Search and Matching Friction and Status Conscious Job Choice*

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Abstract

The present general equilibrium model seeks to find an explicit relationship between inheritance (and hence, the long run wealth distribution) and the unemployment, generated due to search-friction in the labor market. The existence of unemployment in equilibrium is guaranteed even with the presence of a perfect and an imperfect labor market. Reflecting the reality, this model displays that inheritance affects unemployment positively at the micro-level, but at the macro level, there is a negative relationship between GDP and unemployment. The model ensures that a dynasty does not get stagnated in a particular income class. By simulating the model, it has been shown that the long run income distribution is independent of the initial income distribution, which questions the efficacy of the celebrated trap theory.

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1. Introduction

Casual observation on real world shows two interesting facts: on one side, most of the unemployed persons does not represent poorest of the poor of a country, and on the contrary, almost all underdeveloped countries register a high rate of unemployment. The primary motivation behind the current work is to build a unified theoretical model which generates both the results under one umbrella.

This model has one organized sector and another unorganized sector producing a single good. In an economy, co-existence of an unorganized sector, where wages are flexible and market driven, and unemployment is theoretically somewhat puzzling, given the sequential job choice is allowed. Organized sector consists of labor market friction and jobs are uncertain. The productivity of the organized sector is high but in many countries that sector is less dense compared to unorganized sector and the hiring and firing is costlier for many different attributes. C. A. Pissarides and others has elaborated this nature of labor market in length[3]. After an active search for the job, if an individual fails to get employed in the organized sector, then staying without earning (which is the definition of unemployment[4]) should be dominated by getting a job in the unorganized sector where obtaining a job (i.e. a strictly positive earning opportunity) is relatively easier. This situation can be commonly observed in many developing countries.

The model, in line with the real world observation, shows that the existence of status conscious job preference can lead to unemployment as an equilibrium outcome even after incorporating the unorganized sector and sequential job choice. It is argued that the individuals who have higher inherited wealth, are more conscious about their social status. So, the difference in the level of inheritance is very crucial to guarantee the existence of two classes of people, namely unemployed and unorganized sector worker. Intuitively the argument is: people with lesser inheritance level are less capable to afford joblessness. On the other hand, wealthier individuals like to avoid working in the inferior and less remunerative unorganized sector due to social stigma. Thus we connect the labor market

[3] Most of the empirical justifications use the data of the service and/or manufacturing sectors of USA, UK, France etc. where these sectors are organized (Mills (2001), Behrenz (2001), Bontemps et.al (2000), Warren (1996)).

[4]The "unemployed" comprise all persons above a specified age who during the reference period were "without work", “currently available for work” and “seeking work”.http://www.ilo.org/public/english/bureau/stat/download/res/ecacpop.pdf

with wealth distribution, and explain the wealth dynamics of a dynasty with the help of the degree of labor market efficiency.

The concept of status consciousness in economics is indeed as old as Veblen (1899) (the idea of 'conspicuous consumption'). In relatively nearer past, Grossman and Shapiro (1988), and Basu (1989) recognized the presence of a 'status good' in the preference function and captured the features of the market for such goods[5]. Charles, Hurst and Roussanov (2009) empirical justified the conspicuous consumption. They showed the presence of conspicuous consumption among "Blacks and Hispanics" to demonstrate their

> "…employment can be a factor in self-esteem and indeed in esteem by others… If a person is forced by unemployment to take a job that he thinks is not appropriate for him, or not commensurate with his training, he may continue to feel unfulfilled…"
>
> ---Amartya Sen (1975)

economic status in comparison with "Whites". Pham (2005), in his model, introduced desire for social status and which is increasing with individual wealth level. In Marjit (2012) poverty and inequality explained in terms of the societal status where the effect of status has been captured by the relative income of the individual. These last two method of introducing status consciousness resembles to our approach. In our model the inheritance level indicates the social status of a representative individual. It is argued that the disutility in taking up unorganized sector job is dependent on the existing social status of the agent. This explains the presence of unemployment. Relation between occupational choice and social status is also well established in the existing literature.

Unorganized sector workers in many countries face social exclusion too, along with economic and political exploitation (see, Carr and Chen (2004)). Number of empirical studies argue that family background has a definite impact on job choice of the individuals.

[5] Cole, Mailath and Postlewaite (1992) explained cross country heterogeneity of growth rates through status good in the preference function. In Moav and Neeman (2010) the choice pattern of poor people discussed by assuming preference to be status conscious. On a similar note, Banerjee and Mullainathan (2010) argued that the consumption puzzle of the poor can be explained using 'temptation good' in the utility function. Corneo and Jeanne's 2010 paper has an extensive formulation of status consciousness. More importantly, this paper questions the basis of the formation of symbolic value related to the economic activities and then defines an index which can map the "judgeable characteristics" into real numbers. Each agent tries to pass their values to their successor. Therefore, the value index is a function of the job choice and the index of the present generation. That index appears in the utility function in additive form.

Some examples are Udoh and Sanni (2012), Tsukahara (2007), Constant and Zimmermann (2004), Onyejiaku (1987) etc. In fact, the effect of social status in job choice discussed in the sociological literature for quite a long time. Sociologists recognize occupational type as one of the important factors to compute social status. Among different employment types, they assign least score to informal jobs to estimate social status (Hollingshead 2011). Bardley (1943), Sewell, Haller and Straus (1957), Amundson (1995), Sellers, Satcher and Comas (1999) are also important contributions from that literature.

Bequest motive (which has enough empirical support as well; e.g. Wilhelm, (1996); Altonji et al., (1997); Carroll, (2000)) of the agent generates an inheritance distribution in the discussed setup. Agents are willing to save a part of their wealth for the intergenerational transfer and, the inheritance of the offspring is a function of that transferred part. Hence this recursive process leads us in the direction of income dynamics. Starting from any initial income, the labor market search friction in our model randomizes the next point of the income path. That evident feature not only rescues a dynasty from getting stagnated into a particular income class but also stops the long run income path from being concentrated (or polarized) in some particular point or points (c.f. Galor and Zeira (1993)) or mutually exclusive small intervals (c.f. Grossman 2008) on the income stream. At this point our model supports Banerjee and Newman (1993).

On the macro side, the comparative statics results of the model show that technological improvement can reduce aggregate unemployment with a rise in the GDP of the economy. The result imitates when the reduction in cost of posting vacancy occurs. Thus, this theoretical setup accommodates both, micro and macro level reality. The model comments about the change in the size of unorganized sector (can also be interpreted as informality) too.

Plan of the paper is the following. Section 2 is a brief and casual empirical motivation. The model set up is explained in section 3. Section 4 and 5 deal with the short run and the long run equilibrium. Section 6 complies the comparative statics results. Section 7 consists of the simulation results. The concluding remarks are in section 8.

2. Empirical Motivation

To motivate our technical set up this section quickly visits few casual empirical findings. American Time Use Survey (ATUS) data provides the information about "the amount of time people spend doing various activities, such as paid work, childcare, volunteering, and socializing"[6]. Using ATUS data, a significant (at 10% level) positive correlation for 4 years within 2003-2009 has been found between family income of the different individuals and the total time spent for job search, waiting and other activities, not associated with earning. In the years 2003 and 2008, the coefficient is significant even under 99% confidence interval. Therefore, this positive relation reveals that the wealthy people spend more time when they are not employed but available for work (a status which may be termed as unemployed). Later (in sub section 2.1.1.) we will focus on the household level data of India to understand the micro level relation between unemployment and wealth more clearly. Detail result of the exercise base on ATUS data is given in the following table.

Table 1: Correlation between Wealth and Time Use for Job search and Related Activity.

Year	Correlation coefficient	Prob > |t|
2003	0.0169	0.0106***
2004	0.0059	0.4654
2005	-0.0135	0.1053
2006	0.0142	0.0846*
2007	0.0190	0.0251**
2008	0.0271	0.0016***
2009	-0.0012	0.8883

At the macro level, however, an apparently different picture shows up. 100 countries are taken under consideration over 32 years (1980-2011)[7]. A cross section analysis is done for each year. We fit a line for unemployment against GDP, where countries are considered

[6] Source: http://www.bls.gov/tus/
[7] For the initial years, few countries are dropped due to lack of data.

as the different observations[8]. This exercise shows a steady negative relationship between unemployment and GDP[9]. Coefficients of GDP for all the years are significant at 10% level and it is true for 30 years even at 5% level of significance (year 1993 and 1994 are two exceptions). Following table displays the results.

Table 2.: Relation between GDP and unemployment.

Year	Coefficient value	p-value	Year	Coefficient value	p-value
1980	-0.0005395***	0.004	1996	-0.0001607***	0.006
1981	-0.0005036***	0.002	1997	-0.0001758***	0.002
1982	-0.0004586***	0.008	1998	-0.0002013***	0.001
1983	-0.0004193***	0.007	1999	-0.0001987***	0.001
1984	-0.0003231***	0.022	2000	-0.0002152***	0.001
1985	-0.0002917***	0.026	2001	-0.0002194***	0.001
1986	-0.0002584***	0.025	2002	-0.0002091***	0.001
1987	-0.0002405***	0.026	2003	-0.00018***	0.001
1988	-0.0002268***	0.022	2004	-0.0001649***	0.001
1989	-0.0001981***	0.019	2005	-0.0001486***	0.001
1990	-0.0002259***	0.003	2006	-0.0001361***	0.001
1991	-0.0001937***	0.006	2007	-0.0001237***	0.001
1992	-0.0001852***	0.013	2008	-0.0001114***	0.001
1993	-0.000131**	0.063	2009	-0.0000805***	0.017
1994	-0.0001064**	0.084	2010	-0.0000733***	0.04
1995	-0.0001287***	0.023	2011	-0.0000745***	0.033

In the next sub-section an empirical exercise has been undertaken based on household level data of National Sample Survey (NSS) of India. The increasing trend of number of unemployed in the relatively higher wealth category has been observed.

[8] GMM criterion is used to abate the problem of heteroscedasticity.
[9] Source: IMF database, http://www.imf.org/external/ns/cs.aspx?id=28.

2.1. A Brief Micro Level Empirical Analysis on India

For the present purpose 59th round of the NSS data is used. NSSO in this round of survey has reported the individual level data of occupational status and the detail of the wealth of each household. In the report, wealth includes household specific information on the value of land, house, livestock holding, durable goods, investment etc. No other rounds after 59th round has covered all that information in detail. Span of survey for the 59th round was 1st January 2003 to 31st December 2003.

Our major two variables of interest are the value of long term assets and number of unemployed. In this analysis the total asset of a household is defined as the sum total of value of lands and buildings and value of other durable assets (like television, refrigerator, furniture etc.). At the beginning of the analysis, we drop those sample households under survey who are in-capable or/and reluctant to provide information. Per unit asset of an individual is generated from the total value of the household's wealth by dividing it with the total number of the members of that particular household excluding servants (here onwards we call it as household size). Therefore,

$$\text{Per unit asset} = \frac{\text{value of the total asset of a household}}{\text{household size}}.$$

The analysis is restricted for the individuals of age 18 to 35. Occupational choices are made mostly within this age group. However, an individual is not likely to acquire substantial wealth by himself within that age. Mostly the wealth of such individuals' is inherited wealth. So, occupational choice is less probable to affect the wealth level. The following table gives on the descriptive stats of the per unit asset for overall India, rural India and urban India.

Table 3.: Descriptive statistics of per unit asset (in Rupees)

Per unit asset	Observations	Mean	Std. Dev.	Min	Max
Overall India	220667	54495.14	138212.4	0	9754667
Rural	137559	47929.33	103844.9	0	4606100
Urban	83108	65362.76	180783.8	0	9754667

Occupational choice depends not only on the per unit asset of the individuals, but on many other factors. So, to comprehend the relation between asset and the unemployment correctly we need to set controls for the other variables which can possibly affect the occupational pattern. In this analysis age, sex, education, religion and social group are the control variables.

The whole range of per unit asset (taken in logarithm[10]) is divided into suitable number of quintiles classes. For each asset class, the proportion of unemployed to the total number of individuals is computed, and that becomes the dependent variable of this model. The aim is to check whether this proportion is increasing or decreasing with the asset quintile classes significantly after controlling for other factors. Correlation coefficients of these two variables for rural and urban India are 0.11 and 0.18 respectively.

Following equation describes the model:

$$y = \delta_1 + \delta_2 \ln(x) + \sum_{i=1}^{9} \delta_{3_i} \ln(E_i) + \delta_4 M + \sum_{i=1}^{6} \delta_{5_i} \ln(R_i) + \sum_{i=1}^{3} \delta_{6_i} \ln(G_i) + \epsilon$$

Where $y \equiv \ln(\frac{\text{freq of unemployed}}{\text{total freq of individuals}})$ for each asset quintile class.

$x \equiv$ asset quintile class (after clubbing the asset value of long term wealth, like TV, jewelries, land holdings etc, we divide it in 100 quintile classes).

$E_i \equiv$ frequency of individuals at the education level i per asset quintile class

(Education classes are segregated as the following: 1) not literate, 2) literate without formal schooling, 3) literate but below primary, 4) primary, 5) middle, 6) secondary, 7) higher secondary, 8) diploma/certificate course, 9) graduate).

$M \equiv$ frequency of male individuals per asset quintile class

$G_i \equiv$ frequency of individuals at the social group i per asset quintile class

(Social groups are identified as: 1) scheduled tribe, 2) scheduled cast, 3) OBC).

$R_i \equiv$ frequency of individuals of religion i per asset quintile class

(Major religions of India are considered: 1) Hinduism, 2) Islam, 3) Christianity, 4) Sikhism, 5) Jainism, 6) Buddhism).

$\epsilon \equiv$ random error.

[10] Logarithmic scale is taken to control the outliers.

We compile the results for rural and urban India separately. R-square value is 0.3238 for the rural India. Other regression results are tabulated below (Table 4). Asset quintile class is positively and significantly related with the y variable. It is also noteworthy that higher education classes also positively and significantly related with y. This observation supports the first result too. That is, as individuals get more education, they become more selective about their job choice. Though up to below primary level this effect is not significant. Religion does not have any significant impact on y whereas gender and social groups show significant influence on y in case of rural India. Here, the intercept term is statistically significant with the sign, negative.

R-square value is 0.3723 is highly significant for the urban India also. Table 5 demonstrates the regression results for urban India. In case of urban India also asset class shows a positive and significant impact on y. The result for urban is also similar to rural India for education levels and social groups. However, gender has a significant role to play in this case, but religion does not have any statistically significant relation with y.

Table 4.: Regression result for urban India

y	coef. (δ_{-1})[11]	P-value	st. Error
x	0.0171 ***	0.001	0.0038
Education level per			
asset class: level 1	-0.0358	0.472	0.0497
E_2	0.0281	0.249	0.0025
E_3	0.0179	0.320	0.0181
E_4	0.1421***	0.001	0.0151
E_5	0 .3302***	0.001	0.0238
E_6	0.5263***	0.001	0.0221
E_7	0.2955***	0.001	0.0585
E_8	0.3235***	0.001	0.0301
E_9	0.2487***	0.001	0.0739
Male per asset class	0.2198***	0.001	0.0219

[11] δ_{-1} denotes all other coefficients leaving δ_1, the intercept term.

religion 1 per asset			
class	0.0306	0.657	0.0689
R_2	0.0419	0.548	0.0698
R_3	0.0692	0.333	0.0714
R_4	-0.0481	0.509	0.0729
R_5	-0.2359*	0.074	0.1322
R_6	0.0859	0.342	0.0902
social group 1 per			
asset class	0.0421***	0.006	0.0153
G_2	0.0669***	0.001	0.0126
G_3	0.0263***	0.007	0.0098
Constant(δ_1)	-0.1778**	0.011	0.0701

Table 5.: Regression result for urban India

y	Coef. (δ_{-1})	P-value	st. Error
x	0.0264 ***	0.001	0.0024
Education level per			
asset class: level 1	0.1080	0.387	0.0816
E_2	-0.0447	0.232	0.0373
E_3	-0.0416	0.217	0.0337
E_4	0.0450*	0.079	0.0256
E_5	0.2331***	0.001	0.03
E_6	0.5817***	0.001	0.0288
E_7	0.2623***	0.001	0.0568
E_8	0.2844***	0.001	0.0323
E_9	0.2172***	0.001	0.044
Male per asset class	0.2043***	0.001	0.0247

religion 1 per asset			
class	-0.1060	0.565	0.1843
R_2	-0.0874	0.635	0.1843
R_3	-0.0726	0.697	0.1866
R_4	-0.2708	0.154	0.19
R_5	-0.2048	0.310	0.2018
R_6	-0.0691	0.717	0.1906
social group 1 per			
asset class	0.0721*	0.056	0.0376
G_2	0.0546**	0.011	0.0214
G_3	0.0494***	0.001	0.0120
Constant(δ_1)	-0.0501	0.788	0.1862

Hence, given this empirical result it can be argued that in the Indian economy wealth class has a statistically significant positive influence on unemployment. This is true for both rural and urban India.

Thus, when empirically we cannot rule out the presence of a negative relation between unemployment and wealth in the macro sense, the reverse relation is found for the micro level data. That induces an apparent paradox between micro and macro level relationships between the two variables. Following sections develop a theoretical model which explains the empirical findings.

3. The Model

We model an economy where a single good is produced using labor as the only factor of production. The modelling mechanism allows for intertemporal dynamics through intergenerational transfer of wealth.

3.1. Preference and Time

Consider a discrete time framework where at the beginning of each period a new batch of population joins the economy. They live for two periods. Let the total mass of each generation be normalized to unity (thus in our economy there is no population growth).

So, a new and an old (call them as 'young' and 'old' respectively) group of people live simultaneously at each time period and therefore at any instance, total population mass is two. Each individual is identically endowed with one unit of labor inelastically in each period.

Let us name the young age of an agent as period 1 and period 2 as her old age. Individuals receive some wealth as inheritance (X) from her previous generation. They cannot save and hence completely exhausts their income earned plus the inheritance (of her lifetime) to purchase the produced good. Realization of utility (through consumption of the purchased goods and leaving a bequest) occurs at the end of her lifespan. Specifically, the preference structure of an individual born at time t, is assumed as:

$$U_t = \frac{1}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}} c_{t+1}{}^{1-\alpha} b_{t+1}^{\alpha} - D_t k X_t - D_{t+1} k X_t \quad \text{with } \alpha \in (0,1) \text{ and } k > 0 \qquad (1)$$

The above function reveals that an individual born at time t gets positive utility (U) from consumption (c) and bequest (b). The indicator D takes the value either equal to 1 or 0, depending on the type of employment that the individual receives at the subscripted time. D equals to 1 if the individual joins unorganized sector, otherwise it takes the value 0. The construction of the utility function demonstrates that the individual gets a disutility from working in the unorganized sector. The disutility level has an increasing relation with X. Here, inheritance appears in the utility function as a symbol of social status. Everyone in this economy cares about their societal position and thus, each of them has the stigma associated with the unorganized job. However, the social cost of choosing an unorganized job is higher for the individuals who have higher social status.

3.2. Production

One good is produced in the economy, but there are two sectors that engage in this productive activity. One sector, termed as the organized sector, utilizes a technology where one unit of labor produces 'p' units of the consumable. The other sector: the unorganized sector, produces 'a' units of the good with one unit of labor. Each firm of both the sectors uses a single worker at a time. The technological superiority of the organized sector is assumed by taking $p > a$. The unorganized sector is perfectly competitive in both, product and factor markets, while the organized sector has the same only in its product market.

3.3. Decision problem

Any individual in this economy faces a series of choice problems in her life span. At each point where she has to take a single decision, she gets three different possible options of action.

I. Organized sector job.

II. Unorganized sector job.

III. Wait.

Initially at period one when she is about to enter the labor market she chooses one among the three. If second or third is selected, then no more decisions are to be taken in that period. The first option, although, creates another choice problem. If she opts for the organized sector job, then she has to pass through the search process which is a random 'lottery' to her. After the 'lottery' she may get an organized job (call it as 'lucky' situation) or may remain jobless (call it as 'unlucky' situation). Here she has to reveal state contingent decisions. Hence, she faces a choice problem again, and takes a call between the three for different states. In case of 'unlucky' situation the option of 'organized job' does not remain as a feasible one. At the beginning of period two, when she becomes old, she has to follow the same path of the decision problem again.

All the decisions are taken by the individual at the beginning of her young age. Every agent can expect rationally. Decisions are taken so as to maximize the expected indirect utility. Uncertainty in the indirect utility arises because of the search-matching mechanism in organized sector.

3.4. Factor market

At every point of time, each individual in the economy is endowed with an indivisible unit of labor, which she can supply either to the organized or to the unorganized sector. Labor market of the organized sector is not perfect and consists of search frictions. So, at any point of time, a pool of job seekers searches for jobs in the organized sector and at the same time, there are infinitely lived firms in this sector, looking for workers to commence production. Both the number of firms and individuals, who are looking for productive matching, are endogenously determined within the model. This "trade in the labor

market"[12] is uncoordinated. So, this may well be the case that some of the vacant posts fail to get a worker, on the other hand some workers remain jobless after an active search. Here we use a Pissarides type matching function to capture this scenario. This gives the number of jobs formed at any moment in time as a function of the number of workers looking for jobs and the number of firms looking for workers. The matching function is increasing in its each argument, and is concave and homogeneous of degree one. The particular functional form assumed is the following:

$$m_t = [u_t^{\zeta} + v_t^{\zeta}]^{\frac{1}{\zeta}}$$

Where, m_t be the proportion of the population who are matched, u_t be the proportion of searching population in the total population at time t and v_t be the ratio of total number of vacancy and total population at time t. This form of matching function was supported in Stevens (2007).

For simplicity, let us assume $\zeta = -1$.

Hence, $\frac{m_t}{u_t} = \frac{v_t}{u_t+v_t} \equiv \rho_t$(say) and $\frac{m_t}{v_t} = \frac{u_t}{u_t+v_t} \equiv \pi_t$ (say).

One additional property of this matching function is, therefore,

$$\rho_t + \pi_t = 1. \qquad (2)$$

Let ϕ_t be the proportion of the young in the searching population. Initially, we take ϕ_t as given, later we determine ϕ_t dynamically and in the steady state. Then $\phi_t\rho_t$ represents the proportion of young agents getting an organized sector job at time t. On the other hand $(1-\phi_t)\rho_t$ becomes the proportion of old individuals who secure their job in the organized sector at time t. Similarly, $\phi_t\pi_t$ is the matching probability of a young worker with a vacant post, likewise a vacant post finds an old worker with the probability $(1-\phi_t)\pi_t$. A job seeker in the organized sector may remain jobless with probability $(1-\rho_t)$. So, $(1-\rho_t)\phi_t$ gives the proportion of young unemployed persons and $(1-\rho_t)(1-\phi_t)$ is the proportion of old in the unemployed mass.

Job destruction in this case occurs automatically when an employed worker completes her lifespan (similar to Charlot and Decreuse 2005). To an organized sector firm $(1-\pi_t)$ is the probability of not having a successful match with a worker.

[12] C. Pissarides (2000), Equilibrium Unemployment theory

An individual does not receive any wage if she remains unemployed. Alternatively, she may opt for a job in the unorganized sector, in which she instantaneously receives employment and earns a positive wage (note that factor market in the unorganized sector is frictionless).

3.5. The organized sector firms

To post a vacancy organized sector firm has to bear a strictly positive fixed cost. Notice, in this model, we assume cost explicitly only for firms, and no explicit cost is assumed for the workers. The idea behind this assumption is that workers have free time while unemployed and they may spend that time in some activity which gives them benefit (family time, home production etc.), and in addition some odd income may also come in that period. However, they also have searching cost too. (See Pissarides (2000), chapter 1). On the other hand, firms face only losses for a vacant post. They have to incur cost to keep the work place ready for the next match and for active search to fill the vacant post. No per period gain is associated with a vacant post. This is how literature somewhat justify the assumption.

From our earlier discussion, it is evident that there may arise three cases after a vacancy is posted in the organized sector. Other than the possibility of not getting a worker, two more events may occur. A vacant post can be matched either with a young worker or with an old worker. The difference between the last two situations is the following: young worker can work for two consecutive periods, whereas an old worker can supply her labor for only one period.

We use J_{yt} to denote the expected infinite income stream from a filled job having a young worker at time 't' and J_{ot} to denote the analogous value for an old worker. V_t, on the other hand is used to denote the expected infinite income stream from a vacancy. New firms enter the market as long as V_t remains positive.

Let w_{sy} be the wage of the young worker employed in the organized sector. $w_{so}$is the wage paid to an old worker in the same sector.

Now we can write the following relations:

$$J_{yt} = 2(p - w_{sy}) + V_{t+2} \quad (3)$$

$$J_{ot} = (p - w_{so}) + V_{t+1} \quad (4)$$

$$V_t = -d + \pi_{t+1}\left[\phi_{t+1}J_{yt+1} + (1-\phi_{t+1})J_{ot+1}\right] + (1-\pi_{t+1})V_{t+1} \quad (5)$$

Where, 'd' is the cost of posting a vacancy.

Explanations of these equations are the following. A firm receives a positive return of $(p - w_{sy})$ per period whenever the vacant firm gets a worker. Therefore, when a young worker is matched with a firm at time t the firm receives positive return for two consecutive periods with certainty. But after these two periods the post becomes empty and the firm has to post a vacancy to resume the production again. Therefore, from period $\overline{t+2}$ onwards V_{t+2} is the return to the firm. Similarly we get the equation for J_{ot}.

A vacant firm pays strictly positive fixed cost d to post a vacancy at each period. If the firm matches with a worker then firm either gets J_{yt} or J_{ot} according to the worker's remaining life span, and on the other hand if the firm fails to match with any worker then the firm has to start with a vacant post at period $\overline{t+1}$ again; hence will receive V_{t+1} from the next period onward.

Free entry guarantees that in equilibrium $V_t = 0$, for all t. That is, at the margin, firms would be indifferent between posting and not-posting the vacancy. If V_t remains positive (negative), firms would enter (leave) the market. Hence, both the J's become time independent.

$$J_y = 2(p - w_{sy}) \quad (6)$$

$$J_o = (p - w_{so}) \quad (7)$$

Now the equation (5) can be rewritten as,

$$\pi_t = \frac{d}{\phi_t J_y + (1-\phi_t)J_o} \quad (8)$$

3.6. Wages

The factor market of the unorganized sector is perfect[13]. So, a laborer receives her value marginal product as wage, and CRS production technology levels the marginal product and average product of laborer. Unorganized sector wage is, what she produces.

That is, $w_n = a$ (9)

Hence, w_n is time independent.

[13] Similar assumption as in Matusz (2006), Zenou (2008).

Costly labor market friction in the organized sector creates the opportunity to extract some positive rent out of this market interaction. Both the firms and laborers have some strictly positive degree of bargaining power in the organized sector, and firm owner and laborer share the total value of production through Nash bargaining. If $\beta(<1)$ denotes the bargaining power of laborers, then the wages are determined by the following equations:

$$w_{sy} = \arg\max_{w_{sy}} (2w_{sy})^{\beta}(2\overline{p - w_{sy}})^{1-\beta} \quad (10)$$

$$w_{so} = \arg\max_{w_{so}} (w_{so})^{\beta}(p - w_{so})^{1-\beta} \quad (11)$$

Solving above two equations,

$$w_{sy} = w_{so} \equiv w_s = \beta p. \quad (12)$$

Here we strengthen our assumption as $\beta p > a$ to make w_s higher than w_n, since the assumption that an organized sector is more productive than the unorganized one does not suffice to guarantee the stated wage differential. Note that, agents, in equilibrium, always choose to search for the organized sector job and that does not depend on their wealth level. Wealth level plays the crucial role only to segregate the unorganized sector labor pool and the unemployed mass. It is explained in more detail in section 2.3.

Unorganized sector wage, as an outside option in the bargaining process, is not included. First, the two wages of organized sector become unequal and dependent on time, Moreover, it will make the analysis difficult in the sense of explaining the result. Since not every individual joins the unorganized sector, and the people who take up the job are differentiated by their inheritance level. Therefore, that will guarantee higher wage in the organized sector on the basis of the worker's inheritance level. This is something unrealistic. However, inclusion of the outside option will widen the wage gap between the two sectors and that will push the analysis more towards the derived result. Including the outside options do not contribute significantly towards our analysis, but make it more cumbersome.

4. Short-run Equilibrium

Following sub-sections discuss, first, the occupational choice problem of the agent and, after that we move to the factor market solutions and finally the inheritance distribution and its dynamics are elaborated in length.

The equilibrium short run[14] solutions of our designed economy is the focus of this section.

4.1. Optimal Occupational Choice

Every individual optimally chooses to search for a job in the organized sector with any level of X. This is because, the wage of this sector is strictly higher than the return from the unorganized sector or from unemployment, and moreover, workers' pay nothing for the job-search. If she fails to get a job in period one she goes for search in period two. However, if she becomes 'lucky' in the first period, there is no more extra incentive to go for search in the second period again. This is the unique solution at the beginning of the first period's decision problem.

Decisions vary from one individual to the other for the following two situations. Agents, who face an 'unlucky' situation, opt for the unorganized sector job if she has $X_t \leq \frac{w_n}{k}$. This decision remains the same, if she is 'unlucky' in both the two periods. On the contrary if her inheritance, X_t , is greater than $\frac{w_n}{k}$ then she never chooses to work in the unorganized sector: even if she faces an unlucky situation in both the periods. As stated earlier, agents have a disutility to work in the unorganized sector due to her status, which is represented by her inheritance. Although the unorganized sector job gives an income gain, social stigma outweighs that gain for the individuals with higher X (read it as 'higher social status'). To follow the result formally, interested readers are requested to consult the Appendix 1.

Therefore, the following two strategies prevail in equilibrium:

i. Search for organized job is chosen, at the beginning and then, if becomes 'lucky', 'work for organized sector' is chosen; if 'unlucky' be the case then wait is chosen.
ii. Search for organized job is chosen, at the beginning and then, if becomes 'lucky', 'work for organized sector' is chosen; if 'unlucky' be the case then unorganized job is chosen.

The actual form of the expected indirect utility functions (EIU) for (i) and (ii) are as follows. (For derivations see the appendix 2).

$$EIU(i) = X + \rho_t(2w_s) + (1 - \rho_t)\rho_{t+1}(w_s) \quad (12)$$

[14] Given the information of (t-1), all the endogenous variables can be determined at period t. This is how we define as the short run solution in the model. Latter, a discussion follows to explain the time independent solution of the model which is characterized as the long run steady state solution.

$$EIU(ii) = X - \left((1-\rho_t) + (1-\rho_t)(1-\rho_{t+1})\right)kX + (2\rho_t + (1-\rho_t)\rho_{t+1})(w_s) + \left((1-\rho_t) + (1-\rho_t)(1-\rho_{t+1})\right)(w_n). \quad (13)$$

Comparing equation (12) and (13), it is clear that, (ii) is the dominant strategy for $X \leq \frac{w_n}{k}$, and (i) otherwise.

In the figure below (Figure 1.) we plot the optimal expected indirect utility path, with the needed parametric restrictions, denoted by the thick line.

Therefore, at the end of any period, people who have more inheritance than $\frac{w_n}{k}$ and do not get organized job choose to remain unemployed in this economy. This result explains the micro-level empirical finding elaborated in section (2.1). Note that this solution is true for any non-zero and non-unitary probability values generated from the organized sector. In the following section we solve for the equilibrium short-run probability values.

Therefore, at the end of any period, people who have more inheritance than $\frac{w_n}{k}$, remain unemployed in this economy. This result explains the micro-level empirical finding elaborated in section (1.1) and (1.2). Note that this solution is true for any non-zero and non-unitary probability values generated from the organized sector. In the following section we solve for the equilibrium short-run probability values.

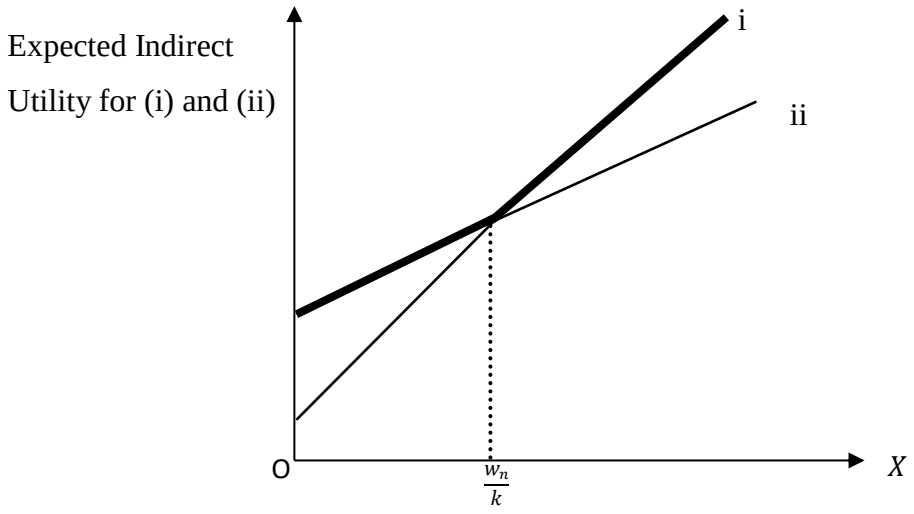

Figure 1.: Expected Indirect Utility of the Agent

4.2. Factor Market Solutions

At any point in time, populations from two consecutive generations are economically active. So, in our economy total population adds up to 2 at any instance. The whole young population and the old individuals who became 'unlucky' in their young age, participate in the search process of a particular period.

Then, if S_t is the total number of job-seekers at time period t, $S_t = 1 + (1 - \rho_{t-1}\phi_{t-1} S_{t-1})$. As stated earlier ϕ_t is defined as the proportion of the young among the searching population at time t. Since the young population proportion (recollect, they all are searchers too) is equal to one, therefore, $\phi_t S_t = 1$. The left hand side of the equation is the young pool of searchers.

Hence, $S_t = 1 + (1 - \rho_{t-1})$.

Thus, $\phi_t = \frac{1}{2-\rho_{t-1}}$. (14)

As all the previous period values of each variable are known to the economy at period t, from equation 14, ϕ_t can be determined for each t. Once ϕ_t is known then using equation 8 and equation 2 one can easily solve π_t and ρ_t for each t, as the wages are already determined.

The next sub-section discusses how these probabilities affect the inheritance distribution of the economy.

4.3. Inheritance Distribution

Inheritance distribution of the economy summarizes all the optimal decisions of the individuals. Unemployment, as defined by the International Labour Organization, is the situation when people are without jobs and they have actively sought work for a given time period. In our model unemployed mass (according to this definition) lies above X^c (which is equal to $\frac{w_n}{k}$) as a critical inheritance level. People below X^c is termed as 'poor'; otherwise 'rich'. Optimal decision of the individual who has lesser X than X^c, shows that she chooses to work in the unorganized sector when she does not get the organized sector job. Where, in an 'unlucky' state individual with $X > X^c$ does not choose to go for an unorganized job, but to wait.[15] Utility maximization exercise shows optimal allocation on bequest is α

[15] A relation between inheritance (termed there as wealth) and choice of occupation was formulated in Banerjee and Newman (1993). In their model of occupational choice, a window was kept open for the least

proportion of the total endowment. Assuming the entire bequest can be transferred to next generation as inheritance, following dynamic equations of inheritance are, hence, derived as:

Let us call $\frac{w_n}{k}$ as X^c.

If $X_t \leq X^c$,

$X_{t+2} = \alpha(X_t + 2w_s)$, with probability ρ_t (15)

$X_{t+2} = \alpha(X_t + w_n + w_s)$, with probability $(1-\rho_t)\rho_{t+1}$ (16)

$X_{t+2} = \alpha(X_t + 2w_n)$, with probability $(1-\rho_t)(1-\rho_{t+1})$ (17)

If $X_t > X^c$,

$X_{t+2} = \alpha(X_t + 2w_s)$, with probability ρ_t

$X_{t+2} = \alpha(X_t + w_s)$, with probability $(1-\rho_t)\rho_{t+1}$ (18)

$X_{t+2} = \alpha(X_t)$, with probability $(1-\rho_t)(1-\rho_{t+1})$ (19)

If the agent receives the opportunity of working in the organized sector at the beginning of period 1, her wealth equates with $(X_t + 2w_s)$ for all X_t at the end of period 2. So, it explains equation (15). In case of the other equations inheritance level plays a key role. First, we consider $X \leq X^c$. Individual works in the unorganized sector if the 'unlucky' state is realized. It is true for both young and old age. That is, total wealth can be either $(X_t + w_n + w_s)$ or $(X_t + 2w_n)$ with probability $(1-\rho_t)\rho_{t+1}$ or $(1-\rho_t)(1-\rho_{t+1})$ respectively. Again, if $X_t > X^c$, optimal decision dictates the agent to wait when she does not get employment in the organized sector after an active search. Hence, if she fails to be 'lucky' in the period 1 but receives an organized sector job in next period, then the total wealth of the individual is $(X_t + w_s)$ and if she faces 'unlucky' state in both the periods, her wealth remains as X_t.

The numbering of the bold lines is done according to the equation number. Figure 2 depicts the above equations.

wealthy individuals to remain idle; but lacks to explain why the wealthier individuals are more probable to remain unemployed. Moreover, in their contribution 'remain idle' cannot be a feasible option in equilibrium.

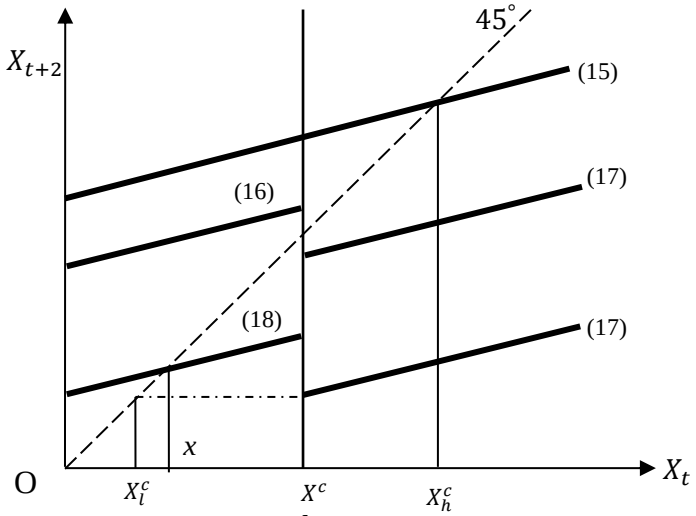

Figure 2: Inheritance Dynamics

There may arise a situation where all the three lines cut the $45°$ line within $[0, X^c]$. In that case, all individuals in the long run would have inheritance less than X^c and then no one in the population remains unemployed after a certain finite time period. That creates an uninteresting situation in the long run for the present purpose. We get the above figure by imposing suitable parametric restrictions (Appendix 3) such that we can concentrate on the case where unemployment prevails in the economy. More discussion on the inheritance dynamics is kept at section 5.1.

From figure 2 we can have the following observation. An individual who herself initially starts as poor may bring her next generation to the richer section. The reverse is also true. Therefore, a dynasty always faces a positive probability of changing the economic status within some arbitrary finite number of generations. The economic mobility from rich to poor (or the reverse) depends mostly on the labor market efficiency. The corresponding transition probabilities are displayed below:

$$P(X_{t+2} > X^c | X_t > X^c)$$

$$= \begin{cases} \rho_t, & \text{if } X_t < \left(\frac{w_n}{\alpha k} - w_s\right) \\ \rho_t + (1-\rho_t)\rho_{t+1}, & \text{if } \left(\frac{w_n}{\alpha k} - w_s\right) < X_t < \frac{w_n}{\alpha k} \\ 1, & \text{otherwise} \end{cases} \quad (20)$$

$$P(X_{t+2} > X^c | X_t < X^c) = \begin{cases} \rho_t, & \text{if } X_t < \left(\frac{w_n}{\alpha k} - w_s - w_n\right) \\ \rho_t + (1-\rho_t)\rho_{t+1}, & \text{otherwise} \end{cases} \quad (21)$$

5. Long run equilibrium

In this section, first we discuss the movement of the inheritance distribution with time, given any initial distribution and there after the dynamics of probability values will be considered.

5.1. Inheritance dynamics

For each generation, there is a distribution of inheritance (X) over the entire population. Let the distribution function be $F_t(X_t)$, where $X_t \in (0, \overline{X})$ and $\overline{X}$ is the exogenous large finite upper bound of inheritance (the construction of which is shown in fig 2). That is $F_t(X_t)$ proportion of people have less than or equal to X_t amount of inheritance at period t. To analyze the evolution of the inheritance of the dynasty over time from an initial time period, we set up a starting point where the economy is populated by a given pool of old and young individuals with their respective inheritance levels.

Note that, in our model if the probability values remain strictly positive and non-unitary, then the inheritance distribution[16] of the population can never become polarized. It cannot be the case that every individual become either 'rich' or 'poor' after a finite time. This remains true for any initial population distribution. This is a very significant departure from Galor and Zeira (1993). The probabilistic nature of this factor market halts any unidirectional movement over X and opens up the more realistic possibility, that is, X of a particular dynasty can move both way with time.[17]

From Figure 2, let us we concentrate on X_l^c and X_h^c. It is not difficult to prove that after a finite time, inheritance of all individual come within the interval $[X_l^c, X_h^c]$, provided probability values remain strictly positive and non-unitary (the next sub-section shows that

[16] X is a good proxy of wealth since, X is a function of b and b depends on the wealth.

[17] Galor (1996) pointed out that, debates related to the convergence of income distribution focuses on the validity of the three competing hypothesis: absolute convergence, conditional convergence and club convergence. According to the above classification our hypothetical economy can converge conditionally. By simulating our model, we find that the initial income distribution does not affect the long run income path (as in Loury (1981))

in the long-run equilibrium also probability values satisfies these restriction endogenously). Note that, in Figure 2 all lines cut the $45°$ line from below. Hence, if the model was a deterministic one, then 'x' or X_h^c would be a long run stable equilibrium. That is, the process might end up at x or X_h^c after infinite time interval. Because of the stochastic nature of the model under discussion, no X_{t+2} can remain infinitely on the same inheritance path on which X_t lies. There is always a positive probability of switching the path. Therefore, given a X_t either below X_l^c or above X_h^c, this dynamic process brings X_{t+n} within the stated interval after some arbitrary time periods. Once all X_ts come within the interval $[X_l^c, X_h^c]$, it is impossible to get out of that interval; although the population will never converge at a particular inheritance level. For certain parametric restriction simulation result (shown in section 2.6) displays that long-run distribution of 'X' converges to a bounded and continuous wealth distribution.

5.2. Factor Market Dynamics

In this subsection, again we return to the factor market. Here we consider the factor market behavior with time. We have seen earlier that factor market variable of the unorganized sector is time independent, so we concentrate on the factor market of the organized sector. Let us reframe the equation (8) using equation (2).

$$\rho_t = 1 - \frac{d}{\phi_t J_y + (1-\phi_t) J_o} \tag{22}$$

Using (14) and (19) we get a difference equation of ϕ_t.

$$\phi_t = \frac{1}{\left(1 + \frac{d}{\phi_{t-1} J_y + (1-\phi_{t-1}) J_o}\right)} \tag{23}$$

Above stated dynamic relations yields following results:

$\frac{\partial \phi_t}{\partial \phi_{t-1}} > 0$, $\frac{\partial^2 \phi_t}{\partial \phi_{t-1}^2} < 0$.

$0 < \phi_t|(\phi_{t-1} = 0) < 1$, $0 < \phi_t|(\phi_{t-1} = 1) < 1$ and $\phi_t|(\phi_{t-1} = 0) < \phi_t|(\phi_{t-1} = 1)$ (see Appendix 4). Now we put the above results in figure.

So, from Figure 2.3 it is clear that in the long run ϕ_t converges to an interior stable equilibrium, A.

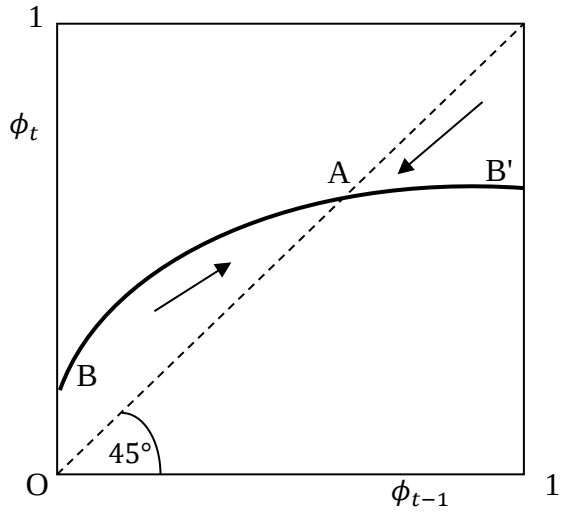

Figure 2.3.: Dynamics of the Proportion of Young Agent

Therefore, the long run probability values remain strictly positive and non-unitary (from equation 22). In the long run, ϕ_t becomes time independent. As we solve for ϕ and all other endogenous variables of the imperfect factor market, ρ, π. Hence, S can be determined. This proves the existence of unemployment in the long-run equilibrium.

6. Comparative Static Results

In this section we find out how the economy changes with the change of two different parameters: one is the production parameter and other is from factor market. Actually, we focus on the parametric change of the organized sector because this is the sector which makes our model interesting and plays a very crucial role in this hypothetical economy.

6.1. Effect of change in production technology

Suppose productivity of the organized sector (i.e. p) rises due to some exogenous technological upgradation. So, a filled job pays more and hence increases the incentive of posting vacancies. That is, V_t becomes positive. Therefore, more new firms enter and post vacancies till V_t remains positive. That increase in the number of the vacancy increases the probability (i.e. ρ_t) of getting a job in the organized sector in short-run. Mathematically, it is clear that an increase in p leads to a rise in the denominator of the RHS of the equation

8. Hence, π_t falls for a rise in the productivity of the organized sector and that implies an increase in ρ_t from equation 2.

Another interesting thing to notice is the following. Since the probability of being 'lucky' rises, it actually decreases the proportion of searchers within the searching population who are old. (Remember that the old searchers are those who failed to get an organized job in their younger age).

In Figure 2.3, BB' curve shifts up with a rise in p and accordingly A, the steady state point of ϕ, also moves in an upward direction. From equation (23) it is evident that ϕ and ρ changes in the same direction. Therefore, if p increases, the long-run steady state value of ϕ and ρ also increases, and π falls. In the steady state, this in turn shrinks the size of unorganized sector as well. This is because probability of job match in the organized sector rises and for any X, G(X) falls with the increase in p, which lefts lesser proportion of people for the unorganized sector job.

As ρ_t changes in the positive direction with p, the total number of unemployment at time t (i.e. short-run[18]) of the economy declines. On the other hand GDP at time t rises through both the increase in productivity and the increment in the probability of getting matched in the organized sector. Although the total production of the unorganized sector falls because of shortage in the supply of labor, the higher productivity of the organized sector outweighs that loss. Therefore, a more advanced technology in the organized sector implies a higher GDP coupled with a lower unemployment and this has accorded with our empirical findings documented earlier.

Mathematical proofs are in the Appendix 5.

6.2. Effect of Change in Cost of Posting A Vacancy

If the cost of posting a vacancy (i.e. d) falls, it makes vacancy posting lucrative. It increases the number of vacancies. If d falls, as the previous one, BB' moves in an upward direction and similar effects as described in the previous subsection, take place. So, as d falls total unemployment decreases and GDP increases (Appendix 6) at time t (in short-run).

[18] This claim is true for short-run. Since change in *p* changes the probability of the job match, and hence the transition probabilities (probability of switching the income class: rich to poor and the reverse) also change, that perturbs the whole inheritance distribution. Therefore, long-run change in unemployment or GDP can be shown by simulation results, which has been demonstrated at section 2.6.

This sub-section shows the economy wide importance of factor market efficiency in the long run income distribution. Here, we are summarizing what we obtain from the simulation study (see next section for detailed results in tabular form) for a change in d with appropriate parameter values for a very large iteration:

i. Country with higher cost of posting vacancy faces a greater level of long-run unemployment and a lesser level of long-run GDP.
ii. If the cost of vacancy is high enough, then in the long run economy wise inheritance distribution becomes biased towards lower income and the vice-versa.

If the factor market is not efficient enough (i.e. high 'd') then the distribution of income resembles Pareto distribution. Results show that even if initially a country starts with a very high average income, then also the average income of the country may drop down because of factor market inefficiency. On the other hand, an initially poor country can become a high average income country by improving their factor market.

Additionally, for a higher value of d, since the probability of job match falls and for any X, G(X) rises, the proportion of people works for unorganized sector also increases. That is, if the organized sector's labor market of an economy is less efficient then the size of the unorganized sector of that economy would be larger in the steady state.

Countries like USA[19] or Norway[20], representative of lesser labor market friction, show that the long run income distribution is skewed towards the higher income quintiles. On the other hand, for countries like Brazil or India income distribution is skewed to the left tail.

6.3. Effect of Change in Status Consciousness

From equations (22) and (23) it clear that in the steady state probability of job match for the worker (ρ) does not depend on the status consciousness of the individuals (which is captured by the value of k). However, the distribution of the inheritance gets affected. As k rises, the cut off inheritance (X^c) goes up, and equations (20) and (21) shows, that drives up the proportion of people who stays above or moves up with respect to the X^c. This brings down the participation and size of the unorganized sector.

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[19] *Economic inequality through the prisms of income and consumption*, David S. Johnson, Timothy M. Smeeding, and Barbara Boyle Torrey (http://www.bls.gov/opub/mlr/2005/04/art2full.pdf)

[20] http://www.regjeringen.no/en/dep/hod/documents/regpubl/stmeld/2006-2007/Report-No-20-2006-2007-to-the-Storting/2/2/1.html?id=466524

Due to higher value of k, therefore, chance of getting job in the organized sector remains unaltered but the number of people who does not want to join unorganized sector increases. As a result, the overall unemployment rises and GDP falls. Both of these two results from the fact that the size of the unorganized economy shrinks when status consciousness is high in the economy.

7. Simulation Results

This section elaborates the numerical exercise done in this work. Since the long-run wealth distribution in our model is theoretically intractable, though it has a serious influence on the findings, this section has a separate importance. Following table displays the hypothetical parametric assumptions.

Table 6.: Parameter values

Parameters	Description	Value
α	Proportion of income spent for bequest	0.40
d	Cost of posting a vacancy (Low)	0.25
d^h	Cost of posting a vacancy (High)	0.54
β	Bargaining power of an organized sector worker	0.55
p	Marginal productivity of labor in organized sector (Low)	1
p^h	Marginal productivity of labor in organized sector (High)	1.5
k	Disutility parameter from social stigma	0.5
a	Marginal productivity of labor in unorganized sector	0.22

Number of individuals under observation are 10000. Number of iteration is, T=1000. Following are the results reported for the parametric restrictions given in the table above.

Result 1: The distribution of inheritance converges in the long run. That steady state distribution does not depend on the initial wealth distribution.

Following table depicts Kolmogorov-Smirnov[21] test statistic for the convergence test of the long-run inheritance distribution.

Table 7.: Convergence of inheritance distribution

Initial wealth distribution	'T' vis-à-vis '(T-1)'	'T' vis-à-vis '(T-100)'
Normal	0.0094	0.0158
	(0.7671)	(0.1633)
Uniform	0.0169	0.0126
	(0.1138)	(0.4032)
Single valued (all the values are same but below the cut-off level)	0.0260	0.0270
	(0.8840)	(0.8547)
Single valued (all the values are same but above the cut-off level)	0.0055	0.0154
	(0.9981)	(0.1850)

Following table shows the convergence in the long run starting from different initial wealth distributions given the other parametric values. Results narrates that initial condition has no significant role for the long run distribution of inheritance.

[21] Non-technically, Kolmogorov-Smirnov test statistics is used to compare between a sample with some reference distribution, or to compare between two samples.

Table 8.: Convergence test starting from two different initial distribution of inheritance

Two different initial distributions	Kolmogorov-Smirnov test statistic
Normal vis-à-vis Uniform	0.0164
	(0.1345)
Normal vis-à-vis Single valued (below the cut-off)	0.0267
	(0.5306)
Normal vis-à-vis Single valued (above cut-off)	0.0086
	(0.8519)
Uniform vis-à-vis Single valued (below the cut-off)	0.0358
	(0.1907)
Uniform vis-à-vis Single valued (above the cut-off)	0.0108
	(0.6020)
Single valued: below cut-off vis-à-vis above the cut-off	0.0296
	(0.3981)

Result 2: The long-run steady state GDP increases and the long-run steady state unemployment decreases for an increase in the productivity of the organized sector.

Following two figures (figure 2.4 and figure 2.5) display the above result. We compute the whole model for a higher value of p ($\equiv p^h$) and compare the GDP and the unemployment values for the two different situations. This exercise is done with the uniform initial wealth distribution.

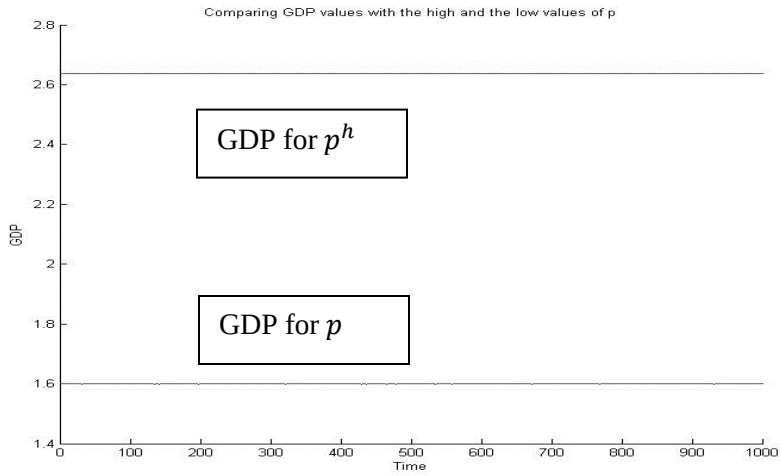

Figure 4.: GDP values for High and Low values of 'p'

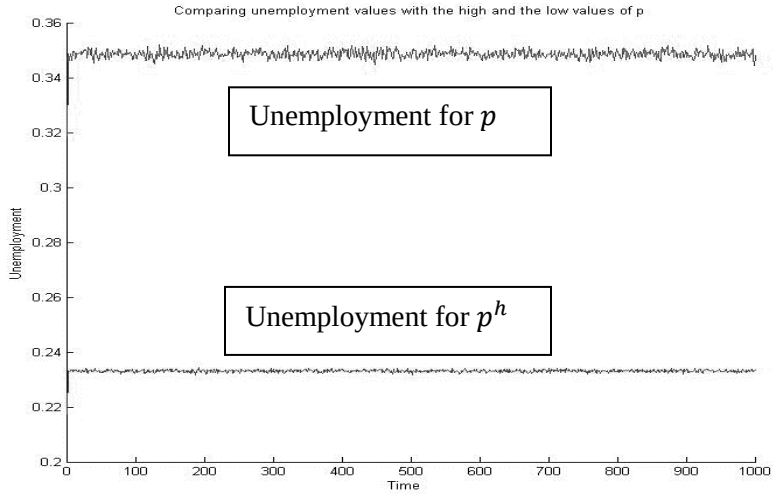

Figure 5.: Aggregate Unemployment for High and Low Values of 'p'

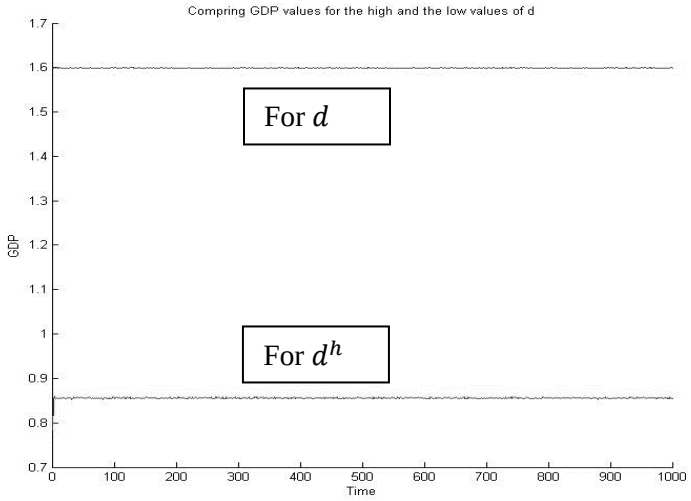

Figure 6.: GDP Values for High and Low Values of 'd'

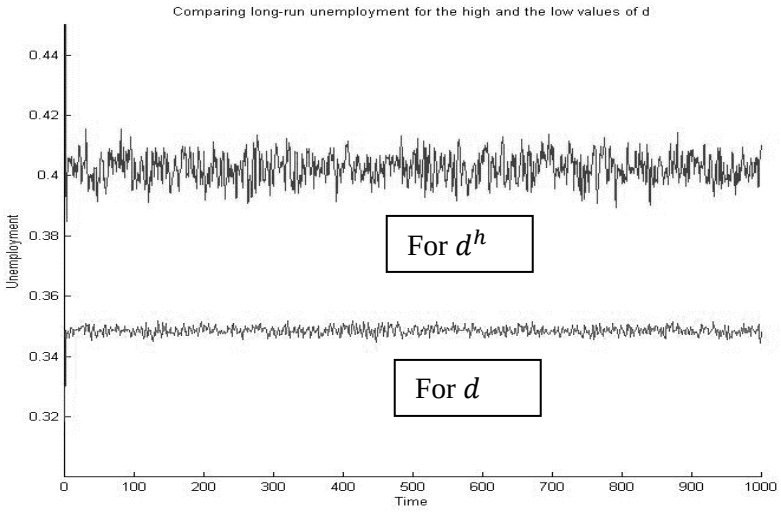

Figure 7.: Unemployment Values for High and Low values of 'd'

Result 4: If cost of vacancy is high enough, then in the long run economy wise inheritance distribution becomes biased towards lower income and the vice-versa.

Next two histograms depict the long-run inheritance distribution of the individuals for the two different level of cost of posting vacancies (for d and d^h respectively).

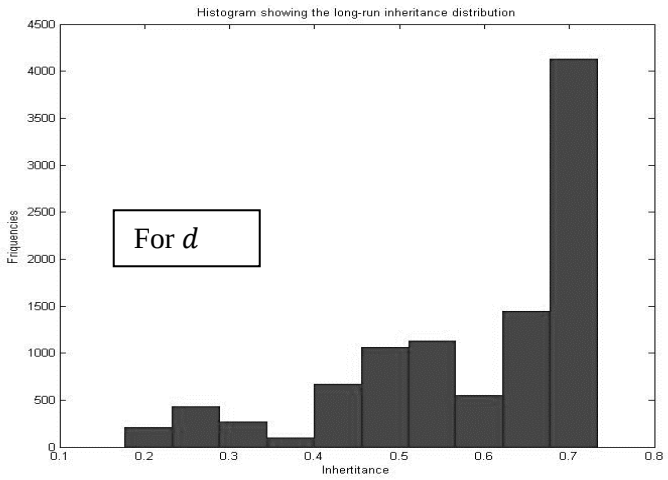

Figure 8.: Simulated Inheritance Distribution for Low ‘d’

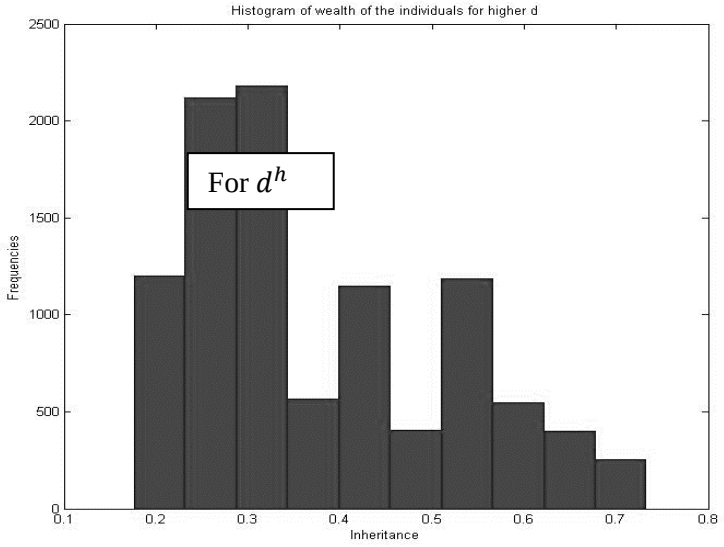

Figure 9.: Simulated Inheritance Distribution for high ‘d’

8. Conclusion

The Walrasian general equilibrium framework has established the fact that “… factors of production are always fully employed in the full-information, frictionless markets” (Davidson, et al., 1988). To account for the presence of unemployment, economists have sometimes relaxed the assumptions of ‘frictionless markets’ or have avoided ‘full

information' situation. Keeping all these contributions in mind, we think that an explicit relation between inheritance and unemployment; generated due to labor market friction, needs to be established.

This model churns out a relationship between unemployment and inheritance, and postulates that, individuals who inherit relatively more remain unemployed. It showcases the existence of unemployment together with the persistence of a perfect and an imperfect labor market in the equilibrium both in long and short run without restricting 'on the job search' (c.f. Davidson, Martin, & Matusz, 1988). A cutoff inheritance level is determined under which no one chooses to continue without positive earnings. This result explains the micro-level empirical findings too.

This model offers a dynamic structure such that the descendent of any agent can move either below or above the cutoff level of inheritance with positive probability given her present level of inheritance. That is, we refute the importance of the initial and thus, we discord with the concept of equilibrium trap which suggests that if a country begins with a very low (or high) income can never change their situation in the long run. The present work guarantees an inheritance (and thus, income) distribution spread out both below and above the cutoff in the long run. The long run income distribution is moderated only by the productivity parameters or the factor market parameters and not due to initial inheritance distribution.

The model also describes the macro level result obtained in the empirical exercise. Most of the countries with higher GDP have lower level of unemployment. We have shown that higher productivity and/ or lesser labor market friction can yield higher GDP coupled with lesser unemployment.

A possible alley of extension of this work can accommodate unemployment for targeted income groups (for example the middle class) as well as study the consequences of trade on unemployment in this framework.

Appendix

Appendix 1

Here the optimal decisions of the agents are solved. Since in the discussed model, cost of searching is equal to zero, each individual likes to search for an organized sector job at each period. An agent can receive a higher wage from organized sector, only if she faces the search process. But she does not lose anything if she goes for search. Therefore, she can take a chance in the search process of the organized sector to get a higher wage without cost. Hence, it is optimal for any agent to search in the organized sector. The choice problem between opting for a search or not is actually a comparison between the weighted average with strictly positive weights and the minimum value, where all values are not identical. Hence, opting for search becomes a dominant strategy.

The following table shows different pay-offs for different strategies under alternative states of the world. States and strategies are noted in rows and columns respectively. Notations used in the table are likewise: 'L' and 'U' indicate lucky and unlucky situations; 'O', 'N' and 'W' are for organized job, unorganized job and wait, respectively.

Pay-off matrix of each period:

	O	N	W
L	w_s	$w_n - kX$	0
U	not applicable	$w_n - kX$	0

Optimal solutions are illustrated below

for, $X \leq w_n/k$		for, $X > w_n/k$	
if L then	O	if L then	O
if U then	N	if U then	W

Since the agent faces the same pay-off matrix in second period, optimal decisions also remain also unchanged.

Recollect that, in our model, after being lucky the job cannot be destroyed, therefore, if an agent receives the state L in period one then realization of any state in period two makes

no difference to her pay-off. Hence, if she is lucky in period one then she continues as organized sector worker in both the periods of her life.

Appendix 2

Expected indirect utility representations (EIU) of the optimal decisions for a representative individual are written below.

If $X \leq \frac{w_n}{k}$ then

$$EIU|_{X\leq\frac{w_n}{k}}$$
$$= (\rho_t)(2w_s) + (1-\rho_t)(w_n - kX) + (1-\rho_t)(\rho_{t+1})w_s + (1-\rho_t)(1-\rho_{t+1})(w_n - kX) + X$$

$$= [(\rho_t)(2w_s) + (1-\rho_t)w_n + (1-\rho_t)(\rho_{t+1})w_s + (1-\rho_t)(1-\rho_{t+1})w_n] + [1-(1-\rho_t) - (1-\rho_t)(1-\rho_{t+1})]X$$

$$= [\rho_t + (1-\rho_t)(\rho_{t+1})]w_s + [(1-\rho_t) + (1-\rho_t)(1-\rho_{t+1})]w_n + [1-(1-\rho_t) - (1-\rho_t)(1-\rho_{t+1})]X \quad (24)$$

$$EIU|_{X>\frac{w_n}{k}}$$
$$= (\rho_t)(2w_s) + (1-\rho_t)(\rho_{t+1})w_s + X \quad (25)$$

Appendix 3

Parameter restrictions for the figure 2.2 are listed below:

i) $\frac{w_n}{(w_n+w_s)} < \frac{\alpha k}{1-\alpha} < \frac{w_n}{w_s}$

ii) $\frac{w_n}{2\alpha k} < w_s < \left(\frac{1}{\alpha k} - 1\right) w_n$

iii) $\frac{\alpha}{1-\alpha} < \frac{1}{2k}$

Where $w_n = a$ and $w_s = \beta p$.

Appendix 4

$$\frac{\partial \phi_t}{\partial \phi_{t-1}} = \frac{d(J_y - J_o)}{(d + \phi_{t-1}J_y + (1-\phi_{t-1})J_o)^2}$$

$$\frac{\partial^2 \phi_t}{\partial \phi_{t-1}^2} = (-2) \times \frac{d(J_y - J_o)^2}{(d + \phi_{t-1}J_y + (1-\phi_{t-1})J_o)^3}$$

$\phi_t|(\phi_{t-1} = 0) = \frac{1}{1+\frac{1}{J_o}} < 1$ and positive.

$\phi_t|(\phi_{t-1} = 1) = \frac{1}{1+\frac{1}{J_y}} < 1$ and positive.

Appendix 5

$$\frac{\partial \phi_t}{\partial p} = \frac{d}{(d + \phi_t J_y + (1-\phi_t)J_o)^2} \times \left(\phi_{t-1}\frac{\partial J_y}{\partial p} + (1-\phi_{t-1})\frac{\partial J_o}{\partial p}\right) > 0, \text{ for all } 0 < \phi_{t-1} < 1.$$

and $\frac{\partial \rho_t}{\partial \phi_t} > 0$

Where, $\frac{\partial J_y(p)}{\partial p} > 0$, $\frac{\partial J_o(p)}{\partial p} > 0$.

Total Unemployment

$$\equiv TU_t = (1 - F_{t-1}(X^c))\,(1-\rho_{t-1})(1-\rho_t) + \left(1 - F_t(X^c)\right)(1-\rho_t). \quad (26)$$

$\frac{\partial TU_t}{\partial p} < 0$

$$GDP_t = [F_{t-1}(X^c)\,(1-\rho_{t-1})(1-\rho_t) + F_t(X^c)(1-\rho_t)]a + [\rho_{t-1}\phi_{t-1}S_{t-1} + \rho_t S_t]p. \quad (27)$$

$$\frac{\partial GDP_t}{\partial p} = \rho_{t-1}(1-\rho_t) + 2\rho_t + [(p - F_t(X^c)a) + (1-\rho_{t-1})(p - F_{t-1}(X^c)a)]\frac{\partial \rho_t}{\partial p} > 0.$$

Appendix 6

$$\frac{\partial \phi_t}{\partial d} = -\frac{1}{\left(1+\frac{d}{\phi_{t-1}J_y + (1-\phi_{t-1})J_o}\right)^2} \times \frac{1}{\phi_{t-1}J_y + (1-\phi_{t-1})J_o} < 0. \quad (28)$$

$\frac{\partial TU_t}{\partial d} > 0.$

$$\frac{\partial GDP_t}{\partial d} = [(p - F_t(X^c)a) + (1-\rho_{t-1})(p - F_{t-1}(X^c)a)]\frac{\partial \rho_t}{\partial d} < 0. \quad (29)$$

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