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A NOTE ON GAMBLING, LABOUR CONTRACTS AND THE UTILITY OF LEISURE

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WHY DO WORKERS BUY LOTTERY TICKETS?
A NOTE ON GAMBLING, LABOUR CONTRACTS AND THE UTILITY OF LEISURE

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¿POR QUÉ COMPRAN BILLETES DE LOTERÍA LOS TRABAJADORES? UNA NOTA SOBRE JUEGOS DE AZAR, CONTRATOS DE TRABAJO Y LA UTILIDAD DEL OCIO

ABSTRACT
When asked why they buy lotteries tickets, many people say that if they were to win, they would quit their jobs and enjoy life with the money. Curiously enough, the value of quitting the job, that is the gains of additional free time, has not been taken into account as a reason to understand gambling. That is, the utility of leisure has not been paid the attention it deserves to explain why people bet and the focus has always been put only on the utility of wealth or income. It will be shown here that a combination of value of leisure and inflexibility of (voluntary) labour contracts can be a sufficient condition to explain the preference of workers for gambling.

RESUMEN
Cuando se le pregunta por qué compran billetes de lotería, mucha gente dice que si ganaran renunciarían al trabajo y disfrutarían la vida con el dinero del premio. Es curioso que el valor de renunciar al puesto de trabajo, es decir las ganancias de tener tiempo libre, no ha sido tomado en cuenta como una razón para entender por qué se apuesta. La utilidad del ocio no ha recibido la atención que merece para explicar por qué la gente juega y en cambio el énfasis ha sido siempre puesto sólo en la utilidad de la riqueza o del ingreso. Se verá aquí que una combinación del valor del ocio con la inflexibilidad de los contratos de trabajo (de aceptación voluntaria) pueden ser suficiente para explicar la preferencia de los trabajadores por los juegos de azar.

Keywords: Trabajadores - Apuestas - Ocio
Palabras claves: Workers - Gambling - Leisure

JEL Codes: D11, D81 y D86

1. Introduction

When asked why they buy lottery tickets, many people say that if they were to win, they would quit their jobs and enjoy life with the money. Curiously enough, the value of quitting the job, that is the gains of additional free time, has not been taken into account as a reason to understand gambling. That is, the utility of leisure has not been paid the attention it deserves to explain why people bet and the focus has always been put only on the utility of wealth or income. Economic analysis has devoted more effort to discuss phenomena associated to increasing marginal utility of income or risk loving attitudes (remember Friedman and Savage, 1948), to behavioural biases to explain why people bet (for example the pleasure of gambling, as argued by Alfred Marshall) and even to rational addiction (as is the case of Becker and Murphy, 1988).

In fact Diecidue, Schmidt and Wakker (2004) conclude that "any utility of gambling almost unavoidably implies a violation of fundamental rationality properties, such as transitivity or stochastic dominance, for static choices between gambles. This result may explain why the utility of gambling, a phenomenon so widely discussed, has never been formalized in the economics literature".

Even though that literature can give interesting and useful explanations, it seems that the value of leisure should be explored as a reason to explain the propensity to buy lottery tickets. However it is not enough for buying a ticket, but when combined with inflexibility of labour hours the two conditions together can explain the preference for gambling and quitting a job. The presence of indivisibilities was argued to explain the propensity to bet by Ng Yew Kwang in 1965 and it explains why the presence of lotteries can be Pareto optimal (see for example its use in the literature of sunspot equilibria, e.g. see Shell and Wright, 1993).

It will be shown here that a combination of value of leisure and inflexibility of labour contracts (a indivisibility) can be a sufficient condition to explain the preference of workers for gambling and therefore that neither risk loving nor behavioural biases are necessary in an environment of voluntary exchange.

Limited flexibility of working hours has empirical support even for developed economies. Bryan (2007) says that for UK "large minorities of individuals typically report they would like to change their weekly hours at their current hourly wage". Stewart and Swaffield (1997) use results of the British Household Panel Survey for 1991 to conclude that "over a third of male manual workers would prefer to work fewer hours at the prevailing wage rate...".

It is interesting to quote a poll between American workers conducted by Gallup in 2013. More than 30% of the respondents said that they would quit their job in case they won a prize of 10 million dollars (see Gallup, 2013); that share had a peak of 44% before the financial crisis of 2008 and then moved down, probably because of the uncertainty on financial returns.

Thus, in this paper we will see how the utility of free time and labour contracts specificities can incentive workers to enter in fair actuarial bets even when they are risk-averse (in the normal definition, restricted to the dimension of income or wealth). Then it will be possible that, simultaneously, rational agents will prefer to have a job rather than being unemployed, buy lottery tickets and quit their jobs if they win.

2. The basic model

The structure of the model represents a labour market where workers are offered jobs in the form of contracts that involve a wage rate and a given number of work hours. The agent has to decide to accept or not a job. Once the agent has accepted the job, he or she chooses to buy a fair lottery ticket or not. And if they win they will have to decide whether to quit the job or not.

The inflexibility of the labour contract could be explained by organizational reasons for example. It is not difficult to find examples of jobs that specify the number of work hours among other conditions.

Let $U(Y, T\text{-}L)$ be the utility function of the worker as it is traditional. Real income is indicated with Y and leisure time is the difference between total available time T and time devoted to work, L. Total real income is defined as:

$$Y = W\,L + M.$$

M stands for non-working income and W for the wage rate.

The utility function has all regular conditions of differentiability and concavity. In particular, it can be assumed increasing and (strictly) concave with respect to both arguments without loss of generality for our results. Moreover, we will assume risk aversion (in the Arrow-Pratt definition) with respect to the first argument of the utility function; this implies that a fair gamble will be rejected when leisure time is not taken into consideration.

First of all, let us define a labour contract. A typical labour contract C specifies a wage rate W_C and a certain number of hours to work at the job, L_C .We will impose the condition that labour contracts should be accepted voluntarily by workers, we have a Voluntary Exchange (VE) condition, i.e.

(VE) $U(W_C L_C + M, T - L_C) - U(M, T) \geq 0.$

Thus, it is preferable to have a job. This is a participation condition and it says that the worker chooses working rather than being idle. And this happens under voluntary exchange even though the worker is not determining the optimal number of hours in order to maximize utility. In fact the number of hours that maximize utility could be lower than those established in the contract, but it is a regular condition imposed for contracts as is the case in Principal-Agent relationships.

Secondly, we shall assume that the worker can buy (only) one ticket of a fair lottery. The price of the lottery ticket is b and there are N tickets. The probability of winning is $1/N$ and the whole revenue of the lottery, Nb, is paid to the winner, i.e. the lottery is actuarially neutral. Thus, the expected monetary value of this fair lottery is zero:

$$(N-1)b(1/N) - b(N-1/N) = 0.$$

Notice that $(N-1/N)$ is the probability of losing and in that case the loss equals the price of the ticket and that $(N-1)b$ in the first term is the net result of the lottery for the winner after paying for the lottery ticket.

The worker will choose buying the ticket if the following condition is met:

$$(1/N)\, U(W_C L_C + M + b(N-1),\, T - L_C) + (N-1/N)\, U(W_C L_C + M - b,\, T - L_C) \geq U(W_C L_C + M,\, T - L_C).$$

That is, the expected utility of betting is not lower than the certain utility of not buying the lottery ticket.

Then the condition can be referred as the Gambling Condition (GC) and it is written as:

(GC) $$(1/N)\, U(M + b(N-1),\, T) + (N-1/N)\, U(W_C L_C + M - b,\, T - L_C) - U(W_C L_C + M,\, T - L_C) \geq 0.$$

In this case, the whole level of free time is taken into account into the utility function in the favourable event of winning.

Let us now specialize this condition and assume that our agent will leave the labour market when he wins and that there are not penalties for quitting the job. To be sure that the worker will prefer to quit his/her job if he/she wins, it is necessary that:

(QJ) $$U(M + b(N-1),\, T) - U(W_C L_C + M + b(N-1),\, T - L_C) \geq 0.$$

What this Quitting Job (QJ) condition tells us is that total leisure time is computed in the utility level when the worker wins and quits, i.e. the level of leisure in the first term is equal to T, and that is the relevant additional element to understand why people bet.

To summarize, we have three basic conditions: 1) (VE) having a job is better than being idle,2) (GC) betting is better than not betting, and 3) (QJ) quitting the job in the event of winning the lottery is better than staying in the labour contract.

3. A numerical example

Is it possible to meet the three of them simultaneously for a reasonable set of parameters and for a utility function with the regularity conditions imposed by sound economic theory? Let us consider an example and define $U(W_C L_C + M,\ T - L_C) = (W_C L_C + M)^{\alpha}\ (T - L_C)^{1-\alpha}$, with $0 < \alpha < 1$. The agent has a Cobb-Douglas utility function; notice that this implies that when leisure is not taken into account the utility function will be strictly concave and the agent will refuse to buy a ticket for a fair gamble due to risk aversion. But adopt now the following parameter values:

$W_C = 1,\ L_C = 9,\ T = 10,\ b = 0.1,\ \alpha = 0.5,\ M = 0,\ N = 100.$

It can be shown that all our inequalities become strictly positive: (VE) = 3, (GC) = 5.60 and (QJ) = 5.29 (there is a file with the simulation available from the author to check these results). It is important for this outcome for L_C to be close enough to total available time T, because utility on the job will be lower due to the "excessive" time devoted to work; in other words, it is more likely that a worker burdened by work hours will buy a lottery ticket. Since all inequalities are strictly positive, the worker could be accepting a non-fair lottery, i.e. one that has a positive price for the ticket.

The key to the fulfilment of our inequalities at the same time is in the selection of a low level of M and a high level of L_C with respect to T. The implication is that low-income and hard-working agents will probably buy lottery tickets. Because being poor implies that the job will be accepted and being hard working will imply that the worker will quit the job when the prize is big enough.

With the same simulation it can be seen that:

1) If α is increased (approximately to 0.77) then (QJ) will not be satisfied and the worker will prefer to stay in his job. The reason is that increasing α also increases the marginal utility of income with respect to leisure.

2) When N is too small the agent will prefer not to buy the lottery ticket and when it is too big the agent will not quit the job; this seems to imply that there will be a number of tickets that will maximize the willingness to pay for the lottery (because the prize is not big enough to maintain the living standard).

3) If M tends to one the (VE) condition will tend to zero; that indicates that the agent will leave the labour market when he/she is "wealthy".

This is only an illustration, and many other examples can be constructed. It can also be shown that for the given level of L_C in the example the optimal value for b will be 0.825688 (the level of b that maximizes (GC)).Why is the optimal value not zero given that U is strictly concave in income? The reason is that the second argument of the function, leisure time, will be different when the agent wins than when the bet is lost. However, when the choice of L is flexible, the optimal level for b is zero. We will address this issue below.

The quasi-linear case when the utility function can be written as U(wL +M) + φ(T-L) shows that the agent will buy the lottery ticket provided the parameter φ is big enough. As said, several other examples of utility functions and set of parameters can be found that will be compatible with our results.

However, these results cannot be extended to the case when the agent can choose freely *L.* Why? Ng Yew Kwang (1965) argued that indivisibilities could be a sufficient condition for making fair lotteries attractive for risk-averse individuals. In our case, it is the inflexibility of the work hours that is behind the propensity to accept an actuarially fair bet. However the quasi-linear example shows that when the utility of leisure is too low agents might prefer not to gamble. And therefore the indivisibility by itself is not enough. When the agent can choose freely the number of working hours then the optimal strategy is not to bet. To check that result, let us maximize the expected utility of gambling then both L and b can be chosen freely. We can see that the optimal levels of b and L cannot be positive for all states of nature at the same time. Given a wage rate W and a non-labour income M, the agent maximizes

(1/N) U(WL+M+ b(N-1), T-L)+(N-1/N) U(WL+ M-b, T – L).

Let U_{YG} be the marginal utility of income when the lottery is won and U_{YP} when it is lost. Accordingly, let U_{SG} and U_{SP} be the marginal utility of leisure when it is won and when it is lost, respectively. Then the necessary conditions for maximization with respect to L and b are:

$$((1/N)\,U_{YG} + (N-1/N)U_{YP})W - ((1/N)\,U_{SG} + (N-1/N)U_{SP} = 0,$$

$$U_{YG} - U_{YP} = 0.$$

Since leisure time is the same in all the states of nature, these conditions imply that net income must be the same also, which in turns implies:

$$WL+M+ b(N-1) = WL+ M-b.$$

And the only possible solution is $b = 0$. This result is the direct consequence of assuming that leisure is the same in both states, which resumes the problem to the evaluation of traditional lotteries on income and gives the traditional result: a risk-averse agent will reject fair lotteries.

4. Concluding remarks

We have seen that a combination of value of leisure time and inflexibilities in labour contracts are a sufficient condition to explain why risk-averse workers will buy tickets of fair lotteries. Therefore neither risk loving nor behavioural biases are necessary to explain gambling in several cases. There are two basic lessons to obtain from this analysis.

First of all, that the preference for buying lotteries has to be re-examined out of the strict perspective of traditional spot markets. As we know, transactions can also be realized through contracts and at the interior of the firms, and gambling could be a means to compensate for indivisibilities or low flexibility of transactions and contracts; this is a spill-over of constraints or distortions of the labour market on the lotteries markets.

Secondly, there may be some neglected dimensions to be taken into account when evaluating the rationality of betting. A hidden variable, leisure in our case, could be operating in the dark to explain the betting behaviour.

This reasoning does not rule out or make invalid the contributions from behavioural economics, like risk loving preferences, self-confidence or addiction, though it seem to be opening new research opportunities such as what families of utility functions are compatible with betting and quitting jobs, or what is the interaction of lotteries markets and the rest of the markets of the economy.

We have to take into account that it is not possible to extend the results for workers under unemployment because the agent will have too much leisure and the marginal utility of leisure will be very low.

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