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## ABSTRACT

### **Managerial Talent, Motivation, and Self-Selection into Public Management\***

The quality of public management is a recurrent concern in many countries. Calls to attract the economy's best and brightest managers to the public sector abound. This paper studies self-selection into managerial positions in the public and private sector, using a model of a perfectly competitive economy where people differ in managerial ability and in public service motivation. We find that, if demand for public sector output is not too high, the equilibrium return to managerial ability is always higher in the private sector. As a result, relatively many of the more able managers self-select into the private sector. Since this outcome is efficient, our analysis implies that attracting a more able managerial workforce to the public sector by increasing remuneration to private-sector levels is not cost-efficient.

JEL Classification: H83, J24, J3, J45

Keywords: public management, public service motivation, managerial ability, self-selection

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# 1 Introduction

The quality of management in the public sector is a recurrent concern in many countries. Part of this concern is based on the perception that the public sector is an unattractive employer for high-quality managers. Inferior remuneration and weak financial incentives attract less talented managers to the public sector and lead them to put little effort in their job. For the US, this is nicely illustrated by the report of the National Commission on the Public Service (2003), which concludes that “*recognition that there is much wrong with the current organization and management of the public service is widespread today.*” (p.2) and that “*too few of our most talented citizens are seeking careers in government*” (p.iv). Moreover, “*too many of the best recruits are rethinking their commitment, either because they are fed up with the constraints of outmoded personnel systems and unmet expectations for advancement or simply lured away by the substantial difference between public and private sector salaries in many areas*” (p.8).

Not only policy makers are concerned about the quality of management in the public sector. Employees in the public sector have similar concerns and ‘vote with their feet’, as is illustrated by Table 1. This table reports data from a large-scale survey conducted by the Dutch Ministry of the Interior and Kingdom Relations among workers who have quit a public sector job to take a private sector job or vice versa in 2002 in the Netherlands. The second and third column of Table 1 list the percentage of workers who claim that management aspects had been one of the three most important reasons to quit their former job.<sup>1</sup> While 35% of the respondents who moved from the private sector to the public sector consider management as important in their decision to quit, this holds for more than 60% of the respondents moving in opposite direction. It is also clear from Table 1 that management aspects are an important reason to quit in all 7 branches of the public sector.

Several policy makers have called for a change: The public sector should attempt to attract the economy’s best and brightest managers. In the words

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<sup>1</sup> Respondents could choose from a list of 19 potential reasons for leaving one’s job, including items like salary, promotion prospects, atmosphere, and responsibilities. Table 1 gives the percentages of people who among the three most important reasons list either personnel policies, general management of their unit, or supervision. Similar results arise if we single out each of these categories. Also, restricting attention to the single most important reason for leaving one’s job or to people who do not supervise anyone themselves do not alter the general picture.

**Table 1: Percentage of workers who mention management aspects as one of the three most important reasons to quit their former job**

	Workers moving from the private sector to the public sector	Workers moving from the public sector to the private sector
All	35.0	61.6
<hr/>		
Part of public sector		
Central government	33.9	61.3
Local government	40.4	65.9
Police	31.3	71.5
Research <sup>1</sup>	30.7	66.3
Hospitals <sup>2</sup>	41.3	53.4
Defence	25.6	63.5
Education	35.5	47.5

Data source: Ministerie van Binnenlandse Zaken, Mobiliteitsonderzoek 2002.

All differences between inflow and outflow are significant at the 1% level except for the sector hospitals. The total number of respondents is 3038.

<sup>1</sup> Research consists of universities and research institutes.

<sup>2</sup> Only university hospitals were included in the survey.

of the National Commission on the Public Service (2003): “*Salaries for [executives in government] should be based on the compelling need to recruit and retain the best people possible.*” (p.26) <sup>2</sup> This paper questions this view. In a nutshell, we show that, if demand for public sector output is not too high, perfect competition on all markets results in an equilibrium where relatively few of the more able managers seek employment in the public sector. The equilibrium is efficient, both from the point of view of a social planner as well as of a policy maker aiming to deliver a certain amount of public sector output at lowest cost. Hence, attempts to attract a more able managerial workforce to the public sector by increasing remuneration to private-sector levels are not efficient.

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<sup>2</sup>Similar recommendations can be found in a report from the OECD (2001) that studies countries’ experiences with recruiting and retaining public sector personnel. The report concludes that “*The public sector is not usually able to compete with the salaries offered by private employers, especially those of highly-educated personnel and managers. However, pay increases may be necessary to prevent an outflow of highly-qualified personnel.*” (p. 29)

We develop a model of a perfectly competitive economy with two sectors, the public sector and the private sector. The sectors differ only in the kind of output that is produced; production technology and the institutional environment are assumed identical. Production takes place in units consisting of one manager. Output is homogeneous within a sector, and is sold at the market-clearing price. Further, managers are residual claimants of their unit.<sup>3</sup>

Crucially, people in our economy differ in two characteristics. First, people differ in managerial talent. Talent increases one's effectiveness as a manager. Hence, better managers earn a higher income and attain higher utility.

Second, people in our economy differ in public service motivation (PSM), which we define as a relative preference for working in the public sector. Public service motivation can arise from a preference for tasks specific to the public sector, for contributing to goals specific to public organizations, or for helping the specific set of clients that is served by public organizations in sectors like health care and education.<sup>4</sup> In most of the paper we let a person's PSM be independent of effort and output; later on, we relax this assumption. Crucially, we assume that PSM is sufficiently widespread in the economy (or, equivalently, that demand for public sector output is not too high) so that in equilibrium the marginal managers have positive public service motivation. Consequently, the equilibrium price of public sector output must be lower than the price of output in the private sector. For otherwise, a given amount of production in the public sector would yield managers equal or higher revenue and higher motivational utility compared to the private sector, so that no one with positive PSM would be willing to become manager of a unit in the private sector.

These differences in output prices between the public and the private sector have profound implications for the effect of managerial ability on a

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<sup>3</sup>This may seem to be a far cry from real-world production and wage determination in the public sector. However, this setup allows us to analyse self-selection of people into sectors when no restrictions are being imposed on price or wage formation, which gives the efficient allocation. This serves as a benchmark for evaluating attempts to improve upon the pool of people opting for public management.

<sup>4</sup>Recent empirical studies on the motivation of workers in the public sector include Antonazzo et al. (2003) on nursing workers, Edmonds et al. (2002) on teachers, and Frank and Lewis (2004) and Gregg et al. (2008) on employees in these and several other areas of the public sector. Le Grand (2003, ch.2) and Perry and Hondegheem (2008) provide overviews of the empirical literature on PSM.

manager's payoff in the two sectors, and so for the sorting of people into public and private management. We show that, in any equilibrium where demand for public sector output is not too high, the marginal return to managerial ability is higher in the private sector than in the public sector. Hence, the relative attractiveness of the public sector decreases in ability, and when the right tail of the ability distribution is sufficiently long, all of the most talented managers reside in the private sector. Furthermore, relatively many of the least able managers sort into the public sector.

An important aspect of our analysis is that low remuneration for managers in the public sector arises endogenously. While this implies that the public sector attracts managers with relatively low ability, it is the least costly way of producing a given amount of public sector output. Hence, attempts to attract a more able managerial workforce to the public sector by increasing remuneration to private-sector levels are not efficient, neither from the perspective of a policy maker minimizing cost of public goods provision nor for a social planner maximizing social welfare.

Our theory is well in line with recent empirical findings on public-private wage differentials at the higher echelons as presented by Bargain and Melly (2008), using panel data for France. Whereas cross-sectional estimates show substantial negative public sector wage premia at the top of the wage distribution, these are much smaller when controlling for individual fixed effects. Bargain and Melly (2008) conclude from this finding that: “*At the top of the wage distribution, agents with the highest wage potential ... have self-selected in the private sector*” (p.13). Earlier papers on public-private wage differentials also find public sector wage penalties at the top of the wage distribution (Poterba and Rueben, 1994; Disney and Gosling, 1998; Melly, 2005), but cannot account for endogenous selection effects.<sup>5</sup>

Our theory is also applicable beyond the public-private setting. For instance, jobs offered by non-profit organizations are often regarded as attractive to intrinsically motivated people (cf. Preston, 1989; Rose-Ackerman, 1996). In line with this, most empirical studies find a negative wage differential in the non-profit sector (Mocan and Tekin (2003) being a notable exception), and some studies attribute this finding partially to selection ef-

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<sup>5</sup>At the bottom of the wage distribution, empirical studies often find positive rather than negative wage premia. One reason – outside the scope of our theory – for this may be that, during wage negotiations, employers in the public sector are less tough than private sector employers, as in e.g. Haskel and Szymanski (1993).

fects. For instance, Weisbrod (1983) finds a 20% wage penalty for lawyers in non-profit ‘public interest’ firms, while Goddeeris (1988) argues that a large part of this differential is driven by selection. In line with our theory, Preston (1989) finds that the non-profit wage penalty is higher for managers and professionals than for sales and clerical workers, and her results support the hypothesis that the wage difference is partially driven by selection. Lastly, Roomkin and Weisbrod (1999) show that top executives in for-profit hospitals receive both higher total income and stronger monetary incentives than their counterparts in non-profit hospitals, and that these differences are smaller at lower levels in the hierarchy.

We proceed as follows. The next section discusses related literature. Section 3 describes the model, which is next analysed in Section 4.<sup>6</sup> In Section 5, we study the case where utility derived from PSM depends on output. Section 6 concludes.

## 2 Related Literature

Our paper builds on the literature on compensating wage differentials. The theory of equalizing differences developed by Rosen (1974) asserts that in a competitive labour market, marginal workers’ valuation of job attributes is reflected in compensating wage differentials (see also Brown, 1980; Rosen, 1986). Selection effects complicate the empirical estimation of these compensating wage differentials, see e.g. Goddeeris (1988) and Hwang et al. (1992). The reason is that wage differentials may also arise from unobserved differences in workers’ ability, which in turn may be related to job attributes, e.g. because a worker’s valuation of job attributes depends on his income (Goddeeris, 1988; Krueger and Summers, 1988; Gibbons and Katz, 1992). Recent work using matched employee-employer data establishes that inter-industry wage differentials are largely explained by these unobserved ability differences (Abowd et al., 1999; Goux and Maurin, 1999). In line with these findings, the public-private earnings differential for managers that arises in our theoretical analysis is partly a ‘true’ compensating earnings differential and partly caused by selection, where selection arises endogenously from the adjustment in prices to differences in sectors’ job attributes.

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<sup>6</sup>A more extensive model, including two types of jobs per sector (manager and worker) and endogenous demand for workers by managers, is contained in a previous version of this paper (Delfgaauw and Dur, 2008b).

A recent literature in economics on intrinsic motivation examines the assignment of differently motivated workers to jobs that vary in intrinsic qualities (e.g. Handy and Katz, 1998; Dixit, 2002; Besley and Ghatak, 2005; Francois, 2007; Prendergast, 2007; Delfgaauw and Dur, 2007, 2008a; Macchiavello, 2008). A key prediction of this literature is relatively low pay and weak monetary incentives in jobs with high intrinsic qualities, as these lead to self-selection of job applicants with high motivation. Typically, papers in this literature have either a moral-hazard framework (such as Besley and Ghatak, 2005; Francois, 2000) or an adverse-selection framework (Handy and Katz, 1998; Delfgaauw and Dur, 2007, 2008a), or both (Francois, 2007; Prendergast, 2007). We contribute to this literature by studying occupational choice when people differ in intrinsic motivation and in ability. We show that even in the absence of information asymmetries, intrinsically rewarding jobs are associated with lower (incentive) pay and attract, on average, people with lower ability.

Previous studies have modelled public service motivation in a variety of ways: as a concern for the level of public service arising from (pure) altruism (Francois 2000, 2007; Prendergast, 2007), as enjoyment of one's personal contribution to public service (Besley and Ghatak, 2005; Delfgaauw and Dur, 2007, 2008a), and as a non-monetary benefit of being employed in the public sector, unrelated to effort or output (Handy and Katz, 1998; Macchiavello, 2008). These different approaches correspond well to Perry and Wise (1990), a key article on PSM in the public administration literature. Their typology of public service motivation includes both the "*desire to serve*" as well as the "*desire to participate*" as the latter "*can be exciting, dramatic, and reinforcing of an individual's image of self importance*" (p.368).<sup>7</sup> In most of this paper, we equate PSM with a non-monetary benefit of being employed in the public sector, and show that the presence of such public service motivation implies that, on average, individuals with relatively weak ability self-select into public management. In Section 5, however, we show that in our model, there is neither negative nor positive sorting of ability into the public sector when individuals' utility from PSM is output-dependent only. Hence, when PSM yields both output-dependent and output-independent

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<sup>7</sup>An earlier stream of research in public administration stresses the prestige value of holding a public sector job, see Perry and Wise (1990) for a brief discussion and relevant references.

benefits, negative selection of ability into the public sector arises.

### 3 The Model

We consider a perfectly competitive economy consisting of two sectors  $s \in [g, k]$ : the public sector ( $g$ ) and the private sector ( $k$ ). All individuals in the economy choose between working in the public sector and working in the private sector; including the option of being unemployed does not affect the main results. Output produced in sector  $s$  is sold at price  $p^s$  per unit. Throughout, we assume that demand for products and, hence, prices are such that production takes place in both sectors of the economy. We think of demand for public sector output as stemming from a political process, which we treat as exogenous. In most of the analysis, we shall assume that this demand for public sector output triggers market supply. Proposition 3, however, will generalize our results to the case where a social planner or a policy maker who aims to minimize the cost of public sector output designs contracts so as to attract people to produce public sector output. For simplicity, we assume that taxes are nondistortionary. This allows us to ignore taxation throughout the analysis.

People are heterogenous in two dimensions. First, they differ in managerial ability  $\alpha_i \in [0, \bar{\alpha}]$ . The implications of  $\alpha_i$  for an individual's productivity and payoff will become clear from our description of production technology below. Second, people differ in their intrinsic preference for working in the public sector relative to working in the private sector. Initially, we assume that this intrinsic utility only depends on the choice of sector. In Section 5, we study the case where it depends on the level of one's production. Let  $\gamma_i^s$  denote individual  $i$ 's intrinsic utility derived from working in sector  $s$ . For convenience, we normalize individuals' intrinsic utility from working in the private sector to zero:  $\gamma_i^k = 0$  for all  $i$ . This implies that  $\gamma_i^g$  describes an individual's *relative* intrinsic preference for working in the public sector, which we refer to as 'public service motivation' (PSM). Generally, people may intrinsically prefer to work in either sector; that is, an individual's  $\gamma_i^g$  can be positive or negative. We focus on the case where PSM is sufficiently prevalent (or, equivalently, where demand for public sector output is sufficiently low) so that in equilibrium the *marginal* individuals have strictly

positive public service motivation.<sup>8</sup> Without further loss of generality, this key assumption allows us to reduce the type space to non-negative PSM:  $\gamma_i^g \in [0, \bar{\gamma}]$ .<sup>9</sup> The density of the joint distribution of  $\alpha_i$  and  $\gamma_i^g$  is described by  $f(\alpha, \gamma) > 0$  over its support  $[0, \bar{\alpha}] \times [0, \bar{\gamma}]$  and zero elsewhere.

Production technology is identical across sectors. When individual  $i$  exerts effort  $e_i^s$  in sector  $s$ , his productivity equals  $q(e_i^s, \alpha_i)$ . We make the following assumptions about the production function. First, both effort and ability must be positive to generate production,  $q(\cdot, 0) = q(0, \cdot) = 0$ . Second, production is concave in both elements:  $q_e > 0$ ,  $q_{ee} < 0$ ,  $q_\alpha > 0$ ,  $q_{\alpha\alpha} < 0$ , where, throughout the paper, subscripts to functions denote partial derivatives. Third, we assume that ability increases the marginal productivity of effort and vice versa:  $q_{e\alpha} > 0$ .

Individuals derive utility from their income  $y$  and from their intrinsic preference for working in a sector  $\gamma_i^s$ . They derive disutility from exerting effort. The utility of individual  $i$  working in sector  $s$  is given by:

$$U_i^s = y_i^s + \gamma_i^s - c(e_i^s). \quad (1)$$

As usual, the cost of effort are increasing and (weakly) convex:  $c_e > 0$ ,  $c_{ee} \geq 0$ . Perfect competition in both sectors implies that individuals earn their full marginal product:

$$y_i^s = p^s q(e_i^s, \alpha_i). \quad (2)$$

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<sup>8</sup>Boyne (2002) reviews evidence in the public administration and management literature on differences between managers in the private and public sector, which suggests that on average, public-sector managers tend to place more emphasis on public service and less on remuneration than private-sector managers. Similar differences have been found between public and private sector employees, see in addition to the studies mentioned in footnote 4 e.g. Crewson (1997), Houston (2000), and Lewis and Frank (2002); Rainey and Bozeman (2000) and Wright (2001) provide overviews. Whether *marginal* individuals have positive PSM cannot be inferred from these studies. However, this key assumption in our paper is in line with the negative public sector wage premia at the top of the wage distribution as found by the empirical studies discussed at the end of the Introduction.

<sup>9</sup>Given that marginal individuals have positive PSM, all individuals with negative PSM always prefer to work in the private sector; see also footnote 10 below.

## 4 Optimal Effort and Occupational Choice

### 4.1 Optimal Effort

An individual who chooses to work in sector  $s$  decides how much effort to exert, taking price  $p^s$  as given. Substituting individual's income (2) into utility function (1) and maximizing with respect to  $e_i^s$ , we obtain the first-order condition:

$$p^s q_e(e_i^s, \alpha_i) - c_e(e_i^s) = 0. \quad (3)$$

Let  $\tilde{e}_i^s$  be the solution to (3) for individual  $i$  in sector  $s$ . Note that  $\tilde{e}_i^s$  does not depend on  $\gamma_i^s$ . Proposition 1 describes the comparative static effects of managerial ability  $\alpha_i$  and the product price  $p^s$  on individual's effort, which have a straightforward interpretation.

**Proposition 1** (i) Given ability  $\alpha_i$ , optimal effort  $\tilde{e}_i^s$  increases in price  $p^s$ .  
(ii) Given price  $p^s$ , optimal effort  $\tilde{e}_i^s$  increases in ability  $\alpha_i$ .

**Proof.** See Appendix A.1. ■

An implication of Proposition 1 (i) is that if  $p^g = p^k$ , a given individual would exert the same level of effort in both sectors,  $\tilde{e}_i^g = \tilde{e}_i^k$ , while if  $p^g > p^k$  (respectively  $p^g < p^k$ ), then  $\tilde{e}_i^g > \tilde{e}_i^k$  ( $\tilde{e}_i^g < \tilde{e}_i^k$ ).

### 4.2 Occupational Choice

Individuals choose their sector of employment, taking output prices  $p^k$  and  $p^g$  as given. Given optimal effort  $\tilde{e}_i^s$ , an individual's utility from working in the private sector and in the public sector is given by, respectively:

$$U_i^k = p^k q(\tilde{e}_i^k, \alpha_i) - c(\tilde{e}_i^k), \quad (4)$$

$$U_i^g = p^g q(\tilde{e}_i^g, \alpha_i) + \gamma_i^g - c(\tilde{e}_i^g). \quad (5)$$

An individual is indifferent between working in either sector when the expression in (4) equals the one in (5), which can be written as:

$$\gamma_i^g = p^k q(\tilde{e}_i^k, \alpha_i) - c(\tilde{e}_i^k) - [p^g q(\tilde{e}_i^g, \alpha_i) - c(\tilde{e}_i^g)]. \quad (6)$$

Equation (6) describes, for each level of ability  $\alpha$ , the level of public service motivation  $\gamma^g$  at which individuals are indifferent between the two sectors.

People with higher public service motivation strictly prefer the public sector, while people with lower public service motivation strictly prefer the private sector. Equation (6) can be depicted as an indifference curve in the  $(\alpha, \gamma)$ -plane, which fully characterizes the equilibrium allocation of individuals to sectors.

Lemma 1 establishes that if demand for public sector output is sufficiently high, so that marginal individuals have strictly positive PSM, the price of private sector output  $p^k$  is higher than the price of public sector output  $p^g$ .

**Lemma 1** *If  $p^k \leq p^g$ , all individuals with  $\alpha_i > 0$  and  $\gamma_i^g > 0$  prefer working in the public sector to working in the private sector. Only when  $p^k$  is higher than  $p^g$ , a strictly positive number of people with  $\alpha_i > 0$  and  $\gamma_i > 0$  choose to work in the private sector.*

**Proof.** Consider an individual with  $\alpha_i > 0$  and  $\gamma_i^g > 0$ , who optimally chooses  $e_i^k$  when working in the private sector. Suppose this individual would choose the same level of effort in the public sector, implying the same level of production. Then, if  $p^k \leq p^g$ , his payoff in the public sector is always higher because revenues are weakly higher and, since  $\gamma_i^g > 0$ , intrinsic utility is higher (compare (4) and (5)). Setting  $e_i^g$  at its optimal level increases the payoff of working in the public sector even further. Hence, if  $p^k \leq p^g$ , all individuals with  $\alpha_i > 0$  and  $\gamma_i^g > 0$  strictly prefer working in the public sector to working in the private sector, so that no production takes place in the private sector. Increasing  $p^k$  makes private sector positions more attractive, while leaving the payoff of positions in the public sector unchanged.  $p^k > p^g$  is sufficient to attract some individuals with  $\alpha_i > 0$  and  $\gamma_i^g > 0$  to the private sector. ■

Lemma 1 is crucial for our results. It shows that competition between differently motivated people for positions in the two sectors results in a difference in output prices. Competition between individuals with positive PSM for positions in the public sector drives down the public sector output price below the output price in the private sector.

This difference in prices has profound implications for the effect of ability on an individual's payoff in the two sectors, and so for the sorting of highly able people into the public sector. Proposition 2 shows that, in the relevant case where some people with positive PSM prefer to work in the private

sector, earnings rise faster with ability in the private sector than in the public sector. As a result, indifference curve (6) is upward-sloping.

**Proposition 2** *Given that some individuals with  $\gamma_i^g > 0$  prefer to work in the private sector, indifference curve (6)*

- (i) *starts in the origin of the  $(\alpha, \gamma)$ -plane, and*
- (ii) *is upward sloping for all  $\alpha_i \geq 0$  and  $\gamma_i^g \geq 0$ .*

**Proof.** (i) As  $q(\cdot, 0) = 0$ , individuals with  $\alpha_i = 0$  do not generate income in either sector and, hence, are indifferent between the two sectors when they do not intrinsically prefer one sector to the other, i.e. when  $\gamma_i^g = 0$ . Hence, indifference curve (6) crosses the origin of the  $(\alpha, \gamma)$ -plane. (ii) Differentiating (6) with respect to  $\alpha_i$  gives

$$\frac{d\gamma_i^g}{d\alpha_i} = p^k q_\alpha(\tilde{e}_i^k, \alpha_i) - p^g q_\alpha(\tilde{e}_i^g, \alpha_i) > 0, \quad (7)$$

where the effects through changes in  $\tilde{e}_i^k$  and  $\tilde{e}_i^g$  are zero by the envelope theorem. By Lemma 1, we know that  $p^k > p^g$ . From this and Proposition 1 it follows that  $\tilde{e}_i^k \geq \tilde{e}_i^g$ . Hence, since  $q_{\alpha e}(e, \alpha) > 0$ , it follows that  $q_\alpha(\tilde{e}_i^k, \alpha_i) > q_\alpha(\tilde{e}_i^g, \alpha_i)$ . It follows that  $p^k q_\alpha(\tilde{e}_i^k, \alpha_i) > p^g q_\alpha(\tilde{e}_i^g, \alpha_i)$  for all  $\alpha_i \geq 0$  and  $\gamma_i^g \geq 0$ . ■

The intuition behind this result is straightforward. The difference in output prices creates an earnings gap between the two sectors. This earnings gap increases in ability as more able individuals produce more. Hence, more able individuals suffer from a higher income loss when switching from the private sector to the public sector, implying that their PSM needs to be higher to make such a switch attractive. As a result, there is negative selection of ability into the public sector.<sup>10</sup>

Overall, our results give a bleak picture of the quality of public management. Relatively few of the highly able individuals choose careers in public

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<sup>10</sup>Adding individuals with negative public service motivation to our economy does not affect this result, as long as marginal individuals have positive PSM. If, in contrast to our key assumption, marginal individuals would have *negative* PSM, then equilibrium prices would be such that the right-hand side of (6) is negative and decreasing in ability. In contrast to the empirical evidence discussed in the Introduction, this would imply that highly able individuals would earn more in the public sector than in the private sector, and that only people with sufficient distaste for working in the public sector would opt for a position in the private sector. Given the evidence, we believe that the results we highlight are most relevant.

service (see Proposition 2). Moreover, from Proposition 1 and Lemma 1 it follows that those working in the public sector exert less effort than equally able individuals working in the private sector. Yet, this is as good as it gets: it is the most efficient way of producing public sector output. This follows directly from the absence of market failures in our economy. In other words, any attempt to deviate from the effort levels or individuals' selection into the public sector that arise under competition results in higher per-unit costs of public sector output as well as in lower social welfare. Proposition 3 underlines this result. It shows that both a policy maker aiming to minimize the costs of producing a given amount of public sector output, as well as a social planner aiming to maximize the sum of all individuals' utilities, recruit the same people into public employment and induce the same effort as results under competition.

**Proposition 3** *The self-selection of individuals into the public sector and their choices with respect to effort are efficient, both from the perspective of a policy maker aiming to minimize costs of public sector output and from a social-welfare perspective.*

**Proof.** See Appendix A.2. ■

## 5 Output-Oriented PSM

In the previous sections, we have assumed that the intrinsic utility derived from public service motivation is independent of the output one generates. As discussed in Section 2, this contrasts with some of the literature on PSM where this intrinsic utility depends on effort or (one's personal contribution to) output, be it out of impure ('warm-glow') or pure altruism.<sup>11</sup> We now show that in our framework, output-dependent utility from PSM yields ability-neutral sorting of individuals across sectors. This implies that an output-independent component is necessary to obtain negative selection of ability into the public sector, but that adding an output-dependent component to the model of the previous sections would not change our results.

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<sup>11</sup>Francois (2000, 2007) shows that in the context of monopoly supply of public sector output and in the presence of moral hazard, pure altruism leads to a free-rider problem, whereas impure altruism does not; see Francois and Vlassopoulos (2008) for an insightful discussion of this issue. In our context of perfect competition, however, this free-rider problem does not arise. Hence, in our setup, impure and pure altruism result in exactly the same behaviour.

The only difference with the model studied in the previous section is the utility function, which is now given by:

$$U_i^s = y_i^s + \gamma_i^s q(e_i^s, \alpha_i) - c(e_i^s), \quad (8)$$

where the second term reflects that intrinsic utility depends on the output one produces. Substituting (2) for income  $y_i^s$  and maximizing with respect to effort yields the first-order condition:

$$(p^s + \gamma_i^s)q_e(e_i^s, \alpha_i) - c_e(e_i^s) = 0. \quad (9)$$

Let  $\hat{e}_i^s$  denote the solution to (9). Clearly, optimal effort  $\hat{e}_i^s$  is now increasing in  $\gamma_i^s$ . Also, comparing optimal effort for a given individual across sectors, it follows from (9) and  $\gamma_i^k = 0$  that  $\hat{e}_i^k > \hat{e}_i^g$  if and only if  $p^k > p^g + \gamma_i^g$ .

It is easily verified that Lemma 1 carries over to the present model. As intrinsic utility is (weakly) higher in the public sector for all individuals, there are no individuals with positive PSM who strictly prefer the private sector when  $p^k \leq p^g$ . Hence, competition among individuals with positive PSM for public sector positions results again in a lower output price in the public sector,  $p^g < p^k$ .

The difference in output price yields a difference in the monetary return to ability across sectors. However, and in contrast to the previous section, this does not affect the total return to ability, as is shown in Proposition 4.

**Proposition 4** *There is a single level of  $\gamma_i^g$ , given by  $\tilde{\gamma} = p^k - p^g$ , at which individuals are indifferent between the public sector and the private sector. Individuals with  $\gamma_i^g > \tilde{\gamma}$  strictly prefer working in the public sector to working in the private sector and vice versa.*

**Proof.** Using (8) and (2), individual  $i$  is indifferent between the public sector and the private sector when

$$p^k q(\hat{e}_i^k, \alpha_i) - c(\hat{e}_i^k) = (p^g + \gamma_i^g)q(\hat{e}_i^g, \alpha_i) - c(\hat{e}_i^g). \quad (10)$$

From (9), it follows that if  $p^k = p^g + \gamma_i^g$ , it holds that  $\hat{e}_i^k = \hat{e}_i^g$  and, hence,  $q(\hat{e}_i^k, \alpha_i) = q(\hat{e}_i^g, \alpha_i)$ . Hence, equation (10) holds if  $p^k = p^g + \gamma_i^g$ . As utility in sector  $s$  as described by (8) is strictly increasing in  $p^s + \gamma_i^s$ , equation (10) holds only if  $p^k = p^g + \gamma_i^g$ . Hence, the level of  $\gamma_i^g$  at which people are

indifferent is independent of  $\alpha_i$ . ■

Proposition 4 shows that there is neither negative nor positive selection of ability into the public sector when intrinsic utility from public service motivation is fully output-dependent. As in the previous section, the lower output price makes the public sector relatively unattractive for high-ability individuals from a monetary perspective, because the difference in earnings between the sectors increases in ability. However, the difference in intrinsic utility between the sectors now also increases in ability. These effects exactly offset each other, so that selection into the public sector is ability-neutral.<sup>12</sup>

## 6 Concluding Remarks

We have shown that competition between people with different levels of public service motivation and managerial ability results in a negative selection of managerial ability into the public sector. The willingness of public sector managers to accept lower pay in return for (what they perceive as) a more meaningful job results in a lower per-unit output price in the public sector as compared to the private sector. This, in turn, creates a public-private earnings penalty for managers which increases in managerial ability. As a result, many of the ‘best and brightest’ managers of the economy reside in the private sector and the least able managers predominantly sort into the public sector. Moreover, managers in the public sector manage less diligently than managers with the same ability in the private sector as the public sector rewards good performance to a lesser extent.

The equilibrium allocation of managerial talent and effort that arises in our economy seems, at first sight, far from socially optimal. Yet, this allocation is efficient: it is the least costly way of producing a given amount of public output and it results in maximum social welfare as well. This has important implications for public sector human resource policies. When public service motivation is sufficiently prevalent in (a subsector of) the public sector, agencies should not aim to recruit and retain the ‘best and brightest’ managers at all cost, but rather aim at less productive, but better motivated people. Even though this results in relatively weak public management, the

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<sup>12</sup>Clearly, when utility from income and utility from PSM are concave, the two effects need not exactly cancel. Hence, either positive or negative selection may arise depending on the exact specification of the utility function.

benefits of improving the quality of public managers by increasing remuneration to private sector levels, as called for by various policy reports discussed in the Introduction, are bound to be smaller than the cost.

Our analysis can be extended in several interesting directions. The seminal papers by Rosen (1982) and Waldman (1984), on the assignment of people with heterogeneous ability to different hierarchical levels in firms, show that if managerial and subordinate inputs are complementary in production, market forces assign the best-performing individuals to the top of large organizations. Output, labour input, firm size, and managerial rewards all increase more than proportionally in managerial ability. Our model can be extended along these lines by including (the option of having) additional layers in an organization's hierarchy (the previous version of this paper (Delfgaauw and Dur (2008b)) takes some steps in that direction). This would magnify the differences between organizations in the public and the private sector. The lower ability of top managers in the public sector reduces the marginal productivity of their middle managers. This further increases the difference in return to ability between the sectors for people with intermediate ability, which exacerbates the negative selection of ability into the public sector.

The inferior management of public sector organizations implies that productivity is lower than in comparable private sector organizations. In the situation where, for reasons outside our model, a single agency produces all public sector output, an organization arises with more workers than a comparable organization in the private sector would employ. Generally, the low productivity and apparent overstaffing of government agencies is attributed to bureaucratic empire-building (Niskanen, 1971) or to political preferences for excessive employment (Haskel and Szymanski, 1993; Corneo and Rob, 2003). Our theory suggests an efficiency reason: combining less productive but highly motivated management to a larger personnel base is cost-efficient.

## A Proofs

### A.1 Proposition 1

(i) Applying the implicit function theorem to (3), we obtain:

$$\frac{d\tilde{e}_i^s}{dp^s} = -\frac{q_e(\tilde{e}_i^s, \alpha_i)}{p^s q_{ee}(\tilde{e}_i^s, \alpha_i) - c_{ee}(\tilde{e}_i^s)} > 0.$$

(ii) In a similar manner, it follows that:

$$\frac{d\tilde{e}_i^s}{d\alpha_i} = -\frac{p^s q_{e\alpha}(\tilde{e}_i^s, \alpha_i)}{p^s q_{ee}(\tilde{e}_i^s, \alpha_i) - c_{ee}(\tilde{e}_i^s)} > 0.$$

### A.2 Proposition 3

#### Public monopsonist

Consider a public monopsonist that aims to minimize the costs of producing a given amount of public sector output  $Q^g$ . The monopsonist has full information about each individual's type and can verify the effort they exert. It attracts individuals to the public sector by offering wage  $w_i$  to individual  $i$  conditional on the provision of effort level  $e_i^g$ . Individual  $i$  accepts the offer when the participation constraint is satisfied:

$$w_i + \gamma_i^g - c(e_i^g) \geq U_i^k, \quad (11)$$

where  $U_i^k$  is the utility attained by individual  $i$  when working in the private sector, as given by (4). As  $U_i^k$  is independent of  $\gamma_i^g$ , it follows that for a given level of  $\alpha_i$ , cost per unit of effort and hence output decreases with  $\gamma_i^g$ . Hence, the monopsonist prefers to attract better motivated to less motivated people. Let  $\gamma_L(\alpha)$  be the motivation of the least motivated individual the monopsonist attracts among individuals with ability  $\alpha$ . Total costs of public sector output are then given by

$$C = \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} w_i f(\alpha, \gamma^g) d\gamma^g d\alpha. \quad (12)$$

A cost-minimising monopsonist will make offers such that (11) holds with equality for all individuals the monopsonist employs. Substituting (11) into

(12) gives

$$C = \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} \left[ U_i^k - \gamma_i^g + c(e_i^g) \right] f(\alpha, \gamma^g) d\gamma^g d\alpha. \quad (13)$$

The production constraint dictates that the sum of the amounts produced by all individuals in the public sector equals  $Q^g$ :

$$Q^g = \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} q(e_i^g, \alpha_i) f(\alpha, \gamma^g) d\gamma^g d\alpha. \quad (14)$$

The monopsonist minimizes (13) with respect to  $\gamma_L(\alpha)$  and  $e_i^g$  for all  $\alpha$ , subject to the production constraint (14). For ease of exposition, we neglect the constraint that  $\gamma_L(\alpha) \leq \bar{\gamma}$  for all  $\alpha$ . After some rewriting, the Lagrangian equation reads

$$\Gamma = \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} \left[ U_i^k - \gamma_i^g + c(e_i^g + m_i^g) - \lambda q(e_i^g, \alpha_i) \right] f(\alpha, \gamma^g) d\gamma^g d\alpha + \lambda Q^g$$

where  $\lambda$  is the Lagrange multiplier for the production constraint (14). The first-order condition with respect to  $e_i^g$  for individuals with ability  $\alpha_i$  is:

$$-\lambda q_e(e_i^g, \alpha_i) + c_e(e_i^g) = 0.$$

Comparing with (3), this first-order condition is identical to the one for optimal effort under competition with  $\lambda$  replacing  $p^g$ . The first-order condition with respect to  $\gamma_L(\alpha)$  is:

$$-\int_0^{\bar{\alpha}} \left[ U_i^k - \gamma_L(\alpha) + c(e_i^g + m_i^g) - \lambda q(e_i^g, \alpha_i) \right] f(\alpha, \gamma_L(\alpha)) d\alpha = 0.$$

Hence, for any individual recruited into the public sector, it must hold that  $U_i^k - \gamma_L(\alpha) + c(e_i^g) - \lambda q(e_i^g, \alpha_i) = 0$ . Using (4), the relation between  $\gamma_L(\alpha)$  and  $\alpha$  is given by

$$\frac{d\gamma_L(\alpha)}{d\alpha} = p^k q_\alpha(\tilde{e}_i^k, \alpha_i) - \lambda q_\alpha(\tilde{e}_i^g, \alpha_i),$$

where all effects of  $\alpha$  through  $\tilde{e}_i^k$  and  $\tilde{e}_i^g$  are zero by the envelope theorem. Both the level and the slope of  $\gamma_L(\alpha)$  are identical to those defining indif-

ference curve (6) under competition when  $\lambda = p^g$ .

Noting that the public monopsonist must meet the marginal individuals' participation constraints, it follows that the shadow price of public output  $\lambda$  equals  $p^g$ . Hence, our results above imply that the public monopsonist recruits the same individuals and induces the same effort levels as arise under competition, given the level of public sector output.

### Social planner

Now consider a social planner that wants to maximize social welfare, defined as the sum of all individuals' utility minus the costs of public sector output,<sup>13</sup> subject to production constraint (14). Again, the planner attracts individuals to the public sector by offering wage  $w_i$  to individual  $i$  conditional on the provision of effort level  $e_i^g$  and subject to the participation constraint (11) holding with equality. As before, it is easy to show that the social planner prefers to attract better motivated over less motivated people to the public sector. Hence, total welfare is given by

$$\begin{aligned} \Psi &= \int_0^{\bar{\alpha}} \int_0^{\gamma_L(\alpha)} U_i^k f(\alpha, \gamma^g) d\gamma d\alpha + \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} \{w_i + \gamma_i^g - c(e_i^g)\} f(\alpha, \gamma^g) d\gamma d\alpha \\ &\quad - \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} w_i f(\alpha, \gamma^g) d\gamma d\alpha. \end{aligned} \quad (15)$$

Note that we can rewrite (15) such that  $w_i$  drops out. Clearly, since taxes are nondistortionary and utility is linear in income, public sector wages do not affect total welfare (but must fulfill the individuals' participation constraints). After some straightforward algebra, social welfare (15) can be rewritten as

$$\Psi = \int_0^{\bar{\alpha}} \int_{\gamma_L(\alpha)}^{\bar{\gamma}} \left[ \gamma_i^g - c(e_i^g) - U_i^k \right] f(\alpha, \gamma^g) d\gamma d\alpha + \int_0^{\bar{\alpha}} \int_0^{\bar{\gamma}} U_i^k d\gamma d\alpha.$$

This objective function is identical to the objective function (13) minimized by the monopsonist, except for the signs (which are, naturally, opposite) and the last term (which is a constant). Hence, social-welfare maximization,

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<sup>13</sup>Recall that, when studying the individuals' choices of effort and occupation, we ignored taxation for notational convenience. This was innocuous by our assumption of non-distortionary (lump-sum) taxation. Here, however, we need to take the level of taxes into account as it does affect individuals' utilities and, hence, the aggregate level of social welfare. Hence, we subtract the costs of public sector output (which equal the level of taxes) from the sum of individuals' utility.

cost-minimization, and perfect competition yield the same selection of people to the sectors as well as identical levels of effort.

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