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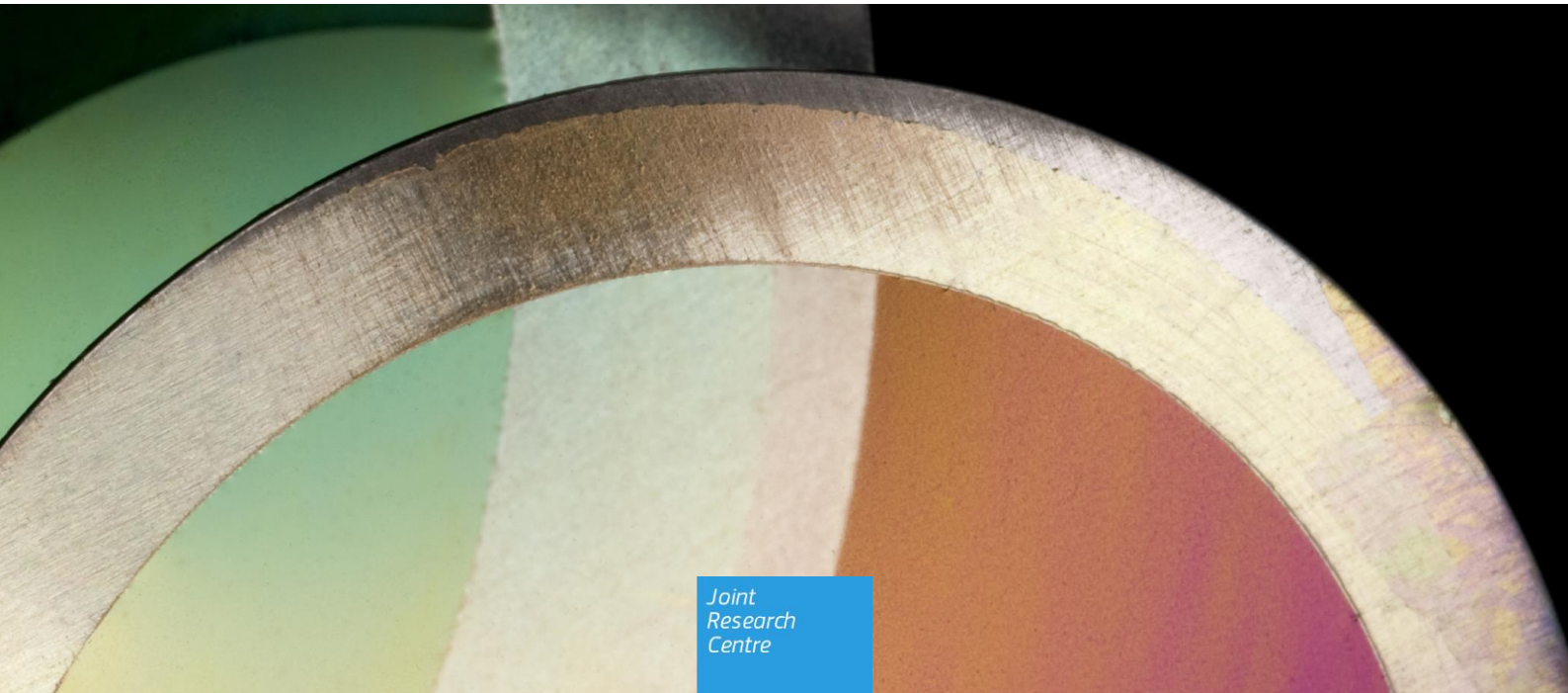

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Superstars and mediocrities: a solution based on personal income taxation

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Abstract

The markets for talent often produce large income inequality and therefore raise political attention. While such inequality can be due to superstar dynamics or factor complementarities, Terviö ("Superstars and Mediocrities: Market Failure in The Discovery of Talent", *the Review of Economic Studies*, 2009) first proposed a market failure that was previously unknown to the literature, pointing to long-term contracts as a solution. I extend the model in Terviö (2009) to include personal income tax policy reforms and demonstrate that tax design can be employed as a solution to the market failure when long-term contracts are unfeasible. With small enough entry payments that novice workers would sustain to compensate employers for the cost of learning, both a progressive tax and a tax incentive on entry wages are found effective. The tax incentive on entry wages, though, can be used even with very large deductible entry payments and with overall negative net entry wages.

JEL classification: H21, H24, J31, J6.

Keywords: superstars, personal income tax, entry wage, talent, learning.

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1 Introduction

Market failures caused by information asymmetries taking the forms of adverse selection and moral hazard have been studied in depth. To the extent that information is incomplete but symmetric among economic agents, the usual prior is that a market may exist that correctly prices risk. It is when asymmetries in information occur that strategic behaviours may undermine the correct functioning of markets and "lemon" mechanisms (Akerlof 1970) produce socially less-than-optimal outcomes.

In Terviö (2009) a previously undocumented source of market failure was identified which relies on symmetric uncertainty about individual abilities. In that model, individuals do not know how talented they are and the discovery process of workers' ability is hampered by the fact that novices are unable to fully compensate employers for the chance to find out their own ability level. This constrained ability to "pay to work" in the industry impedes reaching first-best optimal outcomes (such as the equilibria derived in MacDonald 1982, Miller 1984, MacDonald 1988) where novice workers would sustain fully the cost of learning. As a result, less novices enter the market and more mediocre workers remain than socially optimal. Because the failure is also due to inability to commit to long-term contracts (which would allow employers to capture the upside potential of novice employees), in principle it is also related to the literature on labour mobility and contract design (for instances particularly related to employed researchers: Pakes and Nitzan 1983, Stole and Zwiebel 1996a, Stole and Zwiebel 1996b, d'Andria 2016).

The contribution of Terviö (2009) is very relevant for the study of some industries featuring highly skewed earnings distributions and where superstars dynamics (Rosen 1981) might occur. Markets for artists, performers, sportsmen, managers, scientists and entrepreneurs may eventually be affected by this kind of market failure. Policy-wise a possible solution envisaged in Terviö (2009) is to impose longer-term contracts that would allow employers to retain workers who were discovered to be of high-ability type, thus allow-

ing employers to gain more from the discovery of high-ability types. The problem with such policy is that it is hardly feasible in practice. To motivate the latter claim one can use multiple rationales. First, long-term contracts would distort other aspects of the markets that are not captured by the simple model here discussed, for instance they would impair the assortative matching of workers' ability with the most productive firms when firm productivity changes in time. Overall the efficiency gains obtained by long-term contracts with respect to the market failure described in Terviö (2009) would imply a trade-off that is yet to be studied and somewhat quantified. Second, the kind of workers potentially affected (e.g. football players, musicians, managers, etc.) is usually highly mobile internationally, and a long-term contract would not be easily enforced in other countries if a worker with a large revealed ability decided not to comply with it. Third, in most countries the law limits termination clauses and restrictive covenants not to be any more restrictive on the employee than reasonably necessary to protect the employer's business. Therefore such laws could impair the ability for a policy-maker to impose long-term contracts selectively in some industries only, where the market failure is expected to be relevant.

I propose a set of policies based on wage taxation as an alternative solution to the market failure. To the author's knowledge this is the first time these results are proposed and formally derived. Under the assumption that entry payments are small compared to wages, a more pronounced tax progressivity is found to increase entry thus being welfare improving. Alternatively a reduced tax rate on entry wages bear similar effects. If entry payments are made deductible from the tax, a reduced tax rate on entry wages is found effective even with very large entry payments.

2 Extended Model with Personal Taxation

I extend here the original model in Terviö (2009) to include personal income taxes. All notation not related to taxes remains the same as in the original model to maximise comparability.[1] The description of the original model in the following is limited to the essential elements as more complete exposition can be readily found in Terviö (2009).

Workers are assumed endowed with ability θ drawn from a cumulative distribution function F. Ability produces output equal to θ when combined with other inputs at a cost $c > 0$. In each time period workers are either novices or veterans. Novices are first-time entrants in the industry and their ability θ is unknown to anybody, including themselves. At the end of a first entry period, ability is revealed and a novice either exits the industry or becomes a veteran who works in the industry for T more periods. All workers can opt at any point in time for an outside gross wage w_0. The industry total output q is constrained by a downward-sloping demand $p^d(q)$.

I use the following additional notation: t_0 is the tax rate levied on outside wages, that is, the tax rate generally applied to all labour income sources for jobs earning a wage w_0; t_V is the rate on wages earned by veterans (for simplicity I assume a single tax bracket for all wages above w_0); t_E is the tax rate on wages earned by novices. The existence of a distinct rate t_E implies the assumption that the policy maker can distinguish novices from veterans.

At the equilibrium four conditions must hold. First, firms are assumed to be many and competing, thus they expect zero profits from hiring any worker of ability θ. For each firm it therefore holds the following:

$$P\theta - c - w(\theta) = 0 \tag{1}$$

[1] I prefer though to employ the term *ability* rather than *talent* because the latter seems to imply some form of innate aptitude, while the former better captures the overall joint effect of past education and learning-by-doing, genetic disposition, match with current majority preferences. In modelling terms this distinction makes no difference and ability here works exactly in the same way as talent in the original model in Terviö (2009).

where P is output price and $w(\theta)$ is gross wage paid to a worker of ability θ. If ability is not yet revealed, the (novice) worker receives a wage corresponding to the population average (see below). Second, the exit condition at the equilibrium for the lowest ability veteran is:

$$(1 - t_V)w(\psi) = (1 - t_0)w_0 \tag{2}$$

where ψ is a threshold defining the ability level at which a worker with revealed ability $\theta = \psi$ exits the industry.

The third condition is for the entry of novices. As their ability is ex ante unknown their expected gross wage is the one corresponding to the average ability in the population, $\bar{\theta}$. If workers were financially unconstrained, this entry condition would reflect the fact that novices must be indifferent between entering this market or not. In other words, unconstrained novices would enter if the sum of the novice worker's wage plus the expected value of all the future returns in times T as a veteran are at least as large as the outside option:

$$(1 - t_E)w(\bar{\theta}) + TE[max\{w((1 - t_v)\bar{\theta}), (1 - t_0)w_0\}] = (1 + T)(1 - t_0)w_0$$

Eq. (2) would reflect the corresponding condition (9-A) in Terviö (2009): it assumes that novices, being financially unconstrained, can pay any amount of wage $w(\bar{\theta}) < w_0$ which will compensate employers for the possible losses incurred (compared to the alternative choice of hiring a veteran of quality ψ) in case low quality is discovered. With unconstrained workers then the competitive equilibrium reached in the industry is socially efficient as already proven in Terviö (2009). Standard theoretical arguments about optimal taxation would imply that a welfare-maximizing policy-maker should stick to a flat-rate tax where $t_0 = t_E = t_v$.

The focus here is however on the different scenario where $w(\bar{\theta}) < w_0$ but

novices are financially constrained and are unable to accept a wage lower than $w_0 - b$. This is the case of interest policy-wise as it produces a market failure and sub-optimal level of entry: the threshold ψ is too small compared to the optimum and is increasing with b. The lower is the ability to pay of novices, the larger are wages for all levels of quality and output prices (see Proposition 3 in Terviö 2009). Some workers ("mediocrities") having quality larger than the population average but below the optimal rehiring threshold will not exit the market, while they would have exited in the unconstrained case.

When b is binding the entry condition, following the corresponding entry condition (9-B) in Terviö 2009, becomes:

$$(1 - t_E)w(\bar{\theta}) = (1 - t_0)w_0 - (1 - t_E)b \tag{3}$$

In eq. (3) the entry payment b is the ability to pay for a job, either accepting lower wages than the outside wage or by actual payments in money. The assumption here taken is that b is exogenously constrained below the level b^* (derived in Terviö 2009) at which social efficiency would be reached without policy intervention. The way eq. (3) is written implies that b is deductible from personal taxation: this is the most fitting assumption for the case where b is interpreted as a reduction in the wage $w(\bar{\theta})$ the worker can accept. In the following we will also consider the case where b is non-deductible which better applies to cases where b is made of actual payments that are not allowed deductibility. With non-deductible b eq. (3) changes to:

$$(1 - t_E)w(\bar{\theta}) = (1 - t_0)w_0 - b \tag{4}$$

Finally the last equilibrium condition is:

$$P = p^d(IA(\psi)) \tag{5}$$

which simply states that output must be consistent with the demand corre-

sponding to average per-worker output $A(\psi)$ and employment I, the latter assumed to be a continuous variable equal to the workforce mass in the industry.

From this new setup, it is immediate to derive the following Lemma (which is the tax-augmented version of Lemma 2 in Terviö (2009); the proof here follows the original proof but employing eq. (1) to (5), thus it is straightforward and will be omitted for brevity).

Lemma 1. *Given an equilibrium exit threshold ψ, the price of output is $P(\psi) = [(1 - t_0)w_0 + c]/\psi$ and wages are:*

$$w(\theta|\psi) = \left[\frac{1-t_0}{1-t_V}w_0 + c\right]\left(\frac{\theta}{\psi} - 1\right) + \frac{1-t_0}{1-t_V}w_0 \tag{6}$$

Eq. (6) links the wage function both to the exit threshold ψ and to tax rates. In particular the item $\frac{1-t_0}{1-t_V}w_0$ captures the effect of tax progressivity.

Combining eq. (3) with eq. (6) and solving for ψ I obtain the relation, at the equilibrium, between the exit threshold ψ, net-of-tax earnings and b. In the case of deductible b this is equal to:

$$\psi(b, t_0, t_V, t_E) = \frac{\frac{1-t_0}{1-t_V}w_0 + c}{\frac{1-t_0}{1-t_E}w_0 - b + c}\bar{\theta} \tag{7}$$

Similarly by combining eq. (4) with eq. (6) I obtain the same relation for the case with non-deductible b:

$$\psi(b, t_0, t_V, t_E) = \frac{\frac{1-t_0}{1-t_V}w_0 + c}{\frac{1-t_0}{1-t_E}w_0 - \frac{b}{1-t_E} + c}\bar{\theta} \tag{8}$$

The market failure here addressed takes the form of a ψ value that is too small, so that mediocrities (that is, veteran workers with ability above the population average $\bar{\theta}$ but still below the socially optimal threshold ψ^*) and too-low entry of novices occur. A result is that the average ability in the industry falls short of the average ability that would be obtained in the first-best case. To study the effect of taxes on welfare we therefore have to

look at the way a change in a tax rate affects function $\psi(b, t_0, t_V, t_E)$ in either eq. (7) or eq. (8).

The derivatives of $\psi(b, t_0, t_V, t_E)$ w.r.t. t_0 and w.r.t. t_V are found to produce ambiguous signs, both in the case with deductible and non-deductible b. Only if b is small enough (compared to net-of-tax outside wage) to make the denominator in eq. (7) or eq. (8) positive, then it is verified that $\frac{\partial \psi}{\partial t_0} < 0$ and $\frac{\partial \psi}{\partial t_V} > 0$. This, coupled with the fact that under a flat-rate tax $t_V = t_0$ it is always true (because of the equilibrium exit condition in eq. (2)) that $w(\theta|\psi) > w(\psi|\psi) = w_0$ for veterans, who always have ability $\theta > \psi$, leads to the first policy implication derived here:

Proposition 1. *With small enough constrained payment b a progressive tax featuring $t_V > t_0$ can be welfare-improving.*

It is to note that a small enough b is one that, under flat-rate taxation and non-deductible b, is smaller than $w_o + c$, which is a condition likely to hold in most practical applications.

The derivative of $\psi(b, t_0, t_V, t_E)$ w.r.t. t_E turns out to be always negative if b is deductible, and negative if and only if $b < \frac{1-t_0}{1-t_E} w_0$. This leads to the second policy implication:

Proposition 2. *With constrained deductible payment b a more favourable tax rate $t_E < t_0$ can be welfare-improving. If b is non-deductible, the previous statement only holds if $b < \frac{1-t_0}{1-t_E} w_0$.*

The intuition behind Propositions 1 and 2 is that a larger tax on veterans' wages increases exit of lower-ability mediocrities and consequently raises both the entry of novices and the average ability in the industry. A lower tax rate on entry wages allows for a smaller adjustment of output prices to accomodate more novices into the industry, thus more learning happens which also improves the average ability in the industry.

3 Conclusions and main policy implications

The main conclusion stemming from the analysis is that the effects of the kind of market failure discussed in Terviö (2009) may be counter-acted by a personal tax schedule that is progressive. A tax incentive for novice wages may also obtain similar results. As the corrective policy originally proposed in Terviö (2009) and based on long-term contracts is likely unfeasible in practical applications, these results bear important implications for actual policy making.

It is to stress though that while the result on progressive taxation hinges on the assumption that the entry payment to employers made by novices is small enough compared to net wages, a tax incentive to novice wages would be effective even with large entry payments, provided that the latter are made deductible from the personal income tax. This is an interesting property of the incentive in light of the fact that the entry payment size correlates with the variance across abilities. In principle a subsidy would as well be applicable when the deductible entry payment makes the overall entry wage negative. From a political point of view and under fairness concerns, a tax incentive on novices' income might be easier to introduce compared to a proposal to increase tax progressivity for some industries only.

Moreover and although not captured in this model, a strong progressivity might induce some individuals to simulate lower ability as in optimal taxation models with hidden endowments or hidden action (see Mirrlees 1986). This is not the case for a tax incentive on novice wages as new entry is easily verifiable, for instance by not allowing the incentive to individuals who already benefited from it in the past.

The extended model here presented suggests how a corrective tax policy might be designed, however it also shares the same limitations as the original model without taxes. In particular, future research should study how the specific market failure here analysed interacts, for the purposes of designing tax systems optimally, with adverse selection and moral hazard, with variable

payment schemes and under different competition and innovation regimes.

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