Wealth Distribution and Occupational Choice*

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Abstract

The paper tries to relate inequality, occupational choice and long run wealth. Defining the unskilled as poor, skilled group as middle class and entrepreneurs as rich the paper focuses- starting from a huge middle class relative to the rich along with a higher fraction of borrowing entrepreneurs within the rich group, an economy converges with a very low wealth level. In other words, one needs to have little bit inequality (in terms of wealth dispersion) to start with for long run prosperity. A high fraction of middle class is not necessarily welfare maximizing and education subsidy is not always welfare enhancing, a tax on education might be gainful for an economy in some cases.

JEL Classification: D31, I30, J24, J62, O11.

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1 Introduction

Is inequality always harmful? Following the Gini index as the measure of inequality, the higher the deviation or spread of wealth among people higher is the inequality. A uniform distribution being an extreme form of equality and a bipolar distribution, with poor converging at lower end and rich at the higher pole, the extreme form of inequality, presence of middle class is a case in between. As the fraction of middle class rises an economy moves towards more equality. Hence we can put the above question as - is the presence of a high fraction of middle class (means lower deviation of wealth) well for an economy?

There is a huge literature on 'whether the initial distribution matters in the long run'. Loury ('81) in his pioneering paper has shown, the effect of wealth distribution disappears in the long run and all the initial wealth distributions asymptotically converge to a unique ergodic distribution in the long run. Whereas, Galor and Zeira show that initial distributions are non-ergodic i.e., if one starts from a low (high) wealth converges to a low (high) wealth level in the long run. Their model works through investment in human capital and they do not focus on the spread or inequality aspect. Banerjee and Neuman also conclude that initial distributions matter and they focus that one needs to start from a little bit inequality (or a higher spread of wealth) for the co-existance of several occupations in the long run. Their model works through occupational choice decisions with stochastic production functions but no educational investment.

The paper tries to combine the two models by Galor-Zeira ('93)and Banerjee-Neuman ('93) introducing entrepreneurial as an occupational choice in the Galor-Zeira framework and endogenize the threshold wealth levels for several occupations in contrast to Banerjee-Neuman. The model has three occupational choice for an individual, unskilled, skilled and entrepreneur. Production in skilled sector is not possible without skilled and entrepreneur. The present paper describes how initial distribution affects long run occupational diversity and hence the existence of the skilled sector and finds that, if there is too much equality to start with, i.e., too much middle class in the initial distribution, the economy converges to a low level wealth in the long run. However, one can not infer the same for an unequal initial distribution.

This is a departure from a huge existing literature justifying the necessity of the presence of huge middle class. One is in static framework and the other in dynamic framework. A paper by Murphy, Shleifer and Vishney ('89)relates to the former type and a paper by A. Sarkar ('98) relates to the latter. Both emphasize the importance of the size of middle class for a country's industrialization from demand side explanations. The present paper concludes from supply side in a dynamic framework. So the size of middle class should lie between two bounds for a country to industrialize. The lower limit is given from the demand side and the upper limit from the supply side explanation.

The conclusion of this paper is in sharp contrast to the studies depicting 'inequality-growth trade-off'. Persson and Tabellini ('94) in a model relating distributional conflict, political decisions and growth depict a negative relation between inequality and growth with empirical evidence. Another paper in the similar line by Alesina and Rodrik ('94) studies the relationship between political conflict and growth in a model of endogenous growth. They argue, if wealth is too much unequally distributed, the median voter will vote for high tax hence a lower investment and lower growth rate. In other words, inequality has a negative relation with growth rate.

The model in this paper works through occupational choice hence let us go in brief to the papers trying to model 'occupational choice' decisions of individuals. The Banerjee-Neuman paper is the pioneering in this line of literature. A paper by M. Ghatak ('02) analyzed a simple dynamic model of occupational choice in the presence of credit market imperfections where wealth inequality and returns to various occupations are endogenous. He basically highlights a negative relation between inequality and growth. Chakraborty and Citanna ('03) answer how do the incentives affect the relation between the distribution of wealth, occupational decisions, matching patterns and payoffs. They find, when the incentive problem across occupations is asymmetric, matches are typically heterogeneous with richer individuals choosing matches where incentives are more important. Fall ('04), on the other hand, has shown how even with perfect credit market, inequality persists through investment in human capital, and how workers can never catch entrepreneurs. Fender ('05) considers OLG model with endogenous credit constraint with heterogeneous agents deciding over a sequential occupational choice. Mukherjee and Ray ('04) generalize most existing models of occupational choice including Becker-Tomes-Loury models in which markets are inherently equalizing, endogenous inequality models in which they are inherently disequalizing and 'new-classical' models in which either can happen depending on historical conditions. Which view turns out to be correct depends on two attributes of occupational diversity- range of cost between least skilled and most skilled and richness of occupational structure. For instance, if occupational span is narrow (wide) unique steady state exhibits perfect equality (inequality). To find whether the market is equalizing or disequalizing they needed to compare the occupational span (the range of training cost differences between most-skilled and least-skilled occupations) and the strength of bequest motive (degree of altruism). If span is wide relative to bequest strength, markets are disequalizing and there will be persistent inequality and results of endogenous inequality models will be correct.

There are some major assumptions of the model in the paper - credit market imperfection i.e., interest rate for borrowers are higher than that of lenders due to the tracking cost of the lenders. There are several papers considering credit constraint and imperfect credit market. For eg., Banerjee and Newman , Galor and Zeira , Piketty ('97). Our work is similar to the endogenous inequality literature with imperfect credit market. A paper by Matsuyama ('98) focuses on the role of credit market in determining joint evolution of distribution and interest rate. His model predicts a complete separation of rich and poor where rich maintains a high level of wealth partially due to the presence of poor. The relatively wealthy can borrow and become entrepreneurs, hiring the workers, while the poor, unable to borrow, have no choice but to become workers and lend that keep interest rate low, which is in favor of rich, while the low wage does not give them to accumulate wealth. However the model predicts that the wealth eventually trickles down to the poor in long run and pulls them out of poverty.

In the Section-2 of the paper the model and the short run equilibrium are presented, in Section-3 the short run welfare maximization results and in Section-4, the policy implications are derived. Then the dynamics with some relevant results are shown in Section-5 and lastly the conclusion in Section-6.

2 The Model

The model is in OLG framework. The economy is a small open economy with international Capital mobility. Hence rate of interest is fixed at the international level.

There is only one good which is a numeraire and can be both consumed and invested.

K stock fully depreciates after production and there is full employment in the labour market. Credit market is imperfect with a gap between lending and borrowing rate of interest.

There are infinitely many altruistic people with population normalized to unity. In the first period of their life, they decide over their occcupational choice and invest accordingly by either borrowing or lending in the capital market and consume in their old age.

Their investment decisions in the two periods are given below:

Period1 : Recieves inheritance and decides whether to invest in education or become entrepreneur(E) in the next period.
a) If no, invests the wealth in K market and works as unskilled in the first period.
b) If yes, either borrows or lends the rest of inheritance after educational investment or invests for initial set-up if he choses to become E in the next period.

Period2 : Earns according to investment made in first period, consumes and keeps bequest from net wealth, after paying back loans if he was a borrower or enjoys return if he was a lender and then dies.

Suppose x denotes the inheritance and $f(x)$ is the density function evaluated at x at any period.

2.1 Preferences and Investment Decisions

The utility function is given by :

$$U = \ln u = \alpha \ln c + (1 - \alpha) \ln b$$

Her problem is: maximise U
subject to $b + c \leq A$
Where,

$$A = \begin{cases} (x + w)(1 + r) + w; & \text{if doesn't invest in education or } E \\ (x - h)(1 + i) + v; & \text{if invests in education and is borrower} \\ (x - h)(1 + r) + v; & \text{if invests in education and is lender} \\ (x - g)(1 + i) + \pi; & \text{if invests in } E \text{ and is borrower} \\ (x - g)(1 + r) + \pi; & \text{if invests in } E \text{ and is lender} \end{cases}$$

Exogeneous variables: h, g, r

Where v is skilled wage, h is indivisible education cost, g is indivisible setup cost. Assume $g > h$ [2]

Lender has some cost of keeping track of borrower, hence $i = (a+br) > r$; $a > 0, b > 1$

Lending capital to capitalist is costless.

Here and hereafter E will denote the expectation operator.

[2]This is not a crucial assumption. Assuming $h \geq g$ implies a change in the definitions of the rich and middle class but the basic conclusions remain same. However,$g > h$ is more realistic.

At any time t one recieving x inheritance decides to invest in education if:

$$\left.\begin{array}{c}(x+w)(1+r)+w \leq (x-h)(1+i)+Ev \\ \text{Or, } x \geq s = \frac{w(2+r)+h(1+i)-Ev}{i-r}\end{array}\right\} \quad \text{if} \quad x < h \tag{1}$$

$$\left.\begin{array}{c}(x+w)(1+r)+w \leq (x-h)(1+r)+Ev \\ \text{Or, } Ev \geq w(2+r)+h(1+r)\end{array}\right\} \quad \text{if} \quad x \geq h \tag{2}$$

Similarly, a person will decide to incur the setup cost to be E in next period if:

$$\left.\begin{array}{c}(x-h)(1+r)+Ev \leq (x-g)(1+i)+E\pi \\ \text{Or, } x \geq e = \frac{Ev-h(1+r)+g(1+i)-E\pi}{1-r}\end{array}\right\} \quad \text{if} \quad x < h \tag{3}$$

$$\left.\begin{array}{c}(x-h)(1+r)+Ev \leq (x-g)(1+r)+E\pi \\ \text{Or, } E\pi \geq Ev+(g-h)(1+r)\end{array}\right\} \quad \text{if} \quad x \geq h \tag{4}$$

A lender must think it worthwhile to invest in E rather than remaining unskilled if:

$$\left.\begin{array}{c}(x+w)(1+r)+w \leq (x-g)(1+r)+E\pi \\ \text{Or, } E\pi \geq w(2+r)+g(1+r)\end{array}\right\} \tag{5}$$

This can be represented diagrammatically in Fig1:

Let us define: Unskilled ($x < s$) as Poor(P), Skilled($s \leq x < e$) as Middle Class(MC), Entrepreneur($x \geq e$) as Rich(R)

This canbe represented diagrammatically as follows:

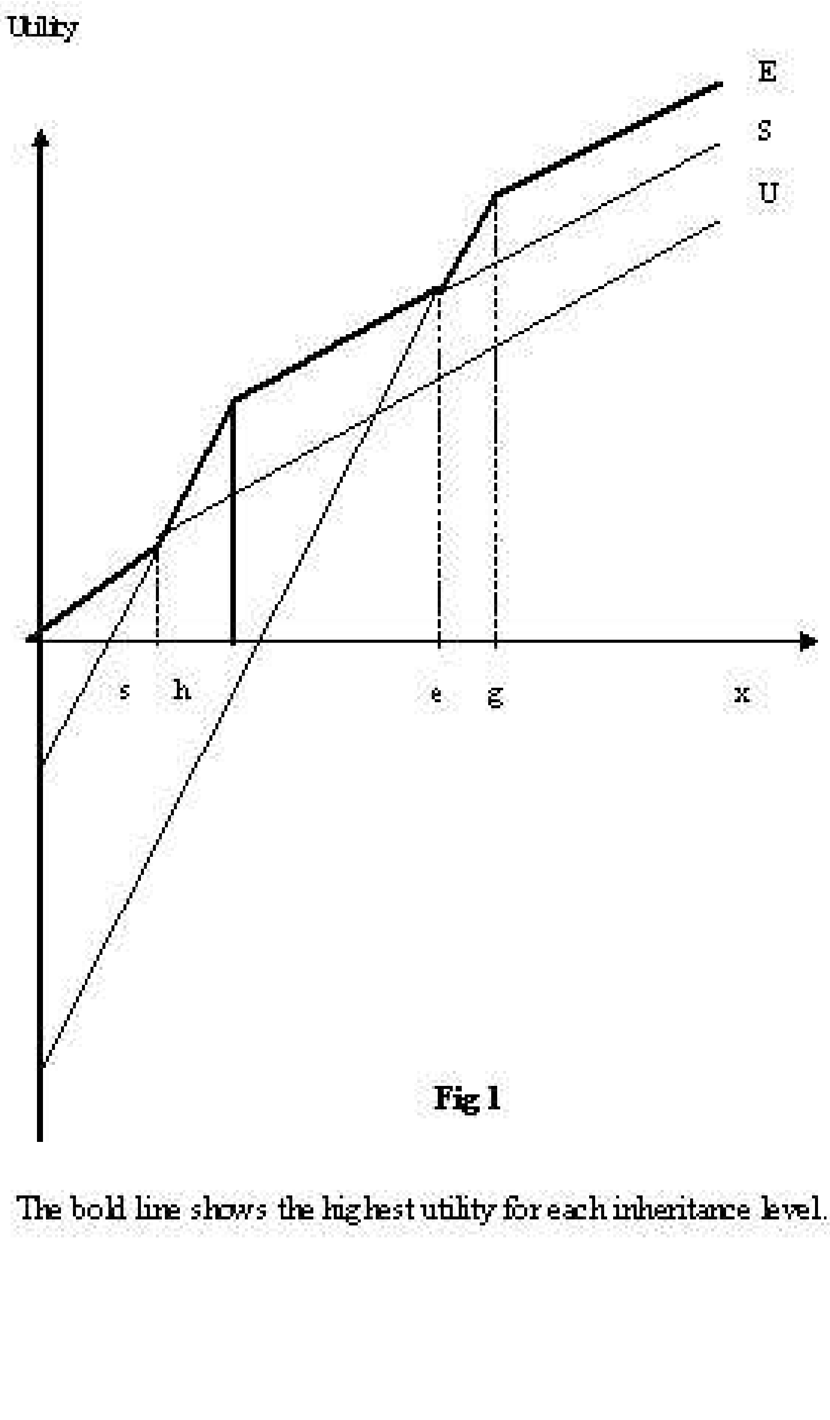


Fig 1

The bold line shows the highest utility for each inheritance level.

2.2 Production Technology

The sector using unskilled labour is a home production sector producing under CRS, hence w may be assumed to be fixed.

The good is produced by skilled labour and entrepreneur according to the following production function:

$$Y = AH^{\alpha}K^{\beta} \qquad\qquad A > 1, \alpha + \beta < 1$$

Each entrepreneur will maximise his profit in the short run. The profit is given by:

$$\pi_j = Y_j - H_j v - K_j R \qquad\qquad R = (1 + r)$$

Maximisation gives:

$$\begin{aligned} R &= A\beta K_j^{\beta-1} H_j^{\alpha} \\ \text{and } v &= A\alpha H_j^{\alpha-1} K_j^{\beta} \end{aligned}$$

Therefore,

$$\begin{aligned} K_j &= \left[\frac{A\beta H_j^{\alpha}}{R}\right]^{\frac{1}{2-\beta}} \\ v &= \frac{\alpha A^{\frac{1}{1-\beta}} \beta^{\frac{\beta}{1-\beta}} H_j^{\frac{\alpha+\beta-1}{1-\beta}}}{R^{\frac{\beta}{1-\beta}}} \qquad \frac{\partial v}{\partial H_j} < 0 \qquad (6) \\ Y_j &= \frac{A^{\frac{1}{1-\beta}} H_j^{\frac{\alpha}{1-\beta}} \beta^{\frac{\beta}{1-\beta}}}{R^{\frac{\beta}{1-\beta}}} \qquad (7) \\ \pi_j &= \frac{A^{\frac{1}{1-\beta}} H_j^{\frac{\alpha}{1-\beta}} \beta^{\frac{\beta}{1-\beta}}}{R^{\frac{\beta}{1-\beta}}} \{1 - (\alpha + \beta)\} \qquad \frac{\partial \pi_j}{\partial H_j} > 0 \qquad (8) \end{aligned}$$

Note: Capital plays no special role in the model except making the production technology closer to reality.

2.3 Short Run equilibrium: A Self-fulfilling Expectation (SFE)

People start from a particular expected skilled stock per unit of entrepreneur (EH_j), putting this in skilled wage function get expected wage, get the expected threshhold value and from the next period's distribution find the expected fraction of skilled per unit of entrepreneur and equate this to EH_j. This gives the self-fulfilled-expectation of the fraction of skilled per unit of entrepreneur. In other words, they get the self-fulfilled-expectation of the fraction of skilled per unit which is given by:

$$\frac{F(e(EH_j)) - F(s(EH_j))}{1 - F(e(EH_j))} = EH_j \tag{9}$$

The Left hand Side is decreasing in EH_j, hence there exists unique solution to the above equation. See Fig2.

Diagrammatically-

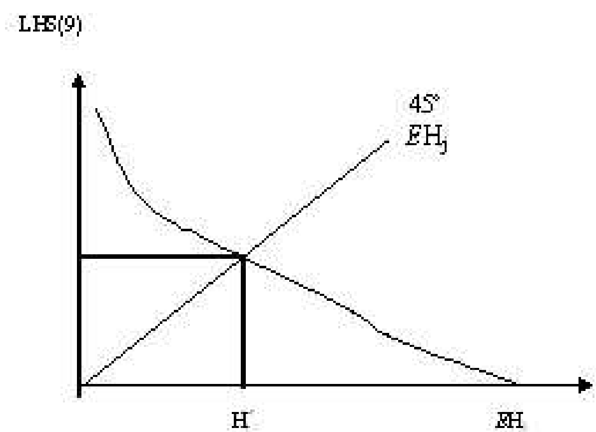


Fig 2

Suppose there are two economies 'A' and 'B' such that there are more middle class (*ie* LHS(9) is more) in 'A' compared to that in 'B'. Hence $H^*_{jA} > H^*_{jB} (\Rightarrow v_A < v_B)$. For extreme cases, $v^*_A = (h+w)R + w$.
In this case,

$$v^* = \alpha A^{\frac{1}{1-\beta}} \left(\frac{\beta}{R}\right)^{\frac{\beta}{1-\beta}} {H^*_j}^{\frac{\alpha+\beta-1}{1-\beta}} = (h+w)R + w$$

Solving,

$$\begin{aligned} H^*_j &= \left(\frac{\alpha c A^{\frac{1}{1-\beta}}}{(h+w)R+w}\right)^{\frac{1-\beta}{1-(\alpha+\beta)}} \\ c &= \left(\frac{\beta}{R}\right)^{\frac{\beta}{1-\beta}} \end{aligned}$$

On the other extreme if MC is too low in fraction, then v is very high and,

$$\begin{aligned} \pi &= v + (g-h)R \\ \text{Or, } \{1-(\alpha+\beta)\}A^{\frac{1}{1-\beta}} c H_j^{\frac{\alpha}{1-\beta}} &= \alpha c A^{\frac{1}{1-\beta}} H_j^{\frac{\alpha+\beta-1}{1-\beta}} + (g-h)R \\ \text{Or, } A^{\frac{1}{1-\beta}} c H_j^{\frac{\alpha}{1-\beta}} (1-\alpha)\{1-(\alpha+\beta) - \frac{1}{H_j}\} &= (g-h)R \end{aligned}$$

The above equation gives a unique $\widetilde{H}_j$ is too small then obviously $H^*_j > 1$.

To find which type of initial distribution results in the above two extreme let us start from a standard wealth distribution, Pareto distribution.
The density function of Pareto distribution is given by

$$f(x) = \frac{\lambda m^\lambda}{x^{\lambda+1}}; \qquad\qquad x \geq m > 0$$

Where, λ:Pareto inequality parameter, $\lambda > 1$ ensures finite variance.

We take 'm' to be small.

$$\begin{aligned} F(x) &= \int_m^x \frac{\lambda m^\lambda}{X}^{\lambda+1} dX \\ &= m^\lambda \left[m^{-\lambda} - x^{-\lambda}\right] \\ &= 1 - \left(\frac{m}{x}\right)^\lambda \end{aligned}$$

Therefore,

$$\frac{F(e)-F(s)}{1-F(e)} = \frac{\left(\frac{m}{s}\right)^\lambda - \left(\frac{m}{e}\right)^\lambda}{\left(\frac{m}{e}\right)^\lambda}$$

$$
\begin{aligned}
&= \frac{e^{\lambda} - s^{\lambda}}{s^{\lambda}} \\
&= \left(\frac{e}{s}\right)^{\lambda} - 1 \qquad (10)
\end{aligned}
$$

Note: as $\lambda \uparrow, LHS \uparrow$.

Proposition 1 *1) For all economies having*

$$
\lambda \geq \frac{\ln\left[1 + \left(\frac{A^{\frac{1}{1-\beta}}\alpha c}{hR+w(2+r)}\right)^{\frac{1-\beta}{1-(\alpha+\beta)}}\right]}{\ln\left[\frac{w(2+r)+g(1+i)-A^{\frac{1}{1-\beta}}c\{1-(\alpha+\beta)\}\left(\frac{A^{\frac{1}{1-\beta}}\alpha c}{hR+w(2+r)}\right)^{\frac{\alpha}{1-(\alpha+\beta)}}}{h(i-r)}\right]}
$$

will have minimum skilled wage (maximum profit) ie, v=(h+w)R+w.

2) For all economies having

$$
\lambda \leq \frac{\ln\left[1 + \widetilde{H}_j\right]}{\ln\left[\frac{g(i-r)}{w(2+r)+h(1+i)-A^{\frac{1}{1-\beta}}c\alpha \widetilde{H}_j^{\frac{\alpha+\beta-1}{1-\beta}}}\right]}
$$

will have minmum profit (maximum skilled wage) ie, $\pi = v + (g-h)R$.

[Proof in the Appendix]

3 Short Run Welfare Maximisation

From (7) we know,

$$
Y_j = \frac{A^{\frac{1}{1-\beta}} H_j^{\frac{\alpha}{1-\beta}} \beta^{\frac{\beta}{1-\beta}}}{R^{\frac{\beta}{1-\beta}}} = c_1 H_j^{\gamma} \quad \forall j \quad \text{where, } \gamma = \frac{\alpha}{1-\beta} < 1
$$

Let ϕ be the fraction of unskilled people.
For a given ϕ, Welfare= $W = nc_1 H_j^{\gamma}$ (since all j's are identical)
Now let us solve the following problem -

$$
\max_{n} \quad W
$$

$$
\text{subject to, } n + nH_j = 1 - \phi = z \text{ (say)}
$$

From the first Order condition,

$$\frac{dW}{dn} = \frac{d(nc_1 H_j^\gamma)}{dn} = \frac{d\left[nc_1\left(\frac{z-n}{n}\right)^\gamma\right]}{dn} = \frac{d\left[n^{1-\gamma}c_1(z-n)^\gamma\right]}{dn} = 0$$

$$\text{Thus, } (1-\gamma)n^{-\gamma}(z-n)^\gamma - \gamma n^{1-\gamma}(z-n)^\gamma - 1 = 0$$

$$\text{Thus, } n^* = z \text{ or, } n^* = z(1-\gamma)$$

Let us ignore the solution $n^* = z$ since $W = 0$ in that case and in the other case $W > 0$.
From the second order condition,

$$\begin{aligned}\frac{d^2W}{dn^2} &= c_1\{(1-\gamma)(-\gamma)(n^*)^{-(1+\gamma)}(z-n^*)^\gamma - (1-\gamma)(n^*)^{-\gamma}\gamma(z-n^*)^{\gamma-1} \\ &\quad -(1-\gamma)(n^*)^{-\gamma}\gamma(z-n^*)^{\gamma-1} + (n^*)^{1-\gamma}\gamma(\gamma-1)(z-n^*)^{\gamma-2}\} \\ &< 0 \qquad\qquad [\text{since, } \gamma - 1 < 0]\end{aligned}$$

Hence, a maximum is attained at $n = n^* = z(1-\gamma)$.

Proposition 2 *1) The welfare maximizing fraction of entrepreneurs is decreasing in the fraction of poor.*
2) A high fraction of middle class to start with (similarly, a high fraction of rich to start with) is not necessarily welfare maximizing.

Proof:1) This is obvious from the expression $n^* = z(1-\gamma) = (1-\phi)(1-\gamma)$.
As ϕ rises, n^* falls. The welfare curves for different ϕ has been shown in Fig3.
2) Given ϕ, we get n^*. Now, if $n \neq n^*$ welfare is not maximised. Hence it is obvious that for either cases, n is too high ($> n^*$, high fraction of rich to start) and n is too low ($< n^*$, high fraction of middle class to start), welfare is not maximised.

4 Policy Implication

Suppose the central planner finds $n \neq n^*$. Knowing the fact that the welfare is not maximised the planner would like to distort the distribution as a ploicy measure. Let us show the policy implication of the model.

Suppose $n < (>) n^*$. Planner would like to raise (reduce) n and reduce (raise) middle class. If it increases (reduces) h so that $n = n^*$, s (the threshold of educational investment) rises (falls) and e (the threshold of wealth for becoming entrepreneur) falls(rises) at all levels of v and π . This shifts the curve SS down (up) (shown below) and we find a new equilibrium H_j smaller (higher) than the earlier value. Note that here as h is raised (reduced), ϕ rises (falls) and hence n^* falls (rises) and $n = n^*$ is reached. The same results can be obtained changing g also.This is given in Fig4.
Observation: Education subsidy, as it is often suggested as a good redistributing device, is not always welfareraising. A tax on education may be helpful in some cases.

Welfare Curves for different $\phi(i)$ look like:

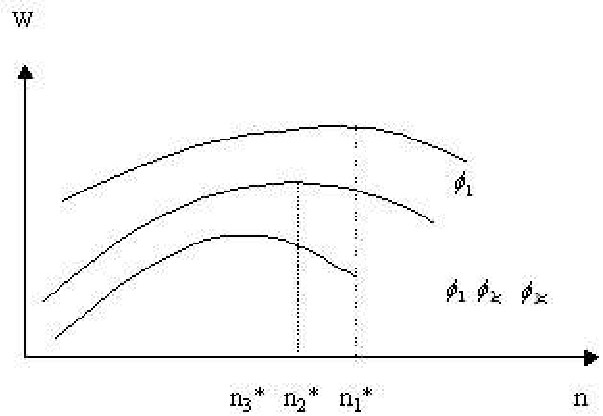


Fig 3

Policy Implication:

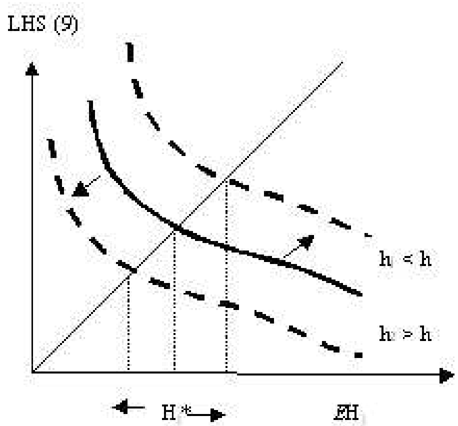


Fig 4

5 Dynamics

The bequest dynamics is given by:

$$x_{t+1} = \begin{cases} (1-\alpha)[(x_t + w)(1+r) + w] & ; s_t > x_t \\ (1-\alpha)[(x_t - h)(1+i) + v_t] & ; h > x_t \geq s_t \\ (1-\alpha)[(x_t - h)(1+r) + v_t] & ; e_t > x_t \geq h \\ (1-\alpha)[(x_t - g)(1+i) + \pi_t] & ; g > x_t \geq e_t \\ (1-\alpha)[(x_t - g)(1+r) + \pi_t] & ; x_t > g \end{cases}$$

Let us start with the assumption $(1-\alpha)R < 1 < (1-\alpha)(1+i)$ and show the Long Run convergence.

<u>Case 1:</u> **Fraction of MC is too high**

Skilled workers get same wage as unskilled in utility terms *ie*,
$v_t = [hR + w(2+r)]$. Here $s_t = h$ (implies, all who invest in education are lenders) and e_t is too low since profit is too high in this case. The MC people keep too low bequest (less than their inheritance) in this case. Let us see how H_{jt} changes in the next period.

$$\begin{aligned} H_{jt} &= \frac{H_t}{E_t} \\ \text{Taking log both sides, } \ln H_{jt} &= \ln H_t - \ln E_t \\ \text{Thus, } \frac{dH_{jt}}{H_{jt}} &= \frac{dH_t}{H_t} - \frac{dE_t}{E_t} \end{aligned}$$

Fig5a depicts it-
The following two subcases may arise-

Subcase (a): All entrepreneurs are lenders
Claim: $v_{t+1} > v_t$
Proof: Suppose the next generation starts expectation from $Ev_{t+1} = hR + w(2+r)$. In this case they find, very few people are there above the thershold h in time $t+1$ since the skilled people in time t kept too low bequest (less than their inheritance).

Now refer to the point J in Fig 5(a) below. Since there are very few E below it, entrepreneurs keeping bequest less than their inheritance are very few so their next generation can also invest as E. Hence, $dH_t < 0, dE_t \cong 0 \Rightarrow dH_{jt} < 0$. Thus H_{jt} falls and v_t rises.

In this case the bequest line shifts up (as shown by arrow in Fig 5(a)) as the skilled wage rises and profit falls. Gradually the long run convergence is obtained at some intermediate value of the two extreme cases or Case 4 is reached.

Subcase (b): All entrepreneurs are borrowers.
Claim: $v_{t+1} = v_t = hR + w(2+r)$
Proof: All E are borrower in period t with wealth in the range $[e, J)$.
Here $dH_t < 0, dE_t < 0 \Rightarrow dH_{jt} \lesseqgtr 0$ according as $\left|\frac{dH_t}{H_t}\right| \gtreqless \left|\frac{dE_t}{E_t}\right|$.
Now, we had very few E in period t. Hence the relative fall in E might be larger leading to a rise in H_{jt}. So, $v_{t+1} = v_t = hR + w(2+r)$ holds. In the subsequent periods this holds since E falls continuously. Thus in the long run all the people converge to 0.

<u>Case 2:</u> **The fraction of rich (E) is very high in the initial distribution such that entrepreneurs and skilled workers get same in utility terms**.
Fig5b depicts this.
Subcase(a): All entrepreneurs are too rich such that

$$\begin{aligned} x_t &> g\left(1 + \frac{1}{R(1-\alpha)}\right) - \frac{\pi(\tilde{H})}{R} \\ \text{Or, } x_{t+1} &= (1-\alpha)[(x_t - g)(1+r) + \pi(\tilde{H})] > g \end{aligned}$$

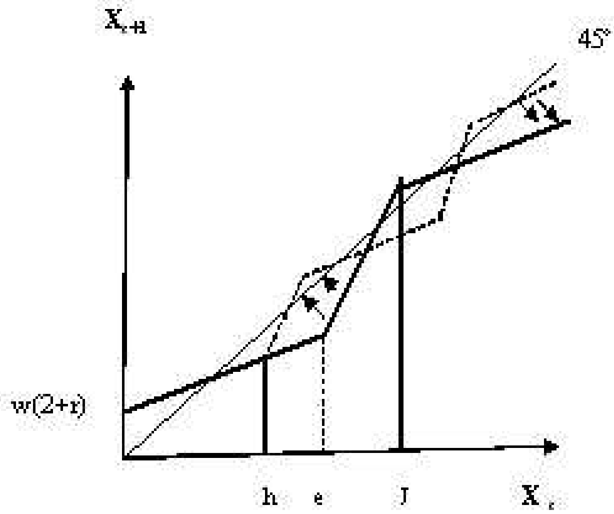
Where, $\tilde{H}$ is obtained by solving $\pi(\tilde{H}) = v(\tilde{H}) + (g-h)R$
Here, $dH_t < 0, dE_t = 0 \Rightarrow dH_{jt} < 0$. In this case, since v_t cannot rise further, it remains there. In the long run it will ultimately end up with either $\int_{s_t}^{N_t} f_t(x)dx = 0$ *ie*, there is no more borrowing skill at any time t or subcase (b) is reached.
Subcase (b): Entrepreneurs had wealth around g so that some of them cannot bequeath more than g. In that case, the fraction of E falls and if $dE_t < 0$, and $dH_{jt} > 0$ (since some of the borrowing skilled cannot afford education so H_t falls due to them), then v_t starts falling.

<u>Case 3:</u> **Intermediate case of the two extreme cases explained above.**
Fig5c depicts it.
This is the case where convergence is obtained and poor converge to somewhere like point P in Fig 5(c), middle class at M and rich at R_1.

<u>Case 4:</u> **cycles are generated** (The conditions are not derived in this paper)

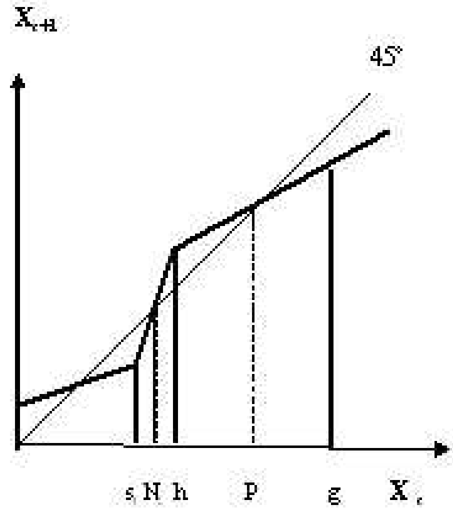
Proposition 3 *In the long run the following situations are observed:*
i) If there is convergence, then
Either All the borrowing classes vanish and convergence is attained with middle class skilled group converging to an intermediate wealth between the rich and the poor.
Or, The economy converges with very low long run wealth. This is observed when it starts from a high fraction of middle class with low wealth-borrowing entrepreneur group (The case of too much equality).
ii) Cycles are generated.

Dynamics



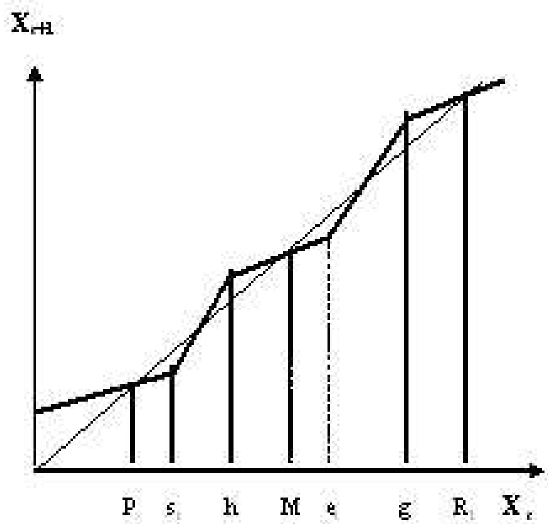
Case 1: Fraction of Middle class too high

Fig 5 a



Case 2: Fraction of rich too high

Fig 5b



Case 3: Intermediate case

Fig 5c

6 Conclusion

The paper tries to relate inequality and occupational choice in an OLG framework. In contrast to the existing literature, it finds that the presence of huge middle class is not necessarily welfare maximizing. Moreover, it might obstruct industrialization in the long run if there is a huge middle class and the entrepreneurs are not rich enough to start with. In that sense, one needs a little bit inequality to start with for the long run prosperity of an economy. Endogenizing the threshold wealth levels for several occupational choice it shows, it is not the 'level' of wealth but the 'spread' of the same that plays crucial role in the long run wealth determination.

The model suggests, the central planner, as a redistributive policy measure, may have to distort the distribution by changing the education cost to achieve the targeted level of welfare maximizing number of entrepreneurs. The planner, in an extremely equal economy, might tax education (rather than subsidizing) or, reduce entrepreneur's set up cost as a welfare maximizing policy.

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Appendix

Proof of Proposition 1: 1) At equilibrium, $\left(\frac{e}{s}\right)^{\lambda} - 1 = H_j^* = \left(\frac{\alpha c A^{\frac{1}{1-\beta}}}{hR+w(2+r)}\right)^{\frac{1-\beta}{1-(\alpha+\beta)}}$

$$\text{Or, } \lambda \ln\left(\frac{e}{s}\right) = \ln\left[\left(\frac{\alpha c A^{\frac{1}{1-\beta}}}{hR+w(2+r)}\right)^{\frac{1-\beta}{1-(\alpha+\beta)}} + 1\right] \tag{11}$$

When $v = hR, s = h\frac{e}{s} = \frac{v-hR+g(1+i)-\pi}{w(2+r)+h(1+i)-v} = \frac{w(2+r)+g(1+i)-A^{\frac{1}{1-\beta}}c\{1-(\alpha+\beta)\}\left(\frac{\alpha c A^{\frac{1}{1-\beta}}}{hR+w(2+r)}\right)^{\frac{\alpha}{1-(\alpha+\beta)}}}{h(i-r)}$

From eqn. (*),

$$\lambda_{min} = \frac{\ln\left[1+\left(\frac{\alpha c A^{\frac{1}{1-\beta}}}{hR+w(2+r)}\right)^{\frac{\alpha}{1-(\alpha+\beta)}}\right]}{\ln\left[\frac{w(2+r)+g(1+i)-A^{\frac{1}{1-\beta}}c\{1-(\alpha+\beta)\ \}\left(\frac{\alpha c A^{\frac{1}{1-\beta}}}{hR+w(2+r)}\right)^{\frac{\alpha}{1-(\alpha+\beta)}}}{h(i-r)}\right]}$$

And $\forall\lambda \geq \lambda_{min}$ we have $v = [hR + w(2+r)]$, *ie*, minimum skilled wage (maximum profit).

2) Similarly, at the other extreme, $\pi = v + (g-h)R$ *ie*, when $H_i = \tilde{H}_j$,

$$\left(\frac{e}{s}\right)^{\lambda} - 1 = \tilde{H}_j$$

$$\text{and } \frac{e}{s} = \frac{g(i-r)}{w(2+r)+h(1+i)-A^{\frac{1}{1-\beta}}c\alpha\tilde{H}_j^{\frac{\alpha+\beta-1}{1-\beta}}}$$

From (*), $\lambda_{max} = \dfrac{\ln\left[1+\tilde{H}_j\right]}{\ln\left[\frac{g(i-r)}{w(2+r)+h(1+i)-A^{\frac{1}{1-\beta}}c\alpha\tilde{H}_j^{\frac{\alpha+\beta-1}{1-\beta}}}\right]}$

And $\forall\lambda \leq \lambda_{max}$ we have $\pi = v + (g-h)R$, *ie*, minimum profit (maximum skilled wage).