Oligarchic Land Ownership, Entrepreneurship, and Economic Development*

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April 5, 2012

Abstract

This paper develops a theory in which oligarchic ownership of land or other natural resources may impede entrepreneurship in the manufacturing sector and thereby retards structural change and economic development. We show that, due to oligopsony power of owners in the agricultural labor market, higher ownership concentration depresses entrepreneurial investments by landless, credit-constrained households, whose investment possibilities depend on the income earned in the primary sector. We also discuss historical evidence from Latin America, India, Taiwan and South Korea which supports our theory.

Key words: Credit Constraints; Entrepreneurship; Oligopsony Power; Land Concentration; Structural Change.

JEL classification: O10, O13, O40.

*We are grateful to two anonymous referees, Abhijit Banerjee, Ann Markusen, Omer Moav, Guido Tabellini, Heinrich Ursprung and Fabrizio Zilibotti for valuable hints and suggestions. Timo Boppart provided excellent research assistance. We are also indebted to seminar participants at the workshop "Economic Growth and Institutions" (University of Copenhagen), the Annual Meetings of the European Economic Association and Verein für Socialpolitik, as well as research seminars at the Universities of Munich, Konstanz and Hannover.

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1 Introduction

Economic development is intimately related to structural change from natural resource-intensive production like agriculture or mining to manufacturing and capital-intensive production. This process is typically driven by the emergence of a new entrepreneurial class which in oligarchic societies challenges the traditional elite of natural resource owners economically and politically. The relevant individual characteristic which enables agents to become entrepreneur is whether or not they have the means to finance the cost of setting up a firm. Under credit constraints and in absence of bequests, this depends on the households' own income. An immediate implication is that, because every economy in an early stage of development is dominated by primary goods production, the income earned by landless workers or tenants in the primary sector is a decisive financial determinant of the possibilities to start manufacturing activity.

This paper argues that, for this reason, the ownership concentration of land or other natural resources plays an important role for entrepreneurship, structural change, and economic development. According to our analysis, oligopsony power of large landowners in the agricultural labor market depresses entrepreneurial investments of landless, credit-constrained households.

Thus, our main focus is on the adverse effects of *economic* power of the preindustrial elite in early stages of development. We thereby propose a complementary theory to the recently emphasized adverse effects of *political* power of landowners which enabled them to block institutional reforms conducive to economic development. Galor, Moav and Vollrath (2009) show that land inequality is negatively related to the point of time in which human capital promoting institutions are adopted, thereby delaying economic development. Falkinger and Grossmann (2005a) relate the opposition of the landed elite to mass education to openness to trade. In their framework, an open trade regime is politically supported by rich landowners under a comparative advantage for primary goods production. These general equilibrium theories advance the hypothesis that the landed elite in Latin America blocked reforms of the public education system towards mass education (e.g. Sokoloff and Engerman, 2000; Engerman and Sokoloff, 2005). In

an interesting recent paper, Vollrath (2010) argues that in order to preserve high rents on land, large landowners also delayed financial development and therefore slowed down structural change towards manufacturing. Again, land concentration is an obstacle to political reforms which could be conducive to economic development.

Other important contributions focus on the land market. Proto (2007) argues that high land inequality is associated with a high rental price of land, which in turn reduces the possibilities of tenant farmers to invest in education. Gall and Masella (2012) show that powerful elites have an incentive to form a coalition which prevents that land is competitively assigned to the skilled by a land market.

Our analysis abstracts from both educational investments and political channels.[1] We rather suggest a new link between credit market imperfections, occupational choice, and long-run growth patterns, which focuses on the dismal effects of oligopsony power of landowners on entrepreneurship.[2] Banerjee and Newman (1993), Aghion and Bolton (1997) and Piketty (1997) propose models in which individuals with one-period lives may open up a firm and leave bequests. They show that initial wealth inequality is typically negatively related to growth due to the disability of poor and credit-constrained individuals to cover fixed costs of setting up profitable projects. Banerjee and Newman (1993) consider a case where high wealth inequality may depress wages and therefore gives rise to a poverty trap.[3] In our model, individuals live two periods and all potential entrepreneurs are born without wealth. Unlike in Banerjee and Newman (1993), they thus have to rely on first-period wage income (rather than on inherited wealth) to invest in entrepreneurship. This implies a major role for labor market characteristics.

[1] This is not to deny that the dynamic interaction between political institutions and the distribution of resources is of major importance for development processes. Acemoglu, Johnson and Robinson (2005) provide an excellent overview on the vast related literature, focussing on institutions like property rights protection.

[2] Falkinger and Grossmann (2005b) show that, when landowners possess oligopsony power in the labor market, they also oppose public investment and other policies which promote productivity in the manufacturing sector. Contrary to landowners, entrepreneurs support productivity-promoting reforms. This is in line with Galor and Moav (2006), who argue that educational reform in 19th century Western Europe was orchestrated by capitalists. This suggests a vicious politico-economic circle: by impeding business creation and the size of the manufacturing sector, a high oligopsony power of landowners also hinders the emergence of a bourgeois class so that the pre-industrial elite remains the dominant political force.

[3] Our paper is less related to Aghion and Bolton (1997) and Piketty (1997). They assume that all workers are self-employed whereas our focus is on entrepreneurship.

We hypothesize in a dynamic two-sector model that ownership concentration in the resource-intensive sector determines the means of the landless population to invest in manufacturing businesses.

Possibly closest to our paper, Ghatak, Morelli and Sjöström (2001) also link occupational choice to wage determination in a model with imperfect credit markets. They propose a principal-agent framework with limited liability constraints to focus on effort choice of workers. Removing credit constraints mitigates entry barriers into entrepreneurship and reduces inequality. Through affecting the agency problem, however, this may reduce incentives to work hard and therefore slow down development. Whereas their model is driven by the "*joint* presence of incentive problems in the labor market *and* imperfections in the credit market" (p. 783; italics original), our model is driven by the joint presence of oligopsony power of landowners and restricted access to credit of landless workers who face the choice whether or not to become entrepreneur. Moreover, our two-sector framework allows us to explicitly focus on structural change from primary production to manufacturing. We also discuss historical evidence on the relationship between land concentration, wages and the evolution of the manufacturing sector.

The plan of the paper is as follows: Section 2 illustrates the basic message of the paper in the simple static model. Section 3 sets up a dynamic overlapping generations model of a small open economy. Section 4 considers individual decisions whereas section 5 derives the macroeconomic equilibrium. Section 6 discusses historical evidence. We first outline how oligopsony power in the rural labor market was historically associated with slow structural change in Latin America and India. We also document the increasing orientation of peasants towards non-agricultural enterprises and fast industrial development in Taiwan and South Korea in the aftermath of successful land reforms initiated in the early 1950s − consistent with the link between ownership concentration, income levels of landless households, and structural change suggested by our framework. The last section provides concluding remarks.

2 Illustrative Model

We first illustrate the basic mechanisms how oligopsony power of oligarchic landowners in interaction with credit market imperfections may affect economic development, by employing a very simple model. There are two sectors, a primary ($X-$) sector, called "agriculture", and a manufacturing ($Y-$) sector. The manufacturing sector consists of an exogenous number of identical entrepreneurs, N^E. In the dynamic version of the model presented below, N^E is endogenous and there is heterogeneity in entrepreneurial ability.

Manufacturing output per entrepreneur is given by $y = g(l^y)$, where l^y denotes employment of a firm; $g(\cdot)$ is increasing and concave. Entrepreneurs have to incur sunk costs in advance of production in order to create workplaces. A fixed labor requirement $\bar{l} \geq 0$ together with a capital requirement $k(l^y)$ creates employment capacity l^y (which is fully used in equilibrium); $k(\cdot)$ is increasing and strictly convex, with $k(0) = 0$. Denoting the wage rate in manufacturing by w^Y, total set up costs are $w^Y\bar{l} + k(l^y)$.

Each entrepreneur can at most incur sunk costs which are a fixed multiple of labor income, earned prior to entrepreneurship. Having received labor income I, he can invest ηI, $\eta \geq 1$.[4] $\eta = 1$ means that no credit market exists. The higher is η, the better developed is the financial market. Also assume that $\eta > \bar{l}$. Otherwise, pre-entrepreneurial labor income would not be sufficient to cover the costs for the fixed labor requirement.

Denote by $L^Y := N^E(l^y + \bar{l})$ the total number of workers in the manufacturing sector. The total number of workers is given by N^L. Labor supplied to the agricultural sector is

$$N^X = N^L - L^Y. \tag{1}$$

We associate a more developed economy as one with higher employment in manufac-

[4]See also Bernake and Gertler (1989). The following simple microfoundation heavily draws on Aghion, Howitt and Mayer-Foulkes (2005). Let r and I denote the interest rate and income, respectively. Suppose an entrepreneur who invests k can defraud the creditors by paying a cost μk, $0 \leq \mu < 1 + r$. To do this is not worthwhile if $\mu k \geq (1 + r)(k - I)$, which is equivalent to $k \leq \eta I$, $\eta \equiv (1 + r)/(1 + r - \mu)$. Thus, the maximum amount of investment is ηI, where $\eta \geq 1$.

turing and, consequently, lower employment in agriculture.

Due to declining marginal productivity of labor in the agricultural sector, individual labor income in the agricultural sector, I^X, is decreasing in N^X. We write $I^X = I(N^X, z)$, where z is a shift parameter, which in the dynamic model below equals landholding per landowner. As shown in the appendix to the dynamic model, under standard assumptions, individual agricultural labor income is increasing in the number of landowners (i.e., decreasing in landholding per owner) if landowners possess oligopsony power; otherwise it is independent of z. Here we assume that I is decreasing in z. Wage income in manufacturing, w^Y, is equal to agricultural labor income. Using (1), we thus have

$$w^Y = I(N^L - L^Y, z). \tag{2}$$

An entrepreneur who is not credit-constrained chooses employment capacity l^y to maximize profit

$$\pi = g(l^y) - w^Y l^y - w^Y \bar{l} - k(l^y). \tag{3}$$

Using $l^y = \frac{L^Y}{N^E} - \bar{l}$ and assuming an interior solution, the first-order condition reads

$$w^Y = g'\left(L^Y/N^E - \bar{l}\right) - k'\left(L^Y/N^E - \bar{l}\right) \equiv \hat{w}(L^Y). \tag{4}$$

Fig. 1 shows in a (L^Y, w^Y)-diagram the two curves defined by (2) and (4), labelled the "$I-$curve" and the "$\hat{w}-$curve", respectively. The $I-$curve is increasing in L^Y whereas the $\hat{w}-$curve is decreasing in L^Y. Higher land concentration (increase from z_0 to $z_1 > z_0$) shifts down the $I-$curve by depressing labor income. In turn, in absence of credit-constraints, this raises the optimal employment capacity and therefore raises total manufacturing employment, L^Y, in equilibrium; in turn, this lowers agricultural employment. The reason is that lower wage costs induces entrepreneurs to raise employment capacity. Thus, without credit constraints, stronger oligopsony power of landowners boosts economic development.

Now suppose that entrepreneurs, with pre-entrepreneurial wage income w^Y, are credit-constrained. Capacity, l^y, is thus limited to the amount implied by the condition

that the means of finance, ηw^Y, equal start-up costs. We have

$$w^Y \bar{l} + k\left(l^y\right) = \eta w^Y \implies w^Y = \frac{k\left(\frac{L^Y}{N^E} - \bar{l}\right)}{\eta - \bar{l}} \equiv \tilde{w}(L^Y, \eta). \tag{5}$$

Fig. 2 shows in a (L^Y, w^Y)-diagram the $I-$curve and "$\tilde{w}-$curve" as defined by (5). The latter starts at $\tilde{w}(N^E\bar{l}, \eta) = 0$. Also the $\tilde{w}-$curve is increasing in manufacturing employment, L^Y. The reason is that higher pre-entrepreneurial wage income allows entrepreneurs to create more workplaces. Since higher manufacturing employment, in turn, leads to higher wages, there may be multiple equilibria, i.e., multiple intersection points between both curves in Fig. 2. As the $I-$curve starts above the $\tilde{w}-$curve, an equilibrium exists and is unique, if the $\tilde{w}-$curve is steeper than the $I-$curve. This is the case shown in Fig. 2. Higher land concentration (increase from z_0 to $z_1 > z_0$) again shifts down the $I-$curve by depressing pre-entrepreneurial income. This tightens credit constraints and therefore, in contrast to the case without binding credit constraints, reduces manufacturing employment. The opposite holds if η increases, which shifts the $\tilde{w}-$curve downwards. For sufficiently high η, credit constraint (5) is no longer binding and the equilibrium is determined by the curves shown in Fig. 1.

In sum, the simple model suggests that higher land concentration promotes development under advanced credit markets and retards development if credit-constraints are severe.

3 Dynamic Model

Now consider a small open two-sector economy (agriculture and manufacturing) populated by overlapping generations with two-period lives. Goods markets are perfectly competitive. Consistent with the small open economy assumption, both the interest rate and the prices of the two goods are exogenous. For notational simplicity, the interest rate is equal to zero and goods prices are equal to unity.

3.1 Individuals

Individuals differ in factor endowments. There is a "traditional elite", represented by discrete number of $N^Z > 1$ households, who own some natural resource, hereafter referred to as "land".[5] In each period, a household consists of parent and child, where the child becomes parent in the second period of life and inherits the land estate. The total amount of land is time-invariant and denoted by Z. It is equally distributed among landowners, each owning $z := \frac{Z}{N^Z}$. The rents from the fixed factor are shared within a household of the traditional elite between parent and child.

Moreover, in each period a large number of workers, N^L, is born. They are identically endowed with raw labor in the first period of life but do not own land. Each landless individual i may become entrepreneur in the manufacturing sector in the second period of life. As formalized below, individuals may differ in entrepreneurial ability. When not becoming entrepreneur, individuals retire in the second period of life.

To focus on the role of land ownership concentration, we normalize $Z = N^L$. Throughout, we measure ownership concentration by the ratio of workers to owners ($\frac{N^L}{N^Z}$), which in view of $Z = N^L$ equals ownership of land per member of the traditional elite, z.

Individuals may save in the first-period of life for old age. As interest rates and goods prices are given in the world market and do not depend on individual choices, saving decisions in this small open economy have no general equilibrium effects and thus play no role in our analysis. We assume that there is no disutility of work for entrepreneurs. As second-period income is zero for those who do not choose to become entrepreneur, individuals enter the market if net profits are non-negative.[6]

[5] For instance, the traditional oligarchy in 19th century South America mainly consisted of landowners. Some of them made their fortune from mining.

[6] For instance, see Grossmann (2009) for an overlapping-generations model with entrepreneurs, free entry, and R&D-driven growth.

3.2 Sectorial Structure

3.2.1 Agricultural Sector

Each landowner produces in period t output x_t in the agricultural ($X-$) sector on his landholding z according to

$$x_t = F(l_t^x, z) \equiv z f(l_t^x/z), \tag{6}$$

where F is a linearly homogenous function and l^x is the amount of labor a single landowner employs; $f(\cdot)$ is increasing, strictly concave and fulfills the standard boundary conditions. (We omit time index t when it does not lead to confusion.)

Again denote the labor supply to the agricultural sector by N^X and total employment of workers in the manufacturing sector by L^Y; $L_0^Y > 0$. According to (1), the share of individuals (seeking) employment in the $X-$sector is

$$n^X := \frac{N^X}{N^L} = 1 - \frac{L^Y}{N^L}. \tag{7}$$

Landowners possess oligopsony power in the labor market and take L^Y as well as an increasing labor supply schedule of agricultural workers as given. As shown in the appendix, income of an agricultural worker can be written as

$$I_t^X = I^X(n_t^X, z); \;\; \frac{\partial I^X}{\partial n^X} < 0, \;\; \frac{\partial I^X}{\partial z} < 0. \tag{8}$$

First, the wedge between the wage rate and the marginal product of agricultural labor increases if land ownership is concentrated on fewer owners (higher z). From this, consistent with historical evidence presented in section 6, we obtain $\frac{\partial I^X}{\partial z} < 0$. According to the appendix, $\frac{\partial I^X}{\partial z} = 0$ if workers in the $X-$sector were paid their marginal product. Second, a larger share of workers, n^X, who seek employment in the agricultural sector, lowers the marginal return to labor. Thus, $\frac{\partial I^X}{\partial n^X} < 0$ would also hold if the wage rate in the $X-$sector was equal to its marginal product. Finally, under oligopsony power, also the labor input per worker in the $X-$sector is reduced, additionally depressing wage

income.

As also shown in the appendix, under production function (6), income (profit) of landowners, π^x, is given by[7]

$$\pi_t^x = \pi^x(n^x, z); \;\; \frac{\partial \pi^x}{\partial n^x} > 0, \;\; \frac{\partial \pi^x}{\partial z} > 0. \tag{9}$$

Two remarks are in order. First, for the critical property $\frac{\partial I^X}{\partial z} < 0$, alternative microfoundations of economic power of owners are conceivable. For instance, although we will refer to a decrease in z as lower land concentration, a reduction in z may be interpreted as any land reform which raises income of tenants and reduces profits of owners. For instance, Besley and Burgess (2000) and Banerjee, Gertler and Ghatak (2002) analyze the impact of various land reform measures in post-independence India, including regulatory improvement of contractual terms of tenants and reduction in power of (absentee) landlords. Second, we have implicitly ruled out that landowners adopt an entrepreneurial role in manufacturing. If landowners could choose to give up their estate and become entrepreneur in the manufacturing sector, the question is in which sector their profits are higher. As will become apparent, in equilibrium, the total derivative of π^x with respect to z is positive. Thus, landowners will not find it attractive to become entrepreneur if ownership concentration z is sufficiently high. This is supported by historical evidence. Consistent with our analysis, Young (1995) finds that savings from previous wage employment was the main source of start-up capital for micro-scale enterprises in rural Scotland between 1840 and 1914. Doepke and Zilibotti (2008) point out that in early stages of development the rich were typically landowners who did not engage in business outside the primary sector. According to Crouzet (1985), in the UK about half of the founders of large industrial undertakings during the first industrial wave (1750-1850) came from the working class or lower middle class. Some of them, or their fathers, were employed in the agricultural or mining sector. However, only 3 percent of entrepreneurs were part of the upper class

[7] $\pi^x(n^x, z)$ would also be increasing in both arguments if agricultural workers were paid their marginal product.

(landowners or officers) and less than 10 percent of entrepreneurs were descendants of a landowner family. For instance, "after 1815, [landowners] did not make any serious contribution either to the cotton industry or to the great expansion of the iron industry which took place in the 1830s" (Crouzet, 1985, p. 77).[8]

3.2.2 Manufacturing Sector

The manufacturing ($Y-$) good is produced by a simple constant returns to scale technology with labor as only input. In the second period of life, entrepreneur i produces output

$$y_{it} = g_i(l_{it}^y) = a_i l_{it}^y \tag{10}$$

in period t, where l_i^y is labor input in firm i and a_i is ability of entrepreneur i. The cumulative distribution function of entrepreneurial ability is time-invariant. It is denoted by $G(a)$ and has support $[0, \bar{a}]$, $\bar{a} > 0$. Let N^E again denote the number of entrepreneurs, where $N_0^E > 0$ is given. In contrast to section 2, N^E is endogenously determined by assuming free entry.

For simplicity, suppose that each worker can be employed in only one sector and inelastically supplies one unit of labor to the $Y-$sector. Note that entrepreneurs would make losses if they were wage-takers at the production stage, due to the presence of set up costs and the constant-returns production technology (10). We consider two alternative assumptions for wage setting in the manufacturing sector.

- First, we start with the simple case where wage income in the manufacturing sector, w^Y, is exogenous and lower than labor productivity in the firm of the entrepreneur with the highest entrepreneurial ability, $\bar{a}$. We shall focus on the case where manufacturing wages are not lower than agricultural wages in the initial period.[9] In this case, entrepreneurs are always able to utilize full capacity

[8] Doepke and Zilibotti (2008) explain such patterns in a model where altruistic parents can invest in the patience capital (time preference) of their children and credit constraints give rise to a complementarity between investment in patience and a steep income profile. Employing this or alternative microfoundations of the negligible role of landowners in industrial development would not affect our main results.

[9] Positive wage income differentials between manufacturing and agriculture are consistent with

at the given wage.[10] In sum:

$$w^Y = \bar{w}^Y \in [I^X(n_0^X, z), \bar{a}). \tag{A1}$$

- Secondly, we analyze the case of section 2, that w^Y equals the wage income in the agricultural sector, I^X:

$$w^Y = I^X(n^X, z). \tag{A2}$$

  For instance, if manufacturing workers lack bargaining power, they will accept any wage which is not below the outside option in the agricultural sector and entrepreneurs pay the lowest one possible.

Similarly to section 2, due to imperfect credit markets, an entrepreneur with first-period income I_{t-1}, can maximally incur set up costs ηI_{t-1}, $\eta \geq 1$, in order to produce in t. An entrepreneur i has to employ a fixed amount of labor, $\bar{l} \in [0, \eta)$. In addition, to create employment capacity l_i^y, required investment of each entrepreneur one period in advance of production is given by $k(l_i^y)$, where function $k(\cdot)$ is again increasing and strictly convex. Denoting by C_{it-1} the total set up costs in period $t-1$ of individual i, we thus have

$$C_{it-1} = w_{t-1}^Y \bar{l} + k(l_{it}^y) \equiv C(l_{it}^y, w_{t-1}^Y). \tag{11}$$

4 Individual Choices

We compare the cases of non-binding and binding credit constraints by first examining the investment choice of entrepreneurs and then the decision of workers whether or not to become entrepreneur in their second period of life.

An entrepreneur i with ability a_i and first-period income I_{it-1} chooses optimal

overwhelming evidence on a positive (real) urban-rural wage gap. For instance, Hatton and Williamson (1992) provide historical data on the U.S. for the period 1890-1941, and discuss related evidence.

[10] It will become apparent that n^X will not increase over time, such that $w^Y \geq I^X$ for any period.

employment capacity (i.e., firm size) l_t^y to maximize net profits, π_{it}^y. We have

$$\max_{l_{it}^y} \pi_{it}^y = (a_i - w_t^Y) l_{it}^y - C(l_{it}^y, w_{t-1}^Y) \text{ s.t.} \tag{12}$$

$$\eta I_{it-1} \geq C(l_{it}^y, w_{t-1}^Y) = w_{t-1}^Y \bar{l} + k(l_{it}^y). \tag{13}$$

4.1 Non-Binding Credit Constraints

Suppose first that no entrepreneur is credit-constrained. An unconstrained entrepreneur (i.e., (13) is not binding) chooses employment capacity according to first-order condition $a_i - w^Y = k'(l_i^y)$, i.e.,

$$l_{it}^y = (k')^{-1}\left(a_i - w_t^Y\right) \equiv \hat{l}_t^y(a_i). \tag{14}$$

The resulting profit is given by[11]

$$\pi_{it}^y = (a_i - w_t^Y)\hat{l}_t^y(a_i) - k(\hat{l}_t^y(a_i)) - w_{t-1}^Y \bar{l} \equiv \hat{\pi}_t^y(a_i). \tag{15}$$

More able entrepreneurs want to create larger firms, $\frac{\mathrm{d}\hat{l}^y}{\mathrm{d}a_i} > 0$.[12] Moreover, it is easy to see that $\hat{\pi}^y(a_i)$ is increasing in ability a_i (applying the envelope theorem) and decreasing in manufacturing wages in the current and previous period. Define $\underline{\hat{a}}_t$ as being given by $\hat{\pi}_t^y(\underline{\hat{a}}_t) = 0$. Since entry is profitable as long as $\pi_i^y \geq 0$, all individuals with ability above threshold ability level $\underline{\hat{a}}$ enter. The following properties hold.

Lemma 1. *$\underline{\hat{a}}_t$ is increasing in w_t^Y and, if $\bar{l} > 0$, in w_{t-1}^Y; $\underline{\hat{a}}_t$ is independent of z.*

Proof. Immediately follows from (14) and (15). ■

The fraction of entrepreneurs in period t is

$$n_t^E := \frac{N_t^E}{N^L} = 1 - G(\underline{\hat{a}}_t). \tag{16}$$

[11] For notational simplicity, wage rates are supressed in functions $\hat{l}_t^y$ and $\hat{\pi}_t^y$.

[12] Thus, the firm size distribution primarily depends on the distribution of entrepreneurial ability $G(a)$. To match the observed firm size distribution is beyond the scope of the paper. It would require to specify $G(a)$ and allow for the "mixed" case where some entrepreneurs (with high ability) are credit constrained and others are not.

The fraction of production labor employed in the $Y-$sector in t is $\int_{\underline{\hat{a}}_t}^{\bar{a}} \hat{l}^y(a)\mathrm{d}G(a)$. The start-up labor requirement ($\bar{l}$) in t is employed by the fraction of entrepreneurs $n_{t+1}^E = 1 - G(\underline{\hat{a}}_{t+1})$ active in $t+1$. Consequently, the total fraction of agricultural workers in period t, $n_t^X = 1 - \frac{L_t^Y}{N^L}$, is

$$n_t^X = 1 - \left[1 - G(\underline{\hat{a}}_{t+1})\right] \bar{l} - \int_{\underline{\hat{a}}_t}^{\bar{a}} \hat{l}_t^y(a)\mathrm{d}G(a) \equiv \hat{n}_t^X. \tag{17}$$

Lemma 2. *$\hat{n}_t^X$ is increasing in w_t^Y and, if $\bar{l} > 0$, also in w_{t-1}^Y and w_{t+1}^Y; $\hat{n}_t^X$ is independent of z.*

Proof. Use (14), (17) and Lemma 1. ■

For $\bar{l} > 0$, if w_{t-1}^Y increases, less entrepreneurs are active in period t (i.e. $\underline{\hat{a}}_t$ is higher) because ex ante labor costs for the start-up labor requirement ($\bar{l}$) rise. When credit constraints are non-binding, this raises the agricultural labor share in t. If w_{t+1}^Y is higher, less entrepreneurs are active in period $t+1$ (i.e., $\underline{\hat{a}}_{t+1}$ is higher) because they anticipate higher marginal costs in $t+1$. If $\bar{l} > 0$, this lowers manufacturing labor demand in t. If w_t^Y is higher, less capacity will be installed by entrepreneurs who are active in period t, according to (14); this raises $\underline{\hat{a}}_t$. Moreover, if $\bar{l} > 0$, costs of entry in order to be active in $t+1$ rise; this raises $\underline{\hat{a}}_{t+1}$. Both effects reduce manufacturing employment in t and therefore raise the fraction of agricultural workers in t.

4.2 Binding Credit Constraints

Now suppose that all entrepreneurs are credit-constrained. If credit-constrained, entrepreneur i with first-period income I_{it-1} in period $t-1$ chooses capacity $l_{it}^y < \hat{l}^y(a_i, w_t^Y)$ which results when constraint (13) is binding. In this case, we have:

$$l_{it}^y = \begin{cases} k^{-1}(\eta I_{t-1}^X - w_{t-1}^Y \bar{l}) \text{ if } I_{it-1} = I_{t-1}^X, \\ k^{-1}((\eta - \bar{l}) w_{t-1}^Y) \text{ if } I_{it-1} = w_{t-1}^Y. \end{cases} \tag{18}$$

Thus, when credit constraints are binding, higher first-period income and more advanced credit markets (higher η) allow to create larger firms. The resulting profit is

$$\pi_{it}^{y} = (a_i - w_t^Y)k^{-1}(\eta I_{it-1} - w_{t-1}^Y \bar{l}) - \eta I_{it-1} \equiv \Pi_{it}^{y}(I_{t-1}^{i}, \eta). \tag{19}$$

Lemma 3. *Π_{it}^{y} is increasing in both I_{t-1}^{i} and η.*

Proof. According to (19), $\frac{\partial \Pi_{it}^{y}}{\partial I_{it-1}} = \frac{(a_i - w_t^Y)\eta}{k'(l_{it}^{y})} - \eta > 0$ if and only if $a_i - w_t^Y > k'\left(\hat{l}_{it}^{y}\right)$. Recall from (14) that, when credit constraints are non-binding, the optimal capacity is given by $a_i - w^Y = k'\left(\hat{l}_i^{y}\right)$. When an entrepreneur is credit-constrained, he chooses $l_i^{y} < \hat{l}_i^{y}$; in this case, $a_i - w^Y > k'\left(l_i^{y}\right)$. In a similar fashion, we can show $\frac{\partial \Pi_{it}^{y}}{\partial \eta} > 0$. ■

The profit in t of a constrained entrepreneur is increasing in the means of finance, ηI_{it-1}, because employment capacity is suboptimally low and, according to (18), also increasing in ηI_{it-1}. This explains Lemma 3. It implies that, if $I^X < w^Y$, a lower fraction of those who worked in the agricultural sector in their first period of life will become entrepreneur compared to the fraction of those who worked in the manufacturing sector.

5 Macroeconomic Equilibrium

We first derive the equilibrium for the assumption of exogenous manufacturing wages and then turn to the case where wage income is the same in both sectors. In order to avoid cumbersome case distinctions and to emphasize the impact of oligopsony power of landowners for economic development through the interaction between land concentration and credit market imperfections in its sharpest relief, we focus on the polar cases where either no or all entrepreneurs are credit-constrained.

5.1 Exogenous Manufacturing Wage Income

First suppose that manufacturing wages are at exogenous level $\bar{w}^Y$.

5.1.1 Non-Binding Credit Constraints

For the case where credit constraints are not binding, use $w_t^Y = w_{t-1}^Y = \bar{w}^Y$ in (15) for determining threshold ability $\underline{\hat{a}}_t$ by $\hat{\pi}_t^y(\underline{\hat{a}}_t) = 0$. Then with (17), the agricultural labor share can be written as function of $\bar{w}^Y$: $n_t^X = \hat{n}^X(\bar{w}^Y)$.

Proposition 1. *Under (A1) and* $\eta I^X(\hat{n}^X(\bar{w}^Y), z) \geq \bar{w}^Y \bar{l} + k(\hat{l}^y(\bar{a}, \bar{w}^Y))$*, there are no transitional dynamics and the agricultural labor share does not depend on land concentration (*z*).*

Proof. Follows from (17) and Lemma 2. The presumption which implies that credit constraints are indeed non-binding follows from using $I_i = I^X(n^X, z)$, $l_i = \hat{l}^y(\bar{a}, \bar{w}^Y)$ and $n^X = \hat{n}^X(\bar{w}^Y)$ in (13). ■

Proposition 1 deals with the case where even an entrepreneur with the highest ability ($\bar{a}$) and first-period income I^X from the agricultural sector is not credit-constrained. The case applies when credit markets are sufficiently advanced (η is high enough) and/or land concentration (z) is low. Under these conditions, land concentration does not affect the macroeconomic equilibrium.

5.1.2 Binding Credit Constraints

If credit constraints are binding, according to (8) and (18), employment capacity of entrepreneur i for production in period t is given by

$$l_{it}^y = \begin{cases} k^{-1}(\eta I^X(n_{t-1}^X, z) - \bar{w}^Y \bar{l}) \equiv \tilde{l}^{yX}(n_{t-1}^X, z, \eta) \text{ if } I_{it-1} = I_{t-1}^X, \\ k^{-1}((\eta - \bar{l})\bar{w}^Y) \equiv \tilde{l}^{yY}(\eta) \text{ if } I_{it-1} = \bar{w}^Y. \end{cases} \tag{20}$$

The following result is immediate.

Lemma 4. $\tilde{l}_t^{yX} \equiv \tilde{l}^{yX}(n_{t-1}^X, z, \eta)$ *is decreasing in both* n_{t-1}^X *and* z*. An increase in* η *raises both* $\tilde{l}^{yX}$ *and* $\tilde{l}^{yY}$*.*

Proof. The effects of a change in η are straightforward, as $k' > 0$. For the other results, use properties $\frac{\partial I^X}{\partial n^X} < 0$ and $\frac{\partial I^X}{\partial z} < 0$ from (8) in (20). ■

Since entrepreneurs who worked in the $X-$sector do not earn higher wage income than those in the $Y-$sector by assumption (A1), we have $\tilde{l}_t^{yX} \leq \tilde{l}_t^{yY}$. According to Lemma 4, if an entrepreneur worked in the agricultural sector in the first period of life, he creates less employment capacity for period t if the agricultural labor share in period $t-1$ (n_{t-1}^X) and/or land concentration (z) are higher, as both reduce his first-period income. A more advanced credit market (higher η) allows entrepreneurs to raise the number of created workplaces.

Installed capacity leads to profits

$$\pi_{it}^y = \Pi_{it}^y(I_{t-1}^i, \eta) = \begin{cases} (a_i - \bar{w}^Y)\tilde{l}^{yX}(n_{t-1}^X, z, \eta) - \eta I^X(n_{t-1}^X, z) \equiv \tilde{\pi}_t^{yX}(a_i) \text{ if } I_{it-1} = I_{t-1}^X, \\ (a_i - \bar{w}^Y)\tilde{l}^{yX}(\eta) - \eta \bar{w}^Y \equiv \tilde{\pi}_t^{yY}(a_i) \text{ if } I_{it-1} = \bar{w}^Y. \end{cases} \tag{21}$$

Define $\underline{\tilde{a}}_t^X \equiv \underline{\tilde{a}}^X(n_{t-1}^X, z, \eta)$ as being given by $\tilde{\pi}_t^{yX}(\underline{\tilde{a}}_t^X) = 0$. $\underline{\tilde{a}}_t^X$ is the threshold ability level for an entrepreneur active in t who worked in the agricultural sector in $t-1$. Similarly, define by $\underline{\tilde{a}}_t^Y \equiv \underline{\tilde{a}}^Y(\eta)$ the threshold ability level for an entrepreneur who worked in the manufacturing sector in $t-1$; it is given by $\tilde{\pi}_t^{yY}(\underline{\tilde{a}}_t^Y) = 0$. According to (A1), $\underline{\tilde{a}}_t^X \geq \underline{\tilde{a}}_t^Y$.

Lemma 5. *$\underline{\tilde{a}}_t^X$ is increasing in both n_{t-1}^X and z. An increase in η reduces both $\underline{\tilde{a}}_t^X$ and $\underline{\tilde{a}}_t^Y$.*

Proof. Follows from the definition of $\underline{\tilde{a}}^X$ and $\underline{\tilde{a}}^Y$ together (8) and Lemma 3. ■

According to Lemma 5, the higher is the agricultural labor share, n_{t-1}^X, or the more concentrated is land ownership (higher z), the lower is the fraction of entrepreneurs in t who worked in the agricultural sector in period $t-1$. Finally, a more advanced credit market (higher η) facilitates entry of all workers.

Under binding credit constraints, the number of entrepreneurs active in $t+1$ is given by

$$N_{t+1}^E = N_t^X(1 - G(\underline{\tilde{a}}_{t+1}^X)) + (N^L - N_t^X)(1 - G(\underline{\tilde{a}}_{t+1}^Y)). \tag{22}$$

Thus, the fraction of entrepreneurs in period $t+1$ reads

$$n_{t+1}^E = n_t^X \left[1 - G(\tilde{\underline{a}}^X(n_t^X, z, \eta))\right] + (1 - n_t^X)[1 - G(\tilde{\underline{a}}^Y(\eta))\big] \equiv \tilde{n}^E(n_t^X, z, \eta). \tag{23}$$

Lemma 6. *$\tilde{n}^E(n^X, z, \eta)$ is increasing in η and decreasing in both n^X and z.*

Proof. Follows from (23), Lemma 4, and $\tilde{\underline{a}}^X \geq \tilde{\underline{a}}^Y$. ■

Thus, given the agricultural labor share of the previous period, entrepreneurship is encouraged by more advanced financial markets and discouraged when land concentration is more pronounced.

In period t, the total amount of production labor employed by credit-constrained entrepreneurs who where agricultural workers in their first period of life (i.e. in period $t-1$) is $N_{t-1}^X \tilde{l}_t^{yX}(1 - G(\tilde{\underline{a}}_t^X))$. Analogously, credit-constrained entrepreneurs who were manufacturing workers create $(N^L - N_{t-1}^X)\tilde{l}_t^{yY}(1 - G(\tilde{\underline{a}}_t^Y))$ units of production labor. Thus,

$$\Gamma(n_{t-1}^X, z, \eta) := \tilde{l}_t^{yY}(1 - G(\tilde{\underline{a}}_t^Y)) - n_{t-1}^X[\tilde{l}_t^{yY}(1 - G(\tilde{\underline{a}}_t^Y)) - \tilde{l}_t^{yX}(1 - G(\tilde{\underline{a}}_t^X))], \tag{24}$$

is the fraction of production labor in manufacturing in the workforce in period t.

Lemma 7. *$\Gamma(n^X, z, \eta)$ is decreasing in both n^X and z, and increasing in η.*

Proof. Follows from (24) by using Lemma 4 and 5, together with $\tilde{l}_t^{yX} \leq \tilde{l}_t^{yY}$, $\tilde{\underline{a}}_t^X \geq \tilde{\underline{a}}_t^Y$ and the facts that both $\tilde{l}_t^{yY}$ and $\tilde{\underline{a}}_t^Y$ are independent of n_{t-1}^X and z. ■

Less workplaces are created if the agricultural labor share in the previous period or land concentration are higher, due to lower labor income of agricultural workers. By contrast, less tight credit constraints boost employment creation.

The start-up labor requirement in t for those entrepreneurs active in $t+1$ is $N^L n_{t+1}^E \bar{l}$. Thus, the agricultural labor share, $n^X = 1 - \frac{L^Y}{N^L}$, in period t is given by

$$n_t^X + \tilde{n}^E(n_t^X, z, \eta)\bar{l} = 1 - \Gamma(n_{t-1}^X, z, \eta). \tag{25}$$

According to (25), the fraction of agricultural labor follows a first-order difference equation, which we write as

$$n_t^X = \Psi(n_{t-1}^X, z, \eta). \tag{26}$$

If $\bar{l} = 0$, $\Psi = 1 - \Gamma$ assigns to each n_{t-1}^X a unique value of n_t^X. In order to avoid uninteresting case distinctions, suppose the left-hand side of (25) is increasing in n_t^X also for $\bar{l} > 0$:

$$1 + \bar{l}\frac{\partial \tilde{n}^E}{\partial n^X} > 0. \tag{27}$$

The dynamics in the agricultural labor share as captured by first-order difference equation (26) stem from the following mechanism. If n_{t-1}^X increases, agricultural wage income in $t-1$ decreases. Thus, credit-constrained entrepreneurs who worked in the $X-$ sector create less employment and have lower profits; in turn, the number of entrepreneurs declines. Consequently, n_t^X increases. Higher land concentration (z) has a similar effect on n_t^X, all other things equal, whereas less tight credit constraints (higher η) allow higher employment in the manufacturing sector. For these reasons, it is easy to see the following result.

Lemma 8. *When (27) holds, $\Psi(n^X, z, \eta)$ is increasing in both n^X and z, and decreasing in η.*

Proof. Apply the implicit function theorem to (25), using Lemma 6 and 7. ■

Denote by $\bar{n}^X$ the steady state agricultural labor share which is given by $\bar{n}^X = \Psi(\bar{n}^X, z, \eta)$. Generally, there may be multiple solutions for $\bar{n}^X$. As is well known, any steady state equilibrium is locally stable if $\frac{\partial \Psi(\bar{n}^X, \cdot)}{\partial n^X} < 1$. We are now ready to derive the main result of this paper.

Proposition 2. *Under (A1), (A3), and binding credit constraints, the following holds.*

(i) Let $\bar{n}^X$ be a stable steady state. For initial condition $n_0^X > \bar{n}^X$ in the local environment of $\bar{n}^X$, the agricultural labor share gradually declines over time in the transition to the steady state.

(ii) A more concentrated ownership of land (higher z) or less advanced financial markets (lower η) raise a stable steady state agricultural labor share ($\bar{n}^X$) and, given any n_{t-1}^X, raises n_t^X in the transition to the steady state. The opposite comparative-statics hold regarding both the number of entrepreneurs and total manufacturing employment.

(iii) Both in a stable steady state and during the transition, income per landowner, π^x, is increasing in z and decreasing in η.

Proof. Part (i) follows from the property that $\Psi(n^X, z, \eta)$ is increasing in n^X (Lemma 8). Part (ii) follows from the comparative-static results in Lemma 8. Part (iii) follows from parts (i), (ii) and the properties of $\pi^x(n^x, z)$ in (9). ■

The dynamic process which governs the evolution of the agricultural labor share and comparative-static results are illustrated in Fig. 3. It shows the gradual decline of n^X for initial condition $n_0^X > \bar{n}^X$ to a unique steady state. In Fig. 3, when z increases or η decreases, the $\Psi-$curve shifts upwards (Lemma 8), reducing $\bar{n}^X$. Higher ownership concentration (z) negatively affects first-period income of workers in the agricultural sector because it strengthens oligopsony power of landowners. Thus, investments of credit-constrained entrepreneurs who worked in this sector fall short to a larger degree to the optimal investment level. Consequently, both employment per entrepreneur in the manufacturing sector and the share of entrepreneurs, n^E, decline. This again lowers agricultural income and hence reduces investments of credit-constrained entrepreneurs also in the next period.

In sum, oligarchic land ownership is harmful for development. Moreover, since π^x is directly increasing in z and also indirectly through the positive effect of an increase in n^X, profits of each landowner are higher when land concentration is more pronounced. More advanced financial markets boost employment of credit-constrained entrepreneurs as well as entrepreneurship, thereby negatively affecting the agricultural labor share. Through the decrease in n^X, an increase in η lowers profits of landowners.

5.2 Same Wage Income in Both Sectors

Now suppose that wage income is the same in both sectors, which means that also wage income in the $Y-$sector is determined by oligopolistic landowners which take N^X (the total number of workers supplying labor to the agricultural sector) as given.

5.2.1 Non-Binding Credit Constraints

According to Lemma 1, threshold ability level $\underline{\hat{a}}_t$ is a function of w_t^Y and, if $\bar{l} > 0$, also of w_{t-1}^Y. Recalling this and substituting $w^Y = I^X(n^X, z)$ in (17), we can write $n_t^X = Q(n_t^X, n_{t+1}^X, n_{t-1}^X, z)$. According to (8) and Lemma 2, function Q is decreasing in n_t^X and z; if $\bar{l} > 0$, Q also depends negatively on n_{t+1}^X and n_{t-1}^X. The steady state solution of the agricultural labor share solves $\bar{n}^X = Q(\bar{n}^X, \bar{n}^X, \bar{n}^X, z)$.

Proposition 3. *Under (A2) and non-binding credit constraints. If $\bar{l} = 0$, there are no transitional dynamics and the long run agricultural labor share, $\bar{n}^X$, is unique. If $\bar{l} > 0$, the agricultural labor share (n_t^X) is governed by a second-order difference equation. $\bar{n}^X$ is decreasing in land concentration (z).*

Proof. Uniqueness of a steady state holds because the right-and side of $\bar{n}^X = Q(\bar{n}^X, \bar{n}^X, \bar{n}^X, z)$ is decreasing in $\bar{n}^X$. To prove the comparative-static result, recall that Q is decreasing in z and apply the implicit function theorem. ■

The main insight of Proposition 3 is simple. Without credit-constraints, entrepreneurs in the $Y-$sector create more workplaces when marginal wage cost at the production stage (w^Y) is lower. With $w^Y = I^X$ (assumption (A2)), this wage cost is decreasing in land concentration (z), because more oligopsony power of landowners in the $X-$sector affects the wage to be paid by entrepreneurs. In absence of credit constraints, this mechanism parallels the illustrative model of section 2, where the number of entrepreneurs was exogenous (Fig. 1). In the dynamic model, there is an additional effect of an increase in z: the increase in profits resulting from a lower w^Y also encourages entrepreneurship. In sum, an increase in z promotes development in absence of credit constraints. Moreover, if $\bar{l} > 0$, there are transitional dynamics.[13]

[13] Specifically characterizing the dynamics from the second-order difference which results when $\bar{l} > 0$

5.2.2 Binding Credit Constraints

If credit-constraints are binding, according to (A2) and (18), the chosen employment capacity of entrepreneur i is given by

$$l_{it}^y = k^{-1}((\eta - \bar{l})I^X(n_{t-1}^X, z)) \equiv \tilde{l}^y(n_{t-1}^X, z, \eta). \tag{28}$$

The next result is analogous to Lemma 4.

Lemma 9. *$\tilde{l}_t^y \equiv \tilde{l}^y(n_{t-1}^X, z, \eta)$ is increasing in η and decreasing in both n_{t-1}^X and z.*

Proof. The effect of a change in η is straightforward, as $k' > 0$. For the other results, use $\frac{\partial I^X}{\partial n^X} < 0$ and $\frac{\partial I^X}{\partial z} < 0$ from (8). ■

As now all entrepreneurs receive the same first-period wage income set by oligopolistic landowners, they create less employment capacity for period t if the agricultural labor share in period $t-1$ (n_{t-1}^X) is higher or if land concentration (z) is higher. The opposite holds of the credit market is more advanced (higher η).

For profits of entrepreneurs we have:

$$\pi_{it}^y = (a_i - I^X(n_t^X, z))\tilde{l}^y(n_{t-1}^X, z, \eta) - \eta I^X(n_{t-1}^X, z) \equiv \tilde{\pi}_t^y(a_i). \tag{29}$$

Given marginal wage costs $w_t^Y = I_t^X$, π_{it}^y is decreasing in z through the effect on I_{t-1}^X (recall $\frac{\partial I^X}{\partial z} < 0$ from (8)). However, in contrast to the case (A1) where marginal costs (w^Y) of entrepreneurs are exogenous, under assumption (A2) there is second, counteracting effect on profits. An increase in z also lowers wage costs per production worker; for entrepreneurs active in t, these are given by I_t^X; through this effect, profits π_{it}^y are increasing in z. Hence, the total effect of an increase in z on entrepreneurial profits is ambiguous. By contrast, because an increase in η raises employment capacity $\tilde{l}_t^y$, π_{it}^y increases when credit markets become more advanced.

Define threshold ability level $\underline{\tilde{a}}_t \equiv \underline{\tilde{a}}(n_t^X, n_{t-1}^X, z, \eta)$ as being given by $\tilde{\pi}_t^y(\underline{\tilde{a}}_t) = 0$. The following results are immediate.

would require strong assumptions on functional forms.

Lemma 10. *$\underline{\tilde{a}}_t$ is decreasing in both n_t^X and η; if $\bar{l} = 0$, $\underline{\tilde{a}}_t$ is increasing in n_{t-1}^X; the impact of an increase in z on $\underline{\tilde{a}}_t$ is ambiguous.*

Proof. Results with respect to a change in z and η follow from the definition of $\underline{\tilde{a}}_t$ and the preceding discussion. An increase in the current agricultural labor share n_t^X lowers marginal wage costs I_t^X (recall from (8) that $\frac{\partial I^X}{\partial n^X} < 0$) and therefore raises π_{it}^y. This explains why $\underline{\tilde{a}}_t$ is decreasing in n_t^X. From (19) and Lemma 3, when $\bar{l} = 0$, π_{it}^y is increasing in $I_{t-1}^X = I^X(n_{t-1}^X, z)$. Thus, $\underline{\tilde{a}}_t$ is increasing in n_{t-1}^X. ■

In period t, the fraction of manufacturing production labor is $(1 - G(\underline{\tilde{a}}_t))\tilde{l}_t^y$. The fraction of entrepreneurs active in period $t+1$, each with labor requirement $\bar{l}$ in t, is given by

$$n_{t+1}^E = 1 - G(\underline{\tilde{a}}(n_{t+1}^X, n_t^X, z, \eta)) \equiv \tilde{n}_{t+1}^E. \tag{30}$$

Thus, the agricultural labor share in t is given by

$$n_t^X = 1 - \tilde{n}_{t+1}^E \bar{l} - (1 - G(\underline{\tilde{a}}(n_t^X, n_{t-1}^X, z, \eta)))\tilde{l}^y(n_{t-1}^X, z, \eta). \tag{31}$$

Again denote the steady state level of the agricultural labor share by $\bar{n}^X$.

Proposition 4. *Under (A2) and binding credit constraints, the following holds.*

(a) Suppose that $\bar{l} = 0$. (i) Then the agricultural labor share (n^X) follows a first-order difference equation. (ii) Let $\bar{n}^X$ be a stable steady state. For initial condition $n_0^X > \bar{n}^X$ in the local environment of $\bar{n}^X$, the agricultural labor share gradually declines over time in the transition to the steady state. (iii) More advanced financial markets (higher η) lead to a decrease in a stable steady state agricultural labor share ($\bar{n}^X$) whereas a more concentrated ownership of land (higher z) has an ambiguous effect on $\bar{n}^X$.

(b) If $\bar{l} > 0$, n^X follows a second-order difference equation and an increase in z has an ambiguous effect on it.

Proof. We start with (a). For $\bar{l} = 0$, according to Lemma 10, the right-hand side of (31) is decreasing in n_t^X and increasing in n_{t-1}^X. This confirms part (i) and (ii), respectively. For the comparative-static results in part (iii), use Lemma 9 and 10. This

confirms (a). The proof of (b) follows from (30), (31) and Lemma 10. ■

Like in the illustrative model in section 2, where the number of entrepreneurs was exogenous, a more concentrated landownership depresses employment creation per entrepreneur. Nevertheless, in contrast to both the illustrative model and the dynamic model with an exogenous manufacturing wage, a higher z does not have an unambiguously negative effect on economic development, as it may foster entrepreneurship (unlike in section 2 where this possibility was ruled out). The reason, as discussed above, is that when landowners possess stronger oligopsony power, marginal wage costs of entrepreneurs are reduced. When $\bar{l} > 0$, also fixed costs of employment creation are reduced, which may affect the evolution of the economy.

6 Discussion of Historical Evidence

This section discusses historical evidence for Latin America, India, Taiwan and South Korea, supporting the mechanisms proposed by our theory: that oligopsony power associated with a high concentration of landholdings depresses income of peasants. In interaction with credit constraints, this possibly impedes employment creation of entrepreneurs and possibly also entrepreneurship outside the agricultural sector.

6.1 Latin America

The strong concentration of landholdings in Latin America has been widely documented in the literature (e.g. McBride 1936; Mosk, 1951; Barraclough, 1970; Clark, 1971; Katz, 1974; Morse, 1975; Bulmer-Thomas, 1994). Apart from its implication on political outcomes, an important economic result of the oligarchic ownership structure was a substantial degree of power of large landowners in the labor market for rural work and over tenants. Binswanger, Deininger and Feder (1995; p. 2678) conclude that "a major purpose of the huge landholdings was to restrict the indigenous population's possibilities for independent cultivation". Peasants were typically allowed to cultivate a small piece of land on the farm of owners of haciendas or landlord estates for own

subsistence in exchange for labor services, for which they might not even receive a wage payment. Clearly as a result of oligopsony power of owners, these "share tenants do not receive their full marginal product" (Binswanger, Deininger and Feder, 1995; p. 2670).

Regional oligopsony power was also secured by restrictions on peasant mobility through vagrancy laws or debt peonage.[14] Vagrancy laws were introduced 1825 in El Salavador and 1877 in Mexico.[15] In Guatemala vagrancy laws replaced debt peonage in 1934 (abandoned in response to international pressure), implying that someone with little or no land had to work at least 150 days per year on a coffee plantation. From the perspective of a large landowner, such legal measures kept the elasticity of labor supply low and thereby enhanced oligopsony power. As a result, the real wage rate for agricultural labor was extremely low. For instance, in Guatemala it showed no upward trend in the century prior to the revolution in 1944 (Schweigert, 2004, Tab. 5). Still in the 1960s, average annual per capita peasant incomes in Brazil, Chile, Columbia, Ecuador, Guatemala and Peru were just about USD 40-100 (Barraclough, 1970).

Despite revolts and revolutions, triggered by the dramatic concentration of landholdings in Latin America and the resulting situation of most peasants, land reforms have mostly been unsuccessful. As a notable exception, Mexico implemented an eventually successful land reform, starting in 1917. It was confiscatory for land in excess of 100 hectares. Total compensation to landowners was a mere fraction of 0.5 percent of expropriated land (Flores, 1970).[16] In line with our prediction that less concentrated land ownership is conducive for investments of initially landless households outside the primary sector, Flores (1970, p. 904) concludes that "there is no doubt that high rates of capital formation for Mexico's industrial revolution in the early stages of the reform,

[14] The poor village and smallholder population accepted to work on the plantations in return to cash advances and had to stay until the debt was paid off. Debt repayment was difficult, however. Employers operated company stores where goods were sold at inflated prices. This contributed to a stagnation of real wages for many decades. After death, the duty to repay debt was passed on to children. (See Katz, 1974, and Bulmer-Thomas, 1994, ch. 4.)

[15] See Binswanger, Deininger and Feder (1995, Tab. 42.1, Appendix 1) for a systematic account of legal measures to "surplus extraction" to the favor of large landowners in many parts of the world.

[16] In contrast, the envisaged large-scale land reform in Venezuela, which began in 1958, was impeded due to high costs of the government, which aimed to compensate landowners according to the market value of land.

1917-42, came from agriculture".

Overall, however, the oligarchic ownership of land in Latin America resulted in a slow-growing manufacturing sector.[17] Until the last quarter of the nineteenth century, industrial development was in fact negligible.[18] During the first half of the twentieth century the situation eventually improved, although manufacturing development still lagged considerably behind most regions of North America.[19] Manufacturing output as share of GDP in 1913 was 16.6 percent in Argentina and 14.5 percent in Chile (Bulmer-Thomas, 1994, Tab. 5.3). In Brazil in 1920 it was 12.1 percent, but only 3 percent of the labor force was employed in modern manufacturing. Mexico, with 12.3 percent in 1910 had a comparable manufacturing share, whereas that of Columbia was just 6.7 percent in 1925. For instance, the share of employment in the agricultural sector was basically stable between 1880-1930 in Brazil at circa 2/3, whereas it sharply declined in the United States and Canada from around 50 percent to 22 and 31 percent, respectively.[20]

6.2 India

In India, during the British empire many small peasants lost their land and became wage workers in the agricultural sector (Patnaik, 1983). Land concentration was particularly high in areas where the British introduced landlord-based revenue systems for collecting land taxes. In these areas, single landlords were free to collect taxes

[17] Consistent with our assumptions, labor was the main input in current manufacturing production and, in contrast to the agricultural or mining sector, typically decently remunerated (see Bulmer-Thomas, 1994, p. 121).

[18] Unsurprisingly, also urbanization was much slower than in the United States. In Argentina, Chile, Mexico and Uruguay, for instance, the fraction of the national population living in the largest cities basically stagnated in the entire nineteenth century (e.g., around 10 percent in Mexico). In the U.S. the population share residing in towns of 8000 or more inhabitants gradually rose from 4.9 percent in 1810 to 33 percent in 1900 (Morse, 1975, pp. 5-9).

[19] Differences in land concentration may also explain differences in regional development within the US. Braunhaut (1949) and Wright (1987, Fig. 1) provide historical data for US farm labor wage rates for the time periods 1909-1948 and 1866-1942, respectively. Consistent with oligopsony power of large landowners, they find substantial and persistent regional wage differentials between the South − which was characterized by large plantations − and the rest of the country. Braunhaut (1949, p. 189) attributes these wage differences to "the fact that agricultural workers have largely remained unorganized [...] [and] virtually without bargaining power, particularly in the instances where farms are being operated on a commercial basis by absentee owners".

[20] See the data provided by Peter Lindert under www.econ.ucdavis.edu/faculty/fzlinder/.

from peasants to fulfil the revenue liability of a village, whereas in other areas revenue settlement was directly made with individual cultivators or village bodies which jointly owned the village (Banerjee and Iyer, 2005). Similarly to many parts of Latin America, wage negotiations were infrequent and agricultural workers were often tied to landlords by debt peonage. Roy (2005) provides evidence that, as a result, the average real wage for agricultural labor in colonial India showed no upward trend from the 1870s until the end of the British empire. In contrast, real wages in urban areas increased significantly.

Rosenzweig (1978) exploited the regional variation of land inequality in India to examine how labor market outcomes depend on land concentration among owners, employing data from a household survey in 1960-61 from 159 Indian districts. He shows that higher land concentration (measured by the Kuznets ratio of landholding inequality) has a strong negative impact on agricultural wages.[21] In line with our model based on labor market power of large owners, he concludes that this finding "may partly reflect the monopsonistic restrictions on wages and employment by relatively large landowners" (Rosenzweig, 1978, p. 860).

More recently, Besley and Burgess (2000) analyze panel data for 16 Indian states, 1958-92, on the impact of land reform measures. They find that particularly those reforms raised agricultural wages and reduced poverty, which improved the conditions of tenancy contracts, reduced power of absentee landowners and abolished intermediaries which collected land revenues increased income of tenants.[22] Banerjee and Iyer (2005) find that, nevertheless, the historical institution of a landlord-based revenue system had long-lasting effects (still in the period 1960-85) on education spending, agricultural investments and agricultural productivity which cannot alone be explained by

[21] There also is a volumnious literature, surveyed by Binswanger, Deininger and Feder (1995), on the effects of land concentration and land reforms on the performance of the agricultural sector. According to evidence by Besley and Burgess (2000), land reforms in India after 1958 had no effect on agricultural output, whereas Banerjee, Gertler and Ghatak (2002) show that tenancy reform in West Bengal in 1977, which to some degree assigned property rights to tenants, substantially raised agricultural productivity.

[22] The evidence by Besley and Burgess (2000) also suggests that land reforms in India after 1958 had no effect on agricultural output, whereas Banerjee, Gertler and Ghatak (2002) show that tenancy reform in West Bengal in 1977, which to some degree assigned property rights to tenants, substantially raised agricultural productivity. The less recent literature on the effects of land concentration and land reforms on the performance of the agricultural sector is surveyed by Binswanger, Deininger and Feder (1995).

high land concentration. They do not look at agricultural wages and development of the manufacturing sector, however. In any case, institutions could matter over and above economic power of landlords which results from high land concentration. We see both approaches as complementary. Future research may attempt a comparative analysis of various theories on the effects of land concentration and land institutions on the non-agricultural sector, which we lack at the moment.

6.3 Taiwan and South Korea

There is still a controversy about the determinants of the remarkable pace of development in Taiwan and South Korea after independence from Japanese colonial rule. For instance, Rodrik (1995) challenges the widespread belief that the 'East-Asian miracle' can mainly be explained by the governments' trade policy. He rather points to possible effects of the unusually successful land reforms and a negative relationship between rates of economic growth and land inequality (rather than income inequality) in cross-country data.

Our paper may contribute to this debate by proposing an economic mechanism for beneficial effects of land redistribution. In Taiwan, during the Qing's dynasty rule (1683-1895), land concentration was greatly enhanced when individuals or land companies purchased land from the government or from aborigines. Smallholders saw little change in real income during Japanese rule and were largely dependent on wage income, whereas the value of land increased quickly. At the end of World War II, after Taiwan was transferred to China, the Nationalist government confiscated Japanese property and, with American help, initiated a major land reform in three steps between 1949-53. First, public land was sold to tenants at a fairly low price (equal to 2.5 times annual yield of the main crop). Second, the rent tenants had to pay to landowners was limited to a maximum of 37.5 percent of normal harvest value, down from typically over 50 percent. Third, and maybe most important, landowners had to sell land in excess of 3 hectares to the government, which resold it to tenants. An estimated 37 percent of cultivated land was redistributed under the program and farm incomes rose

dramatically, by 230 percent to 1968 (Minns and Tierney, 2003). In line with our theory, Minns and Tierney (2003) argue that this "created the basis for a large number of small entrepreneurs [...] to develop manufacturing businesses. [...] Non-farm income for rural households was already 79 percent of their total household income in 1966, rising to 89 percent a decade later". Per capita income grew by almost 6 percent in the three decades after land reform and productivity growth accounted for about 2/3 of total growth. Between 1945 and 1972, the agricultural labor share fell from 2/3 to 1/3 (Oshima, 1986). Consistent with our model, growth in manufacturing was driven by small enterprises. In 1961, 99.1 percent of manufacturing businesses had less than 100 employees. The average size was 8, increasing to 28 until 1971 (Mao and Schive, 1995).[23] Many small enterprises were located in rural areas.

In Korea, during the 19th century a powerful class of landowners emerged and real wages (in terms of rice) were falling, only slightly rebounding in the first half of the 20th century. Due to the fear that tenants would shift towards communism, the U.S. military administration pressed towards land reform, which started 1950 (Agricultural Land Reform Amendment Act). Similar to Taiwan, it enforced a cap on landholding of about 3 hectares. Moreover, farms had to be owner-managed or –cultivated. The government also bought land at low prices and sold it to tenants, who largely made payments in rice (Jeon and Kim, 2000).[24] Compared to the colonial period, rice wages almost tripled until the end of the 1960s (Cha and Wu, 2002, Fig. 7). Like Taiwan, South Korea saw quick emergence of small manufacturing enterprises. This is remarkable as political and economic support mostly focussed on big firms in the 1950s.[25] The timing of the emergence of small businesses (despite suffering from the Korean war 1950-53) is consistent with the effects of a land redistribution predicted by our model.[26]

[23] In the 1950s growth was particularly fast in food-processing and textile industries. Later, industries in electronics and metal products evolved.

[24] Half of the land was already sold prior to 1950 in anticipation of land reform. Landowners were basically forced to these transactions due to personal security threats after the end of Japanese rule. This was also the reason for the weak resistance of owners to land reform.

[25] These were mostly former Japanese large scale industrial facilities established before 1940. The 115 biggest firms produced 33 % of manufacturing output in 1958 (Regnier, 1993, Tab. III). Later on, government support shifted more and more to smaller firms as their important role was increasingly recognized.

[26] The salient role of small businesses in early stages of development is well documented also for

7 Concluding Remarks

While land and other natural resources are the key factor in primary goods production, development and structural change are driven by capital investments into manufacturing firms. The level of such investments depends on the number of individuals who have both an economic interest in and the economic means for entrepreneurial activities. In early stages of development, characterized by a substantial size of the primary sector, the means must be earned in the primary sector. How much of the income from primary goods production is left for entrepreneurial investment depends on the rents kept by landowners. These rents depend on the ownership-concentration of landholdings and on the size of the labor force supplied to the primary sector.

Based on this line of reasoning, the dynamic framework proposed in this paper suggests that an oligarchic land ownership may be a major obstacle to entrepreneurship, structural change and economic development. The key mechanism of our paper is driven by the *interaction* of oligopsony power of landowners in the rural labor market and imperfect credit markets. Higher concentration of landownership depresses wage income and therefore limits entrepreneurial investment. It typically retards economic development. An exception may arise when higher ownership concentration in the primary sector sufficiently reduces wage costs of entrepreneurs also in the manufacturing sector. In this case, despite reduced employment creation per entrepreneur, more workers may choose to open up a firm.

The predicted role of ownership concentration of landholdings for oligopsony power of landowners in the rural labor market is supported by evidence from Latin America, India, Taiwan and South Korea. Moreover, the emergence of small manufacturing businesses in Taiwan and South Korea immediately in the aftermath of land reform suggests that a more equal land distribution plays an important role for promoting economic development apart from politically determined factors like the provision of

today's transition countries. In their survey, McMillan and Woodruff (2002, p. 166) stress that "New firms have usually been the fastest growing segment in transition economies", compared to privatized firms. For instance, about one-sixth of industrial workers in Poland in 1994 were employed in start up firms. In Estonia, start-ups created almost all new jobs between 1989-94 and more than half of the new jobs in Bulgaria and Romania.

education. An interesting task for future research may be to examine the role of the ownership structure in the gold-, oil-, uranium-, tin- or diamond-industry for the poor development of African countries within our framework.

Appendix

This appendix provides a microfoundation for the properties of income of workers in the $X-$sector, I^X, and of landowners, π^x, as hypothesized in (8) and (9), respectively. We assume that landowners have oligopsony power.

Let w_t^X be the wage rate and $l_t^S = l^S(w_t^X)$ be individual labor supply of a worker in the $X-$sector in t. At any date t capacity investment decisions by entrepreneurs are already made in the previous period, where total employment capacity installed in $t-1$ will equal L_t^Y. Landowners therefore face labor supply schedule $L_t^X = N_t^X l^S(w_t^X)$, $N_t^X = N^L - L_t^Y$. Suppose for simplicity that individual labor supply takes the isoelastic form $l^S(w) = w^{1/\vartheta}$, $\vartheta > 0$, so that the inverse labor supply function in the $X-$sector is given by $w^X = (L^X/N^X)^\vartheta$. Observing this schedule, owners simultaneously choose labor demand (l^x) to maximize profits $\pi^x = zf\left(l^x/z\right) - w^X l^x$, taking the hiring of others as given. Then, since employers are identical, in Nash equilibrium we have $l^x = L^X/N^Z$ and the wage rate follows the standard oligopsony formula:

$$w_t^X = \frac{f'(l_t^x/z)}{1+\vartheta/N^Z}. \tag{32}$$

Thus, wages in the $X-$sector are below their marginal product. Individual wage income in the $X-$sector is given by $I = w^X l^S(w^X)$.

We first show that, in equilibrium, w^X is decreasing in both n^X and z, which implies $\frac{\partial I^X}{\partial n^X} < 0$ and $\frac{\partial I^X}{\partial z} < 0$, respectively. Combining $L^X = N^X l^S$ with $L^X = N^Z l^x$ we have $l^x = l^S N^X/N^Z$. From this, using $n^X = N^X/N^L$, $z = Z/N^Z$ and normalization $Z = N^L$, we obtain $l^x/z = l^S n^X$. Hence, using $l^S(w) = w^{1/\vartheta}$ and $z = N^L/N^Z$, (32) can be rewritten as:

$$f'\left((w^X)^{\frac{1}{\vartheta}} n^X\right) = \left(1 + \frac{\vartheta z}{N^L}\right) w^X. \tag{33}$$

This implicitly defines the equilibrium wage rate in the primary sector, $\tilde{w}^X(n^X, z)$, as function of n^X and z. Observing $f'' < 0$, we find $\frac{\partial \tilde{w}^X}{\partial n^X} < 0$ and $\frac{\partial \tilde{w}^X}{\partial z} < 0$. Thus, equilibrium income

$$I = \tilde{w}^X(n^X, z) l^S(\tilde{w}^X(n^X, z)) \equiv \tilde{I}(n^X, z) \tag{34}$$

has the properties as claimed in (8). For later use, from (33) it is also easy to show that

$$\frac{1}{\vartheta} \frac{\partial \tilde{w}^X}{\partial n^X} \frac{n^X}{w^X} + 1 = \frac{\vartheta f'}{\vartheta f' - (w^X)^{\frac{1}{\vartheta}} n^X f''} > 0. \tag{35}$$

We next consider the profit of a landowner, given by $\pi^x = z f(l^x/z) - w^X l^x$. Using $l^x/z = l^S n^X$, $l^S(w) = w^{1/\vartheta}$ and $w^X = \tilde{w}^X(n^X, z)$, we can write equilibrium profit per owner as

$$\pi^x = z \left[f\left((\tilde{w}^X(n^X, z))^{\frac{1}{\vartheta}} n^X \right) - (\tilde{w}^X(n^X, z))^{\frac{1}{\vartheta}+1} n^X \right] \equiv \tilde{\pi}^x(z, n^X). \tag{36}$$

Hence,

$$\begin{aligned} \frac{\partial \pi^x}{\partial n^X} &= z \left[f'\left((w^X)^{\frac{1}{\vartheta}} n^X \right) \left(\frac{1}{\vartheta} (w^X)^{\frac{1}{\vartheta}-1} \frac{\partial \tilde{w}^X}{\partial n^X} n^X + (w^X)^{\frac{1}{\vartheta}} \right) - \right. \\ &\quad \left. \left(\frac{1}{\vartheta} + 1 \right) (w^X)^{\frac{1}{\vartheta}} \frac{\partial \tilde{w}^X}{\partial n^X} n^X - (w^X)^{\frac{1}{\vartheta}+1} \right]. \end{aligned} \tag{37}$$

Substitute (33) into (37) to obtain

$$\frac{\partial \pi^x}{\partial n^X} = z (w^X)^{\frac{1}{\vartheta}+1} \left[\frac{\vartheta}{N^Z} \left(\frac{1}{\vartheta} \frac{\partial \tilde{w}^X}{\partial n^X} \frac{n^X}{w^X} + 1 \right) - \frac{\partial \tilde{w}^X}{\partial n^X} \frac{n^X}{w^X} \right]. \tag{38}$$

Using $\frac{\partial \tilde{w}^X}{\partial n^X} < 0$ and (35), we find $\frac{\partial \pi^x}{\partial n^X} > 0$. In an analogous way, (36) implies

$$\frac{\partial \pi^x}{\partial z} = \frac{\pi^x}{z} + z (w^X)^{\frac{1}{\vartheta}} \left(\frac{1}{N^Z} - 1 \right) \frac{\partial \tilde{w}^X}{\partial z} n^X > 0, \tag{39}$$

(Recall $z = N^L/N^Z$, $N^Z > 1$ and $\frac{\partial \tilde{w}^X}{\partial z} < 0$.) This confirms (9).

Finally, we address the claims in the main text for the case where the wage rate

in the $X-$sector is equal to its marginal product; that is, landowners' labor demand, l^x, is implicitly defined by $f'(l^x/z) = w^X$ as a function $\tilde{l}^x(w^X, z)$ with $\frac{\partial \tilde{l}^x}{\partial w^X} < 0$ and $\frac{\partial \tilde{l}^x}{\partial z} = \frac{l^x}{z}$. Using this in the labor market clearing condition $N^Z \tilde{l}^x(w^X, z) = N^X (w^X)^{\frac{1}{\vartheta}}$, we get the following implicit characterization for the equilibrium wage for agricultural labor:

$$\tilde{l}^x(w^X, z) - n^X (w^X)^{\frac{1}{\vartheta}} z = 0 \tag{40}$$

(recall that individual labor supply is $l^S(w) = w^{1/\vartheta}$). This defines $w^X = \tilde{w}^X(n^X, z)$ in the competitive equilibrium. It is straightforward to show that $\frac{\partial \tilde{w}^X}{\partial n^X} < 0$ and $\frac{\partial \tilde{w}^X}{\partial z} = 0$. (Use $\frac{\partial \tilde{l}^x}{\partial w^X} < 0$ and $\frac{\partial \tilde{l}^x}{\partial z} = \frac{l^x}{z}$.) Thus, as claimed in the main text, $\frac{\partial I}{\partial n^X} < 0$ and $\frac{\partial I^X}{\partial z} = 0$. Moreover, with $w^X = \tilde{w}^X(n^X, z)$, an owner's profit equals

$$\pi^x = z f\left(\frac{\tilde{l}^x(\tilde{w}^X(n^X, z), z)}{z}\right) - \tilde{w}^X(n^X, z)\tilde{l}^x(\tilde{w}^X(n^X, z), z), \tag{41}$$

where $w^X = \tilde{w}^X(n^X, z)$. Differentiation with respect to n^X yields: $\frac{\partial \pi^x}{\partial n^X} = -\frac{\partial \tilde{w}^X}{\partial n^X}\tilde{l}^x > 0$, where the envelope property has been used. In an analogous way, differentiation with respect to z yields: $\frac{\partial \pi^x}{\partial z} = f(\frac{\tilde{l}^x}{z}) - \frac{\tilde{l}^x}{z} f'(\frac{\tilde{l}^x}{z}) - \frac{\partial \tilde{w}^X}{\partial z}\tilde{l}^x$. Using $\frac{\partial \tilde{w}^X}{\partial z} = 0$ together with the fact that $f > \frac{\tilde{l}^x}{z} f'$ for a standard production function f also confirms $\frac{\partial \pi^x}{\partial z} > 0$.

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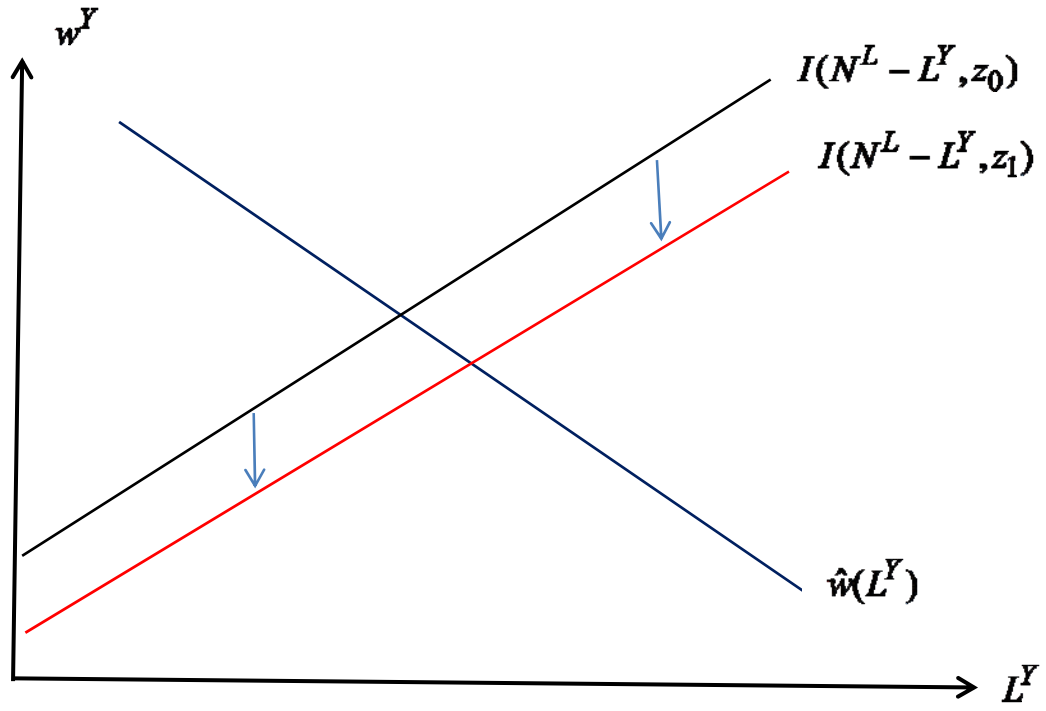

Figure 1. Increase in ownership concentration from z_0 to $z_1 > z_0$ in absence of credit constraints (static model).

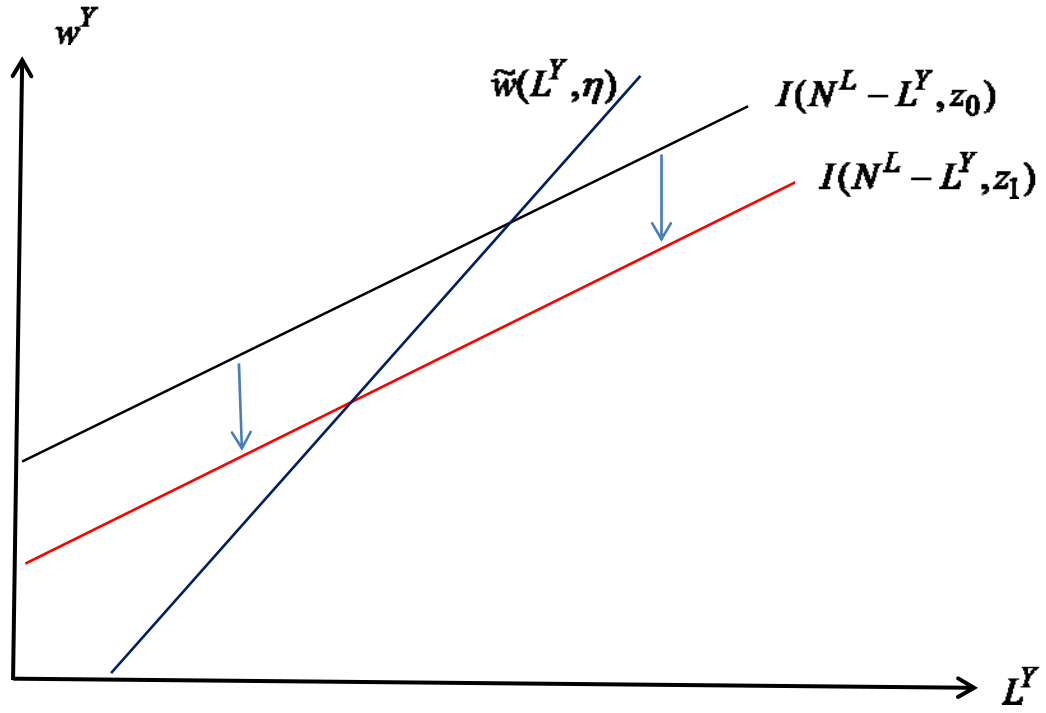

Figure 2. Increase in ownership concentration from z_0 to $z_1 > z_0$ with binding credit constraints (static model).

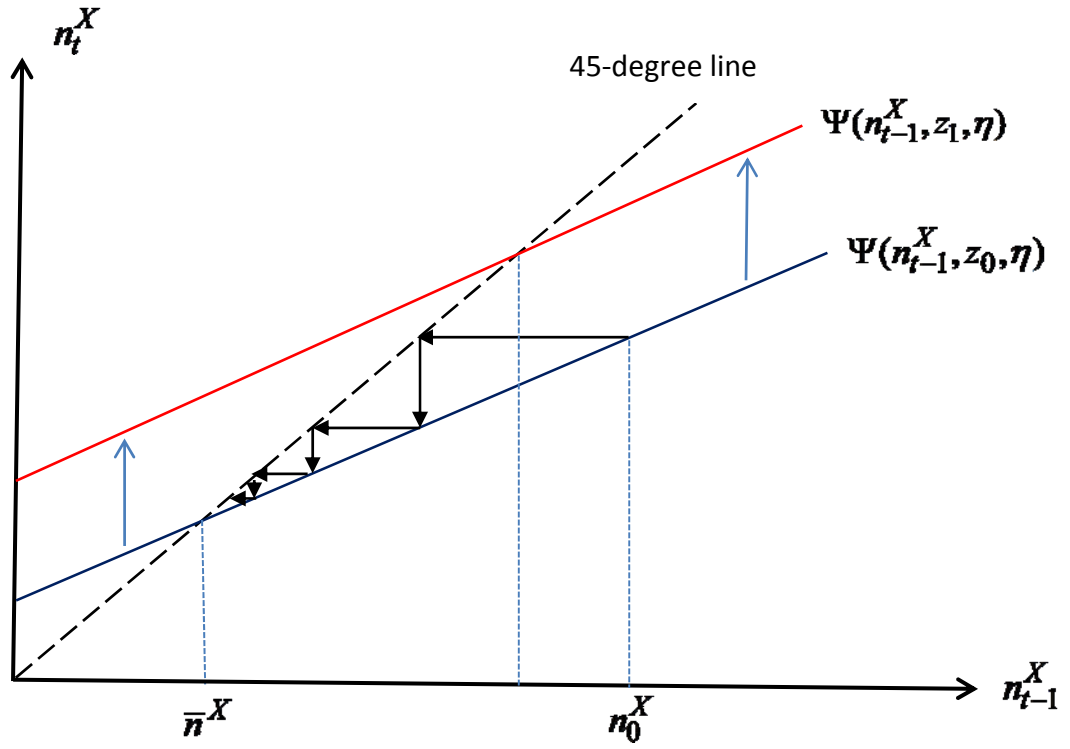

Figure 3. Dynamics of the agricultural labor share to a stable steady state ($\bar{n}^X$) and increase in ownership concentration ($z_1 > z_0$) under binding credit constraints and exogenous manufacturing wage income (assumption (A1)).