Money, «Laissez-Faire» and the Underground Economy

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Economics of Education and Work Incentives

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Abstract. An argument connecting human capital theory with the 'weak version' of the signaling hypothesis, is advanced initially. It is an argument that helps methodologically the derivation of a work-incentives view of the complementarity between human capital theory and the strong version of the signaling theory. This view implies in turn that work incentives have only an income effect, which emerges as the solution to a moral hazard problem concerning the disclosure of productivity-augmenting capabilities to the employer. Thus, it is concluded that policy-induced disincentives, working against this effect and involving perhaps a substitution effect, too, would have serious repercussions on the productivity of labor unless employees and employers take measures to counteract the disincentives.

1. Introduction

According to economics of education, schooling has two roles: one is a productivity-identifying mechanism, in line with screening or signaling theory, and another is a productivity-augmenting device, in accordance with human capital theory (see, for example, Groot, Hartog, 1995). Screening theory maintains that the productive traits of individuals remain unaltered by education, which serves only as a signal to employers about the innate abilities of would-be employees. The educational system transmits such signals by sorting individuals through the use of admission requirements and grading. These two sorting methods help employees to obtain information about the pre-existing abilities of a prospective employee, and compare him with other job applicants. Human capital theory argues that education does alter

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the productive traits of individuals: having hired the best person for a given job on the basis of his diploma and grade transcript, means a certain volume of output, but the studies that led to these credentials translate to even more output.

To appreciate the two theories, note that in view of the expansion of education, employers have upgraded the educational requirements of workers at all levels of job entry (see, for example, Llamas, 1995). Also, note that, as suggested originally by Inkeles and Smith (1974) and Schultz (1989), education has come to be associated with the capacity to produce in terms of the literacy–numeracy, socialization to competence, self-confidence to learn new skills, and ability to adjust to change, offered by education. Therefore, if employers have upgraded educational requirements for job entry, it must be because they have observed, or at least expect education to provide, not only the literacy–numeracy connected with a given job, but also the other qualities influencing capacity to produce.[1] And as the evidence concerning the economic rates of return for education shows, employers do reward these qualities (see, for example, Psacharopoulos, 1985, 1991). Otherwise, a highschool diploma, for instance, would not affect the earning power of, say, a driver *vis-à-vis* elementary school graduation.

These considerations indicate that what augments productivity is *socialization to competence, self-confidence to learn new skills, and ability to adjust*. Indeed, there is nothing productivity-augmenting in the literacy–numeracy of a given job regardless of the years of schooling needed to obtain it. For example, the literacy–numeracy associated with professional driving is professional driving skills, and any elementary school graduate may acquire them. But, more years of schooling would signify the development of the other production capabilities beyond the literacy–numeracy of a particular job. Hiring a highschool graduate as a driver may involve more confidence that the driver is able to maintain his own and the other company vehicles, that he can be switched over to driving these other vehicles, that perhaps he can be turned into an auto-mechanic, too, etc., as deemed necessary by his employer. Screening theory seems to miss this point, to miss employers' *expectations* about the education-productivity nexus. It seems to assert that, for an employer, a diploma or a degree has to do only with literacy–numeracy, that the other qualities developed at school remain to be proven at the workplace. It is true that the workplace is the ultimate judge of even literacy–numeracy *per se*,

but a degree does constitute a signal of an average of all capabilities to produce. Productivity identification is provided not only by literacy–numeracy but also by the other, productivity-augmenting qualities developed at school.

In sum, there appears to be a complementarity between human capital theory and the screening hypothesis. It should be clarified, however, to which version of screening theory this complementarity refers. There is, certainly, complementarity with the 'weak version' according to which starting wages are higher for those with more education because of imperfect information on expected productivity. From this point of view, one more argument about this type of complementarity has been offered here, a type which is, in addition, supported by the evidence surveyed recently by Groot and Hartog (1995). Yet, it is an argument that can readily lead to complementarity with the strong version of the screening hypothesis according to which the wage difference between the more and the less educated persists during tenure (Psacharopoulos, 1979). To see this, note that the 'weak school–job complementarity' emphasizes the demand of employers for productivity-augmenting capabilities (and this is why the term 'expectations' was italicized earlier). What about the supply side? Does the higher reward for more education induce employees with such education to reveal these capabilities at the workplace, to fulfill employers' expectations? Strong school–job complementarity is a matter of answering positively to this question of work incentives. In what follows, the next section establishes strong complementarity and proceeds next with a discussion of such a view on work incentives.[2] Section 3 continues with certain considerations about policy-induced work disincentives. The paper concludes with a discussion of incentive schemes against such disincentives and with a summary.

2. An alternative view on work incentives

The issue of whether the appreciation and, hence, reward for more education by the employers suffices to bring out the productivity-augmenting capabilities of educated workers is a moral hazard problem. It is a problem no different from that raised when a firm (the agent) confronts the problem of what to pay a technology owner (the principal) to make him transfer to the firm not only the technology but also the know-how connected with this technology, the technology and the know-how being in our case

the literacy–numeracy and the productivity-augmenting capabilities, respectively. An affirmative answer to the question posed above would just echo, then, the conclusion of Macho-Stadler *et al.* (1996) that extra payment is needed to disclose the know-how as well. This is very important, since it suggests that economic returns for education are positive not only because employers expect higher productivity from the more educated workers, but also because these expectations are fulfilled most of the time.

The introductory section did mention this by stating that employers reward education because both expect and observe higher productivity from such workers. Nevertheless, it was mentioned only parenthetically, emphasizing the weak school-job complementarity, for the reason that strong complementarity has been linked thus far by the literature with signaling rather than with work incentives. The persistence of a would-be education-induced wage differential during the career is sought not in the productivity-augmenting role of education, but in the persistence of the signaling aspect of it. This is the reason, of course, that the evidence rejects such a view of strong complementarity (Groot, Hartog, 1995). It is not a plausible view, since it really postulates that expectations are never corrected. It also does not follow logically from the notion of weak complementarity, which refers to productivity expectations, and, consequently, strong complementarity should refer to the realization of such expectations, the way perhaps things are put here. Failure to see this is predicated by the strict adhesion to the signaling hypothesis and the complete dismissal of human capital theory.

One might say that weak complementarity is closer to signaling theory while the work-incentives view of strong complementarity advanced herein is closer to human capital theory.[3] To clarify things further, note that such a perception of work incentives differs radically from the traditional one, which wants work effort to be a matter of labor supply (see, for example, Hamermesh, Rees, 1993). Suboptimal work behavior during an 8 hour workday is viewed as being equivalent to less than 8 hours of work, and the issue then is what incentives should be introduced in order to raise labor supply to 8 hours. According to the considerations of this paper, however, things are not quite like that. A person who has been hired to do a job for a certain amount of time does precisely that in the sense that he places the literacy–numeracy of the job for which he has been hired at the disposal of the employer for the prearranged time. To use, once again, the example of the driver, he

is always there to do his driving duties from, for example, 9 a.m. to 5 p.m. It is different if he is asked once to drive to some place to deliver a company file and he refuses to perform the duty of the delivery only by saying that he has not been hired as a mailman. This has to do with his productivity-augmenting capabilities (adjustment to change), which will be mobilized only if there is an incentive to do so.

To put things in a broader perspective, consider also Leibenstein's (1976) scheme of the pace, quality, and time pattern of an activity at the workplace.[4] Some activities can be carried out at different speeds and, hence, the pace varies. Quality refers to hard work in the sense of increased attentiveness, concentration, and worrying about details. The time dimension enters into the rhythm of work, it involves the duration and the number of breaks at work. Pace, quality, and time are up to the individual worker and determine the effort exerted by him in order to carry out a job task. A matter of interpretation by the worker is even the activity, the task he is assigned to perform, and, consequently, the activity is a component of work effort too, since its description by the employer is usually incomplete. Now, to put productivity-augmenting capabilities at work means, within this context, to induce the worker to choose the activity–pace–quality–time (APQT) combination, which is desired by his employer. Even more important is the mobilization of these capabilities when changes in the production technology are involved. Cappelli (1996), for example, would argue that inability of labor to cope with such changes may neutralize novelty and even cause a backsliding to old ways the moment novelty is the cornerstone of development.

As far as we are concerned, none of these considerations is a matter of labor supply or work effort within the traditional meanings of the terms. Here, for instance, any APQT combination is an 8 hour affair to the extent that a working day is concerned. It is like a 2 hour examination at school, designed as such. All students leave the classroom after 2 hours, most of them can earn a passing grade (have the literacy–numeracy of the subject under examination), and, depending then on the interest of each student in the particular course (on the reward), a distribution of grades (different degrees of the utilization of critical thinking, various combinations of APQT) is (are) obtained. The traditional view of work effort is like a 2 hour examination, designed (i) either as a 90 minute one, with the instructor complaining that the distribution of grades (which presumably would be the same as above), could

have been better, or (ii) as a $2\frac{1}{2}$ hour examination, with the instructor making the complaint that the resulting grades are disappointing. The real-world relevance of the traditional view *vis-à-vis* ours is an empirical issue, though our view comes from an interpretation of the evidence that education is rewarding and, hence, our thesis is supported indirectly by this evidence.

In any case, given our perception of workday and work effort — a perception that wants work incentives to have only an income effect — it should be asked next what such a perception implies for work disincentives. Consider Figure 1, which is the usual leisure–labor choice diagram, with $\overline{N}$ and N^* being equal to 24 and 16 hours, respectively, implying a workday of 8 hours. N^*S is the income of the literacy-numeracy needed for the specific job provided, of course, that the 8 hour workday has been a social convention because it suits most people's preferences. The supply of work incentives yields to the educated worker the additional amount of SH *given the 8 hour workday*. That is, for a worker, a job contract solves his leisure-labor choice problem, and leads to point S. Given next this solution, i.e. the hours and description of work as specified in general in the contract, the laborer reconsiders his utility maximization problem soon after the increase of his income brought about by work incentives; this leads to point H. There is, in other words, a two-stage utility maximization problem, as Figure 1 illustrates, where z is a composite good consisting of two goods x and y, the prices of which are Q and P, respectively. Note, now, that the sum SH comes from the solution to the moral hazard problem mentioned earlier. Consequently, were this sum to be reduced for some reason, the worker would decide to go back to point S rather than to an intermediate point between S and H, *ceteris paribus*. This is what work disincentives means, and it should be appreciated by policymaking accordingly. Any sort of taxation would be disastrous for work incentives and, hence, either SH should be the after-tax reward for education or a tax should be somehow counterbalanced so as to leave SH intact. Let us conclude this paper with precisely this point, which has to do with the proper design of work incentives.

3. A game-theoretic approach to policy

Work incentives constitute really a truth-telling mechanism, truth-telling in the sense of revealing to the employer the true

production qualities a worker possesses. Therefore, the slightest distortion in these incentives might provoke retaliation on the part of the employee; this is at least what the repeatedly played prisoner's dilemma game would predict, and it is a very reasonable prediction. Distortions should be charged to improper policy-making, and certainly not to the employer.[5] But, as soon as they come up, a game inevitably is given rise to in which the employer's options are to stick with the incentive mechanism or violate it, whereas the worker's choices are to cooperate by revealing productivity-augmenting capabilities or to be confined to revealing only literacy–numeracy. Having now a government policy that distorts work incentives in such a way that an employer cannot make up for the distortions, means that a worker will never cooperate with management despite the fact that the blame is on the government. If, for example, a percentage of the reward for education is taxed away and a worker is expected to react by reducing his productivity, the employer's response to the worker will be to violate the incentive mechanism (and knowing this, the worker's optimal choice will be to reveal only literacy–numeracy,

Figure 1. The worker's two-stage utility maximization problem

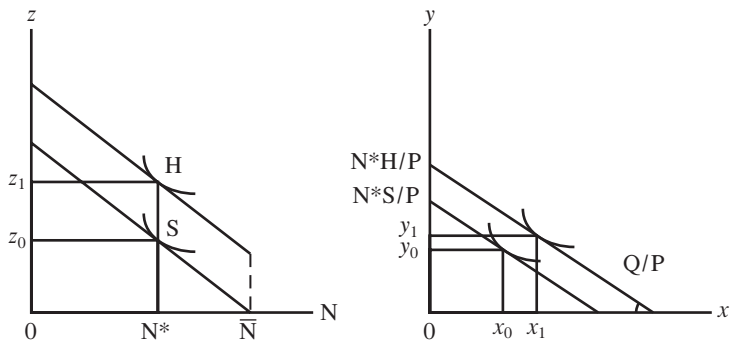

Figure 2. An employer–employee game

	Employer: Stick	Employer: Violate
Cooperate	R, R	F, T
Defect	T, F	V, V

as at point S in Figure 1), but the ultimate responsibility for this course of events lies with the government.

More precisely, consider the game shown in Figure 2, where the strategies of the players correspond to the options of the employer and the employee mentioned above. The structure of the payoffs is presumably $T > R > V > F$, since (i) mutual cooperation[6] is advantageous *vis-à-vis* non-cooperation by both parties, $R > V$, while (ii) deception, i.e. unilateral non-cooperation, benefits the defector (or the same, the violator), more than mutual cooperation, $T > R$, and makes the other party worse off relative to mutual non-cooperation, $V > F$. Certainly, having one's back to the wall in case of being fooled (deceived) by the opponent is better than risking unilateral commitment. Now, given this description of the game, a government policy that would turn the employers' option 'Stick' into 'Violate' would prompt 'Defection' by the worker to avoid a payoff of F, and 'Violate' by the employer anyhow, to get V instead of $F < V$. This would be the aftermath of such a government policy even if repeated employer-employee interaction were allowed. It is simply one of the two parts of the subgame-perfect Nash equilibrium of our game when played repeatedly over time either infinitely or without knowing when the employer will get tired of it and fire the worker.

An examination of the other part of that equilibrium would help us gain more insight as to the character of distortionary government policy. Consider the trigger strategy 'cooperate the first time the game is played and continue doing so until the other party defects, in which case cease cooperating forever'. Also, let $d = (1-p)/(1+r)$, where p is the probability with which the employer may end the game in any one round,[7] while $1/(1+r)$ is the value today of a monetary unit to be received one stage later, r being the interest rate. It follows that the individual gain from secular cooperation, G, will be $G = R + dG \Rightarrow G = R/(1-d)$, while the total payoff from non-cooperation will be $T + dV + d^2V + \ldots = T + [d/(1-d)]$. Were $R/(1-d) \geqslant T + [d/(1-d)]$ or $d \geqslant (T-R)/(T-1)$, it would be a Nash equilibrium for both agents to play the trigger strategy. But this strategy comprises a Nash equilibrium when $d < (T-R)/(T-1)$, too, because it postulates repetition of the stage (static) game equilibrium, i.e. of mutual non-cooperation.[8] Consequently, the Nash equilibrium is subgame-perfect, i.e. an equilibrium of the whole game regardless of the critical value of d (which makes us think of this equilibrium as consisting of two 'parts'). Nevertheless,

these calculations exclude the impact of distortionary policy. To the extent that the worker is concerned, let this impact be a payoff reduction from R to $(R-e) \geqslant F$ in case s/he cooperates unilaterally. This would lead to a $d \geqslant (T-R+e)/(T-1)$, i.e. to a higher critical value of d than before given that the numerator increases by e whereas the denominator remains unaltered. It appears, hence, that distortionary policy acts as a factor rendering cooperation less likely rather than a vain prospect. Yet, note that getting $(R-e)$ and not R constitutes a defection *per se* and, therefore, such policy does result in non-cooperation in a definite manner.

4. Discussion and summary

Game theory might be used to alleviate the last section's pessimism by introducing more strategies like reveal all capabilities, reveal all except adjustment to change, reveal all except adjustment to change and socialization to competence, and so on, along with the subsequent reward strategies on the part of the employer. Yet, such an approach could be anything else but realistic.[9] What would be realistic is for job contracts to contain ways that make up for would-be policy-induced distortions in work incentives. Indeed, incentive schemes used by employers like piece-rate pay coupled perhaps with standard time rates, pay depending on merit coupled perhaps with standard time rates, pay depending on merit at the workplace, efficiency wages, bonuses for good work performance, and profit-sharing, could be interpreted as reward schemes that allow for rewards beyond those for education.[10] Also, the manner according to which job hierarchy is connected with pay is another outlet through which such allowances could be made. Other means are benefits in kind, perquisites, and informal arrangements like tolerance of some fiddling, etc. On the bottom line, there is always the possibility of tax evasion, underground transaction, and other unlawful practices, suffices to worth the risk of getting caught by the authorities.

To sum up, this paper advances initially an argument associating human capital theory with the weak version of the signaling theory. It is an argument, a problematique that helps us methodologically to establish a work-incentives view of the complementarity between human capital theory and the strong version of the signaling hypothesis. This view implies, in turn, that

work incentives have only an income effect, which emerges as the solution to a moral hazard problem concerning the disclosure of productivity-augmenting capabilities to the employer. Thus, it is concluded that policy-induced disincentives working against this effect and involving perhaps a substitution effect, too, would have serious repercussions on the productivity of labor unless employees and employers take measures that counteract the disincentives.

Notes

[1] One might argue alternatively that educational requirements at all levels of job entry have been upgraded because there is an oversupply of educated persons. This, however, does not explain the reward for more education while as Bishop (1996), for instance, claims, there is actually an excess demand for such persons.

[2] It should be pointed out that our focus here is not the debate between human capital theory and the signaling hypothesis, but what the interplay of these two theories implies for work incentives.

[3] Mincer (1980) was one of the first to pinpoint the possibility of complementarity between the two theories, though in a different context.

[4] Leibenstein's scheme is used for the additional reason that one may readily see the relationship of our thesis with *X*-efficiency considerations as well.

[5] Recall that the incentive mechanism is to the best interest of both the employer and the employee; it is the reward for more education.

[6] The option 'Stick' is presumably equivalent to 'Cooperate'. Also, 'Violate' is equivalent to 'Defect', and both of them imply non-cooperation.

[7] The probability p could be made a function of the stage the game is played, but this would complicate things perhaps seriously, without altering our conclusions.

[8] Recall the prisoner's-dilemma character of the game.

[9] What is the meaning, for example, of revealing only socialization to competence, and how can an employer know about this?

[10] It is clear that the term 'incentive scheme' is used conventionally to describe the extra reward beyond that for more education; this is at least what our discussion appears to imply.

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