is allowed ($b_{\text{max}} = 0$). Figure 5 presents quantitative results of a simulation with such borrowing constraints, the business cycle features of Argentina, and varying degrees of impatience ($\beta$). One would expect higher degrees of impatience to enhance the effects of borrowing constraints, as suggested by Deaton (1992).

Note that impatience (decreasing $\beta$s) moves fiscal policy away from the counter-cyclicality of the benchmark case. Revenues become less procyclical, and expenditures and deficits become less counter-cyclical; the correlation of expenditures with revenues becomes less negative. However, as impatience increases, fiscal policy converges to acyclical patterns, with the correlation of all fiscal variables with GDP converging to zero; even at very low values of $\beta$, government expenditures are at most acyclical. There is no value of $\beta$ for which fiscal policy is procyclical. This is as would have been expected from the theory. Binding constraints decrease the capacity of a government to conduct countercyclical fiscal policies, but there is no reason in the theory presented in Section 2 why borrowing constraints should cause fiscal policy to be procyclical.

### 3.4 Rent-Seeking Distortions

Figure 6 now shows how fiscal policy is affected by rent-seeking distortions. It plots the same fiscal variables now as a function of $\Phi$, the degree of rent-seeking motivations. A moderate degree of impatience ($\beta = 0.97$) is assumed and borrowing limits are set so as never to bind.
Figure 6 demonstrates that rent-seeking motivations can capture the most salient features of the stylized facts. Government expenditure is countercyclical when no rent-seeking motivation is present, with a correlation of government expenditure to GDP of approximately -0.40. As rent seeking motivations increase, government expenditure becomes less countercyclical and eventually procyclical. Also note how the correlation between expenditures and revenues increases as rent seeking motivations increase, as observed in the data.

These simulations do not show any significant change in the cyclicality of government revenues. This is consistent with the data. It does not appear that government revenues show different degrees of procyclicality in industrialized and developing countries. Specifically, note in Table 1 that the correlation of government revenues with GDP is higher in Argentina than it is in the U.S. The simulations do fail to reproduce the magnitude of the decline in the countercyclicality of deficits, though. As noted in Section 1, deficits are acyclical in average in developing countries. In Figure 6, deficits are countercyclical even for extremely high levels of rent seeking motivations. Matching the cyclicality of deficits in developing countries requires an interaction between rent seeking motivations and borrowing constraints. Let us turn to simulations demonstrating this result.

3.5 Rent-Seeking Distortions, Voluntary Insolvency, and Fiscal Procyclicality

As motivated in the introduction to Section 3, rent-seeking governments will tend to seek rents to a degree that occasionally forces them into "insolvency" in future periods. In every period, the government will always borrow sufficiently large sums to ensure that it will be unable to provide the transfer payment in the following period with some strictly positive probability. One could therefore conjecture that rent seeking distortions would play a more important role when borrowing constraints are tighter.

Figure 7 presents simulations calibrated to the same values as in the previous section, with the addition of borrowing constraints as in Section 3.3. Figure 7 shows a similar pattern to that of Figure 6: government expenditure becomes less countercyclical and then more procyclical; government revenues remain flat; the correlation of government revenues and expenditures increases; and the countercyclicality of deficits decreases as $\Phi$ increases. However, the results in Figure 7 improve slightly on those presented in Figure 6 in capturing
the acyclical nature of deficits as rent seeking motivations increase. As has been previously noted, deficits are acyclical on average in developing countries.

4 Empirical Evidence

A number of empirical studies have captured the stylized facts of the cyclical nature of fiscal policy and attempted to explain the potential causes for differing cyclical patterns among countries. It has been shown elsewhere that fiscal policy is often procyclical, but mostly in developing countries and only rarely in industrialized ones (Gavin and Perotti, 1998; Kaminsky, Reinhart and Vegh, 2004). While reaching similar conclusions, researchers have differed in their definition of the cyclical nature of fiscal policy. Gavin and Perotti; Catao and Sutton (2002); and Alesina and Tabellini (2005) define procyclical fiscal policy as a combination of a countercyclical ratio of tax revenues to GDP, a procyclical ratio of government expenditures to GDP, and a procyclical ratio of borrowing to GDP, after correcting for terms of trade shocks.

Kaminsky, Reinhart and Vegh, 2004 argue that it makes little sense to discuss the cyclical nature of policy in terms of outcomes (such as the ones used in the aforementioned studies); instead, the cyclical nature of policy instruments should be considered. KRV therefore define procyclical fiscal policy as a combination of procyclical government expenditure (in levels as opposed to as a percentage of GDP) and countercyclical tax rates. The empirical exploration that follows will conform to this approach. However, it is noteworthy that these two measures are highly correlated across countries.

As motivated in the introduction, the main variable of interest is the cyclical nature of government expenditure. Moreover, time series on average tax rates are unavailable for most countries in the sample. The focus will therefore be on the procyclical nature of government expenditures. This will also coincide with the predictions of the model, presented in section 3, that government expenditure is more likely to become more procyclical as rent seeking motivations increase.

No direct measurement of rent seeking motivations in the fiscal process is available. It is therefore necessary to seek a proxy for such a measure. Alesina and Tabellini (2005) use the World Bank’s "Control of Corruption" indicator (Kaufmann, Kraay and Mastruzzi, 2005). While some forms of rent seeking may not register as corruption, per se, such as rent seeking by special interest groups or workers’ unions, or simple pork barrel spending; the definition of the
"Control of Corruption" variable appears to be rather close to the theoretical approach employed here. Kaufmann, Kraay and Mastruzzi (2005) define their indicator as "measuring the exercise of public power for private gain", which is rather close to the way rent extraction is introduced here.

There have been a number of previous empirical studies of the causes for procyclicality. Lane (2003) explores the cyclerality of fiscal policy in OECD countries and finds that wage government consumption is the most procyclical element of government expenditure. This may be consistent with the theory presented here, if rent seeking in OECD countries takes the form of political pressures from unions of government employees. Differing from the theoretical and empirical results here, he also finds that volatile output has an impact on procyclicality. Alesina and Tabellini (2005), looking at a cross-section of both OECD and developing countries, show that corruption is the main explanatory variable for the procyclicality of government expenditures. They find that this result is robust to controlling for democracy, but not always after controlling for the interaction between corruption and democracy. They suggest this as support for their theoretical approach, which implies that procyclicality would appear mainly in corrupt democracies. Their results consistently show corruption as a main explanatory variable for procyclicality, but are less consistent as to whether procyclicality is correlated with corruption in democracies alone. One empirical approach (Table 3 in the February 2006 version of their paper) shows that the correlation between corruption and procyclicality is only present in democracies. A second empirical approach (Table 7 in the same version) shows that the correlation between procyclicality and corruption is robust to controlling for both democracy and the interaction between corruption and democracy (with a higher correlation between procyclicality and corruption in democracies).

However, as mentioned earlier, their measurement of procyclicality differs from the one used here. This section indicates that Alesina and Tabellini's result that corruption is the main factor explaining procyclicality is robust, but their result that its effects are stronger in democracies is not robust to using a different measurement of procyclicality. This justifies the contribution of the theoretical approach employed here, which demonstrates that electoral control is not necessary to generate procyclicality.
4.1 Estimation Strategy

Consider the following empirical model:

\[ P_i = \beta X_i + \epsilon_i \] (28)

Where \( P_i \) is the degree of procyclicality (of government expenditures) of country \( i \) and \( X_i \) is a vector of candidate explanatory variables for procyclicality. As seen below, a measurement of corruption appears to be the only robust explanatory variable for procyclical fiscal policy, supporting the model’s hypothesis that it is rent seeking behavior that is driving the procyclicality of government expenditures in developing countries. This explanation is tested against a number of alternatives.

4.2 The Data

I measure procyclicality using Kaminsky, Reinhart and Vegh’s (2004) data and thus their definition of the procyclicality of government expenditure: the correlation between the cyclical component (using a Hodrick-Prescott filter) of government expenditure with the cyclical component of real GDP, over the period 1970 to 2003. This provides one observation for the procyclicality variable, ranging in value from -1 to 1, for each one of the 102 countries in the sample.

The choice of explanatory variables for procyclicality follows, to a certain extent, Alesina and Tabellini (2005), but looks at additional possible variables as well. Alesina and Tabellini regress their measure of procyclicality against an indicator of corruption, an indicator of democracy, and initial GDP per capita.

In this study, the vector of exogenous variables, \( X \), includes all of Alesina and Tabellini’s variables, an additional variable to measure government size, and a measurement of the volatility of GDP. I measure corruption using Kaufmann, Kraay and Mastruzzi’s Control of Corruption indicator averaged over the years 1996-2004 (the entire span of the series). While this variable is measured close to the end of the period being studied, raising possible endogeneity concerns, it is useful to note that the Control of Corruption score has been very persistent over time, and is thus unlikely to have changed significantly over the period at hand. The Control of Corruption indicator ranges from -2.5 to 2.5, decreasing in the amount of corruption. As mentioned before, this measurement is a proxy for rent seeking in the fiscal process.
A dummy variable, *Democracy*, is used to control for the fact that procyclicality may differ between democracies and non-democracies. I construct the *Democracy* measure using the Polity IV database. The *Polity IV* variable is constructed by subtracting the Polity IV “Autocracy” indicator from its “Democracy” indicator. Since both these indicators are on a scale of 0 to 10, the *Polity IV* variable used here ranges from -10 to 10. The *Polity IV* variable is then taken as the average annual score over the time period considered. *Democracy* obtains a value of 1 if the *Polity IV* variable is positive. For robustness, the same empirical analysis is conducted with the *Polity IV* variable itself.

I control for income using initial (1970) PPP GDP per capita in US dollars, taken from the Penn World Tables. An additional control is added for government size, by adding a variable of initial (1970) government expenditure to GDP (using IMF WEO data). An additional control variable is the volatility of GDP, taken as the variance of real GDP in local currency over the period 1970-2003, using WEO data. I add this control to test the rent seeking hypothesis against the one proposed in Talvi and Vegh (2005), which suggests that procyclicality is caused by political distortions combined with a variable tax base. Finally, to test for the possibility, suggested by Alesina and Tabellini, that the interaction between democracy and corruption generates procyclicality, an additional dummy variable is added, interacting the *Control of Corruption* variable with the *Democracy* dummy.

### 4.3 Results

Regression results are summarized in Table 2. Column 1 shows the stylized fact discussed in much of the empirical literature, and captured in Figure 1, that procyclicality is decreasing in income per capita. The pairwise correlation between “procyclicality” and per-capita GDP indicates that a $1000 increase in 1970 PPP GDP decreases the correlation between the cyclical components of government expenditures and GDP by 15 percentage points. However, as demonstrated in Column 2, procyclicality is also highly correlated with corruption, with a 1-point increase in the *Control of Corruption* score decreasing the correlation between the cyclical components of government expenditure and GDP by 18 percentage points. This is natural, given that the correlation between GDP and the *Control of Corruption* variable is highly statistically significant (with a T-statistic of 16.7). Column 3 shows, however, that the relationship between corruption and procyclicality is robust to controlling for GDP per capita. Cor-
ruption remains statistically significant at the 5% level, while GDP per capita is only a statistically significant explanatory variable for procyclicality at the 10% level. Furthermore, when additional controls are added in columns 4 to 8, corruption remains statistically significant at the 5% level (and occasionally at the 1% level), while GDP per capita is no longer statistically significant. This points to the fact that most of the heterogeneity in procyclicality, seemingly across income lines, is due to rent seeking.

Robustness checks are as follows. Column 4 controls for government size. It is a priori conceivable that the size of government could have bearing on the cyclicality of fiscal policy, but this appears not to be the case\(^{13}\). Column 5 controls for democracy, using the Democracy dummy variable. Column 6 adds a control for the possibility the volatility of real GDP in local currency may be a cause for procyclicality. The volatility of GDP does not appear to be statistically significant\(^{14}\). Columns 7 and 8 show that the results in columns 5 and 6 are robust to using the continuous Polity IV variable instead of the Democracy dummy variable.

Finally, column 9 tests whether the interaction between corruption and democracy has explanatory power for procyclicality, as suggested by Alesina and Tabellini (2005). As can be seen, this interaction term is highly insignificant and of the opposite sign. Thus, Alesina and Tabellini’s result that it is the interaction of corruption and democracy that causes procyclicality does not appear robust to the different measurement of procyclicality used here. The fact that the Control of Corruption variable becomes insignificant as well should not, however, be seen as a refutation of the notion that corruption itself is a viable explanation for procyclicality, but rather a reflection of the low power of this regression. The covariates in this regression suffer, by their nature, from extreme multicollinearity; the sample size is moreover rather small. An addition of an interaction term adds an additional covariate that is highly multicollinear with the others, further reducing the power of the regression. Comparing the result in column 9 to that in column 10 supports this notion. The regression of

\(^{13}\)It is possible, for example, that generous welfare systems, often contributors to "large government" contribute to fiscal countercyclicality: welfare programs tend to be countercyclical by their very nature. Some countries may be "locked in" to generous welfare systems for historical reasons and could conceivably be more countercyclical for that reason. Alternatively, governments that are small for exogenous political reasons, may have less means to affect the cyclicality of their fiscal policies.

\(^{14}\)In fact, the pairwise correlation between procyclicality and the volatility of GDP is not statistically significant. This correlation only becomes statistically significant at the 10% level when a number of outliers are dropped (Angola, Argentina, Bolivia, Brazil, Nicaragua and Peru). The results presented in Table 2 are robust to excluding these six observations.
column 9 includes the exact same data as the one reported in column 10, but includes this additional interaction term. The facts that corruption is statistically significant in column 10, and the interaction term added in column 9 is highly insignificant implies that insignificant coefficient on Control of Corruption in column 9 should be taken with a grain of salt.

In conclusion, we observe that corruption is a robust explanatory variable for procyclicality, as predicted by the theoretical model of the previous sections.

5 Conclusions

The procyclicality of fiscal policy in developing countries has generated much interest in both the economic literature and in policy circles in recent years. Imperfections in capital markets are frequently assumed to be the main culprit. The theory presented here raises questions regarding the ability of borrowing constraints to cause procyclicality. It demonstrates theoretically, numerically, and empirically that use of the fiscal process for rent seeking purposes is a plausible alternative explanation. The model presented in this paper assumes that the main function of fiscal policy, and the main reason for its countercyclicality in industrialized countries, is intertemporal insurance provided by governments to their citizens. Given the proportion of OECD budgets spent on social insurance, this assumption would appear to be a reasonable one. While showing that rent seeking within the fiscal process can cause fiscal procyclicality, the model also contributes to explaining why the amount of resources devoted to social insurance in many developing countries is typically smaller.

This paper provides motivation for a number of directions for further research. The modern literature on fiscal policy has tended to ignore the expenditure side of the balance sheet, usually relegating its cyclicality to an exogenous process. This paper presents one of many possible ways to introduce an endogenous choice of government expenditures. A continued effort in exploring other ways to model government expenditure policy could lead to interesting results. The concept of fiscal policy as social insurance used in this paper could be further expanded by introducing heterogenous agents, since social insurance typically involves an element of income redistribution. The introduction of heterogenous agents in a model of optimal fiscal policy may yield interesting results.

The literature on fiscal policy has always been closely related to the litera-
ture on consumption. Translating some of the ideas explored here to private consumption-savings decisions may lead to interesting results as well. It would be interesting to see if there are ways to translate the dynamic concept of Voluntary Insolvency, introduced here, to consumption problems. This adaptation might help in explaining the empirical failure of the permanent income hypothesis. Since the model presented here relies on overspending in good times rather than inability to borrow in bad times to generate fiscal procyclicality, it would be interesting to see if there is a way to match consumers’ behavior in similar ways as well.

The paper provides interesting policy insights as well. The liquidity that international financial institutions, specifically the IMF, provide to developing countries during financial crises is partially motivated by the perception that imperfections in international financial markets make it difficult for developing countries to borrow during crises. The idea that this insurance may be counterproductive due to moral hazard has a long history. However, this paper questions the utility of this insurance from a new angle. The concept of voluntary insolvency, introduced here, implies that rent seeking behavior over the entire cycle may have pre-committed a government to be in financial crisis. While lending by international financial institutions may provide relief to the citizens of developing countries during these crises, the anticipation of such assistance enables additional rent seeking during good times, so that much of this assistance is actually paying, ex-post, for rent seeking activities that have already occurred. Finally, conditionality imposed by these institutions typically restricts deficits following crises. The model predicts that unless fiscal austerity targets are imposed over the entire cycle, they may not be welfare improving. Ironically, the model predicts that such deficit restrictions are often imposed exactly when rent seeking governments are most committed to using fiscal policy for actual social spending. Overall, this paper appears to imply that focussing on deficit targets without addressing the deficiencies of fiscal institutions provides at best a partial solution to the problems of fiscal policy in developing countries.

References


Appendix A

Proof. Assume that $g > 0$ and $\tau > 0$. Then the multipliers on their non-negativity constraints are zero: $\gamma = 0$ and $\eta = 0$. This implies, via (13) and the assumption that $u(c, \ell)$ satisfies the Inada conditions, that $\mu = 0$. Combining equations (11) and (12), we obtain:

$$u_c + wu_t = 0 \quad (29)$$

Comparing (29) with (2) implies that $\tau = 0$, contradicting the assumption that $\tau > 0$. ■

Appendix B

Lemma 1 The non-negativity constraint on taxes is never binding.

Proof. When the non-negativity constraint is binding, $\tau = 0$, so we need only to consider those states of nature when taxes are zero. Note that the proof of Proposition 1 implies that the non-negativity constraint can only bind when
$g > 0$, in which case the non-negativity constraint on the transfer payment is not binding: $\gamma = 0$. Also, note that (13) implies that $\mu \geq 0$. Equations (11) and (12) combine to yield:

$$wu_c + u_\ell = -\mu \left( w^2 u_{cc} + u_{ll} \right)$$

Equation (2) implies that the left hand side of this equation is equal to zero when $\tau = 0$. Thus, given that $u_{cc} < 0$ and $u_{ll} < 0$, it must be the case that $\mu = 0$, which implies through (13) that $\eta = 0$. Thus, even when $\tau = 0$, the non-negativity constraint on taxes is non-binding.

Appendix C

**Proof.** We start the analysis by looking at periods when the government is transferring and taxes are zero. In other periods, government expenditure is trivially zero, due to Proposition 1. Now note that wage income ($w\ell$) unambiguously increases in wages. This is clearly the case if $\ell$ is increasing in $w$. As for the opposite case, it would imply via (2) that $u_c$ is strictly decreasing in $w$, given that $\tau = 0$. This, in turn, implies that $b_{t+1}$ is decreasing in $w$ (because of (16)) and that $g_t$ is decreasing in $w$ as well (by analyzing (7) when $S = 0$ and $\tau = 0$). But (17) dictates that this decrease in $g_t$, combined with an increase in $c_t$ (necessary for the decrease in $u_c$), be associated with an increase in $w\ell$. Thus wage income is increasing in wages.

It can now be shown that $g_t$ is weakly decreasing in $w_t$. Consider two wage levels $w_1 > w_2$ and the two (non-negative) optimal levels of government expenditure associated with them, $g_1$ and $g_2$, for a given level of debt $b_t$. Assume, by way of contradiction that $g_1 \geq g_2$. The discussion above implies that that $w_1 \ell_1 > w_2 \ell_2$. Thus (1) requires $c_1 > c_2$, given that $\tau = 0$. (16) then requires $b'_1 < b'_2$. However, for a given level of $b_t$, (7) requires that $g_2 > g_1$, which contradicts the assumption that $g_1 \geq g_2$. Thus, when $g_t > 0$, $g_t$ is strictly increasing in $w$.

When $g_t = 0$, on the other hand, $g_t$ is trivially unaffected by $w_t$. However, to complete the proof we will see that the $g_t \geq 0$ constraint is binding for high wage realizations, so that $g_t$ is increasing in $w_t$ over the entire range of wage realizations. To see this, consider the wage rate, $w^*$ at which $g_t = 0$ is the solution to the first order conditions of the $g_t > 0$ case. For any $w > w^*$ it must be the case that equations (7), (16) and (17) cannot be jointly satisfied for any level of $g_t \geq 0$, based on the proof above. Thus, the $g_t \geq 0$ constraint
is binding for all $w > w^*$. By the same argumentation, for all $w \leq w^*$, $g_t \geq 0$, which proves that the transfer payment is positive for low wage realizations.

This concludes the proof of Proposition 2. The last paragraph of this proof provides proof of Proposition 3. ■

Appendix D

Lemma 2 Total government expenditure is higher in "booms" than in "busts".

Proof. To see that this indeed is the case, consider the borderline wage, $w^*$, at which the consumers’ optimal choice of labor contribution, in the absence of taxation, gives $w^*\ell_t = c^*$, where $c^*$ is the level of consumption that satisfies (24). At this wage rate, the government is not interested in taxing nor in transferring, so that this wage rate coincides with the borderline wage separating "booms" from "busts". Consider now a government entering a period with a given amount of debt, $b_t$, and with an optimal level of debt it wants to carry on to the following period, $b_{t+1}$, governed by (14). The government will extract rents of $G_t = S_t = b_{t+1} - (1 + r)b_t$, where the first equality is due to the fact that the government’s transfer to the representative citizen is equal to zero at this wage rate. Now, consider the comparative statics of an increase in $w_t$. This does not affect the choice of $b_{t+1}$, determined by (14). However, (1) implies that the government will increase taxes to bring the representative consumer’s consumption back down to $c^*$, due to (21). Thus, $G_t = S_t = \tau tw_t\ell_t + b_{t+1} - (1 + r)b_t > b_{t+1} - (1 + r)b_t$. Expenditure has increased. Moreover, it’s expenditure will only further increase as $w$ increases, since it has already been shown that government expenditure is increasing in wages during "booms". Consider now the comparative statics of a drop in $w$. Now, the government would like to transfer income to consumers to bring their income back up to $c^*$. Thus, $G_t = S_t + g_t = b_{t+1} - (1 + r)b_t$ has not changed. It has already been shown that government expenditure does not change as $w$ declines further, during "busts". The result that in the rent seeking regime, government expenditure is lower in "busts" than in "booms" follows. ■
The procyclicality of government expenditure is decreasing in GDP per capita.
The procyclicality of government revenues is only mildly increasing in GDP per capita.
The procyclicality of government surpluses is increasing in GDP per capita.
The correlation between government revenues and expenditures is decreasing in per capita income.
Plots the cyclicity of a number of fiscal variables (the correlation coefficient between their cyclical components and the cyclical component of GDP) in simulations with extreme borrowing constraints (the government cannot borrow, only save). As impatience increases (moving rightward along the X axis), we observe that fiscal policy becomes less countercyclical: government expenditures and deficits become less countercyclical and government revenues become less procyclical. However, even for extremely high degrees of impatience, fiscal policy converges to an acyclical pattern. There is no degree of impatience for which fiscal policy becomes procyclical. Thus borrowing constraints alone cannot explain fiscal procyclicality.
Plots simulation results for the cyclicality of a number of fiscal variables (the correlation coefficient between their cyclical components and the cyclical component of GDP), for varying degrees of rent seeking motivations. As rent seeking motivations increase, government expenditures become more procyclical; the correlation between revenues and expenditures also becomes more positive.
While borrowing constraints alone are unable to explain fiscal procyclicality (see Figure 5), the addition of borrowing constraints does improve the model’s ability to match the data. This graph plots simulation results for the cyclicality of a number of fiscal variables (the correlation coefficient between their cyclical components and the cyclical component of GDP), for varying degrees of rent seeking motivations, for a model with rent seeking and borrowing constraints. Government expenditure becomes procyclical, deficits become acyclical, while the cyclicality of tax revenues is unaffected as rent seeking increases, as observed in the data.
Table 2
OLS Estimates: Dependent Variable: Correlation between Government Expenditure and GDP

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Political IV

Volatility

Corruption * Democracy

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T statistics in parentheses
* - Significant at 10%
** - Significant at 5%
*** - Significant at 1%
Table 2 (cont.)
OLS Estimates: Dependent Variable: Correlation between Government Expenditure and GDP

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Adjusted R-squared: 0.39 0.41 0.40 0.37 0.36

T-statistics in parentheses
* - Significant at 10%
** - Significant at 5%
*** - Significant at 1%