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Divergence and Overtaking:
Land Abundance as a Hurdle for Education Reforms*

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Abstract

This research suggests that the distribution of land within and across countries and its impact on the nature of the transition from an agrarian to an industrial economy have been a prime determinate of sustained differences in human capital, income levels, and growth patterns across countries. Land abundance, which was beneficial for the process of development in early stages, has generated a hurdle for human capital accumulation in later stages, retarding the process of industrialization and the transition to modern growth. The qualitative change in the role of land abundance in the process of development has brought about changes in the ranking of countries in the world income distribution. Some land abundant economies, which were associated with the club of the rich economies in the pre-industrial revolution era, were overtaken in the process of industrialization. The basic premise of this research, regarding the negative attitude of landowners towards education reforms, is supported empirically by a newly constructed data set on the voting patterns on England's education reform proposed in the Balfour Act of 1902.

Keywords: Land Inequality, development, human capital accumulation, growth

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1 Introduction

This research argues that the distribution of land within and across countries and its impact on the nature of the transition from an agrarian to an industrial economy have been a prime determinate of sustained differences in human capital, income levels, and growth patterns across countries. Land abundance, which was beneficial for the process of development in early stages, has generated a hurdle for human capital accumulation in later stages, retarding the process of industrialization and the transition to modern growth.[1] This qualitative change in the role of land abundance in the process of development has brought about changes in the ranking of countries in the world income distribution. Some land abundant economies, which were associated with the club of the rich economies in the pre-industrial revolution era, were overtaken in the process of industrialization.

The theory suggests that due to the limited degree of complementarity between human capital and land, the implementation of growth enhancing universal public schooling in early stages of development has not gained the support of landowners. Due to the complementarity between capital and skills, human capital has affected the industrial production process significantly and the agricultural one only modestly.[2] Universal human capital accumulation and the associated differential increase in labor productivity induced therefore labor migration from agriculture to industry, a rise in the returns to labor and physical capital and a decline in the return to land.[3] Hence, although universal public education has been growth enhancing, landowners had no incentive to support it as long as their stake in the productivity of other segment of the economy was insufficient

[1]The potentially adverse relationship between resources and growth is evident even in smaller time frames. Sachs and Warner (1995) and Gylfason (2001) document a significant inverse relationship between natural resources and growth in the post World-War II era. Gylfason finds that a 10% increase in the amount of natural capital is associated with a fall of about 1% in the growth rate.

[2]This would hold as long as the technological environment in the agricultural sector is relatively stable.

[3]Consistent with the proposed theory, Besley and Burgess (2000) find that over the period 1958-1992 in India, land reforms have raised agricultural wages, despite an adverse effect on agricultural output.

(due to limited ownership of physical capital and labor, or modest gains from aggregate taxation through public goods and extraction).

Since the relative importance of returns to labor and physical capital for each landowner is inversely related to his land ownership, the economic interest of landowners in the productivity of other segments of the economy is adversely affected by the economy's land abundance and by the degree of inequality in its distribution. Hence, provided that landowners have affected the political process and thereby the implementation of education reforms, land abundance and inequality in the distribution of land have been a hurdle for human capital accumulation and have thereby impeded the process of industrialization and the transition to modern growth.[4]

The accumulation of physical capital in the process of industrialization raised the importance of human capital in production due to capital skill complementarity. Nevertheless, due to credit markets imperfections, investment in human capital was sub-optimal and the implementation of educational policies that promote investment in human capital were growth enhancing. In economies where agricultural land was abundant relative to the population and its ownership was distributed rather unequally (i.e., economies in which land per landowner was relatively large), an inefficient education policy persisted and the growth path was retarded.[5] In contrast, in societies in which agricultural land was scarce relative to the size of the population or land ownership was distributed rather equally, the process of development brought about the implementation

[4]Consistently with the proposed theory that land per capita as well as land per landlord affects the process of development, Deininger and Squire (1998) document that growth in the period 1960-1992 as well as the level of education are inversely related to land inequality (across landlords) and the relationship is more pronounced in developing countries. Furthermore, Gylfason (2001) argues that natural resources crowd out human capital. In a cross section study, he reports significant negative relationships between the share of natural capital in national wealth and public spending on education, expected years of schooling, and secondary-school enrollments. slowing down the pace of economic development.

[5]In contrast to the political economy mechanism proposed by Persson and Tabellini (2000), where land concentration induces landowners to divert resources in their favor via distortionary taxation, in the proposed theory land concentration induces lower taxation so as to assure lower public expenditure on education, resulting in a lower economic growth..The proposed theory is therefore consistent with empirical findings that taxation is positively related to economic growth (e.g., Perotti (1996)).

of growth enhancing education policies in the form of public schooling.

The process of industrialization fueled by the accumulation of physical capital, is accompanied by an increase in the fraction of physical capital in landowner's portfolio. The economic interest of landowners in the productivity of the industrial sector intensifies and the attitude of landowners towards educational reforms may ultimately alter. Since the importance of returns to labor and physical capital for each landowner is inversely related to his land ownership, the timing of the implementation of universal public education in each economy is inversely related to its land abundance and the inequality in the distribution of ownership over it.

The basic premise of this research, regarding the negative attitude of landowners towards education reforms, is supported by the voting patterns on the Balfour Act of 1902 – the proposed education reform in England that marked the consolidation of a national education system and the creation of a publicly supported secondary school system. In light of the proposed theory, one would expect that variations in the support of the Ministers of Parliament (MPs) for the Balfour Act would reflect the variations in the agricultural and resource intensity in the counties they represent. In contrast to MPs from industrial-intensive counties, those from agricultural and resource intensive counties, would be expected to oppose the imposition of this new education system.

We construct a data set gathered from a variety of historical sources. The data combines the home districts, and party affiliation of each MP with the voting record of each MP on the Balfour Act and the percentage of employment in agriculture and mining in the MP's county as well as the average wage in each county. The empirical analysis shows that there exists a significant inverse relationship between the share of employment in agriculture and mining in a district and the propensity for their MPs to vote in favor of the education reform proposed by the Balfour Act of 1902.

In addition, anecdotal evidence suggests that indeed the distribution of land within and across countries affected the nature of the transition from an agrarian to an industrial economy and has been a prime determinate of sustained differences in human capital, income levels, and growth patterns across countries.

The link between land reforms and the increase in governmental investment in education that is apparent in the process of development of several countries lends credence to the proposed theory. For instance, it is apparent that the process of development in Korea is marked by a major land reform that is followed by a massive increase in governmental expenditure on education. During the Japanese occupation in the period 1905-1945, land distribution in Korea became increasingly skewed. By 1945, nearly 70% of Korean farming households were simply tenants [Eckert, 1990]. In 1949, the Republic of Korea instituted the Agricultural Land Reform Amendment Act that drastically affected landholdings. Individuals could only own land if they cultivated or managed it themselves, they could own a maximum of three hectares, and land renting was prohibited. This land reform had dramatic effect on land ownership. Owner cultivated farm households increased from 349,000 in 1949 to 1,812,000 in 1950, and tenant farm households declined from 1,133,000 in 1949 to nearly zero in 1950. [Yoong, 2000]. Consistent with the proposed theory, following the decline in the inequality in the distribution of land, expenditure on education soared. In 1948, Korea allocated 8% of government expenditures to education. Following a slight decline due to the Korean war expenditure has increased to 9.2% in 1957 and 14.9% in 1960, remaining at about 15% thereafter. Land reforms and the subsequent increase in governmental investment in education were followed by a stunning growth performance that permitted Korea to nearly triple its wealth relative to the United States in about twenty years, from 9% of in 1965 to 25% in 1985.

Korea's process of development is consistent with the proposed theory about the relationship between scarcity of land and the level of output in early stages of development, as well as for the effect of the distribution of land ownership on human capital accumulation and economic growth in later stages of development. Prior to its land reforms

Korea stagnated and its income level was well below that of land-abundant countries in North and South America. However, in the aftermath of the Korean Land reforms, and its apparent effect on human capital accumulation, Korea overtook some land abundant countries in South America that were characterized by unequal distribution of land, as depicted in Table 1.

North and South America provide additional anecdotal evidence for differences in the process of development, and possibly overtaking, due to the effects of the distribution of land ownership on education reforms within land-abundant economies. As argued by Sokoloff (2000) the original colonies in North and South America had vast amounts of land per person and income levels comparable to the European ones. North and Latin America differed in the distribution of land and resources. The United States and Canada were deviant cases in their relatively egalitarian distribution of land. For the rest of the new world, land and resources were concentrated in the hand of a very few, and this concentration persisted over a very long period [Sokoloff, 2000]. As late as 1924 in Chile, for example, 0.7% of landowners held 62.3% of the property [Loveman, 1974]. In Mexico in 1910, 0.2% of the active rural population owned 87% of the land [Estevo, 1983]. Consistent with the proposed theory, these differences in land distribution between North and Latin America, were associated with significant differences in investment in human capital. As argued by Coatsworth (1993 pp 26-7) In the US there was a "...widespread property ownership, early public commitment to certain kinds of social spending (especially on education), and a lesser degree of concentration of wealth and income.", whereas in Latin America, "...public investment in human capital and public spending on social services remained well below the levels achieved at comparable levels of national income in more developed countries." Furthermore, echoing these statements, Sokoloff (2000) maintains that all of the economies in the western hemisphere were rich enough in the early 19th century to have established primary schools, yet only the United States and Canada actually made the investments necessary to educate the general population. The proposed theory suggests that the divergence in the growth performance of North and Latin America in the second half of the twentieth century, as documented in Table 1 (e.g., Argentina vs. the US), may be attributed in part to the more equal distribution of land in the North, whereas the overtaking (e.g., Korea vs. Argentina, Taiwan vs. Chile, etc.) may be attributed to the positive effect of land abundance in early stages of development and the adverse effect in later stages of development.

The comparison between the densely populated countries of Japan and Hong Kong, to the land abundance countries of South American is striking as well. In 1965, South America was nearly as rich as Japan, and Argentina was in fact richer. Yet by 1985, Japan and Hong Kong were in the club of the richest countries, while South American nations are absent from this club. Not only did most of South America not grow in relation to the U.S., they actually lost ground over this period.

The disparity in income per capita across countries has markedly increased in the last two centuries and reversals of relative income levels have been documented [Pritchett, 1997, Quah 1997, Lucas, 2000, and Acemoglu, Johnson, and Robinson, 2002]. Divergence and overtaking, was attributed to initial differences in effective resources [Galor and Weil, 2000], geography [Diamond 1997, and Sacks and Werner 1995] institutions [North, 1981, Engerman and Sokoloff, 1997, Acemoglu et al.2001], asymmetrical effects of international trade [Galor and Mountford, 2001] and the voracity effect [Lane and Tornel, 1996].[6]

In contrast, the proposed theory suggests that natural resources that made some economies rich initially is in fact the factor that led these economies to choose an inefficient level of investment in human capital that affected adversely their growth path. Land and resource abundance, which made nations prosperous in the eve the industrial revolution, had generated economic incentives for their owners that stifle growth over the next 200 years.

[6]See Roderigues and Sacks (1999) as well.

2 The Basic Structure of the Model

Consider an overlapping-generations economy in a process of development. In every period the economy produces a single homogeneous good that can be used for consumption and investment. The good is produced in an agricultural sector and in a manufacturing sector using land, physical and human capital as well as raw labor. The stock of physical capital in every period is the output produced in the preceding period net of consumption and human capital investment, whereas the stock of human capital in every period is determined by the aggregate public investment in education in the preceding period. The supply of land is fixed over time and output grows due to the accumulation of physical and human capital.

2.1 Production of Final Output

The output in the economy in period t, y_t, is given by the aggregate output in the agricultural sector, y_t^A, and in the manufacturing sector, y_t^M;

$$y_t = y_t^A + y_t^M. \tag{1}$$

2.1.1 The Agricultural Sector

Production in the agricultural sector occurs within a period according to a neoclassical, constant-returns-to-scale production technology, using labor and land as inputs. The output produced at time t, y_t^A, is

$$y_t^A = F(X_t, L_t), \tag{2}$$

where X_t and L_t are land and the number of workers, respectively, employed by the agricultural sector in period t. Hence, workers' productivity in the agricultural sector is independent of their level of human capital. The production function is strictly increasing and concave, the two factors are complements in the production process, $F_{XL} > 0$, and the function satisfies the neoclassical boundary conditions that assure the existence of an interior solution to the producers' profit-maximization problem.[7]

Producers in the agricultural sector operate in a perfectly competitive environment. Given the wage rate per worker, w_t^A, and the rate of return to land, ρ_t, producers in period t choose the level of employment of labor, L_t, and land, X_t, so as to maximize profits. That is, $\{X_t, L_t\} = \arg\max\ [F(X_t, L_t) - w_t L_t - \rho_t X_t]$. The producers' inverse demand for factors of production is therefore,

$$\begin{aligned} w_t^A &= F_L(X_t, L_t); \\ \rho_t &= F_X(X_t, L_t). \end{aligned} \tag{3}$$

2.1.2 Manufacturing Sector

Production in the manufacturing sector occurs within a period according to a neoclassical, constant-returns-to-scale, Cobb-Douglas production technology using physical and human capital as inputs. The output produced at time t, y_t^M, is

$$y_t^M = K_t^\alpha H_t^{1-\alpha} = H_t k_t^\alpha; \quad k_t \equiv K_t/H_t; \quad \alpha \in (0,1), \tag{4}$$

where K_t and H_t are the quantities of physical capital and human capital (measured in efficiency units) employed in production at time t. Both factors depreciate fully after one period. In contrast to the agricultural sector, human capital has a positive effect on workers' productivity in the manufacturing sector, increasing workers' efficiency units of labor.

Producers in the manufacturing sector operate in a perfectly competitive environment. Given the wage rate per efficiency unit of human capital, w_t^M, and the rate of return to capital, R_t, producers in period t choose the level of employment of capital, K_t, and the number of efficiency units of human capital, H_t, so as to maximize profits.

[7]The abstraction from technological change is merely a simplifying assumption. The introduction of endogenous technological change would allow output in the agricultural sector to increase over time despite the decline in the number of workers in this sector.

That is, $\{K_t, H_t\} = \arg\max\,[K_t^\alpha H_t^{1-\alpha} - w_t^M H_t - R_t K_t]$. The producers' inverse demand for factors of production is therefore

$$\begin{aligned} R_t &= \alpha k_t^{\alpha-1} \equiv R(k_t); \\ w_t^M &= (1-\alpha)k_t^\alpha \equiv w^M(k_t). \end{aligned} \tag{5}$$

2.2 Individuals

In every period a generation which consists of a continuum of individuals of measure 1 is born. Individuals live for two periods. Each individual has a single parent and a single child. Individuals, within as well as across generations, are identical in their preferences and innate abilities but they may differ in their wealth.

Preferences of individual i who is born in period t (a member i of generation t) are defined over second period consumption,[8] c_{t+1}^i, and a transfer to the offspring, b_{t+1}^i.[9] They are represented by a log-linear utility function

$$u_t^i = (1-\beta)\log c_{t+1}^i + \beta \log b_{t+1}^i, \tag{6}$$

where $\beta \in (0,1)$.

In the first period of their lives individuals devote their entire time for the acquisition of human capital. In the second period of their lives individuals join the labor force, allocating the resulting wage income, along with their return to capital and land, between consumption and income transfer to their children. In addition, individuals transfer their entire stock of land to their offspring.

An individual i born in period t receives a transfer, b_t^i, in the first period of life. A fraction $\tau_t \geq 0$ of this capital transfer is collected by the government in order to finance public education, whereas a fraction $1-\tau_t$ is saved for future income. Individuals devote

[8]For simplicity we abstract from first period consumption. It may be viewed as part of the consumption of the parent.

[9]This form of altruistic bequest motive (i.e., the "joy of giving") is the common form in the recent literature on income distribution and growth. It is supported empirically by Altonji, Hayashi and Kotlikoff (1997).

their first period for the acquisition of human capital. Education is provided publicly free of charge. The acquired level of human capital increases with the real resources invested in public education. The number of efficiency units of human capital of each member of generation t in period $t+1$, h_{t+1}, is a strictly increasing, strictly concave function of the government real expenditure on education per member of generation t, e_t.[10]

$$h_{t+1} = h(e_t), \tag{7}$$

where $h(0) = 1$, $\lim_{e_t \to 0^+} h'(e_t) = \infty$, and $\lim_{e_t \to \infty} h'(e_t) = 0$. Hence, even in the absence of real expenditure on public education individuals posses one efficiency unit of human capital - basic skills.

In the second period life, members of generation t join the labor force earning the competitive market wage w_{t+1}. In addition, individual i derives income from capital ownership, $b_t^i(1-\tau_t)R_{t+1}$, and from the return on land ownership, $x^i\rho_{t+1}$, where x^i is the quantity of land owned by individual i. The individual's second period income, I_{t+1}^i, is therefore

$$I_{t+1}^i = w_{t+1} + b_t^i(1-\tau_t)R_{t+1} + x^i\rho_{t+1}. \tag{8}$$

A member i of generation t allocates second period income between consumption, c_{t+1}^i, and transfers to the offspring, b_{t+1}^i, so as to maximize utility subject to the second period budget constraint

$$c_{t+1}^i + b_{t+1}^i \leq I_{t+1}^i. \tag{9}$$

Hence the optimal transfer of a member i of generation t is,[11]

$$b_{t+1}^i = \beta I_{t+1}^i. \tag{10}$$

[10] A more realistic formulation would link the cost of education to (teacher's) wages, which may vary in the process of development. As can be derived from section 2.4, under both formulations the optimal expenditure on education, e_t, is an increasing function of the capital-labor ratio in the economy, and the qualitative results remain therefore intact.

[11] Note that individual's preferences defined over the transfer to the offspring, b_t^i, or over net transfer, $(1-\tau_t)b_t^i$, are represented in an indistinguishable manner by the log linear utility function. Under both definitions of preferences the bequest function is given by $b_{t+1}^i = \beta I_{t+1}^i$.

The indirect utility function of a member i of generation t, v_t^i is therefore

$$v_t^i = \log I_{t+1}^i + \xi \equiv v(I_{t+1}^i), \tag{11}$$

where $\xi \equiv (1-\beta)\log(1-\beta) + \beta \log \beta$. The indirect utility function is monotonically increasing in I_{t+1}^i.

2.3 Physical Capital, Human Capital, and Output

Let B_t denote the aggregate level of intergenerational transfers in period t. It follows from (8) and (10) that,

$$B_t = \beta y_t. \tag{12}$$

A fraction τ_t of this capital transfer is collected by the government in order to finance public education, whereas a fraction $1-\tau_t$ is saved for future consumption. The capital stock in period $t+1$, K_{t+1}, is therefore

$$K_{t+1} = (1-\tau_t)\beta y_t, \tag{13}$$

whereas the government tax revenues are $\tau_t \beta y_t$.

Since population is normalized to 1, the education expenditure per young individual in period t, e_t, is,

$$e_t = \tau_t \beta y_t, \tag{14}$$

and the stock of human capital, employed in the manufacturing sector in period $t+1$, H_{t+1}, is therefore,

$$H_{t+1} = \theta_{t+1} h\left(\tau_t \beta y_t\right), \tag{15}$$

where, θ_{t+1} is the fraction (and the number) of workers employed in the manufacturing sector. Hence, output in the manufacturing sector in period $t+1$ is,

$$y_{t+1}^M = [(1-\tau_t)\beta y_t]^\alpha [\theta_{t+1} h\left(\tau_t \beta y_t\right)]^{1-\alpha} \equiv y^M(y_t, \tau_t, \theta_{t+1}) \tag{16}$$

and the physical-human capital ratio $k_{t+1} \equiv K_{t+1}/H_{t+1}$ is,

$$k_{t+1} = \frac{(1-\tau_t)\beta y_t}{\theta_{t+1} h(\tau_t \beta y_t)} \equiv k(y_t, \tau_t, \theta_{t+1}), \tag{17}$$

where k_{t+1} is strictly decreasing in τ_t and in θ_{t+1}, and strictly increasing in y_t. As follows from (5), the capital share in the manufacturing sector is

$$(1-\tau_t)\beta y_t R_{t+1} = \alpha y^M_{t+1}, \tag{18}$$

and the labor share in the manufacturing sector is given by

$$\theta_{t+1} h(\tau_t \beta y_t) w^M_{t+1} = (1-\alpha) y^M_{t+1}. \tag{19}$$

The supply of labor to agriculture, L_{t+1}, is equal to $1-\theta_{t+1}$. Output in the agriculture sector in period $t+1$ is therefore

$$y^A_{t+1} = F(X, 1-\theta_{t+1}) \equiv y^A(\theta_{t+1}; X) \tag{20}$$

As follows from the properties of the production functions as long as, $X > 0$, and $\tau_t < 1$, noting that $y_t > 0$ for all t, both sectors are active in $t+1$. Hence, since individuals can either supply one unit of labor to the agriculture sector and receive the wage w^A_{t+1} or supply h_{t+1} units of human capital to the manufacturing sector and receive the wage income $h_{t+1} w^M_{t+1}$ it follows that

$$w^A_{t+1} = h_{t+1} w^M_{t+1} \equiv w_{t+1}, \tag{21}$$

and the division of labor between the two sectors, θ_{t+1}, noting (3), (5) and (17) is determined accordingly.

Since the number of individuals in each generation is normalized to 1, aggregate wage income in the economy, which equals to the sum of labor shares in the two sectors, equals w_{t+1}. Namely, as follows from (3), (19) and (20),

$$w_{t+1} = (1-\theta_{t+1}) F_L(X, 1-\theta_{t+1}) + (1-\alpha) y^M_{t+1}. \tag{22}$$

Lemma 1 *The fraction of workers employed by the manufacturing sector in period* $t+1$, θ_{t+1} :

(a) is uniquely determined:

$$\theta_{t+1} = \theta(y_t, \tau_t; X),$$

where $\theta_X(y_t, \tau_t; X) < 0$, $\theta_y(y_t, \tau_t; X) > 0$, *and* $\lim_{y\to\infty} \theta(y_t, \tau_t; X) = 1.$

(b) maximizes the aggregate wage income, w_{t+1}, *and output* y_{t+1} *in period* $t+1$:

$$\theta_{t+1} = \arg\max w_{t+1} = \arg\max y_{t+1}.$$

Proof.

(a) Substitution (3), (5), and (17) into (21) it follows that

$$F_L(X, 1-\theta_{t+1}) = h(\tau_t \beta y_t)(1-\alpha)\left(\frac{(1-\tau_t)\beta y_t}{\theta_{t+1} h(\tau_t \beta y_t)}\right)^{\alpha}, \tag{23}$$

and therefore the Lemma follows from the properties of the agriculture production technology, $F(X, L_t)$, and the concavity of $h(e_t)$.

(*b*) Since θ_{t+1} equalizes the marginal return to labor in the two sectors, and since the marginal product of factors is decreasing in both sectors, part (b) follows. □

Corollary 1 *Given land size,* X, *prices in period* $t+1$ *are uniquely determined by* y_t *and* τ_t. *That is*

$$w_{t+1} = w(y_t, \tau_t);$$
$$R_{t+1} = R(y_t, \tau_t);$$
$$\rho_{t+1} = \rho(y_t, \tau_t).$$

Proof. Follows from (3), (5), (17), (20) and Lemma 1. □

2.4 Efficient Expenditure on Public Education

This section demonstrates that the level of expenditure on public schooling (and hence the level of taxation) that maximizes aggregate output is optimal from the viewpoint of all individuals except for landowners who own a large fraction of the land in the economy.

Lemma 2 *Let τ_t^* be the tax rate in period t, that maximizes aggregate output in period $t+1$,*

$$\tau_t^* \equiv \arg\max y_{t+1}$$

(a) τ_t^* equates the marginal return to physical capital and human capital:

$$\theta_{t+1} w^M(k_{t+1}) h'(\tau_t^* \beta y_t) = R(k_{t+1}).$$

(b) $\tau_t^* = \tau^*(y_t) \in (0,1)$ and $\tau^*(y_t) y_t$, is strictly increasing in y_t.

(c) $\tau_t^* = \arg\max w_{t+1}$ and $dw_{t+1}/d\tau_t > 0$ for $\tau_t \in (0, \tau_t^*)$.

(d) $\tau_t^* = \arg\min \rho_{t+1}$ and $d\rho_{t+1}/d\tau_t < 0$ for $\tau_t \in (0, \tau_t^*)$.

(e) $\tau_t^* = \arg\max \theta(y_t, \tau_t; X)$ and $d\theta(y_t, \tau_t; X)/d\tau_t > 0$ for $\tau_t \in (0, \tau_t^*)$.

(f) $\tau_t^* = \arg\max y_{t+1}^M$ and $dy_{t+1}^M/d\tau_t > 0$ for $\tau_t \in (0, \tau_t^*)$.

(g) $\tau_t^* = \arg\max (1-\tau_t) R_{t+1}$ and $d(1-\tau_t)R_{t+1}/d\tau_t > 0$ for $\tau_t \in (0, \tau_t^*)$.

Proof.

(a) As follows from (16) and (20) aggregate output in period $t+1$, y_{t+1} is

$$y_{t+1} = y^M(y_t, \tau_t, \theta_{t+1}) + y^A(\theta_{t+1}; X). \tag{24}$$

Hence, since $\tau_t^* = \arg\max y_{t+1}$ and since, as established in Lemma 1, $\theta_{t+1} = \arg\max y_{t+1}$, it follows form the envelop theorem that the value of τ_t^* satisfies the condition in part (a).

(b) It follows from part (a), (5) and (17) that

$$\frac{(1-\tau_t^*)\beta y_t}{h(\tau_t^* \beta y_t)} = \frac{\alpha}{(1-\alpha) h'(\tau_t^* \beta y_t)}.$$

Hence, $\tau_t^* = \tau^*(y_t) < 1$ and $\tau_t^* > 0$ for all $y_t > 0$ (since $\lim_{e_t \to 0^+} h'(e_t) = \infty$) and $\tau^*(y_t) y_t$ is strictly increasing in y_t.

(c) Follows from the differentiation of w_{t+1} in (22) with respect to τ_t using the envelop theorem since, as established in Lemma 1, $\theta_{t+1} = \arg\max w_{t+1}$.

(d) Follows from part (c) noting that along the factor price frontier ρ_t decreases in w_t^A and therefore in w_t.

(e) Follows from part (c) noting that, as follows from the properties of the production function (2), L_{t+1} and w_{t+1}^A are inversely related and hence $\theta_{t+1} = 1 - L_{t+1}$ is positively related to w_{t+1}^A and therefore to w_{t+1}.

(f) Follows from differentiating y_{t+1}^M in (16) with respect to τ_t noting that y_{t+1}^M is strictly increasing in θ_{t+1} and as follows from part (e) $d\theta(X, y_t, \tau_t)/d\tau_t > 0$ for $\tau_t \in (0, \tau^*)$.

(g) Follows from part (f) noting that, as follows from (18), $(1-\tau_t)R_{t+1} = \alpha y_{t+1}^M/(\beta y_t)$.□

The size of the land, X, has two opposing effects on τ_t^*. Since a larger land size implies that employment in the manufacturing sector is lower, the fraction of the labor force whose productivity is improved due to taxation that is designed to finance universal public education is lower. In contrast, the return to each unit of human capital employed in the manufacturing sector is higher while the return to physical capital is lower, since human capital in the manufacturing sector is scarce. Due to the Cobb-Douglass production function in the manufacturing sector the two effects cancel one another and as established in Lemma 2 the value of τ_t^* is independent of the size of land.

Furthermore, since the tax rate is linear and the elasticity of substitution between human and physical capital in the manufacturing sector is unitary, as established in Lemma 2, the tax rate that maximizes aggregate output in period $t+1$ also maximizes the wage per worker, w_{t+1}, and the net return to capital, $(1-\tau_t^*)R_{t+1}$. If the elasticity of substitution would be larger than unity but finite, then the tax rate that maximizes the wage per worker would have been larger than the optimal tax rate and the tax rate that maximizes the return to capital would have been lower, yet strictly positive. If the elasticity of substitution is smaller than unity, the opposite holds.

Corollary 2 *The optimal level of taxation from the viewpoint of individual i, is τ_t^* for a sufficiently low x^i.*

Proof. Since the indirect utility function, (11), is a strictly increasing function of the individual's second period wealth, and since as established in Lemma 2, w_{t+1}, and $(1-\tau_t)R_{t+1}$ are maximized by τ_t^*, it follows from (8) that, for a sufficiently low x^i, $\tau_t^* = \arg\max v(I_{t+1}^i)$. □

Hence, the optimal level of taxation for individuals whose land ownership is sufficiently low equals the level of taxation (and hence the level of expenditure on public schooling) that maximizes aggregate output.

2.5 Political Mechanism

Suppose that changes in the existing educational policy require the consent of all segments of society. In the absence of consensus the existing educational policy remains intact.

Suppose that consistently with the historical experience, societies initially do not finance education (i.e., $\tau_0 = 0$). It follows that unless all segments of society would find it beneficial to alter the existing educational policy the tax rate will remain zero. Once all segments of society find it beneficial to implement educational policy that maximizes aggregate output, this policy would remain in effect unless all segment of society would support an alternative policy.

2.6 Landlords' Desirable Schooling Policy

Suppose that in period 0 a fraction λ of all young individuals in society are Landlords while a fraction $1-\lambda$ are landless. Each landowner owns an equal fraction, $1/\lambda$, of the entire stock of land, X, and is endowed with b_0^L units of output. Since landowner are homogeneous in period 0 and since land is bequeathed from parent to child and each individual has a single child and a single parent, it follows that the distribution of land ownership in society and the division of capital within the class of landowner is constant over time, where each landowner owns X/λ units of land and b_t^L units of output in period

t.

The income of each landowner in the second period of life, I^L_{t+1}, as follows from (8) and Corollary 1 is therefore

$$I^L_{t+1} = w(y_t, \tau_t) + (1-\tau_t)R(y_t, \tau_t)b^L_t + \rho(y_t, \tau_t)X/\lambda, \tag{25}$$

and b^L_{t+1}, as follows from (10) is therefore

$$b^L_{t+1} = \beta[w(y_t, \tau_t) + (1-\tau_t)R(y_t, \tau_t)b^L_t + \rho(y_t, \tau_t)X/\lambda] \equiv b^L(y_t, b^L_t, \tau_t; X/\lambda) \tag{26}$$

Proposition 1 *For any given level of capital and land ownership of each landowner* $(b^L_t, \lambda; X)$ *there exists a sufficiently high level of output* $\widehat{y}_t = \widehat{y}(b^L_t, \lambda; X)$ *above which the optimal taxation from a Landlord's viewpoint,* τ^L_t, *maximizes aggregate output, i.e.,*

$$\tau^L_t \equiv \arg\max I^L_{t+1} = \tau^*_t \quad \textit{for} \;\; y_t \geq \widehat{y}_t$$

where $\widehat{y}(b^L_t, 1; X) = 0$; $\lim_{\lambda \to 0} \widehat{y}(b^L_t, \lambda; X) = \infty$;
$\widehat{y}_\lambda(b^L_t, \lambda; X) < 0$; $\widehat{y}_X(b^L_t, \lambda; X) > 0$.

Proof. Follows from the properties of the agriculture production function (2), Lemma 1 and 2, noting that, since $1 - \theta_{t+1} = \arg\max \; \rho_{t+1}$, for $b^L_t = 0$, $dI^L_{t+1}/dw_{t+1} > 0$ if $\lambda > 1 - \theta_{t+1}$. □

Corollary 3 *For any given level of capital and land ownership of each landowner* $(b^L_t, \lambda; X)$ *there exists a sufficiently high level of output* $\widehat{y}_t = \widehat{y}(b^L_t, \lambda; X)$ *above which the level of taxation,* τ^*_t, *that maximizes aggregate output, is optimal from the viewpoint of every member of society.*

Lemma 3 *(a) The equilibrium tax rate in period* t, τ_t, *is equal to either* 0 *or* τ^*_t, *i.e.,*

$$\tau_t \in \{0, \tau^*_t\};$$

(b) If $\hat{t}$ *is the first period in which* $\tau_t = \tau^*_t$ *then*

$$\tau_t = \tau^*_t \qquad \forall t \geq \hat{t}.$$

Proof. follows from the political structure, Corollary 2 and the assumption that $\tau_0 = 0$.

□

Lemma 4 *Landlords desirable tax rate in period* t, τ_t^L,

$$\tau_t^L = \begin{cases} \tau_t^* & if \quad b_t^L \geq \hat{b}_t; \\ \\ 0 & if \quad b_t^L < \hat{b}_t, \end{cases}$$

where

$$\hat{b}_t = \frac{w(y_t, 0) - w(y_t, \tau_t^*) + [\rho(y_t, 0) - \rho(y_t, \tau_t^*)]X/\lambda}{(1 - \tau_t^*)R(y_t, \tau_t^*) - R(y_t, 0)} \equiv \hat{b}(y_t; X/\lambda),$$

and there exists a sufficiently large λ *such that,* $\hat{b}(y_t, X/\lambda) = 0$ *for any* y_t.

Proof. Follows from (25) and Lemma 3. □

Corollary 4 *The switch to the efficient tax rate* τ_t^* *occurs when* $b_t^L \geq \hat{b}_t$, *i.e.,*

$$b_t^L \geq \hat{b}_t \quad \textit{if and only if} \quad t \geq \hat{t}.$$

3 The Process of Development

This section analyzes the evolution of an economy from an agricultural to an industrial-based economy. It demonstrates that the gradual decline in the importance of the agricultural sector along with an increase in the capital holdings in landowners' portfolio may alter the attitude of landowners towards educational reforms. In societies in which land is scarce or its ownership is distributed rather equally, the process of development allows the implementation of an optimal education policy, and the economy experiences a significant investment in human capital and a rapid process of development. In contrast, in societies where land is abundant and its distribution is unequal, an inefficient education policy will persist and the economy will experience a lower growth path as well as lower level of output in the long-run.

Proposition 2 *The conditional evolution of output per capita, as depicted in Figure 1, is given by*

$$y_{t+1} = \begin{cases} \psi^0(y_t) \equiv (\beta y_t)^\alpha \theta_{t+1}{}^{1-\alpha} + F(X, 1-\theta_{t+1}) & \textit{for} \quad \tau = 0; \\ \psi^*(y_t) \equiv [(1-\tau_t^*)\beta y_t]^\alpha [\theta_{t+1} h(\tau_t^* \beta y_t)]^{1-\alpha} + F(X, 1-\theta_{t+1}) & \textit{for} \quad \tau = \tau^*, \end{cases}$$

where,

$\psi^*(y_t) > \psi^0(y_t)$ *for* $y_t > 0$.

$d\psi^j(y_t)/dy_t > 0$, $d^2\psi^j(y_t)/dy_t^2 < 0$, $\psi^j(0) = F(X,1) > 0$, $d\psi^j(y_t)/dX > 0$, *and*

$\lim_{y_t \to \infty} d\psi^j(y_t)/dy_t = 0$, $j = 0, *$.

Proof. The proof follows from (1), (13), (15), (16) and (20), applying the envelop theorem noting that, as follows from Lemma 1 and Lemma 2, $\theta_{t+1} = \arg\max y_{t+1}$ and $\tau_t^* = \arg\max y_{t+1}$. □

Note that the evolution of output per capita, given schooling policy, is independent of the distribution of land and income.

Corollary 5 *Given the size of land, X, there exists a unique* $\bar{y}^0$ *and a unique* $\bar{y}^*$ *such that*

$$\bar{y}^0 = \psi^0(\bar{y}^0)$$

and

$$\bar{y}^* = \psi^*(\bar{y}^*)$$

where $\bar{y}^* > \bar{y}^0$.

3.1 The Dynamical System

The evolution of output, as follows from Lemma 3 and Proposition 2, is

$$y_{t+1} = \begin{cases} \psi^0(y_t) & \textit{for} \quad t < \hat{t} \\ \psi^*(y_t) & \textit{for} \quad t \geq \hat{t}. \end{cases}$$

The timing of the switch from a zero tax rate to the efficient tax rate τ_t^* occurs, as established in Corollary 4 once $b_t^L \geq \hat{b}_t$. Since $\tau_t = 0$ for all $t < \hat{t}$, and since $\hat{b}_t = \hat{b}(y_t; X/\lambda)$, the timing of the switch, $\hat{t}$, is determined by the co evolution of $\{y_t, b_t^L\}$ for $\tau_t = 0$

$$y_{t+1} = \psi^0(y_t)$$

$$b_{t+1}^L = b^0(y_t, b_t^L)$$

Let the bb locus (depicted in Figure 2) be the set of all pairs (b_t^L, y_t) such that, for $\tau_t = 0$, b_t^L is in a steady state. i.e., $b_{t+1}^L = b_t^L$.

In order to simplify the exposition of the dynamical system it is assumed that the value of β is sufficiently small,

$$\beta < 1/R(y_t, 0) \qquad \forall y_t \tag{A1}$$

where as follows from (3), (5) and Lemma 1, $R(y_t, 0) < \infty$ for all y_t and therefore there exists a sufficiently small β such that A1 holds.

Lemma 5 *Under A1, there exists a continuous single-valued function $\varphi(y_t; X/\lambda)$,such that along the bb locus*

$$b_t^L = \varphi(y_t; X/\lambda) \equiv \frac{\beta[w(y_t, 0) + \rho(y_t, 0)X/\lambda]}{1 - \beta R(y_t, 0)} > 0,$$

where for sufficiently small λ,

$$\varphi(0, X/\lambda) < \hat{b}(0, X/\lambda).$$

and for $\lambda = 1$

$$\hat{b}(y_t; X/\lambda) < \varphi(y_t; X/\lambda) \quad \text{for all } y_t.$$

Furthermore, as depicted in Figure 2, for $\tau = 0$,

$$b_{t+1}^L - b_t^L \gtreqless 0 \qquad \text{if and only if } b_t^L \lesseqgtr \varphi(y_t; X/\lambda).$$

Proof. Follows from (26), A1, and Lemma 4, noting that for $\lambda = 1$, $I_t^L = y_t$ and hence $\tau_t^* = \arg\max I_{t+1}^L$. □

Let yy^0 be the locus (depicted in Figure 2) of all pairs (b_t^L, y_t) such that, for $\tau_t = 0$, y_t is in a steady state equilibrium,. i.e., $y_{t+1} = y_t$.

Lemma 6

$$yy^0 = \{(y_t, b_t^L) : y_t = \bar{y}^0, b_t^L \in R_+\}$$

Furthermore, as depicted in Figure 2, for $\tau = 0$,

$$y_{t+1} - y_t \gtreqless 0 \qquad \text{if and only if } y_t \lesseqgtr \bar{y}^0.$$

Proof. Follows from Proposition 2 and Corollary 5. □

Corollary 6 *For a sufficiently low* λ *there exists* $y > 0$ *such that*

$$\hat{b}(y; X/\lambda) = \varphi(y; X/\lambda).$$

Proof. follows from Lemma 5 and Proposition 16. □

Lemma 7 *Let* $\bar{y}(X/\lambda)$ *be the smallest value of* y_t *such that* $\hat{b}(y_t; X/\lambda) = \varphi(y_t; X/\lambda)$. *Under A1*

$$d\bar{y}(X/\lambda)/d\lambda \leq 0,$$

where $\lim_{\lambda \to 0} \bar{y}(X/\lambda) = \infty$.

Proof. It follows from the properties of $\hat{b}(y_t; X/\lambda)$ and $\varphi(y_t; X/\lambda)$, noting that $w(y_t, \tau_t)$, $\rho(y_t, \tau_t)$ and $R(y_t, \tau_t)$, are independent of λ, and $\rho(y_t, 0) > \rho(y_t, \tau_t^*)$ for all $y_t > 0$. □

In order to simplify the exposition of the dynamical system it is assumed that $\bar{y}(X/\lambda)$ is unique.

Proposition 3 *The economy is characterized by:*

(a) A unique globally stable steady state equilibrium, $\bar{y}^*$, if $\tilde{y}(X/\lambda) < \bar{y}^0$, that is if λ is sufficiently large.

(b) Two locally stable steady states, $\bar{y}^*$ and $\bar{y}^0$, if $\tilde{y}(X/\lambda) > \bar{y}^0$, that is if λ is sufficiently small.

Proof. Follows from the political mechanism, the definition of $\tilde{y}$ and Lemma 5 and 7.□

Theorem 1 *Consider countries that are identical in all respects except for their initial land distribution.*

(a) Countries that have a less equal land distribution, i.e., countries with a low level of λ, will experience a delay in the implementation of efficient education policy and will therefore experience a lower growth path.

(b) Countries characterize by a sufficiently unequal distribution of land and sufficiently low capital ownership by the landowner will permanently conduct an inefficient education policy and will therefore experience a lower growth path as well as lower level of output in the long-run.

Proof. The theorem is a corollary of Proposition 3 and Lemma 3 and 7. □

4 Evidence from the Balfour Act - England 1902

The basic premise of this research, regarding the negative attitude of landowners towards education reforms is examined in light of the voting patterns on the Balfour Act of 1902 – the proposed education reform in England that marked the consolidation of a national education system consisting of a publicly supported and monitored elementary, secondary, and technical education. The proposed theory suggests that variations in the support of the Ministers of Parliament (MPs) for the Balfour Act would reflect the variations in the agricultural and resource intensity in the counties they represent. In contrast to MPs from industrial-intensive counties, those from agricultural and resource intensive counties would be expected to oppose the imposition of this new education system.

We construct a data set on the third (and final) vote on the Balfour act.[12] The data gathered from a variety of historical sources, combines the home districts, and party affiliation for each MP with the voting record of each MP on the Balfour Act as well as the percentage of employment in agriculture and mining in the MP's county and the average weekly wages in each county.

The list of the names and home districts of each of the 465 English MPs during the vote on the Balfour Act is collected from The British Parliamentary Papers. Party affiliation for each MP during the vote on the Balfour Act is taken from Who's Who of British Parliament.[13]

The voting record of each MPs on the Balfour act is gathered from the supplement to the British Parliamentary Papers, the Division Lists. The record specifies who voted in favor and who voted against the bill.[14] In order to assess the influence of the agriculture and mining industries on the voting of each MP, the percentage of employment in agriculture and mining in the MP's county is computed based on the British Regional Employment Statistics, 1901.[15] Finally, in order to control for the income level in each county, Weekly Cash Wage in English counties in 1901 were collected from Fox (1903).[16]

[12]We had hoped to do similar analysis on other education bills, but in all the other cases the vote on the third reading was done by voice, and no record exists of who exactly opposed or supported the bills. These other education bills all have peripheral votes recorded, but these are on amendments or questions of procedure. It is not possible to specify clearly which votes were crucial or which position (yes or no) is actually in support of education reform.

[13]We used only those MPs in either the Liberal or Conservative parties, the dominant parties of the time. The only other party of significance was the Unionist party, but membership in this was not mutually exclusive with the other two. Many members of the Liberal and Conservative parties were Unionists as well. In addition, there are a number of Unionist-only members. Excluding pure Unionists and other members of smaller parties, we remove 52 votes from the sample. In addition, we were unable to locate party affiliation data on 5 of the MP's, removing them from the sample.

[14]Any member not listed had abstained. Of the 465 English MP's, 184 abstained.

[15]The British Regional Employment Statistics provides a breakdown of employment by industry in each county in England, an area that encompasses several districts. Unfortunately, the employment data is not at district level and each MP was therefore assigned the percentage appropriate to the county within which his district existed.

[16]Wage data was not available for every county. This limits our final sample to 199 MP's.

Table 2 shows a summary of the voting by party. As is obvious from the table, Conservatives and Unionists were predominantly supportive of the Balfour Act while Liberals were predominantly opposed.

We perform probit and ordered probit regressions to examine the effect of the percentage of workers employed in agriculture and mining in each MP's county on their voting patterns on the Balfour Act. As documented in Table 3, there exists a significant inverse relationship between the percentage of employment in agriculture and mining in a district and the propensity for their MPs to vote in favor of the education reform proposed by the Balfour Act of 1902.

Regression (1) in Table 3 examines the effect of the ratio of workers employed in agriculture and mining in each MP's county on their voting patterns on the Balfour Act, controlling for party affiliation and for wages. It shows a significant adverse effect of the ratio of workers employed in agriculture and mining in each MP's county on the propensity to vote for education reform.[17]

Regression (2) examines the effect of the ratio of employment in agriculture and mining in each MP's county on party affiliation, controlling for wages. It shows that the ratio of employment in agriculture and mining in each MP's county is significant at ten percent and positively related to affiliation with the Liberal party. Adjusting the probit results to obtain marginal effects, we find that a one percentage point increase in the ratio of employment in agriculture and mining raises the probability of belonging to the Liberal party by approximately 1.24 percentage points.

¿From regressions (1) and (2) it is apparent that both the wage rate and the ratio of employment in agriculture and mining impact the vote on the Balfour Act through two channels. The first is the direct channel, holding party constant. The second is through their influence on the party of the MP itself. Regression (3) reduces the

[17]The coefficient itself does not have an easily interpretable value. What we can say is that an increase in the ratio of workers employed in agriculture and mining lowers the probability of voting Yes and raises the probability of voting No. There is an ambiguous effect on the probability of abstaining.

specification to include only the wage rate and the ratio of employment in agriculture and mining, allowing us to assess the total effect these variables have on the voting pattern [18] Again, an increase in the ratio of workers employed in agriculture and mining lowers the probability of voting Yes and raises the probability of voting No. As in regression (1) we cannot go very far in interpreting the coefficients themselves, but note that both variables increase in significance and magnitude.

It should be noted that the voting patterns of the agricultural sector on alternative bills in the same year differed significantly. In particular, the share of employment in agriculture and mining is an insignificant explanatory variable for the 1902 vote on an income tax bill using an ordered probit with control for wages (as in regression 3). This vote suggests that the agricultural sector does not vote uniformly on each bill and that its objection to the education bill is not associated with the implied tax burden associated with the bill.

5 Concluding Remarks

This research suggests that the distribution of land within and across countries and its impact on the nature of the transition from an agrarian to an industrial economy have been a prime determinate of sustained differences in human capital, income levels, and growth patterns across countries. Land abundance, which was beneficial for the process of development in early stages, has generated a hurdle for human capital accumulation in later stages, retarding the process of industrialization and the transition to modern growth. The qualitative change in the role of land abundance in the process of development has brought about changes in the ranking of countries in the world income distribution. Some land abundant economies, which were associated with the club of

[18] We limit the sample to the 199 MP's we consider in regressions (1) and (2) to facilitate comparison. By excluding party, we can actually increase the sample size in regression (3) to 253 MP's. The results are nearly identical when the sample size is increased. To further expand the sample size we can exclude wages, which are available for only a limited number of counties. This allows the sample size to increase to all 460 MP's. Again, the results for the ratio of workers in agriculture and mining are nearly identical.

the rich economies in the pre-industrial revolution era, were overtaken in the process of industrialization. The basic premise of this research, regarding the negative attitude of landowners towards education reforms, is supported empirically by a newly constructed data set on the voting patterns on England's education reform proposed in the Balfour Act of 1902.

The theory focuses on the direct economic incentives that led landowner to object to growth enhancing educational reform, rather than the indirect force associated that motivate the Elite to block economic development in order to maintain the current political structure and the economic benefits for the Elite that are implied by this structure.

The theory abstracts from the sources of distribution of population density across countries in the pre-industrialization era. The Malthusian mechanism, that positively links the population size to effective resources in each region, suggests that the distribution of population density in the world economy should reflect in the long run the distribution of productive land across the globe. Hence, one could have argued that significant economic variations in effective land per capita in the long run are unlikely. Nevertheless, there are several sources of variations in effective resources per-capita in the pre-industrial world. First, due to rapid technological diffusion across countries and continents in the context of the era of "innovations and discoveries" (e.g., via colonialism) population size in the technologically receiving countries have not completed their adjustment prior to industrialization, and population density in several regions were therefore below their long-run level. Second, inequality in the distribution of land ownership within countries (due to geographical conditions, for instance) prevented population density from fully reflecting the productivity of land.[19]

In contrast to the recent literature that attempts to disassociate the role of geography and institutions in economic development, the theory suggest that geographical

[19]Variations in population density across the globe may therefore reflect, climate, settlement date, disease, and colonization.

conditions and institutions are intimately linked. Geographical conditions that were associated with increasing returns in agricultural, or in the extraction of natural resources led to the emergence of a class of wealthy landowners that ultimately affected adversely the implementation of an efficient institution of public education. Furthermore, geographical conditions were the prime determinant of the timing of the agricultural revolution [Diamond (1997)] and due to the interaction between technological progress and population growth [Malthus (1789) and Boserup (1965)] the cause of variation in the level of technology and population density, in geographically isolated regions despite similar levels of output per capita. Hence, the link that was created between geographically isolated areas in the era of discoveries, and the associated diffusion of technology, generated geographically-based variations in effective land per capita, that according to the proposed theory led to the implementation of different institutions of public education.

The paper implies that differences in the evolution of social structures across countries may reflect differences in land abundance and its distribution. In particular, the dichotomy between workers and capitalists is more likely to persist in economies characterized by land abundance in which its ownership is unequally distributed. As argued by Galor and Moav (2000), due to the complementarity between physical and human capital in production, the Capitalists were among the prime beneficiaries of the potential accumulation of human capital by the masses. They had therefore the incentive to financially support public education that would sustain their profit rates and would improve their economic well being, although would ultimately undermine their dynasty's position in the social ladder and would bring about the demise of the capitalist-workers class structure. As implied by the current research, the timing and the degree of this social transformation depend on the country specific economic interest of landowners.

In sharp contrast to the Marxian hypothesis, this paper suggests that workers and capitalists are the natural economic allies that share an interest in industrial development and therefore in the implementation of growth enhancing universal public education, whereas landowners are the prime hurdle in industrial development.

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Table 1: GDP per Capita Relative to the US

Country	Note	1870	1900	1913	1930	1940	1950	1960	1994
Australia		154.70	104.96	103.73	77.04	84.64	75.40	76.29	75.80
USA		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
New Zealand		126.78	105.47	97.5	80.14	90.23	88.74	84.79	66.84
UK		132.80	112.13	94.8	83.52	93.27	71.52	76.57	72.54
Canada		65.93	67.33	79.3	73.28	72.47	73.61	75.57	81.31
Switzerland		88.40	86.21	79.2	99.04	89.90	93.38	109.77	92.29
Belgium		107.45	89.16	78.3	78.34	63.62	55.84	60.56	76.32
Netherlands		107.45	86.25	74.4	87.89	67.17	61.11	72.23	76.00
Germany		77.86	76.51	72.23	65.10	79.01	44.72	75.61	84.62
Argentina		53.36	67.29	71.55	65.59	59.33	52.09	49.66	37.10
Denmark		78.43	70.85	70.93	82.60	70.13	69.81	75.73	85.54
Austria		76.31	70.83	65.7	58.04	56.78	38.97	58.62	76.59
France		75.62	69.56	65.0	72.17	57.05	54.54	66.76	79.61
Sweden		67.72	62.52	58.3	63.30	69.22	70.39	77.62	74.04
Ireland	***	72.16	60.91	51.5	46.35	44.40	36.75	39.02	55.94
Chile			47.58	50.0	50.53	46.44	39.98	38.45	34.40
Italy		59.71	42.63	47.2	45.88	48.86	35.78	51.72	72.68
Norway		53.03	43.02	42.8	54.29	52.98	51.91	58.51	81.40
Spain	***	56.00	49.80	42.4	47.38	28.81	25.04	30.71	55.58
Finland		45.05	39.55	38.6	41.62	44.57	43.15	54.06	65.48
Greece	***			30.5	38.36	38.86	20.38	28.63	45.04
Mexico		28.90	28.25	27.6	22.04	22.17	21.78	24.85	22.59
South Africa	**			27.3			23.51	23.44	15.29
Philippines	*		25.22	26.7		21.33	13.51	13.29	9.81
Portugal	***	44.16	34.38	25.5	24.69	24.32	22.27	27.65	49.11
Japan		30.16	27.71	25.1	28.62	39.40	19.57	34.66	86.42
Colombia			23.75	23.2	23.70	27.00	21.82	22.33	23.74
Venezuela			20.04	20.8	55.37	57.64	77.55	86.89	37.17
Peru			19.95	19.5	22.78	25.98	23.64	27.01	14.32
Turkey	***			18.4	15.37	19.36	13.57	16.09	18.90
S. Korea	*		20.75	17.8	18.86	23.50	9.15	11.63	44.35
Indonesia	*	26.74	18.19	17.2	19.26	16.19	9.13	10.10	12.18
Thailand	*	29.18	19.82	15.9		11.86	8.86	9.19	20.80
Brazil		30.12	17.19	15.8	17.06	18.55	17.48	20.86	21.54
Taiwan	*		18.53	14.9	17.88	18.81	9.63	12.50	51.35
Pakistan	*		16.77	13.7		9.69	6.79	5.91	7.28
China	*	21.29	15.92	12.9	12.64	11.09	6.41	7.84	13.73
India	*	22.71	15.26	12.4	10.51	8.82	6.24	6.57	5.97
Ghana	**		15.67	12.2			12.46	11.01	4.46
Burma	*			11.9		9.76	4.11	4.90	3.31
Bangladesh			14.18	11.6		8.15	5.76	4.79	3.19
Egypt	**		12.43	9.5			5.40	6.36	8.54
Morocco	**						16.83	13.50	10.31
Nigeria	**						5.71	5.76	5.10
Ivory Coast	**						8.97	9.39	5.02
Kenya	**						6.36	6.41	4.67
Tanzania	**						4.46	4.45	2.66
Zaire	**						6.64	7.22	1.56
Ethiopia	**						2.89	2.70	1.33

* 1938 used for 1940, 1992 used for 1994

** 1992 used for 1994

*** 1920 used for 1930, 1938 used for 1940

From Maddison (1995)

TABLE 2. Voting patterns according to party affiliation.

	Yes	No	Abstain	Total
Conservative	144	2	86	232
Liberal	16	67	60	143
Unionist	40	0	22	62
Other	3	9	11	23
Total	203	78	179	460

TABLE 3. The effect of the share of agriculture employment on voting and party affiliation.

	Dependent Variable	
	(1)	(2)
Independent Variable	Vote on Balfour Act*	Party Affiliation**
Party Affiliation	-1.631 (9.42)	
% Wrks in Ag/Mine	-1.586 (2.51)	3.151 (1.76)
Wage	-0.015 (0.62)	0.096 (2.35)
Constant		-2.159 (3.27)
Chi-square test p-value	0.0000	0.0005
Number of obs	199	199
Specification	Ordered Probit	Probit

*Vote on the Balfour Act: 2=Yes, 1=Abstain, 0=No.
**Party Affiliation: 1 = Liberal, 0=Conservative
Absolute values of t-statistics in parentheses. The t-statistics are calculated using standard errors adjusted for clustering by county.