Marcel Chamarelli Gutierrez

Populism in General Equilibrium:
Indirect Effects on Political Support

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Prof. Eduardo Zilberman
Advisor
Departamento de Economia — PUC–Rio

Prof. Tiago Berriel
Co–Advisor
Departamento de Economia — PUC–Rio

Prof. Gabriel Ulyssea
Departamento de Economia - PUC-Rio

Prof. Pedro Cavalcanti
Escola de Pós Graduação em Economia - FGV-RJ

Prof. Monica Herz
Coordinator of the Centro de Ciências Sociais – PUC–Rio

Rio de Janeiro, April 5^{th}, 2016

Marcel Chamarelli Gutierrez

The author graduated in Economics from UFRJ in 2014.

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Abstract

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We present a version of the standard general equilibrium model with heterogenous agents and incomplete markets to address matters of populism and political support of governments. The novelty is to assume that governments may expropriate part of the resources in the economy. We highlight a new mecanism in which a populist government can obtain the approval necessary to maintain power. Transfers to poorest/less productive households increases the equilibrium interest rates, by reducing precautionary savings, benefiting rich capital holders and creating a coalition between them. Further, we calibrate the model to a standard U.S economy and conduct some comparative statics in key parameters to address the likelihood of such arrangement.

Keywords

Populism; General Equilibrium; Political economy; Political support; Heterogenous agents;

Resumo

Gutierrez, Marcel Chamarelli; Zilberman, Eduardo(orientador); Berriel, Tiago. **Populismo em Equilíbrio Geral: Efeitos Indiretos sobre Apoio Político**. Rio de Janeiro, 2016. 51p. Dissertação de Mestrado — Departamento de Economia, Pontifícia Universidade Católica do Rio de Janeiro.

Apresentamos uma versão do modelo padrão de equilíbrio geral com agentes heterogêneos e mercados incompletos para responder questões acerca do populismo e suporte político. A inovação é assumir que o governo pode expropriar parte dos recusos da economia. Destacamos um novo mecanismo de suporte político, onde o governo populista obtém a aprovação necessária para se manter no poder. Transferências para os mais pobres/menos produtivos aumentam a taxa de juros de equilíbrio, ao reduzir a poupança por motivo precaucional, beneficiando detentores de capital ricos e criando uma coalizão entre eles. Então, fazemos um exercício de calibração para a economia americana e conduzimos exercícios de estática comparativa em parâmetros chave para analisar a verossimilhança do arranjo.

Palavras–chave

Populismo; Equilibrio Geral; Economia politica; Suporte político; Agentes heterogêneoes;

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1
Introduction

What are the incentives faced by governors and voters when they must choose how much to tax and transfer? How much redistribution is necessary to maintain power in unequal societies? These are questions broadly explored in the political economy literature. Robinson e Acemoglu (2006) develops numerous models to explain the rational economic foundations of democratic and authoritarians governments. Also, Krussel e Rios-Rull (1999), Krussel et al. (1997), Krussel e Rios-Rull (1994) and Corbae et al. (2009) uses quantitative and theoretical macroeconomic models to answer similar questions, as how different institutional arrangements induces different growth paths and how much of the level of taxation and distribution observed in countries can we explain as political outcomes in quantitative macroeconomic models.

One of the questions we would like to address is: can we use these various contributions to understand the dynamic of expropriation and corruption in development countries? Specifically, in an emergent economy where commodity exportation is a large fraction of the GNP, what portion (if any) of these products income can a governor confiscate, to whatever end, and still maintain power? If that government desires to expropriate this commodity to which fraction of the population will he find optimum transferring to?

The main inspiration for this paper is the political science work of Mazzuca (2013). The author analyses the "left turn" that has been the major political trend in many Latin American countries since the beginning of the century. As Mazzuca (2013) called, the "rentier populism" that emerged on these countries were characterized by a coalition between the incumbent government, that redistributes natural resources earnings (experiencing often a boom in international prices) to informal workers, and the informal sectors that benefit from these policies and legitimizes them through plebiscitarianism. On the other hand, the constant expropriation of privately owned firms generates a latent inefficiency and a troubling foreign investment getaway.

Mazzuca (2013) highlights the fact that this coalition was only possible due to the boom in commodities prices, launched mainly by the accelerated growth of India and China, improving the terms of trade of these products exporting countries. The idea is that this boom elevated the incentives to expropriate and made it possible to do so despite the distortions derived by it.

In this paper we try to model this work. We use a heterogeneous agent

with incomplete markets model, that we believe replicates reasonably well an emergent economy, with an exogenous income that we chose to interpret as a commodity income that can be divided among workers or expropriated by the local government to non-productive means. We believe this framework is fairly general and contemplates not only the cases Mazzuca (2013) calls rentier populists coalitions and "superpresidentialism" in Latin American countries, but also others authoritarian dominions in agricultural countries, as in African examples. By doing that, we add some new insights to his initial analysis.

Mainly, we found that sometimes a coalition between poor low productive households and rich capital owners can be formed that sustain the populist government in power. As we will see, populism will raise endogenously, as a solution to the government problem of maximizing the amount expropriated. Acemoglu et al. (2013) defines populism as politics to the left of the median voter. In our case, populism will be transferring to the poorest (the least productive ones, it will be clear later why) households even if they are no majority in the population. By doing so, the government induces an equilibrium in which high interest rates benefit the rich capital owners, that, therefore, supports the incumbent government.

High interest rates in development economies such as the ones illustraded by Mazzuca (2013) is quite usual. But the level of nominal and real interests in these countries with left governments are usually associated with the desincentives to savings and investing caused by expropriation risk. In our work we do not consider effects of taxing on private individual incentives to save, since we only allow the government to tax the exogenous income. Instead, interest rises in equilibrium due to the decrease in risk perception (and consequent decrease in precautionary savings) by, mainly, low income households. When the policy maker chooses to focus transfers on households that are most vulnerable to adverse shocks, it decreases the overall level os savings in the economy, consequently elevating capital returns. The trade off they face is analogous: by reducing capital in equilibrium, wages are also reduced. Rich households are also the most productive ones in the economy, so they must choose between more capital return or more labour return. As one should suspect, only extremely wealthy families find this attractive, and the equilibrium outcome most harm the middle class.

Therefore, precautionary savings play a major role in our model. A similar result is found in Krussel et al. (2009), but the authors use a business cycle model to estimate the welfare gains from reducing aggregate shocks. When the government chooses to transfer only to the least productive, in a model where productivity is idiosyncratic as ours, that means an insurance

in the worst state of nature. Households, therefore, responds by reducing precautionary savings, affecting the equilibrium level of capital and, hence, interests and wages. Capital is decreased, as are wages, and interest rate increases. The reduction in wages implies a trade-off, and that is why, for high productive households, only the wealthiest of all will be benefited by the populist government. To the best of our knowledge, our work is the first to address this kind of coalition on a general equilibrium framework.

Since we know from Aiyagari (1994) that precautionary savings can be of little relevance in a more realistic calibration, we proceed by adapting our parameters in a more fashion way. We choose to follow the work of Floden e Lindé (2001) because insurance also plays a major role on their results, and so we calibrate the model in similar way to theirs. We find that, indeed, this coalition between poor and wealthy households that allows a majority political support to the government is less likely to occur in an American economy calibrated model. Also we induct a series of comparative statics in parameters that determine the amount of risk and persistence of the shocks in the economy. We found that economies with higher risk are more likely to experience such an arrangement, although this is somehow dubious. Albeit being essential to our result, precautionary savings can also be its downfall. If asset accumulation for insurance reasons is too high in a standard economy so that the consequent capital reduction that arises by transferring to households in the worst state is very sharp, the reduction on equilibrium wages are so high that weakens the mechanism (the political support given by rich capital owners), even though interests rises considerably.

The rest of the paper is as follows: on Section I we will briefly discuss some of the literature in political economy and macroeconomics that served as inspiration and support to this work; Section II we present the general model we used to present our main results; Section III we will discuss the results and the parametrization used; in Section IV we present the results for the American calibration and perform comparative statics; Section V we conclude.

2
Literature Review

The main idea of this paper is to analyze the contribution of Mazzuca (2013) in a general equilibrium framework. We do so by extending Berriel e Zilberman (2011) model of focused direct transfers to poor workers, by delegating the choice of how much to redistribute (and to whom) to a governor that has its own utility function, as in).

Berriel e Zilberman (2011) investigate how targeted cash transfer programs increase the welfare in a developing economy. The channel here is insurance. They use a incomplete market framework similar to ours, in which the workers face an idiosyncratic productivity shock that lead to uninsurable realizations of the endowment. Their results suggests that re-distributive programs can have positive effects on general welfare by providing safeguard to low income households. These households, initially binded by the borrowing constraint, deeply benefit from this additional income, reducing precautionary savings and increasing consumption. In fact, even workers that are not eligible for the program would support it (they claim that $77,3\%$ of the population in a model parameterized for Brazil are better off with the program). This happens due to the possibility of adverse realizations of the shock in the future, that now are secured by the eligibility for the program.

Corbae et al. (2009) presents us an economy with idiosyncratic shocks to labor efficient and incomplete markets, inspired by Aiyagari (1994) framework, and model the choices of taxes with a political economy equilibrium, which the median voter is the pivotal. The question they look forward to answer is whether the increase in wage inequality, observed in U.S. data between late 70's and early 90's, as the decrease of median to mean wages can explain why we observed also an increase in transfers to poor workers in that period. The idea is that median voters choices tended to more distortionary taxation and transfers, given the elevation of risk (which they claim to be the causation of increased wage inequality).

Another paper of major importance in the literature of quantitative political economy and choices of size of government is Krussel e Rios-Rull (1999). The authors use a neoclassical growth frame, with complete markets and different productivities among workers (but no uncertainty) and develop a dynamic voting general equilibrium model. Perfect foresight becomes crucial here, since voters must predict perfectly all outcomes of different policies to choose consistently with rational expectations. Their

predictions performs reasonably well against data, and seem more realistic (after calibration) than a static model.

The role of the government as a provider of insurance is well documented in Floden (2001), Floden e Lindé (2001) and Dos Reis e Zilberman (2014). All of this papers use a framework of incomplete market and heterogeneous agents similar to ours in a lot of sense, and thy to address matters of insurance. Floden (2001) analyses how variations in public debt and transfers affect risk sharing, efficiency and the distribution of resources in the economy, finding that the government can significantly improve risk sharing if using debt and redistribution correctly. Floden e Lindé (2001) estimates income process, as AR(1), for Sweden and U.S., comparing the degrees of risk faced by households in each country, and insurance provision. They found that, while in Sweden insurance provision is too high, in U.S. it is too low. Dos Reis e Zilberman (2014) extends the general framework to account for public and private employment. In Brazil, for instance, public employment follows very different aspects than private one with respect to the grade of risk of dismissal. They find that public employment is an important provider of insurance, although it provides for middle class families (with middle and high productivities) and not the ones that requires it the most (low productive households that are credit constrained).

The role of political economy in the dynamics of our model is simple, but requires literature fundamental. In our analysis we try to replicate a delegative democracy (not a direct one), so we do not use the median voter framework as usual in the literature. Instead we borrow some insights from the dictatorship models of Robinson e Acemoglu (2006) and Acemoglu e Robinson (2001). There, the level of taxes and transfers are made solely by the governor (a dictator) who faces a revolution constraint, which means his optimization is subject to a wish to stay in power (they assume, in general, that the dictator is in favor of the elite, so he maximizes the richest part of the population utility, and that means less taxes). They find that highly unequal societies are more likely to persist in dictatorship than more egalitarian (although they find that too much equal also increases the odds). That is intuitive, and is aligned with the stylized facts that Barro (1999) finds in his empirical study of the determinants of democracy. That is also something we address by comparative statics. We find that more inequality usually increases the likelihood of a populist arrangement like the one we present.

An alternative work we used as background to ours is). It is an extension of Berriel e Zilberman (2011) analysis of Bolsa Familia in Brazil, but put in the hands of a government the choice of taxes and transfers, as the eligibility

criterion for the program. Our government will be similar to that one in his control variables, but will differ in the objective function. In the next section we will present our model, and therefore explore more of the literature's contribution to our subject.

3
General Model

3.1
Environment Overview

Time is infinite and discrete in a closed economy. There is a continuum of risk averse households that will differ only in their idiosyncratic productivity of labor, and a representative firm that replicates a competitive market for a unique consumption good, which is perfectly convertible to capital. There is only idiosyncratic risk in this economy but no aggregate uncertainty. Agents maximize lifetime utility discounted by (the same) parameter β. Markets are incomplete and the only saving possibility for a household is to rent capital to the firm, receiving an interest rate of r.

As shown in Aiyagari (1994) this type of model demands a borrowing constraint, whether it be a natural one (meaning that an agent would have to almost certain give up all of his future income to repay a loan of the amount of the constraint) or an ad hoc one. In this work we follow the literature and add an ad hoc borrowing limit, so families can save but cannot borrow any positive amount. This will cause individuals to worry about receiving an adverse shock and becoming constrained, bringing precautionary savings to the matter (see Aiyagari (1994) for a detailed exposition of the subject). In other words, in an incomplete market model with idiosyncratic uncertainty, the impossibility of full insurance can be partially offset if households are allowed to borrow when faced with bad realizations of the random productivity (or endowment) and save when favored by luck. With borrowing limits, this is not possible, exacerbating the loss in welfare derived from the lack of insurance. This framework is very close to the original Aiyagari (1994) model and is a simplified version of Berriel e Zilberman (2011) developing economy.

The innovation we propose, relative to these examples, is the presence of an exogenous parameter B, that we assume to be constant every period. This "manna" will be distributed to the population in the form of direct transfers, and any part not distributed is fully consumed by the government. We think of this as a re-distributive state case in Besley e Persson (2011) analysis. The authors claim that a re-distributive state emerges when cohesiveness on internal investment decisions are low (another interpretation in that heterogeneity is high) but political stability is high enough. This case is characterized by redistribution and investment in fiscal capacity of the state

(the ability to tax). We believe this is well applied to the cases exposed in Mazzuca (2013), since these populist governments share high levels of redistribution and a large and powerful state apparatus.

One interpretation here is that B is an exportation income from some national commodity, but this is essentialy arbitrary. The only prerequisite is that this income can be taxed without any kind of distortion since it does not depends on individuals decision making to exist. Also, government consumption has no effect on any variable in the model. We will refer to this tax, sometimes, as expropriation since this is the term used by Mazzuca (2013).

Transfers here are similarly to the ones in Berriel e Zilberman (2011), and are targeted to some specific fraction of the population, that are eligible to receive them. The government will decide the threshold for which families below it will receive (equally divided) the amount not taxed. That threshold will be some level of productivity, for simplicity. Productivity here is only a proxy to labor income, since agents can choose to work more or less. To allow eligibility on total income (including capital rents) is computationally costly, since the stationary distribution of agents is endogenous (see the next section and the computational appendix). Furthermore, allowing the choice of eligibility to be taken with respect to labor income, besides the fact that it does not simplify the problem of endogeneity, would allow cases in which a very wealthy agent that decides not to work receives the transfers. Since this would be even worse for our purpose of replicate transfers directed to social strata, we prefer to maintain the productivity-based eligibility criterion.

In this kind of model, productivity is publicly known and there is no information asymmetry, therefore, the policy maker can observe each individual level of productivity in each period and decide which levels will be eligible. He cannot, however, arbitrarily choose any level of productivity, since he must choose a threshold level from which every level below it will also be eligible.

3.2 Households and Firm

Households differ only in their stochastic productivity $\theta \in \Theta$, where Θ is a finite and countable set, and evolves according to a Markov chain represented by a transition matrix P. That matrix must have a stationary distribution, and it will have since accounted for the sufficient conditions present in Ljungqvist e Sargent (2012). Individuals discount future at a rate β, and each period they choose how much to consume and how much to save to next period. Each worker is provided with one unit of labor that can be

continuously offered in the interval $[0, 1]$, at a wage w. The household problem conditional on a determined level of redistribution is (recursively):

$$V(a, \theta; \tau, T, \overline{\theta}) = \max_{\{a', n\}} [U(c, n) + \beta EV(a', \theta'; \tau, T, \overline{\theta})]$$

subject to

$$\begin{aligned} c + a' =& (1 + r - \delta)a + \theta w n + I_{[\theta \leq \overline{\theta}]} T \\ c \geq& 0 \\ a' \geq& b \\ n \in& [0, 1], \end{aligned}$$

Where x' means a variable in the next period, a is the amount of individual capital, r is the risk free interest rate, T is the amount of transfers and I is an indicator function that equals 1 if the household is eligible to receive the transfers, and 0 otherwise, w is the competitive wage, b is the borrowing constraint ($b \leq 0$) n are units of labor, c is consumption and τ and $\overline{\theta}$ is the expropriation parameter and eligibility criterion, respectively, that will arise from the government problem and indexes individual decisions. U is a strictly concave utility function and $\theta \sim P(\theta', \theta)$.

This is a standard consumer problem when faced with idiosyncratic productivity, inability to self ensure and borrowing constraint. The concavity imposed on the utility function is a sufficient condition for the existence and unity of the optimum. So far the only difference between this problem and a general one is the presence transfers T, but that is hardly new since taxation and distribution problems have been extensively studied in the literature as in Berriel e Zilberman (2011), Corbae et al. (2009), Krussel e Rios-Rull (1999) and others. The indicator function for eligibility is also not a novelty since these papers often work with directed transfers (specially Berriel e Zilberman (2011)).

The solution to the problem above are functions $g(a, \theta)$, of optimum savings, and $n(a, \theta)$, of optimum labor offer. The stationary distribution associated with this solution is $\lambda(a, \theta)$. This distribution is a function of both individual capital and productivity, since it represents the mass of workers that, in steady state, possess wealth of a with productivity θ. The technology of the firm is standard, constant returns to scale, and every period it maximizes profit as in perfect competition, so $F_k(K, N) = r + \delta$ and $F_n(K, N) = w$, where $K = \int g(a, \theta) d\lambda(a, \theta)$ is total capital of the economy, δ is the depreciation rate and $N = \int \theta n(a, \theta) d\lambda(a, \theta)$ is the aggregate efficiency labor measure.

3.3 Government

Government chooses the productivity threshold ($\overline{\theta}$) and the amount of B expropriated or taxed ($\tau \in [0,1]$) as to maximizes it's own utility. The utility of the government is:

$$U_g = h(\tau B)$$

if he is in power and

$$U_g = -\infty$$

otherwise

Where h is any strictly increasing function of τB. That means basically that, whatever that implicates, the government will prefer to maintain power instead of loosing it. It is certainly an important assumption that we are making, and we chose to do so in ordert to guarantee that there will be an equilibrium in which this government (that always wishes to tax more) will maintain power indefinitely. That will allow us to focus only on steady state allocations, which greatly simplifies the analysis.

Now we have to define what determines that the control of the state does not changes hands. Our simple assumption will be that if at least some fraction χ of the population is better off than when compared to an outside option, than the current government will hold office.

A question bound to arise is what do households take into account when they decide whether they are content with the current government actions or not? Here we will present an important assumption, which is the fact that households only compare steady state allocations. This is a simplification with computational purposes. From here on one should recall that every time we refer to an equilibrium allocation, this will be a stationary equilibrium.

Assumption 1 *Households only compare steady state allocations when decide whether or not to overthrown the government.*

In order to retain power, rulers must to some extent benefit at least a fraction of the population when compared to the outside option that is overthrowing the incumbent. On their work, Robinson e Acemoglu (2006) impose a cost of surging, so agents would balance the benefits of a democratic government (in their case a media-voter-guided policy) against the costs of the rebellion. In our model we assume that the outside option is simply an egalitarian government, with zero expropriation (whether the incumbent

is overthrown via elections or revolution, since our model does not require explicitly that the government be a dictatorship).

Assumption 2 *The outside option government is one that equally distributes B to all households.*

So the government chooses $\tau \in [0,1]$ and $\overline{\theta} \in \Theta$. Before we formalize the problem, it is interesting to notice that the outside option government is fully characterized by the pair of potential solutions to the standard government problem: $\tau = 0$ and $\overline{\theta} = \infty$ (it is simply not taxing B and choosing $\overline{\theta}$ to be the supreme of Θ). That, on the other hand, implies a level of transfers that we will call $\overline{T}$.

The governor problem is, therefore:

$$\max_{\{\tau,\overline{\theta}\}} h(\tau B)$$

$$\text{subject to}$$

$$\int I_{[\theta \leq \overline{\theta}]} T d\lambda(a,\theta) = (1-\tau)B$$

$$\int I_{[V(a,\theta;\tau,T,\overline{\theta}) > V(a,\theta;0,\overline{T},\infty)]} d\lambda(a,\theta) > \chi,$$

$$\text{where } \chi \in (0,1)$$

$$h' > 0$$

The first constraint is the budget balance constraint. The government can not operate with deficits or surpluses (nor it would be optimum to do so). The second one is derived from the form of the utility presented before. The ruler always find it would be optimum to retain power, so we include it as a constraint in his problem. It simply states that the mass of households in which the lifetime value functions associated with the chosen allocation have higher value than the ones associated with the outside option, is greater than χ.

Note that T is fully determined by τ and $\overline{\theta}$, for a given B. It becomes clear now why the productivity-based eligibility criterion makes things a lot simpler. Although we express T as an integer on $\lambda(a,\theta)$ it only depends on the distribution of agents among θ, and not the pair (a,θ) (because the mass of workers with each productivity in steady state will always be the same). That distribution depends solely on the transition matrix $P(\theta',\theta)$ (see Ljungqvist e Sargent (2012)). Therefore, the mass of agents that will receive

transfers is entirely determined by $\overline{\theta}$, and it is not an endogenously varying element. That greatly simplify the computation of the equilibrium.

3.4 Equilibrium

Summing up, the government chooses τ, the amount of B taxed (or expropriated), and $\overline{\theta}$, the eligibility threshold. Households optimum policies are indexed by those choices and we will state them as $g(a,\theta;\tau,\overline{\theta})$ and $n(a,\theta;\tau,\overline{\theta})$. Hence, the competitive equilibrium that will unfold is also indexed by the pair suggested by the ruler. We define the steady state competitive equilibrium as follows:

Definição 3.1 *A Recursive Competitive Stationary Equilibrium for given* $\{B,\delta,b,\overline{\tau},\overline{\theta}\}$ *is a value function* $V(a,\theta;\overline{\tau},\overline{\theta})$*, policy functions* $g(a,\theta;\tau,\overline{\theta})$ *and* $n(a,\theta;\tau,\overline{\theta})$*, a measure* $\lambda(a,\theta;\tau,\overline{\theta})$ *and prices* $\{r(\overline{\tau},\overline{\theta}),w(\overline{\tau},\overline{\theta})\}$*, so that:*

1. $g(a,\theta;\tau,\overline{\theta})$ *and* $n(a,\theta;\tau,\overline{\theta})$ *solve the households problem for given* $\{r(\overline{\tau},\overline{\theta}),w(\overline{\tau},\overline{\theta})\}$*;*
2. *The firm maximizes it's profits for given* $\{r(\overline{\tau},\overline{\theta}),w(\overline{\tau},\overline{\theta})\}$*:*
   - $F_k(K,N)=r+\delta$*;*
   - $F_n(K,N)=w$*;*
3. *Markets Clear:*
   - $\int \theta n(a,\theta)d\lambda(a,\theta)=N$*;*
   - $\int g(a,\theta)d\lambda(a,\theta)=K$*;*
4. *Government budget balances:* $T=\frac{(1-\tau)B}{\int I_{[\theta\leq\overline{\theta}]}d\lambda(a,\theta)}$*;*
5. $\lambda(a,\theta;\tau,\overline{\theta})$ *is an invariant probability measure.*

The policy maker, thus, provided as he is with perfect information and foresight, will choose a competitive equilibrium that maximizes his own utility, similar to a Ramsey problem. The government will choose the competitive equilibrium associated with the maximum τ possible so that he keeps a mass of χ workers better off than the egalitarian equilibrium. Since we are focusing on steady state allocations, the solution τ will be constant. For the sake of completeness and since we will use this definition further ahead, we define our political equilibrium.

Definição 3.2 *A Political Economic Stationary Equilibrium is an allocation* $\{\tau*,\overline{\theta}*\}$ *that solves the government problem.*

Hence, we call a political economic equilibrium a pair $\{\tau*, \overline{\theta}*\}$ in which $\tau*$ is the greater possible value between 0 and 1 so that the recursive competitive stationary equilibrium indexed by it keeps χ households happier than the outside option equilibrium. It is clear that, since we allow the choice of τ to be continuous (at least theoretically), the policy maker will choose it in a way that the mass of happy workers will be exactly χ.

3.5 Discussion

Before we move on we will comment some hypothesis we made. First, it clear that our extension to include the commodity B is intentionally simple. This commodity has no direct effect on output (but there will be indirect effects, since it can be redistributed) and we do not formally model and exportation sector or an international market (in fact, our economy is closed). We know from Aguiar e Amador (2011) and Aguiar et al. (2009) and a much extensive literature the effects that expropriation risk generates on incentives to save and invest, and that is not being considered here. That is why the state-owned firm interpretation can be so appealing, since we can view the government as simply choosing to distribute its profits to the economy or keep it to himself, and that should not, in principle, affect how the resources in the company are allocated. Also, we are thinking about Mazzuca (2013) framework, in which the boom of commodities in the early century allowed, to some extent, populist governors to expropriate companies without causing a major fall in commodities income.

Also, we chose to explicitly model a government facing an urge to expropriate. One possible fundamental to this urge to expropriate is Aguiar et al. (2009) commitment problem: investments are made by private firms operating in the commodity market, and after it is complete there are obvious incentives to expropriate them, since it will be non distortionary in that period. In their game, expropriation is punished by zero investment forever, but here we assume it has no effect on the amount of commodity. Taking the example of Venezuela, expropriation of foreign oil companies happened there, but the government took over the business, so firms did not just ceased operating (although they did punished the country with access to financial markets and low or zero direct investment). There is no obvious example, since it is counter intuitive to think expropriation not affecting investment decisions. Therefore, the straightfoward interpretation for τ is an undistortionary tax.

This expropriation or tax can have various interpretations (as we said, we believe our model is general enough to address different situations), but it is

required that it has non productive means, i.e. the amount expropriated is not converted, nor directly nor indirectly, in product or capital or consumption. One can, on the light of Aguiar et al. (2009) and Aguiar e Amador (2011) assumptions, treat this destroyed commodity as some part of the latent inefficiency derived by too much state intervention, or simply as a cost to finance a large state, if we are thinking about left oriented governments in Latin America (for example, one of the issues of bolivarianism is the increase in popular participation in politics via plebiscitarianism, and plebiscites are not cheap).

Finally, regarding the outside option, one could argue that actually the obvious choice would be to let a median voter, for example, to decide who will receive the transfers when the non benevolent expropriator government looses office. This is indeed the choice of Robinson e Acemoglu (2006), when they explicitly model a dictatorship. But even then one could argue, based on Acemoglu et al. (2011) and Acemoglu e Robinson (2000), that when faced with the immanency of loosing power, the ones in charge (in their case the elite) could bound future democracy with inefficiency that guarantees that even rich workers would receive a fraction of the commodity. If one is thinking in a populist democracy of a developing country, it seems reasonable that for example the downfall of Maduro in Venezuela would give space to right wing parties and the return of private companies, which would eventually mean to benefit the richest part of the population with dividends from the exportation sectors. In addition, this is just a simple way to say that the outside option government will not designedly benefit only a fraction of the population, but instead will divide this income among all of fractions of workers somehow.

4
Parametrization and Results

In this section we will discuss our choices of parametrization to our stylized model. Our initial results highlight a theoretical possibility using a quantitative framework. Hence, we have to elect reasonable parameter values for our numerical exercise. Most of the specification we use is standard in the literature. Since we are going to calibrate the model in a more realistic way in the next section, we prefer to maintain coherence and set most parameters to be the same on both analysis. We use Floden e Lindé (2001) as reference point to the calibration.

4.1
Functional Forms and Parameters

The utility function for households is a standard CRRA, separable between labor and consumption. This is not the original function used by Floden e Lindé (2001), although they extend their analysis to include it, but we believe separability is a well established assumption in the literature. Furthermore, we choose it so we can have distinct inter temporal elasticities of substitution for consumption and leisure, and it is the same used by Pijoan-Mas (2005) to match observed individual behavior. The function is:

$$U(c,l) = \frac{c^{(1-\sigma)}}{1-\sigma} + \Lambda \frac{l^{(1-\gamma)}}{1-\gamma}$$

Where l is leisure, $\frac{1}{\sigma}$ is the inter temporal elasticity of substitution of consumption and $\frac{1}{\gamma}$ is the inter temporal elasticity of substitution of leisure.

Production function is Cobb-Douglas with parameter α:

$$F(K,N) = K^{\alpha} N^{1-\alpha}$$

Next, we present our parametrization table.

Here, δ is the depreciation rate and β is the rate of discount, set to match a capital-output ratio of approximately 4. This is not the same match used by Floden e Lindé (2001) (they use a smaller ratio as we will show later in the next section), but it is largely used in the literature and we chose here to keep the calibration as general as possible. Λ is set to match approximately 36% of average hours worked in the population. Both β and Λ are calibrated on a standard model, without any commodity or transfers from the government.

Table 4.1: Parametrization

Parameters	Values	Match
γ	2.50	Floden and Linde (2001)
σ	1.50	
α	0.36	
δ	0.01	
β	0.90	$\frac{K}{Y} \approx 4$
Λ	0.70	Average hours worked ≈ 0.36

As for the environment, credit constraint, b, is set to 0 as usual. The simulated economy is represented by a transition probability matrix of the idiosyncratic shocks, P, and a productivity set Θ. The arrangement is as follows:

Table 4.2: States and Stationary Distribution

State	θ^1	θ^2	θ^3
Productivity Value	0.1	0.50	1.00
Stationary Mass	44.44%	29.87%	25.78%

Each θ represents a different state of nature with a correspondent productivity value. Each state has a correspondent mass of individuals in steady state, represented by percent of total population.

That means 44.44% of the population in our economy, on the steady state, will have productivity of θ_1 (0.1 according to our parametrization), and so on. π is the stationary distribution associated with P, and, as we said, that is important because it will define the mass of households that will receive the transfers.

Those parameters were chosen to represent a standard developing economy, and that is why the most productive worker is ten times more productive than the least, and we have a large fraction of the population with the lower bound on θ. We will see that the government will choose transfers to the least productive households only, and still have the majority support. The commodity parameter, B, is equal to 0.1231. That is an arbitrary value, but it is set to equal 30% of the GNP in a standard model (without our extension, just like β and Λ). Of course, the GNP when we add B is different in every equilibrium, since each one consists in a different value of the transfers, T, and different eligibility criterion, but that proportion does not varies very much (B

is around 35% of the GNP in most equilibria).

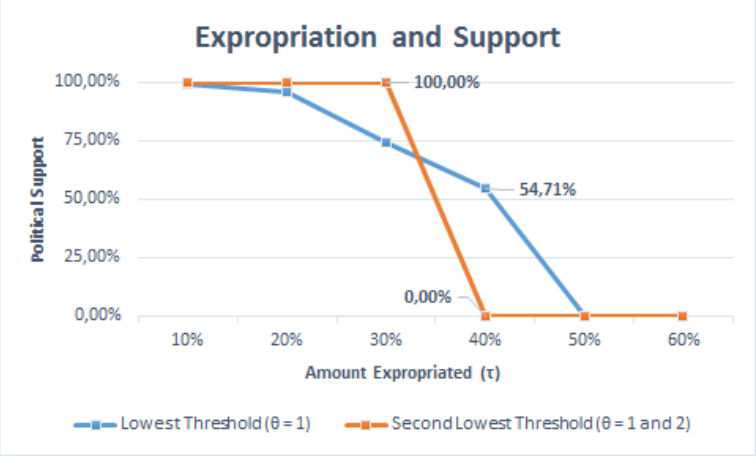
In order to save computational resources, we set the grid of expropriation, τ, to have only decimal values (10%, 20%, 30% and so on). Although our main results are unchanged with a finer grid, we will present results with a finer grid later.

The only parameter left to specify is χ, the proportion of political support the government must achieve to secure power. We define it as being equal to 50%. This is the most direct value possible for the mass of population supporting the government, but it is also essentialy arbitrary. The main mechanism result, meaning the coalition that will be formed between rich capital holders and poor low productive households, is not likely to change, however, if we choose another χ.

4.2 Results

On the next figure we present results for the political support of the government for various levels of expropriation. Each line represents the mass of households that support the suggested allocation, when compared to the outside option equilibrium, when the ruler focus transfers on low productivity workers only or both low and middle productivity (remember of the distribution π and the stationary mass in each state). For obvious reasons we do not need to add a new line representing support when the government chooses the eligibility criterion to be θ_3 (or ∞ following our previous notation). In that case households would be comparing two allocations that only differ on the amount transfered, and it is quite evident that nobody would go for the expropriated economy. The first thing that meets the eye is the fact that, for low values of expropriation, the government can obtain full or almost full political support even when focusing transfers. In addition, when focusing transfers on exclusively low productivity households, the government can steal a larger fraction of B and still maintain power. That is what we call in this paper, the rise of populism. One can argue that it is not a very good definition of populism, since wealthy households are receiving transfers, as long as they are in the worse state. That is a fair point, but we must highlight that the mass of relatively wealthy households among those with the lower productivity is not very significant. When faced with the urge to expropriate, in our model, the policy maker will prefer transfers to low productivity households, even if it is the minority of the population. So populism here rises endogenously with the solution of our proposed problem, because by targeting specific the poor, the incumbent government can expropriate a fraction of B and still

Figure 4.1: Political Support for each eligibility criterium



Political support for increasing values of expropriation (τ) when transfers are focused on θ_1 and $\theta_1 + \theta_2$ ($44,44\%$ and $74,22\%$ of the population respectively)

make the majority better off than the outside option. Our Political Economic Equilibrium here would be with $\tau = 40\%$, since it is the higher possible value that maintains over 50% of political support. Although the model is stylized, and so that value does not say much about real world, it is a considerably high level of expropriation.

Focused transfers benefiting households beyond the eligibility criterion is not new. Berriel e Zilberman (2011), for example, find a much higher proportion of households are happy with Bolsa Familia program in Brazil than the amount that actual contemplates the program. But the reason it is possible to target transfers to lower productivity households and still maintain power are different from the diagnostic given by Berriel e Zilberman (2011). There, households that were not eligible to the cash transfer program and still supported it's existence were the poorest among those not contemplated by the program. The effect is an insurance one, since poor workers are more exposed to the probability of being credit constrained with adverse realizations of the idiosyncratic shock. In our model, when we analyze which households are better off with the populist government (on the Political Economic Equilibrium) with the ones that would prefer zero expropriation and equal distribution of B, we find that those are the richest fraction of the population. By richest we mean households that possess more individual capital among those with higher productivities (and so, not eligible on the optimum). This is not an insurance effect, but a general equilibrium one. In the next table we show how political support unveils.

The table represents each fraction of the population that supports or rejects the incumbents allocation. It is divided in percentiles of wealth, meaning

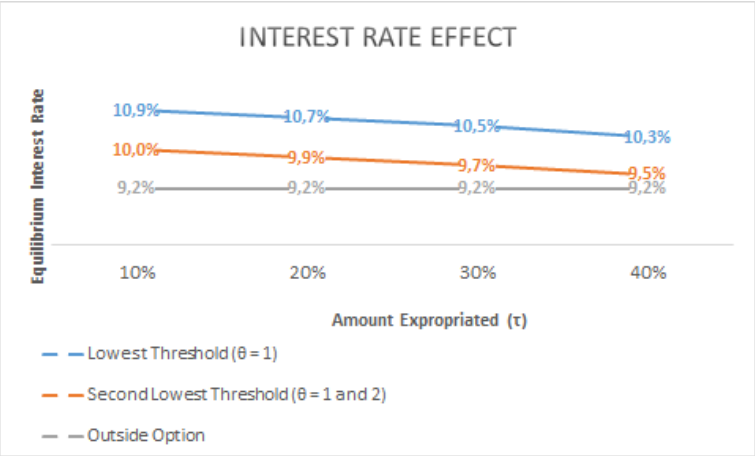
Table 4.3: Political Support and Wealth

Threshold θ / wealth%	0% - 10%	10% - 25%	20% - 50%	50% - 85%	85% - 100%
θ^1	*Supports*	*Supports*	*Supports*	*Supports*	*Supports*
θ^2	*Rejects*	*Rejects*	*Rejects*	*Supports*	*Supports*
θ^3	*Rejects*	*Rejects*	*Rejects*	*Rejects*	*Supports*

Wealth percentiles of total population divided among each productivity state. For each productivity state (column) and wealth percentile (line), "Supports" mean the individuals in the respective state (a,θ) is better than on the outside option. "Rejects" means the opposite.

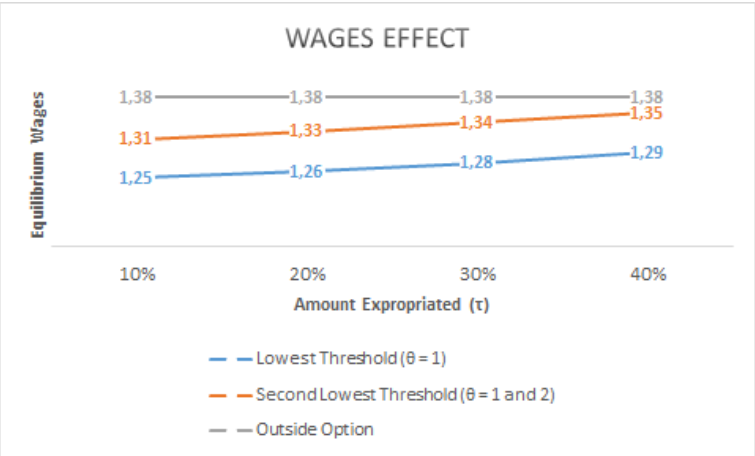
that the first column represents the 10% least wealthy households among each θ, and so on. We can see that support necessary to maintain power in this populist allocation is actually been given by the wealthiest among those who does not receive transfers. These results are surprising in a first look. Workers with low capital, even if with high productivity, are more susceptible to being borrowed constrained in the occurrence of a bad shock. We would expect these households to prefer an allocation that insure them against these shocks, by transferring cash directly to them when it happens. But this is not the case here, since the least wealthy households that are not eligible for transfers are better off on the outside option. Households, when faced with the political decision in matter, have a trade-off, as always in economics. In one hand they have an allocation in which they certainly receive transfers, on the other, they have one that will only pay them in the worst state. To understand why the richest find the latter a better option we must look at two key macroeconomic variables: interest rates and wages. We can see that interest rates are consistently higher than on the outside option, and wages are lower. The reason it is so is due to precautionary savings. Low productivity workers are credit constrained, and so they must save to consume in the future. Workers with high productivity choose to save more in precaution against future adverse shocks, and the possibility of being eventually constrained. When transfers are directed to worse state of nature, the economy experience a major decrease in precautionary savings, and consequently capital. This decrease is relative high when compared to the outside option because we are now transferring a larger amount. Of course, when τ is too big so that the suggested T is smaller than no household is better, in fact, the political support decreases faster than T reaches the outside option level. For example, when $\tau = 40\%$ and the government transfer to $74,22\%$ (θ_1 and θ_2), the support falls rapidly to zero because T is now smaller than transfers on the outside option. The

Figure 4.2: Savings effects on Interests



For each threshold that defines eligibility criterium and each τ that defines the amount expropriated, we present the steady state equilibrium interest rate associated with that threshold (mass and state of workers receiving transfers).

Figure 4.3: Equilibrium effects on Wages



For each threshold that defines eligibility criterium and each τ that defines the amount expropriated, we present the steady state equilibrium wages associated with that threshold (mass and state of workers receiving transfers).

decrease in stationary capital resultant from the precautionary savings effect also affects wages, since it positively depends on the former.

Therefore, the trade-off faced by households that are not eligible for transfers is a more complex one. They compare an allocation in which they receive nothing and have a lower salary, although rents on capital are higher, with another one where they receive some amount and returns on labor are more attractive, but interests are lower. It is clear now why the mechanism has the format shown in the table. The effects on wages is more relevant to the most productive households of all, since for them labor income corresponds to a bigger fraction of total income. Thus, only for extremely wealthy households the increase in interests is such that they will support the populist allocation. For the median productivity workers the logic is the same, but they tend to reject the outside option even with lower accumulated capital, since lower wages affects them relatively less.

Hence, we found that the government, facing the urge to expropriate a fraction of a national commodity, find it optimum to do so by transferring the remainder to the least productive households in the economy. When he does it, he obtains the support of those directly benefited (the least productive) and also, via a general equilibrium effect on prices, the wealthiest households of the economy. To the best of our knowledge, this mechanism of political support is new. In the next section we will test the models prediction with a more realistic calibration. Also, we perform some comparative statics in key parameters to share some more light on this mechanism.

5
American Process for Wages and Comparative Statics

On the previous section we used a model with a general parametrization to highlight a new mechanism of political support of populist governments. We found that the risk faced by households play a main part in our results, since the reduction in precautionary savings is the driver of the effects responsible for providing support for the incumbent by those not directly benefit by populist policies.

The main issue with this calibration was the process we used for productivity and, consequently, wages. It is standard in the literature for this kind of model to assume wages follow an auto regressive process. Of course, the computation of our model demands this process to be approximated by a discrete Markov Chain. In this section we will do so, in light of the work by Floden e Lindé (2001). The point here is to try to address the likelihood of such coalition in a more fashion calibration.

5.1
U.S. Economy Calibration

Let us assume that the individual productivity is as follows:

$$\theta_t = \exp z_t$$
$$z_t = \rho z_{t-1} + \epsilon$$

Where $\rho < 1$ and $Var(\epsilon) = \sigma_\epsilon^2$. This is similar to the one used in Floden e Lindé (2001) with the exception that they add a permanent component. Hence, we can view our model to be a smaller version of theirs, without ex-ante inequality, only ex-post shocks.

Floden e Lindé (2001) made a very rigorous analysis and estimation of the parameters ρ and σ_ϵ^2. We do not pretend to replicate their estimation. Instead we borrow their own estimates for the U.S. economy from the period of 1988 to 1992. They use the Panel Study of Income Dynamics and attempt to dissociate ex-ante inequality from the ex-post one, by using the supposed determinants of each one.

For our approximation of that process we use Rowenhorst Method, since it was shown by Kopecky e Suen (2010) to have desired properties over Tauchen's famous method. We follow Floden e Lindé (2001) and use 7 states.

This is important because now the policy maker will be able to focus even more.

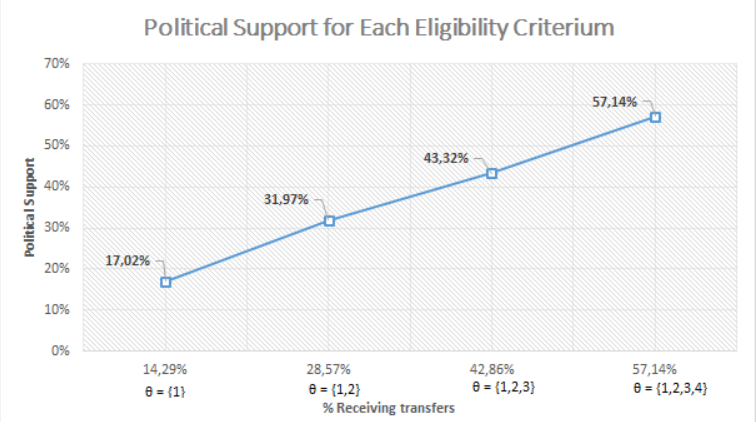
As we said, values for parameters of the utility function and production we used in our general model were already the same they used in their specification. We did it so that we could clean the effects of most parameters in the results, and focus on the amount of risk faced by households. As for internal calibration, Λ is set to match the same 36% average hours worked in a general economy (without B or T), but β is set to match a $\frac{K}{Y}$ ratio of 2.6, as Floden e Lindé (2001). It is likely that the value of the discount play some part in the result, since it affects the mass of households with high accumulated assets in steady state, but again, the model we presented was supposed to be general and served the purpose of exposing a possible new mechanism. Our calibration of this section is as follows: We do not include

Table 5.1: U.S. Economy Calibration

Parameters	Values	Match
ρ	0.9136	Floden and Linde (2001)
σ_ϵ^2	0.0426	
β	0.85	$\frac{K}{Y} \approx 2.6$
Λ	0.70	Average hours worked ≈ 0.36

parameters we use the same value as before for the sake of succinctness. It is imperative to highlight that with this parametrization the government can not transfer to less than 50% of the population and still obtain support over it. The coalition mechanism, although, is still here. As we show in the next graphic, for $\tau = 0.10$ (which is the smaller possible in our division of the expropriation grid), he can still obtain support of a mass of workers bigger than the ones actually receiving transfers. Next we present a table similar to the one presented in the previous section, where we show political support by wealth percentiles for the case of $\tau = 0.10$ and transfers for the $14,29\%$ least productive in the economy. The table is not so clear as the previous one because only a very small fraction of the population with high levels of productivity prefers the populist allocation. What is going on here is that the effects on interests are only compensating the effects on wages and the lack of transfers in all states for extreme wealthy families. The amount of accumulated wealth needed to support the populist government is so high that only an insignificant mass of households achieves it. All support is being given by the second lowest in the scale of productivity, because for them, wages are less relevant relatively

Figure 5.1: Political Mechanism in U.S. Economy Calibration



Political support (vertical) when the government chooses the eligibility to be θ_1, θ_2, θ_3 and θ_4, respectively (and the mass of workers in each state, on the horizontal axis). Each fraction of the population receiving transfers in each criterion is equal to the mass of workers, in steady state, on that state and all previous states contemplated.

to rents on capital. We show now graphics representing the general equilibrium effects on interests and wages, as before. The effects on interests and wages are not monotone, and there where no reason for us to think it would be, due to the high non linearity of this model. It appears that precautionary savings are at it's peak of reduction when the government transfers to θ_1 and θ_2, and we can say so because it is when interests achieve it's maximum value (and wages it's minimum).

The actual solution to the ruler problem here fails in a sense similar to our general model. The government can not obtain majority of support by transferring to a minority. But of course that is highly dependent of several approximation and parameters chosen here, for example, the number of productivity states and the grid of τ (we try to change that later). Even so, apparently the mechanism of political support by capital holders is indeed weakened when we solved the model for this calibration. When the ruler steals 10% of the commodity and focus transfers to both the least productive and the two leasts, he obtains only around 3% of additional political support.

That result is not at all discouraging, as we indeed do not expect the U.S. economy to be highly susceptible to expropriators and populists governments. It simply states that the American economy is not very likely to experience the coalition we found to be possible in a general model.

For the sake of completeness, we show now a graphic with a finer expropriation grid, where we allow values from the range of 1% to 25%, when transfers are focused on the bottom two of productivity distribution (θ_1 and θ_2, or $28,57\%$ of the population). We can see that the mechanism does gets

Table 5.2: Political Support and Wealth in U.S. Calibration

Threshold θ / wealth%	0% - 10%	10% - 66%	66% - 99.99%	100%
θ^1	*Supports*	*Supports*	*Supports*	*Supports*
θ^2	*Rejects*	*Rejects*	*Supports*	*Supports*
θ^3	*Rejects*	*Rejects*	*Rejects*	*Supports*
θ^4	*Rejects*	*Rejects*	*Rejects*	*Supports*
θ^5	*Rejects*	*Rejects*	*Rejects*	*Supports*
θ^6	*Rejects*	*Rejects*	*Rejects*	*Supports*
θ^7	*Rejects*	*Rejects*	*Rejects*	*Supports*

Wealth percentiles of total population divided among each productivity state. For each productivity state (column) and wealth percentile (line), "Supports" mean the individuals in the respective state (a,θ) is better than on the outside option. "Rejects" means the opposite.

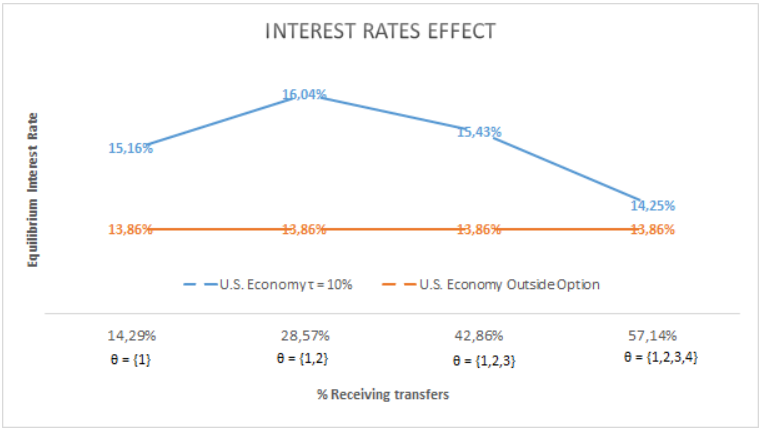
stronger for low values of τ. That is expected since any effect arising from the transfers should get more pronounced if this transfers are higher. But is not sufficient to hold the results as we said. If we increase the eligibility criterion even further, the mechanism gets even weaker because we are dividing the same amount more times and the effects are mitigated.

5.2 Comparative Statics on Wages Process

So in which kind of economy such an arrangement is more likely to occur? In order to try addressing this question we performed some comparative statics for the AR(1) process for individual income. All tables and graphics we will show are relative to $\tau = 10\%$. In other words, we do not solve all of the problem for every different value of each parameter in search for the political economic equilibrium as we did in our general model, for that would be extremely time consuming. And again, the existence or not of a political economic equilibrium in the sense we proposed, with $\tau > 0$, is not of main importance here since it will depend on aspects of the model that do not share direct resemblance with reality. The point in doing comparative statics here is just try to understand how the strength of the mechanism can vary with the amount of uncertainty faced by households.

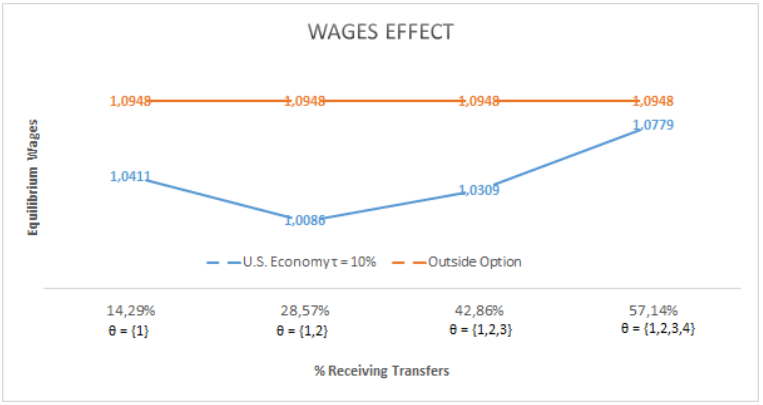
Changing σ_ϵ^2 The most direct measure of risk is of course σ_ϵ^2. It changes the degree of inequality in the economy, as it determines the magnitude of the idiosyncratic shocks and, therefore, affects the productivity changes a

Figure 5.2: Savings effects on Interest on U.S. Economy Calibration



Interest rate when the government chooses the eligibility to be θ_1, θ_2, θ_3 and θ_4, respectively, for $\tau = 10\%$, and interest rate for the outside option. On the outside option the fraction receiving transfers is always 100%, we just include it in the graphic for the sake of exposition.

Figure 5.3: Equilibrium effects on Wages on U.S. Economy Calibration



Wages when the government chooses the eligibility to be θ_1, θ_2, θ_3 and θ_4, respectively, for $\tau = 10\%$, and wages for the outside option. On the outside option the fraction receiving transfers is always 100%, we just include it in the graphic for the sake of exposition.

household could face during lifetime[1]. Next, we present a table with political support of the government when $\tau = 10\%$, for four different eligibility criteria and for σ_ϵ^2 being two times, three times, five times and ten times as large as the one used by Floden e Lindé (2001). It is important to notice that the outside option for each economy will also change. We are not examining the effect on sudden change in risk, but how the model behaves in a different economy, so the increase in risk will be the same for the outside option as well.

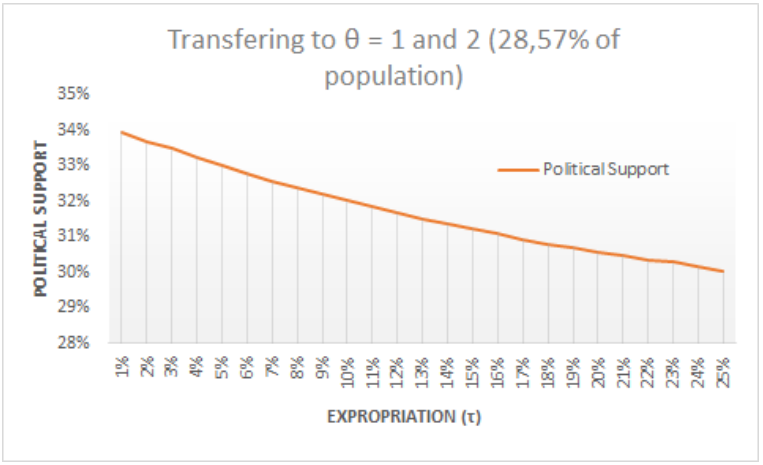
[1]We highlight that the Rowenhorst Method we used derives, from an AR(1) process, a productivity grid, Θ, and a transition matrix, P. We used and will use the term inequality here because when we, for instance, increase σ_ϵ^2 and apply the method again, the transition matrix P is not changed, hence, the frequency of shocks in the economy is the same. What changes is exactly Θ, stretching the productivity grid and exacerbating differences between workers. When we change ρ, on the other hand, Θ is practically unchanged and the larger effect is on P.

Table 5.3: Comparative Statics on σ_ϵ^2

$\tau = 10\%$		Political Support				
% Receiving Transfers	Threshold	**Standard**	$\sigma_\epsilon^2 = 0.052$	$\sigma_\epsilon^2 = 0.1278$	$\sigma_\epsilon^2 = 0.213$	$\sigma_\epsilon^2 = 0.426$
14.29%	$\theta = 1$	17.02%	16.35%	16.45%	17.45%	21.83%
28.57%	$\theta = 1, 2$	31,97%	33.87%	35.15%	35.93%	38.14%
42.86%	$\theta = 1, 2, 3$	43.32%	43.68%	44.09%	44.40%	43.83%
57.14%	$\theta = 1, 2, 3, 4$	57.14%	57.15%	57.17%	57.19%	57.14%

Each fraction of the population receiving transfers is correspondent to an eligibility criterion (from θ_1 to θ_4). The table shows the percentage of the population better than the on outside outside option for increasing values of σ_ϵ^2 (twice as large to ten times as large).

Figure 5.4: Political Support as a function of τ for U.S. Economy



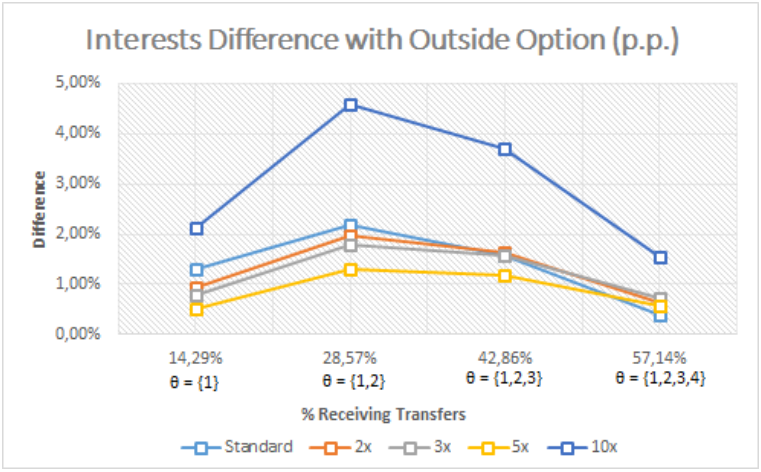
For a fine grid of expropriation (τ, horizontal axis), we plot the mass of workers which are better than on the outside option (political support, vertical axis).

Apparently, the increase in the variance of income shocks has a positive effect on the coalition mechanism. With a same amount of expropriation, the government can obtain a greater popular endorsement when σ_ϵ^2 is higher. Since the only parameter changed was the shock variance, we can only expect this results are driven by a proportionately higher decrease in precautionary savings. That, however, is not entirely true, as we can see from the graphics above. With the exception being given by a variance ten times as large, the difference (in percentage points) between the interest rates on the expropriated steady state when compared to the outside option are, in fact, decreasing. The exact same thing is happening to wages differences, and that is why the mechanism is getting stronger for lower values of the variance. The same thing happens here: the actual difference in precautionary savings is not getting higher when we elevate risk. Actually, it is getting lower, so the difference between capital in the expropriated economy and the outside option is reducing, as we see in the next table.

When that happens, not only interest rates become more similar to the outside option level, but also wages, and that is what is driving the results. Hence, we found that the increase in risk measured by σ_ϵ^2 does strengthens the likelihood of the coalition, but for the somewhat opposite reason we would expect. Wages are, therefore, apparently more important in determining the political support because it is a more relevant determinant of households budget restrictions.

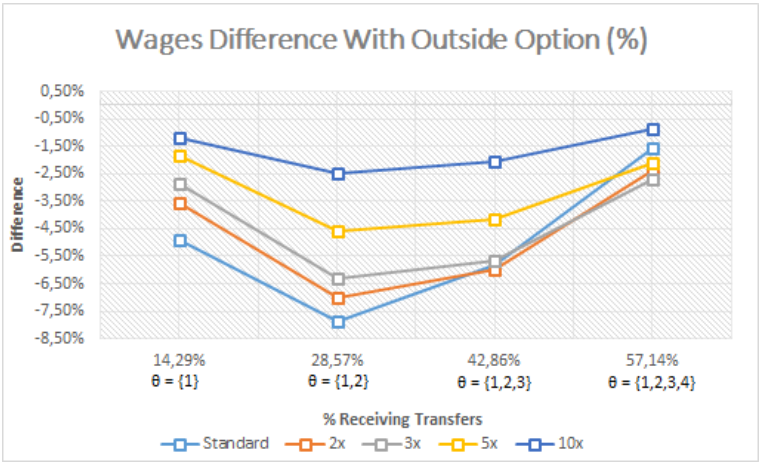
The difference between labor is also reducing. We believe this happens because in a more risky economy, even in the outside option, households work more, so, given the convexity of the utility function and the limit in labor hours

Figure 5.5: σ_ϵ^2 and Interest Rates in Equilibrium



For each eligibility criterion (from θ_1 to θ_4, horizontal axis, for $\tau = 10\%$) the graphic shows the difference, in percentage points, between the interest rate on the referred equilibrium and the one on the outside option equilibrium.

Figure 5.6: σ_ϵ^2 and Wages in Equilibrium



For each eligibility criterion (from θ_1 to θ_4, horizontal axis, for $\tau = 10\%$) the graphic shows the percentual difference between wages on the referred equilibrium and the one on the outside option equilibrium.

Table 5.4: σ_ϵ^2 and Capital in Equilibrium

$\tau = 10\%$		Political Support									
% Receiving Transfers	Threshold	**Standard**		$\sigma_\epsilon^2 = 0.052$		$\sigma_\epsilon^2 = 0.1278$		$\sigma_\epsilon^2 = 0.213$		$\sigma_\epsilon^2 = 0.426$	
14.29%	$\theta = 1$	2.02	-2.55%	2.55	-1.66%	3.15	1.36%	4.43	-0.71%	9.11	-0.94%
28.57%	$\theta = 1, 2$	1.82	-12.14%	2.31	-11.14%	2.86	-7.97%	4.12	-7.61%	8.82	-4.02%
42.86%	$\theta = 1, 2, 3$	1.92	-7.10%	2.36	-8.86%	2.915	6.42%	4.16	-6.63%	8.96	-2.58%
57.14%	$\theta = 1, 2, 3, 4$	2.11	1.74%	2.54	-2.08%	3.10	-0.22%	4.37	-2.02%	9.25	0.66%

The table shows, for each eligibility criterion, the steady state amount of capital on the referred equilibrium, and the percentual different between that amount and the outside option one.

offered, the percentage difference tends to fall. We solved the same model with exogenous supply of labor and found that the mechanism gets even stronger. That happens because the differences in labor supply and demand partially offsets the difference in wages. When labor is exogenous, wages differences are reduced proportionately more.

Also, we believe the sudden increase in interest rate percentage points when σ_ϵ^2 is ten times larger than the American one can be a scale effect. When we change σ_ϵ^2 and apply Rowenhorst's Method we basically change Θ, the grid of productivity, increasing the inequality of the economy. That change, of course, affects the absolute level of labor and, although this is partially controlled by the similar change in outside option, the percentage changes can be more drastic here. Truly, the complexity of the model and the fact that it is a general equilibrium one, where variables are altogether determined, make it very hard for us to explain minutely every aspect of it.

Changing ρ First of all, ρ is not a direct measure of risk in an economy. It simply represents the persistence of the shocks. On one hand, if we decrease the value of ρ, an individual has a higher chance of becoming poor when rich, on the other, a low productive household has a higher chance of becoming productive overnight. It is, therefore, ambiguous. The motivation for this comparative statics is to analyze how a degree of social changes in an economy correlates with our mechanism of political support. If when we change σ_ϵ^2 we only change inequality (meaning the difference between the most productive and the least), when we change ρ we affect very little the productivity grid Θ. The major changes are on the derived transition matrix P. And although we can not properly say we are increasing risk in the economy, households will be experiencing sharper changes in income, and so we would expect them to accumulate more assets for protection. That is indeed the case. But first, we show the table for political support when ρ is 90%, 85% and 80% of the value it takes in the American economy (note that we are not using the values $\rho = 0.9$, $\rho = 0.85$ and $\rho = 0.8$, but instead we chose to represent smaller values of the parameter as proportion of the one used by Floden e Lindé (2001)).

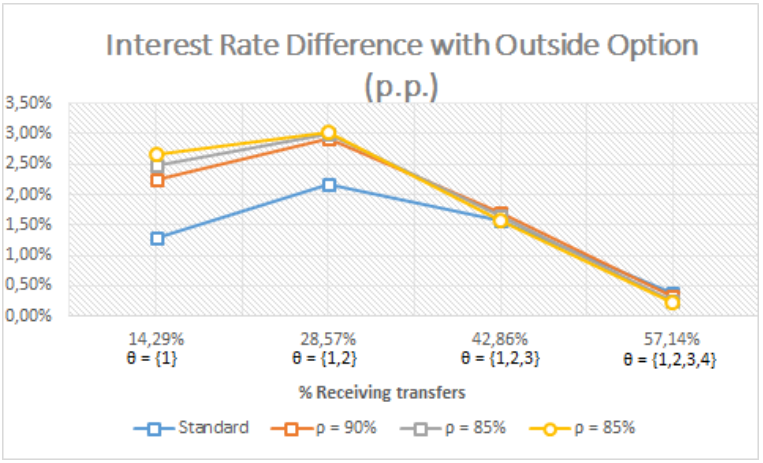
The results are not what we would expect at first, but are in line with the ones we showed when changing σ_ϵ^2. To see why, take a look at the effects on interests and wages. Indeed, as we said, precautionary savings decreases proportionately more when shocks are more transient. Differences in accumulated capital are higher when the government focus transfers to low productivity workers in an economy where the persistence in income is lower, and that is why differences in interests are higher. But is also true in that case that wages are lower, as we can see from the figure. As before, wages appear to

Table 5.5: Comparative Statics on σ_ϵ^2 with Exogenous Labour

$\tau = 10\%$		Political Support				
% Receiving Transfers	Threshold	**Standard**	$\sigma_\epsilon^2 = 0.052$	$\sigma_\epsilon^2 = 0.1278$	$\sigma_\epsilon^2 = 0.213$	$\sigma_\epsilon^2 = 0.426$
14.29%	$\theta = 1$	15.29%	15.69%	16.31%	18.42%	24.64%
28.57%	$\theta = 1, 2$	30.22%	30.91%	31.92%	35.36%	41.00%
42.86%	$\theta = 1, 2, 3$	43.05%	43.77%	44.36%	45.11%	47.75%
57.14%	$\theta = 1, 2, 3, 4$	57.14%	57.14%	57.14%	57.14%	57.14%

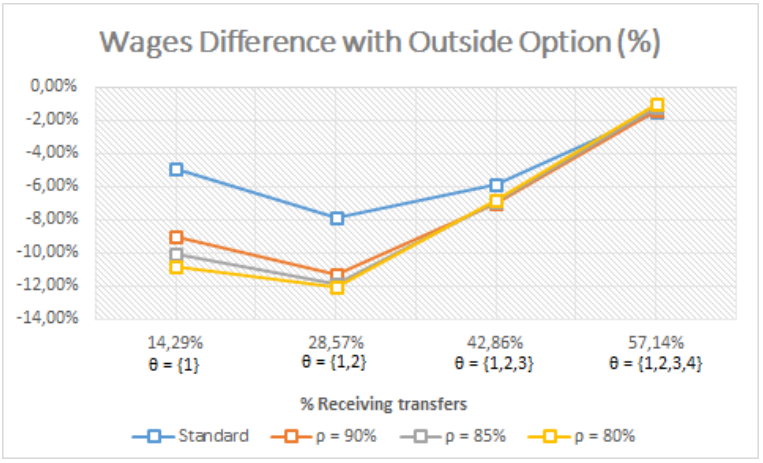
Each fraction of the population receiving transfers is correspondent to an eligibility criterion (from θ_1 to θ_4). The table shows the percentage of the population better than the on outside outside option for increasing values of σ_ϵ^2 (twice as large to ten times as large).

Figure 5.7: ρ and Interest Rates in Equilibrium



For each eligibility criterion (from θ_1 to θ_4, for $\tau = 10\%$) the graphic shows the difference, in percentage points, between the interest rate on the referred equilibrium and the one on the outside option equilibrium.

Figure 5.8: ρ and Wages in Equilibrium



For each eligibility criterion (from θ_1 to θ_4, for $\tau = 10\%$) the graphic shows the percentual difference between wages on the referred equilibrium and the one on the outside option equilibrium.

Table 5.6: Comparative Statics on ρ with Exogenous Labour

$\tau = 10\%$		Political Support			
% Receiving Transfers	Threshold	**Standard**	$\rho = 0.8222$	$\rho = 0.7765$	$\rho = 0.7308$
14.29%	$\theta = 1$	17.02%	15.98%	14.74%	14.46%
28.57%	$\theta = 1, 2$	31.97%	31.00%	29.84%	29.12%
42.86%	$\theta = 1, 2, 3$	43.32%	42.97%	42.89%	42.86%
57.14%	$\theta = 1, 2, 3, 4$	57.14%	57.14%	57.14%	57.14%

Each fraction of the population receiving transfers is correspondent to an eligibility criterion (from θ_1 to θ_4). The table shows the percentage of the population better than the on outside outside option for decreasing values of ρ (90% of the value used on the American calibration to 80%).

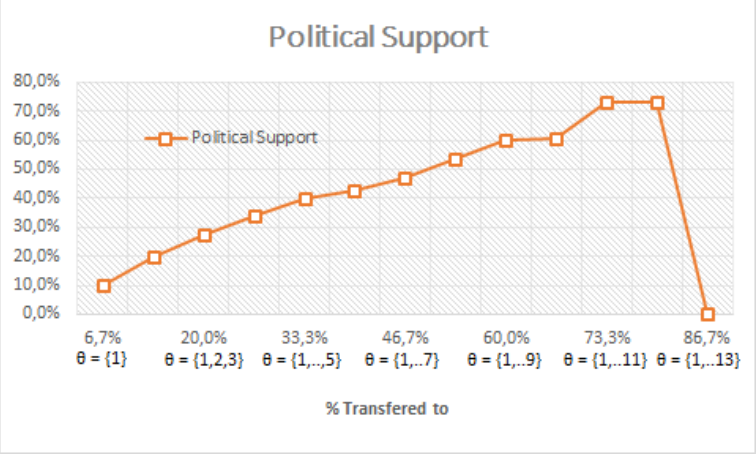
have a higher importance on the determination of the mechanism. If interest rates difference points to the direction of benefiting capital owners, the sharp decrease in wages offsets completely that benefit.

This results bare some resemblance with the assertion of Robinson e Acemoglu (2006) that authoritarianism is more likely to occur when inequality is high, but at some point that ceases to be true. We found that a corrupt populist government is more likely to maintain power expropriating when inequality is high, but that likelihood decreases sharply if the degree of risk in the economy is such that precautionary savings are too high (or simply persistence is low). Interestingly, our results depends on precautionary savings, but can be ruined by it. The cost of populism is too high if income uncertainty is also high: the effect on marginal return on labor is so pronounced that spoils any indirect effect on interests caused by the same decrease in capital accumulation.

5.3 More States

In this section we will solve the same model, with the same calibration as Floden e Lindé (2001), but with a more fine approximation of the AR(1) process, by increasing the amount of states in the economy. We now use 15 states instead of the 7 used by the authors and in the previous sections. Again, we do not solve the model for various values of τ since it would be a computational nightmare. Instead we proceed by showing results with $\tau = 10\%$. Of course, Λ and β are re calibrated the same way as before, and B is also changed to match the same 30% of the GNP in the American economy. On the next graphic we show political support by eligibility criterion. The first two strata of productivity (θ_1 and θ_2), that corresponds to $13,3\%$ of the population, still seems to be where the mechanism is at it's peak. The government obtains over 6% of popular approval beyond those directly receiving transfers. Next,

Figure 5.9: Political Support and Eligibility Criterium



The graphic shows the percentage of the population better than on the outside option, when $\tau = 10\%$, for each eligibility criterion (from θ_1 to θ_13).

we present a table similar to the two previous shown, of political support by wealth percentile of the population, among each productivity. Again, τ equals 10%, and transfers are being focused on the first two strata of the population, since we said the mechanism is more conspicuous.

As we can see, the shape of the coalition remains the same as before. For high productivity workers the wage fall is to relevant and outweighs the interest gains. Again, in this American calibration, all of the support comes from the direct affected by the populist government, and the medium productivity households with high accumulated assets.

We prefer not to call this a coalition between the middle class and the poor because only wealthy capital holders prefer this allocation. We found that the most productive part of the population is harmed by the populist policy, since returns on labor decay. Also, medium productivity workers are also harmed. With low productivity, when not enough to become eligible for government transfers, and low assets, this fraction of the population is most likely the utmost losers in populism.

Table 5.7: Political Support with 15 states

Threshold θ / wealth%	0% - 10%	10% - 20%	20% - 78%	78% - 99.7%	99.97% - 99.99%	100.00%
θ^1	*Supports*	*Supports*	*Supports*	*Supports*	*Supports*	*Supports*
θ^2	*Supports*	*Supports*	*Supports*	*Supports*	*Supports*	*Supports*
θ^3	*Rejects*	*Supports*	*Supports*	*Supports*	*Supports*	*Supports*
θ^4	*Rejects*	*Reject*	*Supports*	*Supports*	*Supports*	*Supports*
θ^5	*Rejects*	*Reject*	*Reject*	*Reject*	*Supports*	*Supports*
θ^6	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^7	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^8	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^9	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^{10}	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^{11}	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^{12}	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^{13}	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^{14}	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*
θ^{15}	*Rejects*	*Reject*	*Reject*	*Reject*	*Reject*	*Supports*

Wealth percentiles of total population divided among each productivity state. For each productivity state (column) and wealth percentile (line), "Supports" mean the individuals in the respective state (a,θ) is better than on the outside option. "Rejects" means the opposite.

6
Final Remarks

We tried to address a few questions about the dynamics of expropriation and power on developing countries. We have various examples of left oriented governments that even though expropriating private firms and causing, sometimes, major economics difficulties still maintains power by popular support. We found that populism can be a response to the desire to appropriate of a fraction of a commodity, and, therefore, is more likely that a corrupt government (for example) chooses populist politics in order to hold office.

Interestingly, the part of the population that supports the expropriator, but populist, government, besides of course the low productive households (benefited directly by the populism policy), is the elite. That comes from a general equilibrium effect on interest rate, caused by the contraction on precautionary savings in the economy, possible due to the transfers households receive when in bad states in political equilibrium. Individuals that are not directly affected by populists policies compare an allocation in which they receive nothing from the government and have a lower salary, although rents on capital are higher, with another one where they receive some amount and returns on labor are more attractive, but interests are lower. We found that for some parametrization it is possible that the increase in interests offsets the reduction in salaries and absence of transfers, so that a coalition is formed. Poor, low productivity households and rich capital owners support the populist allocation instead of an egalitarian one.

Also, we calibrated our model to an American economy like in Floden e Lindé (2001) and found that the mechanism is weak in this more realistic case. Further, we performed some comparative statics in parameters of the AR(1) process we used for wages to try understanding in which types of economy our found arrangement is more likely to occur. We found that when inequality rises the mechanism gets stronger because the reduction in wages falls. We also found that if persistence of income shocks are low, the coalition looses likelihood. Too much precautionary savings increases the negative effects on wages and that offsets the higher differences in interest rates. Precautionary savings are, at the same time, the driver and the ruin of our result.

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A
Appendix

Computation

We use standard algorithms known in the literature to find our stationary competitive equilibriums, found in Rios-Rull (1997). We actually use a slight variation of the fixed point capital iteration method, also found in Ljungqvist e Sargent (2012). The general algorithm is as follows:

1. Discretize the individual capital grid $[b, a_1, a_2, ..., a_n]$, the grid of τ, $[\tau_1, \tau_2, ..., \tau_s]$ and the productivity grid $[\theta_1, \theta_2, ..., \theta_m]$;

2. For each $\tau^i \in [\tau_1, \tau_2, ..., \tau_s]$ and $\overline{\theta}^i \in [\theta_1, \theta_2, ..., \theta_m]$:

   - Calculate the correspondent T (remember, T only depends on the distribution among the productivity state and we know that from the transition probability matrix P);
   - Iterate to find the competitive equilibrium:
     - Guess a lower bound and an upper bound for the interest rate and build an equally divided grid, say, with 3 rates $\{r_l, r_m, r_u\}$ where r_m is the median (you can build this grid larger, in fact, through our work we used 4, but 3 is the least);
     - For each $r \in \{r_l, r_m, r_u\}$, plot the correspondent per capita capital demand $\{k_l^d, k_m^d, k_u^d\}$ and wages $\{w_l, w_m, w_u\}$;
     - For each r and w in the grid, plot the per capita capital offer $\{k_l^o, k_m^o, k_u^o\}$ by solving the agents problem:
       * Use any algorithm to find $g(a, \theta)$ and $n(a, \theta)$ (we used standard value function iteration);
       * Find the correspondent stationary distribution $\lambda(a, \theta)$;
       * Determine the aggregate capital $K = \int g(a, \theta) d\lambda(a, \theta)$ and labor $N = \int \theta n(a, \theta) d\lambda(a, \theta)$;
     - Compare the per capita capital offer and demand for each r on the grid to find the interval where demand intercepts with offer. In other words, find $\{r_l^2, r_u^2\}$ on the grid of r so that the a new grid built by subtracting the offer grid by the demand grid changes signal ($\{\{k_l^d - k_l^o, k_m^d - k_m^o, k_u^d - k_u^o\}\}$);
     - Use $\{r_l^2, r_u^2\}$ as your new upper and lower bounds for r and repeat the process until $|r_u^i - r_l^i| < \epsilon$ for some tolerance parameter ϵ;

- Having the stationary value functions you can now determine the mass of workers happier when compared to the outside option;

3. Repeat the process for each $\tau^i \in [\tau_1, \tau_2, ..., \tau_s]$ and $\overline{\theta}^i \in [\theta_1, \theta_2, ..., \theta_m]$ and take the higher τ so that a mass of χ workers are better off. That is your political economic equilibrium.

Note that this process also finds the outside option, since you can simply set the first τ in the grid to be 0. The fixed point iteration we used in bound to converge if the initial guess on upper and lower bound contains the equilibrium interest rate.

It is important to emphasize that the stationary distribution used to determine the mass of workers better than the outside option is the suggested allocation one. We basically find the points in the state space grid (a, θ) where $V(a, \theta; \tau^i, T, \overline{\theta}^i) > V(a, \theta; 0, \overline{T}, \infty)$ and then use $\lambda(a, \theta; \tau^i, \overline{\theta}^i)$ to compute the mass.