Is Nepotism Inevitable Under Search and Matching Friction?

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Abstract

The present article develops a search and matching framework to model political nepotism in the job market. The model argues that labor market friction generates incentives for the political leaders to provide nepotism under a democratic set up. Both the leaders optimally choose nepotism when the labor market friction is higher. It is shown that even for a relatively lesser labor market friction at least one leader would always choose nepotism. The results of the basic model remain robust in an extension where followers can pay a price and choose their allegiance, to any one of the political parties.

JEL classification: J71, J64, D72.

Keywords: search and matching, nepotism, political regime change.

1. Introduction

Political nepotism is a widespread phenomenon in the job market of many developing countries. Rueda (2006) discusses the role of government partisanship in the context of British labour market. Rueda (2005) analyses how social democratic parties are often

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considers the interests of the labourers with secure employment at the cost of those who do not have so. Rock (2007) gives a general analysis of the relationship between corruption and democracy while Asher and Novosad (2015) discusses in the Indian context, how politicians proactively influence important economic discussions including employment. Hsieh et al. (2011) argues that government of Venezuela specifically targeted citizens who revealed themselves to be opposed to the government, and that these citizens were made poorer as a result. Fafchamps and Labonne (2017) find that elected mayors deliberately withhold municipal jobs from relatives of their closest opponents. The present model is related to this literature and we focus on labour market nepotism that can arise due to strategic interactions between leaders of political parties and the citizens. In this model we argue that structural imperfection of the labor market may play a key role in this context. If the jobs in the open market are uncertain, then given availability, agents will always look for options, such that, she can increase the chance of getting a job. In a democratic set up, political leaders can possibly fetch an advantage of this anxiety of the agents in an election by making it easy for the followers of that party to get a job. We set up a stylized search and matching model to describe this scenario. Initially in the baseline model, followers' action is kept passive i.e. both political parties have an endogenously given measure of followers. Then, the model is extended to a situation where agents can choose their allegiance to a particular party by paying a price, and in exchange they receive a certain degree of nepotism. Therefore, an agent can choose whether she will take nepotism or not. If she agrees to take nepotism and the corresponding leader also agreed to provide nepotism, the leader will expect her allegiance in the next election. In both the versions of the model, it is found, given option, (at least) one of the leaders' would choose nepotism.

The structure of the model is analytically two fold. We begin by modeling the frictional labor market in the line of Pissarides (2000) type search and matching, but later introduce the strategic interaction between the two leaders and eventually, between the two leaders and the followers. The former part is simplified by following Charlot and Decreuse (2005) to handle the later part in detail, where by assumption the death rate and birth rate of the agents are same. Any agent is born as unemployed and searches for job. If she gets the job (i.e. get matched) then the match stays until she dies. The matching process observed by the firms, is homogeneous for all the laborers. However, the laborers know that if the leaders offer nepotism then another *pair* of heterogeneous matching functions (two for two leaders) will be available in practice which is unobserved to firms. Leaders have different returns for these two different scenarios. The winning probability of the leader is contingent upon the number of people supporting him as opposed to his competing leaders. Thus, the model generates a strategic situation between the two leaders, and this model structure resembles with the seminal contribution of Besley and Persson (2010). Although their contribution sheds lights on public good provisioning, but the modeling technique opens up the possibly of a discourse where policy makers themselves are engaging into pay-off maximization.

The literature of labor market friction discusses the impact of social networking in job. The central focus of the discussion of social networking is based on job searching through friends and relatives, and its possible impact. Fontaine (2007) develops a simple urn-ball model of search and matching friction, and shows that social network can be optimally established. In his model, hiring takes place both through posting vacancy and through the networks of the already matched employees. It is shown that social network increases the wage and reduces unemployment.The empirical literature also finds the significant impact of social network on job match (Marmaros and Sacerdote 2002), although the effect of networking on job market outcomes is an issue of debate (Simon and Warner 1992, Elliot 1999, Smith 2000 etc). The extent of using the social network also varies significantly among place, race, age, gender, educational qualifications, class etc (Ports 1993, Bradshaw 1973, Ioannides 2004, Oesch and von Ow 2017). Tumen (2016) in a theoretical search and matching model generates the non-monotonic effects of networking on the labor market outcomes and hence, tries to bridge between theoretical and empirical findings. Bentolila, Michelacci and Suarez (2010) points out the possible negative side of the social network in job market matching. They develop a search theoretic model to show that although social contacts produce easy job, but that can also generate miss-match with productive advantage of the laborer and the job she gets. However, the literature is more or less silent about political nepotism under a democratic rule with a micro-foundation. The pertinent question here is, when the political leaders are strategically interacting with each other in a democratic set up, then is it always optimal to offer nepotism? Our model fills up this gap in the literature and shows political nepotism is inevitable with a frictional labor market, when political leaders face the possibility of regime change. At least one of the leaders will find nepotism as an optimal strategy always. In both the versions of the model developed here, the basic result remains unchanged.

The plan of the paper is the following. Section 2 describes the structure of the baseline model where laborers role is somewhat passive. Given the set up discussed in section 2, the strategy set and the equilibrium are characterized in section 3. As an extension of the basic model, section 4 allows laborers to actively choose their action to show their allegiance. Section 5 sets the concluding remarks.

2. The Baseline Model

2.1. Basic Labor Market Structure

We consider a hypothetical economy which is characterized by search and matching friction. Both firms and the workers cannot match with each other frictionlessly. Firms post vacancies and unemployed workers look for job. There exists a Pissarides type matching function commonly known to all the agents, and both, firms and workers, get matched on the basis of that. The matching function is denoted as m.

$$m = m(u, v) \tag{1}$$

Where, u is the number of unemployed job searcher and v is the number of vacant firms. m is homogeneous of degree one, concave and increasing in its each argument. Hence, $m/u = m(1, \theta)$ and $m/v = m(\theta^{-1}, 1)$ are the rate of getting a private sector job by a job seeker and rate of getting a job seeker by a vacant private sector firm, respectively (where $\theta \equiv v/u$, also termed as market tightness). Like any standard search matching generated unemployment model, θ and, hence u and v is determined in this model endogenously. Let us assume that, rate of death and birth rate are same and constant at λ. Employed individual does not lose the job unless she dies. That is, population does not grow, remains as constant length of 1, and in each period people are born as unemployed.

V_j is denoted as the value of the infinite income stream of the j^th category worker: Employed (E) or Unemployed (U). If a worker is E then the per period earning is the wage (w) which is endogenous to the model, and for algebraic simplicity it is assumed that there is no unemployment benefit. Therefore, in the steady state,

$$rV_E = w \tag{2}$$

Similarly,

$$rV_U = m(1,\theta)\Big(V_E - V_U\Big) \tag{3}$$

For the firms, J_l is denoted as the value of the infinite income stream of the l^th category firms: Filled (E) or Vacant (V). To post a vacancy firms pay d. Each firm can post a single vacancy. If the vacancy is filled by a worker, the production can commence and lets assume, a productive match can produce p unit of goods (which is technologically fixed). Hence,

$$rJ_E = (p - w) - \lambda(J_E - J_V) \tag{4}$$

$$rJ_V = -d + m(\theta^{-1}, 1)\,(J_E - J_V) \tag{5}$$

In equilibrium firms entry and exit freely in the market such that

$$J_V = 0. \tag{6}$$

And hence from equation (5),

$$J_E = \frac{d}{m(\theta^{-1}, 1)}. \tag{7}$$

And, using equation(6) into equation (4) it becomes,

$$J_E = \frac{p - w}{\lambda + r}. \tag{8}$$

Therefore, equilibrium from the demand side of the labour market says,

$$\frac{p - w}{\lambda + r} = \frac{d}{m(\theta^{-1}, 1)}. \tag{9}$$

Wage is determined by the Nash Bargaining. Firm and worker bargain over the surplus they generate by the productive matching. β is the bargaining power of the worker and $1 - \beta$ is the same for the firm.

$$w \;\; = \;\; arg\ max_w \left(J_E - J_V\right)^{1-\beta} \left(V_E - V_U\right)^{\beta}$$

This maximization exercise yields to

$$(V_E - V_U) = \beta\big(V_E - V_U + J_E\big) \tag{10}$$

$$\Rightarrow w - rV_U = \beta(p) - \beta r V_U.$$

Therefore,

$$w = \beta p + (1 - \beta) r V_U \tag{11}$$

Equation (10) can also be written as,

$$\frac{\beta}{1-\beta}J_E = V_E - V_U \tag{12}$$

Using equation (12) in equation (3), V_U can be determined as follows,

$$r\,V_U = m(1,\theta)\frac{\beta}{1-\beta}J_E.$$

Putting the value of the J_E from equation (7) to solve V_U:

$$rV_U = \frac{\beta}{1-\beta}\theta d \tag{13}$$

Hence, from equation (11), the wage rate of the informal sector (w) is solved as,

$$w = \beta(p + \theta d) \tag{14}$$

Equation (14) shows a positive relation between θ and w. Therefore, equation (9) and equation (14) solve both θ and w endogenously.

In the light of this model, the discussed standard search and matching unemployment framework has slightly different understanding. Firms does not have the information about the nepotism. For them this is the only market where they can operate. However, agents who are distributed uniformly along a unit length, take the solutions of the wage rate and market tightness from the labour market and compare the related gain from the option of nepotism versus no nepotism. Gain from the nepotism is not homogeneous for all the agents. That is, at the micro level, if the option of nepotism operates then for each individual the probability of getting a job is different, and hence their expected return. Interestingly even when nepotism is operating, firms are still looking at the macro outcome: that is, the average of (envelop of) all the individual's probability of getting a job as the matching rate of the market for the workers. In the next section, we discuss how the nepotism is defined technically in this model and how the envelop of all the individuals' probability of getting job can be same as the macro level probability of getting job.

2.2. Assumptions and Structure of the model with nepotism

There are two possible candidates in an economy, designated as L and R, who contends among themselves to capture political power. All agents, including the contenders are uniformly distributed in the interval $[0, 1]$. The position occupied at the leftmost corner is that of L, (i.e. at 0) while the position occupied at the other end (at 1) is that of R. The position of the agents, reflect their " affinity"[3]. Smaller is the distance from L (R), closer is the person in terms of "affinity" to L (R). The possibility that the jth agent [4], gets a job depends on how close is the person to the ruling power, i.e. either L or R. Thus, this differential affinity gets reflected tangibly in terms of employment opportunity, when the leaders find it optimal to do nepotism. However, as a viable strategy, leaders may well choose not to provide nepotism, and in that case all the agents faces equal market determined probability to get a job. On the other hand, if the leader who is in power, wants to provide nepotism then the probability of getting a job is denoted by $m(j)$ for the jth person. j is the distance of the individual from the ruling power, (either L or R) and is thus measured from 0 (when L is in power) or 1 (when R is in power) depending upon who is offering the individual nepotism. This probability, is assumed to be:

$$m(j) = (1 - j)^{\theta^{-1}} \tag{15}$$

where $\theta > 0$. It is clear from above, that $m'(j) < 0$ [5], and thus we define nepotism in this model as the enhancement of the chance of getting a job when proximity to power increases. Also,

$$\int_0^1 (1 - j)^{\theta^{-1}} dj = \frac{1}{1 + \theta^{-1}}. \tag{16}$$

As we discussed earlier, the labour market is characterized by imperfection as workers and firms face search frictions. The matching function (Stevens 2006), which determines

[3]Affinity can indicate ideology, ethnicity or any other attribute by which agents can be distinguished by their distance from the extremes.

[4]the person is at j distance from the origin.

[5]$m(j = 0) = 1$ and$m(j = 1) = 0$, when L is in power nd the reverse is true when R is in power

the number of workers getting a job at any instant of time was given by,

$$M(u, v) = \frac{uv}{u + v}. \tag{17}$$

Comparing equations (16) and (17), it is clear that the technologically given probability of getting a job in overall economy (equivalently, in case of no nepotism) is essentially an envelope of the nepotism ridden job receiving probability given by equation (16) [6]. Thus, firms perceive that vacant jobs and workers get matched by the matching function, $M(u, v)$, while individual workers know that the probability they would get a job depends on how close they are to the centre of power (as in equation (2)). This is how nepotism is defined in this model.

The leaders believe that the probability of their winning would depend positively upon j^*, where the agents receiving a net benefit from nepotism (as practised by the candidate) has a measure of j^*. Below, we determine this j^* endogenously. [7] The perceived probability of a candidate of winning the elections is,

$$\gamma = \gamma(\bar{\gamma}, j^*). \tag{18}$$

$\bar{\gamma}$ is the perceived probability of winning to the candidate when they cannot/does not strategically influence the outcome. Our previous discussions implies γ is an increasing function of both its arguments. Each individual maximises their expected return which depends only upon their wage[8].

3. The Game and The Equilibrium

The structure of the game is as follows:

[6] Dividing both sides of equation (3) by u gives $\frac{M(u,v)}{u} = \frac{1}{1+\theta^{-1}}$, where $\theta = \frac{v}{u}$.

[7] For example, L believes that if the agents between $(0, j^*)$ get the benefit from nepotism provided by L over the other alternatives (such as no nepotism or nepotism provided by R) then $(0, j^*)$ mass of population will positively affect the winning probability of L. Similarly one can define the winning probability of R.

[8] It can be shown from equations 2 and 3, return from unemployment is an increasing function of wage and rate of getting employment.

1)Both L and R decides the optimal strategy given the fact that the opponent would also choose the optimal plan. There are four possibilities:

Case A: L chooses nepotism, R does not.

Case B: R chooses nepotism, L does not.

Case C: Nobody chooses nepotism.

Case D: Both chooses nepotism.

2)Individuals maximise their expected utility by comparing their benefit from the strategies of L vis-a-vis R. Thus, we get j_i^* (as the marginal person to whom the strategies of both the leaders are equally remunerative) for case i in stage 1, where $i \epsilon \{A, B, C, D\}$.

We proceed to solve the game through backward induction. Leaders by choosing their optimal strategies can alter their perceived winning probability which is dependent on the measure of the total beneficiaries when the opposition has chosen the strategy. Thus, we solve stage 2 of this game and calculate an optimal j_i^* for each possible scenario that can arise in stage 1.

Case A: *When L chooses Nepotism (N), but R chooses no nepotism (NN)*:
In this case all agents who receive N gets an wage $wm(j) = w(1-j)^{\theta^{-1}}$ and all agents who does not receive N gets $\frac{w}{1+\theta^{-1}}$. Thus, N is beneficial only when,

$$w(1-j)^{\theta^{-1}} \geq \frac{w}{1+\theta^{-1}} \Rightarrow j \leq 1 - (\frac{1}{1+\theta^{-1}})^{\theta} = j_A^* \tag{19}$$

So, the rest of the agents ($\frac{1}{(1+\theta^{-1})^{\theta}}$) get benefit from NN, i.e. $R's$ strategy.

Case B: *When R chooses Nepotism (N), but L chooses no nepotism (NN)*:
In this case all agents who receive N gets an wage $wm(j) = w(1-(1-j))^{\theta^{-1}} = wj^{\theta^{-1}}$[9] and all agents who does not receive N gets $\frac{w}{1+\theta^{-1}}$. Thus, N (i.e. strategy of R) is

[9]Since R provides the nepotism, we consider the position of R, to be the origin. The probability of getting a job when agents can enjoy nepotism, $(1-(1-j))^{\theta^{-1}}$

beneficial only when,

$$wj^{\theta^{-1}} \geq \frac{w}{1+\theta^{-1}} \Rightarrow j \geq (\frac{1}{1+\theta^{-1}})^{\theta} = j_B^* \tag{20}$$

Hence $1 - \frac{1}{(1+\theta^{-1})^{\theta}}$ of the total populations gets the benefit from N, i.e. $R's$ strategy. Rest is benefited by L.

Case C: *When nobody chooses* N:

In this case since nobody receives any kind of nepotism, all agents only receive the market determined wage i.e. $\frac{w}{1+\theta^{-1}}$.

Case D: *When both chooses* N:

Here, agents who receive N from L, has an wage $w(1-j)^{\theta^{-1}}$ and those who receives N from R gets $wj^{\theta^{-1}}$. By similar reasoning as above, the marginal agent receives same return from both the leaders and hence,

$$(1-j)^{\theta^{-1}} = j^{\theta^{-1}} \Rightarrow j_D^* = \frac{1}{2} \tag{21}$$

Next, we proceed to find the optimal strategies and thus the reaction functions of L and R, when both decide simultaneously, whether to commit to nepotism (N) or no-nepotism (NN) given the strategy chosen by the opponent. Thus, we solve the game by backward induction and move from stage 2 to stage 1. To solve for the sub game perfect Nash equilibrium (SPNE), the best response functions of L and R. This is given by lemmas 1 and 2.

Lemma 1. *For low value of θ,i.e. if $\theta \in (0, \theta^*)$ (θ^* endogenously determined) L always chooses N irrespective of what R has chosen. However, for higher values of θ, L chooses NN, when R chooses N, and chooses N when R chooses NN.*

Proof. $i>$ Suppose R has chosen nepotism, this implies that L by choosing nepotism, receives an utility

$$w\gamma(\bar{\gamma}, \frac{1}{2}) + (1 - \gamma(\bar{\gamma}, \frac{1}{2})).0 = w\gamma(\bar{\gamma}, \frac{1}{2}). \tag{22}$$

The situation faced by the agents is D, and thus the value of $j^* = j_D^* = \frac{1}{2}$. In this case, by choosing to follow a strategy of nepotism, L receives a return w, with probability

$\gamma(\bar{\gamma}, \frac{1}{2})$, which is the winning probability. L looses with probability $(1-\gamma(\bar{\gamma}, \frac{1}{2})$ and gets no job and thus no return in that case. The expected utility is given by equation (22). On the other hand, if L decides to choose no-nepotism as the optimal response, the expected utility received would be,

$$\frac{w}{1+\theta^{-1}}\gamma(\bar{\gamma}, \frac{1}{(1+\theta^{-1})^{\theta}}) + (1-\gamma(\bar{\gamma}, \frac{1}{(1+\theta^{-1})^{\theta}}).0 = \frac{w}{1+\theta^{-1}}\gamma(\bar{\gamma}, \frac{1}{(1+\theta^{-1})^{\theta}}) \qquad (23)$$

The situation faced by the agents is B and thus $j^* = j^*_B = (\frac{1}{1+\theta^{-1}})^{\theta}$. In this case, by choosing to follow a strategy of no nepotism, L receives a return $\frac{w}{1+\theta^{-1}}$, with probability $\gamma(\bar{\gamma}, (\frac{1}{1+\theta^{-1}})^{\theta})$, which is the winning probability. L looses with probability $(1-\gamma(\bar{\gamma}, (\frac{1}{1+\theta^{-1}})^{\theta}))$ and gets no job and thus no return in that case. The expected utility is given by equation (23). From equations (22) and (23), it is clear that L will choose N, when R has chosen N, if and only if,

$$w\gamma(\bar{\gamma}, \frac{1}{2}) > \frac{w}{1+\theta^{-1}}\gamma(\bar{\gamma}, \frac{1}{(1+\theta^{-1})^{\theta}}) \qquad (24)$$

Consider a probability function, $\gamma = \bar{\gamma}\frac{1}{(1+\theta^{-1})^{\theta}}$. It is straightforward to check that the RHS of the inequality is then a rising function of θ [10]. Hence, there must exist a θ^* such that $w\gamma(\bar{\gamma}, \frac{1}{2}) = \frac{w}{1+\theta^{-1}}\gamma(\bar{\gamma}, (\frac{1}{1+\theta^{-1}})^{\theta})$, for $\theta = \theta^*$. Then, for $\theta \in [0, \theta^*]$, L chooses N while if $\theta \in (\theta^*, \infty]$, L chooses NN.

ii> Suppose R has chosen no-nepotism, this implies that L by choosing nepotism, receives an utility,

$$w\gamma(\bar{\gamma}, 1-(\frac{1}{1+\theta^{-1}})^{\theta}) + \frac{w}{1+\theta^{-1}}(1-\gamma(\bar{\gamma}, 1-(\frac{1}{1+\theta^{-1}}))) \qquad (25)$$

[10] As mentioned earlier, gamma is a monotonically increasing function in each of its arguments. $\frac{1}{(1+\theta^{-1})^{\theta}}$ is a decreasing function of θ. Therefore as θ increases γ falls. However, the multiplicative term $\frac{1}{1+\theta^{-1}}$ is increasing in θ. Comparing $\frac{1}{(1+\theta^{-1})^{\theta}}$ and $\frac{1}{(1+\theta^{-1})}$ it can be seen that the rate of increase in the later is higher than the rate of fall in the former. Now, if γ is weakly concave in its second argument then the rate of fall of $\gamma(\bar{\gamma}, \frac{1}{(1+\theta^{-1})^{\theta}})$ with respect to increase in θ will be even lesser. Hence, if γ, is weakly concave in its second argument then RHS of the above inequality is an increasing function of θ. Henceforth, we will assume this functional specification for γ.

The situation faced by the agents is A and thus $j^* = j^*_A = 1 - (\frac{1}{1+\theta^{-1}})^{\theta})$. In this case, by choosing to follow a strategy of nepotism, L receives a return w, with probability $\gamma(\bar{\gamma}, 1 - (\frac{1}{1+\theta^{-1}})^{\theta}))$, which is the winning probability. L looses with probability $(1 - \gamma(\bar{\gamma}, 1 - (\frac{1}{1+\theta^{-1}})^{\theta}))$ and gets a job with an expected return determined by the labour market. The return thus is $\frac{w}{1+\theta^{-1}}$ with a probability $1 - (\frac{1}{1+\theta^{-1}})^{\theta}$. The expected utility is given by equation (25). On the other hand, if L chooses NN, then the expected return is simply $\frac{w}{1+\theta^{-1}}$ (this is case C). Since,

$$w\gamma(\bar{\gamma}, 1-(\frac{1}{1+\theta^{-1}})^{\theta}) + \frac{w}{1+\theta^{-1}}(1-\gamma(\bar{\gamma}, 1-(\frac{1}{1+\theta^{-1}})) - \frac{w}{1+\theta^{-1}} = w\gamma\frac{1}{1+\theta} > 0. \quad (26)$$

So in equilibrium, L chooses N always irrespective of $R's$ choice.

Case (i) and (ii), together proves Lemma 1.

■

The best response function of R can be derived in an analogous manner. Since, the position of L and R are completely symmetric, their best response functions would be mirror image of each other.

Lemma 2. *For low value of θ, i.e. $\theta \in [0, \theta^*]$ R always chooses N irrespective of what L has chosen. However, for higher values of θ, i.e. $\theta \in (\theta^*, \infty]$, R chooses NN, when L chooses N, and chooses N when L chooses NN.*

Proof. Similar to L, $R's$ winning probability also depends on $\bar{\gamma}$ and the measure of people getting benefit from $R's$ strategy. So, given L chooses N, if R chooses N too, then it is same as case D, and thus $1/2$ of the total measure of the agents gets the benefit from R. Therefore, the winning probability will be $\gamma(\bar{\gamma}, 1/2)$. Now if R chooses NN then it is case A. The mass of agents who gets benefit from R is $\frac{1}{(1+\theta^{-1})^{\theta}}$. Hence, the relevant range is between $\gamma(\bar{\gamma}, 1/2)$ and $\frac{1}{1+\theta^{-1}}\gamma(\bar{\gamma}, \frac{1}{(1+\theta^{-1})^{\theta}})$, which is same as that in lemma 1, case (i). Similarly, given L chooses NN, the pay-offs for R will be symmetric as in the case of lemma 1. ■

The above two lemmas leads us to the sub game perfect Nash equilibrium of the game.

Proposition 1. *For $\theta \in [0, \theta^*]$ (N, N) is the unique SPNE, otherwise, there are two possible SPNE : (N, NN) and (NN, N). So at least one party always chooses nepotism.*

Proof. Given, $\theta \in [0, \theta^*]$, suppose L chooses N. Then, by lemma 2, R always chooses N. If R chooses N, then by lemma 1, it is always optimal for L to have chosen N. Thus, (N, N) is an unique SPNE.

If $\theta > \theta^*$, suppose L chooses N. Then, by lemma 2, R chooses NN. On the other hand, lemma 1 states that L always chooses N, if R chooses NN. This makes the strategy profile (N, NN) a possible $SPNE$. In a similar manner, it can be shown that (NN, N) is another possible SPNE.

This completes the proof of the proposition. ■

The proposition 1 uncovers the observation that if the initial friction in the labour market is very high, i.e. rate of matching is less, then leaders' best strategy is to provide nepotism [11]. Additionally, even if initial friction is less but labour market consists of friction, then also at least one of the leaders offers nepotism. Summing it up, nepotism is an equilibrium outcome for frictional labour market.

4. The Model with Cost of Nepotism

In the previous model, it has been assumed that agents by declaring their allegiance, receives promises of nepotism from the ruling or the opposition party. However, this process is completely costless. In this section, we relax this assumption and introduce c to be the cost of nepotism. That is, agents who pay a cost c to the concerned party leader (i.e. one who offers nepotism), receives the nepotism from the party. The limit to which the offer of nepotism would be extended, and the measure of agents who would be willing to buy nepotism in the equilibrium, is determined endogenously. That is, both these limits follow from the optimization exercise of the leaders and the agents buying the

[11] See Galeotti and Merlino 2014. It is shown that the effect of the job separation rate on network investment is positive.

nepotism. Suppose any one of the leaders of the two political parties come to power and decides to offer nepotism to an agent who is willing to pay the cost. The last (marginal) agent who buys this nepotism from the party k, is indexed as j_k^*. Thus, the measure of agents who are buying nepotism from the state is within $[0, j_k^*]$. The aggregation of the probability densities (of receiving job) of agents who are receiving nepotism (within the range$[0, j_k^*]$) and agents who are not receiving nepotism (within the range $[j_k^*, 1]$) is equivalent to the probability of getting a job as perceived by the firms. Thus using equation (16), this condition can be written as:

$$\int_0^{j_L^*} (1-j)^{\theta^{*-1}} dj + S_L(j_L^*) = \frac{1}{1+\theta^{*-1}} \tag{27}$$

where $S_L(j_L^*)$ is the aggregate probability of getting job for people who are within the range $[j_L^*, 1]$, when L is in power. Thus from equation(27), $S_L(j_L^*) = \frac{(1-j_L^*)^{\theta^{*-1}+1}}{1+\theta^{*-1}}$. Assuming an uniform distribution of the agents in the concerned range, the per person probability of getting the job becomes $s_L(j^*) = \frac{(1-j_L^*)^{\theta^{*-1}}}{1+\theta^{*-1}}$. The last agent who receives the nepotism from L receives an expected return from the labour market given by $w^*(1-j_L^*)^{\theta^{*-1}}$ and pays c to the left wing leader. If nepotism would not have been bought, then the expected return from the labour market would be $w^*\frac{(1-j_L^*)^{\theta^{*-1}}}{1+\theta^{*-1}}$. On the margin, for the j_L^*th agent the following indifference should hold,

$$w^*(1-j_L^*)^{\theta^{*-1}} - c = w^* \frac{(1-j_L^*)^{\theta^{*-1}}}{1+\theta^{*-1}} \tag{28}$$

Equation (28) can be solved to obtain

$$j_L^* = 1 - [\frac{c}{w^*}(1+\theta^*)]^{\theta^*}. \tag{29}$$

If the right wing leader offers nepotism, then agents in the interval $[0, j_R^*]$ would not receive the benefits of nepotism, while $[j_R^*, 1]$ would get it. Suppose $S_R(j^*)$ is the aggregate probability of getting job for people within the range $[0, j^*]$. Then by similar reasoning as above the following condition should hold,

$$S_R(j^*) + \int_{j_R^*}^{1} j^{\theta^{*-1}} dj = \frac{1}{1+\theta^{*-1}}. \tag{30}$$

Similarly as above, equation (30) can be solved to obtain j_R^*,

$$j_R^* = [\frac{c}{w^*}(1+\theta^*)]^{\theta^*} \tag{31}$$

As the left (right) wing leader captures power, and decides to give nepotism to the agents at the price c , then provided there are agents who are willing to buy the nepotism from these leaders, j_L^* (j_R^*) is the last agent who would be buying this nepotism. As gains from receiving this nepotism is falling with the distance of the recipient from the leader, the last agent receiving this nepotism is essentially indifferent between receiving and non receiving nepotism. However, since this exercise is done before any particular party comes to power, obviously agents would accept nepotism by comparing *the alternatives available to them*. This alternative options may be offers of nepotism by either leaders, or offer of nepotism by a particular leader while the offer of no nepotism by the other. j_k^{**} is the last (marginal) person who accepts the offer of the k wing leader, given the other option is available. In the next subsection we proceed to endogenize the value of j_k^{**} in all possible situations.

4.1. Choice of agents to accept or reject offers of nepotism, when j_k^* is known

There can be four possible situations, regarding the choice of strategies of the left wing and the right wing leader and thus the option profiles in front of the agents

Case A: L chooses nepotism, R does not.

Case B: R chooses nepotism, L does not.

Case C: Both chooses nepotism .

Case D: Nobody chooses nepotism .

Case A: In this case, the Left wing leader chooses nepotism while the right wing leader would chose no-nepotism if power is captured. Now people (indexed by j) would support left wing leader only if the following condition holds

$$w^*(1-j)^{\theta^{-1}} - c > \frac{w^*}{1+\theta^{*-1}} \tag{32}$$

The LHS of the above equation represents the nepotism ridden expected return of the agent, when L captures power and the agent supports the left wing part (net of costs). The RHS represents the return of the jth from the labour market, when right wing leader captures power and goes for a no-nepotism strategy. The above inequality holds $\forall j$ when

$$j < 1 - \left[\frac{1}{1+\theta^{*-1}}\right]^{\theta^*} = j_L^{**} \tag{33}$$

So $[0, j_L^{**}]$, will be benefited from L. The point of concern is whether j_L^{**} falls short of j_L^*. If $j_L^{**} < j_L^*$, then agents in the range from $[j_L^{**}, j_L^*]$ will be better off from R. However, if $j_L^{**} > j_L^*$, then people in the range from $[j_L^*, j_L^{**}]$ is better off buying nepotism compared to no nepotism from R. If latter happens the following must be true,

$$w^* \frac{(1-j)^{\theta^{*-1}}}{1+\theta^{*-1}} \geq \frac{w^*}{1+\theta^{*-1}} \Rightarrow j_L^* \leq 0 \tag{34}$$

which is impossible. Thus agents who choose not to buy nepotism, they will choose no nepotism from R, i.e $[0, j_L^*]$ may support L, and the rest may support R.

Case B: Suppose j_R^{**} be the last (marginal) person who supports R over L. For this, his net return from the labour market due to the policy of R should be at least as high from the return if no-nepotism is adopted i.e. $\frac{w^*}{1+\theta^{*-1}}$. For the marginal person, this return, $w^*(j_R^{**})^{\theta^{*-1}} - c$ should be equal to $\frac{w^*}{1+\theta^{*-1}}$. Solving this we get $j_R^{**} = \left(\frac{1}{1+\theta^{*-1}} + \frac{c}{w^*}\right)^{\theta^*}$. On the other hand in this case, people who do not buy nepotism from R will always prefer the policy of L. This is because,

$$\frac{w^*}{1+\theta^{*-1}} \geq w^* \frac{j^{**\theta^{-1}}}{1+\theta^{*-1}} \tag{35}$$

which is always true as $j^{**} \leq 1$. It can be shown that $\frac{c}{w^*} < \frac{1}{1+\theta^*}$ ensures that $j_R^{**} > j_R^*$.

Thus, if this inequality holds then agents in the interval $[j_R^*, j_R^{**}]$ will buy nepotism if R comes to power but is better off from L' s policy of no nepotism. Moreover, $\frac{c}{w^*} > \frac{1}{1+\theta^*}$ can never happen as j_R^* is positive. [12] So, all people in the range $[j_R^{**}, 1]$ may support R and the rest might support L.

Case C: In this case, the agents know that whoever comes to power would offer nepotism. To determine the range of people supporting each party we first proceed to compare the positions of j_L^* and j_R^*. Using equations (29) and (31), we have

$$j_L^* > j_R^* \tag{36}$$

$$\Rightarrow [\frac{C}{w^*}(1+\theta^*)] \geq \frac{1}{2} \tag{37}$$

Suppose the inequality in (35) holds and $j_L^* > j_R^*$. We can thus divide the whole range of agents from $[0,1]$ into three distinct zones (see figure), namely $[0, j_R^*]$, $[j_R^*, j_L^*]$ and $[j_L^*, 1]$. Agents in the range $[j_L^*, 1]$ gets $w^* \frac{(1-j)^{\theta^*-1}}{1+\theta^{*-1}}$ if L wins, while if R wins they obtain $w^* j^{\theta^*-1} - c$. Thus, the range of people, who would support R is obtained by identifying by the marginal agent j_R^{**}, who is indifferent between the two options. Thus,

$$w^* j^{\theta^*-1} - c = w^* \frac{(1-j)^{\theta^*-1}}{1+\theta^{*-1}} \tag{38}$$

$$\Rightarrow j_R^{**} = \{\frac{(1-j_L^*)^{\theta^*-1}}{1+\theta^{*-1}} + \frac{C}{w^*}\}^{\theta^*}. \tag{39}$$

From equation (39), j_R^{**} is a decreasing function of j_L^*, it may be the case that $j_R^{**} > j_L^*$. However, we need to check whether it is consistent with the assumption that $j_L^* > j_R^*$. It is straightforward to check that in this case, $j_R^{**} = j_R^*$ and $j_L^{**} = j_L^*$[13]. Hence $[j_L^*, 1]$ will be better off by R, and agents in the range $[0, j_R^*]$, will be better off from the policy of L.

[12] From equations (31) and (29) we have, $j_L^* + j_R^* = 1$. The inequality $\frac{c}{w^*} < \frac{1}{1+\theta^*}$ implies j_L^* is positive and thus j_R^* is positive and less than one.

[13] $j_R^{**} = \{\frac{(1-j_L^*)^{\theta^*-1}}{1+\theta^{*-1}} + \frac{C}{w^*}\}^{\theta^*} = [\frac{C}{w^*}(1+\theta^*)]^{\theta^*} = j_R^*$. The last step follows from equation (31)

Thus, the interval from $[j_R^*, j_L^*]$ becomes the determining set of agents. In this interval, for any arbitrary member j, the support would be for R over L if and only if $wj^{\theta^{*-1}} - c$ (which is the expected return from buying nepotism from R) is higher than $w(1-j)^{\theta^{*-1}} - c$ (which is the expected return from buying nepotism from L). Thus,

$$wj^{\theta^{*-1}} - c > w(1-j)^{\theta^{*-1}} - c \tag{40}$$

$$\Rightarrow j > \frac{1}{2}. \tag{41}$$

.

The above discussion can be summarized as:

If $\frac{1}{2} \in (j_R^*, j_L^*)$, then $[\frac{1}{2}, 1]$ will be supporting R, and the rest is expected to support L. If $\frac{1}{2} < j_R^*$ then $[0, j_R^*)$ will be supporting L and $[j_R^*, 1]$ will support R.If $\frac{1}{2} > j_R^*$, then $[0, j_L^*)$ will be better of by L and $[j_L^*, 1]$ will be better of by R.

Suppose the condition in equation (39) does not hold, and thus $j_R^* > j_L^*$. In this case, agents in the range $[0, j_L^*]$ will be better of by L, while agents in the range $[j_R^*, 1]$ will be better off by R. The agents in the range $[j_L^*, j_R^*]$ are indifferent between L and R winning.[14].

Case D: In this case all agents have the same market determined probability of getting jobs.

4.2. Strategies of the leaders and the equilibrium

The leaders of both the parties would take into account the values of j^* and j^{**}, while calculating their expected utilities from their choice of strategies. To characterize the equilibrium we write down all possible outcome profiles contingent upon the fact that the left and the right wing leaders choose their strategies simultaneously. The expected

[14]If L wins, then these agents earn a expected return of $\frac{w(1-j_L^*)^{\theta^{*-1}}}{1+\theta^{*-1}}$, while if R wins they earn $\frac{(j_R^*)^{\theta^{*-1}}}{1+\theta^{*-1}}$. Since $j_L^* + j_R^* = 1$, these returns are equal

utility of the leader from either party would be determined, from each strategy profile as the weighted average of being the ruler or the opposition. Thus,

$EU(s, s^{'})$ =(Pay off from winning)P(winning when s and $s^{'}$ is chosen)+(Pay off from loosing)(1-P(winning when s and $s^{'}$ is chosen)).

where s and $s^{'}$ are the strategies chosen by the leader and opponent respectively and $P(E)$, represents the probability of a particular event E. We now proceed to write down all possible strategy profiles of both parties, when the values of j^{*} and j^{**} are known.X enlists the return of L for a particular choice of strategy profile of R. Similarly Y gives the return of R for a particular choice of strategy profile of L. X and Y in its turn can be seen encompassing the following possible sub cases:

$X >$ (i) Given R chooses N (a) L chooses NN (b) L chooses N.

(ii) Given R chooses NN (a) L chooses NN (b) L chooses N.

Similarly, $Y >$ (i) Given L chooses N (a) R chooses NN (b) R chooses N.

(ii) Given L chooses NN (a) R chooses NN (b) R chooses N.

We give below one possible case as an example. [15]

$CaseXi.a)$ in this case L chooses NN and R chooses N. The expected return of L is given by,

$$\frac{w^{*}}{1+\theta^{*-1}}\gamma(\bar{\gamma}, j_{R}^{**}) + w^{*} j_{R}^{*\theta^{-1}}(1-\gamma(\bar{\gamma}, j_{R}^{**})). \tag{42}$$

where the expression of j_{R}^{**} is obtained from Case$B$ of the previous section. [16] Substituting the value of j_{R}^{*} in equation (42) we get,

$$\frac{w^{*}}{1+\theta^{*-1}}\gamma(\bar{\gamma}, j_{R}^{**}) + c\theta^{*}(1-\gamma(\bar{\gamma}, j_{R}^{**})). \tag{43}$$

In a similar manner, we can find out the pay-offs of the leaders for all possible combination

[15]Detailed derivations are available from the author on request

[16]The expected return depends upon the value of j_{R}^{**} as it gives the measure of agents who would buy nepotism from R given the other option is available.

	RN	RNN
LN	Aib, Bib	Aiia, Bia
LNN	Aia, Biia	Aiib, Biib

Figure 1: Pay-off matrix of the leaders

of the strategies chosen. These pay-offs are represented as a normal form of the game in figure 1.

The Nash Equilibrium of the game is given by the following proposition:

Proposition 2. *For $\theta \in [0, \theta^{**}]$ (LN, RN) is the unique SPNE, otherwise, there are two possible SPNE : (N, NN) and (NN, N).*

Interestingly, proposition 2 is very similar to proposition 1[17]. In a model with cost of nepotism (that is if the agents have to buy nepotism) one of the party leaders would always chose nepotism just as in the basic model.

5. Conclusion

Structural imperfection in the labor market creates uncertainty of job to a job seeker. Again, political leaders face uncertainty about winning elections in a democratic set up. The present model argues that due to these uncertainties both leaders and followers have incentive to opt for nepotism. Given the option of nepotism available, either both the leaders choose to provide nepotism or one of the two leaders chooses the same depending on low or high labor market tightness, respectively. Thus, the model suggests, the countries with higher labor market friction, would face more prevalence of political nepotism in a democratic set up. This result remains intact when job seekers are allowed to pay price for choosing their preferred allegiance.

[17]Detailed proof available on request.

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