Institutions and Development: The Interaction between Trade Regime and Political System*

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Abstract

This paper argues that openness to goods trade in combination with an unequal distribution of political power has been a major determinant of the comparatively slow development of resource- or land-abundant regions like South America and the Caribbean in the nineteenth century. We develop a two-sector general equilibrium model with a tax-financed public sector, and show that in a feudal society (dominated by landed elites) productivity-enhancing public investments like the provision of schooling are typically lower in an open than in a closed economy. Moreover, we find that, under openness to trade, development is faster in a democratic system. We also endogenize the trade regime and demonstrate that, in political equilibrium, a land-abundant and landowner-dominated economy supports openness to trade. Finally, we discuss empirical evidence which strongly supports our basic hypotheses.

Key words: Economic Development, Institutions, Political System, Public Education, Trade.

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1 Introduction

One of the most fundamental facts regarding long run development in the last centuries is the remarkable divergence between countries in per capita income levels. For instance, Latin America as a whole had somewhat higher per capita income after industrialization in the colonization period between the 16th and 18th century than North America (i.e., the US and Canada) (see Maddison, 2003, Tab. 4-1). Nowadays, per capita GDP of North America exceeds that of Latin America by a factor of almost five.

Most economists agree that the relatively dismal growth performance and slow industrialization of many resource- or land-abundant regions like those of Latin America after independence are critically affected by their institutions.[1] On a general level, the main argument is that the distribution of political power affects political institutions (e.g., the form of government, voting rights legislation) which in turn determine economic institutions like property rights legislation, the education system or the trade regime.[2]

This paper contributes to the literature on political institutions and growth by arguing that inequality of political power *in interaction with* the trade regime determines the public provision of education and infrastructure, and thus its economic development. More specifically, we develop a two-sector general equilibrium model with a tax-financed public sector, and show that in a feudal society, which is dominated by landed elites, productivity-enhancing public investments are typically lower in an open than in a closed economy. Moreover, we find that, under openness to trade, development is faster in a democratic system. These results suggest that an unequal distribution of political power *in combination* with openness to trade has been a major determinant of the comparatively slow development of resource- or land-abundant regions like the 'New World' economies in South America and the Caribbean. In addition, we show

[1] Seminal work on institutions and development was done by North (1981, 1988).

[2] For a systematic outline of this framework, see Acemoglu, Johnson and Robinson (2004). So the difference to standard growth theory is to endogenize the economic conditions for development by political institutions which themselves are shaped by political power. For instance, several recent theoretical studies have endogenized the level of property rights protection (see e.g. Tornell, 1997; Eicher and Garcia-Penalosa, 2003; Gradstein, 2004). For a comprehensive discussion of the role of property rights for economic development, see Rodrik, Subramanian and Trebbi (2004).

that lack of public education is an impediment to structural change from agriculture to manufacturing. This induces a negative feedback to industrialization by preventing learning-by-doing effects in manufacturing.[3] Finally, we simultaneously endogenize the second economic institution which drives development in our model along with the provision of public education: the trade regime. We demonstrate that, in political equilibrium, a land-abundant and landowner-dominated economy supports openness to trade without providing public schooling.

Our analysis suggests that, without openness big landlords might have supported education for promoting productivity in the manufacturing sector in order to get access to cheaper manufacturing products. In contrast, with access to the world market the landed elites had no incentives to implement reforms towards a better educated labor force at home. As argued in more detail at the end of the paper, focussing on the case of New World economies, our basic mechanism is well-supported by empirical evidence. First, there has been a substantial degree of inequality in the distribution of political power in many Southern New World economies towards big landowners at least until the beginning of the 20th century (e.g., Sokoloff and Engerman, 2000; Engerman, Haber and Sokoloff, 2000; Engerman and Sokoloff, 2002), related to a failure to introduce an effective education system (Reimers, 2004). Second, there is overwhelming evidence that - thanks to dramatically falling transport costs and support by trade policy - commodity markets have become highly integrated in the late 19th century. Consistent with our theory, Latin American economies have been major exporters of agricultural goods and mineral resources, in turn importing manufacturing goods from the European industrial core (e.g., O'Rourke, Taylor and Williamson, 1996; Williamson, 1998; Maddison, 2000; Bértola and Williamson, 2003).

The literature on institutions and development has recently become a core field in the study of economic growth. For instance, in an interesting but different approach

[3] Matsuyama (1992) analyzes a two-sector model which shows that an increase in agricultural productivity may have a negative impact on growth (fueled by learning-by-doing in the manufacturing sector) in a small open economy and is positively related to growth in autarky, when the income elasticity of demand for the agricultural good is less than unitary. In contrast, we analyze the role of the political system and the trade regime for the political equilibrium and its implications for structural change and development.

to ours, Galor, Moav and Vollrath (2003) analyze for a closed economy the politico-economic equilibrium regarding growth-enhancing public expenditure on education.[4] They argue that ultimately the accumulation of physical capital will give landowners incentives to support public education because of capital-skill complementarity. However, the point in time for this to happen is adversely related to land inequality. Therefore, high land inequality is an impediment for development.[5] In an alternative approach, Acemoglu, Johnson and Robinson (2001, 2002) argue that European settlers introduced property rights protection in previously poor economies, which has been favorable to future investments, whereas they expropriated resource- and land-abundant regions.[6]

From a theoretical point of view, the main innovation that our analysis contributes to the literature on institutions and development is to examine the interaction between the political system and the trade regime when tax-financed public investments are essential for economic progress. In contrast to Galor et al. (2003), we argue that the open trade regime prevalent in landowner-dominated oligarchies has played a salient role for their incentives to block educational reforms. That is, the political power of landed elites in combination with openness to world trade has been responsible for the dismal growth performance of many resource-abundant but nowadays less developed economies. Moreover, whereas Galor et al. assume perfect substitutability of agricultural and manufacturing goods, in our political mechanism the impact of both

[4] In a related paper by Gradstein and Justman (1997), typically, a democratic choice is favorable to public education and growth as opposed to an elite society. Their closed economy, one-sector model is, however, not designed to explain the interests of landed elites and does not refer to the role of the trade regime.

[5] In a similar fashion, Galor and Moav (2003) argue that the demise of the class struggle between capitalists and workers in Europe and the U.S. can be led back to eventually coinciding interests with respect to public education, induced by a gradual decline in the marginal productivity of physical capital as capital accumulated. This view is in contrast to a recent literature which argues that democratization has been deliberately supported by the elites to avoid social unrest and revolution (e.g., Acemoglu and Robinson, 2000, 2001) or to reap the benefits from an educated labor force. Bourguignon and Verdier (2000) analyze the trade-off solved by elites when education of the poor has positive externalities to them but inevitably leads to an extended voting participation, and thus to redistribution from the elites to the poor.

[6] Acemoglu et al. (2001) argue that a high settler mortality rate in the 19th century discouraged settlements and thus has led colonizers to set up "extracting states". In contrast, they introduced property rights legislation in regions which have been more favorable to settlement.

higher public investments and a change in the trade regime works through changes in relative goods prices. We also allow for heterogeneity among landowners where small landowners are more inclined to give up their land and become workers in the process of development. This accounts for a plausible feature of structural change.[7]

The plan of the paper is as follows. Section 2 presents the basic structure of the model. Section 3 derives the economic equilibrium. Section 4 analyzes for democracy as well as for a feudal system the political equilibrium regarding both public investment for a given trade regime and the trade regime itself. Moreover, we examine the implications of the politico-economic equilibrium for structural change. Section 5 provides a dynamic version of the model which incorporates productivity spillovers and learning-by-doing effects of endogenous structural change towards manufacturing. Section 6 discusses the empirical relevance of our analysis for Latin American development. The last section summarizes and briefly discusses some implications for development policy today. All proofs are relegated to an appendix.

2 The Basic Model

Consider a two-sector economy ("agriculture" and "manufacturing"), producing two consumption goods under perfect competition. The price of the agricultural good (X) is normalized to unity.[8] The price of the manufacturing good (Y) is denoted by p.

[7] In contrast to Galor and Weil (2000), Galor et al. (2003) and Galor and Moav (2003, 2004), we do not provide a unified growth theory in the sense that human capital accumulation endogenously arises as a consequence of prior development processes, and becomes the engine of growth in later stages of development (for a survey on unified growth theory, see Galor, 2004). At least for Latin America, there is evidence of a continued struggle between the industrial elite in the cities and landowners where the former gradually gained power during the twentieth century (e.g., Coatsworth and Williamson, 2002; Bértola and Williamson, 2003; Reimers, 2004). Interestingly, this occurred in parallel with significant increases in protectoral measures in Europe and the U.S. which limited trade with Latin America. This suggests that the "globalization backlash" in the twentieth century weakened political power of landowners and, consistent with the predictions of our theory, altered their attitude towards public education to some degree. Thus, our model not only provides a good description of the divergence of Latin America and Western economies particularly in the nineteenth century, still echoing today, but is also consistent with a change in Latin America's public education policy thereafter.

[8] The $X-$good may also be interpreted as some natural resource like silver or gold. For instance, mining was the primarily form of production in Spanish colonies such as Mexico and Peru, and silver and gold their first primary export. In contrast, other colonies like Jamaica, Barbados, Cuba and Brazil primarily grew sugar, tobacco, coffee and other staple crops for the world market.

Under free trade, p is exogenously given by the world market at $\bar{p} \in \mathbb{R}_{++}$.

There is a unit mass of individuals, of initially three types: big landlords, small landlords and landless workers, indexed $i = B, S, W$, with fraction (and number) $\mu^B \in (0,1)$, $\mu^S \in [0, 1 - \mu^B)$ and $\mu^W = 1 - \mu^B - \mu^S$, respectively. Each big landlord owns an amount ρ^B of land, whereas a small landlord owns $\rho^S < \rho^B$ of land. Thus, the economy's total land endowment is given by $\bar{R} = R^B + R^S$, where $R^B \equiv \mu^B \rho^B$ and $R^S \equiv \mu^S \rho^S$.

Moreover, each individual holds a unit time endowment. (Individuals do not differ in abilities.) For simplicity, individuals have homothetic and identical preferences over the two consumption goods, which can be represented by a linearly homogenous utility function $u(x, y)$ meeting the standard properties.[9] Thus, the indirect utility function of an individual with net income m^i, denoted V^i, can be written as

$$V^i = g(p)m^i, \tag{1}$$

where $g(\cdot)$ is a strictly decreasing function.

Landowners can decide whether to be active farmers or to give up their land. This captures the possibility of migration from land to the cities, i.e., urbanization and expansion of the manufacturing sector, which is an important feature of *structural change*. If not working as farmer, an individual supplies its time endowment inelastically to a perfect labor market. The unit time endowment of active farmers is fully absorbed by supervising and organizing agricultural production (and sales) at their land. If a landlord decides not to be active as farmer, either this land is not used or another individual has to employ one unit of labor for supervising agricultural production at this land. As will become apparent below, this assumption simplifies the analysis by removing the land market from the model. In Appendix B, we relax the assumption such that structural change goes along with a selling of land by small to big landowners,

[9] Allowing for non-homothetic preferences, e.g., accounting for "Engel's law", does not affect the main insights from our analysis regarding the conflict between landed elites and workers on the preferred level of public investment (and the role of the trade regime), but makes the mechanisms much less transparent and considerably complicates the analysis.

and show that the insights of our analysis remain unaffected.

Both sectors employ constant-returns-to-scale technologies. The agricultural good is produced with land and labor, which are perfect complements.[10] Denoting dependent labor input as l^i, a farmer of group $i = B, S$ produces output x^i according to the production function

$$x^i = A_X \min(\rho^i, l^i). \tag{2}$$

The production technology for output Y in the manufacturing sector is given by

$$Y = A_Y L_Y, \tag{3}$$

where L_Y denotes labor input in manufacturing. In order to ensure that there are enough labor resources in the economy such that the manufacturing sector can be active even if all landlords choose to fully employ their land to produce the $X-$good, we assume $\bar{R} + \mu^B + \mu^S < 1$, i.e., $\bar{R} < \mu^W = 1 - \mu^B - \mu^S$.

Productivity level A_Y, and possibly also A_X, can be influenced by policy. In particular, we assume that they are functions of the level of public expenditure G, i.e.,

$$A_j = f_j(G), \; j = X, Y. \tag{4}$$

For instance, G can be interpreted as (per capita) spending on public (compulsory) schooling or investment in public infrastructure.[11] Suppose that $f_X(\cdot)$ fulfills $f_X(0) > 0$, $f'_X(\cdot) \geq 0$ and $f''_X(\cdot) \leq 0$. $f_Y(\cdot)$ is strictly increasing and strictly concave, and fulfills $f_Y(0) > 0$, $\lim_{G \to 0} f'_Y(G) = \infty$ and $\lim_{G \to \infty} f'_Y(G) = 0$. It is plausible to assume, particularly with respect to educational expenditure, that public investment G is

[10] This assumption not only simplifies the analysis considerably but is also plausible in view of the limited substitution possibilites in traditional agricultural production.

[11] For the interpretation of G as (per capita) schooling investment (recall that there is a unit mass of individuals), let A_Y be the efficiency unit per manufacturing worker, which positively depends on G. That is, output Y is determined by the employed efficiency units of labor (i.e., the human capital stock), $A_Y L_Y$, in manufacturing. Productivity A_X can be thought of being determined by a spillover effect from technological knowledge A_Y in manufacturing. Formally, such a spillover can be written as $A_X = F(A_Y) = F(f_Y(G)) \equiv f_X(G)$, where the mapping F represents the spillover effect.

more effective in the manufacturing sector than in the agricultural sector.[12] Defining $\alpha_j(G) := Gf_j'(G)/f_j(G)$ as the elasticity of productivity A_j with respect to G in sector $j = X, Y$, this means

$$\alpha_X(G) < \alpha_Y(G). \tag{A1}$$

Public spending is financed by taxes T^i, $i = B, S, W$. The government budget is balanced.

3 Economic Equilibrium

In equilibrium, each dependent worker must be indifferent between working for a farmer or working in the manufacturing sector. Thus, the wage rate paid by both sectors coincides; it is denoted by w. Moreover, production technology (2) and fixed supervising requirements imply that either $l^i = \rho^i$ or $l^i = 0$, $i = B, S$. Thus, the gross income level of an active farmer i is given by[13]

$$I^i = (A_X - w)\rho^i = (f_X(G) - w)\,\rho^i,\ i = B, S. \tag{5}$$

Gross income of a dependent worker is given by w since workers inelastically supply one unit of time to the labor market. Net income levels are given by

$$m^i \equiv I^i - T^i,\ \ i = B, S, W. \tag{6}$$

If $m^S > m^W$, a small farmer hires ρ^S units of labor. In contrast, if $m^S < m^W$, he gives up his land and works either for a big landlord or in the manufacturing sector, earning wage income w. In this case, he will not be able to sell the land at a positive

[12] Thinking about the late 19th century, for instance, skill requirements for manufacturing production have increased substantially during the "second" industrial revolution (the petro-chemical industrial wave), which embodied fairly complex technologies (e.g., Bértola and Williamson, 2003). The assumption that the effectiveness of an increase in G is larger in the manufacturing sector is perhaps more debatable in the case of infrastructure provision like railways, which also promoted agricultural exports.

[13] A positive income of active farmers requires $A_X > w$. This may require further restrictions on (parameters of) the model, which will be made explicit in later footnotes.

price (see, however, the modification of the model in Appendix B). To see this, note that any landless individual using this land for agricultural production requires to earn at least outside option m^W, and an already active farmer has to hire somebody for supervision at wage rate w. Since $m^S < m^W \leq w$ if a small farmer gives up his land, employing this land does not pay for anybody, so its price will be zero. (Analogous considerations hold for a big landlord.) Let w^i, $i = B, S$, be the wage rates at which a landowner of group i is indifferent between working as farmer or as dependent worker; formally, w^i is given by $(A_X - w^i)\rho^i - T^i = w^i - T^W$, according to (5) and (6). This implies for the threshold values at which farmers give up land

$$w^i = \frac{T^W - T^i + A_X \rho^i}{1 + \rho^i}, \, i = B, S. \tag{7}$$

If taxes are uniform,[14] then $w^i = A_X \rho^i/(1+\rho^i)$. Allowing for non-uniform tax schedules alters the result in a straightforward manner. If, say, $T^S > T^W$, then w^S is smaller than in the case of uniform taxes for any given level of A_X. That is, small landlords take into account that giving up their land would imply a more favorable tax treatment and thus become dependent worker for a lower wage rate than if taxes were uniform. As this straightforward effect is not central to our main arguments, we can further simplify the analysis by focussing on a uniform lump-sum tax. That is, we suppose

$$T^B = T^S = T^W = G, \tag{A2}$$

where the latter equation follows from the balanced budget assumption. Moreover, w^i is strictly increasing in ρ^i and positive under A2. Thus, $0 < w^S < w^B$ for all $G \geq 0$.

Denoting the share of small and big landowners who are active as farmers by s and b, we have in total $b\mu^B + s\mu^S$ active farmers employing an amount $\hat{R}(s, b) \equiv bR^B +$

[14] The shape of the tax schedules is irrelevant for the decision of farmers to give up their land. For an income tax $T^i(I^i)$ we have $T^W(w^i) - T^i((A_X - w)\rho^i)$, at the right-hand side of (7). Thus, the threshold wage w^i is implicitly defined ($(T^i)' < 1$ guarantees a unique w^i), $i = B, S$. Only the tax burden at w^i matters for structural change. Any tax, whether lump-sum or not, with a uniform tax burden at w^i is neutral in our context. (Note that individual effort supply is inelastic.) Thus, we don't lose anything by focussing on lump-sum taxes only.

sR^S of both land and labor (which coincide under production technology (2)). Thus, manufacturing employment is given by $L_Y = 1 - b(\mu^B + R^B) - s(\mu^S + R^S) \equiv \hat{L}_Y(s, b)$. (Note that $\hat{L}_Y(1, 1) = \mu^W - \bar{R} > 0$.)

Finally, note that profit maximization under perfect competition in the $Y-$sector implies

$$w = pA_Y = pf_Y(G), \tag{8}$$

according to (3). We are now ready to derive the equilibrium under autarky and in a small open economy, respectively.

3.1 Autarky

This section examines the equilibrium outcomes under autarky and derives comparative-static results with respect to an increase in public spending G.

Since preferences are homothetic, utility maximization implies that aggregate demand for the manufacturing good relative to aggregate demand of the agricultural good is a strictly decreasing function of p, and independent of any income variables. Denote this function by $D(p)$ and note that $D'(\cdot) < 0$. In a goods market equilibrium, $Y/X = D(p)$, where $X = A_X \hat{R}(s, b)$ is total output of the agricultural sector and $Y = A_Y \hat{L}_Y(s, b)$ is manufacturing output. Consequently, the (relative) equilibrium price p is given by

$$\hat{L}_Y(s, b)\xi = D(p)\hat{R}(s, b), \tag{9}$$

where $\xi \equiv A_Y/A_X = f_Y(G)/f_X(G) \equiv \tilde{\xi}(G)$. This defines p as a function $\tilde{p}(G, s, b)$ with the following properties.

Lemma 1. *Under A1, $\tilde{p}(G, s, b)$ is decreasing in G, and increasing in s and b.*

Assumption A1 implies $\tilde{\xi}' > 0$. An increase in G is more effective in enhancing productivity, and thus output, of the manufacturing sector. Hence, the relative price p of the $Y-$good must decrease after an increase in G in order to restore the goods market equilibrium. In fact, the required decrease in p (shifting demand towards the $Y-$good) is less pronounced the higher the elasticity of substitution between the two goods, $\varepsilon(p) \equiv -pD'(p)/D(p)$. Moreover, p increases if production of the $Y-$good declines and that of the $X-$good increases, which explains why $\partial\tilde{p}/s > 0$ and $\partial\tilde{p}/b > 0$.

Using (8) and $p = \tilde{p}(G, s, b)$, we get for the wage rate w

$$w = \tilde{p}(G, s, b) f_Y(G) \equiv \tilde{w}(G, s, b). \tag{10}$$

Lemma 2. *$\partial\tilde{w}(G, s, b)/\partial G > (=, <)0$ if and only if $\varepsilon(\tilde{p}(G, s, b)) > (=, <)1 - \alpha_X(G)/\alpha_Y(G)$. Moreover, $\tilde{w}(G, s, b)$ is increasing in s and b.*

An increase in G has two opposing effects on the wage rate w. On the one hand, relative output price p declines under A1. This has a negative effect on wage rate w. On the other hand, productivity in the $Y-$ sector is raised when G increases, which has a positive effect on w. The net effect hinges on the relationship between the elasticity of relative goods demand $D(p)$ with respect to p, $\varepsilon(p)$, and the relative elasticity of productivity with respect to G in the two sectors, $\alpha_X(G)/\alpha_Y(G)$. If ε or α_X/α_Y is high, then only a small decrease in p is required to restore the equilibrium after an increase in G. Thus, the productivity effect of G dominates and the wage rate w rises with G. However, the opposite may be true if both ε and α_X/α_Y are low. For instance, in the special case in which G is only effective in the manufacturing sector (i.e., $\alpha_X = 0$), and utility function u is Cobb-Douglas i.e., $\varepsilon = 1$), an increase in G has no effect on $\tilde{w}(\cdot, s, b)$. In fact, $u(x, y) = x^\chi y^{1-\chi}$, $0 < \chi < 1$, implies $D(p) = (1-\chi)/(\chi p)$, and thus,

$$\tilde{w}(\cdot, s, b) = \frac{(1-\chi)\hat{R}(s, b)A_X}{\chi\hat{L}_Y(s, b)}, \tag{11}$$

according to (9) and (10). We will refer to this case of Cobb-Douglas utility with $A_X = const.$ as *Example* in the following.[15]

So far, the autarky equilibrium has been characterized for given fractions of active

[15]Note that in this *Example*, $A_X > \tilde{w}(G, 1, 1)$ (implying that gross income of farmers is positive) requires $\chi\mu^W > \bar{R}$, as $\hat{L}_Y(1, 1) = \mu^W - \bar{R}$ and $\hat{R}(1, 1) = \bar{R}$. (This also implies $A_X > \tilde{w}(G, 0, 1)$ since $\tilde{w}(G, s, b)$ is increasing in s, according to Lemma 2.)

farmers, b and s. Besides goods market clearing and labor market clearing, however, in equilibrium, landlords must not have an incentive to deviate from their decisions whether to become workers or to remain farmers. Different occupational regimes may result in equilibrium, depending on how many farmers give up their land and move to manufacturing. The following proposition characterizes the equilibrium regimes in autarky.

Proposition 1. (Autarky equilibrium). *Under A2, s_{AUT}, b_{AUT} and $w_{AUT} = \tilde{w}(G, s, b)$ are an autarky equilibrium if and only if one of the following conditions hold, where $w^i = A_X \rho^i/(1+\rho^i)$, $i = B, S$.*

(i) $\tilde{w}(G, 1, 1) \leq w^S$ and $s_{AUT} = b_{AUT} = 1$.

(ii) $\tilde{w}(G, \hat{s}, 1) = w^S$ for $0 < \hat{s} < 1$ and $s_{AUT} = \hat{s}$, $b_{AUT} = 1$.

(iii) $w^S \leq \tilde{w}(G, 0, 1) \leq w^B$ and $s_{AUT} = 0$, $b_{AUT} = 1$.

(iv) $\tilde{w}(G, 0, \hat{b}) = w^B$ for $0 < \hat{b} < 1$ and $s_{AUT} = 0$, $b_{AUT} = \hat{b}$.

Recall that w^S and w^B (with $w^S < w^B$) are the threshold wages at which small and big landowners, respectively, are indifferent of being active as farmers or to become workers. Moreover, $m^S > (<) m^W$ if $w < (>) w^S$, and analogously for big landowners, since increasing wage rates reduce income from farming (through rising labor costs) and benefit workers. Note first that $s > 0$ implies $\tilde{w}(G, s, b) \leq w^S < w^B$ and thus $b = 1$. That is, if ever, big landowners are the last to become workers. Part (i) of Proposition 1 describes the case in which all landlords remain farmers, as the wage is below threshold w^S. In the case of part (ii), we have an interior solution with some small landlords being farmers and others being workers. To see that no other pair $(s, b) \neq (\hat{s}, 1)$, $0 < \hat{s} < 1$, can be an equilibrium, note that at $w < w^S$ all landowners want to remain farmers, i.e., $(s, b) = (1, 1)$, which is inconsistent with presumption $w^S = \tilde{w}(G, \hat{s}, 1) < \tilde{w}(G, 1, 1)$. Similarly, if $w > w^S$, then $s = 0$, which is inconsistent with $\tilde{w}(G, 0, 1) < \tilde{w}(G, \hat{s}, 1) = w^S$. Part (iii) refers to the case in which the wage rate is in a medium range: high enough to induce small landlords to withdraw from their land, but low enough for all big landowners to remain farmers. In case (iv), small landlords all become workers since $w = w^B > w^S$, whereas a more or less large fraction of big landlords remain farmers. To see that this is the only equilibrium when $w^B < \tilde{w}(G,0,1)$, note that any $(s,b) \neq (0,\hat{b})$ would require $\tilde{w}(G,0,1) \leq w^B$, in contradiction to $w^B = \tilde{w}(G,0,\hat{b}) < \tilde{w}(G,0,1)$. Finally, $b = 0$ cannot hold in autarky equilibrium, as this would imply that output of the $X-$good is zero. Since the case that big landlords give up their land to become workers ($b < 1$) is of no interest in our context anyway, we shall focus the analysis in the remainder of the paper exclusively on $b = 1$.

Proposition 1 also shows that, in general, in case (ii) s_{AUT} varies with G since $\hat{s}$, defined by condition $\tilde{w}(G,\hat{s},1) = w^S$, is a function of G. In an analogous way, $\hat{b}$ would be a function of G in case (iv) with $b_{AUT} < 1$. However, in our *Example*, these equilibrium values are independent of public investment G, i.e., an increase in G can never induce structural change. To see this, note first that threshold wages $w^i = A_X\rho^i/(1+\rho^i)$, $i = B, S$, are constant if A_X is constant. Second, according to (11), also $\tilde{w}(G,s,b)$ is independent of G. Thus, G doesn't enter the criterion $\tilde{w} \gtreqless w^i$ so that the autarky equilibrium s_{AUT}, b_{AUT} and w_{AUT} depend on preferences, land endowments and exogenous technological fundamentals only.

The political equilibrium will depend on how well different agents fare under a certain $G-$choice. For this, consider the indirect utility functions given by

$$V^i = [(A_X - w)\rho^i - G]g(p), \ i = B, S, \tag{12}$$

$$V^W = [w - G]g(p), \tag{13}$$

according to assumption A2, (1), (5) and (6). Recalling $g'(p) < 0$, it follows that all individuals gain as consumers from cheaper manufacturing goods. The next result shows that this unambiguously occurs in any autarky equilibrium when G increases.[16]

Corollary 1. (Relative price in autarky equilibrium). *Under A1 and A2, autarky equilibrium price $\tilde{p}_{AUT}(G) \equiv \tilde{p}(G, s_{AUT}, b_{AUT})$ is decreasing in G.*

[16] Moreover, if G is raised, active farmers may also gain from higher sales revenue, to the extent that $f_X(G)$ is increasing. Finally, they benefit from an increase in G if wages decrease (i.e., if $\varepsilon + \alpha_X/\alpha_Y < 1$, according to Lemma 2), which of course would hurt workers. But also the opposite may hold, since $\partial\tilde{w}(G,s,b)/\partial G > 0$, is possible.

Corollary 1 is important when comparing the autarky equilibrium with the equilibrium under openness, which is done next. This comparison will ultimately be the key to gain insight in the analysis of the political equilibrium in section 4.

3.2 Small Open Economy

In a small open economy (SOE), we have $p = \bar{p}$. Thus, domestic public policy cannot benefit individuals as consumers by lowering the price p, contrary to the autarky regime. Moreover, $w = \bar{p}A_Y = \bar{p}f_Y(G) \equiv w_{SOE}$. Hence, the wage rate under openness unambiguously increases in G. In contrast, according to the analysis in the previous section, w_{AUT} may increase or decrease with G, or remains unaffected. Thus, workers may benefit more from an increase in G under openness than in autarky since, under plausible conditions, the wage effect of an increase in G is higher under openness.[17] (Obviously, it also holds in our *Example* above, where changes in G do not affect autarky wages at all.) Thus, under openness to trade, an increase in G gives rise to a distributional conflict between farmers and dependent workers (see (12) and (13)), which is not the typical case under autarky.

The next result characterizes the occupational structure. It shows that in equilibrium of a SOE, an increase in G does sooner or later lead to structural change (whereas we saw that in autarky this possibly never happens). In the knife-edge case that landowners are indifferent between keeping the farm or becoming worker, we assume that they are giving up their land.

Proposition 2. (Equilibrium in SOE). *Let s_{SOE}, b_{SOE} denote the equilibrium fractions of active landlords (small and big, respectively) under openness. Under A2:*

(i) If $\bar{p}\tilde{\xi}(G) < \frac{\rho^S}{1+\rho^S}$, then $(s_{SOE}, b_{SOE}) = (1, 1)$.

(ii) If $\frac{\rho^S}{1+\rho^S} \leq \bar{p}\tilde{\xi}(G) < \frac{\rho^B}{1+\rho^B}$, then $(s_{SOE}, b_{SOE}) = (0, 1)$.

(iii) If $\bar{p}\tilde{\xi}(G) \geq \frac{\rho^B}{1+\rho^B}$, then $(s_{SOE}, b_{SOE}) = (0, 0)$.

[17] Generally, $\partial w_{SOE}/\partial G = \bar{p}f_Y' > \partial w_{AUT}/\partial G$ if $(1 - \alpha_X/\alpha_Y)/\varepsilon + \bar{p}/\tilde{p} > 1$. Thus, an increase in G has a higher impact on the wage rate in SOE if relative elasticity α_X/α_Y or substitutability between goods, ε, are sufficiently small. (Use $w_{AUT} = \tilde{p}(G, s_{AUT}, b_{AUT})f_Y(G)$ and the derivation in Lemma 1, 2.)

Since public investment is more effective in raising manufacturing productivity under A1, in SOE, farmers eventually will leave their land and become workers when G rises.[18]

4 Political Equilibrium

The political equilibrium involves decisions in two dimensions: the choice of public investment level G, and of the trade regime (autarky/openness). The equilibrium is considered for two political systems, a "feudal society" and a "democracy".

Policy preferences of big landlords determine the political outcome in a feudal society. Under democracy, workers' preferences are decisive. Policy preferences of small landlords are important to evaluate welfare consequences of political equilibria. As will become apparent, the interests of small landowners under openness are in line with either those of big landowners or those of workers, depending on the size of their landholdings, ρ^S. One can thus think of wealth requirements for voting participation as a characteristic which distinguishes a feudal from a democratic system.[19] A democratic system can be thought of one in which people with no or little land determine the political equilibrium. In contrast, if wealth requirements are high, then the pivotal voter is a big landlord representing a landowner-dominated system. Finally, recall that the behavior of small landlords determines whether there is structural change in the economy.

For the role of the political system and of policy choices for economic development, two channels are important. First, as the analysis of the economic equilibrium has shown, public investment G in interaction with the trade regime determine to which extent there is structural change. Second, the $G-$level determines the productivity increase. In section 5, we extend the model to a dynamic framework in which eco-

[18] Note that $s_{SOE} = b_{SOE} = 0$ is possible in SOE, since goods do not have to be produced domestically in order to satisfy demand. However, as pointed out already in section 3.1, we shall not pay attention to the implausible case $b < 1$ in the following.

[19] As will be discussed in section 6.1, wealth requirements for the assignment of voting rights were prevalent and substantial in 19th century Latin America.

nomic growth is positively related to investment G. The main results from our basic (static) model remain qualitatively true.[20] We will thus refer to a low level of G as an impediment for development of the considered economy.

4.1 Public Investment in Political Equilibrium

Let G^i_{SOE} and G^i_{AUT} be the preferred levels of G of group $i = B, S, W$ under openness and under autarky, respectively. (For simplicity, we assume throughout that these preferred levels are unique.)[21] The following lemma characterizes policy preferences of big landowners and workers with respect to G.

Lemma 3. *Under A1 and A2.*

(i) Suppose

$$f'_X(G) < 1/\rho^B + \bar{p}f'_Y(G) \text{ for all } G \geq 0. \tag{A3}$$

Then $G^B_{SOE} = 0$, whereas $G^B_{AUT} > 0$ is possible (and indeed prevails in the 'Example').

(ii) $G^W_{SOE} = f'_Y{}^{-1}(1/\bar{p}) > 0$. $G^W_{AUT} > 0$ is possible (and indeed prevails in the 'Example').

For an intuitive understanding of Lemma 3 it is useful to remember the characterization of the economic equilibrium in the previous section. In SOE, the wage rate $w_{SOE} = \bar{p}f_Y(G)$ unambiguously rises with G due to enhanced productivity in the manufacturing sector.[22] Thus, if the impact of an increase in G on agricultural production is small (assumption A3), big landlords lose more than they gain from an increase in G. They have to pay both higher taxes and higher wages without significantly raising sales revenue. In contrast, workers in SOE simply face the trade-off between higher

[20] In addition, the dynamic model allows us to analyze the development path of the economy, after a change in the political system or in the trade regime, respectively.

[21] Note that our focus on $b = 1$ requires $\bar{p}\tilde{\xi}(G^W_{SOE}) < \rho^B/(1+\rho^B)$ under openness and $\tilde{p}(G^W_{AUT}, 0, 1)\tilde{\xi}(G^W_{AUT}) \leq \rho^B/(1+\rho^B)$ in autarky (i.e., the preferred investment level of workers is such that big landlords remain farmers). The former condition follows from Proposition 2. The latter condition is equivalent to $\tilde{w}(G, 0, 1) \leq w^B$, evaluated at $G = G^W_{AUT}$, and follows from Proposition 1.

[22] Note that, according to part (ii) of Lemma 3, condition $A_X > w$ (implying that gross income of farmers is positive) holds in a democratic and open economy if $A_X > \bar{p}f_Y(G^W_{SOE}) = \bar{p}f_Y(f'_Y{}^{-1}(1/\bar{p}))$. This is fulfilled if A_X is sufficiently high and/or $\bar{p}$ is low. Under these conditions also $A_X > \bar{p}f_Y(0)$ holds, which is relevant for a feudal and open economy.

wages and higher taxes, which is a well-defined problem leading to an interior solution for G^W_{SOE} with $\partial G^W_{SOE}/\partial \bar{p} > 0$. That is, the higher the world market price for manufacturing products, the higher the level of public education investment preferred by workers. Under autarky, all individuals benefit from a lower price of the manufacturing good if G increases (Corollary 1), whereas $p = \bar{p}$ in SOE. Moreover, as argued in section 3.2, the wage effect is typically smaller in autarky than under openness and may even favor farmers. For instance, in our *Example*, neither sales of landlords nor production costs of landlords are affected by an increase in G. Also wage income of workers is unaffected. But since both groups gain as consumers of cheaper manufacturing goods, they vote for a positive amount of G under autarky.

The next results show how the politico-economic equilibrium regarding public investment depends on the political system and the trade regime. We first ask how, given the political system, changes in the trade regime affect development.

Proposition 3. (Trade regime and development, conditional on political system). *Under A1-A3.*

(i) In a feudal society, if anything, public investment is higher under autarky than under openness.

(ii) In democracy, the trade regime does not matter in a systematic way for development; that is, $G^W_{SOE} >, =, < G^W_{AUT}$ *is possible.*

Part (i) of Proposition 3 is an immediate consequence of part (i) of Lemma 3. It suggests that openness to trade is typically an impediment for development in a political system which is dominated by big landowners. In contrast, according to part (ii) of Proposition 3, public investment resulting in a democracy may be higher under openness than in autarky.

The following proposition shows how, given the trade regime, the political system affects development.

Proposition 4. (Political system and development, conditional on trade regime). *Under A1-A3.*

(i) $G^W_{SOE} > G^B_{SOE} = 0$*, i.e., under openness, public investment is higher in democracy than in feudal society.*

(ii) Under autarky, the political system does not matter in a systematic way for development; that is, $G^B_{AUT} >, =, < G^W_{AUT}$ *is possible.*

Part (i) of Proposition 4 casts doubts on the conventional wisdom that openness to goods trade always fosters development, suggesting that this may be true only under democracy. In contrast, according to part (ii), the political system may not matter for development under autarky.

Regarding the slow development of relatively open but politically very unequal regions, like Latin America after independence, our results suggest that the ruling class of big landlords had no incentive to introduce or strengthen productivity-enhancing institutions like schooling due to their access to manufacturing products from abroad. In addition, underdevelopment of the manufacturing sector contributed, to the benefit of farmers, to low wages. Without openness the landlords might have supported productivity-enhancing education in order to get access to cheaper manufacturing products.

We now turn to welfare consequences. Of course, big landlords are always better off in a feudal society, in which they are pivotal for the political outcome, and workers benefit from democracy. The next result characterizes the welfare effects of the political system for small landlords by examining their policy preferences.

Proposition 5. (Small landlords). *Assume A1-A3.*

(a) Under openness, (i) if $\bar{p}\tilde{\xi}(G^W_{SOE}) < \rho^S/(1+\rho^S)$*, welfare of small landlords is maximized in a feudal society; (ii) if* $\bar{p}\tilde{\xi}(0) > \rho^S/(1+\rho^S)$*, welfare of small landlords is maximized in democracy; (iii) if* $\bar{p}\tilde{\xi}(0) \leq \rho^S/(1+\rho^S) \leq \bar{p}\tilde{\xi}(G^W_{SOE})$*, welfare of small landlords is maximized in a feudal society if* $f_X(0)\rho^S + G^W_{SOE} \geq \bar{p}\left[f_Y(0)\rho^S + f_Y(G^W_{SOE})\right]$ *and in a democratic society otherwise.*

(b) Under autarky, the political system does not matter in a systematic way for welfare of small landlords.

<**Figure 1**>

Part (a) of Proposition 5 is illustrated in Fig. 1. Recall that $G^B_{SOE} = 0$. As long as small landlords do not become workers (i.e., $s = 1$), their utility decreases gradually with G. At $G = \tilde{\xi}^{-1}\left(\rho^S / \left[\bar{p}(1+\rho^S)\right]\right) \equiv \hat{G}$, small landlords are indifferent between being active as farmer or as dependent worker (see Proposition 2). Thus, for $G > \hat{G}$ their utility coincides with that of landless workers. Now, if utility of small landlords is higher at point A than at point B, then they prefer zero investment, whereas G^W_{SOE} is optimal for them if vice versa. Also note that policy preferences of small landlords are directly related to their landholding, ρ^S. If ρ^S is high, the interests of big and small landlords coincide. That is, which group of landlords is pivotal doesn't matter. What we call feudal society is thus consistent with a political system in which the wealth requirement for voting participation is high. In contrast, the interests of small landlords coincide with those of workers. Thus, a democracy may be seen as a political system in which workers *or* landowners with little land are pivotal (e.g., if wealth requirements for voting participation are low). Under autarky, a change in the political system from, say, an oligarchic system to a democracy may increase or lower welfare of small landlords in an unsystematic way, as suggested by Proposition 5 (b). This also implies that in a political system in which small landowners are pivotal, the political equilibrium does not depend in a systematic way on their landholdings ρ^S.

Proposition 5 is related to the decision of small landlords to be farmer or to be employed as dependent worker. Suppose we start from an open economy with $G = 0$ and $s = b = 1$ before individuals vote over the level of public investment. We may then ask how the likelihood of structural change under openness, i.e., a switch $s = 1$ to $s = 0$ (and thus from agricultural production to manufacturing), depends on the political system.

Proposition 6. (Structural change in SOE). *Under A1-A3. Suppose* $G = 0$ *and* $s = 1$ *initially. Then under openness, if anything, structural change occurs in democracy but never in a feudal society.*

Democracy in an open economy, because it leads to higher public investment than in a feudal society, also is more likely to promote structural change. This has important long-run implications. Structural change from agriculture to manufacturing production may have positive feedback effects upon the development process through learning-by-doing in the manufacturing sector. They are worked out in the dynamic version of the model in section 5.

4.2 Openness or Autarky in Political Equilibrium?

So far we have examined how education or infrastructure provision depends on the interaction between the political system (feudal or democratic) and the trade regime (openness vs. autarky). Now we also allow the trade regime, *in addition* to the level of G, to be endogenously determined in political equilibrium (for either political system), i.e., we analyze a two-dimensional voting choice. This is important because if, for instance, openness would not arise in a feudal society under plausible conditions in our model, one could argue that the result about the role of goods trade for development in a feudal society is not of much interest.

For examining the plausibility of an open and feudal economy trapped in a low education-low productivity equilibrium, we relate the political equilibrium regarding the trade regime to the pattern of comparative advantage. Comparative advantages are determined by the relationship between the autarky price $\tilde{p}_{AUT}(G)$ for some $G-$level, and the world market price, $\bar{p}$. If $\tilde{p}_{AUT}(G) > \bar{p}$, then the considered economy has a comparative advantage with respect to the agricultural good, which is plausible for a land-abundant, developing country. We consider first the trade regime in a feudal society.

Proposition 7. (Trade regime in feudal society). *Under A2 and A3, openness is supported in a feudal society if* $\tilde{p}_{AUT}(G^B_{AUT}) > \bar{p}$.

According to Proposition 7, big farmers prefer to have access to the world market whenever the economy has a comparative advantage in the $X-$good. In this case, the change in relative prices induced by a change in the trade regime from autarky to open goods markets lets big landlords unambiguously gain. Even if in autarky the wage rate would decrease with G (which would lower production costs of farmers), switching to an open trade regime with $G^B_{SOE} = 0$ unambiguously pays off for the landlords due to the benefit as consumer. In addition, there may be saving of taxes for public schooling provision.

Under democracy, the following holds.

Proposition 8. (Trade regime in democracy). *Under A2, openness may or may not be supported in a democracy. In particular, both outcomes are possible if* $\tilde{p}_{AUT}(G^W_{AUT}) > \bar{p}$.

Proposition 8 shows that workers do not necessarily prefer openness to autarky, although an open trade regime *may* be implemented in a democracy. This also applies when the economy has a comparative advantage in the $X-$good, in contrast to the unambiguous support of openness by landlords in an analogous situation (Proposition 7). On the one hand, workers gain as consumers when p declines after a change in the trade regime; however, on the other hand, wage rates may be depressed.

5 A Dynamic Framework

In this section, we extend our basic model to a dynamic framework in which public investments and structural change are the engines of development. This allows us to examine explicitly how the development path depends on the interaction between the political system and the trade regime of the economy.

5.1 Structure of the Dynamic Economy

For convenience, suppose that individuals are infinitely living in continuous time. For simplicity, we assume that there are no savings or storage possibilities. Lifetime-utility of an individual from group $i = B, S, W$, is then given by the present discounted value of the stream of instantaneous utility $V^i(t) = g(p(t))m^i(t)$ at time $t \geq 0$, according to (1), i.e., $\int_0^\infty V^i(t)e^{-\beta t}dt$, where $\beta > 0$ is the time preference rate.[23] Again, we focus on uniform lump-sum taxation under a balanced budget (each period) to finance public investment (assumption A2).

The key assumption in this section is that productivity A_Y in the manufacturing sector evolves over time according to[24]

$$\dot{A}_Y(t) = f_Y(G(t))A_Y(t)^\gamma L_Y(t)^\theta - \delta A_Y(t), \tag{14}$$

where $\gamma > 0$ and $\theta \geq 0$ give rise to intertemporal spillovers or learning-by-doing effects which render the impact of an increase in G for raising productivity more effective if the level of productivity or the amount of labor employed in the manufacturing sector are high. If $\theta = 0$, then manufacturing employment, $L_Y(t)$, has no impact on the future evolution of productivity A_Y. If $\theta = \gamma$, then $\dot{A}_Y = f_Y(G)Y^\gamma - \delta A_Y$, which resembles the learning-by-doing spillovers from output $Y\,[= A_Y L_Y]$ as modelled, e.g., by Matsuyama (1992). However, we exclude the knife-edge case of balanced steady-state productivity growth (which would occur if $\gamma = 1$), i.e., we assume $\gamma \in (0, 1)$. $\delta \in (0, 1]$ is the depreciation rate of productivity A_Y. (The function $f_Y(G)$ has the same properties as in the basic model.)

In the basic model, we assumed that public investment is less effective in the $X-$sector than in the $Y-$ sector (assumption A1) and, for the analysis of the political equilibrium, focussed on the case in which the impact of a marginal increase in G on A_X is sufficiently small (assumption A3). Here, we make our life simple by supposing that A_X is a constant. Finally, suppose for simplicity that the rest of the world is in its steady state, i.e., output price p is fixed at $\bar{p}$ in SOE at all times.

[23] Alternatively, in a discrete-time model we could replace the infinite-life assumption by hypothesizing non-overlapping generations, each living one period, which are characterized by some dynastic bequest motive à la Barro (1974). That is, life-time utility of a member i of generation t is given by $U_t^i = V_t^i + \beta U_{t+1}^i$, $0 < \beta < 1$, i.e., $U_t^i = \sum_{t=0}^\infty \beta^t V_t^i$. Results would be unchanged compared to the continuous time version. An even simpler alternative, which however does not allow to examine the development path but reproduces the results of our static version, is a two-period model in which public investments made in period 1 pay off in terms of productivity gains in period 2.

[24] (14) replaces (4) from the basic model for the $Y-$sector.

5.2 Economic Equilibrium

Note from (9) that in autarky p is given by $\hat{L}_Y(s(t), b(t))A_Y(t) = D(p(t))\hat{R}(s(t), b(t))A_X$, i.e., p is decreasing in A_Y. That is, output price $p(t)$ falls as the economy develops (driven by public investment), whereas the impact on the wage rate $w(t) = p(t)A_Y(t)$ is ambiguous.[25] In contrast, under openness, since $p(t) = \bar{p}$, w is unambiguously increasing in A_Y.

The autarky equilibrium can be characterized by a straightforward modification of Proposition 1. For simplicity, we shall focus however on the case of Cobb-Douglas preferences in which the wage rate is fixed to the level in (11). As a consequence, the fractions of active farmers, s, b, and thus $L_Y = \hat{L}_Y(s, b)$ are independent of the public investment stream and A_Y in the closed economy. For the open trade regime, Proposition 2 implies the following evolution of employment in the manufacturing sector.

Corollary 2. (Evolution of $L_Y(t)$). *Suppose A2 holds. Under openness,*

$$L_Y(t) = \Phi(A_Y(t)) \equiv \begin{cases} \hat{L}_Y(1,1) \equiv L_Y^I \text{ if } A_Y(t) < \frac{A_X \rho^S}{\bar{p}(1+\rho^S)}, \\ \hat{L}_Y(0,1) \equiv L_Y^{II} \text{ if } \frac{A_X \rho^S}{\bar{p}(1+\rho^S)} \leq A_Y(t) < \frac{A_X \rho^B}{\bar{p}(1+\rho^B)}, \\ \hat{L}_Y(0,0) \text{ if } A_Y(t) \geq \frac{A_X \rho^B}{\bar{p}(1+\rho^B)}. \end{cases} \tag{15}$$

Hence, under openness, there will be structural change when the economy develops, where the state of development is measured by the productivity of the manufacturing sector.[26] That is, the economy may move from *Regime I* in early stages of development, characterized by low manufacturing employment L_Y^I, to *Regime II* in later stages of development, with $L_Y^{II} > L_Y^I$. In turn, according to (14), this has a positive feedback effect on the evolution of productivity if $\theta > 0$, for any given path of $G(t)$.[27] In a steady

[25] w is increasing (decreasing) in A_Y if $\varepsilon > (=, <) 1$.

[26] Introduction of a land market leads to a slight modification of (15) which however does not change the results (see Appendix B).

[27] Irwin (2002) presents evidence which suggests that economic growth in the late 19th century was crucially driven by structural change, i.e., by reductions in the share of agricultural employment. This lends support to the accumulation equation (14).

state with $G(t) = G^*$ (steady state values are indicated by superscript (*) hereafter) we have $\dot{A}_Y = 0$, and thus, $L_Y(t) = L_Y^* = \Phi(A_Y^*)$, where (14) and (15) imply that A_Y^* is given by

$$A_Y^* = \left[\frac{f_Y(G^*) \left(L_Y^*\right)^{\theta}}{\delta} \right]^{\frac{1}{1-\gamma}} \equiv \Psi(G^*, L_Y^*) = \Psi(G^*, \Phi(A_Y^*)). \tag{16}$$

5.3 Political Equilibrium

In the following politico-economic analysis, we focus on the two key questions of the paper which address the slow development process of relatively open, land- or resource-abundant, but politically unequal economies like in Latin America. First, how does the development path under openness depend on the political system, and second, how does it depend on the trade regime in a feudal system? That is, we analyze the qualitative effects of a switch from a feudal society to a democracy under openness, and a switch from a feudal society under openness to autarky.

Suppose that, initially, the economy is in a steady state with $G = 0$ and $s = b = 1$, i.e., $A_Y(0) = \Psi(0, L_Y^I) \equiv \Psi_0^I > 0$. Again, we focus on $b = 1$.[28] Then, by virtue of the assumption that policy preferences of big landlords determine the political equilibrium in a feudal society, the following emerges.

Proposition 9. (Development path of SOE in feudal society). *Under A2, in political equilibrium of an open and feudal economy, there is neither development nor structural change; that is, the economy gets stuck at* $(A_Y(t), G(t), L_Y(t)) = (\Psi_0^I, 0, L_Y^I)$ *for all* $t \geq 0$.

As in the static version of the model, big landowners in an open economy have no incentive to vote for an institutional reform, which would raise both wage cost and taxes without affecting output prices. Thus, the ruling class of big landowners prevents both development and structural change under openness.

[28] This means, in analogy to the basic model, that big landowners do not want to give up their land at any time t under path $G(t)$ chosen by policy.

Next we consider the political equilibrium in democracy, which is determined by policy preferences of workers. Using (13), workers maximize

$$\int_0^\infty [\bar{p}A_Y(t) - G(t)]\, g(\bar{p}) e^{-\beta t} dt \quad \text{s.t.} \quad (14),\ (15),\ \lim_{T\to\infty} A_Y(T) \geq 0, \tag{17}$$

and given $A_Y(0) = \Psi_0^I$ and $L_Y(0) = L_Y^I$. We obtain the following result.

Proposition 10. (Development path of SOE in democracy). *Under A2, in political equilibrium of an open and democratic economy, the development path has the following properties.*

(a) In any steady state equilibrium, $G^* > 0$ *and* $A_Y^* = \left(f_Y(G^*)\,(L_Y^*)^\theta/\delta\right)^{\frac{1}{1-\gamma}} > \Psi_0^I$ *with* $L_Y^* \geq L_Y^I$.

(b) Initially, public investment jumps to $G(0) > 0$. *If* $\theta = 0$, *then for* $t > 0$, $A_Y(t)$ *and* $G(t)$ *gradually increase along a saddle path towards a unique steady state equilibrium. If* $\theta > 0$, *then there may be a further jump in* $G(t)$, *together with structural change. After this structural change,* $A_Y(t)$ *and* $G(t)$ *gradually increase along a saddle path towards higher steady state values than without structural change.*

Comparing Proposition 9 and 10, a democracy will always fare better under openness than a feudal society (as suggested by Proposition 4 in the static version of the model), and - whenever there are learning-by-doing effects from expansion of the manufacturing workforce ($\theta > 0$) - the more so if there is structural change.

<Figures 2, 3>

Fig. 2 depicts the phase diagram of the saddle path equilibrium adjustment to the steady state in an open and democratic economy without structural change (e.g., for $\theta = 0$), whereas Fig. 3 shows a development path with both structural change through learning-by-doing effects from employment in the $Y-$sector. The figures illustrate that under openness a switch from a feudal system (stuck at Ψ_0^I) to democracy starts a development process fueled by continuous investments in public education/infrastructure and, possibly, structural change.

We now examine the political equilibrium in a closed economy. It turns out that the development path is qualitatively similar under both a feudal system and a democracy if we assume Cobb-Douglas utility.

Proposition 11. (Development path under autarky in a feudal system). *Under A2, with Cobb-Douglas utility. In a closed economy political equilibrium under either political system, initially, public investment jumps to* $G(0) > 0$*, and for* $t > 0$*,* $A_Y(t)$ *gradually increases and* $G(t)$ *gradually decreases along a saddle path towards a unique steady state equilibrium. The steady state is characterized by* $A_Y^* > \Psi_0^I$*,* $G^* > 0$ *and* $L_Y^* = L_Y^I$*.*

<**Figure 4**>

Comparing Proposition 9 and 11, a feudal system experiences economic development under autarky but not under openness (as suggested by Proposition 3). Moreover, a closed democracy clearly fares better that an oligarchic system under an open trade regime. Fig. 4 illustrates the transition of the economy to a steady state under either political system in the Cobb-Douglas example, with gradually increasing labor productivity in the manufacturing sector. In contrast to the development process in an open and democratic economy (Proposition 10), there will never be structural change under Cobb-Douglas utility.

6 Evidence: The Case of New World Economies

This section discusses the empirical relevance of the basic mechanism underlying our result that landowner-dominated societies, when integrated into world commodity markets, do not support growth-promoting institutions like public schooling. The historical evidence on the political and economic structure of New World economies shows that the analyzed interaction between the political system, trade regime and public education indeed contributes to an understanding of the economic divergence between Latin America and today's advanced countries. Two groups of historical facts are relevant.

First, the oligarchic political system in Latin America after independence, the status of educational reforms and the role of human capital for industrialization in the late 19th century. Second, the integration of commodity markets in the 19th century, with Latin America exporting both agricultural goods and natural resources, in turn importing manufacturing ones.

6.1 Oligarchic Structures and Human Capital

As pointed out by Sokoloff and Engerman (2000), Engerman, Haber and Sokoloff (2000) and Engerman and Sokoloff (2002), although many parts of the Caribbean and South America have formally been democracies, they lacked secrecy in balloting and had both wealth and literacy requirements for voting. In addition, there has been an extreme inequality in land holding and human capital. For instance, only 2.4 percent of household heads in rural Mexico owned land in the year 1910, in contrast to 74.5 percent in the US in 1900 and 87.1 percent in Canada in 1901 (Engerman and Sokoloff, 2002). Moreover, illiteracy rates in most South American and Caribbean places have been (partly considerably) above 75 percent around 1870.[29] As a result, voting participation was usually below 10 percent. Moreover, in Spanish America "[e]lite families generally acted as local representatives of the Spanish government in the countryside during the colonial period and maintained their status long after independence" (Sokoloff and Engerman, 2000, p. 222). This has contributed, in addition to voting restrictions, to a persistence of an undemocratic and oligarchic political system.

Moreover, due to widespread illiteracy and the failure to adopt effective public education policies, "Latin America was unprepared for the petro-chemical industrial wave - the late 19th century 'second' industrial revolution - which embodied more complex technologies, larger scale and higher skill requirements" (Bértola and Williamson, 2003, p. 35). Rosenberg and Trajtenberg (2001) provide interesting evidence for the impor-

[29] In contrast, illiteracy rates in the US have already been down to 20 percent in 1870 and 17.5 percent in Canada 1861 (Engerman and Sokoloff, 2002; Tab. 8). See also Coatsworth (1993) for a discussion of differences in both wealth inequality and public schooling investments between Latin America and the US.

tance of human capital for industrialization in the late 19th century U.S. economy. They show that the adoption of the Corliss steam engine, a prime example of a general purpose technology at that time, was crucially affected by the regional availability of skill.

As pointed out by Reimers (2004), a widespread acceptance of the desirability of providing universal primary education - although long supported among a substantial group of "liberals" - was not reached in Latin America before the mid-20th century. Throughout the first half of the 20th century, "struggles between liberals and conservatives continued with the conservatives loosely representing the interests of the landed oligarchies" (Reimers, 2004, p. 10).[30]

6.2 Globalization in the 19th Century

Until the early 20th century, commodity markets were well integrated, even from today's perspective. O'Rourke (2001) provides an excellent survey which highlights the significant drop in transport costs and European tariff-cutting from mid-19th century onwards (followed by a "globalization backlash" in the early 20th century). With 9.7 percent, merchandise exports as share of GDP in Latin America as a whole in 1870 was as high as in 1998 (Maddison, 2000, Tab. 3-2b). Latin America exclusively exported agricultural goods like sugar, tobacco, coffee and other staple crops, and natural resources like silver or gold, well into the 20th century (Blattman, Hwang and Williamson, 2003). Tab. 1 shows, for instance, that over two-thirds of Brazilian exports have been coffee between 1878 and 1938, whereas silver was Mexico's major export in the late 19th century. Columbia mainly exported coffee and tobacco, whereas Peru's export portfolio, although to a substantial part consisting of sugar, was somewhat more diversified.

<Tables 1, 2>

[30] As a result, illiteracy rates in 1960 have still been 39 percent in Brazil, 55 percent in Honduras, and 35 percent in Mexico, down from 65, 67 and 77 percent in 1900, respectively, whereas those countries with relatively low illiteracy rates in 1900 also saw the largest drop until 1960: from 50 to 16 percent in Chile and from 53 to 9 percent in Argentina (Reimers, 2004, Tab. 6).

As shown in Tab. 2, exports shares were substantial in both New World economies and the European industrial core, in 1913 amounting to over 16 percent in Germany, the Netherlands and the UK, 9.1 percent in Mexico and 9.8 percent in Brazil. Moreover, trade volumes were increasing fast between 1870 and 1913. In addition, there have been enormous capital flows from the centre to the periphery. For instance, 32.7 of world FDI has been to Latin America between 1870 and 1910, and the share of net foreign inward investment in gross fixed capital formation was 70 percent in Argentina and 75 percent in Mexico (O'Rourke, 2001). Although direct data on import shares is not available, it is evident from the massive goods exports and capital imports that commodity imports to Latin America must have been enormous. This is consistent with our hypothesis that good access to manufacturing goods from the world market has governed policy preferences of big landowners.[31] As pointed out by Earle (2003), "in late nineteenth century Brazil, for example, the Sao Paulo elite spent the proceeds of their coffee plantations on [...] European luxury products. This pattern was repeated across Latin America". For instance, Orlove and Bauer (1997) provide details on the expansion of imports during Chile's belle époque. In particular, Chile's imports consisted of building materials and architectural design (in addition to foreign wine and hot beverages). Similarly, Langer (1997) provides insights into the significant consumption of high-quality European textiles in Bolivia, e.g., among mestizo farmers. These facts are consistent with our hypothesis that because of both export possibilities of agricultural commodities, in which Latin America had a comparative advantage, and consumption opportunities from imports of manufacturing goods, rich farmers had an incentive to support an open trade regime (Proposition 7).[32]

In addition to trade volumes as indicator for openness, there is overwhelming evidence on factor price convergence between Latin America and the European industrial core (e.g., O'Rourke et al., 1996; Williamson, 1998; O'Rourke, 2001). Like predicted by standard Heckscher-Ohlin trade theory, and consistent with our small open econ-

[31] In contrast to Latin America, countries like Germany and the UK had a well-developed manufacturing sector already in the 1870s. According to Broadberry (1998, Tab. 5), the manufacturing employment share was 33.5 percent in the UK 1871, and 24.7 percent in Germany 1875.

[32] See Rogowski (1989) for a similar line of reasoning.

omy assumption, rising external terms of trade in Latin America went along with a falling wage rate (for unskilled labor) and rising land returns. For instance, according to Williamson (1998, Tab. 1), the wage/rental ratio dropped by an annual rate of 4 percent in Argentina between 1870 and 1910, and by 3 percent in the New World as a whole. In our model, the external terms of trade are represented by $1/p$, which rises as p drops from p_{AUT} to $\bar{p}$ after market integration. For a given stage of development, reflected by manufacturing productivity, A_Y, this leads to a decrease in the wage rate, $w = pA_Y$, and a rise in $A_X - w \left[= I^B/\rho^B = I^S/\rho^S\right]$ which measures the land return in our model.

Although this section has provided compelling evidence in favor of our theory, one may object that tariffs in Latin America have been comparatively high in the mid-19th century, and did not decline for a prolonged period thereafter. So is this consistent with the hypothesis that big landowners have been the ruling class, determining policy outcomes, particularly - due to an open trade regime which they supported according to our theory - opposing educational reforms? In a series of papers, Williamson and co-authors examined the root of Latin American tariff policy, concluding that de-industrialization fears (of emerging industrialists, lobbying for protection) were entirely absent in 19th century Latin America (e.g., Coatsworth and Williamson, 2002; Bértola and Williamson, 2003). Rather, they document that revenue requirements, which were primarily determined by wars (between independence and 1880, Argentina, Brazil, Chile, Cuba, Mexico, Peru and Uruguay all fought at least two major wars) and internal power struggles, dictated tariff policy in the 19th century.[33] After independence, Latin American economies were characterized by both low taxation capacity and major hurdles to implement efficient tax collection (i.e., a lack of a functioning

[33] It is easy to extend our model to account for positive military spending together with zero schooling investments (i.e., $G = 0$) in political equilibrium of an open and oligarchic system. Note that tariffs have in common with the considered lump-sum taxation that both farmers and (given that they also consume some manufacturing products) workers bear some share of the tax burden. Now suppose that the utility function is given by $u(x, y) + Z(M)$, where M is military spending (and $Z' > 0$, $Z'' < 0$). Then a balanced budget requires that assumption A2 is replaced by $T_B(I) = T_S(I) = T_W(I) = G+M$, where T includes tariff revenues. Qualitatively our results remain unchanged with this extension, and, in addition, $M > 0$ and thus $T > 0$ will emerge in political equilibrium under either scenario.

bureaucracy). In contrast, customs revenue was easy to collect.[34] Moreover, from the perspective of landowners, relying on customs revenue for financing military spending, which accounted for "over 70 percent and often more than 90 percent of all revenues" (Bértola and Williamson, 2003, p. 18), was obviously preferred by landlords to its alternatives: a land or property tax (like in the U.S.).[35]

7 Concluding Remarks

This paper has proposed a two-sector general equilibrium model with tax-financed public education which addresses the long-standing debate of the comparatively slow development in many land- or resource abundant economies like in South America or the Caribbean, relative to a prospering North of what today is the US and Canada. Consistent with the hypotheses of Engerman and Sokoloff in a series of papers, based on overwhelming empirical evidence, we provided a politico-economic analysis which relates the divergence in development paths between New World economies to a failure to introduce or strengthen public education institutions in landowner-dominated, feudal systems. As a new aspect, we brought the role of trade regimes into this debate. We have argued that access to foreign manufacturing goods has been an important factor for the ruling class of big landowners to oppose productivity-enhancing institutions like public schooling. This has been an impediment for both development and structural change.[36] Our analysis suggests that negligence of public education provision and the dismal growth performance in formerly colonized countries might have been avoided under more restrictive trade constraints, and would not have occurred under more

[34] As pointed out by Centeno (1997, p. 1587): "Custom taxes represented an ideal solution to fiscal problems given the orgaizational ease with which they could be collected. A few soldiers in the main ports could provide considerable income."

[35] According to Centeno (1997, p. 1578), in Brazil, "taxes on wealth and production contributed to less than 4% of ordinary revenue even during the war years", and in Chile, "[l]and rents never accounted for more than 3% of total receipts". In contrast, "[t]ariffs were particularly attractive to the rural elite. [...] The fiscal use of trade thus contradicted any possibility of protectionists economic policy" (Centeno, 1997, p. 1588).

[36] In contrast, structural change in the US has been fast. The agricultural employment share in the U.S. has declined from 50 percent in 1870 to 32 percent in 1910, 20.9 percent in 1930 and 11 percent in 1950 (Broadberry, 1998, Tab. 5).

democratic constitutions. Stronger trade restriction would have meant less access of the elites to cheap manufacturing products from abroad. This raises the need to incur the costs of public investment for forming a productive labor force at home.

Interestingly, a similar argument may be made for the cotton exporters in the South of the U.S. in the 19th century. According to North (1961, pp. 133-134), "the dominant planter class [...] could see little return to them in investment in human capital. Expenditures to educate the large percentage of white southerners who were outside the plantation system was something they vigorously opposed" (see also Nicholls, 1956).

In contrast, the political preferences of workers (or people with little land) are in favor of institutions which foster the development of the manufacturing sector. Moreover, our analysis suggests that an open and democratic economy is typically most prone to structural change, compared to any alternative mix of the political system and trade regime.

What are the political implications of our analysis for developing countries today? Under the widely-accepted hypothesis that an effective public schooling system is a crucial factor for growth, first, it suggests that supporting democratization may be a prerequisite for the development of countries with a large agricultural or natural resource sector. Second, opening up an economy to goods trade without democratization may be harmful for the development process.[37]

However, the second policy lesson should be treated with caution. We should emphasize that one has to distinguish clearly between openness to goods trade and other forms of opening up the economy, e.g., to allow for factor mobility, foreign direct investment, and media-provided information, which are issues we have not studied here. In fact, both capital and labor mobility may have the often stressed positive growth effects due to technology transfer and knowledge spillovers (in addition to raising efficiency by equalizing marginal products) also under an oligarchic political system. Moreover,

[37] There is no shortage of theoretical approaches which are consistent with a negative relationship between openness and growth. These include, for instance, the infant-industry argument (e.g. Bardhan, 1970) or explanations related to endogenous growth through technical change (e.g., Grossman and Helpman, 1990; Young, 1991). In contrast, we have provided a politico-economic mechanism which suggests that a systematically negative relationship between openness and growth occurs in landowner-dominated elite societies only.

our focus was on the development process of economies through human capital investments rather than the usual static gains from trade. One should also note that, although openness may indeed have been an obstacle to growth in the 19th century (e.g., O'Rourke, 2000; Clemens and Williamson, 2001; Vamvakidis, 2002),[38] evidence for the late 20th century suggests the contrary (e.g., Harrison, 1995; Sachs and Warner, 1995).[39] In the context of our analysis this means that, contrary to a more historical perspective, landowners are no longer the ruling class even in oligarchic systems.

Appendix

A. Proofs

Proof of Lemma 1. First, note that $\tilde{\xi}'(G) = [\alpha_Y(G) - \alpha_X(G)]\,\xi/G$. Applying the implicit function theorem to (9), and substituting $\tilde{\xi}'$, we obtain $\partial\tilde{p}/\partial G = [\alpha_Y - \alpha_X]\,\xi\hat{L}_Y/[G\hat{R}D']$. Combining this with (9), we have

$$\frac{\partial\tilde{p}(\cdot)}{\partial G}\frac{G}{p} = \frac{\alpha_X(G) - \alpha_Y(G)}{\varepsilon(p)}, \tag{18}$$

where $\varepsilon(p) = -pD'(p)/D(p)$ has been used. Since $\varepsilon(p) > 0$, $\partial\tilde{p}(\cdot)/\partial G < 0$, according to assumption A1. Noting that $\hat{L}_Y(s,b)$ is decreasing and $\hat{R}(s,b)$ is increasing in both s and b, the effects of s and b on $\tilde{p}(G,s,b)$ immediately follow from (9). ■

Proof of Lemma 2. According to (10), $(\partial\tilde{w}/\partial G)(G/w) = (\partial\tilde{p}/\partial G)(G/p) + \alpha_Y$. After substitution of (18) the result is easily confirmed. ■

Proof of Proposition 1. The arguments which prove Proposition 1 are outlined

[38] In a sample of mostly European and New World economies, Vamvakidis (2002) finds that the relationship between openness (as measured by various indicators) and growth is negative for the time intervals 1870-1910 and 1920-1940, although statistically significant for the latter period only. Focussing on a panel of ten, nowadays rich countries for the period 1875-1914, O'Rourke provides evidence for a rather substantial positive relationship between tariffs and growth. In a similar vein, Clemens and Williamson (2001) find that tariffs have promoted growth from the 1870s until World War II.

[39] See, however, Yanikkaya (2003) for a modification of this result and Rodriguez and Rodrik (2001) for a critical review of the literature.

in the main text. ■

Proof of Corollary 1. According to Lemma 1, the result is obvious for cases (i) and (iii) of Proposition 1. For cases (ii) and (iv), note that $\tilde{w}(G, \hat{s}, 1) = w^S$ and $\tilde{w}(G, 0, \hat{b}) = w^B$ imply $\tilde{p}(G, \hat{s}, 1)\tilde{\xi}(G) = \rho^S/(1+\rho^S)$ and $\tilde{p}(G, 0, \hat{b})\tilde{\xi}(G) = \rho^B/(1+\rho^B)$, respectively. Since $\tilde{\xi}' > 0$, $\tilde{p}$ must decrease with G in both cases. This proves that $\tilde{p}_{AUT}(G)$ is declining in G within a given case. Now consider a switch between case (i) and (ii). Choose $\bar{G}$ so that $\tilde{w}(\bar{G}, 1, 1) = w^S$, i.e., $\tilde{p}(\bar{G}, 1, 1)\tilde{\xi}(G) = \rho^S/(1+\rho^S)$ and suppose that G is increased to $G' > \bar{G}$. If $\tilde{w}(G', 1, 1) < w^S$, then we stay in case (i) with $\tilde{p}(G', 1, 1) < \tilde{p}(\bar{G}, 1, 1)$, according to Lemma 1. If $\tilde{w}(G', 1, 1) > w^S$, then we switch to (ii) with $\tilde{w}(G', \hat{s}, 1) = w^S$ and thus $\tilde{p}(G', \hat{s}, 1)\tilde{\xi}(G') = \rho^S/(1+\rho^S) = \tilde{p}(\bar{G}, 1, 1)\tilde{\xi}(\bar{G})$. Since $\tilde{\xi}(G') > \tilde{\xi}(\bar{G})$, $\tilde{p}(G', \hat{s}, 1) < \tilde{p}(\bar{G}, 1, 1)$. Analogous arguments apply for switches between other cases. This concludes the proof. ■

Proof of Proposition 2. Follows immediately from comparing $w_{SOE} = \bar{p}f_Y(G)$ and threshold wages $w^i = A_X\rho^i/(1+\rho^i)$, $i = B, S$, using $\tilde{\xi}(G) = f_Y(G)/f_X(G)$. ■

Proof of Lemma 3. Part (i). Using $w = \bar{p}f_Y(G)$ and $p = \bar{p}$ in (12), we have

$$G^B_{SOE} = \arg\max_{G\geq 0} \left\{ \left[(f_X(G) - \bar{p}f_Y(G))\, \rho^B - G \right] g(\bar{p}) \right\}, \tag{19}$$

implying the first-order condition $f'_X(G) - \bar{p}f'_Y(G) \leq 1/\rho^B$, with strict equality if $G > 0$. Hence, if $f'_X(G) < 1/\rho^B + \bar{p}f'_Y(G)$ for all G (assumption A3), then $G^B_{SOE} = 0$. For the autarky case, consider the *Example*: $A_X = const.$, $u(x, y) = x^\chi y^{1-\chi}$. Then, w_{AUT} is independent of G in either scenario of Proposition 1. Moreover, it is easy to verify that $g(p) = \Lambda/p^{1-\chi}$, where $\Lambda \equiv \chi^\chi(1-\chi)^{1-\chi} > 0$. Using this and $p = w_{AUT}/f_Y(G) \equiv p_{AUT}$ in (12), we have

$$G^B_{AUT} = \arg\max_{G\geq 0} V^B_{AUT} \equiv \left[(A_X - w_{AUT})\, \rho^B - G \right] \Lambda \left(\frac{f_Y(G)}{w_{AUT}} \right)^{1-\chi}, \tag{20}$$

and

$$\frac{\partial V^B_{AUT}}{\partial G} = \left(-1 + \left[(A_X - w_{AUT})\rho^B - G \right] (1-\chi) \frac{f'_Y(G)}{f_Y(G)} \right) (p_{AUT})^{\chi-1}\Lambda. \tag{21}$$

Thus, $\partial V^B_{AUT}/\partial G = 0$ is equivalent to

$$\left[(A_X - w_{AUT})\rho^B - G\right]\frac{f'_Y(G)}{f_Y(G)} = \frac{1}{1-\chi}. \tag{22}$$

Since the left-hand side of (22) decreases from infinity to zero as G increases, the level of G implicitly defined by (22) is strictly positive. Moreover, (21) implies that $\partial^2 V^B_{AUT}/\partial G^2 < 0$ whenever $\partial V^B_{AUT}/\partial G = 0$. Thus, $G^B_{AUT} > 0$. This confirms part (i).

To prove part (ii), first, note that $G^W_{SOE} = \arg\max_{G\geq 0}\{[\bar{p}f_Y(G) - G]\, g(\bar{p})\}$, according to (13) with $w_{SOE} = \bar{p}f_Y(G)$. The expression for G^W_{SOE} then immediately follows from the corresponding first-order condition (also note that the second-order condition holds since $f''_Y < 0$). To examine G^W_{AUT}, we again consider the *Example*, for which

$$G^W_{AUT} = \arg\max_{G\geq 0} V^W_{AUT} \equiv [w_{AUT} - G]\,\Lambda\left(\frac{f_Y(G)}{w_{AUT}}\right)^{1-\chi}, \tag{23}$$

implying first-order condition

$$[w_{AUT} - G]\,\frac{f'_Y(G)}{f_Y(G)} \leq \frac{1}{1-\chi}, \tag{24}$$

with strict equality if $G > 0$. Like (22), this determines a unique $G^W_{AUT} > 0$. Moreover, it is straightforward to check that $\partial^2 V^W_{AUT}/\partial G^2\big|_{G=G^W_{AUT}} < 0$. ■

Proof of Proposition 3. Part (i) immediately follows from part (i) of Lemma 3. Evaluating (24) at $G^W_{SOE} = {f'_Y}^{-1}(1/\bar{p})$, we see that we can always find values of $\bar{p}$ or of the exogenous parameters determining w_{AUT} by (11) so that $G^W_{SOE} >, =, < G^W_{AUT}$. This confirms parts (ii). ■

Proof of Proposition 4. Part (i) follows from Lemma 3. Regarding part (ii), comparison of (22) and (24) reveals that $G^B_{AUT} > G^W_{AUT}$ in the *Example*, since $w_{AUT} < A_X\rho^B/(1+\rho^B) = w^B$ whenever big landlords are not inclined to become workers (Proposition 1). To see that also $G^B_{AUT} \leq G^W_{AUT}$ is possible, suppose again Cobb-Douglas utility but now assume $f'_X(G) > 0$. Also suppose, for instance, that G is in a range such that $(s_{AUT}, b_{AUT}) = (1,1)$, and thus, $w_{AUT} = z(1,1)f_X(G)$, where

$z(s,b) \equiv (1-\chi)\hat{R}(s,b)/[\chi\hat{L}_Y(s,b)]$, according to (11). Then, according to (20) and (23), respectively,

$$V^i_{AUT} = \left\{ \left[f_X(G)\phi^i - G\right] \Lambda \left(\frac{\tilde{\xi}(G)}{z(1,1)}\right)^{1-\chi} \right\}, \ i = B, W, \tag{25}$$

where $\phi^B \equiv (1 - z(1,1))\rho^B$ and $\phi^W \equiv z(1,1)$. Suppose that V^i_{AUT} is strictly concave in G for $i = B, W$, which holds under weak conditions.[40] Thus, $G^B_{AUT} < (=) G^W_{AUT}$ if $\partial V^B_{AUT}/\partial G|_{G=G^W_{AUT}} < (=)0$. Using (25), G^W_{AUT} is given by first-order condition $(1-\chi)\tilde{\xi}'/\xi = -\left[f'_X(G)\phi^W - 1\right] / \left[f_X(G)\phi^W - G\right]$. Substituting this into the expression for $\partial V^B_{AUT}/\partial G$, which can be calculated from (25), and noting that $m^B > m^W$ requires $\phi^B > \phi^W$, it is easy to show that $\partial V^B_{AUT}/\partial G|_{G=G^W_{AUT}} < (=)0$ if and only if $\alpha_X(G^W_{AUT}) > (=)1$. This concludes the proof. ■

Proof of Proposition 5. Part (a). To prove part (i), recall from Proposition 2, part (i), that $\bar{p}\tilde{\xi}(G^W_{SOE}) < \rho^S/(1+\rho^S)$ implies that small landlords do not want to become workers at $G = G^W_{SOE}$ under openness. If they are active as farmers, they prefer $G = 0$ if $f'_X(G) - \bar{p}f'_Y(G) < 1/\rho^S$ for all $G \geq 0$, according to (12). Since $\rho^B > \rho^S$, this always holds under A3. Also note that $\tilde{\xi}'(G) > 0$ under A1, i.e., $\tilde{\xi}(0) < \tilde{\xi}(G^W_{SOE})$. Thus, $\bar{p}\tilde{\xi}(0) < \rho^S/(1+\rho^S)$; that is, small landlords are indeed farmers at $G = 0$. This confirms part (i).

If $\bar{p}\tilde{\xi}(0) > \rho^S/(1+\rho^S)$, then, according to Proposition 2, part (ii), small landlords want to become workers at both $G = 0$ and $G = G^W_{SOE}$, which confirms part (ii).

Under the presumption of part (iii), small landlords are farmers if $G = 0$ and become workers if $G = G^W_{SOE}$, according to Proposition 2. Thus, they prefer $G = 0$ iff $(f_X(0) - \bar{p}f_Y(0))\,\rho^S g(\bar{p}) \geq \left[\bar{p}f_Y(G^W_{SOE}) - G^W_{SOE}\right] g(\bar{p})$, and prefer $G = G^W_{SOE}$ otherwise, where the left-hand side of the preceding inequality equals the maximum utility which can be obtained as farmer (recall that assumption A3 implies $(f'_X(G) - \bar{p}f'_Y(G))\,\rho^S <$

[40] A sufficient condition is $\tilde{\xi}'' \leq 0$. Using definition $\xi = f_Y/f_X$, it is easy to verify that $\tilde{\xi}'' \leq 0$ is equivalent to $2\alpha_X(\alpha_Y - \alpha_X) + \eta_Y\alpha_Y - \eta_X\alpha_X \geq 0$, where $\eta_j \equiv -Gf''_j/f'_j$, $j = X, Y$. Observing $\alpha_Y > \alpha_X$ (assumption A1), this holds, for instance, if $\eta_X \leq \eta_Y$.

1 for all $G \geq 0$), and the right-hand side the one which can be obtained as worker. Rearranging terms confirms part (iii).

Part (b). First, note that under autarky the interests of workers and small landlords coincide if $s < 1$. Thus, small landlords can never lose in this case when the political system is switching from an oligarchy (with G^B_{AUT}) to a democracy (with G^W_{AUT}) as long as $s < 1$. For $s = 1$, however, as $G^B_{AUT} >, =, < G^W_{AUT}$ is possible (Proposition 4), it is unclear whether small landlords gain or lose from a switch of the political system. ■

Proof of Proposition 6. Suppose $\bar{p}\tilde{\xi}(0) \leq \rho^S/(1+\rho^S) < \bar{p}\tilde{\xi}(G^W_{SOE})$, where $G^W_{SOE} = f'_Y{}^{-1}(1/\bar{p})$. According to Proposition 2, $s_{SOE} = 1$ if $G = 0$, whereas $s_{SOE} = 0$ if $G = G^W_{SOE}$. This implies that the economy switches to $s_{SOE} = 0$ in democracy, if starting from $G = 0$ before voting takes place. In contrast, since $G^B_{SOE} = 0$, the economy always gets stuck in $s_{SOE} = 1$ in a feudal society. ■

Proof of Proposition 7. First, recall that $G^B_{SOE} = 0$. Thus, according to (12), the ruling class of landlords is worse off (better off) in autarky compared to free trade iff

$$f_X(G^B_{AUT}) - p_{AUT} f_Y(G^B_{AUT}) < (>) \left(f_X(0) - \bar{p} f_Y(0)\right) \frac{g(\bar{p})}{g(p_{AUT})} + \frac{G^B_{AUT}}{\rho^B}, \qquad (26)$$

where $p_{AUT} = \tilde{p}_{AUT}(G^B_{AUT})$. First, suppose $G^B_{AUT} > 0$. According to assumption A3, $f'_X(G) - \bar{p} f'_Y(G) < 1/\rho^B$ for all $G \geq 0$. Taking integrals of both sides of this inequality with respect to G from 0 to G^B_{AUT} yields

$$f_X(G^B_{AUT}) - \bar{p} f_Y(G^B_{AUT}) < f_X(0) - \bar{p} f_Y(0) + \frac{G^B_{AUT}}{\rho^B}. \qquad (27)$$

Inequality (27) together with $p_{AUT} > \bar{p}$ and thus $g(p_{AUT}) < g(\bar{p})$ (since $g'(\cdot) < 0$) imply that the left-hand side of (26) is strictly smaller than the right-hand side of (26). For $G^B_{AUT} = 0$, the result immediately follows from (26). This concludes the proof. ■

Proof of Proposition 8. Using (13), workers are worse off (better off) in autarky compared to free trade iff

$$Q(\bar{p}) \equiv \left[\bar{p} f_Y(G^W_{SOE}) - G^W_{SOE}\right] g(\bar{p}) > (<) \left[w_{AUT} - G^W_{AUT}\right] g(p_{AUT}), \tag{28}$$

where $p_{AUT} = \tilde{p}_{AUT}(G^W_{AUT})$ and $w_{AUT} = \tilde{w}_{AUT}(G^W_{AUT})$. (Also recall $G^W_{SOE} = (f'_Y)^{-1}(1/\bar{p})$.) It suffices to look at our *Example*, in which $g(p) = \Lambda/p^{1-\chi}$. Using this, we next show that there always exists a $\bar{p} \in \mathbb{R}_{++}$ such that both sides of (28) are equal. To see this, first, note that the right-hand side of (28) is strictly positive, according to (24) and $G^W_{AUT} > 0$. Second, using the facts that $\bar{p} f'_Y(G^W_{SOE}) = 1$ and $g(p) = \Lambda/p^{1-\chi}$, we obtain that $Q'(\bar{p}) = \Lambda[\chi \bar{p} f_Y(\cdot) + (1-\chi) G^W_{SOE}]/\bar{p}^{2-\chi} > 0$. Third, by employing L'Hôpital's rule, we find that

$$\lim_{\bar{p}\to 0} Q(\bar{p}) = \frac{\Lambda \lim\limits_{\bar{p}\to 0} f_Y(G^W_{SOE})}{(1-\chi)\lim\limits_{\bar{p}\to 0} p^{-\chi}} = 0 \tag{29}$$

and, observing that $\lim\limits_{\bar{p}\to\infty} G^W_{SOE} \to \infty$,

$$\lim_{\bar{p}\to \infty} Q(\bar{p}) = \frac{\Lambda \lim\limits_{\bar{p}\to \infty} f_Y(G^W_{SOE})}{(1-\chi)\lim\limits_{\bar{p}\to \infty} p^{-\chi}} \to \infty. \tag{30}$$

This confirms that there exists a $\bar{p} \in \mathbb{R}_{++}$ such that (28) holds with equality. Denote this level by $\bar{p}_{AUT}$. Since $Q'(\bar{p}) > 0$, we find that openness (autarky) is preferred if $\bar{p} > (<) \bar{p}_{AUT}$. Moreover, since $\lim\limits_{\bar{p}\to 0} Q(\bar{p}) = 0$, it is obvious that there exists a $\bar{p}$ such that $\bar{p} < \bar{p}_{AUT}$ and $\bar{p} < p_{AUT}[= \tilde{p}_{AUT}(G^W_{AUT})]$, which proves that workers may prefer autarky if $\bar{p} < p_{AUT}$.

Finally, we need to show that also openness is possibly preferred if $\bar{p} < p_{AUT}$. The following specifications in our *Example* suffice. Let $f_Y(G) = 1 + G^{1/2}$, $\chi = 0.5$ (i.e., $g(p) = 0.5/\sqrt{p}$), $w_{AUT} = 1.25$, and $\bar{p} = 1$. Then, using $\bar{p} f'_Y(G^W_{SOE}) = 1$, we have $G^W_{SOE} = 0.25$, and $Q(1) = 0.625$. Moreover, using that G^W_{AUT} is given by (24), holding with equality, and denoting $c = \sqrt{G^W_{AUT}}$, we obtain after rearranging terms that c is given by $c^2 + 0.8c - 0.25 = 0$, i.e., $c = (\sqrt{41} - 4)/10 \approx 0.24$. Thus, $p_{AUT} = w_{AUT}/f_Y(G^W_{AUT}) = 1.25/(1+c) > 1[= \bar{p}]$. Moreover, since the utility level of workers under autarky is given by $[w_{AUT} - G^W_{AUT}]g(p_{AUT}) = [1.25 - c^2]\,0.5(p_{AUT})^{-1/2}$, we find that utility under autarky becomes $[1.25 - c^2]\sqrt{1+c}/\sqrt{5} \approx 0.59$, which is below the utility level of workers under openness, $0.625[= Q(1)]$. This concludes the proof. ■

Proof of Corollary 2. Follows from Proposition 2, by replacing $\tilde{\xi}(G)$ by $A_Y(t)/A_X$ and observing $L_Y = \hat{L}_Y(s_{SOE}, b_{SOE})$. ■

Proof of Proposition 9. Big landlords maximize

$$\int_0^\infty \left[\left(A_X - \bar{p}A_Y(t)\right)\rho^B - G(t)\right] g(\bar{p})e^{-\beta t}dt \text{ s.t. } (14), (15) \text{ and } \lim_{T\to\infty} A_Y(T) \geq 0, \quad (31)$$

given $A_Y(0) = \Psi^I_0$ and $L_Y(0) = L^I_Y$. It is thus obvious that they lose from any increase of productivity A_Y, be it directly from public investment or indirectly through structural change. ■

Proof of Proposition 10. To prove the result, we first derive the dynamical system arising under openness in democracy. We first neglect the evolution of L_Y conditional on A_Y, indicated by (15). Note that with our focus on $b = 1$, $L_Y \in \{L^I_Y, L^{II}_Y\}$. The current-value Hamiltonian function for the utility maximization problem (17), $\mathcal{H}^W_{SOE}$, reads

$$\mathcal{H}^W_{SOE} = [\bar{p}A_Y - G]\,g(\bar{p}) + \lambda\left[f_Y(G)\,(A_Y)^\gamma\,(L_Y)^\theta - \delta A_Y\right], \quad (32)$$

where λ is the current-value co-state variable associated with (14). The first-order conditions with respect to control variable G and state variable A_Y are given by $\partial\mathcal{H}^W_{SOE}/\partial G = 0$ and $-\partial\mathcal{H}^W_{SOE}/\partial A_Y = \dot{\lambda} - \beta\lambda$, respectively, i.e., we have[41]

$$\lambda = \frac{g(\bar{p})}{f'_Y(G)\,(A_Y)^\gamma\,(L_Y)^\theta} \implies \frac{\dot{\lambda}}{\lambda} = \eta_Y(G)\frac{\dot{G}}{G} - \gamma\frac{\dot{A}_Y}{A_Y}, \quad (33)$$

[41] The transversality condition associated with constraint $\lim_{T\to\infty} A_Y(T) \geq 0$ reads $\lim_{T\to\infty} e^{-\beta T}\lambda(T)A_Y(T) = 0$, which can be rewritten as $\lim_{T\to\infty} e^{-\beta T}A_Y(T)^{1-\gamma}/f'_Y(G(T)) = 0$, according to (33). Thus, if $\lim_{T\to\infty} A_Y(T) = const.$ and $\lim_{T\to\infty} G(T) = const.$, it becomes $\lim_{T\to\infty} e^{-\beta T} = 0$, i.e., for any steady state the transversality condition holds.

where $\eta_Y(G) \equiv -f_Y''(G)G/f_Y'(G) > 0$, and

$$\frac{\dot{\lambda}}{\lambda} = \beta + \delta - \gamma f_Y(G) (A_Y)^{\gamma-1} (L_Y)^{\theta} - \frac{\bar{p}g(\bar{p})}{\lambda}. \tag{34}$$

Substituting the expressions for λ and $\dot{\lambda}/\lambda$ from (33) into (34), using $\dot{A}_Y/A_Y = f_Y(G) (A_Y)^{\gamma-1} (L_Y)^{\theta} - \delta$ from (14), and rearranging terms, we get

$$\frac{\dot{G}}{G} = \frac{\beta + \delta(1-\gamma) - \bar{p}f_Y'(G) (A_Y)^{\gamma} (L_Y)^{\theta}}{\eta_Y(G)}. \tag{35}$$

We are now ready to prove part (a). Substituting (16) into (35), setting $\dot{G} = 0$ and rearranging terms, we obtain the following implicit characterization of steady state value G^*:

$$\bar{p}f_Y'(G^*) \left(\frac{f_Y(G^*)}{\delta}\right)^{\frac{\gamma}{1-\gamma}} (L_Y)^{\frac{\theta}{1-\gamma}} = \beta + \delta(1-\gamma) > 0. \tag{36}$$

Thus, since $\lim_{G\to 0} f_Y'(G) = \infty$ and $\lim_{G\to\infty} f_Y'(G) = 0$, given $L_Y \in \{L_Y^I, L_Y^{II}\}$, we have $0 < G^* < \infty$ for any G^* satisfying (36).[42] In turn, since $L_Y^I < L_Y^{II}$, this implies $A_Y^* = \left(f_Y(G^*) (L_Y^*)^{\theta} / \delta\right)^{\frac{1}{1-\gamma}} > \left(f_Y(0)(L_Y^I)^{\theta}/\delta\right)^{\frac{1}{1-\gamma}} = \Psi_0^I$. This confirms part (i).[43]

For part (b), note that $\partial \dot{A}_Y/\partial G > 0$, according to (14). Also note that, for given L_Y, $\partial\dot{G}/\partial A_Y < 0$, according to (35). We now turn to the $\dot{A}_Y = 0$ and $\dot{G} = 0$ loci in $A_Y - G-$space. From (14), it is easy to check that the $\dot{A}_Y = 0$ locus has a finite and strictly positive slope. Moreover, note that $\dot{G} = 0$ implies the relationship

$$\bar{p}f_Y'(G) = \frac{\beta + \delta(1-\gamma)}{(A_Y)^{\gamma} (L_Y)^{\theta}}. \tag{37}$$

Thus, observing the boundary conditions of f_Y' and $L_Y = \Phi(A_Y) \in \{L_Y^I, L_Y^{II}\}$, we have

[42] Due to the boundary conditions of f_Y', existence of a steady state equilibrium is ensured for $\theta = 0$.

[43] The steady state equilibrium can be defined as a pair (A_Y^*, G^*) which solves

$$\bar{p}f_Y'(G^*) \left(f_Y(G^*)/\delta\right)^{\frac{\gamma}{1-\gamma}} \Phi(A_Y^*)^{\frac{\theta}{1-\gamma}} = \beta + \delta(1-\gamma) \text{ and } A_Y^* = \left[f_Y(G^*)\Phi(A_Y^*)^{\theta}/\delta\right]^{\frac{1}{1-\gamma}},$$

according to (15), (16) and (36).

$G > 0$ for any $A_Y > 0$ at the $\dot{G} = 0$ locus. Moreover, given L_Y,

$$\left.\frac{\partial G}{\partial A_Y}\right|_{\dot{G}=0} = -\frac{\gamma\left[\beta + \delta(1-\gamma)\right]}{\bar{p} f_Y''(G)(L_Y)^{\theta}\left(A_Y\right)^{\gamma+1}} > 0. \tag{38}$$

Together with $\partial \dot{A}_Y / \partial G > 0$, $\partial \dot{G} / \partial A_Y < 0$ and the fact that $G > 0$ for any $A_Y > 0$ at the $\dot{G} = 0$ locus, public investment initially jumps to $G(0) > 0$, and the development path conditional on the employment regime (i.e., given L_Y) is a saddle path, as shown in Fig. 2. Now recall that $A_Y(0) = \Psi_0^I$. Thus, if $\theta = 0$, A_Y^* and G^* are independent of L_Y, and the steady state of the political equilibrium is characterized by the minimum levels of (A_Y^*, G^*) which solve (16) and (36), i.e., the dynamical system converges to a unique steady state equilibrium. If $\theta > 0$, gradual productivity increases may ultimately imply a switch from Regime I to II, according to Corollary 2, and thus may lead to a jump in G. It remains to be shown that structural change boosts both A_Y^* and G^*. To see this, note that an increase in L_Y, associated with structural change from Regime I to II, shifts the $\dot{A}_Y = 0$ locus (which is given by $f_Y(G)\left(L_Y\right)^{\theta} = \delta\left(A_Y\right)^{1-\gamma}$, according to (14)) downward and, according to (37), the $\dot{G} = 0$ locus upward (see Fig. 3). This concludes the proof of part (b). ■

Proof of Proposition 11. Recall that initially the economy is in Regime I. Moreover, with Cobb-Douglas utility, $w(t) = (1-\chi)\bar{R}A_X/[\chi L_Y^I] \equiv w^I$ is independent of A_Y under autarky, according to (11), and thus, time-independent. Thus, irrespective of the decisions of the pivotal class (of big landowners or workers, respectively), the economy is always in Regime I. Let us start with a feudal system. According to (12), big landlords maximize

$$\int_0^{\infty} \left[\left(A_X - w^I\right)\rho^B - G(t)\right] g(p(t)) e^{-\beta t} dt \text{ s.t. } (14), (15), \lim_{T\to\infty} A_Y(T) \geq 0, \tag{39}$$

given $A_Y(0) = \Psi_0^I$ and, for all t, $L_Y(t) = L_Y^I$. Recall that $g(p) = \Lambda/p^{1-\chi}$ in the Cobb-Douglas case. Moreover, $p(t) = w^I/A_Y(t)$. Thus, the current-value Hamiltonian function for the utility maximization problem (39), $\mathcal{H}_{AUT}^{B}$, can be written as[44]

$$\mathcal{H}_{AUT}^{B} = \left[\left(A_X - w^I\right)\rho^B - G\right](A_Y)^{1-\chi}\Theta + \lambda\left[f_Y(G)\left(A_Y\right)^{\gamma}\left(L_Y\right)^{\theta} - \delta A_Y\right], \qquad (40)$$

where $\Theta \equiv \Lambda\left[(1-\chi)\bar{R}A_X/(\chi L_Y^I)\right]^{\chi-1} > 0$. The first-order conditions $\partial\mathcal{H}_{AUT}^{B}/\partial G = 0$ and $-\partial\mathcal{H}_{AUT}^{B}/\partial A_Y = \dot{\lambda} - \beta\lambda$ imply

$$\lambda = \frac{\Theta(A_Y)^{1-\chi-\gamma}}{f_Y'(G)(L_Y)^{\theta}} \implies \frac{\dot{\lambda}}{\lambda} = \eta_Y(G)\frac{\dot{G}}{G} + (1-\chi-\gamma)\frac{\dot{A}_Y}{A_Y} \qquad (41)$$

(recalling $\eta_Y(G) = -f_Y''(G)G/f_Y'(G)$), and

$$\frac{\dot{\lambda}}{\lambda} = \beta + \delta - \gamma f_Y(G)\left(A_Y\right)^{\gamma-1}\left(L_Y\right)^{\theta} - \frac{(1-\chi)\Theta\left[\left(A_X - w^I\right)\rho^B - G\right](A_Y)^{1-\chi}}{\lambda}. \qquad (42)$$

Combining (41), (42) and (14), and rearranging terms, we obtain

$$\frac{\dot{G}}{G} = \frac{\beta + \delta(2-\chi-\gamma) - (1-\chi)(A_Y)^{\gamma-1}(L_Y)^{\theta}\left[\left[\left(A_X - w^I\right)\rho^B - G\right]f_Y'(G) + f_Y(G)\right]}{\eta_Y(G)}. \qquad (43)$$

Thus, $\partial\dot{G}/\partial A_Y > 0$ (recall $\gamma < 1$), and $\dot{G} = 0$ implies

$$(A_Y)^{\gamma-1}\left[\left[\left(A_X - w^I\right)\rho^B - G\right]f_Y'(G) + f_Y(G)\right] = \frac{\beta + \delta(2-\chi-\gamma)}{(1-\chi)(L_Y)^{\theta}}. \qquad (44)$$

We find

$$\left.\frac{\partial G}{\partial A_Y}\right|_{\dot{G}=0} = \frac{(1-\gamma)\left[f_Y'(G) + \frac{f_Y(G)}{(A_X - w^I)\rho^B - G}\right]}{f_Y''(G)A_Y} < 0. \qquad (45)$$

Moreover, combining $\left(A_Y^*\right)^{1-\gamma} = f_Y(G^*)\left(L_Y^*\right)^{\theta}/\delta$ from (16) with (44),

$$\frac{\left[\left(A_X - w^I\right)\rho^B - G^*\right]f_Y'(G^*)}{f_Y(G^*)} + 1 = \frac{\delta}{1-\chi}\left[\beta + \delta(2-\chi-\gamma)\right]. \qquad (46)$$

Since the left hand side of (46) is strictly decreasing from infinity to approaching zero, we have $G^* > 0$. In sum, the preceding results give rise to the phase diagram in Fig.

[44] Again, λ is the current-value co-state variable associated with (14). Moreover, it can again be shown that the transversality condition holds.

4.

For the political equilibrium in a closed democracy, just replace the gross income of big landowners in Regime I, $\left(A_X - w^I\right)\rho^B$, with the wage rate w^I (i.e., the income of workers in Regime I) everywhere (compare (12) and (13)), which reveals that the dynamical system under autarky is qualitatively similar in either political system. This concludes the proof. ■

B. Introducing a Land Market

In the main text, our assumptions endogenously removed transactions of land from the model when structural change occurred. Small landlords left their land idle when becoming a worker. In this appendix, we extend our framework by introducing a land market in the analysis.

The key modification is to relax the following two assumptions: first, that small landlords have to devote their entire unit time endowment to supervise production, and second, that the supervising capacity of big landowners is limited to the initially possessed land. Formally, this is captured by modifying the technology available for small landlords to

$$x^S = A_X^S \min(\rho^S, l^S) + a. \tag{47}$$

where the term $a > 0$ (which may be a function of ρ^S) indicates that a small landlord is productive on his land apart from supervising, $A_X^S \geq 0$. $A_X^S = 0$ implies that he does not employ dependent workers. The technology of big landlords still has the form $x^B = A_X^B \min(\rho^B, l^B)$, where, possibly, $A_X^B \neq A_X^S$.[45] However, in contrast to the assumption in the main text, they can supervise work at additional land without hiring a supervising agent. Let π denote the price per unit of land and suppose $A_X^S > 0$ first. Then a small landlord is willing to sell his land and become worker if $w + \pi\rho^S \geq (A_X^S - w)\rho^S + a$, which is equivalent to $\pi \geq A_X^S + \left[a - w(1+\rho^S)\right]/\rho^S \equiv \pi^S$. π^S is a small landlord's "willingness to accept" a buy offer. The "willingness to pay" of

[45] Allowing for $A_X^B > A_X^S$ captures, for instance, that big landlords, which may be thought of early settlers in the New World economies, had access to more fertile land or, due to size advantages, were able to exploit scale economies (Sokoloff and Engerman, 2000; Engerman and Sokoloff, 2002).

big landlords for a unit of land is given by $\pi^B \equiv A_X^B - w \left[= I^B/\rho^B\right]$. Thus, small landowners are both willing and able to sell their land to big landowners whenever $\pi^S \leq \pi \leq \pi^B$. Note that $\pi^S \leq \pi^B$ is equivalent to $w \geq a - \rho^S(A_X^B - A_X^S) \equiv \bar{w}$. If $\bar{w} \leq 0$, then land is sold immediately at some price between π^S and π^B, so small landlords would disappear from the model. Suppose $\bar{w} > 0$, i.e., the average land productivity in small farms must exceed that of big farmers for this land, e.g., because of particular effort a small landowner exerts. Moreover, we have to ensure that the resulting equilibrium land price, $A_X^B - \bar{w}$, is positive. In sum, $0 < \bar{w} < A_X^B$, which requires $A_X^B < A_X^S + a/\rho^S < A_X^B(1 + 1/\rho^S)$. If $A_X^S = 0$, a similar logic applies. It is easy to show that, in this case, the willingness to accept for a small landowner is $\pi^S = (a - w)/\rho^S$. If $A_X^B \geq a/\rho^S$, then $\pi^S \leq \pi^B$ for any w and small landowners disappear from the model. Supoose $A_X^B < a/\rho^S$. Then, for any w, $\pi^S > \pi^B$ if $\rho^S \geq 1$. No land market can arise in this case. For $\rho^S < 1$, $\bar{w} = (a - \rho^S A_X^B)/(1 - \rho^S)$, and $0 < \bar{w} < A_X^B$ if $a < A_X^B < a/\rho^S$.

We focus on the specifications of the dynamic model, i.e., productivity parameters A_X^B and A_X^S are constants and utility is Cobb-Douglas. Thus, under autarky, w is independent of the stage of development, so either land is sold in the initial period at price $A_X^B - \bar{w}$ or structural change never occurs. In contrast, under openness, no land is sold ($s_{SOE} = 1$) as long as $w < \bar{w}$, whereas $s_{SOE} = 0$ when $w \geq \bar{w}$. Thus, (15) has to be modified to $L_Y(t) = L_Y^I$ if $A_Y(t) < \bar{w}/\bar{p}$ (early stage of development) and $L_Y(t) = L_Y^{II}$ in a later stage of development, i.e., structural change eventually occurs in the process of development if initial productivity $\Psi_0^I < \bar{w}/\bar{p}$. Most importantly, Propositions 9-11 hold under the modifications of this appendix. As the equilibrium land price, $\pi = A_X^B - \bar{w}$, is equal to the willingness to pay of big landowners, they don't get any rent from acquiring land in economic equilibrium. This implies that their policy preferences towards public investment G remain unaffected under either trade regime.

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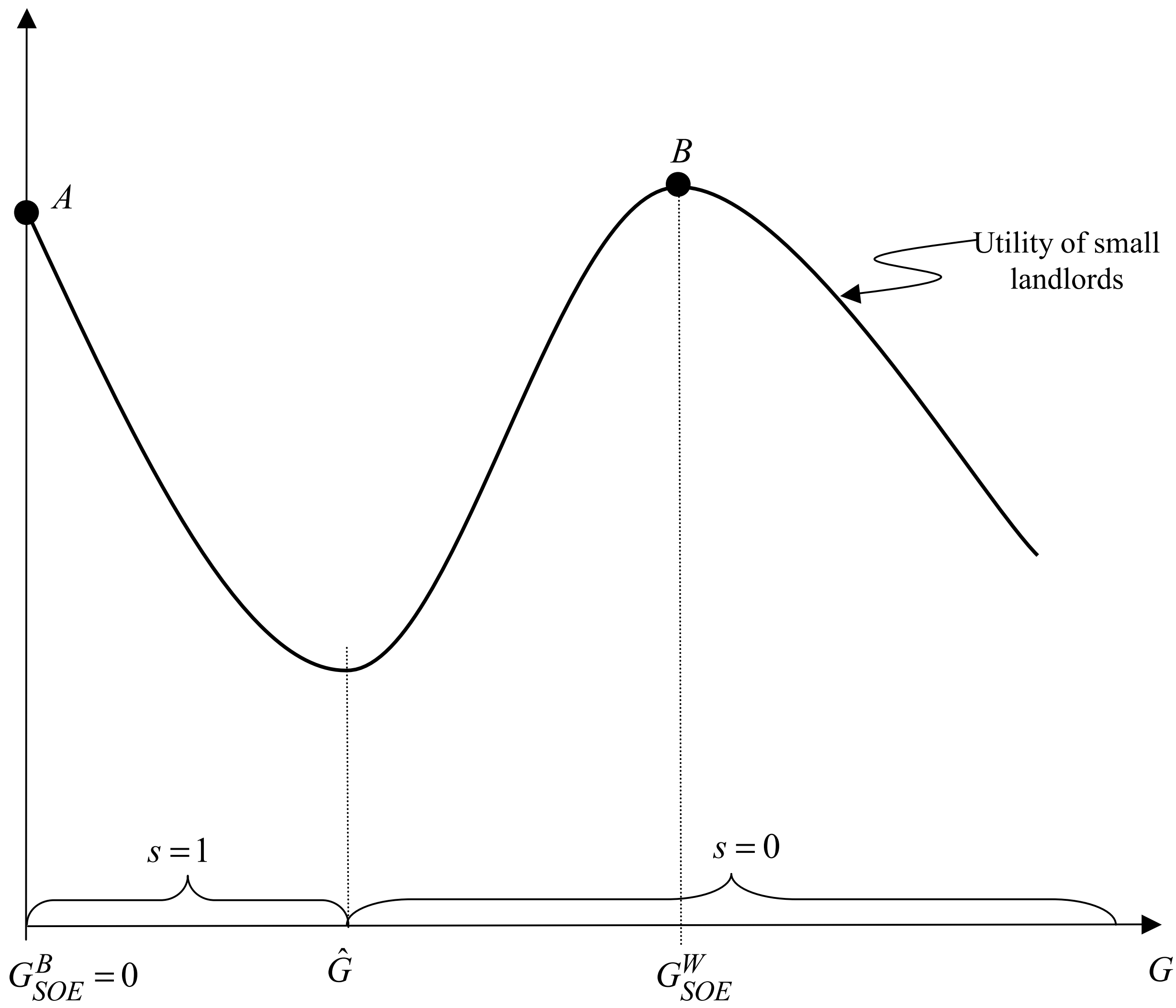

Figure 1: Illustration of part (a) of Proposition 4.

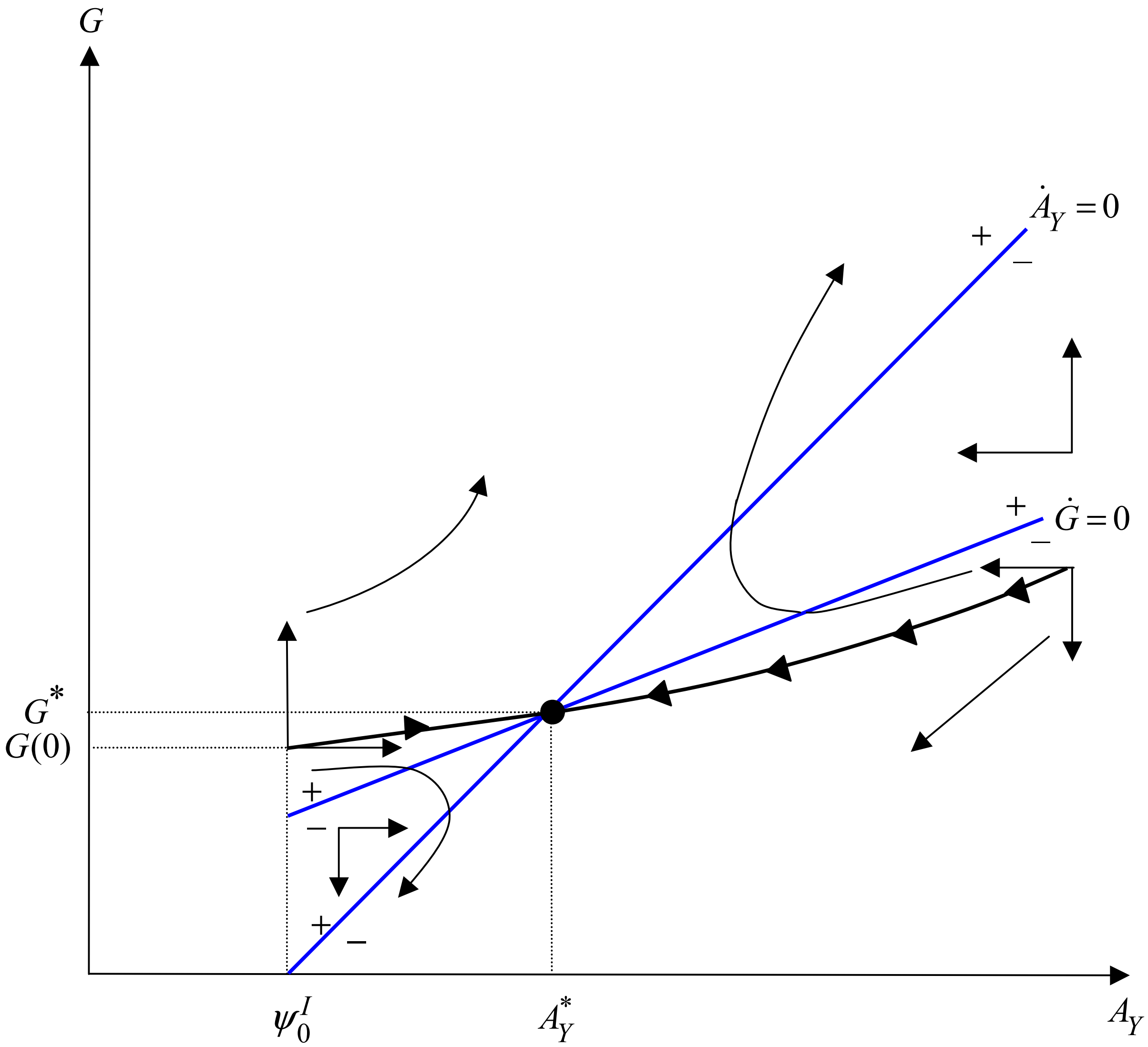

Figure 2: Saddle path equilibrium in an open and democratic economy if $\theta = 0$.

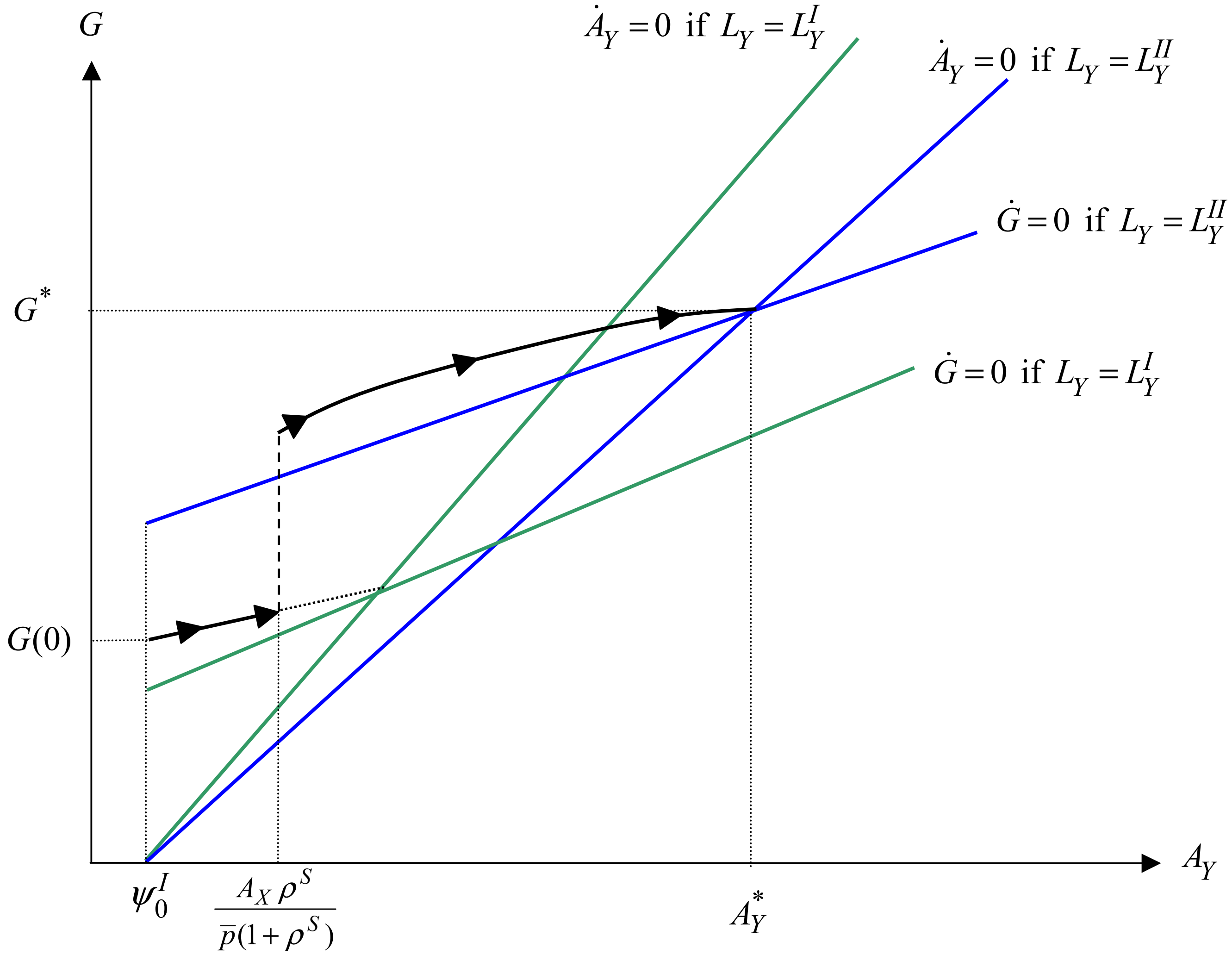

Figure 3: Development path in an open and democratic economy if $\theta > 0$, characterized by structural change from Regime I to Regime II.

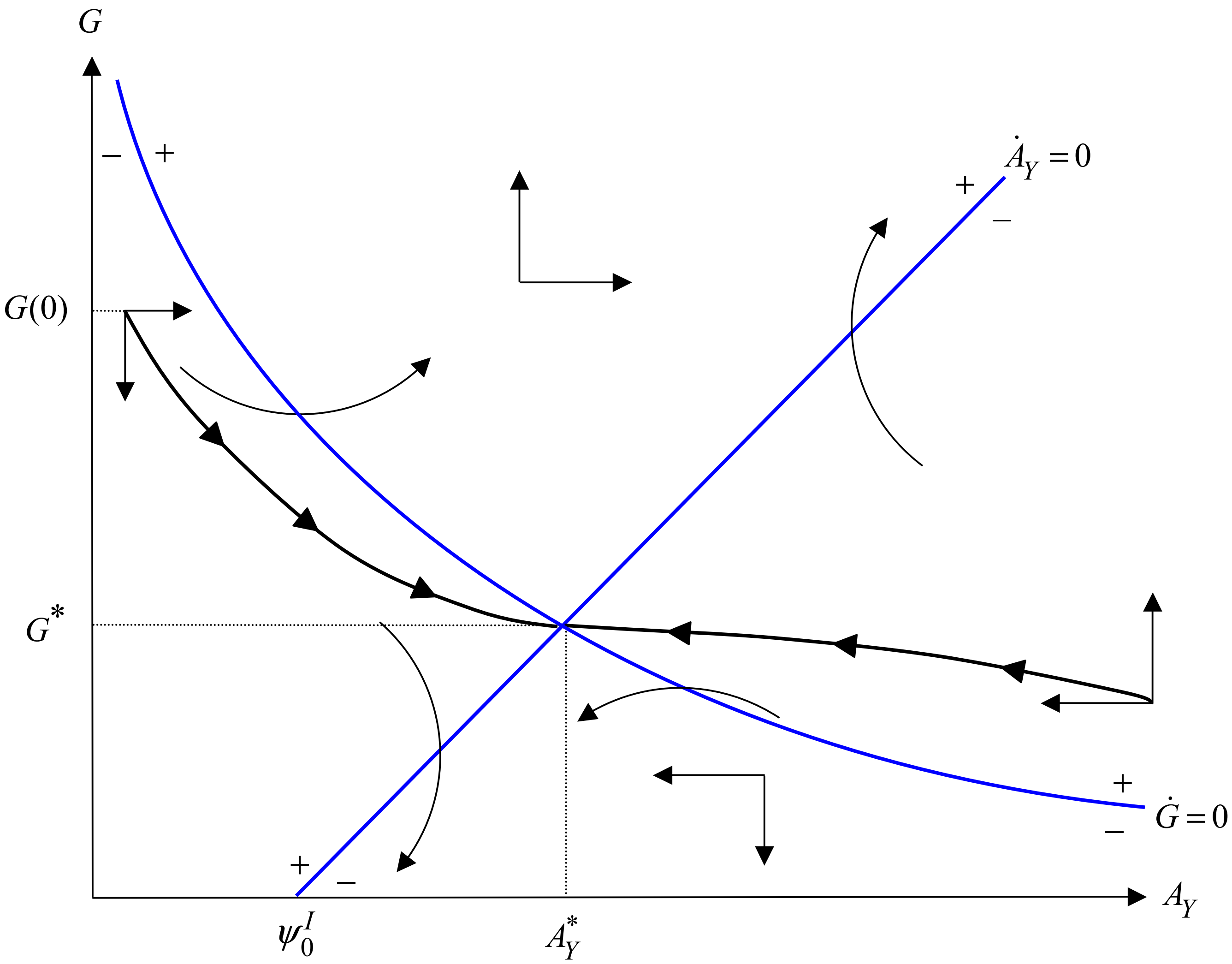

Figure 4: Phase diagram in a closed economy under either political system (Cobb-Douglas utility).

	1878-1882				1898-1902			
	Primary	**%**	**Secondary**	**%**	**Primary**	**%**	**Secondary**	**%**
Argentina	Wool	56	Hides	31	Wool	35	Wheat	23
Uruguay	Hides	44	Wool	30	Wool	40	Hides	32
Brazil	Coffee	70	Sugar	16	Coffee	65	Rubber	26
Chile	Copper	68	Nitrate	32	Nitrate	81	Copper	19
Colombia	Tobacco	61	Coffee	39	Coffee	92	Tobacco	8
Mexico	Silver	92	Coffee	7	Silver	75	Copper	11
Peru	Sugar	48	Silver	26	Sugar	32	Silver	23

	1920-1924				1934-1938			
	Primary	**%**	**Secondary**	**%**	**Primary**	**%**	**Secondary**	**%**
Argentina	Wheat	31	Maize	20	Maize	25	Meat	22
Uruguay	Meat	41	Wool	39	Wool	54	Meat	31
Brazil	Coffee	83	Sugar	6	Coffee	68	Cotton	24
Chile	Nitrate	75	Copper	25	Copper	62	Nitrate	38
Colombia	Coffee	98	Tobacco	2	Coffee	74	Petroleum	26
Mexico	Petroleum	69	Silver	16	Silver	31	Petroleum	31
Peru	Sugar	31	Cotton	28	Petroleum	40	Cotton	27

Table 1: Major exports in Latin America around 1900.

Source: Blattman, Hwang and Williamson (2003, Tab. 1).

	Exports/GDP		Annual Change
	1870	**1913**	**1870-1913**
France	4.9	7.8	2.8
Germany	9.5	16.1	4.1
Netherlands	17.4	17.3	2.3
UK	12.2	17.5	2.8
Argentina	-	-	5.2[a]
Brazil	12.2	9.8	1.9
Chile	-	-	3.4
Columbia	-	-	2.0
Mexico	3.9	9.1	5.4[b]
Peru	-	-	
Canada	-	-	4.1
US	2.5	3.7	4.9

Table 2: Merchandise exports around 1900 as percent of GDP and annual average growth rate of volume. New world and European industrial core.

Source: Maddison (2000, Tab. 3-10, F-5)

[a] 1877-1912, [b] 1877/8-1910/1