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Urban bias, migration control and rural land policy: the case of Hukou in China

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Abstract

Urban-biased politics often drives distortionary policies in many countries. We develop a political economy model in which the government faces a trade-off between retaining urban support and expanding its industrial rent base. The model shows that while an increase in urbanization strengthens the government's incentives to adopt rural land reform and to encourage rural–urban migration, an increase in urban productivity has the opposite effect. These effects are mediated by the income share of labor in the rural sector, the political power of urban residents and the labor elasticity of urban output. Using China's context, we illustrate that the model's predictions are consistent with the observed policies on land ownership and rural–urban migration.

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1. Introduction

Government bias in favor of urban residents is often cited as a major political incentive driving distortionary economic policies in many countries (Majumdar et al., 2004; Bezemer and Headey, 2008). We develop a political economy model featuring an urban-biased government that faces the trade-off between retaining the support of urban residents and expanding its industrial rent base. The model shows how this trade-off determines the choice of policies toward rural land ownership and rural–urban migration. Using the context of China, where the distortionary effects of these policies have been shown to entail enormous welfare losses (Benjamin and Brandt, 2002; Adamopoulos et al., 2022), we show that the model provides predictions that are consistent with observed policies over the past years.

The model features some key aspects of economics and politics in urban-biased regimes. Since our focus is on the government's incentives in the context of rural and urban sectors, we consider a simple dual-economy model in which rural–urban migration is driven by the income gap between the two sectors (Lewis, 1954; Jorgenson, 1961; Harris and Todaro, 1970; Mourmouras and Rangazas, 2013).

In many developing countries with large rural sectors, the disproportionate political power of urban residents remains a salient feature of politics (Lipton, 1977; Lee and Luca, 2018). The geographic concentration and proximity of urban residents to power centers often affords them significant political influence (Bates, 1984; Huang, 2012). Located in

remote rural areas far from power centers, peasants lack such influence. As we demonstrate in our detailed discussion of the Chinese context (see Online Appendix A), urban bias is also a fundamental aspect of politics in China (Perkins and Yusuf, 1984; Yang and Cai, 2000; Wallace, 2014; Mutreja et al., 2021).

Another common feature of urban-biased regimes is the imposition of restrictions on rural–urban migration (Selod and Shilpi, 2021). Naturally, disparities in living standards between urban and rural residents could lead to large-scale rural–urban migration and explosive growth in the urban population, which may threaten the fiscal sustainability of urban privileges and endanger the stability of the regime (Ades and Glaeser, 1995). Many governments responded to this threat with policies that reduce rural–urban migration (United Nations, 2016). In the case of China, the government adopted the household registration system named *hukou* (Cheng and Chung, 2018). A pillar of this policy, and the focus of our study, is the land tenure system that ties access to rural land with one's place of residency, restricts peasants' rights to engage in land transactions and, hence, acts 'as a back-pulling force' on rural–urban migration (De La Rupelle et al., 2008).

For an urban-biased government that desires to modernize the economy, such as that of China (Xu, 2011), rural–urban migration poses conflicting political incentives with regard to industrializing the economy and financing urban privileges. While decreasing the growth of the urban population (by lowering rural–urban migration) decreases the cost of financing urban consumption, it also undermines the industrialization of the economy by tying labor to the rural sector. We formalize this trade-off by assuming that (1) the urban output constitutes the leader's rent base and (2) urban residents are guaranteed a certain level of consumption.

We focus on how the concern about controlling rural–urban migration affects the government's choice of land policy. In the model, the government chooses between two types of land ownership rights, which we refer to as *unrestricted ownership rights* (*UOR*) and *restricted ownership rights* (*ROR*). Under *UOR*, land is owned by private owners with unrestricted transfer rights. On the other hand, *ROR* closely resembles the current rural land tenure in China, where farmers have only use rights—they can farm their plot but they do not have the right to transfer ownership through land markets. Land property rights could affect rural–urban migration because as migrants leave farming for urban jobs, their options to transfer their land to alternative users depend on the property right regime. By restricting such transfer rights, *ROR* increases the opportunity cost of rural–urban migration, and hence, could serve as a policy tool to control migration (Yang, 1997).

The model sheds some key insights as to how the modernization of the economy, as indicated by the level of urbanization and productivity of the urban sector, could affect land policy. While a higher level of urbanization encourages the adoption of *UOR*, an increase in urban productivity has the opposite effect.

Urbanization matters because the effect of migration on the urban sector depends on the number of migrants relative to the existing urban population. Since the stock of complementary inputs available in the urban sector, including public infrastructure and private capital stock, is likely to increase with increases in the existing urban labor force, we assume that capital stock in the urban sector increases with the level of urbanization (i.e., the size of the premigration urban labor force). Intuitively, this is equivalent to assuming that while an increase in migration decreases the marginal product of labor in the urban sector, this effect diminishes with a decrease in the share of migrants in the total urban labor force. Thus, for a given level of migration, an increase in the level of urbanization increases the marginal contribution of migrant labor to the leader's rent base, strengthening his incentive to adopt *UOR*.

While an increase in urban productivity increases the contribution of migration to the leader's rent base (by increasing the productivity of labor in the urban sector), it also raises the cost of financing urban consumption. First, the minimum living standard demanded by urban residents increases with the level of urban productivity, raising the cost of financing consumption per urban resident. Second, this increase in urban consumption widens rural–urban inequality and increases migration. Due to the diminishing marginal product of labor in the urban sector, as migration increases further, the leader's marginal gain from migration eventually becomes less than the cost of financing urban consumption. Thus, beyond some threshold level of urban productivity, rural–urban inequality and the resultant migration are high enough that the leader prefers restricting migration and, hence, he adopts *ROR*.

The net effect of urbanization and urban productivity depends, in turn, on the income share of labor (vis-à-vis land) in the rural sector, the level of political power held by urban residents and the elasticity of labor demand in the urban sector. While increases in the income share of rural labor and the elasticity of demand for urban labor make the adoption of *UOR* more likely, an increase in urban political power has the opposite effect.

Using the context of China, we show how the model provides predictions that are consistent with observed policies. In past years, China has implemented some incremental measures to ease migration restrictions and strengthen rural land property rights (CPC, 2013; PRC, 2015). In Section 6, we use the model to demonstrate how the increase in China's urbanization may have incentivized the government to adopt such policy changes. However, the model also shows the possibility that, due to the counteracting effects of urbanization and urban productivity on political incentives, some restrictions on rural land ownership could persist despite the further modernization of the economy.

This paper contributes to the literature on property rights and migration control (Brandt et al., 2002; Jacoby et al., 2002; Besley et al., 2011; Kung and Bai, 2011).[1] In a closely related work, Fergusson (2013) examines how the colonial rural elite undermined the land property rights of local peasants to discourage rural–urban migration. Diaz (2000) also attributes the lack of secure property rights for peasants to the disproportionate influence of the elite who own large farms. Fergusson et al. (2015) studies the elite's use of communal land allocation to foster the dependence of peasants on the Mexican state. Our model extends the notion of land policy as the elite's purposeful choice to a setting featuring urban bias.

We also contribute to the growing literature on policy reforms in China (Roland, 2002; Tao and Xu, 2007; Henderson, 2009; World Bank, 2014). Zhang (2011) studies the effect of competition among Chinese local leaders to attract investments on the reallocation of agricultural land for industrial development. Xie and Xie (2017) show how belief differences among competing party factions within the ruling elite could result in a gradual rolling out of economic reforms. Lau et al. (2000) study reforms that target not only increasing the overall efficiency of the economy but also protecting the economic rents enjoyed by incumbent beneficiaries. Wei (1997) shows how the gradual adoption of reforms splits political resistance that could have blocked the reform if it had been implemented by a single large push. Our model also shares this premise of protecting economic rents by incumbent beneficiaries as a precondition for policy reforms.

1 See also Rosenzweig (1978), North (1990), Moene (1992), Horowitz (1993), Grossman (1994), Binswanger et al. (1995), Besley and Burgess (2000), Bardhan et al. (2014), Chernina et al. (2014), Keswell and Carter (2014), Besley et al. (2016) and Chari et al. (2017).

Section 2 presents the model environment. The analysis of the model follows in Sections 3–5. In Section 6, we discuss China's land and migration policies through the lens of the model. We conclude in Section 7.

2. The model environment

2.1. Production

Consider a simple static model for the dual economy with rural and urban sectors. The initial (i.e., premigration) size of the rural and urban labor forces equal $N_r \in (0, \infty)$ and $N_u \in (0, \infty)$, respectively. The postmigration number of workers in the respective sectors are $L_r = N_r - m$ and $L_u = N_u + m$, where m represents the number of rural–urban migrants.

The economy is endowed with $A \in (0, \infty)$ units of agricultural land. Output in the agricultural sector, Y_r, is a Cobb–Douglass function of land and labor:

$$Y_r = A^{\lambda} L_r^{1-\lambda}, \quad \lambda \in (0, 1). \tag{1}$$

The urban sector utilizes capital (K) and labor:

$$Y_u = K^{\alpha} (z L_u)^{1-\alpha}, \quad \alpha \in (0, 1). \tag{2}$$

where z, henceforth referred to as 'urban TFP', represents the level of productivity in the urban sector.

The stock of complementary inputs in the urban sector (e.g., public infrastructure and private capital stock) is likely to increase with increases in the existing size of the urban labor force and the level of urban productivity (Chen, 2020). Moreover, urban capital stock may not change immediately in response to changes in the supply of rural–urban migrants due to, for example, the presence of adjustment costs. We formalize this by assuming that the level of K is proportional to the premigration level of the urban labor force and urban TFP, zN_u,

$$K = \psi^{\frac{1}{z}} z N_u, \tag{3}$$

where $\psi > 0$ is some constant that, without a loss of generality, is normalized to 1.[2]

Note that the productivity term z affects urban output (and rural–urban inequality) both directly through its effect on effective labor (Equation (2)) and indirectly through its effect on capital stock (Equation (3)). As we show in Section 5, urban TFP affects land policy mainly through its effect on rural–urban inequality. Since exogenous increases in urban TFP and capital stock both increase rural–urban inequality, they exert a similar influence on the leader's incentives toward land policy.

The marginal product of migrant labor in the urban sector is given by

$$\frac{dY_u}{dm} = (1 - \alpha) z^{1-\alpha} K^{\alpha} L_u^{-\alpha}. \tag{4}$$

2 The parameter ψ represents factors that determine the capital–output ratio, such as infrastructure investment and the share of capital intensive sectors in the urban economy.

Since this expression equals $(1-\alpha)zN_u^{\alpha}(N_u+m)^{-\alpha}$ (from Equation (3)), the marginal product of a migrant worker is decreasing in m but increasing in N_u. That is, the effect of migration depends on the number of migrants *relative to* the size of the existing urban labor force (as opposed to the absolute number of migrants). For a given m, an increase in N_u implies that migrants constitute a smaller share of the total urban labor force and, hence, their effect on the urban sector is less pronounced.

2.2. Politics

To capture the government's trade-off between the benefits of industrializing the economy (by allowing more migration to urban areas) and the cost of financing economic privileges for a larger urban population, we first tie the leader's political rent to the size of the modern sector. We assume that the leader's consumption, T, is given by

$$T = \tau Y_u, \tag{5}$$

where τ (for 'tax rate') is the share of the urban output consumed by the leader. Thus, an increase in urban output increases the leader's rent base. The remaining $(1-\tau)Y_u$ of the urban output is consumed by the urban residents. Urban consumption per worker is given by

$$C_u = \frac{(1-\tau)Y_u}{L_u}. \tag{6}$$

We assume that the leader must guarantee a minimum level of per capita consumption for urban residents (by controlling migration and/or setting tax rates):

$$C_u \geq C_{min} = \gamma \overline{C}, \quad \gamma \in (0,1). \tag{7}$$

The parameter γ captures the level of political power wielded by the urban population (Acemoglu, 2005; Shifa, 2013). $\overline{C}$ represents per capita urban consumption when both m and τ are set equal to 0, so that the inequality in Equation (7) imposes a constraint on the combined effect of taxes and migration on the consumption of urban residents. Plugging the value of K from Equation (3) into the urban consumption function (6), it can be shown that $\overline{C}$ equals z.

With regard to land policy, we focus on the implications of ownership restrictions for rural–urban migration. Under *UOR*, we assume that owners have unrestricted rights to sell and rent their land and that there are fully functional labor and land markets in the rural sector. Rural wages in such a market equal $\eta_w y_r$, where $y_r = (A/L_r)^{\lambda}$ is rural output per worker and $\eta_w \in (0,1)$ represents an exogenously given income share of workers in the rural labor market. The income share of land, η_r, is equal to $1-\eta_w$.

We assume that under *ROR*, land is equally distributed among peasants, and peasants have the right only to use their plot. Peasants who migrate to the urban sector lose their rural land, which is redistributed to those who remain in the rural sector.[3] The key aspect of land exchange restrictions under *ROR* is that by tying land-use rights to rural residency, the restrictions increase the opportunity cost of rural–urban migration due to the loss of

3 This assumption of the outright redistribution of migrants' land is shorthand to capture the missing land market due to ownership restrictions and is not particularly essential for our conclusions. The important feature is that *ROR* increases the level of land market imperfection, so that the opportunity cost of migration increases.

the use rights after migration. On the other hand, with no ownership restrictions on land exchange, migrants under *UOR* can rent/sell their land upon migration, and hence, migration does not entail such an opportunity cost from losing one's land.

Thus, migrants under *UOR* lose only their labor income (w_r), but they lose all of their agricultural output (y_r) under *ROR*. The opportunity cost of migration, denoted by C_r, is therefore given by

$$C_r = \begin{cases} y_r & \text{if } p = 0 \\ w_r = \eta_w y_r & \text{if } p = 1, \end{cases} \tag{8}$$

where p (for "property right") equals 1 for *UOR* and 0 otherwise.[4]

We assume that migration continues until the consumption gain from working in the urban sector equals the opportunity cost of leaving the rural sector:

$$C_u = C_r. \tag{9}$$

Given the political constraints imposed by the urban population (Equation (7)) and the migration parity condition (Equation (9)), the leader chooses the tax rate τ and land property rights regime $p \in \{0, 1\}$ that maximize his rent T:

$$\begin{aligned} &\max_{\tau, p} T = \tau Y_u \\ &\text{s.t.} \quad (2), (6) - (9) \end{aligned}. \tag{10}$$

By focusing on the leader's desire to expand his urban rent base, we abstract from the government's other interests in the rural sector. We particularly assume away the possible role of rural taxes in generating economic rent for the government. This assumption is motivated partly by the limited role of the rural sector in generating government revenue. In the case of China, with the growth of the urban sector, most rural taxes have been abolished and they no longer constitute a significant share of government revenue. Moreover, rural development policy constitutes objectives that are important but too complex to study within the scope of our paper. Rural development serves as a policy tool to provide unemployment insurance for rural–urban migrants, minimize rural–urban income inequality and mitigate the social tensions that could result from inequality. For countries that are highly dependent on food imports, minimizing strategic risks due to reliance on imported food partly guides policies for agricultural development. In interpreting our model, one needs to keep in mind that we abstract from these and other considerations of rural development that could potentially matter for the choice of land policy.

Since our focus is on land reform in the context of rural–urban migration, we restrict our attention to the case where migration occurs only from rural to urban areas so that $0 \leq m \leq N_r$. The reverse case, in which initial rural incomes are higher than urban incomes, also is not empirically relevant, as urban areas tend to be richer than rural areas. Our parameter space, denoted by $\overline{\boldsymbol{\Omega}} \subset \mathbb{R}^8$, is given by

4 We assume that agricultural productivity (as captured by land size A) is the same under *ROR* and *UOR*. We also abstract from changes in relative prices between agricultural and nonagricultural goods. However, we conjecture that allowing for a higher level of productivity under *UOR* and/or relative price changes does not change our propositions under realistic scenarios (i.e., as long as *ROR* results in a smaller level of rural–urban migration than *UOR* does). See the discussion in Section 4 on the effect of η_w.

$$\begin{aligned}\overline{\boldsymbol{\Omega}} = \{&(\gamma, \alpha, \eta_w, \lambda, z, A, N_r, N_u) : \\ &\gamma, \alpha, \eta_w, \lambda \in (0,1); \\ &z, A, N_r, N_u \in (0, \infty+); \\ &\left(\tfrac{A}{N_r}\right)^{\lambda} < \gamma z\}.\end{aligned} \tag{11}$$

The last inequality rules out the possibility that rural residents receive a higher consumption than urban residents.

3. The role of political constraint

Combining Equations (5) and (6), and given the one-to-one relationship between m and τ (from Equations (6) and (9)), the leader's maximization problem in Equation (10) can be rewritten as

$$\begin{aligned}\max_{m,p\in\{0,1\}} \; & T = Y_u - C_u L_u \\ \text{s.t.} \quad & (2), (7) - (9)\end{aligned}. \tag{12}$$

This expression illustrates the leader's trade-off with respect to migration. The first term of T represents the rent base (Y_u). The second term equals the total consumption by urban workers ($C_u L_u$). The difference between these terms, that is, the portion of urban output that is not consumed by urban workers, equals the leader's rent. On the one hand, an increase in m expands the rent base. On the other hand, an increase in m increases both L_u and C_u (see Equation (9)), raising the total cost of financing urban consumption.

One can approach the leader's maximization problem (12) in two stages: first, choose the optimal level of migration under each of the two property right regimes and then, select the regime with the highest T. Let m_0^* and m_1^* denote the levels of migration that maximize the leader's revenue under *ROR* and *UOR*, respectively,

$$m_p^* = \underset{m}{\text{argmax}}\; T(m; p). \tag{13}$$

The change in the leader's revenue due to switching from *ROR* to *UOR* equals

$$\Delta = T(1, m_1^*) - T(0, m_0^*). \tag{14}$$

The leader chooses *UOR* over *ROR* if this gain is positive:

$$p^* = \underset{p\in\{0,1\}}{\text{argmax}}\; T(p; m_p^*) = \begin{cases} 1 & \text{if } \Delta \geq 0 \\ 0 & \text{otherwise.} \end{cases} \tag{15}$$

Figure 1 illustrates this migration trade-off faced by the leader and how the trade-off is affected by the political constraint. The downward sloping *MR* represents the marginal contribution of an additional migrant to the rent base, while upward sloping *MC* captures the marginal effect of an additional worker on total urban consumption. Taking the derivative of T with respect to m (for a given p):

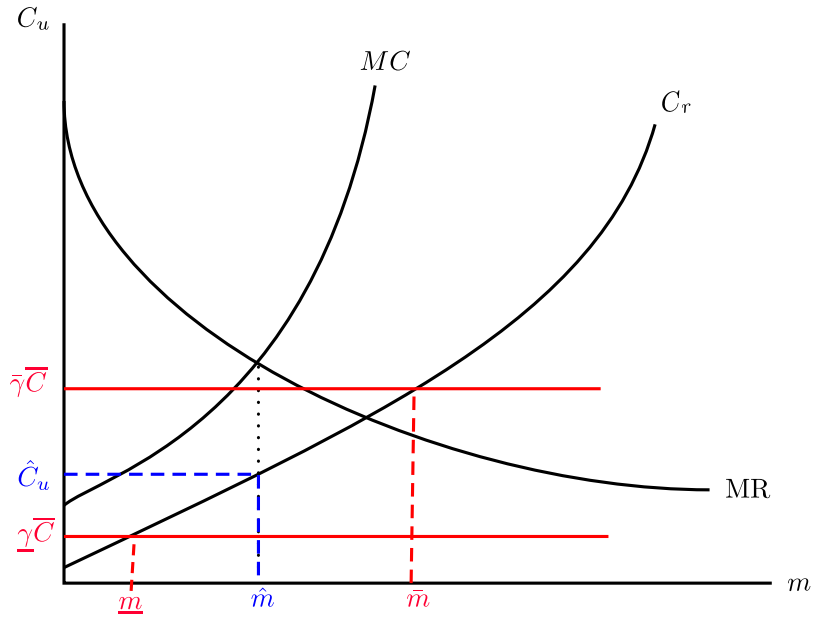

Figure 1. Migration trade-off and the political constraint.

$$\frac{T(p,m)}{m} = \frac{Y_u}{m} - \left(C_u(p,m) + L_u \frac{C_u(p,m)}{m} \right). \tag{16}$$

The *MR* and *MC* curves are given by the first and second terms in Equation (16), respectively,

$$MR(m) = \frac{Y_u}{m}, \tag{17}$$

$$MC(p,m) = C_u(p,m) + L_u \frac{C_u(p,m)}{m}. \tag{18}$$

Holding the value of urban consumption per worker constant, an increase in the number of urban workers increases the total consumption in the urban sector, $(N_u + m)C_u$. In addition, an increase in m, by increasing the land–labor ratio in the rural sector, also increases C_r. Since C_u and C_r have to reach equilibrium, the increase in C_r implies an increase in urban consumption. This latter effect is captured by the term $L_u(dC_r/dm)$. The curve C_r describes the positive relationship between m and the opportunity cost of migration. Since $C_r = C_u$, this curve also represents the supply of migrants, as a function of C_u. If the political constraint is not binding, the leader's optimal level of migration is given by the intersection of the *MC* and *MR* curves. The corresponding urban consumption and migration levels equal $\hat{C}_u$ and $\hat{m}$, respectively.

Whether the optimal migration level $\hat{m}$ is feasible depends on the political constraint. In Figure 1, $\hat{m}$ is attainable if $\gamma = \underline{\gamma}$ (bottom horizontal line). In contrast, if we consider the top horizontal line (i.e., $\gamma = \bar{\gamma} > \underline{\gamma}$), setting urban consumption at the level of $\hat{C}_u$ is politically unfeasible due to the greater power of urban residents. At a minimum, the leader must provide $\gamma\overline{C}$ to urban residents, that is, the lowest amount of urban consumption that

is politically feasible. This will result in $\overline{m}$ level of migration. From Equations (8) and (9), this migration level under *ROR* and *UOR* is, respectively, given by

$$\overline{m}_0 = N_r - A\left(\frac{1}{\gamma z}\right)^{\frac{1}{\lambda}}, \tag{19}$$

$$\overline{m}_1 = N_r - A\left(\frac{\eta_w}{\gamma z}\right)^{\frac{1}{\lambda}}. \tag{20}$$

The political constraint binds if *MC* is greater than *MR* at the point of intersection between the horizontal constraint curve and the C_r curve:

$$MC(p, \overline{m}_p) \geq MR(\overline{m}_p). \tag{21}$$

Since $\overline{m}_1 > \overline{m}_0$, if condition (21) holds under *ROR*, it also holds under *UOR*. Intuitively, the political constraint binds when the leader is forced to set urban consumption at a level that is higher than what he ideally wants and is, as a result, faced with excessive migration. If this problem of excessive migration exists under *ROR*, it also should exist under *UOR*, as the latter ownership regime results in a higher level of migration.

Lemma 1 describes the parameter space for the two scenarios: (1) the political constraint binds under both *ROR* and *UOR* or (2) it binds under neither *ROR* nor *UOR*.[5]

Lemma 1. *The political constraint binds both under ROR and under UOR if*

$$\begin{aligned}&(1-\alpha)\left(\frac{N_u}{N_u+N_r-A\left(\frac{1}{\gamma z}\right)^{\frac{1}{\lambda}}}\right)^{\alpha} \leq \\ &\gamma + \frac{\lambda}{A} z^{\frac{1}{\lambda}} \gamma^{\frac{\lambda+1}{\lambda}} \left(N_u + N_r - A\left(\frac{1}{\gamma z}\right)^{\frac{1}{\lambda}}\right).\end{aligned} \tag{22}$$

The political constraint binds under neither ROR nor UOR if

$$\begin{aligned}&(1-\alpha)\left(\frac{N_u}{N_u+N_r-A\left(\frac{\eta_w}{\gamma z}\right)^{\frac{1}{\lambda}}}\right)^{\alpha} \geq \\ &\gamma + \frac{\lambda}{A} \left(\frac{z}{\eta_w}\right)^{\frac{1}{\lambda}} \gamma^{\frac{\lambda+1}{\lambda}} \left(N_u + N_r - A\left(\frac{\eta_w}{\gamma z}\right)^{\frac{1}{\lambda}}\right).\end{aligned} \tag{23}$$

Proof: See Online Appendix B.1. □

Figure 2 shows how the political constraint affects the leader's choice of land policy. The top graphs plot the leader's rent as a function of m: T_0 under *ROR* and T_1 under *UOR*. The upward sloping curves in the bottom panels present the supply of migrants. The migration supply curve for *UOR* lies to the right of the curve for *ROR* due to the lower opportunity cost of migration under the former.

5 A third scenario is that the constraint binds under *UOR* but does not bind under *ROR*. Our main results remain the same for this scenario.

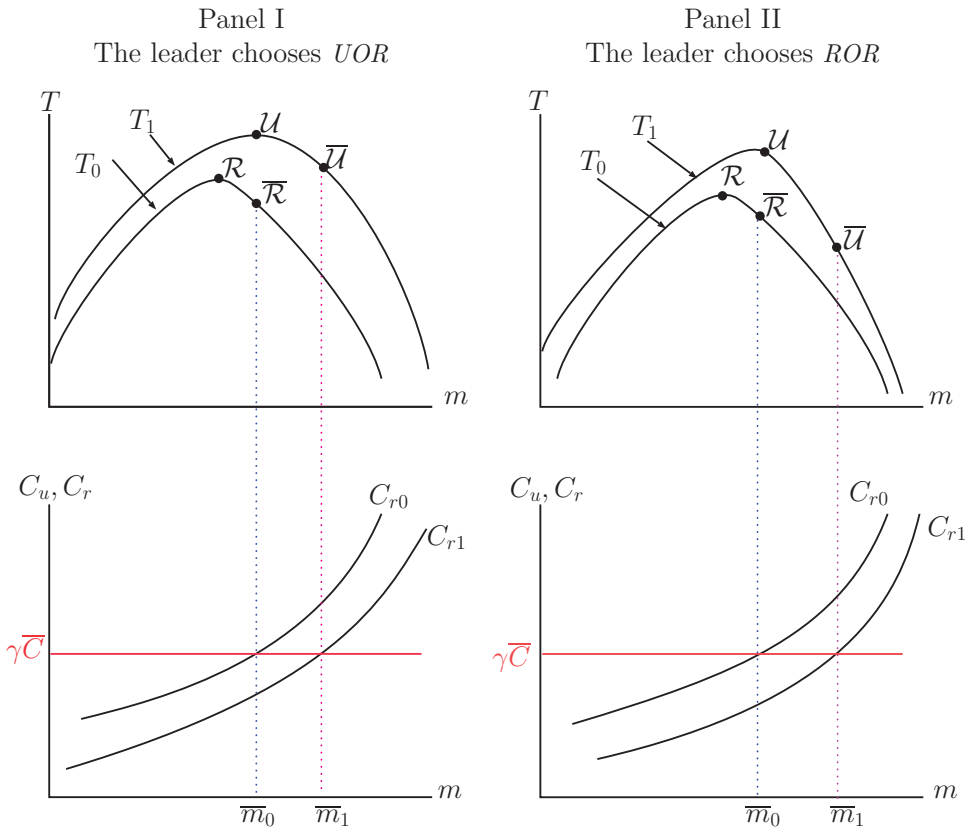

Figure 2. Land policy under a binding political constraint. The top two graphs in both panels show the leader's revenue as a function of migration level under *ROR* (T_0) and *UOR* (T_1). The bottom graphs show the number of migrants as a function of urban consumption. The horizontal line $\gamma\overline{C}$ is the political constraint. Panel I (Panel II) represents a scenario in which the leader's preferred land policy is *UOR* (*ROR*).

An important difference between T_0 and T_1 is that for each level of m, the latter is larger than the former. To verify this, plug the values of C_r and C_u from Equations (8) and (9) into the expression for the leader's rent in Equation (12). Then, the vertical gap between the two curves is given by

$$T(p=1,m) - T(p=0,m) = (C_r(0,m) - C_r(1,m))L_u. \tag{24}$$

This expression is positive since the opportunity cost of migration under *ROR*, $C_r(0,m)$, is greater than the cost under *UOR*, $C_r(1,m)$ (see Equation (8)). The maximum values of T_0 and T_1 are indicated by points $\mathcal{R}$ (for 'restricted') and $\mathcal{U}$ (for 'unrestricted'), respectively. If unbounded by the political constraint (i.e., if condition (23) holds), the leader thus chooses point $\mathcal{U}$ and hence adopts *UOR*. The following proposition summarizes this result.

Proposition 1. *Let* $p^* : \overline{\boldsymbol{\Omega}} \to \{0,1\}$ *where* p^* *is given by Equation (15). For all* $\boldsymbol{\omega} \in \overline{\boldsymbol{\Omega}}$ *such that Equation (23) is satisfied, UOR is the equilibrium policy.*

Proof: See Online Appendix B.2. □

Whereas the leader chooses *UOR* whenever condition (23) holds, Figure 2 also illustrates that this condition is not necessary for the adoption of *UOR*. Panel I shows that the leader could still choose *UOR* as his optimal policy even though the political constraint remains binding.

Since the maximum points $\mathcal{R}$ and $\mathcal{U}$ correspond to consumption levels below $\gamma\overline{C}$ (bottom panels), these points are not politically feasible for the leader. Hence, bounded by the political constraint, the leader instead sets urban consumption at $\gamma\overline{C}$, corresponding to the points $\overline{\mathcal{R}}$ and $\overline{\mathcal{U}}$. This results in migration levels of $\overline{m}_0$ and $\overline{m}_1$ (given by Equations (19) and (20)). In Panel I, the leader's rent at $\overline{\mathcal{U}}$ is greater than the rent at $\overline{\mathcal{R}}$, and hence, he chooses *UOR*. The opposite is true in Panel II.

Plugging the values of $\overline{m}_0$ and $\overline{m}_1$ into the expression for the leader's gain from switching to *UOR* (Equation (14)), Lemma 2 summarizes the condition for the adoption of *UOR* when the political constraint binds.

Lemma 2. *Let* $p^*:\overline{\mathbf{\Omega}}\to\{0,1\}$ *where* p^* *is given by Equation (15). For all* $\boldsymbol{\omega}\in\overline{\mathbf{\Omega}}$ *such that Equation (22) is satisfied,* $p^*(\boldsymbol{\omega})=1$ *if and only if*

$$zN_{\mathrm{u}}^{\alpha}\left\{\left(N_{\mathrm{u}}+N_{\mathrm{r}}-A\left(\frac{\eta_{\mathrm{w}}}{\gamma z}\right)^{\frac{1}{\lambda}}\right)^{1-\alpha}-\left(N_{\mathrm{u}}+N_{\mathrm{r}}-A\left(\frac{1}{\gamma z}\right)^{\frac{1}{\lambda}}\right)^{1-\alpha}\right\}\geq \gamma zA\left(\frac{1}{\gamma z}\right)^{\frac{1}{\lambda}}\left(1-\eta_{\mathrm{w}}^{\frac{1}{\lambda}}\right). \tag{25}$$

Proof: See Online Appendix B.3. □

The left-hand side of Equation (25) represents the change in leader's rent base from adopting *UOR*, while the right-hand side captures the change in the cost of urban consumption. Since $\overline{m}_1>\overline{m}_0$, urban output is larger under *UOR*. On the other hand, total urban consumption, which equals γz times the number of urban workers, also is larger under *UOR*. The adoption of *UOR* is optimal when the increase in urban output exceeds the increase in the cost of urban consumption.

To summarize, the conditions under Lemmas 1 and 2 show two possibilities that may result in the adoption of *UOR*. Either the political constraint does not bind (i.e., Equation (23) is satisfied) or the political constraint binds, but the leader still chooses *UOR* (both Equations (22) and (25) are satisfied). Condition (23) implies that the government wants more migrants in the urban sector. This is clearly inconsistent with the migration restrictions observed in many urban-biased regimes (including China). Thus, in analyzing the effect of various parameters, we mostly restrict our focus to the case in which the political constraint binds, and the parameter space is thus given by

$$\mathbf{\Omega}=\{\boldsymbol{\omega}\in\overline{\mathbf{\Omega}}\text{ such that (22) holds}\}, \tag{26}$$

where $\overline{\mathbf{\Omega}}$ is given by Equation (11).[6]

6 Our main conclusions remain the same even if we remove the restriction in Equation (26).

4. Rural income share, political power and urban labor elasticity

Figure 3 provides an intuitive illustration of how the choice of land policy is affected by the income share of labor in the rural sector (η_w), the political power of urban residents (γ) and the labor elasticity in the urban sector (α).

For the benchmark case in all panels, that is, prior to the changes in the parameters, the leader's optimal rent under *ROR* and *UOR* is denoted by, respectively, $\overline{\mathcal{R}}$ and $\overline{\mathcal{U}}$ (i.e., the maximized value of T under a binding political constraint). Since the leader's rent under *ROR* (point $\overline{\mathcal{R}}$) is smaller than that under *UOR* (point $\overline{\mathcal{U}}$), this benchmark case represents a scenario in which the leader's preferred land policy is *UOR*.

By decreasing the opportunity cost of rural–urban migration, a decrease in η_w increases the equilibrium level of migration under *UOR*. In Panel I, this effect is represented by a rightward shift in C_r (from C_{r1} to C'_{r1}). The increase in migration decreases the leader's rent under *UOR* (from point $\overline{\mathcal{U}}$ to $\overline{\mathcal{U}}'$) and changes the leader's optimal policy from *UOR* to *ROR*.[7]

In Panel II of Figure 3, an increase in γ is indicated by the upward shift in the political constraint curve (from $\gamma\overline{C}$ to $\gamma'\overline{C}$, where $\gamma' > \gamma$). This increase in per capita urban consumption (from $\gamma\overline{C}$ to $\gamma'\overline{C}$) attracts more migrants to the urban sector, further raising the total cost of urban consumption. Since C_r is convex in m and the equilibrium level of migration is larger under *UOR* than under *ROR*, the cost of financing urban consumption for an extra migrant is higher under the former. In Figure 3, this is indicated by the rent curve at point $\overline{\mathcal{U}}$ being steeper than the curve at point $\overline{\mathcal{R}}$. As we show in Proposition 2, this difference in the slope of the rent curves implies that following the increase in γ, the leader loses more revenue under *UOR* than under *ROR*. Thus, as the political constraint tightens further, the leader's gain from switching to *UOR* (from *ROR*) decreases.

An increase in α implies a decrease in the marginal contribution of a migrant worker to urban output. In Panel III of Figure 3, this effect is manifested as a downward shift in the rent curves. The decrease in the marginal contribution of the migrant worker changes the leader's optimal policy from *UOR* to *ROR* (i.e., from point $\overline{\mathcal{U}}$ to point $\overline{\mathcal{R}}'$).

Proposition 2 provides a formal summary of the effects of these three parameters on the choice of land policy.

Proposition 2. *Let* $p^* : \boldsymbol{\theta} \to p$, *where* $p^*(\theta; \boldsymbol{\omega}_\theta)$ *is given by Equation (15),* $\theta \in \{\eta_r, \gamma, \alpha\}$, $p \in \{0, 1\}$ *and* $\boldsymbol{\omega}_\theta$ *is a vector containing all parameters except* θ.

- *If* $p^*(\theta; \boldsymbol{\omega}_\theta) = 1$ *for some* $\theta = \overline{\theta}$, *then for all* $\theta < \overline{\theta}$, $p^*(\theta; \boldsymbol{\omega}_\theta) = 1$.
- *If* $p^*(\theta; \boldsymbol{\omega}_\theta) = 0$ *for some* $\theta = \underline{\theta}$, *then for all* $\theta > \underline{\theta}$, $p^*(\theta; \boldsymbol{\omega}_\theta) = 0$.

Proof: See Online Appendix B.4. □

5. Urbanization and urban productivity

Many developing countries have exhibited rapid growth in their urban sector in terms of both improved productivity and a rising share of employment (see Figure 4 for China). What are the possible consequences of such an economic transformation for the choice of

7 The change in η_w can also represent other changes that can affect agricultural wages, such as agricultural productivity and the bargaining power of workers in the rural labor market.

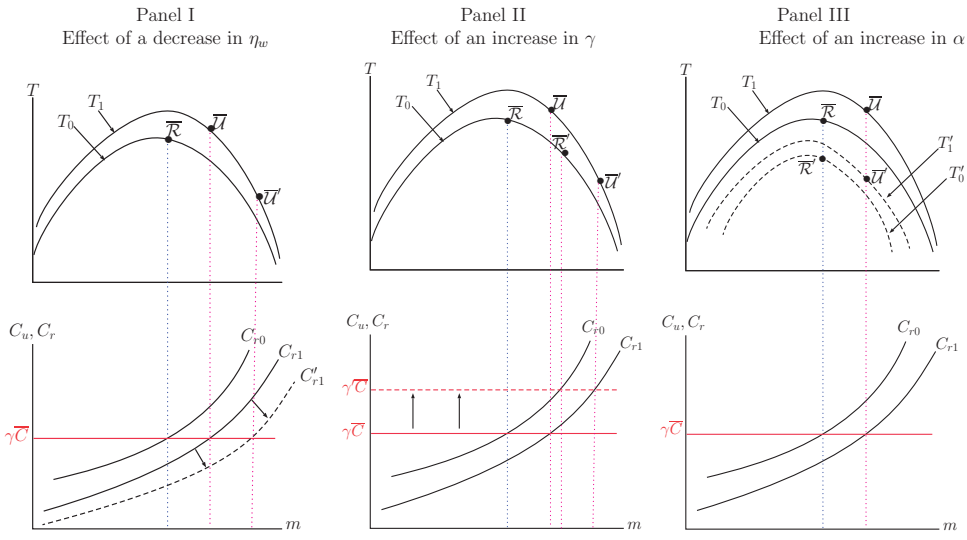

Figure 3. Effects of changes in the labor share of income in the rural sector (Panel I), urban political power (Panel II) and labor elasticity of urban output (Panel III). The top graphs in all panels show the leader's revenue as a function of migration level under *ROR* (T_0) and *UOR* (T_1). The bottom graphs show the number of migrants as a function of urban consumption. The horizontal line $\gamma\overline{C}$ is the political constraint.

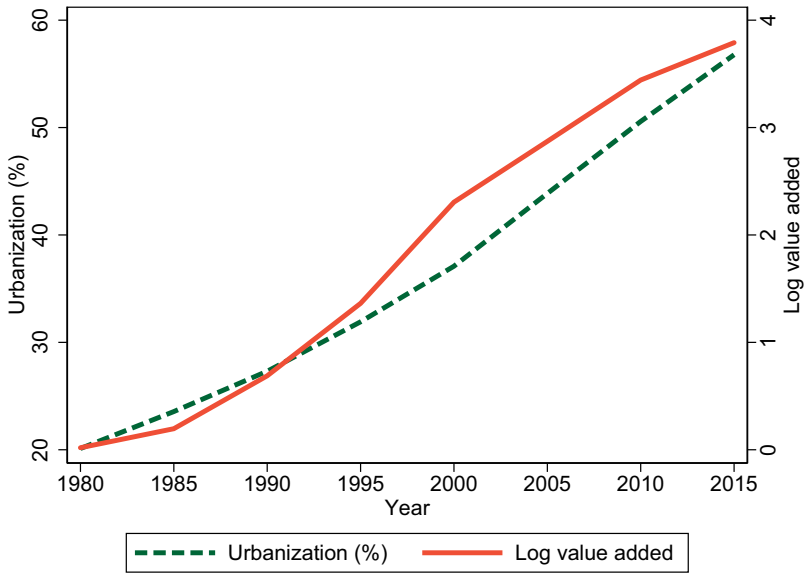

Figure 4. Urbanization and log manufacturing value added per worker in China.
Source: National Bureau of Statistics of China (2018).

land reform? We turn to this question by analyzing how increases in urban productivity and the share of the urban labor force, $\mu \equiv N_u/(N_u + N_r)$, influence the government's incentives regarding land policy.

5.1. Urbanization and land policy

Figure 5 illustrates how urbanization affects the choice of land policy.[8] The bell-shaped curves in the top panel, C_{u0} and C_{u1}, indicate per capita urban consumption under *ROR* and *UOR*, respectively. The dotted horizontal line in this panel represents $\gamma\overline{C}$, the minimum consumption level dictated by the political constraint.

The regions where the consumption curves overlap with the horizontal line (i.e., $C_{u0} = \gamma\overline{C}$ or $C_{u1} = \gamma\overline{C}$) show the level of urbanization in which the political constraint binds. The figure shows that the political constraint binds when the level of urbanization is either sufficiently low or sufficiently high. In the intermediate levels of urbanization, the constraint does not bind.

Since an increase in urbanization increases the marginal contribution of migrant labor to the leader's rent base (see Equation (4)), it could incentivize the leader to attract more migrant workers (by increasing urban consumption). In Figure 5, the consumption increase in response to an increase in urbanization reflects this effect. However, higher urbanization also increases the cost of financing urban consumption, since when the leader increases urban consumption to attract more migrants (i.e., the term dC_u/dm in Equation (16)), this increase applies to the consumption of *all* workers in the urban sector (i.e., the term $dC_u/dm * L_u$ in Equation (16)). This effect eventually dominates and the leader decreases urban consumption until he is bound by the political constraint.

Urban consumption under *ROR* tends to be higher than that under *UOR*. This is due to the higher opportunity cost of migration under the former, which increases the level of urban consumption that is needed to attract peasants to the urban sector. The differences in C_{u0} and C_{u1} also echo Lemma 1, where the range of urbanization in which the political constraint binds is wider under *UOR*.

The migration plots (middle panel) mimic the consumption plots. Migration increases in tandem with increases in urban consumption, as the latter attracts more migrants to the urban sector. Moreover, for each level of urbanization, the level of migration is higher under *UOR* than under *ROR*.

The bottom panel shows how urbanization affects the leader's gain from switching to *UOR* from *ROR*, that is, the difference in the leader's rent under the two ownership regimes ($\Delta = T_1 - T_0$, see Equation (14)). We see that an increase in urbanization always increases the leader's gain from switching to *UOR*. We provide proof for this result in the Online Appendix (see Proposition 3). Intuitively, a combination of three explanations underlies why the gain from adopting *UOR* could increase with urbanization. First, as discussed above, the contribution of migrant labor to urban output increases with urbanization. Second, whenever the political constraint binds, migration is set at a fixed value, given by $C_r^{-1}(\gamma z)$. Hence, when the constraint binds, an increase in urbanization does not affect the cost of financing urban consumption via dC_u/dm (Equation (16)). Third, when the political constraint does not bind (in the intermediate ranges of urbanization in Figure 5), the effect of migration on the contribution of migrant labor is sufficiently high that it dominates the effect on the cost of financing urban consumption.

The following proposition summarizes the effect of urbanization on the leader's choice of land policy.

8 Rural–urban inequality is the primary channel through which z affects migration and land policy. We abstract from the potential effect of z through changing the level of urbanization, which we instead analyze by directly examining the effect of N_u.

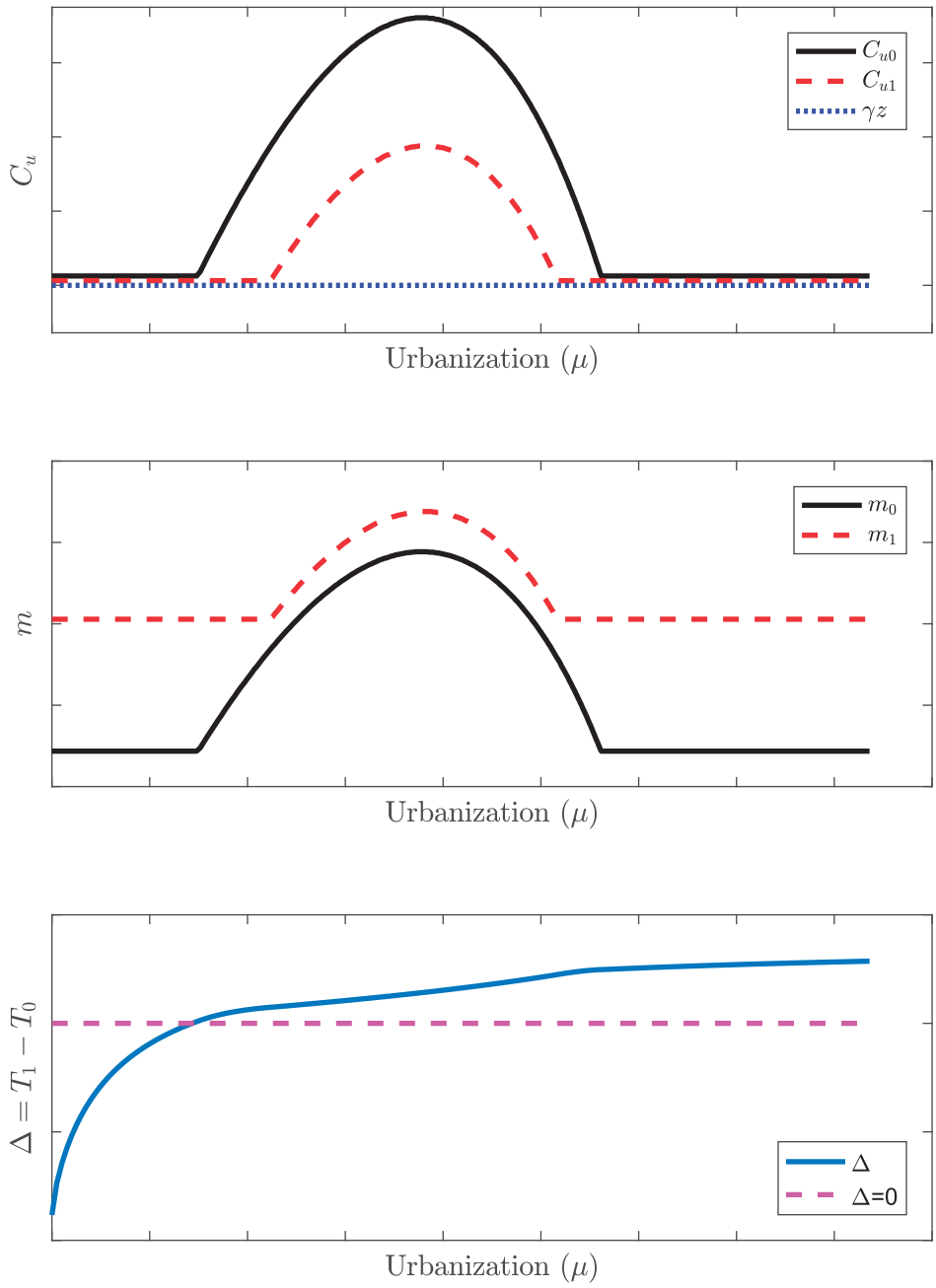

Figure 5. Effect of urbanization (μ). This graph displays the effect of urbanization on the level of consumption (top panel), migration (middle panel) and the leader's gain from adopting *UOR* (bottom panel).

Proposition 3. *Let* $p^* : N_u \rightarrow p$, *where* $p^*(N_u; \boldsymbol{\omega}_u)$ *is given by Equation (15),* $p \in \{0, 1\}$ *and* $\boldsymbol{\omega}_u$ *is a vector containing all parameters except* N_u.

- *If* $p^*(N_u; \boldsymbol{\omega}_u) = 1$ *for some* $\mu = \underline{\mu}$, *then for all* $\mu > \underline{\mu}$, $p^*(N_u; \boldsymbol{\omega}_u) = 1$.
- *If* $p^*(N_u; \boldsymbol{\omega}_u) = 0$ *for some* $\mu = \overline{\mu}$, *then for all* $\mu < \overline{\mu}$, $p^*(N_u; \boldsymbol{\omega}_u) = 0$.

Proof: See Online Appendix B.5. □

5.2. Urban productivity and land policy

Figure 6 displays the effects of z. The upward sloping straight curve in the top curve equals γz, the minimum consumption level imposed by the political constraint. The range of z for which the political constraint binds is wider under *UOR* than it is under *ROR*, as noted in Lemma 1. Note also that for each level of z, the number of migrants is larger under *UOR* than it is under *ROR*.

The relationship between z and m shows a distinguishable break at the point where the political constraint starts to bind. At low levels of z, rural–urban inequality is too low to induce migration levels that are large enough to pose political concerns for the leader and, hence, the political constraint does not bind. The effect of z on consumption is also more modest in the range of z for which the political constraint does not bind. However, once the political constraint starts to bind, the leader is forced to increase consumption at a faster rate. This increase in consumption results in a larger increase in migration. The increase in migration eventually flattens—as more workers leave the rural sector, the marginal product of labor in the rural sector increases at an increasing rate, making migration an attractive option to fewer and fewer rural workers.

An increase in z increases the contribution of rural–urban migration to the leader's rent base, because of increased labor productivity in the urban sector. Increases in z also increase the leader's cost of financing urban consumption. First, the minimum consumption demanded by urban residents increases with the level of urban productivity (top panel), raising the cost of financing consumption per urban resident. Second, this increase in urban consumption widens rural–urban inequality and increases rural–urban migration (middle panel). Thus, as shown in the bottom panel, the leader's gain from switching to *UOR* (from *ROR*) first increases because of the productivity increases. However, given the diminishing marginal product of labor in the urban sector, as migration increases further, the leader's gain starts to decrease and, finally, turns into a loss.

As z increases further, the difference in the leader's rent under the two policy options tends to narrow. Note that the effect of z on Δ is driven by the difference in the number of migrants under the two ownership regimes. As z becomes very large, much of the rural labor leaves agriculture, irrespective of the land ownership regime, leading to an ever smaller difference in the number of migrants between the two regimes. However, as we prove in Proposition 4, once Δ becomes negative (crosses the horizontal line), it remains negative when z increases. Thus, the leader does not choose *UOR* if z is above a certain threshold level.

The following proposition formally summarizes the effect of z on the choice of land policy.

Proposition 4. *Let* $p^* : z \rightarrow p$, *where* $p^*(z; \boldsymbol{\omega}_z)$ *is given by Equation (15),* $p \in \{0, 1\}$ *and* $\boldsymbol{\omega}_z$ *is a vector containing all parameters except* z.

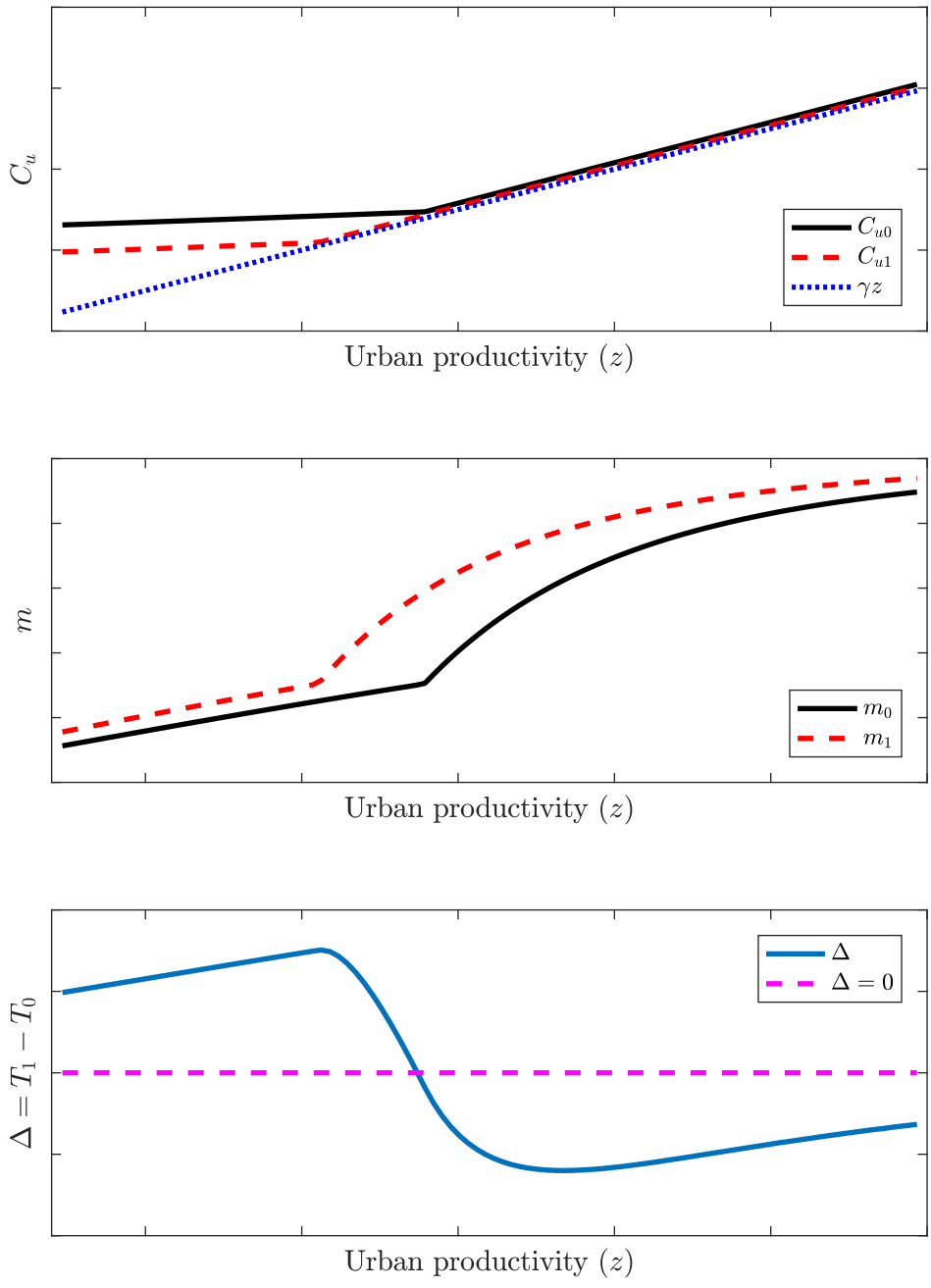

Figure 6. Effect of urban TFP (z). This graph displays the effect of urban TFP (z) on the level of consumption (top panel), migration (middle panel) and the leader's gain from adopting *UOR* (bottom panel).

- *If* $p^*(z;\boldsymbol{\omega}_z) = 1$ *for some* $z = \bar{z}$, *then for all* $z < \bar{z}$, $p^*(z;\boldsymbol{\omega}_z) = 1$.
- *If* $p^*(z;\boldsymbol{\omega}_z) = 0$ *for some* $z = \underline{z}$, *then for all* $z > \underline{z}$, $p^*(z;\boldsymbol{\omega}_z) = 0$.

Proof: See Online Appendix B.6. □

5.3. The race between urbanization and urban productivity

Figure 7 displays how the net effect of urbanization and urban TFP determine the threshold values of urbanization for which the leader adopts land reform. In both panels, the horizontal and vertical axes represent the level of urbanization (μ) and urban TFP (z), respectively. The shaded areas indicate the values of (μ, z) for which the leader adopts *UOR*. As the level of urban TFP increases, the threshold level of urbanization to adopt *UOR* also increases.

This threshold depends on, among other factors, the political power of urban residents (γ), the labor elasticity of urban output (α) and the income share of labor in the rural sector (η_w). For example, for any given z, an increase in γ also increases the required level of urbanization to adopt *UOR*. In Figure 7, this effect is represented by the shrinking of the shaded area further to the right as we move from the top to the bottom panel. Increases in α and decreases in η_w also have qualitatively identical effects, that is, they shrink the shaded area to the right (not shown here).

Even though an increase in urbanization increases the gain from adopting *UOR*, the model also shows that one cannot rule out the possibility that *UOR* may not be adopted even for a very high level of urbanization. The following proposition presents the crucial condition for whether the leader adopts *UOR* in response to a sufficiently high level of urbanization.

Proposition 5. *Let* $p^* : N_u \to p$, *where* $p^*(N_u;\boldsymbol{\omega}_u)$ *is given by Equation (15),* $p \in \{0,1\}$ *and* $\boldsymbol{\omega}_u$ *is a vector containing all parameters except* N_u.

Then, $\lim_{\mu\to 1} p^* = 1$ *if and only if*

$$1 - \alpha - \gamma > 0. \tag{27}$$

Proof: See Online Appendix B.7. □

This proposition has two important implications. First, the labor elasticity of urban output (i.e., $1-\alpha$) should be large enough for migrant labor to be valued adequately by the leader. Second, the power of urban people should be sufficiently diminished to contain the political constraint. Without a combination of these two preconditions in place, so that Equation (27) holds, higher urbanization on its own is not destined to lead to *UOR*.

6. Discussion: China's reforms through the lens of the model

Historically, China's control of rural–urban migration combined the twin strategies of weakening rural land property rights and suppressing the welfare of migrant workers. The latter took place mostly in the form of excluding migrant workers from access to social services in cities, such as health care and education. However, in recent decades, the government has moved toward improving the welfare of migrant workers and their access to social services. Many observers of China note that these policies are at least partly aimed

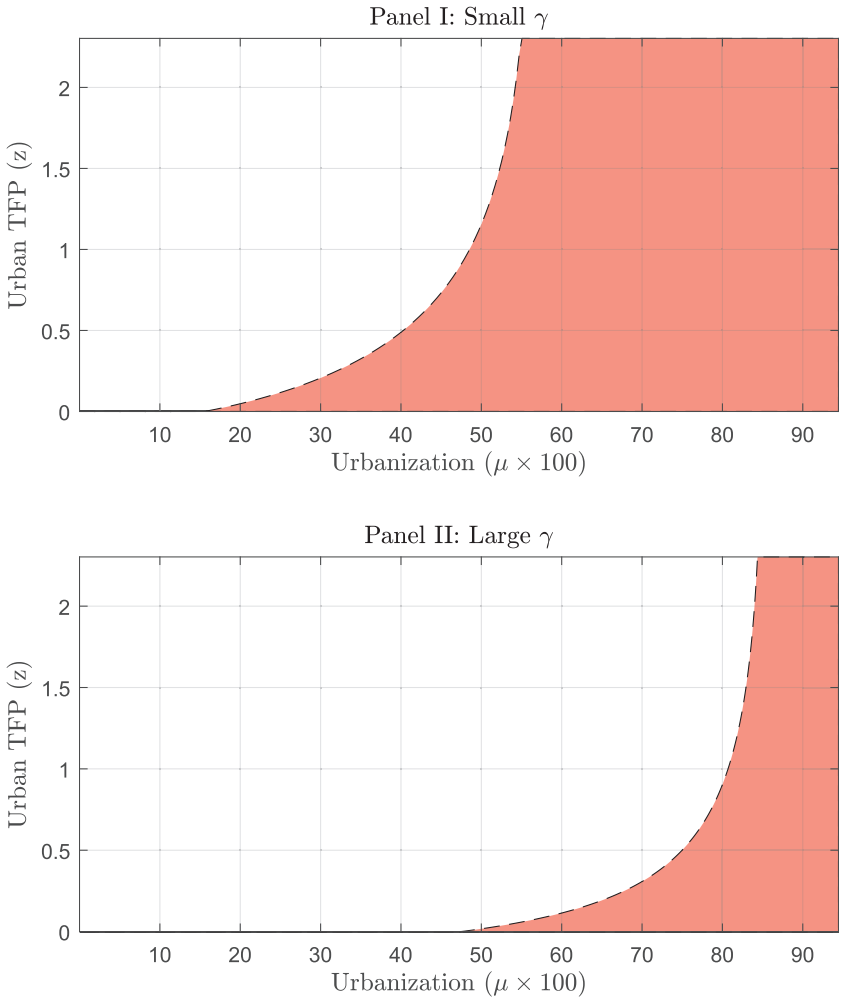

Figure 7. The race between TFP and urbanization. The shaded area represents the set of urbanization level and urban productivity pairs (μ, z) for which the leader prefers *UOR* to *ROR*.

at encouraging rural–urban migration. This raises two important questions. First, is this shift toward improving the welfare of migrant workers consistent with the prediction of our model? Second, if the government desires to encourage rural–urban migration, how can we reconcile the fact that the government still retains ownership restrictions on rural land while increasing urban consumption to attract migrant workers?

Figure 8 illustrates how the increase in China's urbanization could affect land policy and the level of C_u offered by the leader in a way consistent with the observed policies over the past years. The top panel shows C_u as a function of urbanization (μ). The middle and bottom panels, respectively, show migration (m) and the leader's gain from adopting *UOR* (Δ).

In Stage I, where the level of urbanization is less than $\underline{\mu}$, Δ is negative. Therefore, the optimal land policy is *ROR*. In this stage, C_u is set at γz, which is the lowest feasible value given the political constraint. Thus, this stage represents the level of urbanization in

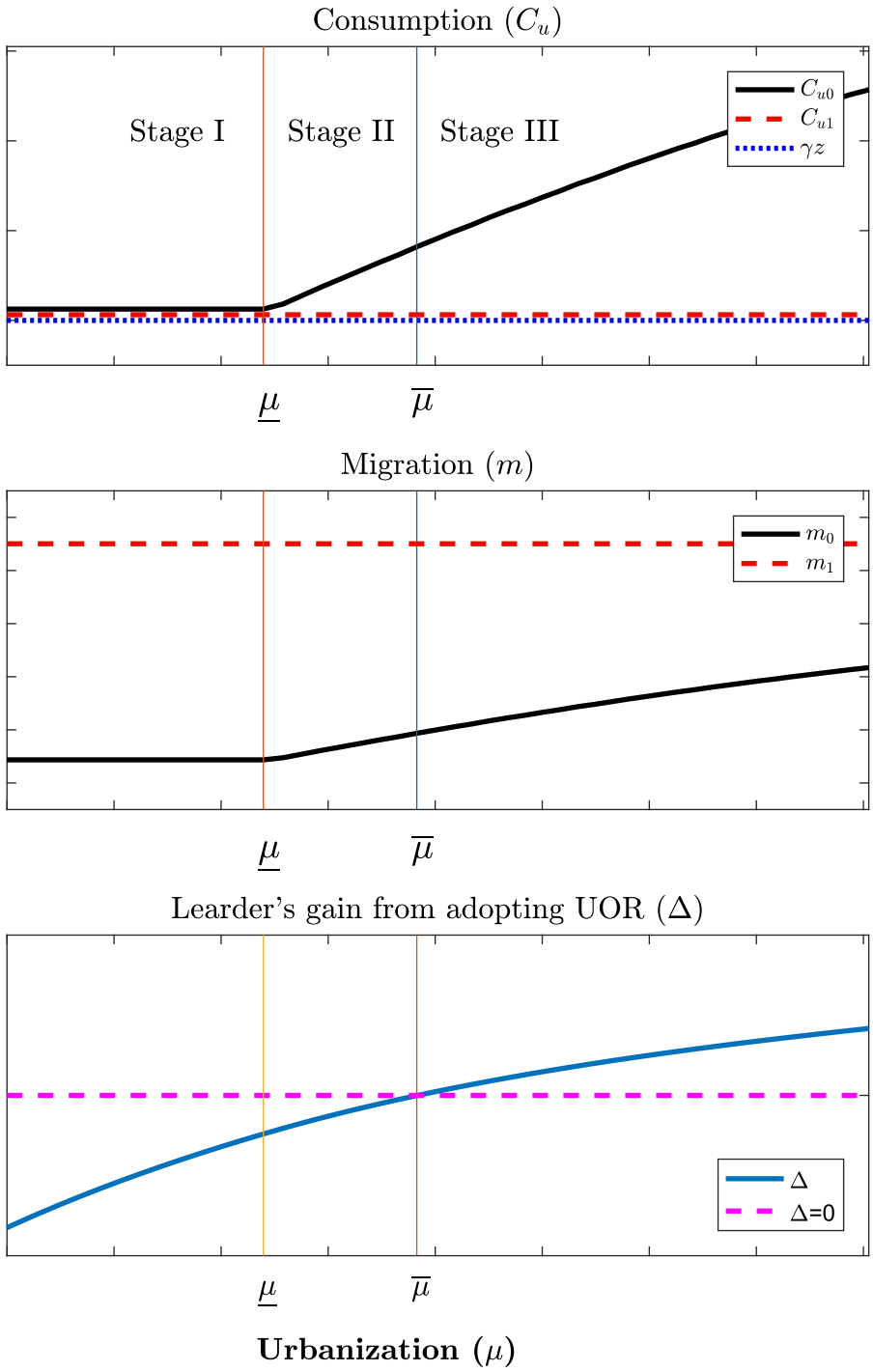

Figure 8. Stages of policy reforms. The graph shows the level of consumption (top panel), migration (middle panel) and the leader's gain from adopting *UOR*, as functions of urbanization. In Stage I, C_u equals γz and *ROR* is the land policy. In Stage II, C_u is set to above γz and *ROR* is the land policy. In Stage III, *UOR* is the land policy.

which the government uses *both* C_u and land policy to restrict rural–urban migration, as was observed in the earlier decades of the PRC.

In Stage II, where the level of urbanization is greater than $\underline{\mu}$ but less than $\overline{\mu}$, Δ is still negative, and hence, the optimal land policy is *ROR*. However, C_u is set *above* γz. Thus, this stage represents the level of urbanization in which the government uses raising C_u to *increase* migration but refrains from adopting *UOR*.

Finally, in Stage III, where urbanization is greater than $\overline{\mu}$, Δ is positive and the optimal land policy is *UOR*. For the range of urbanization in Stage III, the leader now uses land policy to *increase* migration.

China's policy reforms in past years have been quite consistent with the movement from Stage I to Stage II. Although the government still imposes migration restrictions in some very large cities, it has started encouraging rural–urban migration by improving living conditions for workers who move to the urban sector. According to our model, this shift is captured by the increase in C_u that happens in Stage II. However, even though China has started encouraging migration through policies that raise consumption for migrant workers, this happened without adopting *UOR*, as predicted in Stage II of our model. A key aspect of this shift to Stage II is that it represents the leader's desire to increase migration only *marginally*, but not to the extent that is implied by a large-scale land reform. That is, even if the leader wants more migrants, this demand for extra workers is not large enough to accommodate the level of migration ushered by adopting *UOR*. Nevertheless, according to our model, these policy changes to Stage II also can be viewed as initial steps toward a gradual removal of ownership restrictions as the economy moves to Stage III.

7. Concluding remarks

We develop a political economy model that takes into account some important features of an urban-biased government facing the trade-off between expanding the modern sector and retaining the support of urban residents. Using the context of China, we show how the model's mechanisms could explain observed policies on rural–urban migration and land property rights.

One of the central insights from the model is that while a higher level of urbanization encourages the adoption of *UOR*, an increase in urban productivity has the opposite effect. We also show that increases in the income share of rural labor and the elasticity of demand for urban labor make adoption of *UOR* more likely, but an increase in urban political power has the opposite effect.

While the marginal product of migrant labor decreases with an increase in the level of migration, this effect diminishes with a decrease in the share of migrants in the total urban labor force. Thus, for a given level of migration, increases in urbanization increase the marginal contribution of migrant labor to urban output (the leader's rent base) and, hence, increase the leader's benefit from adopting *UOR*.

An increase in urban productivity increases both the contribution of migration to the leader's rent base and his cost of financing urban consumption. Due to the diminishing marginal product of labor in the urban sector, the marginal contribution of migration (induced by higher urban productivity) is eventually dominated by the increase in the cost of financing urban consumption, and to restrict further migration, the leader adopts *ROR*.

Although our results provide important insights into the political incentives affecting rural land reform and migration control, the economic and political ramifications of land

tenure are too many to fully address in a single paper. Many questions still beg for more research. We focus on the migration implications of land reform for urban politics. Other potentially relevant considerations in the choice of rural land policy, such as rural governance and social control of the rural population, ideology and food self-sufficiency, fall outside our scope (Xu, 2011). Our model is a static one, and hence, issues of policy credibility and dynamic interactions also are beyond the scope of our paper. These and other remaining questions certainly warrant more research. We hope to address some of them in future studies.

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Conflict of interest

Authors have no conflict of interest to declare.

Supplementary material

Supplementary data for this paper are available at *Journal of Economic Geography* online.

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