Endogenous Economic Institutions, Wage Inequality, and Economic Growth

by

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CHAPTER 1

Endogenous Economic Institutions and Wage Inequality

1.1. INTRODUCTION

In the period after 1970 economic fortunes diverged, especially in the United States. Middle and high income Americans have continued to benefit from the massive economic growth. But material well-being for the lower income classes has stagnated. Households with an annual income of over $100,000 (year $2000 dollars) increased from under 3% in 1967 to over 12% in 2000. In year 2000 dollars, median income increased from $31,400 in 1967 to $42,200 in 2000.

Although overall inequality increased steadily after 1970, this was not the case for skill premium. In 1970 college graduates earned 55% more than high school graduates. This premium fell to 41% in 1980, but then increased to 62% in 1995.[1]

One explanation for the rapid increase in the college premium in the 1980s is skill biased technological change.[2] According to this explanation, an increase in the supply of skills has two effects on skill premium. First, it decreases skill premium through the conventional substitution effect which makes the economy move along a downward sloping relative demand curve. Second, it increases skill premium through the directed technology effect which shifts the relative demand for skills because the increase in the supply of skills induces faster upgrading of skill-complementary technologies. Galor and Moav (2000) argue that an increase in the rate of technological progress raises the returns to ability and simultaneously generates an increase in wage inequality between and within groups of skilled and unskilled workers and an increase in education. Finally,

[1] See Autor, Katz, and Krueger (1998).
[2] See Acemoglu (1998).

there is the international trade explanation. According to this theory, an increase in the volume of trade will increase the demand for skill intensive goods in countries that export these goods. This will increase both the supply of skills and the skill premium.

This paper provides another explanation that works through economic institutions and policies. Economic institutions determine the incentives of economic actors, and shape economic outcomes. As such they are social decisions chosen for their consequences. Different groups and individuals benefit from different economic institutions and policies. Thus, there is generally a conflict over these social choices, ultimately resolved in favor of groups with greater political power. An increase in the number of skilled individuals will increase their political power and their ability to affect economic policies.

Economists agree that economic institutions and policies are endogenously determined. McCarthy, Poole and Rosenthal (2006) argue about the changes in economic policy that took place during the 1980s: 'Reagan conservatism was a product sitting on a shelf in the political supermarket. In 1980, customers switched brands'. As the number of those who benefit from conservative economic policies increased dramatically during the 1970s, both parties, and not only Republicans, adopted relatively more conservative economic policies. McCarthy, Poole, and Rosenthal (2006) argue that both Democrats and Republicans became more conservative in economic issues after 1975. Gerring (1998) argues that after the 1970s Democrats have moved their platforms away from general welfare issues to issues based on ascriptive characteristics (race and gender) of individuals.

The basic argument is the following: low-educated voters are not able to fully understand the impact the various policies have on their income. As a result, they rely on advertisement in order to decide which policies will benefit them more. This gives an incentive to political parties to choose bad policies that benefit some groups, in exchange for campaign contributions that 'buy' unskilled workers' votes. Bad policies (low property right protection, high tax on profits, high cost to start a new firm and high minimum wage) imply smaller support from educated voters and bigger support from uneducated voters. An increase in the proportion of skilled workers in the labor force implies an increase in the relative importance of skilled workers in the political process. As a result, an increase in the proportion of skilled workers reduces skill premium in the short run, but then it induces a change in economic policies that increases the skill premium, possibly even above its initial value.

Empirical evidence supports the conjecture that economic institutions and policies can account for much of the rise in dispersion of the wage distribution. DiNardo, Fortin, and Lemieux (1996) find that from 1979 to 1988 the decrease in the minimum wage explains 24% (for men) and 32% (for women) of the change in the variance in log wages. Card

and Krueger (1995) conclude that 20 to 30 percent of the rise in wage dispersion during the 1980s could be attributed to the decline in the real value of the minimum wage. Mishel, Bernstein, and Schmitt (1996) examine the 90/10 wage differential and report even larger effects. Lee (1999) finds that during the 1980s, the estimates for men, women as well as the combined sample, imply that almost all of the growth in the wage gap between the tenth and fiftieth percentiles is attributable to the erosion of the real value of the minimum wage during the decade. He also argues that the minimum wage may account for as much as 80% of the growth in so called 'within-group' wage inequality and about 15% of the change in the return to schooling during the 1980s. This last piece of evidence shows also that skilled workers benefit from a low minimum wage.

This paper argues that political parties will choose such bad (for skilled workers) policies not in order to gain support from unskilled workers through redistribution, but in order to benefit some special interest groups in exchange for campaign contributions.[3] Indeed, Neumark, Schweitzer, and Wascher (2004) argue that low-wage workers are adversely affected by minimum wage increases. Although wages of low-wage workers increase, their hours and employment decline, and the combined effect of these changes is a decline in earned income. They also find that relatively low-wage union members gain at the expense of the low-wage nonunion workers when minimum wages increase. This explains the vigorous support of labor unions for minimum wage increases and their significant contributions to the political campaigns.[4] Labor market regulations, high taxes, corruption, and restrictions that increase the cost of starting a firm are some other policies that affect negatively skilled workers (entrepreneurs) more than unskilled. Labor unions, corrupt bureaucrats, and firms that target government subsidies and, thus, they prefer high tax rates and large government, are those that support these policies.

The assumption that unskilled individuals are impressionable voters is at the heart of the model. Impressionable are those voters who are not willing or are not able to make the calculations necessary for strategic voting. These voters pay attention to campaign advertisement. The more a party spends (holding constant the spending of its rival), the greater is its share of the impressionable votes. Strategic voters understand the political environment and the implications of their votes. By voting for the party whose platform he prefers, a strategic voter slightly increases his expected welfare. There is empirical evidence that education increases civic participation.[5] Educated individuals participate more actively in politics, read more often newspapers, send letters to politicians and try to

[3] Alesina, Glaeser, and Sacerdote (2001) show empirically that higher inequality is not associated with more redistribution. This implies that the traditional model of the median voter who chooses the level of redistribution is not a good representation of reality.

[4] According to Hrebenar, Burbank, and Benedict (1999), both in the 1995-1996 and in the 1997-1998 campaign cycles, five out of the top ten political action committee (PAC) contributors to federal candidates are labor unions.

[5] See Dee (2003), Glaeser, Ponzetto, and Shleifer (2007), and, Milligan, Moretti, and Oreopoulos (2004).

persuade others. Also, education allows those who are interested in politics to understand and evaluate the different policies and the impact that these policies have on their welfare. In other words, education allows individuals to become strategic voters.[6]

The impact of an increase in the supply of skills on the skill premium is determined by two competing forces: the first is the conventional substitution effect which makes the economy move along a downward sloping relative demand curve. The second is the political economy effect, which shifts the relative demand curve for skills as shown in figure I, because the increase in the supply of skills induces policy changes that benefit skilled workers.

A large increase in the supply of college graduates as in the late 1960s and 1970s first moves the economy along a short-run (constant policy) relative demand curve, reducing the college premium. The relative supply change also increases the fraction of strategic voters and decreases the fraction of impressionable voters. Thus, policies change and skill premium increases. The relative demand curve in Figure I shifts to the right. If the political economy effect is not big enough then the skill premium first falls and then increases, but not above its initial level. In contrast, if the political economy effect is big enough, the model predicts that in the long run the college premium should increase. This case (shown in Figure I) explains the change in the U.S. college premium over the past 25 years.

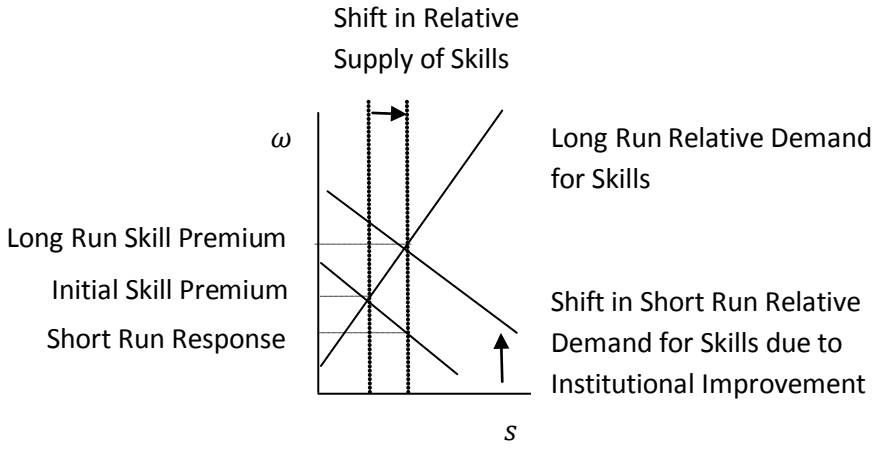

Figure I

[6] A similar assumption has been made by Bourguignon and Verdier (2000). They argue that only those with high enough education vote. I argue that only those with high enough education are strategic voters.

1.2. THE MODEL

1.2.1. Production

There is a sequence of discrete time periods $t = 1,2, ...$ There is a mass L of workers in the economy. Workers can be skilled (entrepreneurs) or unskilled. I assume that the number of skilled and unskilled workers is exogenous. Later I will relax this assumption. There are s skilled and u unskilled individuals that supply labor inelastically. Individuals live forever and for simplicity I assume that they cannot save or borrow. In the end of each period they consume all their income, and thus they seek to maximize it.

People consume only one good, called the final good, which is produced by perfectly competitive firms using as inputs unskilled labor and a continuum of intermediate goods according to the technology:[7]

$$Y_t = u^{1-\alpha} \int_0^1 A_{it}^{1-\alpha} x_{it}^{\alpha} di, \tag{1}$$

where each x_{it} denotes the quantity of intermediate input i used in final good production at time t, and A_{it} is a productivity parameter that reflects the current quality of the intermediate good i. The coefficient α lies between zero and one. In any period the productivity parameters will vary across intermediate products because of the randomness of the innovation process.

Each intermediate good is produced by a monopolist each period, using the final good as all input, one for one. That is, for each unit of intermediate good, the monopolist must use one unit of final good as input. Final good that is not used for intermediate production is available for consumption.

Each monopolist at t maximizes his profit measured in units of the final good:

$$\Pi_{it} = p_{it} x_{it} - x_{it} \tag{2}$$

where p_{it} is the price of the intermediate good i relative to the final good.

The inverse demand curve facing each monopolist charging the price p_{it} is the marginal product:

$$p_{it} = \alpha (A_{it} u)^{1-\alpha} {x_{it}}^{\alpha-1} \tag{3}$$

[7] This model is based on Aghion and Howitt (2009).

Therefore, the monopolist in sector i chooses the quantity x_{it} to maximize profits,

$$\Pi_{it} = (\alpha(A_{it}u)^{1-\alpha}{x_{it}}^{\alpha-1} - 1)x_{it} \tag{4}$$

which implies an equilibrium quantity:

$$x_{it} = \alpha^{\frac{2}{1-\alpha}}A_{it}u \tag{5}$$

The equilibrium profit of the monopolist is:

$$\Pi_{it} = (1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}A_{it}u \tag{6}$$

In each period, entrepreneurs (skilled individuals) will attempt an innovation, each one in a different sector. If an entrepreneur succeeds, the innovation will create a new version of the intermediate good, which is more productive than previous versions. Specifically, the productivity of the intermediate good will go from last period's value $A_{i,t-1}$ up to $A_{it} = \gamma A_{i,t-1}$, where $\gamma > 1$. If he fails, then there will be no innovation and the intermediate good will be the same one that was used in $t-1$, so $A_{it} = A_{i,t-1}$.

In order to innovate, the entrepreneur must conduct research, a costly activity that uses entrepreneur's labor as its only input. The probability that an innovation occurs in any period t is:

$$\mu_t = \lambda\frac{\varphi A_t}{A_{it}^*} \tag{7}$$

where $A_{it}^* = \gamma A_{i,t-1}$ is the productivity parameter if he succeeds. The reason why the probability of innovation depends on A_{it}^* is that as technology advances it becomes more complex and thus harder to improve upon. λ is a parameter that reflects the productivity of the research sector. Entrepreneurial skills are produced by two inputs: time and local knowledge. I take as given the amount of time spend in education by each entrepreneur.[8] Local knowledge is a public input which we assume to be proportional to aggregate productivity $A_t = \int_0^1 A_{it}di$. φA_t is the skill level of each entrepreneur.[9]

Each entrepreneur's wage is his expected reward from innovation:[10]

[8] It is straightforward to endogenize the time spend on education. Suppose that $\varphi = (1-n)n^m$ represents the effective supply of skills, where n is the time spent in education and m lies between zero and one. Each entrepreneur chooses the same n in order to maximize φ.

[9] The same assumption is made by Howitt and Mayer-Foulkes (2005). They assume that the skill level depends on the average level of technology.

[10] This is not the actual wage. It is the expected wage. The actual wage is either zero or Π_{it}. To simplify the analysis I assume that entrepreneurs can buy insurance. Thus, they receive with certainty their expected reward from innovation.

$$w_s = \lambda \frac{\varphi A_t}{A_{it}^*} \Pi_{it} = \lambda \frac{\varphi A_t}{A_{it}^*} (1-\alpha) \alpha^{\frac{1+\alpha}{1-\alpha}} A_{it} u = \lambda \varphi A_t (1-\alpha) \alpha^{\frac{1+\alpha}{1-\alpha}} u \quad (8)$$

because $A_{it}^* = A_{it}$ when innovation takes place. Equation (8) implies that the expected reward is the same in all sectors.

Each unskilled worker will receive his marginal product. Simple algebra gives:

$$w_u = (1-\alpha) \alpha^{\frac{2\alpha}{1-\alpha}} A_t \quad (9)$$

Skill premium, ω, is defined as follows:

$$\omega = \frac{w_s}{w_u} = \lambda \varphi \alpha u = \lambda \varphi \alpha (L - s) \quad (10)$$

I assume for simplicity that $L = 1$ and thus, s is the share and the number of skilled workers. Skill premium becomes:

$$\omega = \lambda \varphi \alpha (1 - s) \quad (11)$$

1.2.2. Political economy model

There are two political parties, A and B. Each party announces before the election the set of policies that will implement if elected. To simplify the analysis I restrict the available policies to those that affect directly only the profit of a successful innovator.[11] Such policies are for example the tax rate on profits, efforts to reduce corruption and protect property rights, the cost to start a new firm, labor market regulations like the minimum wage, etc.[12] The outcome of each set of policies is a tax rate, t, such that t is the total fraction of the profits that the owner of each firm loses because of taxation, corruption, labor market regulations, etc.

This tax rate affects directly the wage of skilled workers (and their relative wage, or skill premium). The wage becomes:

$$w_s = \lambda \frac{\varphi A_t}{A_{it}^*} (1-t) \Pi_{it} = (1-t) \lambda \varphi A_t (1-\alpha) \alpha^{\frac{1+\alpha}{1-\alpha}} u \quad (12)$$

[11] These policies affect directly the wage of strategic voters. All other policies that this paper doesn't consider affect only unskilled workers. The assumption that policies that affect unskilled workers are exogenous is based on the basic assumption of the model that unskilled workers are impressionable voters and they don't take into account the proposed policies when they vote.

[12] Benabou (2005) uses a similar way, through a unique tax rate, to represent the set of public policies like taxes and transfers, minimum wage laws, firing costs, etc.

And the skill premium:

$$\omega = (1-t)\lambda\varphi\alpha(1-s) \tag{13}$$

There are, also, two special interest groups, SIG_A and SIG_B. Members of each group are all the economic agents that benefit from the policies of party A and B respectively. When an economic agent benefits from the policies of both parties then this agent is member of both interest groups. Members can be the firms that receive part of the total tax revenue as a subsidy, the bureaucrats who benefit from corruption, and the labor unions that receive contributions from their members who benefit from the higher minimum wage and other labor market regulations. I assume that both special interest groups are small enough such that there is no coordination cost and no free riding.

The timing of events is the following: first, the two parties announce their set of policies. Then, each SIG announces its contribution to its party, and finally election takes place.[13] Also, I assume that after a party announces its policy, it cannot change it and it is committed to implement it, if elected.

Voters maximize the following utility:

$$U_j = c^b {f_j}^{\alpha} \tag{14}$$

Where c is consumption (each individual consumes all her income), and f_j depends on the political ideology of the specific individual, j, and on the political ideology of each party.

There are two types of voters: strategic and impressionable.[14] According to Grossman and Helpman (2001), 'strategic voters understand the political environment and the implications of their votes'. On the other hand, 'impressionable voters rely on campaign ads'. Grossman and Helpman (2001) assume that the share of strategic and impressionable voters is exogenous. I assume that the level of education affects the ability of people to make the calculations necessary for strategic voting.[15] Individuals with high enough education are able to make these calculations and, thus, they know exactly how a specific policy will affect them. Political advertisement has no effect on them. In other words, the assumption is that political advertisement will not make them change their mind once they know the policy that each party is willing to adopt.

[13] This timing implies that SIG will not contribute money in order to influence policies. In order for this to happen, SIG should contribute before the party announces its policy. In this paper, SIG give their contributions after the parties announce their policies. Thus, SIG have only electoral motive. See Grossman and Helpman (2001) for a detailed discussion about influence and electoral motive.

[14] The analysis and the model presented here are based on Grossman and Helpman (1996, 2001)

[15] Also, education affects civic participation. See Dee (2003), Glaeser, Ponzetto, and Shleifer (2007), and, Milligan, Moretti, and Oreopoulos (2004).

Individuals with relatively low education cannot make the necessary calculations and, thus, they don't know how a specific policy will affect them. Political advertisement affects their decision. If the amount of advertisement is bigger for one of the parties, this party will attract more impressionable voters. For simplicity, I assume that skilled individuals have high enough education and they are strategic voters, while unskilled individuals are impressionable voters.

Strategic voter's j utility is:

$$U_{ij}^{s} = (f_{ij})^{a}(w_s(t_i))^{b}, \tag{15}$$

where $i = A, B$ denotes party A and B.

Strategic voter j chooses party A if: $f_{Aj}^{a}c_A^{b} \geq f_{Bj}^{a}c_B^{b} \rightarrow \frac{f_{Bj}}{f_{Aj}} \leq (\frac{w_s(t_A)}{w_s(t_B)})^{\frac{b}{a}}$. Where $f_j = \frac{f_{Bj}}{f_{Aj}}$ is the relative popularity of party B for voter j. I assume that f_j is uniformly distributed with mean z.[16] Also: $c_i = w_s(t_i)$, shows that consumption is equal to the wage, and that the wage depends on the set of policies, t_i.

The share of votes for party A among strategic voters is:

$$V_A^{S} = \frac{1}{2} - z + \left(\frac{w_s(t_A)}{w_s(t_B)}\right)^{\frac{b}{a}}, \tag{16}$$

where z shows the relative popularity of party B's fixed position. If $z = 1$, then the two parties are equally popular and, thus, if they choose the same policies, each will get 50% of the votes.

Impressionable voters' utility is:

$$U_i^{u} = (f_i)^{a}(Ew_u(t_i))^{b}, \tag{17}$$

where $i = A, B$ denotes party A and B.

Impressionable voters cannot estimate the effect of the policy on their income. They form expectations with respect to this effect:

$$Ew_u(t_i) = (D_i)^{\beta}, \tag{18}$$

$i = A, B$. D_i is the contribution of SIG_i to party i. This is also the amount that this party will spend on advertising. β is a parameter measuring the effectiveness of the campaign spending.

[16] Grossman and Helpman (1996, 2001) assume uniform distribution, too.

Impressionable voter j chooses party A if: $f_{Aj}^{a}(D_A^{\beta})^b \geq f_{Bj}^{a}(D_B^{\beta})^b \rightarrow \frac{f_{Bj}}{f_{Aj}} \leq (\frac{D_A}{D_B})^{\frac{\beta b}{a}}$, where $f_j = \frac{f_{Bj}}{f_{Aj}}$ is the relative popularity of party B for voter j. Again, f_j is uniformly distributed with mean z. This means that the popularity of the two parties is the same among strategic and impressionable voters.

The share of votes of party A among impressionable voters is:

$$V_A^u = \frac{1}{2} - z + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} \tag{19}$$

And the total share of votes for party A is:

$$V_A = V_A^s s + V_A^u(1-s) = \frac{1}{2} - z + \left(\frac{w_s(t_A)}{w_s(t_B)}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s) \tag{20}$$

And so:

$$V_A = \frac{1}{2} - z + \left(\frac{(1-t_A)\lambda\varphi A_t(1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}u}{(1-t_B)\lambda\varphi A_t(1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}u}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s), \text{ and} \tag{21}$$

$$V_A = \frac{1}{2} - z + \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s), \tag{22}$$

where s is the fraction of skilled individuals and, thus, the fraction of strategic voters, and $(1-s)$ is the fraction of unskilled individuals and, thus, the fraction of impressionable voters. Also, again, individuals consume all their income,

$$c = w_s = (1-t)\lambda\varphi A_t(1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}u.$$

The probability that $V_A \geq \frac{1}{2}$, that is, the probability that party A wins the election is equal to the probability that $z \leq \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s)$. z is a random variable and $F()$ is its distribution function. The probability that party A wins the election, P_A, is equal to:

$$P_A = F\left(\left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s)\right) \tag{23}$$

Given D_B, t_A and t_B (remember that first parties announce their policies and then SIG choose their contributions), SIG_A will choose D_A in order to maximize its expected net benefit:

$$B_A = P_A(D_A)\zeta t_A \pi - D_A \tag{24}$$

Where $P_A(D_A)$ is the probability that party A wins the election when contribution is D_A, and $\zeta t_A \pi$ is the total net benefit from the set of policies, t_A, for SIG_A. π is the total profit of all the monopolists, and ζ lies between zero and one and captures the deadweight loss.[17]

The FOC is the best response function for SIG_A:

$$F'(\left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s)) \frac{\frac{\beta b}{a} D_A^{\frac{\beta b}{a}-1}}{D_B^{\frac{\beta b}{a}}} (1-s)\zeta t_A \pi = 1 \quad (25)$$

Similarly for SIG_B:

$$B_B = P_B(D_B)\zeta t_B \pi - D_B, \quad (26)$$

where $P_B = 1 - P_A$.

The FOC is:

$$F'(\left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1-s)) \frac{\frac{\beta b}{a} D_A^{\frac{\beta b}{a}}}{D_B^{\frac{\beta b}{a}+1}} (1-s)\zeta t_B \pi = 1 \quad (27)$$

The two FOCs imply:

$$\frac{D_A^*}{D_B^*} = \frac{t_A}{t_B} \quad (28)$$

Party A will choose t_A to maximize its share of votes:

$$V_A = \frac{1}{2} - z + \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{t_A}{t_B}\right)^{\frac{\beta b}{a}} (1-s) \quad (29)$$

The FOC which is also the best response function for party A is:

$$\frac{b(1-t_A)^{\frac{b}{a}-1}}{a(1-t_B)^{\frac{b}{a}}} s = \frac{\beta b (t_A)^{\frac{\beta b}{a}-1}}{a(t_B)^{\frac{\beta b}{a}}} (1-s) \quad (30)$$

Party B maximizes:

[17] I assume here that the members of each special interest group receive an amount that is proportional to the entire amount the firms lose because of the policy. The more realistic model with deadweight loss that is proportional to the square of the 'tax' is presented in the appendix. The two approaches give different tax rates in equilibrium, but they predict a very similar effect of the supply of skills on skill premium.

$$V_B = 1 - V_A = \frac{1}{2} + z - \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s - \left(\frac{t_A}{t_B}\right)^{\frac{\beta b}{a}} (1-s) \quad (31)$$

The FOC is:

$$\frac{b(1-t_A)^{\frac{b}{a}}}{a(1-t_B)^{\frac{b}{a}+1}} s = \frac{\beta b (t_A)^{\frac{\beta b}{a}}}{a(t_B)^{\frac{\beta b}{a}+1}} (1-s) \quad (32)$$

The two first order conditions imply:

$$t_A^*(s) = t_B^*(s) = t^*(s) = \frac{\beta(1-s)}{s+(1-s)\beta} \quad (33)$$

PROPOSITION 1.1. In equilibrium:

- Both political parties choose the same policy (tax rate), $t^*(s) = \frac{\beta(1-s)}{s+(1-s)\beta}$, which is a decreasing function of the supply of skills and an increasing function of the effectiveness of the political campaign, β.

Proof. Follows from the differentiation of $t^*(s)$ with respect to s and β.

Thus, the level of economic institutions can be expressed as a function of the percentage of skilled workers.

1.2.3. The effect of the supply of skills on skill premium

Remember that skill premium, ω, and also the relative demand for skilled labor is:

$$\omega = (1-t)\lambda\varphi\alpha(1-s) \quad (34)$$

It can be derived easily that, if the level of economic institutions, t, is exogenous (in which case we have the short run demand for skilled labor, i.e. the demand for skilled labor before institutions adjust, after an exogenous change in the relative supply of skills) then an increase in the share of skilled workers will decrease skill premium: $\frac{\partial \omega}{\partial s} = -(1-t)\lambda\varphi\alpha < 0$

This implies that the short run demand is always downward sloping. Given the demand for skilled labor, an increase in the supply of skilled labor will result to a lower skill premium.

Things are very different when the amount of skilled labor affects the level of economic institutions (long run). In this case, skill premium becomes:

$$\omega = (1 - t^*(s))\lambda\varphi\alpha(1 - s) \tag{35}$$

where: $t^*(s) = \frac{\beta(1-s)}{s+(1-s)\beta}$

The total effect of an exogenous change of the proportion of skilled workers is the following:

$$\frac{\partial\omega}{\partial s} = -\frac{\partial t^*(s)}{\partial s}(\lambda\varphi\alpha(1 - s)) + (1 - t^*(s))\frac{\partial(\lambda\varphi\alpha(1-s))}{\partial s} \tag{36}$$

where $\frac{\partial t^*(s)}{\partial s} = -\frac{\beta}{(\beta(1-s)+s)^2} < 0$

Thus, the total effect is decomposed into two effects: the first is the one described above and is negative. The second effect is positive, and it is coming from the fact that the amount of skilled labor affects the level of economic institutions and policies, and through them, the returns to skilled labor. In other words, the supply of skilled labor affects the demand for skilled labor.

More specifically, the second term of the right hand side of equation (36), is always negative and shows the decrease in skill premium right after an increase in the relative supply of skills. This captures the short run response (see Figure II) and it is simply the movement along the short run demand curve (in the short run, $\frac{\partial t^*(s)}{\partial s} = 0$). On the other hand, the first term is always positive and shows the increase in skill premium in the long run caused by the institutional improvement that the increase in the relative supply of skills induces. In Figure II this is shown by the shift to the right of the short run demand curve.

If the second term is higher than the first, then the total effect is negative:

$$\frac{\partial\omega}{\partial s} = -\frac{\partial t^*(s)}{\partial s}(\lambda\varphi\alpha(1 - s)) + (1 - t^*(s))\frac{\partial(\lambda\varphi\alpha(1-s))}{\partial s} < 0 \tag{37}$$

In this case, the positive effect from institutional improvement is lower than the negative market effect.

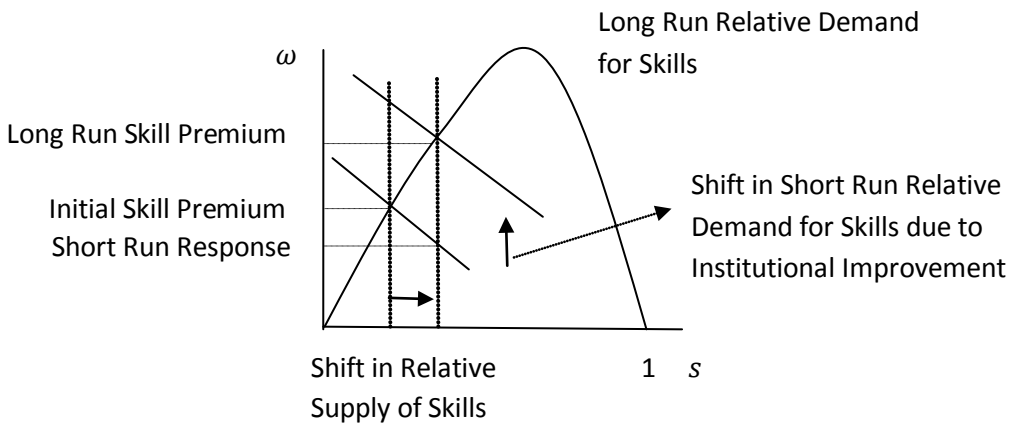

Figure II

If the first term is higher than the second, then the total effect is positive.

$$\frac{\partial \omega}{\partial s} = -\frac{\partial t^*(s)}{\partial s}(\lambda\varphi\alpha(1-s)) + (1-t^*(s))\frac{\partial(\lambda\varphi\alpha(1-s))}{\partial s} > 0 \qquad (38)$$

This case, shown in Figure II, is consistent with what was observed in the U.S. during the 70s and the 80s.

The above analysis is summarized in the following proposition:

PROPOSITION 1.2. Short run and long run relative demand for skills:

a. The short run relative demand for skills,
$$\omega_{SR}(s) = \frac{w_s}{w_u} = (1-t)\lambda\varphi\alpha(1-s)$$
is always downward sloping. The skill premium always decreases right after an exogenous increase in the relative supply of skills.
b. The long run relative demand for skills:
$$\omega_{LR}(s) = \frac{w_s}{w_u} = (1-t^*(s))\lambda\varphi\alpha(1-s) = \frac{s\lambda\varphi\alpha(1-s)}{s+(1-s)\beta}$$
is upward sloping when:
$$0 \le s < \frac{\sqrt{\beta}}{1+\sqrt{\beta}} < 1$$

and it is downward sloping when:

$$0 < \frac{\sqrt{\beta}}{1+\sqrt{\beta}} < s \leq 1$$

For sufficiently low values of s, skill premium increases in the long run after an exogenous increase in the relative supply of skills.

Proof. See appendix

Figure II presents the case where an increase in the relative supply of skills decreases skill premium in the short run, but increases it in the long run above its initial value.

In order to examine whether the magnitudes of the changes in the relative wage of skilled labor that this model predicts are similar to the ones that were observed in the United States after 1970, it would be useful to assign numbers to the parameters and see what is this model's predicted short run and long run effect of the observed change in the supply of skills. According to Barro and Lee (2001), the fraction of college graduates in the United States in 1970 was 21%. I assume that $s = 0.21$, $\alpha\lambda\varphi = 3.5$ and that $\beta = 0.2$, and I take $t_1 = 0.43$, and $\omega = 1.56$, which means that college graduates earn 56% more than those without a college degree. This is exactly the number in the beginning of 1970s. Again according to Barro and Lee (2001), the fraction of college graduates in the United States in 1980 was 30%. In this case, and under the assumption that policies are constant, $t_1 = 0.43$, I find $\omega_{SR} = 1.4$ which is the short run response that the model predicts and it is very close to the actual value which is 1.41. Finally, in order to find the long run skill premium I find first the new equilibrium level of t when $s = 0.3$. This is: $t_2 = 0.32$. This value of t implies that the long run value of skill premium is $\omega_{LR} = 1.67$, which is very close to the actual value that is 1.62 in 1995.

1.3. ENDOGENOUS SUPPLY OF SKILLS

In the previous section the supply of skilled and unskilled labor was exogenous. In this section, I assume that education choices are forward looking and respond to returns. Of course, there can still be exogenous changes in the supply of skills caused for example by a change in the quality of education.

I assume that in the beginning of every period workers must become reeducated in order to qualify as skilled workers with the new generation of technology.[18] If an individual decides to become educated, he or she will receive the wage of the skilled worker, w_s. The cost of education is proportional to the skilled wage, $\sigma\psi_i w_s$, where σ is a subsidy on education or simply the quality of education. When the quality of education is higher, σ is low, then the cost of education is lower. We could think of this cost as a time cost. If the quality of education is higher, then a worker will spend less time in order to become skilled. $\psi_i \geq 0$ is a random variable that captures the heterogeneity among individuals caused by different ability or credit constraints. Lower values of ψ_i imply higher ability. If an individual chooses to remain uneducated, he or she will receive w_u.

An individual i will become skilled if: $w_s - \sigma\psi_i w_s \geq w_u$, which implies that all individuals with $\psi_\iota \leq \frac{\omega-1}{\sigma\omega}$ will choose to become skilled. The fraction of skilled workers is $s = G(\frac{\omega-1}{\sigma\omega})$, where G is the distribution function of ψ_i, and ω is the skill premium. This function represents the supply of skills. Under the assumption that ψ_i is uniformly distributed in $[0,1]$, the supply function becomes: $s = \frac{\omega-1}{\sigma\omega}$.

The relative supply curve is shown in Figure III. As expected, it is upward sloping. A decrease in the cost of education, or an increase in the quality of education shifts the relative supply curve to the right. All the results presented above, in the model with exogenous supply of skills, hold here as well.

Figure III shows that when the quality of education is high enough there are three equilibria: the first at $s = 0$ is stable, the second, s_1, is unstable and the third, s_2, is stable. The economy will end up in the third equilibrium only if initially the relative supply of skills is sufficiently high, $s > s_1$. If initially the relative supply of skills is lower than this critical point, then the economy will remain in a poverty trap. Low education levels will make beneficial for the political parties to allow high levels of corruption and impose high taxes on profits, and these policies will offer poor incentives for investment and innovation. This explains why poor democracies with low levels of education cannot escape stagnation. Special interests capture the government and extract rents through policies that keep the country poor because there is no sufficient number of voters that is willing to support growth promoting policies.

[18] An alternative assumption could be that the economy is populated by dynastic families and that each family has one member that lives only one period, so that every period a new member replaces the old.

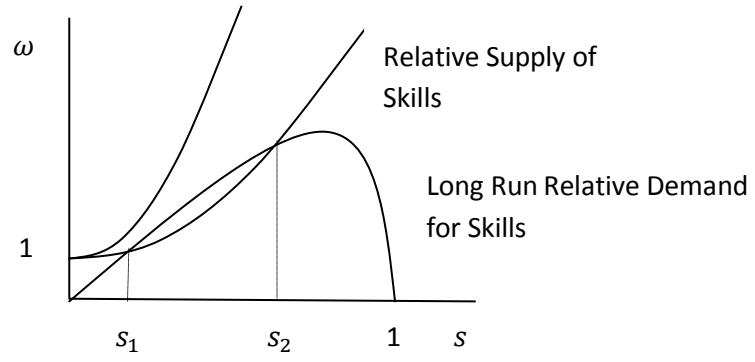

Figure III

1.4. CONCLUDING REMARKS

This paper argues that there are three distinct groups in every democracy: the uneducated, the educated, and the (political) elite. I argue that voters have the power to choose their leaders, but not all voters are able to act as strategic voters. Strategic voting implies that voters are able to make the calculations that are necessary in order to evaluate the effect that policies have on their welfare. To a large extent, economic institutions and policies, for example the level of corruption, can be determined endogenously through the political process. If all voters were strategic then we wouldn't observe democracies with bad policies and economic institutions (there are several examples in Latin America and Africa). I argue that only educated individuals act as strategic voters, and that the political conflict is mainly between the educated individuals and the political elite (and those who have access to it). This doesn't mean that uneducated voters do not participate in politics. The relative political power of the elite depends on the proportion of uneducated voters. The elite can use its influence and money in order to 'buy' the support of these voters. The level of education determines the allocation of the political power, and the allocation of the political power determines the quality of economic institutions.

This model provides an explanation for the observed pattern of the supply of skills and skill premium in the United States after 1970. It argues that an increase in the supply of skills decreases skill premium in the short run, but then it induces institutional improvement through the political process. As a result, skill premium increases, possibly above its initial value.

1.5. APPENDIX

1.5.1. Deadweight loss from taxation that is proportional to the square of the tax rate.

This appendix examines the case in which the deadweight loss from the policies is proportional to the square of the 'tax' rate. In this case special interest groups receive $\left(t-\frac{1}{2}t^2\right)\pi$ instead of $\zeta t\pi$.

SIG_A maximizes:

$$B_A = P_A(D_A)(t_A - \tfrac{1}{2}t_A^2)\pi - D_A,$$

and SIG_B maximizes:

$$B_B = (1 - P_A(D_B))(t_B - \tfrac{1}{2}t_B^2)\pi - D_B.$$

The two first order conditions imply:

$$\frac{D_A^*}{D_B^*} = \frac{t_A - \frac{1}{2}t_A^2}{t_B - \frac{1}{2}t_B^2}$$

Party A will choose t_A to maximize its share of votes:

$$V_A = \frac{1}{2} - z + \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s + \left(\frac{t_A - \frac{1}{2}t_A^2}{t_B - \frac{1}{2}t_B^2}\right)^{\frac{\beta b}{a}} (1-s)$$

The FOC which is also the best response function for party A is:

$$\frac{b(1-t_A)^{\frac{b}{a}-1}}{a(1-t_B)^{\frac{b}{a}}} s = \frac{\beta b(1-t_A)(t_A - \frac{1}{2}t_A^2)^{\frac{\beta b}{a}-1}}{a(t_B - \frac{1}{2}t_B^2)^{\frac{\beta b}{a}}} (1-s)$$

Party B maximizes:

$$V_B = 1 - V_A = \frac{1}{2} + z - \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} s - \left(\frac{t_A - \frac{1}{2}t_A^2}{t_B - \frac{1}{2}t_B^2}\right)^{\frac{\beta b}{a}} (1-s)$$

The FOC is:

$$\frac{b(1-t_A)^{\frac{b}{a}}}{a(1-t_B)^{\frac{b}{a}+1}}s = \frac{\beta b(1-t_B)(t_A-\frac{1}{2}t_A^2)^{\frac{\beta b}{a}}}{a(t_B-\frac{1}{2}t_B^2)^{\frac{\beta b}{a}+1}}(1-s)$$

The two first order conditions give only one solution for t that lies between zero and one. This is the same for both political parties:

$$t^*(s) = \frac{2\beta(1-s)+s-\sqrt{s(2\beta+s-2\beta s)}}{2\beta(1-s)+s}$$

The long run relative demand for skill becomes:

$$\omega_{LR}^*(s) = \left(1-\frac{2\beta(1-s)+s-\sqrt{s(2\beta+s-2\beta s)}}{2\beta(1-s)+s}\right)\alpha\lambda\varphi(1-s)$$

The equation $\frac{\partial\omega_{LR}^*(s)}{\partial s}=0$ has only one solution that lies between zero and one, $\forall\beta\in\left(0,\frac{1}{2}\right)\cup(\frac{1}{2},\infty)$:

$$s^* = \frac{3\beta-\sqrt{\beta(4+\beta)}}{4\beta-2}$$

Also, L'Hospital's rule implies:

$$\lim_{\beta\to\frac{1}{2}^-}\frac{3\beta-\sqrt{\beta(4+\beta)}}{4\beta-2} = \lim_{\beta\to\frac{1}{2}^+}\frac{3\beta-\sqrt{\beta(4+\beta)}}{4\beta-2} = \frac{1}{3}$$

Again, when $s<s^*$, the long run relative demand for skills is upward sloping, while when $s>s^*$, the long run relative demand for skills is downward sloping.

1.5.2. Proof of Proposition 1.2.

a. Follows from the differentiation of $\omega_{SR}(s)$ with respect to s.
b. The derivative of $\omega_{LR}(s)$ with respect to s is: $\frac{\partial\omega_{LR}(s)}{\partial s}=\frac{\alpha\varphi\lambda(\beta(s-1)^2-s^2)}{(\beta+s-\beta s)^2}$. Set it equal to zero and solve for s: $s_1^*=-\frac{\sqrt{\beta}}{1-\sqrt{\beta}}$ and $s_2^*=\frac{\sqrt{\beta}}{1+\sqrt{\beta}}$. For $\beta>0$, $s_1^*\in(-\infty,0)\cup(1,+\infty)$, and $s_2^*\in(0,1)$. The derivative of $\omega_{LR}(s)$ with respect to s is positive when $s=0<s_2^*$. Thus, the relative demand for skills is upward sloping when $0\le s<s_2^*<1$ and downward sloping when $0<s_2^*<s\le 1$.

CHAPTER 2

Endogenous Economic Institutions and Persistent Income Differences

2.1. INTRODUCTION

A number of facts suggests that a study of income levels may be more important than a study of growth rates. Easterly et al. (1993) show that the correlation of growth rates across decades is low. This suggests that differences in growth rates across countries may be mostly transitory. Mankiw et al. (1992) also emphasize that differences in growth rates are transitory: countries grow more rapidly the further they are below their steady state. The focus of their growth regressions is to explain the transitory differences in growth rates across countries. On the other hand, models of idea flows across countries such as Barro and Sala-i-Martin (1992) and Klenow and Rodriguez-Clare (2005) imply that all countries will grow at a common rate in the long run. These models argue that technology diffusion is easier the farther from the frontier is the country. This will keep countries from drifting indefinitely far from each other. Furthermore, these studies argue that differences in income levels are highly persistent. This implies that it is more important to explain these persistent income differences among countries.

This research argues that there are 3 types of countries: leader countries that grow through innovation, follower countries that grow through imitation, and poor countries that grow very slowly or they don't grow at all. Several papers explain why some countries may not be able to escape the poverty trap. Becker and Barro (1989), and Galor and Weil (1996) show how poverty traps can be based on multiple equilibria in physical capital accumulation. Azariadis and Drazen (1990), Galor and Zeira (1993), Benabou (1996), and Galor and Tsiddon (1997) show how poverty traps can be based on multiple equilibria in human capital accumulation. On the other hand, Howitt and Mayer-Foulkes

(2005) explain both why some countries are not able to escape stagnation and why countries that have escaped stagnation and grow at the same rate as the leader may not be able to catch up with the leader. They argue that there is not only an advantage of backwardness.[19] There is a disadvantage of backwardness as well.[20] The ability of countries to grow depends on their level of skills. Countries that are far from the frontier have low level of skills and thus they are not able to use 'leading-edge R&D'. Instead, they improve their level of technology through 'implementation' which is less productive than 'leading-edge R&D'. This implies that history (initial conditions) determines whether a country that has escaped stagnation will catch up with the leader or not.

This paper provides a new explanation for the persistent income differences among countries that have escaped stagnation. Following the existing literature, I show that the follower countries will catch-up with the leader if they adopt policies similar to those of the leader. Existing literature assumes that policies are exogenous. I argue that some types of policy are endogenous and they are determined through the political process. This paper develops a political economy model based on Grossman and Helpman (1996, 2001). More specifically, I argue that there are two types of voters: strategic and impressionable. Strategic voters understand the political environment and the implications of their votes. By voting for the party whose platform he prefers, a strategic voter slightly increases his expected welfare. On the other hand, impressionable voters are not willing or are not able to fully understand the impact the various policies have on their income. As a result, they rely on advertisement in order to decide which policies will benefit them more. This gives an incentive to political parties to choose bad policies that benefit some groups, in exchange for campaign contributions that attract impressionable voters. Bad policies (low property right protection, high tax on profits, high cost to start a new firm and high minimum wage) imply smaller support from strategic voters and bigger support from impressionable voters. I assume that education determines whether a voter is strategic or impressionable. An increase in the amount of education increases the proportion of strategic voters and thus implies better policies.

The main argument of the paper is the following: innovation is more skill intensive than imitation.[21] As a result, the amount of education is higher in leader countries that grow through innovation than in follower countries that grow through imitation. This implies that leader countries will adopt better endogenous policies. This fact generates a disadvantage for the follower countries. If they wish to catch-up with the leaders they will have to adopt similar policies, but the fact that some of their policies, the endogenous ones, are worse than the leaders' endogenous policies, implies that the follower countries

[19] See Gerschenkron (1952).

[20] Basu and Weil (1998) and Acemoglu and Zilibotti (2001) present models with a disadvantage of backwardness. They argue that the technologies that are being developed by the leader are not appropriate for the followers.

[21] Howitt and Mayer-Foulkes (2005) make a similar assumption.

will have to adopt significantly better exogenous policies than the leader. Such policies may not even exist.

An important assumption of the model is that some economic policies are endogenous. Economic policies determine the incentives of economic actors, and shape economic outcomes. As such, they are social decisions chosen for their consequences. Different groups and individuals benefit from different economic institutions and policies. Thus, there is generally a conflict over these social choices, ultimately resolved in favor of groups with greater political power. Political economists agree that to some extent economic policies are endogenous. McCarthy, Poole and Rosenthal (2006) argue that policies like the tax rate, labor market regulations, the minimum wage and others are endogenously determined through the political process. They show that the significant change in economic policies that took place in the United States during the 1980s was not exogenous. It was caused by a change in voters' preferences.

The assumption that education determines whether an individual is strategic or impressionable voter, is at the heart of the model. Impressionable are those voters who are not willing or are not able to make the calculations necessary for strategic voting. These voters pay attention to campaign advertisement. The more a party spends (holding constant the spending of its rival), the greater is its share of the impressionable votes. Strategic voters understand the political environment and the implications of their votes. There is empirical evidence that education increases civic participation. Dee (2004), Glaeser, Ponzetto, and Shleifer (2007), and, Milligan, Moretti, and Oreopoulos (2004) show that educated individuals participate more actively in politics, read more often newspapers, send letters to politicians and try to persuade others. Also, education allows those who are interested in politics to understand and evaluate the different policies and the impact that these policies have on their welfare. In other words, education allows individuals to become strategic voters.[22]

This paper argues that only a fraction of the countries that have escaped stagnation grows through innovation. The rest of them grow through imitation. Indeed, data on R&D expenditure and on the number of patents suggest that only a small number of countries accounts for almost all the global R&D expenditure and the total number of patents awarded worldwide.[23] This doesn't mean that there is no technological progress in the rest of the countries. These countries grow through imitation. Imitation is a costly activity but relatively less skill intensive than innovation. Imitation process does not produce new technologies. In other words, it does not advance the world technological frontier. It simply adapts a technology invented in a leader country.

[22] A similar assumption has been made by Bourguignon and Verdier (2000). They argue that only those with high enough education vote. I argue that only those with high enough education are strategic voters.
[23] See OECD 2010 Factbook at: http://www.oecd-ilibrary.org/economics/oecd-factbook_18147364

2.2. THE MODEL

2.2.1. Production

There is a sequence of discrete time periods $t = 1,2, \ldots$ There is a mass L of workers in the economy. Workers can choose to be skilled (entrepreneurs) or unskilled. There are s skilled and u unskilled individuals that supply labor inelastically. Individuals live forever and for simplicity I assume that they cannot save or borrow. In the end of each period they consume all their income, and thus they seek to maximize it.

People consume only one good, called the final good, which is produced by perfectly competitive firms using as inputs unskilled labor and an intermediate good according to the technology:[24]

$$Y_t = (A_t L)^{1-\alpha} x_t^{\alpha} \tag{39}$$

where x_t denotes the quantity of the intermediate input used in final good production at time t, and A_t is a productivity parameter that reflects the current quality of the intermediate good. The coefficient α lies between zero and one.

The intermediate good is produced by a monopolist each period, using the final good as all input, one for one. That is, for each unit of intermediate good, the monopolist must use one unit of final good as input. Final good that is not used for intermediate production is available for consumption.

The monopolist at t maximizes his profit measured in units of the final good:

$$\Pi_t = p_t x_t - x_t \tag{40}$$

where p_t is the price of the intermediate good relative to the final good.

The inverse demand curve facing the monopolist charging the price p_t is the marginal product:

$$p_t = \alpha (A_t u)^{1-\alpha} {x_t}^{\alpha-1} \tag{41}$$

Therefore, the monopolist chooses the quantity x_t to maximize profits,

$$\Pi_t = (\alpha (A_t u)^{1-\alpha} {x_t}^{\alpha-1} - 1) x_t \tag{42}$$

[24] This model is based on Aghion and Howitt (2009).

which implies an equilibrium quantity:

$$x_t = \alpha^{\frac{2}{1-\alpha}} A_t u \tag{43}$$

The equilibrium profit of the monopolist is:

$$\Pi_t = (1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}} A_t u \tag{44}$$

In each period, entrepreneurs (skilled individuals) will attempt to improve the quality of the intermediate good. If someone succeeds, then he or she will create a new version of the intermediate good, which is more productive than previous versions. Specifically, the productivity of the intermediate good will go from last period's value A_{t-1} up to $A_t = \gamma A_{t-1}$, where $\gamma > 1$. If all the entrepreneurs fail, then there will be no improvement and the intermediate good will be the same one that was used in $t-1$, so $A_t = A_{t-1}$. I assume that the period is short enough such that the probability that two entrepreneurs succeed is assumed zero.

In order to improve the quality of the intermediate good, each entrepreneur must conduct research, a costly activity that uses entrepreneur's labor as its only output. I assume that there are two countries: a leader and a follower. Leader is the country that uses state of the art technology. An entrepreneur in this country can improve technology only through innovation. On the other hand, follower is a country that uses older technology. An entrepreneur in this country can improve technology either through innovation or through imitation. The probability that an improvement in technology occurs in any period t is:

$$\mu_{l,t} = \lambda_i \frac{\varphi_i A_{i,t-1}}{A^*_{i,t}} \tag{45}$$

where $l = n, m$ denotes whether the country improves its technology through innovation or through imitation. $A^*_t = \gamma A_{t-1}$ is the productivity parameter if the entrepreneur succeeds. The reason why the probability of innovation depends on A^*_t is that as technology advances it becomes more complex and thus harder to improve upon. $d = \frac{A_m}{A_n}$ is the proximity of the follower to the technological frontier (A_m is the level of technology in the follower country and A_n is the level of technology in the leader country). λ_l is a parameter that reflects the productivity of the research sector. I assume that $\lambda_m = (1-d)\delta_m$, and that λ_n, the productivity of the research sector in the country that innovates is lower than the productivity of the research sector in the follower

country, λ_m, when the latter imitates and is very far below the frontier, which means that $d = \frac{A_m}{A_n}$, is close to zero. In other words, $\delta_m > \lambda_n$.[25]

Entrepreneurial skills are produced by two inputs: time and local knowledge. Local knowledge is a public input which I assume to be proportional to aggregate productivity A_{t-1}. Entrepreneurs choose the fraction of their working time they spend in education in order to maximize their supply of skills, φ_l, where $\varphi_l = (1-\varepsilon_l)\varepsilon_l^{z_l}$, ε_i is working time spent in education and z_l is a parameter. Because education is more important in innovation than in imitation, I assume that $z_n > z_m$. Maximization implies that $\varepsilon_l^* = \frac{z_l}{z_l+1}$. With simple algebra it can be shown that $\varepsilon_n^* > \varepsilon_m^*$, that is, entrepreneurs in the country that improves the technology through innovation choose more education than entrepreneurs in the country that imitates.

$$\mu_{l,t} = \lambda_l \frac{(1-\varepsilon_l)\varepsilon_l^{z_i} A_{l,t-1}}{A_{l,t}^*} = \lambda_l \frac{(1-\varepsilon_l)\varepsilon_l^{z_l}}{\gamma} \tag{46}$$

Each entrepreneur's wage is his expected reward from innovation:[26]

$$w_{l,s} = \lambda_l \frac{\varphi_l^* A_{l,t-1}}{A_{l,t}^*} \Pi_t = \lambda_l \frac{\varphi_l^* A_{l,t-1}}{A_{l,t}^*} (1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}} A_{l,t} u = \frac{\lambda_l \varphi_l^* A_{l,t} (1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}} u}{\gamma} \tag{47}$$

because $A_{l,t}^* = A_{l,t}$ when innovation takes place.

Also: $\varphi_l^* = (1-\varepsilon_l^*)(\varepsilon_l^*)^{z_l}$

Each unskilled worker will receive his marginal product. Simple algebra gives:

$$w_{l,u} = (1-\alpha)\alpha^{\frac{2\alpha}{1-\alpha}} A_{l,t} \tag{48}$$

Skill premium, ω, is defined as follows:

$$\omega = \frac{w_s}{w_u} = \frac{\lambda_l \varphi_l \alpha}{\gamma} u = \frac{\lambda_l \varphi_l \alpha}{\gamma} (L-s) \tag{49}$$

For simplicity I assume that $L = 1$ and thus, s is the share and the number of skilled workers. Skill premium becomes:

[25] This assumption implies that imitation is easier than innovation at least in countries that are far from the frontier. In other words, this assumption captures the advantage of backwardness.

[26] This is not the actual wage. It is the expected wage. The actual wage is either zero or Π_t. To simplify the analysis I assume that entrepreneurs can buy insurance. Thus, they receive with certainty their expected reward from innovation.

$$\omega = \frac{\lambda_l \varphi_l \alpha}{\gamma}(1-s) \tag{50}$$

2.2.2. The Political Economy Model

There are two political parties, A and B. Each party announces before the election the set of policies that will implement if elected. To simplify the analysis I restrict the available policies to those that affect the profit of a successful innovator. Such policies are for example the tax rate on profits, efforts to reduce corruption and protect property rights, the cost to start a new firm, labor market regulations like the minimum wage, etc.[27] The outcome of each set of policies is a tax rate, t, such that $t\Pi$ is the total share of the profits that the owner of the firm loses because of taxation, corruption, high cost to enter the market, etc.

This tax rate affects directly the wage of skilled workers (and their relative wage, or skill premium). The wage becomes:

$$w_{l,s} = \lambda_l \frac{\varphi_l^* A_{l,t-1}}{A_{l,t}^*}(1-t)\Pi_t = (1-t)\frac{\lambda_l \varphi_l^* A_{l,t}(1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}}{\gamma}(1-s) \tag{51}$$

And the skill premium:

$$\omega_l = (1-t)\frac{\lambda_l \varphi_l \alpha}{\gamma}(1-s) \tag{52}$$

There are, also, two special interest groups, SIG_A and SIG_B. The members of each group are all the economic agents that benefit from the policies of party A and B respectively. When an economic agent benefits from the policies of both parties then this agent is member of both interest groups. Members can be the firms that receive part of the total tax revenue as a subsidy, the bureaucrats who benefit from corruption, and the labor unions that receive contributions from their members who benefit from the higher minimum wage and other labor market regulations. Both special interest groups are small enough such that there is no coordination cost and no free riding.

The timing of events is the following: first, the two parties announce their set of policies. Then, each SIG announces its contribution to its party, and finally election takes place.[28]

[27] Benabou (2005) uses a similar way, through a unique tax rate, to represent the set of public policies like taxes and transfers, minimum wage laws, firing costs, etc.

[28] This timing implies that SIG will not contribute money in order to influence policies. In order for this to happen, SIG should contribute before the party announces its policy. In this paper, SIG give their

After a party announces its policy, it cannot change it and it is committed to implement it, if elected.

Voters maximize the following utility:

$$U_j = {f_j}^{\alpha} c^b \tag{53}$$

where c is consumption (I assume that each individual consumes all her income), and f_j depends on the political ideology of the specific individual, j, and on the political ideology of each party.

There are two types of voters: strategic and impressionable.[29] According to Grossman and Helpman (2001), 'strategic voters understand the political environment and the implications of their votes'. On the other hand, 'impressionable voters rely on campaign ads'. Grossman and Helpman (2001) assume that the share of strategic and impressionable voters is exogenous. I assume that the level of education affects the ability of people to make the calculations necessary for strategic voting. Individuals with high enough education are able to make these calculations and, thus, they know exactly how a specific policy will affect them. Political advertisement has no effect on them. In other words, the assumption is that political advertisement will not make them change their mind once they know the policy that each party is willing to adopt. Individuals with relatively low education cannot make the necessary calculations and, thus, they don't know how a specific policy will affect them. Political advertisement affects their decision. If the amount of advertisement is bigger for one of the parties, this party will attract more impressionable voters. I assume that fraction $h_l > 0$ of skilled individuals are strategic voters, and that all unskilled individuals are impressionable voters. Also, $h_n > h_m$, which means that greater fraction of skilled individuals in the country that innovates are strategic voters. This assumption is based on the fact that the amount of education of skilled individuals in the country that innovates is greater than the amount of education of skilled individuals in the country that imitates.

Strategic voters' j utility is:

$$U_{ij}^s = (f_{ij})^a (w_s(t_i))^b, \tag{54}$$

where $i = A, B$ denotes party A and B.

Strategic voter j chooses party A if: $f_{Aj}^a c_A^b \geq f_{Bj}^a c_B^b \rightarrow \frac{f_{Bj}}{f_{Aj}} \leq (\frac{w_s(t_A)}{w_s(t_B)})^{\frac{b}{a}}$, where $f_j = \frac{f_{Bj}}{f_{Aj}}$ is the relative popularity of party B for voter j. I assume that f_j is uniformly distributed with

contributions after the parties announce their policies. Thus, SIG have only electoral motive. See Grossman and Helpman (2001) for a detailed discussion about influence and electoral motive.

[29] The analysis and the model presented here are based on Grossman and Helpman (1996, 2001)

mean z.[30] Also: $c_i = w_s(t_i)$, shows that consumption is equal to the wage, and that the wage depends on the set of policies, t_i.

The share of votes for party A among strategic voters is:

$$V_A^s = \frac{1}{2} - z + \left(\frac{w_s(t_A)}{w_s(t_B)}\right)^{\frac{b}{a}}, \tag{55}$$

where z shows the relative popularity of party B's fixed position. If $z = 1$, then the two parties are equally popular and, thus, if they choose the same policies, each will get 50% of the votes.

Impressionable voters' utility is:

$$U_i^u = (f_i)^a (Ew_u(t_i))^b, \tag{56}$$

where $i = A, B$ denotes party A and B.

Impressionable voters cannot estimate the effect of the policy on their income. They form expectation with respect to this effect:

$$Ew_u(\mu_i) = (D_i)^\beta, \tag{57}$$

$i = A, B$. D_i is the contribution of SIG_i to party i. This is also the amount that this party will spend on advertising. β is a parameter measuring the effectiveness of the campaign spending.

Impressionable voter j chooses party A if: $f_{Aj}^a (D_A^\beta)^b \geq f_{Bj}^a (D_B^\beta)^b \rightarrow \frac{f_{Bj}}{f_{Aj}} \leq (\frac{D_A}{D_B})^{\frac{\beta b}{a}}$, where $f_j = \frac{f_{Bj}}{f_{Aj}}$ is the relative popularity of party B for voter j. Again, f_j is uniformly distributed with mean z. In other words the popularity of the two parties is the same among strategic and impressionable voters.

The share of votes of party A among impressionable voters is:

$$V_A^u = \frac{1}{2} - z + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} \tag{58}$$

Thus, the total share of votes for party A is:

$$V_A = V_A^s h_l s + V_A^u (1 - h_l s) = \frac{1}{2} - z + \left(\frac{w_s(t_A)}{w_s(t_B)}\right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s), \tag{59}$$

[30] Grossman and Helpman (1996, 2001) assume uniform distribution, too.

And so:

$$V_A = \frac{1}{2} - z + \left(\frac{(1-t_A)^{\frac{\lambda_l \varphi_l^* A_{l,t}(1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}}{\gamma}(1-s)}{(1-t_B)^{\frac{\lambda_l \varphi_l^* A_{l,t}(1-\alpha)\alpha^{\frac{1+\alpha}{1-\alpha}}}{\gamma}(1-s)}} \right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s), \text{ and}$$

$$V_A = \frac{1}{2} - z + \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s) \tag{60}$$

where s is the share of skilled individuals and $h_l s$ the share of strategic voters, $(1-s)$ is the share of unskilled individuals and $(1 - h_l s)$ the share of impressionable voters. Also, I assume again that individuals consume all their income, $c = w_s$.

The probability that $V_A \geq \frac{1}{2}$, that is, the probability that party A wins the election is equal to the probability that $z \leq \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s)$. I assume that z is a random variable and that $F()$ is its distribution function. The probability that party A wins the election, P_A, is equal to:

$$P_A = F(\left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s)) \tag{61}$$

Given D_B, t_A and t_B (remember that parties first announce their policies and then SIGs choose their contributions) the SIG_A will choose D_A in order to maximize its expected net benefit:

$$B_A = P_A(D_A)\zeta t_A \pi - D_A, \tag{62}$$

where $P_A(D_A)$ is the probability that party A wins the election when contribution is D_A, and $\zeta t_A \pi$ is the total net benefit from policies for SIG_A. π is the total profit of all the monopolists, and ζ lies between zero and one and captures the deadweight loss [31].

The FOC is the best response function for SIG_A:

$$F'(\left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s)) \frac{\frac{\beta b}{a} D_A^{\frac{\beta b}{a}-1}}{D_B^{\frac{\beta b}{a}}} (1 - h_l s)\zeta t_A \pi = 1 \tag{63}$$

Similarly for SIG_B:

[31] I assume here that the members of each special interest group receive an amount that is proportional to the entire amount the firms lose because of the policy. The qualitative results are not affected if, instead, the deadweight loss is proportional to the square of the 'tax'.

$$B_B = P_B(D_B)\zeta t_B \pi - D_B, \tag{64}$$

where $P_B = 1 - P_A$.

The FOC is:

$$F'\left(\left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s + \left(\frac{D_A}{D_B}\right)^{\frac{\beta b}{a}} (1 - h_l s)\right) \frac{\frac{\beta b}{a} D_A^{\frac{\beta b}{a}}}{D_B^{\frac{\beta b}{a}+1}} (1 - h_l s)\zeta t_B \pi = 1 \tag{65}$$

If we solve the two FOCs we get:

$$\frac{D_A^*}{D_B^*} = \frac{t_A}{t_B} \tag{66}$$

Party A will choose t_A to maximize its share of votes:

$$V_A = \frac{1}{2} - z + \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s + \left(\frac{t_A}{t_B}\right)^{\frac{\beta b}{a}} (1 - h_l s) \tag{67}$$

The FOC which is also the best response function for party A is:

$$\frac{b(1-t_A)^{\frac{b}{a}-1}}{a(1-t_B)^{\frac{b}{a}}} h_l s = \frac{\beta b (t_A)^{\frac{\beta b}{a}-1}}{a(t_B)^{\frac{\beta b}{a}}} (1 - h_l s) \tag{68}$$

Party B maximizes:

$$V_B = 1 - V_A = \frac{1}{2} + z - \left(\frac{1-t_A}{1-t_B}\right)^{\frac{b}{a}} h_l s - \left(\frac{t_A}{t_B}\right)^{\frac{\beta b}{a}} (1 - h_l s) \tag{69}$$

The FOC is:

$$\frac{b(1-t_A)^{\frac{b}{a}}}{a(1-t_B)^{\frac{b}{a}+1}} h_l s = \frac{\beta b (t_A)^{\frac{\beta b}{a}}}{a(t_B)^{\frac{\beta b}{a}+1}} (1 - h_l s) \tag{70}$$

The two first order conditions imply:

$$t_A^*(s) = t_B^*(s) = t^*(s) = \frac{\beta(1-h_l s)}{h_l s + (1-h_l s)\beta} \tag{71}$$

Thus, the demand for skills in the leader country that innovates is:

$$\omega^n(s) = \frac{w_s}{w_u} = (1 - t^*(s)) \frac{\lambda_n \varphi_n \alpha(1-s)}{\gamma} = \frac{h_n s \lambda_n \varphi_n \alpha(1-s)}{\gamma(h_n s + (1-h_n s)\beta)} \tag{72}$$

The demand for skills in the follower country, if it improves its technology through imitation is:

$$\omega^m(s) = \frac{w_s}{w_u} = \left(1 - t^*(s)\right)\frac{(1-d)\delta_m\varphi_m\alpha(1-s)}{\gamma} =$$
$$= \frac{h_m s(1-d)\delta_m\varphi_m\alpha(1-s)}{\gamma(h_m s + (1-h_m s)\beta)}$$

Note that the demand for skills in the leader is independent of the level of technology. This is not the case in the follower country. Everything else equal, the demand for skills is greater the greater the distance from the technological frontier.

2.2.3. The Relative Supply of Skills

The supply can be found as follows: assume that in the beginning of every period workers must become reeducated in order to qualify as skilled workers with the new generation of technology.[32] If an individual decides to become educated, he or she will receive the wage of the skilled worker, w_s. I assume that the cost of education is proportional to the skilled wage, $\sigma\psi_j w_s$, where σ is a subsidy on education or simply the quality of education. When the quality of education is higher, σ is low, then the cost of education is lower. We could think of this cost as a time cost. If the quality of education is higher, then a worker will spend less time in order to become skilled. $\psi_j \geq 0$ is a random variable that captures the heterogeneity among individuals caused by different ability or credit constraints. Lower values of ψ_j imply higher ability. If an individual chooses to remain uneducated, he or she will receive w_u.

An individual j will become skilled if: $w_s - \sigma\psi_j w_s \geq w_u$, which implies that all individuals with $\psi_j \leq \frac{\omega-1}{\sigma\omega}$ will choose to become skilled. The fraction of skilled workers is $s = G(\frac{\omega-1}{\sigma\omega})$, where G is the distribution function of ψ_j, and ω is the skill premium. This function represents the supply of skills. Under the assumption that ψ_j is uniformly distributed in $[0,1]$, the supply function becomes: $s = \frac{\omega-1}{\sigma\omega}$.

The relative supply curve is shown in Figure I. As expected, it is upward sloping. A decrease in the cost of education, or an increase in the quality of education shifts the relative supply curve to the right.

[32] I could assume that instead of individuals that live forever, there are dynastic families and that each member of the dynastic family lives only one period so that every period a new member replaces the old.

2.2.4. Steady State Analysis

The focus of this paper is first to show that steady state income differences among countries can be observed even among countries with the exact same exogenous characteristics and policies, in which case there is club convergence. Second, this paper examines the conditions under which the follower can catch up and overtake the leader.

In steady state, both countries, the leader and the follower, grow at the same rate, and in both countries the equilibrium relative supply of skills equates the supply of skills with the demand for skills.

In the leader:

$$A_{t+1} = \lambda_n \frac{\varphi A_t}{\gamma A_t} s_{n,t} \gamma A_t + (1 - \lambda_n \frac{\varphi A_t}{\gamma A_t} s_{n,t}) A_t$$

And thus, the growth rate is:

$$g_{n,t+1} = \frac{A_{t+1} - A_t}{A_t} = \lambda_n \frac{\varphi}{\gamma} s_{n,t} (\gamma - 1)$$

Similarly in the follower country:

$$g_{m,t+1} = \frac{A_{t+1} - A_t}{A_t} = \delta_m (1 - d) \frac{\varphi}{\gamma} s_{m,t} (\gamma - 1)$$

In steady state: $g_{n,t+1} = g_{m,t+1} \rightarrow \delta_m (1 - d) = \lambda_n \frac{s_n}{s_m}$

Initially, follower countries grow faster and converge to the leader. Convergence implies that d increases and the growth rate decreases, up to the point that it becomes equal to the growth rate of the leader.

Thus, the relative reward for skilled labor becomes:

$$\omega^n(s_n) = \frac{h_n s_n \lambda_n \varphi \alpha (1 - s_n)}{h_n s_n + (1 - h_n s_n)\beta} \tag{74}$$

$$\omega^m(s_m) = \frac{h_m s_m \delta_m (1-d) \varphi \alpha (1 - s_m)}{h_m s_m + (1 - h_m s_m)\beta} = \frac{h_m s_n \lambda_n \varphi \alpha (1 - s_m)}{h_m s_m + (1 - h_m s_m)\beta} \tag{75}$$

PROPOSITION 2.1.: if the two countries have similar exogenous policies, i.e. $\sigma^n = \sigma^m$, then (see figure I):

a. $\omega^n(s_n)$ is initially upward sloping and then downward sloping. $\omega^m(s_m)$ is always downward sloping. When $s_n = 0$, $\omega^n(s_n) = 0$. Also, when $s_n = 1$, $\omega^n(s_n) = 0$, and when $s_m = 1$, $\omega^m(s_m) = 0$
b. When $s_m = s_n^* \neq 1$, $\omega^m(s_m) < \omega^n(s_n)$

As a result, in steady state: $s_n^* > s_m^*$

Proof:

a. Follows from differentiation of $\omega^m(s_m)$ with respect to s_m, and from the differentiation of $\omega^n(s_n)$ with respect to s_n.
b. I set $s_n = s_m = s$, and find $\omega^m(s)$ and $\omega^n(s)$. It follows that $\omega^m(s) < \omega^n(s)$

Proposition 2.1. shows that even if the two countries have similar exogenous characteristics, the leader will choose endogenously better policies, $t(s_n^*) < t(s_m^*)$. As a result, the leader will grow at the same rate as the follower but will have higher income, higher level of technology, lower tax rate, and fewer labor market restrictions. Figure I shows the equilibrium.

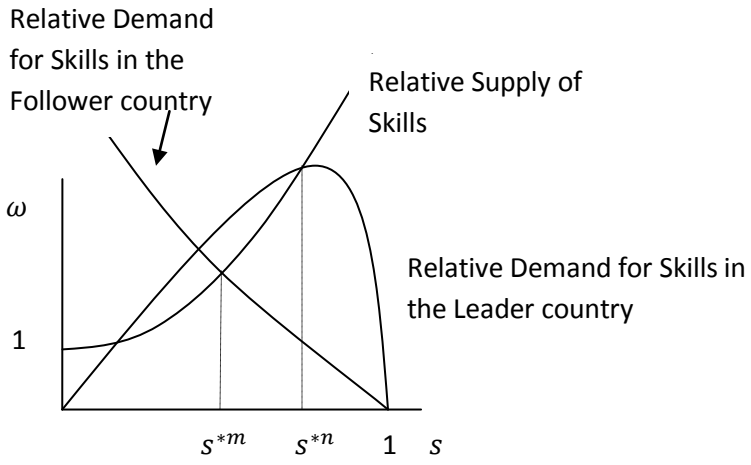

Figure I

In the previous analysis I assumed that the two countries have similar exogenous policies ($\sigma^n = \sigma^m$). The analysis is similar if instead, the leader has better exogenous policies.

Next I derive the condition under which the follower will overtake the leader. In order for this to take place, entrepreneurs in the follower country must switch from imitation to innovation. In other words, their expected profit from innovation should become greater than their expected profit from imitation.

Their expected profit from innovation is:

$$\omega_{s,n} = \big(1 - t(s_m)\big)\lambda_n \varphi\alpha(1 - s_m) = \frac{h_m s_m \lambda_n \varphi\alpha(1-s_m)}{h_m s_m + (1-h_m s_m)\beta} \tag{76}$$

Their expected profit from imitation is:

$$\omega_{s,m} = \big(1 - t(s_m)\big)\lambda_n \frac{s_n}{s_m} \varphi\alpha(1 - s_m) = \frac{h_m s_n \lambda_n \varphi\alpha(1-s_m)}{h_m s_m + (1-h_m s_m)\beta} \tag{77}$$

And $\omega_{s,n} > \omega_{s,m}$ if $s_m^* > s_n^*$.

This implies that entrepreneurs in the follower country will switch from imitation to innovation only if, at steady state, the proportion of skilled workers is bigger in the follower country. Proposition 1 implies that in order for this to happen it is not enough for the follower country to adopt exogenous policies that are a little better than those in the leader. The follower will have to adopt sufficiently better policies. This is difficult to happen and as a result we observe persistent income differences.

The relative demand for skills in the leader country is:

$$\omega_d^n(s_n) = \frac{h_n s_n \lambda_n \varphi\alpha(1-s_n)}{h_n s_n + (1-h_n s_n)\beta} \tag{78}$$

The relative supply is:

$$\omega_s^n(s_n) = \frac{1}{1-\sigma_n s_n} \tag{79}$$

In equilibrium, supply is equal to the demand:

$$\frac{h_n s_n \lambda_n \varphi\alpha(1-s_n)}{h_n s_n + (1-h_n s_n)\beta} = \frac{1}{1-\sigma_n s_n} \tag{80}$$

There is one stable solution (see Figure I): $s_n^* = s_n^*(\sigma_n)$

Similarly in the follower country, in equilibrium the relative demand for skills is equal to the relative supply:

$$\frac{h_m s_n \lambda_n \varphi\alpha(1-s_m)}{h_m s_m + (1-h_m s_m)\beta} = \frac{1}{1-\sigma_m s_m} \tag{81}$$

The unique solution is: $s_m^* = s_m^*(\sigma_m, s_n^*(\sigma_n))$

Thus, $s_m^* > s_n^*$ if $s_m^*(\sigma_m, s_n^*(\sigma_n)) > s_n^*(\sigma_n)$

This inequality has two variables, σ_n and σ_m, and shows how much bigger σ_m must be from σ_n, in order for the entrepreneurs in the follower country to decide to switch from imitation to innovation.

2.3. CONCLUDING REMARKS

This research argues that some of the economic institutions and policies are determined endogenously, by the voters, through the political process. The rest of them can be considered exogenous. The level of education affects the ability of people to choose, through the political process, good policies. In follower countries that rely on imitation, the demand for education is relatively low compared with countries that grow through innovation. As a result, given the level of technology, follower countries have lower level of education, and because of that, voters elect relatively worse, for economic growth, policies.

This provides a theoretical support for club convergence. More specifically, the model predicts that countries will sort themselves into three groups: those that grow through innovation, those that grow through imitation, and poor countries. Countries in the first two groups grow at the same rate. The follower country can overtake the leader if it adopts the necessary exogenous policies. The model shows that this is not very probable because the necessary exogenous policies are significantly better than those in the leader country.

Among others, this paper explains why voters in the U.S. elect better, for economic growth, policies compared to the policies that European voters elect. In other words, it provides a new theoretical explanation for the existence of the European-style 'welfare state' and the U.S.-style 'laissez faire' social contracts.

BIBLIOGRAPHY

Acemoglu, Daron, 1998, 'Why do New Technologies Complement Skills? Directed technical Change and Wage Inequality.' Quarterly Journal of Economics, CXIII, 1055-1090.

Acemoglu, Daron, Philippe Aghion, and Fabrizio Zilibotti, 2006, 'Distance to Frontier, Selection, and Economic Growth', Journal of the European Economic Association, 4(1), 37-74.

Aghion, Philippe and Peter Howitt, 1992, 'A Model of Growth Through Creative Destruction'. Econometrica, LX, 323-351.

Aghion, Philippe and Peter Howitt, 2009, 'The Economics of Growth', The MIT Press, Cambridge, Massachusetts.

Alesina, Alberto, Edward Glaeser, and Bruce Sacerdote, 2001, 'Why Doesn't the United States Have a European-Style Welfare State?', Brookings Paper on Economics Activity, 187-278.

Autor, David H., Lawrence F. Katz, and Alan B. Krueger, 1998, 'Computing Inequality: Have Computers Changed the Labor Market?', The Quarterly Journal of Economics, MIT Press, 113(4), 1169-1213.

Azariadis, Costas, and Allan Drazen, 1990, 'Threshold Externalities in Economic Development', The Quarterly Journal of Economics, 105(2), 501-526.

Barro, R. J. and Sala-i-Martin, X., 2003, Economic Growth, MIT Press, Cambridge, MA.

Barro R. J., and J. Lee, 2001, 'International Data on Educational Attainment: Updates and Implications', Oxford Economic Papers, 53, 541-563.

Baron, David, 1994, 'Electoral Competition with Informed and Uninformed Voters', American Political Science Review, 88, 33-47.

Basu, Susanto and David N. Weil, 1998, 'Appropriate Technology and Growth', The Quarterly Journal of Economics, 113, 1025-1054.

Becker, Gary, and Robert J. Barro, 1989, 'Fertility Choice in a Model of Economic Growth', Econometrica, 76, 481-501.

Benabou, Roland, 1996, 'Equity and Efficiency in Human Capital Investment: The Local Connection', Review of Economic Studies, 63, 237-264.

Benabou, Roland, 2005, 'Inequality, Technology, and the Social Contract', Handbook of Economic Growth, Edited by Philippe Aghion and Steven N. Durlauf, Elsevier.

Bourguignon, Francois and Thierry Verdier 2000, 'Oligarchy, Democracy, Inequality and Growth', Journal of Development Economics, 62, 285-313.

Card, David, and Alan Krueger, 1995, 'Myth and Measurement: The New Economics of the Minimum Wage', Princeton: Princeton University Press.

Caselli, F., 2005, 'Accounting for cross-country income differences', in Aghion, P. and Durlauf, S. (eds.) Handbook of Economic Growth (Amsterdam: North-Holland), 679-741.

Dee, Thomas S., 2004, 'Are there Civic Returns to Education?', Journal of Public Economics, 88, 1697-1720.

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux 1996, 'Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach', Econometrica, 65, 1001-44.

Dinopoulos, Elias and Paul Segerstrom, 1999, 'A Schumpeterian Model of Protection and Relative Wages', American Economic Review, 89, 450-472.

Easterly, W., Kremer, M., Pritchett, L. and Summers, L., 1993, 'Good policy or good luck? Country growth performance and temporary shocks,' Journal of Monetary Economics 32, 459-483.

Galor, Oded, 1996, 'Convergence? Inferences from Theoretical Models', Economic Journal, 106, 1056-69.

Galor, Oded, and Omer Moav, 2000, 'Ability-Biased Technological Transition, Wage Inequality, and Economic Growth, Quarterly Journal of Economics, 469-497.

Galor, Oded, and D. Tsiddon, 1997, 'The Distribution of Human Capital and Economic Growth', Journal of Economic Growth, 93-124.

Galor, Oded, and J. Zeira, 1993, 'Income Distribution and Macroeconomics', Review of Economic Studies, 35-53.

Galor, Oded, and David N. Weil, 1996, 'The Gender Gap, Fertility, and Growth', American Economic Review, 86, 374-387.

Gerring, John, 1998, 'Party Ideologies in America, 1828-1996', New York: Cambridge University Press.

Gerschenkron, Alexander, 1952, 'Economic Backwardness in Historical Perspective', in The Progress of Underdeveloped Areas, edited by Bert F. Hoselitz, Chicago, University of Chicago Press.

Glaeser, Edward L., Giacomo A. M. Ponzetto and Andrei Shleifer, 2007, 'Why does Democracy need Education?', Journal of Economic Growth, 12, 2, 77-99.

Grossman, Gene M., and Elhanan Helpman, 1996, 'Electoral Competition and Special Interest Politics', Review of Economic Studies, 63, 265-286.

Grossman, Gene M., and Elhanan Helpman, 2001, 'Special Interest Politics', The MIT Press, Cambridge, Massachusetts.

Hall, R.E., Jones, C.I. (1999), 'Why do some countries produce so much more output per worker than others?'. Quarterly Journal of Economics 114, 83-116.

Howitt, Peter, and David Mayer-Foulkes, 2005, 'R&D, Implementation, and Stagnation: A Schumpeterian Theory of Convergence Clubs', Journal of Money, Credit and Banking', 37, 147-177.

Hrebenar, Roland J., Matthew Burbank, and Robert C. Benedict, 1999, 'Political Parties, Interest Groups, and Political Campaigns', Westview Press.

Klenow, P. J. and Rodriguez-Clare, A., 2005, 'Externalities and growth,' in Aghion, P. and Durlauf, S. (eds.) Handbook of Economic Growth (Amsterdam: North-Holland), 817-861..

Lee, David S., 1999, 'Wage Inequality in the United States During the 1980s: Rising Dispersion or Falling Minimum Wage?', The Quarterly Journal of Economics, 114, 977-1023.

Mankiw, G., Romer, D. and Weil, D. N., 1992, 'A contribution to the empirics of economic growth'. Quarterly Journal of Economics 107, 407-437.

Mauro, Paolo, 1995, 'Corruption, Country Risk and Growth', Quarterly Journal of Economics, 110, 681-712.

McCarthy, Nolan M., Keith T. Poole, and Howard Rosenthal, 2006, 'Polarized America: The Dance of Ideology and Unequal Riches', The MIT Press, Cambridge, Massachusetts.

Milligan, Kevin, Enrico Moretti, and Philip Oreopoulos, 2004, 'Does Education improves Citizenship? Evidence for the United States and the United Kingdom', Journal of Public Economics', 88, 1667-1695.

Murphy, M. Kevin, Andrei Shleifer, and Robert W. Vishny, 1993, 'Why is Rent Seeking so costly to Growth? American Economic Review Papers and Proceedings, 83, 409-414.

Mishel, Lawrence, Jared Bernstein, and John Schmitt, 1996, 'The State of Working America, 1996-1997', Armonk, N.Y.: M. E. Sharpe, Economic Policy Institute.

Neumark, David, Mark Schweitzer, and William Wascher, 2004, 'The Effects of Minimum Wages Throughout the Wage Distribution', Journal of Human Resources, 39, 424-50.

North, Douglass C., 1990, 'Institutions, Institutional Change and Economic Performance', New York, NY, Cambridge University Press.

Wegenast, Tim, 2010, ‘Uninformed Voters for Sale: Electoral Competition, Information and Interest Groups in the US’. KYKLOS, 63, 271-300.