Productivity and Deferring Leisure

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Abstract

In this paper we consider the situation under which workers are willing to invest more effort (or/and time) at the workplace and by doing so increase productivity and decrease leisure for the present. In order to do so, the workers substitute leisure at that time for more leisure in the future. In the future the workers decrease effort and increase the consumption of leisure. Our model is presented in terms of temporary workers who come to work in a host country for a certain period of time. During this time, the temporary workers increase their efforts and the time invested at the workplace while decreasing their leisure. On their return to their home country, they increase the consumption of leisure. We show conditions under which workers would be willing to defer their leisure and increase production at this point. Even though this paper talks in terms of migration, it could easily be generalized to many other situations such as project type jobs, situations where there is a high turnover of workers etc.

1. Introduction

The division of time, between leisure and time at the work place, is important for production. In this paper we consider which type of workers wish to invest more time or effort, for the present, devoted to work and then later take time off for leisure. In many industries this issue is important since workers are asked to invest many hours over and above the normal working day to finish different projects. It is vital to know which type of workers fit such situations. One other implication of such a condition is the movement of workers, such as migration and temporary migration. The flow of permanent legal immigrants brings both benefits and costs to the host country. At certain times, the host country may consider that the costs outweigh the benefits: the integration of immigrants may be slow and social tensions may exist; the economy may be depressed and unemployment high amongst the existing labour force; the level of illegal immigration may be considered to be excessive; and the level of anticipated family unification immigration may be high. Under these circumstances the host country may wish to create additional flexibility in both the numbers and skills of migrants by substituting temporary for permanent immigration. This alters the pattern of costs and benefits for both the origin and host countries.[1]

In order to focus on this, we will adopt the story of migration even though this may well fit many different situations and jobs. Contracted temporary migration benefits the local firms in the host country because the firms gain access to skilled and/or unskilled workers who are needed for production. How are firms affected by employing temporary rather than permanent migrants? First, temporary workers will have to leave the host country after a certain time period and thus, the employer may have to incur costs to train new workers. However, this may not be a major additional cost if permanent migrant workers change jobs and are replaced by others in the different life cycles of a job. It will also be a minor cost if migrants supply general human skills not firm-specific ones. Second, workers incentives, to invest in firm-specific human capital, will be lower if they anticipate a shorter spell at the contracted firm than other workers do. However, if contracted temporary workers are unable to invest in general human capital in the origin country, due to training opportunities being unavailable, it may encourage such investment at higher rates than permanent migrants in the host country. Depending on the work context, this may increase or

[1]See Boeri, Hanson and McCormick (2002).

reduce the effort of the temporary migrant provided to the employer. Third, the fact that the workers have to return at the end of the period to their host country will effect: *a.* the self selection of the workers and *b.* the effort invested by the workers. In this paper we will consider this last affect.

The aim of the work is to consider the effect on workers who are temporarily away from there family, in particular the level of effort invested at work on the one hand and on selection of workers choosing to work at such jobs on the other hand. Who are the temporary workers? Temporary workers may be from all the levels and types. For example, they may be professors who go on a sabbatical for a semester or year to a university at a different country, they may be workers sent by their firm to work overseas for a certain period of time, they may be low or high skilled workers needed at a host country for a certain period of time, etc. In Israel, for example, in the 1990s', the purpose of contracted temporary migration guest-worker programs were a result of sector-specific labor shortages: temporary migrant workers have been nurses and providers of old-age care from the Philippines, building construction workers from Romania, agricultural workers from Thailand, and other specialized services from Russia and the Ukraine (catering principally to other foreign workers). Our paper wishes to look at the effort extracted from these types of workers who come in to the host country for a short time and know the reason for coming and who leave at the end of the period. [2]

The literature on migration has considered legal and illegal migration. There exists a large literature on the effect migrants have on the local population, see for example, Benhabib (1996), Borjas (1994), (1995), Gang and Rivera-Batiz (1994), Schmidt, Stilz, and Zimmermann (1994), Zimmermann (1995) and more recently, Boeri, Hanson and McCormick (2002). There exists also a large migration policy literature which involves a large range of issues such as legal and illegal migrants, temporary and permanent migration, high skilled and low skilled migration and asylum seekers and family unification. Many studies have been carried out regarding the optimal migration policy and the effects that different migration policies might have on the host country. Concern has been focused on whether to impose capital and skill requirements on the migrants, Benhabib (1996), on the alternative future policy

[2] Alowing legal workers to come into a host country for a cartain period of time may well open the door to illegal migration, instead of leaving at the end of the period the workers decide to become illegal, see for eaxmple Epstein, Hillman and Weiss (1999).

options, given past experience, Zimmermann (1995)[3], on whether a reform of immigration policy can alone resolve the fiscal problems associated with the aging of the baby boom generation, Storesletten (2000), on the preferred policy regarding temporary and illegal migration, Epstein (2003), Epstein, Hillman and Weiss (1999) and Hillman and Weiss (1999) and on the migration policy implications of efficiency wage setting, Epstein and Hillman (2003). Other implications of migration policy are studied in Boeri, Hanson and McCormick (2002) and Bauer and Zimmermann (2002), see also references therein. However these studies do not deal with the effect of temporary migration on effort invested by the workers and the self selection of migrants.

The aim of this paper is to consider migrants that decide to migrate for a short period of time. At the end of the period the migrant will return to his host country. We wish to look at the temporary migrants' efforts invested in the host country. As the objective of the migrant is to maximize his utility over time, over the period he spends in the host country and his home country. We will consider his optimal choice in the distribution of his time between work and leisure. After understanding the optimal allocation of time between such activities we may analyze the type of workers that would exert the highest amount of effort in such situations and derive optimal public policies. This model can be generalized to many different situations such as project type jobs, flexible working days etc.

In the next section we present a simple model under which the worker has to divide his time between two activities, work and leisure. We then present policy implications and concluding remarks.

2. The Model

Let us consider an individual that works for two periods ($i=1,2$). Notice that in terms of migration, the first period can be seen as the period of time that he works in the host country and the second period of time is spent in the home country. In each period the individual determines the number of hours spent working, h_i, and hours of leisure, L_i.

[3] Zimmermann (1995) shows that there has been a limited positive effect on the labor market and thus there are only few alternative policy options in the future,

The individual has a positive utility from leisure and from consumption generated from the income earned. To simplify, we disregard the different effect of consumption in the host country versus consumption in the home country. Making such a separation between the two would only enhance our results. Denote by *w* the individual's wage per hour of work. Therefore the earnings of the worker are the amount of hours working, *h*, times the wages per hour, *w*, equaling: $h_i\, w$.

The utility the individual/migrant receives from leisure depends on the amount of time he/she spends working during that period of time. This assumption really says, that as the individual has spent more time at the work place he/she will be less able to enjoy the leisure. For example, if one wants to enjoy leisure one must have the strength to do so. After coming back from a long day of work, it is hard to spend time and enjoy your leisure. Moreover, as leisure increases, the resources needed in order to consume the leisure also increase. Therefore, we assume that in period number one, in order for the individual to be able to consume leisure at a level of L_1, he/she needs resources at a level of $g(L_1)\, w_0$ (*where* $0 \le g(L) \le 1$).

The discounted earnings over the two periods is denoted by $w_0 = w_1 h_1 + \frac{1}{1+r} w_2 h_2$ (were *r* is the interest rate).

To simplify our analysis, we assume that the total amount of time spent at leisure over the two periods of time is fixed at a level of *a*. For example, each individual needs 8 hours of sleep a day, thus the time left for work and leisure is 16 hours a day (the minimum 8 hours of sleep is not considered leisure). We assume also that there is another factor that affects the consumption of leisure by the workers and the presence of his family with him. Denote a dummy variable that represents the presents of the family by F_i. If the family is present with the worker in period *i* then F_i equals one 1 otherwise it equals zero. To simplify our story we assume that in the second period the worker is with his family: $F_i = 1$ However it is not clear which will be in the first period. We assume that if the family is present with the worker, the utility the worker obtains from leisure will be higher. To simplify this we look at L_1 as the proportion of the total time devoted to work and leisure: therefore, as leisure is a proportion of time, it holds that $0 \le L \le 1$.

Individual *i*'s utility is given by:

(1) $$v = u(v_1, v_2, F_1) + \frac{1}{1+r} u(v_3, v_4, F_2 = 1)$$

s.t.

$$v_i = f(h_i) L_i \quad \forall\ i = 1,3$$

$$v_2 = g(L_1)\ w_0$$

$$v_4 = (1 - g(L_1))\ w_0$$

(2)

$$w_0 = w_1 h_1 + \frac{1}{1+r} w_2 h_2$$

$$L_1 + L_2 = a$$

$$L_i + h_i = 1$$

where $\frac{1}{1+r}$ is the time preference of the individual. It is assumed that as the individual works more he enjoys the leisure less: $\frac{\partial f}{\partial h} < 0$ moreover it is assumed that , $\frac{\partial u_i}{\partial v_i} > 0$ and $\frac{\partial g(L_1)}{\partial L_1} > 0$. It is assumed that $\frac{u(., F_i = 1)}{\partial v_i} > \frac{u(., F_i = 0)}{\partial v_i}$ namely the presence of the family increases his utility from leisure.

To simplify we assume that *r = 0* and wages are identical over both periods $w_1 = w_2 = w$, substituting (2) into (1), (1) becomes

(3)

$u =$

$$u(f(1 - L_1)L_1, g(L_1)(2 - a)w, F_1) + \frac{1}{1+r} u(f(1 - a + L_1)(a - L_1), (1 - g(L_1))(2 - a)w, F_2 = 1)$$

Remember that during the second period it is assumed that the family is with the worker thus $F_2 = 1$. The individual wishes to determine L_1 such that (3) is maximized. The first order condition that satisfies (3) is given by:

(4)

$$\frac{\partial u}{\partial L_1} =$$

$$\frac{\partial u}{\partial v_1}\left(\frac{\partial f(1-L_1)}{\partial L_1}L_1 + f(1-L_1)\right) + \frac{\partial u}{\partial v_2}\frac{\partial g(L_1)}{\partial L_1}w(2-a)$$

$$\frac{1}{1+r}\left(\frac{\partial u}{\partial v_3}\left(\frac{\partial f(1-(a-L_1))}{\partial L_1}(a-L_1) - f(1-(a-L_1))\right) + \frac{\partial u}{\partial v_4}\left(-\frac{\partial g(L_1)}{\partial L_1}w(2-a)\right)\right)$$

Rewriting (4)

(5)

$$\frac{\partial u}{\partial L_1} = \left(-\frac{\partial u}{\partial v_4} + \frac{\partial u}{\partial v_2}\right)\frac{\partial g(L_1)}{\partial L_1}w(2-a) + \frac{\partial u}{\partial v_1}\left(\eta_{f(1-L_1),L_1} + 1\right) + \frac{1}{1+r}\frac{\partial u}{\partial v_3}\left(-\eta_{f(1-(a-L_1)),(a-L_1)} - 1\right)$$

where $\eta_{f(1-L_1),L_1} = \frac{\partial f(1-L_1)}{L_1}\frac{L_1}{f(1-L_1)} > 0$ and

$$\eta_{f(1-(a-L_1)),(a-L_1)} = \frac{\partial f(1-(a-L_1))}{\partial(a-L_1)}\frac{a-L_1}{f(1-(a-L_1))} > 0$$

To simplify assume that *a=1*thus,

$$\frac{\partial u}{\partial L_1} =$$

(6) $$\frac{\partial u}{\partial v_1}\left(\frac{\partial f(1-L_1)}{\partial L_1}L_1 + f(1-L_1)\right) + \frac{\partial u}{\partial v_2}\frac{\partial g(L_1)}{\partial L_1}w$$

$$\frac{1}{1+r}\left(\frac{\partial u}{\partial v_3}\left(\frac{\partial f(L_1)}{\partial L_1}(1-L_1) - f(L_1)\right) + \frac{\partial u}{\partial v_4}\left(-\frac{\partial g(L_1)}{\partial L_1}w\right)\right)$$

Rewriting (6)

(7)

$$\frac{\partial u}{\partial L_1} = \left(\frac{\partial u}{\partial v_2} - \frac{\partial u}{\partial v_4}\right)\frac{\partial g(L_1)}{\partial L_1}w + \frac{\partial u}{\partial v_1}\left(\eta_{f(1-L_1),L_1} + 1\right) + \frac{1}{1+r}\frac{\partial u}{\partial v_3}\left(-\eta_{f(L_1),(a-L_1)} - 1\right)$$

where $\eta_{f(1-L_1),L_1} = \frac{\partial f(1-L_1)}{L_1}\frac{L_1}{f(1-L_1)} > 0$ and $\eta_{f(L_1),(1-L_1)} = \frac{\partial f(L_1)}{\partial(1-L_1)}\frac{1-L_1}{f(L_1)} > 0$

Let us consider the derivative of (7) at the point where $L_1 = 0.5$. In this case $L_1=L_2=h_1=h_2=0.5$ and thus $\eta_{f(1-L_1),L_1}\big|_{L_1=0.5} = \eta_{f(L_1),(1-L_1)}\big|_{L_1=0.5}$ thus

(8) $$\left.\frac{\partial u}{\partial L_1}\right|_{L_1=0.5} = \left.\left(\left(\frac{\partial u}{\partial v_2} - \frac{\partial u}{\partial v_4}\right)\frac{\partial g(L_1)}{\partial L_1}w + \left(\frac{\partial u}{\partial v_1} - \frac{\partial u}{\partial v_3}\right)\left(\eta_{f(1-L_1),L_1} + 1\right)\right)\right|_{L_1=0.5}$$

In order for the individual to consume more leisure in the second period it must hold that $\left.\frac{\partial u}{\partial L_1}\right|_{L_1=0.5} = \left.\left(\left(\frac{\partial u}{\partial v_2} - \frac{\partial u}{\partial v_4}\right)\frac{\partial g(L_1)}{\partial L_1}w + \left(\frac{\partial u}{\partial v_1} - \frac{\partial u}{\partial v_3}\right)\left(\eta_{f(1-L_1),L_1} + 1\right)\right)\right|_{L_1=0.5} < 0$

Note that $\frac{\partial u}{\partial v_4} > 0,\ \frac{\partial u}{\partial v_2} > 0,\ \frac{\partial g(L_1)}{\partial L_1} > 0,\ \ \frac{\partial u}{\partial v_1} >,\ \frac{\partial u}{\partial v_3} > 0$ *and* $\eta_{f(1-L_1),L_1} > 0$

Workers without family in the first period and with family in the second period

Since $F_2=1$, in the case where $F_1=0$, it holds that $\frac{\partial u}{\partial v_2} - \frac{\partial u}{\partial v_4} < 0,$ *and* $\frac{\partial u}{\partial v_1} - \frac{\partial u}{\partial v_3} < 0$

Therefore,

Workers that are alone in the first period and with their family in the second period will have a decrease in the consumption of leisure in the first period and an increase in the second period.

Now let us consider the case where

Workers with family in the first period and also in the second period

Since $F_2=1$, in the case where $F_1=1$, $v_1 = v_3 = f(h_i = 0.5)(L_i = 0.5)$ (8) becomes:

(9) $$\left.\frac{\partial u}{\partial L_1}\right|_{L_1=0.5} = \left.\left(\left(\frac{\partial u}{\partial v_2} - \frac{\partial u}{\partial v_4}\right)\frac{\partial g(L_1)}{\partial L_1} w\right)\right|_{L_1=0.5}$$

in order for (9) to be negative it must be that $\left.\frac{\partial u}{\partial v_2} - \frac{\partial u}{\partial v_4}\right|_{L_1=0.5} < 0$ *namely the benefit a workers will obtain from leisure in the second period will be greater than that of the first. This would occur when the workers have increasing returns to leisure.*

Namely, by transferring leisure to the second period the worker increases his utility. By the way, the same argument would also be appropriate in the case where the worker first consumes his leisure and then works.

3. Discussion and Conclusions

The issue, of delaying leisure in order to work more in the present, is an important issue in many firms and in different types of jobs. In many firms workers are asked to work extra hours in different time periods of the year (end of quarters, before publishing financial results, finishing specific projects etc.). In these situations employers would prefer employees who are willing to delay their consumption of leisure in favor of investing more time at the workplace at the present time (when required). However, the employer must be aware that at a cretin point in time he will have to provide the worker with his leisure and it follows that it must be an extended time away from work. The willingness of the worker to defer consumption of leisure is also a function of a few more important variables:

1. The discount rate of an individual plays an important role in the determination of deferring leisure. As the time preference increases the worker will prefer to consume leisure in the present rather than in the future.
2. The marriage status of the worker. If he is married then one must also take into consideration the preferences of the spouse. If the spouse prefers not to defer consumption of leisure this will have an effect on the decision making of the worker.
3. In migration, it is important to know whether the worker migrants is with his family or not. A worker that comes alone will be more agreeable to defer consumption of leisure than when he has a family with him. If a country is interested in temporary workers who will work many hours, the policy should consider workers who come by themselves. In which case workers should NOT be allowed to bring family with them.
4. The idea of investing more time in the present and leaving leisure to the future may well be seen as a model to consider how much effort should be invested at the workplace. The more effort you put in today, the less effort left for leisure thus leaving leisure to the future. Therefore, one does not need to think of the model as one of time but also as a model of the intensity of investment of effort at the workplace. Individuals, willing to invest more effort in the present with less leisure time, would trade it for less effort in the future with more leisure.

5. Such a model could also fit "project" type of works. You employ the workers for a certain project. During this project you want the worker to invest all his time and effort to increase production. When the project is completed you give the worker sufficient time for leisure till he starts the next project.

So how do we identify such workers? The way to identify such workers must be via self-selection. The working hours and the situation must be clear to all the candidates. Given all this information, the workers, who satisfy these conditions, will apply. The employer and the host country will prefer single workers and, if married, those that are willing to come without their families. In terms of temporary migration, we could consider migrants who wish to migrate for a short period of time to a host country. At the end of the period, the migrant will return to his host country. At the end of the period, the employer may decide to re-employ him again after a lapse of time. It will be better if the migrant comes without any family ties, so that he/she will be more willing to decrease leisure time whilest in the host country.

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