The dual policy in the dual economy - the political economy of urban bias in dictatorial regimes

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Abstract

In many developing countries, public resource allocation is often biased against the rural population. Since a vast majority of the poor live in rural areas, the bias is highlighted as one of the most important institutional factors contributing to poverty. This paper develops a dynamic political economy model of urban bias in a dictatorial regime. A novel result of the model is that urban bias can emerge in predominantly agrarian economies even if there is no bias in political power toward urban residents. The empirical evidence from a recently compiled country-level panel dataset on agricultural taxes/subsidies is consistent with the prediction of the model.

Keywords: Urban bias; rural poverty; dictatorship.

JEL Classification:D7, H2, O1, O2, R1.

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1 Introduction

One of the major policy features that characterize many developing countries is a heavy bias against the rural population. This bias is highlighted as one of the most important policy obstacles to poverty reduction as a vast majority of the poorest households depend on farming for their livelihood. According to the Rural Poverty Report[2011] “1.4 billion people continue to live in extreme poverty, struggling to survive on less than US $1.25 a day. More than two thirds of them reside in rural areas of developing countries.” The bias was first articulated by Lipton and he coined the term “urban bias” in 1977 with his influential book Why Poor People Stay Poor: Urban Bias in World Development [Lipton, 1977]. Lipton identified such systematic bias against rural residents as the single most important source of deprivation for the majority of the poor across the world. Moreover, Bates (1984) provides extensive accounts of various tax instruments that governments use to extract resources from the rural sector. For example, government-owned marketing boards with monopsony power buy export products from peasants at administratively set low prices, sell those products at prevailing world prices, and pocket the surplus. Bates (1984) also shows how governments in Sub-Saharan Africa manipulated exchange rates against exportable farm products and used other domestic policies to suppress the prices of agricultural products (particularly food) in the domestic market. More recently, Bezemer and Headey (2008) single out urban bias as “the largest institutional impediment to growth and poverty reduction in the world’s poorest countries.”

This paper presents a model to shed light on the political economy mechanism driving the bias. The paper also provides empirical support for the main prediction of the model. As previous studies of urban bias have shown that the bias is primarily a feature of non-democratic regimes [e.g. see Ades and Glaeser, 1995], the focus in this paper is on dictatorial regimes. One of the main regime features that characterize a dictatorial regime is the role of intra-elite conflict in power transfer [Lizzeri and Persico, 2004]. In many dictatorial regimes, conflicts within the ruling elite are major sources of threat to political power. Citizens may also play a role in those conflicts. For example, citizens can support certain factions within the ruling circle. On the other hand, regime insiders may use popular sentiments against the current leader to come to power. It is not unusual for regime insiders to capitalize on citizens’ dissatisfaction to justify coups d’état against leaders. The model combines these features in a dynamic setting (Bates, 1984).
The model provides testable predictions regarding political incentives and economic structure as defined by the relative size of different sectors in the economy. A novel result of the model is that anti-agricultural biases can emerge in predominantly agrarian economies even if there is no bias in political power between urban and rural citizens. In the political game, it is assumed that the insider can stage a coup and take over power with the support of either the rural or the urban residents. To avert a coup, the leader has two options: either to bribe the insider or lower the taxes to citizens so that they do not provide support for the insider. Urban residents are said to be politically more powerful the higher is the probability that the insider needs their support to overthrow the leader. Urban bias is then defined as the expected tax rate on the rural residents relative to the expected tax rate on urban residents. This relative tax rate becomes higher when the share of output by the rural sector is larger. The reason is that, as the relative size of agriculture increases, appeasing the rural population may require giving up a large amount of rent. And the leader reverts to bribing the insider whenever the insider needs the support of the rural residents. On the other hand, whenever the insider needs the support of the urban residents, the leader prefers to lower taxes on urban residents rather than bribing the insider. Using a recently compiled country-level panel dataset on taxation of the agricultural sector (see Anderson and Valenzuela 2008), I show that the empirical evidence is consistent with the prediction of the model.

Previous literature on the political economy of urban bias emphasizes the role of disproportionate political power by urban residents as a driving force of urban bias. A common explanation follows the “group action logic” forwarded by Olson (1971), where a larger size of the agricultural labor force is argued to weaken farmers lobbying ability by worsening the free-riding problem (Olson 1986). This explanation is motivated by what appears to be a general pattern that poorer countries, which tend have a larger share of their labor force in the agricultural sector, tend to tax agriculture while rich countries subsidize (e.g. Bale and Lutz 1981, Honma and Hayami 1986, and Krueger et al. 1988). Information advantage by urban residents is argued as an alternative explanation for urban bias. Using a voting model with imperfect information, Majumdar et al. (2004) show how information advantage by urban residents can lead to disproportionate political influence by urban residents. Ades and Glaeser (1995) emphasize differences in regime types as

Swinnen (2010) provides a detailed review of the literature.
a source of differences in political power between urban and rural residents. They argue that dictatorships favor urban residents since urban residents are assumed to have higher political power in dictatorships than in democracies. In this paper, I expand on this idea. Specifically, I show that the extent to which dictatorships are biased toward the urban sector varies substantially depending on the relative size of the rural economy. A key finding of the paper is that dictatorship may feature urban bias in predominantly agrarian societies even if there is no bias in political power between urban and rural residents.

The remainder of this paper proceeds as follows. The model is presented in Section 2. This is followed by the analysis of the equilibrium outcomes in Section 3. Section 4 looks at correlates of agricultural policies and economic structure under different regime types to examine the major prediction of the model. The final section presents concluding remarks.

2 The model

2.1 Setup: players, strategies and timing

Consider a dynamic game among various groups within a society. Specifically, assume that there are four groups of players: an incumbent leader (denoted by $L$), a regime insider (denoted by $I$), a continuum of urban citizens (denoted by $U$) and a continuum of rural citizens (denoted by $R$).

Political influences and power rivalries are carried out through non-democratic means. The leader’s objective is to maximize his rent (taxes collected) from the output produced by the citizens. While doing so, however, he faces certain constraints depending on the relative political strength of each group within the society. The main constraint is the threat he faces from his own insider.

There are two states of the world, denoted by $q \in \{q_u, q_r\}$. In order to overthrow the leader, the insider needs the support of $R$ if the state is $q_r$. He needs the support of $U$ if the state is $q_u$.  

If the leader is overthrown, there is uncertainty regarding each group’s relative political power in the future (i.e. the state of the world may change).  

\footnote{The main results do not change if one allows for more states. For example, we can consider two additional states – the insider can overthrow the leader by himself (with no support) and the insider can overthrow the leader with the support of either $U$ or $R$.}
Such uncertainties are typically the case following political uprisings in weakly institutionalized states. Following Besley and Kudamatsu (2007) and Padro-I-Miquel (2007), the uncertainty is captured by random changes in the state variable \( q \) whenever there is a change in power (i.e. leader overthrow). In each period, assume that \( y_u \) and \( y_r \) quantities of output are produced by the urban and rural sectors, respectively.

The timing of the game and the strategies by each player are as follows:

Step 1 At time \( t = 0 \) (the initial period), nature randomly selects a leader and an insider from the citizens, and determines the type of the state \( q_t \in \{q_u, q_r\} \) according to the probability distribution \( p(q_u) = p_u > 0 \) and \( p(q_r) = p_r = 1 - p_u > 0 \).

Step 2 All players observe the state of the world \( q_t \).

Step 3 The leader announces tax rates on both sectors \( \tau'_{u,t}, \tau'_{r,t} \in [0, \bar{\tau}] \) for some \( \bar{\tau} \in [0, 1) \), and the share of the rent to be given to the insider \( \delta'_t(\tau'_{u,t}y_u + \tau'_{r,t}y_r) \), with \( \delta_t' \in [0, 1] \)

Step 4 The insider proposes whether to overthrow the leader and, if so, whether to do it with the support of \( U \) or \( R \). Denote the insider’s strategy by \( \psi_t = (\psi_{u,t}, \psi_{r,t}) \in \Psi \equiv \{0, 1\} \times \{0, 1\} \). We have \( \psi_{u,t} = 1 \) \( (\psi_{r,t} = 1) \) if the insider calls for support of the urban (rural) citizens; otherwise, \( \psi_{u,t} = 0 \) \( (\psi_{r,t} = 0) \).

Step 5 Citizens decide whether to offer support for the insider’s call: \( z_{u,t}, z_{r,t} \in \{0, 1\} \). Following Acemoglu and Robinson (2006), I assume that participating in a revolution to overthrow an incumbent is a costly activity. Hence, if \( z_{s,t} = 1 \) for \( s \in \{u, r\} \) (i.e. if citizens participate in an overthrow), it costs them \( \gamma y_s \) for some \( \gamma > 0 \).

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3The assumption that \( \bar{\tau} < 1 \) is a reduced form for non-political constraints faced by the leader. One such constraint is what is called the “dead-weight loss” where the actual revenue for the leader from a tax rate of \( \tau \) will be \( \tau - \alpha \tau^2 \) for some \( \alpha > 0 \); see Meltzer and Richard (1981). The other constraint is what Acemoglu (2005) calls “economic power” of citizens where citizens can hide their output and evade taxes albeit with certain costs (such as resorting to informal activities which may give them lower returns) if taxes are too high.

4The sequence between Step 4 and 5 is not necessary for the conclusion on tax rates. The equilibrium tax rates will still be the same even if we interchange Step 5 and Step 4.
Step 6 If the leader is not overthrown, \( q_{t+1} = q_t \), \( \tau_{u,t} = \tau'_{u,t} \), \( \tau_{r,t} = \tau'_{r,t} \) and \( \delta_t = \delta'_t \); and the game continues from Step 2 in period \( t + 1 \).

Step 7 If the leader is overthrown, \( \tau_{u,t} = \tau_{r,t} = 0 \). The leader gets 0 in the future. \( q_{t+1} \) takes either of the values with probabilities \( p_u \) and \( p_r \). In period \( t + 1 \), the game continues from Step 2 with the insider as a new leader and a randomly selected citizen as an insider. This assumption implies that an insider who overthrows a leader and takes over power will face similar rivalry from his own insider. Leaders change, but the political regime remains the same.

Payoffs for player \( j \), denoted by \( V^j \), are the discounted sum of instantaneous consumptions \( C^j_t \):

\[
V^j = \sum_{t=0}^{\infty} \beta^t C^j_t
\]

where

\[
C^j_t = \begin{cases} 
(1 - \delta_t)(\tau_{u,t}y_u + \tau_{r,t}y_r), & \text{if } j \text{ is a leader in period } t. \\
\delta_t(\tau_{u,t}y_u + \tau_{r,t}y_r), & \text{if } j \text{ is an insider in period } t. \\
(1 - \tau_{s,t} - z_{s,t}\gamma)y_s, & s \in \{u, r\}, \text{ if } j \text{ is an ordinary citizen.}
\end{cases}
\]

The difference between probabilities \( p_u \) and \( p_r \) reflects the relative power of the two groups, \( U \) and \( R \). Higher \( p_u \), for example, implies that it is more likely that urban residents become important political constituencies for rival groups within the ruling circle (i.e. the leader and the insider). The opposite is true for higher \( p_r \). Although \( \gamma \) is assumed to be the same for both \( U \) and \( R \), in reality, it could also vary across \( U \) and \( R \) depending on the political tools available to the groups. Among many others, Ades and Glaeser (1995) and Bates (1984), for example, argue that urban residents tend to have better access to influence due to factors such as physical proximity to power centers, better access to information, and better ability to organize. In this model, the purpose of assuming similar \( \gamma \) for \( U \) and \( R \) is to focus on the impact economic structure on urban bias in spite of no differences in the \( \gamma \)s for the urban and rural residents.

\footnote{An interpretation could be that he loses everything after having been purged.}
2.2 Equilibrium

The equilibrium concept used in this analysis is a pure strategy Markov Perfect Equilibrium (henceforth MPE). The appealing feature of MPE is its analytical simplicity. Within each period, players play a sub-game perfect equilibrium. And along the equilibrium path, equilibrium strategies are functions of the state variable $q$. The following definition presents a precise equilibrium concept used in this analysis.

**Definition.** The MPE of this game is a set of the value functions \(\{V_i(q) : i \in \{U, R, I, L\}\}\); strategy by the leader \((\tau_u, \tau_r, \delta)(q)\); strategy by citizens \(z_u(q)\) and \(z_r(q)\); and strategy by the current insider \(\psi(q)\) such that:

- Given \((z_r, z_u, \psi(q), (\tau_u, \tau_r, \delta)(q))\) and \(V_L(q)\) solve
  \[
  V_L(q) = \max_{\tau_u, \tau_r \in [0, \bar{\tau}], \delta \in [0, 1]} \left\{ C_L\left(\tau_u, \tau_r, \delta, (z_u, z_r, \psi)(q), q\right) + \beta \mathbb{E}V_L(q') \right\}
  \]

- Given \((z_r, \tau_u, \tau_r, \delta, \psi)(q), z_u(q)\) and \(V_U(q)\) solve
  \[
  V_U(q) = \max_{z_u \in \{0, 1\}} \left\{ C_U\left(z_u, (z_r, \tau_u, \tau_r, \delta, \psi)(q), q\right) + \beta \mathbb{E}V_U(q') \right\}
  \]

- Given \((z_u, \tau_u, \tau_r, \delta, \psi)(q), z_r(q)\) and \(V_R(q)\) solve
  \[
  V_R(q) = \max_{z_r \in \{0, 1\}} \left\{ C_R\left(z_r, z_u(\tau_u, \tau_r, \delta, \psi)(q), q\right) + \beta \mathbb{E}V_R(q') \right\}
  \]

- Given \((z_u, z_r, \tau_u, \tau_r, \delta)(q), \psi(q)\) and \(V_I(q)\) solve
  \[
  V_I(q) = \max_{\psi \in \Psi} \left\{ C_I\left(\psi, (z_r, z_u, (\tau_u, \tau_r, \delta)(q), q\right) + \beta \mathbb{E}V_I(q') \right\}
  \]

The political constraint faced by the leader is binding only when $\gamma < \bar{\tau}$, and we assume so throughout the analysis$^6$. Depending on the parameter values of the model, we will see that there are four cases with unique equilibrium tax rates in each case. These cases correspond to the leader’s decision with regard to the group he wants to appease. The leader adopts one of the following four strategies:

$^6$If $\gamma \geq \bar{\tau}$, the political constraint becomes irrelevant and the equilibrium tax rates are always equal to $\bar{\tau}$.
Case 1. Irrespective of the state of the world, impose the maximum tax rate $\bar{\tau}$ on both $U$ and $R$, and rely on the insider’s support for survival.

Case 2. Lower $\tau_u$ if $q = q_u$ and lower $\tau_r$ if $q = q_r$, i.e. rely on the support of either $U$ or $R$ that can provide support for the insider.

Case 3. Lower $\tau_u$ when $q = q_u$ but impose $\tau_r = \bar{\tau}$ when $q = q_r$, i.e. rely on the support of $U$ when $q = q_u$ and on the insider’s support when $q = q_r$.

Case 4. Lower $\tau_r$ when $q = q_r$ but impose $\tau_u = \bar{\tau}$ when $q = q_u$, i.e. rely on the support of $U$ when $q = q_u$ and on the insider’s support when $q = q_r$.

The following proposition states MPE of the game under those four cases. Assumptions A1-A4 in the proposition correspond to the four cases.

Proposition 1. Assume that either of the following four sets of assumptions (A1-A4) are satisfied.

$$
\begin{align*}
\gamma y_u + \bar{\tau} y_r, \bar{\tau} y_u + \gamma y_r &\leq \bar{\tau}(y_u + y_r) - V_1 \quad (A1) \\
\tau_2 y_u + \bar{\tau} y_r + \tau_2 y_r &\geq \bar{\tau}(y_u + y_r) - V_2 \quad (A2) \\
\bar{\tau} y_u + \gamma y_r &\leq \bar{\tau}(y_u + y_r) - V_3 \leq \tau_2 y_u + \bar{\tau} y_r \quad (A3) \\
\gamma y_u + \bar{\tau} y_r &\leq \bar{\tau}(y_u + y_r) - V_4 \leq \bar{\tau} y_u + \tau_2 y_r \quad (A4)
\end{align*}
$$

where

$$
\begin{align*}
\tau_2 &= \frac{1}{1 - \beta p_i} (\gamma - \gamma \beta + \beta \bar{\tau} - \beta p_i \bar{\tau}) \quad \text{for } i \in \{r, u\} \quad (1) \\
V_1 &= \beta \bar{\tau} (y_u + y_r) \quad (2) \\
V_2 &= \beta (p_u (\tau_2 y_u + \bar{\tau} y_r) + p_r (\bar{\tau} y_u + \tau_2 y_r)) \quad (3) \\
V_3 &= \beta (p_u (\tau_2 y_u + \bar{\tau} y_r) + p_r \bar{\tau} (y_u + y_r)) \quad (4) \\
V_4 &= \beta (p_r (\bar{\tau} y_u + \tau_2 y_r) + p_u \bar{\tau} (y_u + y_r)). \quad (5)
\end{align*}
$$

Then,

- the MPE urban tax rate $\tau_u(q)$ is given by

$$
\tau_u(q) = \begin{cases} 
\tau_2 & \text{if either } A2 \text{ or } A3 \text{ is satisfied and } q = q_u. \\
\bar{\tau} & \text{otherwise.}
\end{cases}
$$
• the MPE rural tax rate \( \tau_r(q) \) is given by

\[
\tau_r(q) = \begin{cases} 
\tau_{r2} & \text{if either } A2 \text{ or } A4 \text{ is satisfied and } q = q_r. \\
\bar{\tau} & \text{otherwise.}
\end{cases}
\]

• the MPE insider’s share \( \delta(q) \) is given by

\[
\delta(q) = \begin{cases} 
\frac{V_1}{\bar{\tau}(y_u + y_r)} & \text{if } A1 \text{ satisfied.} \\
\frac{V_3}{\bar{\tau}(y_u + y_r)} & \text{if } A3 \text{ is satisfied and } q = q_u. \\
\frac{V_4}{\bar{\tau}(y_u + y_r)} & \text{if } A3 \text{ is satisfied and } q = q_r. \\
0 & \text{otherwise.}
\end{cases}
\]

• \( \psi_i(q) = z_i(q) = 0 \) for \( i \in \{u, r\} \) and for all \( q \).

Proof. See the appendix.

3 Urban bias, political power and dominance of agriculture

The impact of political power (as measured by the probability distribution) depends on which of the four cases prevail and, for a given case, which state of the world we are in. On the other hand, whether a particular case prevails may in turn depend on the probability distribution. For example, under Case 1 (i.e., under Assumption (A1)), a change in \( p_u \) has no effect on the equilibrium \( \tau_u \). However, under Case 3, an increase in \( p_u \) decreases the equilibrium \( \tau_u \) if the state is \( q_u \). Case 3 is also less likely to to prevail as \( p_u \) increases. In order to conceptualize urban bias in the framework of this model and derive a testable prediction, we thus need to have a comprehensive measure of urban bias accounting for all of these factors. Therefore, we consider the expected tax rates on both sectors, denoted by \( E\tau_u \) and \( E\tau_r \), as such a measure where

\[
E\tau_u = p_u \tau_u(q_u) + p_r \tau_u(q_r) \\
E\tau_r = p_u \tau_r(q_u) + p_r \tau_r(q_r)
\]

\footnote{This is so because \( \tau_{u2} \) is increasing in \( p_u \). As \( \tau_{u2} \) increases, the second inequality in Assumption (A2) is less likely to hold.}
\( \mathbb{E}\tau_u \) and \( \mathbb{E}\tau_r \) can be interpreted as the expected tax rates in a randomly picked country characterized by the model parameters. Since \( \tau_u(q) \) and \( \tau_r(q) \) are equilibrium tax rates, \( \mathbb{E}\tau_u \) and \( \mathbb{E}\tau_r \) take into account the impacts of changes in model parameters (such as the political power distribution and the relative size of each sector) on (a) the likelihood of each state, (b) the cases prevailed, and (b) the tax rates within each case and the realized state.

An increase in \( p_u \) decreases \( \mathbb{E}\tau_u \) in those cases where urban support is relevant (i.e., Cases 2 and 3). This happens because of two reasons. First, \( \tau_u(q_u) \) decreases as \( p_u \) increases. And \( \mathbb{E}\tau_u \) decreases since \( \tau_u(q_u) \) enters additively in the expression for \( \mathbb{E}\tau_u \). Second, note that \( \tau_u(q_u) \leq \tau_u(q_r) \). An increase in \( p_u \) decreases \( \mathbb{E}\tau_u \) since higher \( p_u \) means a larger weight for the smaller term in the expression for \( \mathbb{E}\tau_u \) and a smaller weight for the larger term.

Similarly, an increase in \( p_r \) decreases \( \mathbb{E}\tau_r \) under the cases where rural support could be relevant (i.e., Cases 2 and 4). The following proposition summarizes these effects.

**Proposition 2.** \( \mathbb{E}\tau_u \) is decreasing in \( p_u \) if either of assumptions A2 and A3 hold. Similarly, \( \mathbb{E}\tau_r \) is decreasing in \( p_r \) if either of assumptions A2 and A4 hold.

**Proof.** See the appendix.

This proposition is consistent with previous claims that urban bias, among other factors, is driven by disproportionate political power by urban residents (see e.g. Ades and Glaeser (1995)). According to Proposition 2, the group with higher \( p \) is likely to get relatively favorable tax rates.

Disproportionate political power by urban residents, however, is not a necessary condition for urban bias to emerge. Urban residents could be more likely to get favorable tax rates if the urban sector is small relative to the rural sector. This happens because, as the share of the rural sector increases, a shift to Case 3 from either of the Cases 1, 2 or 4 may occur. Note that Case 3 features urban bias in the sense that the leader lowers the urban tax rate whenever urban support is relevant (i.e. when \( q = q_u \)) but he does not lower the rural tax rate when rural support is relevant (i.e. \( q = q_r \)). \( \mathbb{E}\tau_r \) may hence increase as the relative size of the rural sector increases. Such bias against agriculture can occur despite the relative political power of the

\[ \frac{8 \partial^2 \tau_u}{\partial p_u^2} = -\beta (1 - \beta) \frac{\tau - \gamma}{(1 - \beta p_u)\tau} < 0. \]
rural residents (as measured by \( p_u \) and \( p_r \)). The main intuition behind this result is that, when the relative size of agriculture increases, appeasing the rural population may require giving up a large amount of rent. Instead of lowering the taxes to the rural population to win their support, the leader therefore prefers to impose the maximum tax rate on the rural population and rely on the insider’s support.

Consider the relative expected tax rates \( E\tau_r / E\tau_u \) as a measure of bias against agriculture. There is no bias if \( E\tau_r / E\tau_u = 1 \), the bias is against agriculture if \( E\tau_r / E\tau_u > 1 \), and the bias is against the urban sector if \( E\tau_r / E\tau_u < 1 \). Thus, we have the following proposition stating the bias that is driven by the mere dominance of agriculture in the economy.

**Proposition 3.** Assume that \( p_u = p_r = 0.5 \), i.e. there is no bias in political power. For large enough \( y_r / y_u \), \( E\tau_r / E\tau_u \geq 1 \). Moreover, if \( \gamma - (1 - \beta)\bar{\tau} < 0 < 0.5\beta\bar{\tau} + (1 - \beta) (\gamma - \bar{\tau} (1 - 0.5\beta)) \), then \( E\tau_r / E\tau_u > 1 \) for large enough \( y_r / y_u \). Conversely, for small enough \( y_r / y_u \), \( E\tau_r / E\tau_u \leq 1 \). Moreover, if \( \gamma - (1 - \beta)\bar{\tau} < 0 < 0.5\beta\bar{\tau} + (1 - \beta) (\gamma - \bar{\tau} (1 - 0.5\beta)) \), then \( E\tau_r / E\tau_u < 1 \) for small enough \( y_r / y_u \).

*Proof.* See the appendix.

## 4 Empirical evidence

This section takes a look at the data to verify whether the statistical correlates between agriculture’s share in the national economy and observed policies are consistent with Proposition 3. I will first discuss the main variables in the analysis and the data source. Then, we will proceed to the regression analysis.

### 4.1 Data

The two key variables in the analysis are the nominal rate of assistance (NRA) and the relative rates of assistance (RRA) to agriculture. Estimates for NRA and RRA are compiled by a team of researchers under auspices of the World Bank. The data source is Anderson and Valenzuela (2008).

NRAs measure the subsidies (or taxations) that the agricultural sector receives (or pays) as a result of mainly government-imposed measures. Details of the measurement steps are described in Anderson et al. (2008). For each
country in the sample, NRAs are estimated for a variety of agricultural commodities. Then, a weighted average of NRAs for each commodity is taken to estimate overall NRA to the agricultural sector in the country. The nominal rate of assistance that a particular agricultural product $i$ receives, denoted by $NRA_i$, is defined as

$$NRA_i = \frac{D_i}{R_i} - 1$$

(6)

where $D_i$ denotes the actual return that a producer of agricultural product $i$ receives while $R_i$ denotes the return that would have prevailed under a free market condition. An agricultural commodity $i$ is said to be subsidized (or taxed) if $NRA_i > 0$ (or $NRA_i < 0$). The subsidies/taxes take various forms such as tariffs on competing imported items, export subsidies/taxes, direct production subsidies/taxes to farmers, exchange rate manipulations, and subsidies/taxes to inputs for production. The overall NRA that the agricultural sector receives is computed as a weighted average of NRAs offered to each commodity.

$$NRA = \sum_i \alpha_i NRA_i$$

(7)

where $\alpha_i$ is the ratio of commodity $i$’s value to the value of the country’s total agricultural produce. Hence, $\alpha_i$ measures the relative economic importance of commodity $i$ in the country’s agricultural sector. For each country included in the sample, the annual time series of NRAs are estimated spanning from year 1955 to 2007. For some countries, the time series may not cover the entire period of 1955-2007. A total of 75 countries are included in the estimation. According to [Anderson and Valenzuela (2008)](https://www.worldbank.org/en/research/documents/2008/02/21/92percent-world-population-agricultural-gdp-95percent-total-gdp), the countries together account for 92 percent of the world population and agricultural GDP and 95 percent of total GDP. They also account for more than 85 percent of farm production and employment in each of Africa, Asia, Latin America and the transition economies of Europe and Central Asia.

RRA, on the other hand, measures the net assistance offered to agriculture relative to other sectors. It is computed using the formula

$$RRA = \frac{1 + NRA}{1 + NRA_{nonagri}} - 1$$

(8)

where $NRA_{nonagri}$ measures the nominal rate of assistance offered to non-agricultural sectors.

As a measure of the relative importance (or extent of dominance) of agriculture in the national economy, I use the ratio of value-added by the
agricultural sector to total value-added in the whole economy (i.e. the sum of value added by all sectors). The correlation between the share of agriculture’s value-added in the national economy and the NRA/RRA will be used to study the statistical relationship between agricultural dominance and anti-agricultural policy. Other variables included in the statistical analysis are ratio of agricultural to non-agricultural population, income from resource extraction, number of conflicts, number of anti-government demonstrations, and government consumption (as a percentage of GDP). The data sources are World Development Indicators 2010, Heston et al. (2011), Banks (2001) and Teorell et al. (2011).

Since the model focuses on dictatorial regimes, a measure of political freedom is needed to distinguish regimes that are dictatorial from those that are not. I use the Freedom in the World 2010 data that ranks countries as either free, partially free or not free.

4.2 Estimation Results

Tables 1 and 2 present fixed-effect panel regression estimates to examine the relationship between output share of agriculture in the national economy (defined as the ratio of value added by agriculture to the total value added in the economy) and rate of assistances. An advantage of the fixed-effect estimate is that it controls for time-invariant factors such as geography and historical legacies. As the mechanisms outlined in the model pertain to non-democratic regimes, the estimations in Tables 1 and 2 are carried out for non-democratic regimes (labeled not free or partially free in the Freedom House category). In Table 1, the dependent variable is NRA. The dependent variable in Table 2 is RRA.

Column (A) in Table 1 includes agriculture’s share of value added as the only right-hand-side variable. The dependent variable is NRA. The theoretical model predicts that, in dictatorial regimes, expected agricultural tax rates are higher in economies with a greater share of agricultural GDP. The estimated coefficient is negative. As the output share of agriculture in the economy increases, countries tend to impose higher tax rates on the agricultural sector, which is consistent with the prediction of the model. A unit increase in the share of agriculture decreases the NRA by almost a proportionate amount (0.92).

Columns (B) to (E) verify whether the correlation between the share of agricultural output and NRA disappears if we control for alternative expla-
<table>
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<tr>
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<th>(B)</th>
<th>(C)</th>
<th>(D)</th>
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<td>Agri. value added</td>
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<tr>
<td>Agri/non-Agri pop.</td>
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<td>-0.00</td>
<td>-0.00</td>
<td>-0.00</td>
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</tr>
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<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Mineral(% of GNI)</td>
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<td>-0.01***</td>
<td>-0.01***</td>
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</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government share</td>
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<td>1.05**</td>
<td>1.11**</td>
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<tr>
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<td>(0.46)</td>
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<tr>
<td>Manuf. value added</td>
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<td>(1.21)</td>
<td>(1.20)</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>(2.53)</td>
<td>(2.51)</td>
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<td></td>
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</tr>
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<td>Armed conflicts</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.02)</td>
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<tr>
<td>R-Square</td>
<td>0.073</td>
<td>0.122</td>
<td>0.156</td>
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</tbody>
</table>

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
nations. One such explanation follows from Olson (1971) where, due to a free-riding problem, smaller groups may be more effective at lobbying than larger groups. Applied to agricultural policies, this argument implies that an increase in the relative size of agricultural population, by reducing the lobbying incentive of farmers, may thus have a negative effect on NRA (Olson, 1986; Anderson, 1995). If the agricultural population share is correlated with the agricultural output share (which is true in the data), the observed negative correlation between the agricultural output share and NRAs may also be due to farmers’ weaker incentive to lobby. Note that the group action logic is a different mechanism to the one outlined by the model in this paper. According to the group action logic, a larger agricultural population share leads to lower NRAs by reducing the political power of farmers (by changing the farmers’ incentive to lobby). According to the model in this paper, however, a larger agricultural share leads to lower NRAs by changing the leader’s incentive despite the political power of the agricultural population (see Proposition 3). If the observed negative correlation between agricultural output share and NRAs is driven by the group action logic, the correlation should become insignificant when we control for agricultural population share. Column (B) in Table 1 thus controls for the ratio of agricultural to non-agricultural population. The estimated coefficient is negative and significant, suggesting that the group action logic is indeed empirically valid. However, the coefficient on the value added share of agriculture is still significantly negative.

Another potential explanation is related to the fiscal capacity of the state (i.e. the state’s ability to mobilize fiscal resources). At the early stage of development, countries may have a lower capacity to collect taxes (see e.g. Acemoglu (2005), Besley and Persson (2010)). Such countries may thus have to rely on few agricultural products (particularly tradeable commodities) to raise revenue. Moreover, countries with a higher share of agricultural output may have lower state capacity since typically, as the economy grows along with higher state capacity, the economy passes through a structural change where agricultural output share falls. In order to control for this channel, I make use of two observations in the recent literature on state capacity – (a) countries with a higher fiscal capacity tend to have a larger government share of GDP and (b) resource rich countries tend to have a lower fiscal capacity (see Acemoglu (2005), Besley and Persson (2010), Besley and Persson (2011), Sachs and Warner (1995)). Column (C) thus controls for two sets of variables: the share of government consumption in GDP and
resource income as a percentage of GNI. The estimated effect of the control variables is consistent with this view. Resource availability, as captured by the two variables Energy Income (% of GNI) and Mineral Income (% of GNI), decreases NRA. The government share of GDP (as a proxy for state capacity) has a positive and significant effect. The coefficient on output share of agriculture still remains significantly negative.

A third potential explanation relates to the role of ideology. In countries with a lower level of industrialization, governments’ ambition to develop their manufacturing sector through resource transfer from the agricultural sector is often mentioned as a reason for anti-agricultural policies in many developing countries (see e.g. Schiff and Valds, 2002; Krueger, 1996). To control for such effect, column (D) includes the value added share of the manufacturing sector in the country’s total value added. Due to the potential non-linearity of this effect, partly because of the non-linearity in the share of the manufacturing sector in the stage of economic transformation, the square term is also included. Consistent with this view, the estimated coefficients show that NRAs increase as the share of the manufacturing sector increases (before reaching a maximum). The coefficient on the agricultural output share remains largely unaltered.

Ades and Glaeser (1995) argue that unstable governments tax the rural sector more. The last column (E) accounts for instability by controlling for the number of armed conflicts. The coefficient has the expected sign (is negative), although it is insignificant.\footnote{The result is similar when an alternative measure of instability, namely, the number of anti-government demonstrations from Banks (2001), is controlled for.}

Finally, Table 2 reports estimation results with RRA as the dependent variable. NRA and RRA are highly correlated (with a correlation coefficient of 0.97). The estimation results show the positive effect of a higher agricultural output share on relative agricultural tax rates. The coefficient also remains significant when we control for the alternative explanation (columns (B) through (E)).

Corresponding regressions are also carried out for democratic regimes, i.e., regimes that are categorized as free by the Freedom House. The results are reported in the Appendix. For democratic regimes, the agricultural value

\footnote{The data source for government consumption share is Heston et al. (2011). Resource income data is from World Development Indicators. It includes income from energy and mineral resources. The minerals are bauxite, copper, iron, lead, nickel, phosphate, tin, zinc, gold and silver.}
Table 2: Share of agriculture and RRA in non-democracies

<table>
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<tr>
<th></th>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>(D)</th>
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<tr>
<td>Agri. value added</td>
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<td></td>
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<td>(0.42)</td>
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<td>Agri/non-Agri pop.</td>
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<td>-0.08***</td>
<td>-0.08***</td>
<td>-0.08***</td>
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<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Energy (% of GNI)</td>
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<td>-0.01**</td>
<td>-0.01**</td>
<td>-0.01**</td>
<td>-0.01**</td>
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<tr>
<td>Mineral(% of GNI)</td>
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<td>-0.01***</td>
<td>-0.01***</td>
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</tr>
<tr>
<td>Government share</td>
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<td>0.93**</td>
<td>0.93**</td>
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<td>0.93**</td>
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<td>(1.33)</td>
<td>(1.33)</td>
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<tr>
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<td>Countries</td>
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<tr>
<td>R-Square</td>
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<td>0.200</td>
<td>0.243</td>
<td>0.289</td>
<td>0.289</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01
added share does not have a significant effect on NRA. This finding suggests that the relationship between output share of agricultural sector and anti-agricultural policies is primarily driven by political forces that are typical to non-democratic regimes. The model in this paper provides such a mechanism.

5 Conclusion

A heavy systematic bias against the rural population, who constitute the majority of the poor, still remains to be one of the major policy features that characterize many developing countries. As argued by Bezemer and Headey (2008), the bias remains to be “the largest institutional impediment to growth and poverty reduction in the world’s poorest countries.” Political incentives that perpetuate anti-agricultural policies respond to changes in economic structure, and the incentives respond differently under different political environments.

This paper develops a formal political economy model to explain urban bias in dictatorial regimes. By identifying the mechanisms that link economic structure with political incentives under dictatorial regimes, the model shades light on the impact of economic structure and policy outcomes. In economies with a larger share of agricultural output, the model shows that dictatorial regimes have the incentive to impose higher agricultural tax rates even if there is no bias in political power. The empirical evidence is consistent with the prediction of the model. Alternative empirical specifications suggest that the mechanism outlined in the model complements existing theories of urban bias.

This paper examines the implication of differences in economic structure among dictatorial regimes. Given that urban bias is primarily a feature of dictatorial regimes (Ades and Glaeser 1995), and that there is a large heterogeneity among dictatorships with respect to political structures, an important avenue for future research may be to examine the policy implications of such heterogeneity within dictatorships. Besley and Kudamatsu (2007) for example emphasize the importance of differences between party and autocratic dictatorships. Future research may thus examine the implication for urban bias of differences in political structure within dictatorial regimes. The large dataset on agricultural taxes and subsidies made available by Anderson and Valenzuela (2008) also provides an opportunity to empirically test alternative theories.
References


Heston, Alan, Robert Summers, and Bettina Aten, Penn World Table Version 7.0 Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania May 2011.


Rural Poverty Report


Teorell, Jan, Marcus Samanni, Sren Holmberg, and Bo Rothstein, “The Quality of Government Dataset,” April 2011.

World Development Indicators

World Development Indicators, September 2010.
A Proof of Proposition 1

We follow the usual procedure where we first conjecture that the set of strategies are MPE strategies and then verify the claim.\footnote{See, for example, Hassler et al. (2003).}

A.1 MPE – Case 1

Note that the expected payoff for the insider from taking power, given the conjecture under assumption A1, equals $V_1 / (1 - \beta)$. Note also that, when $q = q_u$, urban residents are indifferent between paying the current tax $\tau_u$ and participating in overthrow of the leader (upon the insider’s call to do so) if

$$\frac{\beta(1 - \tau_u(q_u))}{1 - \beta} + 1 - \tau_u = 1 - \gamma + \frac{\beta}{1 - \beta} \left( p_u(1 - \tau_u(q_u)) + p_r(1 - \bar{\tau}) \right)$$

Under the conjecture, $\tau_i(q_s) = \bar{\tau}$ for all $i, s \in \{r, u\}$. So the above condition becomes

$$\frac{\beta(1 - \bar{\tau})}{1 - \beta} + 1 - \tau_u = 1 - \gamma + \frac{\beta}{1 - \beta} \left( p_u(1 - \bar{\tau}) + p_r(1 - \bar{\tau}) \right)$$

$$\tau_u = \gamma$$

By assumption A1, however, the leader is better off increasing the taxes to $\bar{\tau}$ and sharing the rent with the insider. Since the insider gets $V_1$ in each period, he does not have the incentive to call for an overthrow of the leader.

A.2 MPE – Case 2, 3 and 4

Given the conjecture, note that the expected payoff for the insider from taking power is $V_2 / (1 - \beta)$, which is a discounted sum of future rents (where $V_2$ is given by equation (3) in the main text). If he can, the insider wants to overthrow the leader as long as the leader’s offer (in each period) to the insider is less than $V_1$.

Note also that, when $q = q_u$, urban residents are indifferent between paying the current tax $\tau_u$ and participating in an overthrow of the leader.\footnote{See, for example, Hassler et al. (2003).}
(upon the insider’s call to do so) if
\[
\frac{\beta (1 - \tau_u(q_u))}{1 - \beta} + 1 - \tau_u = 1 - \gamma + \frac{\beta}{1 - \beta} \left( p_u (1 - \tau_u(q_u)) + p_r (1 - \bar{\tau}) \right)
\]
\[
\tau_u = \gamma - \frac{\beta}{1 - \beta} \left( p_r (1 - \bar{\tau}) - (1 - p_u) (1 - \tau_u(q_u)) \right)
\]
\[
\tau_u = \gamma + \frac{\beta}{1 - \beta} \left( (1 - p_u) (\bar{\tau} - \tau_u(q_u)) \right)
\]

In equilibrium, \( \tau_u = \tau_u(q) \), which implies that \( \tau_u = \tau_u^2 \) (given by equation (1)).

Similarly, when \( q = q_r \), rural citizens are indifferent between paying the current tax \( \tau_r \) and protesting if
\[
\frac{\beta (1 - \tau_r(q_r))}{1 - \beta} + 1 - \tau_r = 1 - \gamma + \frac{\beta}{1 - \beta} \left( p_u (1 - \bar{\tau}) + p_r (1 - \tau_r(q_r)) \right)
\]
\[
\tau_r = \gamma + \frac{\beta}{1 - \beta} \left( (1 - p_r) (\bar{\tau} - \tau_r(q_r)) \right)
\]

In equilibrium \( \tau_r = \tau_r(q) \), which implies \( \tau_r = \tau_r^2 \) (given by equation (1)).

The leader does not have the incentive to decrease taxes below what is required to keep the urban and rural residents just indifferent between protesting or not (i.e. \( \tau_u^2 \) and \( \tau_r^2 \)). If the leader increases the tax rates beyond \( \tau_u^2 \) and \( \tau_r^2 \), he must appease the insider as citizens will support the insider’s call for leader change. However, by assumption A2, increasing taxes to \( \bar{\tau} \) and sharing the rent with the insider is not optimal for the leader. So the leader proposes \( \tau_u^2 \) and \( \tau_r^2 \) as his optimal strategy. And knowing that he will not get the support from the citizens, the insider does not have the incentive to call for an overthrow of the leader.

Similar steps can be followed to solve for MPEs under Case 3 and Case 4. Under Case 3, urban residents are indifferent between protesting or not if the current tax rate equals \( \tau_u^2 \) (given in equation (1)). And, by assumption A3, it is optimal for the leader to impose \( \tau_u^2 \) whenever the state is \( q_u \) (rather than increasing the tax rate and sharing with the insider). Rural residents are indifferent between protesting or not if the current tax rate equals \( \gamma \). The leader prefers increasing the rural tax rate and sharing the revenue with the insider (by assumption A3). Under Case 4, the opposite of Case 3 happens.
B  Proof of Proposition 2

We take the derivatives of $E\tau u$ with respect to the probabilities and see if they are negative or positive.

$$
E\tau u = p_u\tau_u(q_u) + p_r\tau_u(q_r) = p_u\tau_u(q_u) + (1 - p_u)\tau_u(q_r)
$$

$$
\implies \frac{dE\tau u}{dp_u} = \tau_u(q_u) + p_u\frac{\partial \tau_u(q_u)}{\partial p_u} - \tau_u(q_r) + (1 - p_u)\frac{\partial \tau_u(q_r)}{\partial p_u}
$$

Under Cases 2 and 3, $\tau_u(q_u) = \tau_{u2}$ and $\tau_u(q_r) = \bar{\tau}$. Thus,

$$
\frac{dE\tau u}{dp_u} = \tau_{u2} + p_u\frac{\partial \tau_{u2}}{\partial p_u} - \bar{\tau} + (1 - p_u) \times 0
$$

Since $\partial \tau_{u2}/\partial p_u = -(1 - \beta)(\bar{\tau} - \gamma)/(1 - \beta p_u)^2 < 0$,

$$
\frac{dE\tau u}{dp_u} = p_u\frac{\partial \tau_{u2}}{\partial p_u} - 2\bar{\tau} < 0.
$$

Similar steps can be followed to prove that $E\tau_r$ is decreasing in $p_r$ if either of assumptions A2 and A4 holds.

C  Proof of Proposition 3

First, note that if $p_u = p_r$, then $E\tau_r/E\tau_u = 1$ under Case 1 and 2, $E\tau_r/E\tau_u > 1$ under Case 3, and $E\tau_u/E\tau_r > 1$ under Case 4. So we prove this proposition by proving that given that the condition $(1 - \beta)(\tau - \gamma) > \beta/\tau(1 + (1 - p_u)\beta)$ is satisfied, for a large enough $y_r/y_u$, assumption A3 is satisfied. Assumption A3 is given by the two inequalities

$$
\bar{\tau}y_u + \gamma y_r \leq \bar{\tau}(y_u + y_r) - V_3
$$

$$
\tau_{u2}y_u + \bar{\tau}y_r \geq \bar{\tau}(y_u + y_r) - V_3
$$

Replace $V3$ using equation 4

$$
\bar{\tau}y_u + \gamma y_r \leq \bar{\tau}(y_u + y_r) - \beta(p_u(\tau_{u2}y_u + \bar{\tau}y_r) + p_r\bar{\tau}(y_u + y_r))
$$

$$
\tau_{u2}y_u + \bar{\tau}y_r \geq \bar{\tau}(y_u + y_r) - \beta(p_u(\tau_{u2}y_u + \bar{\tau}y_r) + p_r\bar{\tau}(y_u + y_r))
$$
Let $\sigma = y_r/y_u$. Dividing both sides of the inequalities by $y_u$, we get:

$$
\bar{\tau} + \gamma \sigma \leq \bar{\tau}(1 + \sigma) - \beta(p_u(\tau_{u2} + \bar{\tau}\sigma) + p_r\bar{\tau}(1 + \sigma))
$$

$$
\tau_{u2} + \bar{\tau}\sigma \geq \bar{\tau}(1 + \sigma) - \beta(p_u(\tau_{u2} + \bar{\tau}\sigma) + p_r\bar{\tau}(1 + \sigma))
$$

Thus, we have the following inequalities

$$
a_1 \sigma + b_1 \leq 0 \quad (9)
$$

$$
a_2 \sigma + b_2 \geq 0 \quad (10)
$$

where $a_1, a_2, b_1$ and $b_2$ are constants, and $a_1$ and $a_2$ are given by

$$
a_1 = (\gamma - \bar{\tau}(1 - \beta))
$$

$$
a_2 = \left( \frac{(\gamma(1 - \beta) + \beta p_r)}{1 - p\beta} - \bar{\tau}(1 - \beta) \right)
$$

Since the left-hand sides of inequalities (9) and (10) are linear in $\sigma$, the inequalities are satisfied (with strict inequality) for large enough $\sigma$ if $a_1 < 0$ and $a_2 > 0$, which is the case under the assumption in Proposition 3.

Similar steps can be followed to prove that for small enough $y_r/y_u$, $E\tau_r/E\tau_u < 1$. 

25
### D Regression results for democracies

Table 3: Share of agriculture and NRA

<table>
<thead>
<tr>
<th></th>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>(D)</th>
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<tbody>
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<td>Agri. value added (ratio)</td>
<td>0.53</td>
<td>0.05</td>
<td>-0.11</td>
<td>-0.28</td>
<td>-0.28</td>
</tr>
<tr>
<td></td>
<td>(0.69)</td>
<td>(0.59)</td>
<td>(0.57)</td>
<td>(0.64)</td>
<td>(0.64)</td>
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<tr>
<td>Ratio of agri. to non-agri. pop.</td>
<td>-0.30**</td>
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<td>-0.16</td>
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<tr>
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<td>(0.15)</td>
<td>(0.25)</td>
<td>(0.28)</td>
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<td>Energy income (% of GNI)</td>
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<td>-0.03</td>
<td>-0.03</td>
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<tr>
<td></td>
<td>(0.03)</td>
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<tr>
<td>Mineral income (% of GNI)</td>
<td>-0.04**</td>
<td>-0.05**</td>
<td>-0.05**</td>
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<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
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<tr>
<td>Government share</td>
<td>2.82</td>
<td>1.54</td>
<td>1.54</td>
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<tr>
<td></td>
<td>(1.78)</td>
<td>(1.54)</td>
<td>(1.54)</td>
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</tr>
<tr>
<td>Manuf. value added (ratio)</td>
<td>12.70**</td>
<td>12.69**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(5.16)</td>
<td>(5.21)</td>
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</tr>
<tr>
<td>Manuf. value added (ratio)-square</td>
<td>-29.35***</td>
<td>-29.33**</td>
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<tr>
<td></td>
<td>(10.82)</td>
<td>(10.92)</td>
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<td>Number of armed conflicts</td>
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<td></td>
<td>(0.01)</td>
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<td>Observations</td>
<td>998</td>
<td>848</td>
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<td>Countries</td>
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<tr>
<td>R-Square</td>
<td>0.002</td>
<td>0.008</td>
<td>0.026</td>
<td>0.084</td>
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Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$