Cultural Diversity, Status Concerns and the Organization of Work[*]

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February 13, 2003

Abstract

A well-documented human tendency is to compare outcomes with others, trying to outperform them. These tendencies vary across cultures and among different individuals in a given society. The workplace is an important source for social interaction. The willingness of workers to exert effort depends on the private and social rewards that they receive in the form of wages and esteem. Workers may differ in the importance that they give to status ranking and the reference group to which they compare themselves. We explore the conditions under which, at equilibrium, firms would mix workers with different status concerns. We then discuss the effects of such cultural diversity on wages and show that, for equally productive workers, wages may vary, reflecting the different incentives that firms provide to workers with different social concerns. We show that, under plausible conditions, a more diverse workforce can increase the total output of the economy.

Keywords: Diversity, Status Concerns, Aggregate Output, Wage Dispersion.

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1 Introduction

One of the interesting developments in the last decades is the transformation of homogenous societies to multi-culture multi-ethnic societies. It is enough to visit the factories or to walk in the streets of Berlin, Amsterdam, Bangkok or Tel Aviv to understand that cultural and ethnic heterogeneity is the norm rather than the exception.

The conventional wisdom is that culturally mixed societies face a higher potential for conflict, because members of such societies have different goals, habits and attitudes. In this paper, we wish to argue that diversity can also be beneficial because of the increased potential for trade amongst the different members of society. We shall illustrate this general point in the context of the labor market, where workers of different cultural background can trade in social status (see Frank, 1984a,b, 1985).

One important source of social status is the workplace. In all societies, the firm or the profession is a place for social interactions and comparisons. Workers try to outperform each other and thereby obtain esteem from their co-workers and possibly from other members of society. Because of this social interaction, the organization of work, in particular the matching of workers with different status concerns, has strong implications for welfare and economic performance

The willingness of workers to exert effort depends on the private and social rewards that they receive in the form of wages and esteem from other members of society.[1] Firms that mix workers with different preferences for status can elicit more effort from its workers by inducing the workers who care more (less) about status to exert more (less) effort. By modifying their behavior, the workers essentially trade in social status and can all be made better off. Homogenous societies provide less opportunities for such trade, because the gain of one worker is a loss to the other.

To analyze these issues in a tractable manner, we use a standard principal agent framework in which there is one sector, and firms consist of two workers and a principal.

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[1] The relationship between wages and status originates with Adam Smith. Frank (1985) analyzes this relation within firms and Fershtman and Weiss (1993) and Fershtman, Murphy and Weiss(1996) analyze it across occupations. For empirical and experimental evidence for the relevance of wage comparisons see Clark and Oswald (1996), Zizzo and Oswald (2001). Social concerns about wages go beyond status concerns and also relate to fairness and reciprocity. See, for instance, Hicks (1963), Reder (1957) and Akelof and Yellen (1990). However, we shall not discuss these important concerns here.

The workers' effort is unobserved and wages are paid based on output, which is a noisy measure of effort. The output of a worker depends on his own productivity and effort and is, in this respect, independent of other workers. However, a worker's utility may depend on the wage of the other workers. We thus bring together two strands of the literature, incentive contracts and social interactions.[2] In this respect, this paper follows earlier work of Akerlof (1982), Kandel and Lazear (1992), Lazear (1989, 1999) and Rotemberg (1994).[3] Our main purpose is to pursue the implications of *heterogeneity* in social concerns. We, therefore, distinguish between workers who care only about the wage of other workers inside the firm, workers who care about wages of workers outside the firm and workers who do not care about relative wages at all, and analyze several combinations of these types. Different social concerns may be associated with observed differences between workers and we have three examples in mind. We expect women, immigrants, and young workers to be less concerned than men, natives and senior workers, respectively, about their status in the workplace, mainly because they are less attached to the firm in which they work. In each case, we examine the implications of such differences in status concerns for the organization of work, especially whether or not mixed firms are formed, and for the implied effort, output and wage levels.

Our main results can be easily summarized. First, we find that, in equilibrium, firms mix workers with different status concerns, provided that there is sufficient heterogeneity among workers. Such mixing may require that workers differ both in their productivity and in their preferences, because otherwise the workers who gain from the association may be unable to 'bid' for the workers who are indifferent to it. Second, although workers may have the same productivity, equilibrium will generate a dispersion in (expected) wages, and workers with status concerns will have more high-powered incentives, work more and earn more than workers who do not care about status. Third, we find that a more diverse workforce can increase the total output of the economy. This increase in output is a

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[2] Gibbons and Waldman (1999) and Predergast (1999) provide recent surveys of the principal agent problems within firms. Sobel, (2001) provides a general survey of social interactions. Fehr and Schmidt (2001) survey the experimental and theoretical literature on reciprocity and Charness and Rabin (2002) attempt to identify experimentally the separate roles of reciprocity, fairness and inequality aversion.

[3] Auriol and Renault (2001) also analyze the impact of status concerns on incentives in a principal agent model. They allow firms to provide, at no cost, status symbols that are *independent* of wages, and show that higher levels of effort can be elicited.

result of the higher effort exerted by the status minded workers that offsets the reduction in effort by those who do not care about status and, therefore, it must involve increased variability in wages.

2   Diversity and status concerns

Diversity can take many forms. Much attention has been given to observed features such as gender, race and ethnic origin. However, these measurable factors are related to more basic individual and group characteristics and can operate in a complex manner.[4] Individuals with different cultural background may find it harder to communicate and share information and thus build trust and cooperation. Nevertheless, diversity in the society at large and in organizations has its benefits. In the market place, individual differences create the potential for trade and division of labor. Within smaller units, such as firms, individuals of different cultural background can exchange ideas and aggregate information (see Thomas and Ely, 1996, and Ely and Thomas, 2001). In this paper, we focus on diversity in preferences and in particular in status concerns

Social status is a ranking of individuals (or groups of individuals) in a given society, based on their traits, assets and actions.[5] A person of high social standing expects to be treated favorably by other individuals with whom he might engage in social and economic interactions. This favorable treatment can take many forms: transfer of money goods, transfer of non-market goods (through marriage, for instance), transfer of authority (letting the high status person be the leader) modified behavior (such as deference or cooperation) and symbolic acts (such as showing respect). Because of these social rewards, each individual seeks to increase his status through group affiliation, investment in assets (including human and social capital) and an appropriate choice of actions.

Status ranking are relative in nature and individuals compare themselves, and are compared by others, to other individuals within some reference group. Depending on the nature of the social and economic interactions, the reference group may include members

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[4]Alesina et al. (2002) and Fearon (2002) examine in detail the problems associated with the construction of an operational measure of diversity.

[5]This section relies on Weiss and Fershtman (1998). The interested reader is referred to this survey for the relevant references.

of the family, colleagues at the place of work, members of the same ethnic group, or members of society at large.

In this paper, we are mainly interested in the status that a worker receives in the workplace and we assume that it is directly related to his or her wage. However, depending on the reference group this wage can be compared to the wage of different individuals. Workers who are strongly attached to a particular firm will compare their wage to other workers in the firm, and derive their status benefits from the association with their co-workers.[6] Workers who are less attached to their work place may compare their wages to the wages of individuals outside the firm, such as family members, compatriots, members of the same ethnic group, or to a random member of the society. Of course, a person cares about his or her wage not only because of the possible social benefits, but mainly because of the direct benefits that can be obtained through the purchase of market goods. Different individuals may have different preferences over these different benefits. That is, some may care more about social status, relative to private goods, than others. Our analysis will allow for such heterogeneity too.

We wish to point out, at the outset, the social concerns that will not be discussed in this paper. We shall not discuss discrimination or xenophobia, where some individuals have low status based on their gender or ethnic origin. This is not because we dismiss such phenomena as being empirically irrelevant, but rather because we find situations in which individuals can influence their social status via some actions more interesting from a theoretical point of view. In this paper, the main instruments by which an individual can affect his or her social status are the choice of firm and the amount of effort exerted on the job. Other important channels such as investment in schooling and choice of occupation have been discussed in our previous work.[7]

The assumption that social status depends only on wage comparisons is restrictive, because individuals can earn distinction and esteem in ways that are unrelated or con-flicting with income. In addition, wages may not be directly observable and other means, such as conspicuous consumption, are used to indicate the relative ranking in the income

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[6]Frank (1984a,b, 1985) was the first to recognize the importance of local status that is provided by firms.

[7]See Fershtman, Murphy and Weiss (1996).

distribution. Our interest in wages is derived from our more general interest in the roles of private and social rewards in eliciting effort. A starting point is to recognize that wages play a dual role in this respect. They provide a private reward that can be used to purchase market goods and a social reward that, depending on the wage of others, can be used to obtain non-market goods.

3 Local status: Status at work

We first examine a diverse society consisting of two groups of workers. One group consists of status minded individuals whose status is determined by the difference between their own wage and the wage of their co-workers. When these workers are matched in one firm, they will try to outdo each other, by exerting more effort. We refer to this pattern of behavior as status oriented or competitive behavior. The other group consists of individuals who may have no status concerns, or status concerns that are unrelated to their wage. Such workers will not act in a competitive manner.

3.1 The model

The economy consists of a large number of workers and firms. Firms offer a wage contract and workers choose in which firm to work, depending on the contracts they are offered and the characteristics of the firms. There is a free mobility of workers between firms and no entry or exit costs for firms.

Production: The output of worker i depends on his productivity t_i, his effort e_i and a random shock ε_i. We let $\tilde{y}_i = t_i e_i + \varepsilon_i$; where e_i denotes his effort, t_i his productivity and ε_i is an *iid* random shock with zero mean. We start by assuming that all workers have the same productivity and normalize t_i to unity. We will later consider the case in which workers may have different t_i and there is a correlation between types (status concerns) and productivity. We assume that firms have a capacity constraint and employ only two workers. Each firm's output is the sum of the output of the two workers.[8]

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[8]The assumption of independence in production allows us to focus on the interactions that results from preferences.

Preferences and Diversity: Workers are risk neutral and their utility is assumed to be linear in wages. Some of the workers are assumed to care about their local status which is assumed to be captured by the difference in their wage from the wage of other workers in the firm.[9] Effort is costly and we denote by $v(e_i)$ the cost (or disutility) of effort. The utility function is assumed to be of the form

$$u_i = \tilde{w}_i + \delta_i \beta (\tilde{w}_i - \tilde{w}_j) - v(e_i), \tag{1}$$

where $\tilde{w}_i$ is agent i's realized wage and $\tilde{w}_j$ is the wage of the other worker who is employed by the *same* firm. β represents the relative importance of local status compared with own consumption, and δ_i, where $\delta_i \in \{0, 1\}$, indicates whether or not individual i cares about his local status.

We assume that there are only two types of workers. Workers who care about their relative wage in the firm (local status), for whom $\delta_i = 1$, and workers who do not care about any wage comparisons, for whom $\delta_i = 0$. The proportions of type 1 and type 2 workers in the population are ξ and $(1 - \xi)$, respectively, where $0 < \xi < 1$. Thus, ξ represents the degree of diversity, where $\xi = 1$ and $\xi = 0$ represent homogenous populations while $\xi = 1/2$ is a fully diverse society with two types of equal size.

Wage Contracts and the Choice of Effort: We assume that the output of each agent is observable and can be contracted upon. Given the utility function (1) it is sufficient to condition the wage of each worker on his own output and to restrict ourselves to *linear* contracts, which will achieve first best levels of effort. We thus set

$$\tilde{w}_i = s_i + a_i \tilde{y}_i, i = 1, 2. \tag{2}$$

where s_i is the salary and a_i is the 'piece rate'.

Given the contract, workers choose effort levels to maximize their expected utility, yielding

$$e_i = a_i(1 + \delta_i \beta), i = 1, 2. \tag{3}$$

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[9]A companion paper, Fershtman, Hvide and Weiss (2002), provides a similar model with risk averse workers. That paper focuses on the case in which the reference group is outside the firm.

The implied expected profits made by the firm are,

$$E(\pi) = e_1(1 - a_1) + e_2(1 - a_2) - s_1 - s_2. \tag{4}$$

Given the characteristics of the workers that join the firm, δ_i, the risk neutral firm chooses the wage parameters (s_i, a_i); $i = 1, 2$, so that expected profits are maximized subject to each worker obtaining at least his reservation utility r_i. The workers' reservation values, r_i are endogenously determined and depend on the contracts offered by other firms. We must therefore solve for an equilibrium that specifies contracts in *all* firms, using the condition that workers cannot benefit by switching employers and firms cannot gain from changing the contract that they offer.

Because of the interdependence in preferences, firms with a different mix of workers will provide different incentives to their workers. At equilibrium, some firms will employ workers with identical preferences and other firms will employ workers with different preferences. We shall refer to these two types of firms as homogenous (or segregated) and heterogenous (or mixed), respectively.

The linearity assumption in preferences and the wage contracts imply transferable utility and allows us to simplify the analysis considerably. In particular, we can determine the incentive structure provided for workers of each type and the consequent effort level before considering the full market equilibrium, because these are independent of the reservation utility levels.

Consider the maximization of the firm's profit subject to the constraints that each workers receives at least his reservation utility. The associated Lagrangian is

$$L = E(\pi) + \lambda_1[E(u_1) - r_1] + \lambda_2[E(u_2) - r_2]. \tag{5}$$

where, λ_1 and λ_2 are constants that depend only on the preferences of the two workers. For any choice of the incentive parameters (a_1, a_2) the maximization with respect to (s_1, s_2) yields

$$\lambda_i = \frac{1 + 2\delta_j\beta}{1 + \delta_1\beta + \delta_2\beta}, \ i, j = 1, 2. \tag{6}$$

Using these conditions to eliminate the λ_1 and λ_2 from L, we see that the firm chooses

the incentive parameters (a_1, a_2) that induces the worker to exert first best levels of effort that maximize the total 'pie' given by

$$W = e_1 + e_2 - \lambda_1 v(e_1) - \lambda_2 v(e_2), \tag{7}$$

and the induced effort levels must satisfy

$$\lambda_i v'(e_i) = 1, \ i = 1, 2. \tag{8}$$

For convenience, we shall assume hereafter that $v(e) = \frac{1}{2}e^2$ so that $e_i = \frac{1}{\lambda_i}$.

3.1.1 Homogenous firms

Consider a firm that hires two workers with the same preferences (either they both care about their local status or they both do not care about it). Given that in such a case $\lambda_i = 1$, we obtain that

Proposition 1 *(i) The first best effort levels in segregated firms are* independent *of whether workers do or do not care about local status and given by* $e_1^* = e_2^* = 1$. *(ii) To implement this outcome, the firm offers* different *contracts to the two types,* $a_i = 1$ *if the two workers do not care about status and* $a_i = (1 + \beta)^{-1}$, $i = 1, 2$, *if they both care about their local status.*

The independence of effort from β follows from the fact that the local status concerns are purely relative and wash out when the firm hires workers with identical preferences.

When both workers care about local status, incentives are slackened (i.e., $a_i < 1$). Intuitively, agents in such a case are eager to invest more effort to gain status. If such a worker would get the incentives $a_i = 1$, he would try to compete with other workers and work harder, to the point where the marginal product exceeds the marginal cost of effort. In such a "rat-race" the firm acts as a coordinator and mitigates the wasteful competition by reducing the monetary incentive for effort, compensating the workers with a fixed payment.

3.1.2 Heterogenous firms

Consider now a firm that hires two workers, one who cares about his local status (a type 1 worker) while the other does not (a type 2 worker). Given the appropriate λ_1, λ_2 from (6), we obtain the following:

Proposition 2 *(i) The first best effort level of the status minded worker, $e_1 = 1 + \beta$, exceeds the effort level of the worker who does not care about status, $e_2 = \frac{1+\beta}{1+2\beta}$. (ii) To implement this outcome, the firm offers* different *contracts to the two types, with $a_1 = 1$ to the worker who cares about status and $a_2 = \frac{1+\beta}{1+2\beta} < 1$ to the worker who does not.*

The important insight of proposition 2 is that the status minded worker gets a stronger incentive to exert effort in a heterogenous firm than in a homogenous firm. The worker that does not have a local status concern on the other hand is given a weaker incentive to exert effort in a heterogenous firm than in a homogenous firm. This is because the firms internalize the status concerns and can increase the utility of both workers by reducing the effort of the non-competitive worker. The firm has an interest in doing so, because it can then attract workers at lower wages.

3.2 Market equilibrium

As a benchmark, consider first the equilibrium in an homogenous workforce, i.e., $\xi = 0$ or $\xi = 1$. In such societies, all firms will have two workers with the same preferences. We have shown above that in such a case workers exert the same level of effort, $e = 1$, whether or not the care about status, which implies that the level of effort and aggregate output are independent of whether $\xi = 0$ or $\xi = 1$.

The independence of effort from status concerns in homogenous societies is a consequence of the role that firms play in our model. Recall that firm compete for workers by offering them a wage contract, and in doing so they have an interest to eliminate all externalities that are internal to the firm. In the absence of such coordination by the firms, homogenous societies consisting of different cultural types display different economic performance. Imagine, instead, a society in which everyone is self employed, but individuals meet socially and compare their wages. For example, wage comparison are made with

a randomly matched member of society. Then, in a homogenous society where everyone cares about status, the effort of each worker will be $e = 1 + \beta$, while in an homogenous society consisting of individuals who do not care about status the effort of each worker will be $e = 1$. Although output is higher in the first society, welfare is lower because workers engage in an inefficient rat-race, where workers try to outdo each other but the end outcome is that they gain no status.

Let us now consider the equilibrium in a heterogenous society with $\xi \in (0, 1)$. Recall that there is a large number of firms with free entry and exit, and a fixed number of workers, with a fraction ξ of the competitive type, and the worker type being observable.[10] Workers choose the firm they work for and there is a free mobility of workers among firms. Since each firm employs exactly two workers, there must be some firms that employ two workers of the majority type. That is, at equilibrium, there are always segregated (homogenous) firms that employ two workers of the majority type. Since we assume free mobility, workers of the majority type must have the same utility in segregated and heterogenous firms. From our previous analysis, two workers of type j work in the same firm, will exert the same level of effort, 1, and the their cost of effort is $\frac{1}{2}$. The total expected output of the firm is equally divided and each worker has an expected wage of 1 and expected utility of $\frac{1}{2}$. Thus, the reservation utility of the majority type is $r_j = \frac{1}{2}$.

We can now calculate the utility of the minority type worker in a mixed firm and compare it to what she might get in a segregated firm consisting of two minority workers. If we can show that the minority workers get a higher utility working with mixed firm then, at equilibrium, all workers of the minority type will work in mixed firms. If the minority workers get higher utility working in a segregated firm then there are no heterogeneous firms in equilibrium, implying that some firms will hire only type 1 workers and some firms will hire only type 2 workers.

Proposition 3 (Industry Structure) *Mixed firms are always formed in equilibrium. Specifically, when a type j is the minority, all workers of this type will be employees in*

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[10]If types are correlated with gender or ethnic background or age then types are easily observable. In a previous draft, we considered a model in which workers signal their preference for status by acquiring schooling. The basic idea there is that schools sort individuals not only based on ability but also based on motivation.

heterogenous firms. When a type j is the majority type, then there are some segregated firms employing two workers of type j and some mixed firms employing the two different types of workers.

Proof. See the Appendix. ∎

The intuition for Proposition 3 is as follows: If the two types of workers mix, and both types exert the same effort as in segregated firms, the expected utility of type 1 worker increases while the expected utility of type 2 and the firms' expected profits remain the same. By coordinating efforts levels, raising the effort of type 1 worker and reducing the effort of the type 2 worker, the firm can further increase the expected utility of the minority type, keeping the expected utility of the majority type fixed at its reservation value, while holding expected profits constant. Thus, mixing is motivated by the modified behavior of workers with different tastes within firms that generates local status that one worker enjoys and the other is willing to provide.[11]

3.3   Equilibrium wage structure

Wage differentials occur in this model as a result of the different incentives that firms offer to workers of different types and the induced differences in effort (and not because of differences in productivity). Recall that wages depend not only on the worker's effort but also on random shocks. We, therefore, discuss the *expected* total wage payment that each worker receives. To economize on notation, we omit the expectation operators and denote the expected wage of a worker of type i by w_i and the expected output by y_i.

In the absence of diversity, there is only one level of (expected) wages in our model. When some of the workers care about status, there are three levels of (expected) wages, two for the majority type and one for the minority type.

Proposition 4 *For any $\xi \in (0, 1)$,*

(i)Status minded workers in heterogenous firms earn more than workers without status concern.

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[11]This mechanism differs from Frank (1984a), who obtains mixing because of inherent differences in productivity.

(ii) The mean expected wage in heterogenous firms exceed the mean wage in homogenous firms.

(iii) When status minded workers are in the minority, i.e. $\xi < \frac{1}{2}$, $w_1^{het} > w_2^{\mathsf{hom}} > w_2^{het}$.

(iv) When status minded workers are in the majority, i.e. $\xi > \frac{1}{2}$, there are two possible orders, depending on the intensity of status concerns, β. For a low β, $w_1^{het} > w_1^{\mathsf{hom}} > w_2^{het}$ and for a high β, $w_1^{het} > w_2^{het} > w_1^{\mathsf{hom}}$.

Proof. See the Appendix ∎

The reason that type 1 workers always receive a higher (expected) wage than type 2 workers in mixed firms is the stronger incentive to exert effort provided to the status minded workers. Thus, if type 2 workers are the majority, their reduced effort must also imply a lower expected wage, since their expected utility is constant. On the other hand, the type 1 workers, who exert more effort, are compensated partially by having a higher local status and partially by increased wages. If type 2 workers are in the minority, such workers will be compensated for the association with type 1 workers and, for sufficiently strong status concern, the type 2 workers in mixed firms earn more than type 1 workers in homogenous firms.

The above analysis indicates a very specific wage dispersion. While the population of workers in our model is identical in terms of ability or productivity, the differences in status concerns translate into wage inequality. In equilibrium, workers that are not concerned with their local status and work in mixed firms get the lowest wage in the society (for sufficiently low β). Their wage would have been higher if they could work in segregated firms. The highest wage is received by status minded workers in mixed firms. Although we get wage dispersion among equally productive workers, driven by differences in effort, we also have wage compression in the following sense. In homogenous firms, both workers receive expected wages that equal their expected output. In mixed firms, the expected wages of status minded workers fall short of their expected output, while workers who do not care about status receive a wage that exceed their expected output. Thus, the competitive worker "transfers" part of his output to the noncompetitive worker, as a payment for the association and for the willingness to reduce his effort. The size of this payment depends on the relative supply of the two types and the wage incentives to

exert effort provided to the two types of workers.

3.4 Differences in output

Different types of firms provide different incentives which imply different levels of output. Under our assumptions, the total expected output of homogenous firms is 2, while heterogenous firms have an expected output of $2 + \frac{2\beta^2}{1+2\beta}$. Thus, heterogenous firms have higher expected output than homogenous firms and the gap rises with β. In other words, the status minded worker in a mixed firm is induced to increase his effort by more than the person who does not care about status is induced to reduce his effort. This result, however, depends on the functional form of the the cost of effort, $v(e)$, and on the assumption that the two workers have the same productivity.

Let us first discuss the role of the marginal cost of effort. Recall that, by (8), the effort levels of the two workers in the heterogenous firms must satisfy $\lambda_i v'(e_i) = 1$, so that $v'(e_1) = 1 + \beta$ and $v'(e_2) = \frac{1+\beta}{1+2\beta}$. Thus, if $g(x)$ is as the inverse of the marginal cost of effort, the expected output of a homogenous firm is $y^{\text{hom}} = 2g(1)$ and the expected output of a heterogenous firm is $y^{het} = g(1 + \beta) + g(\frac{1+\beta}{1+2\beta})$. For $\beta = 0$, output is the same in the two types of firms. A sufficient condition for $y^{het} - y^{\text{hom}} > 0$ for any positive β is that $g(x)$ is convex. Some degree of concavity of $g(x)$ is consistent with rising output, but it is easy to construct examples in which output declines, because the increase in effort by the status minded worker is smaller than the reduction in effort by the worker who does not care about status.[12]

Consider now the role of differences in productivity and further assume that there is a positive correlation between status concerns and productivity such that status minded individuals are also more productive.[13] One can then generalize Proposition 3 and show

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[12]A border line case is when the cost of effort is $v(e) = -b\ln(a - e))$ where $a > 2b > 0$. For this specification, the marginal cost is convex and effort cannot exceed a. For this case,

$$y^{het} = a - \frac{b}{1 + \beta} + a - b\frac{1 + 2\beta}{1 + \beta} = 2a - 2b,$$

which is independent of β, implying that $y^{het} = y^{\text{hom}}$. Any convex transformation of this function yields that $y^{het} < y^{\text{hom}}$.

[13]Such a positive correlation may be motivated by a signaling equilibrium in which status minded individuals acquire more schooling. However, we shall not elaborate this idea here.

that heterogenous firms are formed in equilibrium (see the Appendix). Maintaining the assumption $v(e) = \frac{1}{2}e^2$, the effort levels of the two types of workers are $e_i = t_i$ in an homogenous firm and $e_1 = (1 + \beta)t_1$ and $e_2 = \frac{(1+\beta)t_2}{(1+2\beta)}$ in a heterogenous firm. The corresponding outputs are $y^{hom} = 2t_i$ and $y^{het} = t_1^2(1 + \beta) + \frac{t_2^2(1+\beta)}{1+2\beta}$. Compared with the case of identical productivities, β has a stronger positive effect on y^{het} when $t_1 > t_2$, because the heterogenous firm shifts the allocation of effort in the direction of the more productive worker. For the same reason, one would expect that output will rise for a broader class of specifications for the cost of effort, $v(e)$.

3.5   Aggregate Output

Proposition 3 implies that whenever only some of the workers have local status concerns then, at equilibrium, a heterogenous type firm will employ all the minority type workers while the remaining majority type workers will be employed by homogenous type firms. Therefore, the degree of diversity, ξ, affects the relative number of mixed firms, which based on our previous analysis, produce higher output. We can use these results to determine the effect of the degree of diversity on the total aggregate output.

We continue to assume that the cost of effort is $v(e_i) = \frac{1}{2}e_i^2$ and consider first the case in which all the workers have the same productivity. In this case,

Proposition 5 *(Diversity and output) (i) An increase in the proportion of the status minded individuals in the population, ξ, raises aggregate output when $\xi < .5$ and reduces aggregate output when $\xi > .5$. Consequently, aggregate output is maximized when the population is (almost) evenly divided between the two types of agents.*

(ii) An increase in degree of competitiveness, β, raises aggregate output.

Proposition 5 illustrates the possible advantage of having a diverse society with individuals that have different social concerns. The diversity in our case implies a higher aggregate output as well as a higher average wage. The mechanism that leads to such an outcome is 'cultural trade'. Firms manipulate the incentives they provide, inducing the worker that care about status to exert more effort, while inducing the worker who does not care about status to reduce his\hers effort.

In the above discussion, all workers were assumed to be equally productive. A question is whether we get the same result if the status minded worker is more productive, i.e., $t_1 > t_2$. In such a case, the distribution of types influences both the gains from mixing and the average workers' productivity. The impact on aggregate output depends on the relative strength of these two opposing effects. To illustrate this issue, we shall maintain the assumption that the cost of effort is $v(e_i) = \frac{1}{2}e_i^2$ then aggregate output, Y, is

$$Y = \begin{cases} 2n\left(\xi[t_1^2(1+\beta) + t_2^2\frac{(1+\beta)}{(1+2\beta)}] + (1-2\xi)t_2^2,\right) & \text{if } \xi < .5, \\ 2n\left((1-\xi)[t_1^2(1+\beta) + t_2^2\frac{(1+\beta)}{(1+2\beta)}] + [1-2(1-\xi)]t_1^2\right) & \text{if } \xi > .5. \end{cases} \tag{9}$$

Raising β will clearly result in a higher aggregate output. Given ξ, the number of heterogenous firms is fixed, but as we showed above a higher β raises output even if workers have the same productivity. But now output will be raised even further since the workers that raise their effort are the high productivity workers.

An increase of ξ has a more complex effect. When $\xi < .5$, the majority of workers are of type 2, and an increase in ξ implies also that low productivity type workers are replaced by high productivity, type 1 workers, who also exert more effort when placed in heterogenous firms. However, if $\xi > .5$ then the new type 1 workers are placed in homogenous firms where they exert less effort, so that aggregate output will decline if β is sufficiently high. That is, when $\xi > .5$ whenever β is small, an increase in the proportion of agents who care about status, ξ, raises aggregate output. For β sufficiently large, aggregate output rises if $\xi < .5$ and declines if $\xi > .5$. In such a case aggregate output is maximized when the population is (almost) evenly divided between the two types of agents.

Figure 1 illustrates proposition 5 and describes the output per worker for $t_1 = 1.5$, $t_2 = 1$, and $\beta = 0, 0.5, 1$.

FIGURE NEEDS TO BE INSERTED

We remark again that all the above results depend also on the functional form of the cost of effort $v(e)$. If this function is convex, it is possible that mixed firm will produce less and therefore an increase in their number may lead to a reduction in aggregate output.

4 Different Reference Groups: Local and global status

In the previous section, we assumed that some of the workers care about local status while the others do not care about status at all, or have a status ranking that is independent of wages. In this section, we consider a different profile of preferences, such that all the workers derive their status from wage comparisons, but differ in their social reference group. Specifically, we assume that type 1 workers care about local status at work, while type 2 workers compare themselves (i.e., their wage) to a reference group outside the firm. This reference group can be the whole population or a more specific group such as individuals of the same ethnic background or age. We will refer to such status concerns as global, since in such a case the reference group of the worker is outside the firm and therefore cannot be manipulated by the firm.

4.1 The Model

Preferences are now given by

$$u_1 = w_i + \beta(w_i - w_j) - \frac{1}{2}e_i^2, \tag{10}$$

$$u_2 = w_i + \beta(w_i - \bar{w}_2) - \frac{1}{2}e_i^2, \tag{11}$$

where $\bar{w}_2$ is the average wage of the relevant reference group of type 2 workers. We assume for simplicity that the intensity of status preferences, β, is identical for the two groups.[14]

As in the previous section we assume linear contracts $w_i = s_i + a_i y_i, i = 1, 2$ and consider first the case of equally productive workers. Following the same analysis as in the previous section, we obtain

Proposition 6 *(homogenous firms)(i) The first best level of effort in a homogenous firm with two workers that care about their* local *status, is lower than in a homogenous firm*

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[14]The modification of this assumption is straightforward from our analysis.

with two workers care about their global *status. The respective levels of effort are* $e_i^* = 1$ *and* $e_i^* = (1 + \beta)$.

(ii) (heterogenous firms) Am heterogenous firm that hires two different workers, one that cares about local *status and one that cares about* global *status, will induce the status minded worker to exert more effort. The respective first best levels of effort are* $e_1^* = 1 + \beta$, *and* $e_2^* = \frac{(1+\beta)^2}{1+2\beta}$.

Proof. See the Appendix. ■

The difference between the two types of homogenous firms is that the firm does not co-ordinate the reduction of effort when the reference group is outside the firm. In contrast, an heterogenous firm employing one worker of each type takes into account the externalities that the "global" worker imposes on the "local" worker. However, the attempt to reduce the effort if the global worker makes the association less attractive to this type and we obtain

Proposition 7 *In a society with two types of workers, type* 1 *that cares about local status and type* 2 *cares about his global status, only homogenous firms are formed in equilibrium.*

Proof. See the Appendix ■

The intuition for this non mixing result is that when type 2 workers care about global status, it will be too costly for type 1 workers to compensate the type 2 workers to reduce effort, because such a reduction impinges on their global status. In equilibrium, there is trade in status concerns within firms. The equilibrium is, therefore, characterized by a complete segregation of the two types. Individuals with local status concerns will work in separate firms and earn an (expected) wage of 1, while the individuals with global status status concerns will work in different firms and earn an expected wage of $1 + \beta$.

The situation is quite different if the two types have different productivity and $t_1 > t_2$ so that the person who cares about local status also has a higher productivity. In this case, workers in homogenous firms exert the effort levels $e_1 = t_1$ and $e_2 = t_2(1 + \beta)$ and the corresponding wages are $w_1^{\text{hom}} = t_1^2$, $w_2^{\text{hom}} = t_2^2(1 + \beta)$. Now consider breaking the two homogenous firms and mixing the two types of workers in a heterogenous firm. The effort levels in the heterogenous firm are give by $e_1 = t_1(1 + \beta)$ and $e_2 = t_2\frac{(1+\beta)^2}{1+2\beta}$ so that the

person who cares about local status raises his effort and the one who cares about global status reduces his effort. If it can be shown that even without this modification in effort the person who cares about status gains while the one who does not is indifferent, which would hold if

$$w_1^{\text{hom}} - w_2^{\text{hom}} = t_1^2 - (1 + \beta)t_2^2 > 0, \tag{12}$$

then by modifying the effort in the heterogenous firm, the two workers can be made even better off, and therefore mixing will occur. We can, therefore conclude that

Proposition 8 *Assume that a worker who cares about local status is also more productive than the type of worker who care about global status, $t_1 > t_2$. Then, if the difference in productivity is sufficiently large, so that condition (12) holds, mixed firms are formed in equilibrium. In such firms, the status minded and more productive worker will exert more effort.*

More generally, differences in productivity are a separate source for gains from trade in status concerns that exists even if workers do not modify their behavior. If this difference is large enough, workers who care about local status are willing and able to pay for the association with workers who care about their status outside the firm.

5   Discussion

Our model has implications for the wages of different strata of the population, depending upon their assumed preferences.   We shall briefly discuss some cases in which we have some prior knowledge or indications of differences in preferences.

   Immigration: Immigrants and guest workers often work at low status jobs receiving lower wages than natives. During their initial period in the host country, immigrants seem less concerned than natives about the implied loss of status, because their reference group includes mainly other immigrants or related individuals in the source country.[15] According to our model, immigrants with strong status concerns outside the firm will choose not

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[15]The large wave of immigration from the former USSR to Israel in the early 1990's illustrates this point. These immigrants found work very quickly but in low status jobs. Within 5 years, only 30% of the immigrants worked at the same level of jobs as in their country of origin. They also report almost no *social* contact with native Israelis.

to mix with local workers and work with other immigrants in segregated firms. In this respect, social segregation can lead to occupational segregation, whereby immigrants concentrate in specific industries, firms or jobs. Other immigrants, possibly those who have stayed longer in the new country or plan to do so, are more likely to join mixed firms and work together with natives. Our model also suggests that these immigrants will receive lower wages than their coworkers and also lower wages than immigrants in the segregated occupations. These results seems to square well with the facts. It seems unlikely, however, that immigrants in fact exert less effort in the mixed firms. A consideration that we have not incorporated in our analysis is that immigrants have important investment motives that may induce them to spend less "effective time" in work, using some of the time to the acquisition of general skills, such as language and familiarity with local market conditions, skills that they plan to use in subsequent job matches (See Eckstein and Weiss, 2003).

A puzzling finding is that even large and concentrated waves of immigration have only negligible impact on the wage of natives. This lack of effect is usually ascribed to entry of capital that complements the entry of workers and mobility of native workers into different jobs or locations (see Card, 2001, Freidberg, 2001, and Weiss, 2000). According to our model, when immigrants are in the minority, natives who associate with them in mixed firms will have no change in utility because they continue to receive their reservation utility, which reflects the option to move to alternative (homogenous) firms. However, the wage and effort of these native workers will rise, as they obtain stronger incentives to exert effort. Thus, our model provides a channel by which immigrants can exert a *positive* effect on the wages of local workers with the same productivity, based on the difference in preferences between the two groups.

Gender: It is often argued that women earn less than observationally similar men because of discrimination. An alternative explanation for the wage gap between the genders is based on the different incentives to invest in human capital that stem from the lower attachment of women to the labor force (see Polachek and Siebert, 1992). Our model indeed shows that if women are less attached to a particular firm and, therefore, care less about local status, they would get weaker wage incentives have lower wages than

equally productive men within the same firm.[16]

A related issue that received much attention is the lower promotion rates of women and their relative scarcity at high level positions (see Lazear and Rosen, 1990). Although our model does not discuss promotions, it is easy to rephrase it so that the higher wage in the firm is associated with a higher position or rank. Under this reinterpretation, to the extent that women care less about their relative wage in the firm, promotion policies provide them with weaker incentives and, therefore, they are less likely to be promoted.

Finally, we may speculate on the impact of the increased entry of women into the labor force and the transformation of some occupations, such as law, from a "male" occupation to one with a balanced sex ratio. According to our model, men who work with women in mixed firms exert more effort and will make higher wages than the women who enter these firms, and also higher wages than men who continue to work with men in homogenous firms. The first observation appears to be consistent with the facts, but we are not aware of evidence that bears on the second observation.[17]

Seniority: Wages tend to rise with seniority even if the workers productivity remains the same (see Medoff and Abrahm, 1980). The usual explanation for this phenomenon is associated with firm specific investments and a rising wage profile that is designed to induce the workers to stay with the firm. Our model suggests that senior workers receive stronger incentive to exert effort and earn more because they are more likely to stay with the firm and therefore are more concerned about their status inside the firm. This consideration is closely related to the findings by Gibbons and Murphy (1992) that incentives are in fact made stronger with seniority. Their explanation is that young workers have stronger career concerns, anticipating to move on to other firms, and therefore need less incentive from the current firm to exert effort. We make the additional point that senior workers may suffer a negative externality by the excessive zeal of the young, which is a further reason to weaken the incentives of the young.

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[16]Even with the same degree of attachment, women may be less "competitive" than men in the sense that they react less strongly to monetary incentives when playing against men (see Gneezy et al., 2003).

[17]There may be also aggregate effects associated with the feminization of the professions, including a loss of occupational status that, depending on the specific model, may lead to lower or higher wages of all workers in the occupation. But these issues are beyond the scope of this paper.

6   Concluding Remarks

While social concerns are typically the focus of sociological studies, they cannot be ignored by economists, because of their impact on economic performance. Indeed, there is a growing interest among economists in the effects of social concerns on various economic outcomes, such as investment in education, occupational choice, growth and the distribution of income. Societies and individuals may differ in the weight that they put on individual incentives and equity considerations. Thus, one question for analysis is the economic implications of such *cultural* differences on economic performance.[18] However, many societies are also characterized by cultural *diversity* that reflects the heterogenous preferences of their members. Does a society benefit from such a diversity or is homogeneity a key for political stability and economic success? This is a debated issue with important policy implications in the areas of education, immigration, taxation and welfare programs.[19]

As economists recognize, differences in preferences can enhance trade and for this reason diversity may be beneficial.[20] In this paper, we extend the basic economic concept of "gains from trade" in goods to trade in social or cultural concerns and show that diversity may be beneficial when such a trade is feasible. The question is how societies may develop mechanisms that facilitate such trades. We have emphasized how the labor market may fill this role. Specifically, firms in our model offer the workers who care about status a wage contract with higher sensitivity to output but a lower fixed payment than the contract that is offered to workers who do not care about status, thereby inducing these workers to modify their behavior and creating internal differences that one worker enjoys and the other is willing to supply. In this manner, firms internalize the workers social concerns and make cultural trade feasible. The cultural trade inside the firms

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[18]For instance, Lipset (1993) notes that despite many similarities, Canada and the US have marked cultural differences which cause significant differences in welfare policy, unionization and entrepreneurship. Devroye and Freeman (2001) find that surprisingly little of the greater dispersion of wages in the US compared to (a sample of) European countries can be attributed to differences in the skill distribution. This discrepancy suggests a possible role for cultural and institutional differences.

[19]See, for instance, Glazer (1997) for a discussion of the dilemma between the melting pot and multicultural approaches in schools.

[20]However, too much diversity can eliminate trade altogether, if the gains from trade are unbounded (see Chichilinski, 1994).

was shown to have important effects on the wage dispersion and aggregate output of the economy (society).

Economists are well aware of the other important considerations that are involved in the debate on the desired (or feasible) level of heterogeneity that may conflict with the gains from trade. The most important issues are probably associated with the provision of public goods in a multi-cultural political economy. In fact, there is some evidence that ethnic divisions and cultural fractionalization do reduce spending on public goods and weaken economic growth.[21] From a policy perspective, however, it is not sufficient to examine aggregate outcomes. It is important to trace the variety of ways in which cultural differences operate, including the impact on the labor market that we have chosen to analyze.

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[21]See Alesina Baqir and Easterly (1999) and Alesina, et al. (2002).

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7 Appendix

We now consider mixing in general under various status concerns. The only restrictions are that utility is linear in wages and that wages are linear in output, so that the conditions

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for transferable utility hold. Specifically,

$$\tilde{u}_i = \tilde{w}_i + \beta_i(\tilde{w}_i - \tilde{w}_j) + \alpha_i(\tilde{w}_i - \bar{w}_i) - v(e_i), \tag{A1}$$

where $\tilde{w}_i$ is the worker's own wage, $\tilde{w}_j$ is the wage of another worker in the same firm and, $\bar{w}_i$ is the a reference wage outside the firm, and

$$\tilde{w}_i = s_i + a_i \tilde{y}_i. \tag{A2}$$

There is no loss of generality in assuming that the wage of each worker depends only on his own output. We allow for productivity differences and a general cost of effort function $v(e_i)$ that is increasing and strictly convex.

A competitive firm that consists of two workers offers contracts (s_i, a_i) that maximize the Lagrangian

$$L = E(\pi) + \lambda_1[E(u_1) - r_1] + \lambda_2[E(u_2) - r_2], \tag{A3}$$

taking into account that workers choose effort level that maximize their utility, where r_1 and r_1 are the reservation values of the two workers,. The workers' choices of effort depend only on the incentive parameters, a_1, a_2, and are independent of the fixed payments s_1 and s_2. Differentiating the Lagrangian with respect to s_1 and s_2, we have

$$-1 + \lambda_i(1 + \beta_i + \alpha_i) - \beta_j \lambda_j = 0, \ i = 1, 2, j \neq i. \tag{A4}$$

Substituting these values back into the Lagrangian, we see that the incentive parameters a_1 an a_2 and the associated levels of effort e_1 and e_2 must maximize the total surplus of the firm and two workers

$$S = t_1 e_1 + e_2 t_2 - \lambda_1(v(e_1) + r_1 + \alpha_1 \bar{w}_1) - \lambda_2(v(e_2) + r_2 + \alpha_2 \bar{w}_2). \tag{A5}$$

Thus, the first best levels of effort are given by

$$\lambda_i v'(e_i) = t_i. \tag{A6}$$

To induce these levels of effort the firm sets

$$a_i = \frac{t_i}{\lambda_i(1 + \beta_i + \alpha_i)} = \frac{t_i}{1 + \lambda_j \beta_j}. \tag{A7}$$

Thus, incentives are set to correct for the externalities imposed on other workers in the firm.

For homogenous firms, we have that

$$\lambda_1 = \lambda_2 = (1 + \alpha_i). \tag{A8}$$

We can now calculate the levels of effort, the wage that each worker receives in a homogenous firm and define the reservation values r_i for joining an heterogenous firm to be the expected utility that each worker can receive in an homogenous firm. Let S^* be the maximized value of S for an heterogenous firm, then mixing occurs if $S^* > 0$, segregation occurs if $S^* < 0$ and there is indeterminacy if $S^* = 0$. Another way to state this condition is to define the joint "pie" W as the *weighted* sum of the expected payoffs of the players, with a weight of 1 for the firm and weights λ_1 and λ_2 for two types of workers and require that it exceeds the *weighted* sum of the reservation values, which means that the reservation point is within the utility frontier.

Because $v(e_i)$ is strictly convex, S is strictly concave in e_1 and e_2 and the maximum is unique. The choices of homogenous firms are also available to the heterogenous firm. Therefore, a *sufficient* condition for mixing is that $S \geq 0$, when evaluated at the levels of effort chosen by the homogenous firms.

We shall focus here on the two preference profiles discussed in the text: (1) The type 1 worker cares only about his co-worker, $\beta_1 = \beta, \alpha_1 = 0$, and the type 2 worker does not care about status at all $\beta_2 = 0, \alpha_2 = 0$. (2) The type 1 worker cares only about his co-worker, $\beta_1 = \beta, \alpha_1 = 0$, and the type 2 worker cares only about the wages of workers outside the firm $\beta_2 = 0, \alpha_2 = \beta$. For these examples, we assume that $v(e) = \frac{1}{2}e^2$. But the method of analysis is applicable to other specifications.

7.1 Type 1 cares about local status, type 2 does not care about status

Suppose that, as in section 3, that type 1 workers care about their local status in the firm, i.e., $\beta_1 = \beta, \alpha_1 = 0$, and that type 2 workers do not care about status at all, i.e., $\beta_2 = 0, \alpha_2 = 0$. Thus,

$$
\begin{aligned}
-1 + \lambda_1(1 + \beta) &= 0, \\
-1 + \lambda_2 - \beta\lambda_1 &= 0,
\end{aligned}
\tag{A9}
$$

so that $\lambda_1 = \frac{1}{1+\beta}$ and $\lambda_2 = \frac{1+2\beta}{1+\beta}$.

Workers in homogenous firms exert effort t_i. Evaluating S at this point, we get a sufficient condition for mixing

$$
\begin{aligned}
S &= t_1^2(1 - \lambda_1) + t_2^2(1 - \lambda_2), \\
&= \frac{\beta}{1 + \beta}(t_1^2 - t_2^2) > 0
\end{aligned}
\tag{A10}
$$

Hence, if the workers who care about status are equally or more productive, mixing must occur.

The necessary and sufficient condition for mixing is that $S^* \geq 0$. The effort levels chosen by the heterogenous firm are

$$
e_1 = (1 + \beta)t_1, \; e_2 = \frac{(1 + \beta)t_2}{(1 + 2\beta)}.
\tag{A11}
$$

Substituting these value into S, we obtain that $S^* \geq 0$ if

$$
\frac{t_1^2}{t_2^2} \geq \frac{(2 + 3\beta)}{(2 + \beta)(1 + 2\beta)},
\tag{A12}
$$

which, for a positive β, can be satisfied even if the workers who care about status are less productive.

7.1.1 Calculation of wages

The expected wage bill of an heterogenous firm is given by

$$E(w_1) + E(w_2) = t_1 e_1 + t_2 e_2 = (1 + \beta)t_1^2 + \frac{(1 + \beta)t_2^2}{(1 + 2\beta)}. \tag{A13}$$

The equilibrium division of this wage between the two workers depends on which type is in the majority.

Case 1: Workers who care about status are the minority in the population $(\xi < \frac{1}{2})$. Since $\xi < .5$, a type 2 worker, who is the majority type, must get his reservation utility, which is the utility that he would obtain in an homogenous firm. Thus, at equilibrium, $E(w_2)$ is given by

$$E(w_2) - \frac{1}{2}[\frac{(1 + \beta)t_2}{(1 + 2\beta)}]^2 = \frac{1}{2}t_2^2. \tag{A14}$$

We can now solve for $E(w_2)$ and subtract it from the total wage bill to obtain the expected wage of type 1 worker in heterogenous firms.

$$\begin{aligned} E(w_1) &= (1 + \beta)t_1^2 + \frac{(1 + \beta)t_2^2}{(1 + 2\beta)} - \frac{1}{2}[\frac{(1 + \beta)t_2}{(1 + 2\beta)}]^2 - \frac{1}{2}t_2^2 \\ &= (1 + \beta)t_1^2 - \frac{\beta^2 t_2^2}{2(1 + 2\beta)^2}. \end{aligned} \tag{A15}$$

Note that, for a positive β, then $E(w_1) > E(w_2)$ and the wage gap rises with β.

Case 2: Workers who care about status are the majority in the population $(\xi > \frac{1}{2})$. We follow the same procedure as in the previous case. Because type 1 workers are the majority, there must be some homogenous firms that employ only type 1 workers. Thus, if there are heterogenous firms in equilibrium, the type 1 workers in those firms obtain their reservation utility, which is their expected utility in an homogenous firm. Therefore,

$$E(w_1)(1 + \beta) - \beta E(w_2) - \frac{1}{2}[(1 + \beta)t_1]^2 = \frac{1}{2}t_1^2. \tag{A16}$$

Using this indifference condition and the zero profits condition, we obtain

$$E(w_1) = t_1^2 \frac{1 + 2\beta + \frac{3}{2}\beta^2}{(1 + 2\beta)} + t_2^2 \frac{\beta(1 + \beta)}{(1 + 2\beta)^2}, \tag{A17}$$

$$E(w_2) = t_1^2 \frac{\beta + \frac{1}{2}\beta^2}{(1 + 2\beta)} + t_2^2 \frac{(1 + \beta)^2}{(1 + 2\beta)^2}. \tag{A18}$$

Again, for a positive β, then $E(w_1) > E(w_2)$ and the wage gap rises with β.

7.2 Type 1 cares about local status, type 2 cares about wages outside the firm

Suppose now that, as in section 4, that type 1 workers have local status preferences so that $\beta_1 = \beta, \alpha_1 = 0$, and that type 2 workers care only about the wages of workers outside the firm, $\beta_2 = 0, \alpha_2 = \beta$. We follow the same type of analysis as in the previous section and obtain the following results.

In homogenous firms with two workers of type 1, $\lambda_1 = \lambda_2 = 1$, implying $e_1 = t_1$ and $r_1 = \frac{t_1^2}{2}$. In an homogenous firm with two type 2 workers, $\lambda_1 = \lambda_2 = 1 + \beta$, implying $e_2 = t_2(1 + \beta)$ and

$$r_2 = t_2^2(1 + \beta) - t_2^2(1 + \beta)^2/2 + \beta(t_2^2(1 + \beta) - \bar{w}_2)) = \frac{t_2^2(1 + \beta)^2}{2} - \beta\bar{w}_2. \tag{A19}$$

For heterogenous firm, we substitute the assumed (α_i, β_i) into (A4), which yields

$$-1 + \lambda_1(1 + \beta) = 0, \tag{A20}$$
$$-1 + \lambda_2(1 + \beta) - \beta\lambda_1 = 0,$$

so that $\lambda_1 = \frac{1}{1+\beta}$ and $\lambda_2 = \frac{1+2\beta}{(1+\beta)^2}$, implying that $e_1 = t_1(1 + \beta)$ and $e_2 = t_2\frac{(1+\beta)^2}{1+2\beta}$. Evaluating S at this point, we get

$$\begin{aligned} S^* = {} & t_1^2(1 + \beta) + t_2^2 \frac{(1 + \beta)^2}{1 + 2\beta} - \frac{1}{1 + \beta}\left(\frac{t_1^2(1 + \beta)^2}{2} + \frac{t_1^2}{2}\right) \\ & - \frac{1 + 2\beta}{(1 + \beta)^2}\left(\frac{1}{2}\left(\frac{(t_2(1 + \beta)^2}{1 + 2\beta}\right)^2 + \frac{(t_2(1 + \beta))^2}{2}\right) \end{aligned} \tag{A21}$$

If the two types have the same productivity $t_1 = t_2$, then the condition that $S^* > 0$ is

equivalent to the requirement

$$\beta - (1 + \beta)^2 + \frac{(1 + \beta)^3 (1 - 4\beta)}{(1 + 2\beta)^2} \geq 0. \tag{A22}$$

But this inequality cannot be satisfied for $\beta > 0$, which implies that there is no equilibrium with heterogenous firms.

However, for $t_1 > t_2$ a mixed equilibrium can exist. Evaluating S at the effort levels chosen by the homogenous firms $e_1 = t_1$ and $e_2 = t_2(1 + \beta)$ we get

$$S = t_1^2(1 - \lambda_1) + t_2^2(1 + \beta) - \lambda_2 t_2^2(1 + \beta)^2 = \frac{\beta}{1 + \beta} t_1^2 - \beta t_2^2. \tag{A23}$$

Thus, the sufficient condition for mixing holds if $t_1^2(1 + \beta) > t_{2.}^2$.

7.2.1 Calculation of wages

If the two types are equally productive, i.e., $t_1 = t_2 = 1$, and there are no heterogenous firms then the wages of the two types are simply $E(w_1) = 1$ and $E(w_2) = 1 + \beta$. That is, the worker who cares about global status works harder and obtains higher wages. But the expected utility of the person who cares about local status, which equals $\frac{1}{2}$ exceeds the expected utility of the person who cares about global status, $1 + \beta - \frac{(1+\beta)^2}{2}$. This discrepancy illustrates the inefficiency of the status competition when firms do not serve as coordinators that internalize the wage externalities.

Assume now that the sufficient condition for mixing holds, i.e., $t_1^2 > t_2^2(1 + \beta)$. Then the output of and wage bill of a mixed firm is

$$E(w_1) + E(w_2) = t_1 e_1 + t_2 e_2 = (1 + \beta)t_1^2 + \frac{(1 + \beta)^2 t_2^2}{(1 + 2\beta)}. \tag{A24}$$

The equilibrium division of this wage between the two workers depends on which type is in the majority.

Case 1: Workers who care about local status are the minority in the population ($\xi < \frac{1}{2}$). Since $\xi < .5$, a type 2 worker, who is the majority type, must get his reservation utility, which is the utility that he would obtain in an homogenous firm. Thus, at equilibrium,

$E(w_2)$ is determined by

$$E(w_2) - \frac{1}{2}(\frac{(t_2(1+\beta)^2}{1+2\beta})^2 - \beta\bar{w}_2 = \frac{t_2^2(1+\beta)^2}{2} - \beta\bar{w}_2, \tag{A25}$$

yielding

$$E(w_2) = \frac{t_2^2(1+\beta)^2}{2} + \frac{1}{2}(\frac{(t_2(1+\beta)^2}{1+2\beta})^2. \tag{A26}$$

We can now subtract $E(w_2)$ from the expected wage bill to obtain the expected wage of the type 1 worker

$$E(w_1) = (1+\beta)t_1^2 + \frac{(1+\beta)^2 t_2^2}{(1+2\beta)} - \frac{t_2^2(1+\beta)^2}{2} - \frac{1}{2}(\frac{(t_2(1+\beta)^2}{1+2\beta})^2. \tag{A27}$$

Under the assumption that, $t_1^2 > t_2^2 (1+\beta)$, it is can be verified that $E(w_1) > E(w_2)$.

Case 2: Workers who care about status are the majority in the population ($\xi > \frac{1}{2}$). We follow the same procedure as in the previous case. Because type 1 workers are the majority, there must be some homogenous firms that employ only type 1 workers. Thus, if there are heterogenous firms in equilibrium, the type 1 workers in those firms obtain their reservation utility, which is their expected utility in an homogenous firm. Therefore,

$$E(w_1)(1+\beta) - \beta E(w_2) - \frac{1}{2}[(1+\beta)t_1]^2 = \frac{1}{2}t_1^2. \tag{A28}$$

Using this indifference condition and the zero profits condition, we obtain

$$E(w_1) = \frac{\beta[(1+\beta)t_1^2 + \frac{(1+\beta)^2 t_2^2}{(1+2\beta)}] + [\frac{1}{2}t_1^2 + \frac{1}{2}[(1+\beta)t_1]^2].}{1+2\beta} \tag{A29}$$

$$E(w_2) = \frac{(1+\beta)[(1+\beta)t_1^2 + \frac{(1+\beta)^2 t_2^2}{(1+2\beta)}] - [\frac{1}{2}t_1^2 + \frac{1}{2}[(1+\beta)t_1]^2].}{1+2\beta} \tag{A30}$$

Under the assumption that, $t_1^2 > t_2^2 (1+\beta)$, it is now possible that $E(w_2) > E(w_1)$, reflecting the fact that the type 2 workers are now scarce.

We can now close the model and determine the reference wage $\bar{w}_2$ for the type 2 worker. Because the wages in homogenous and heterogenous firms where seen to be *independent* of $\bar{w}_2$, we can choose any combination of these wages as a reference. Let us assume, for

instance that each type 2 worker cares only about the average wage of his own type. Then if $\xi > .5$ and all type 2 workers work in heterogenous firms $\bar{w}_2 = E(w_2)$. However, if $\xi < .5$ and some type 2 workers work in homogenous firms then $\bar{w}_2 = \frac{\xi}{1-\xi} E(w_2) + \frac{1-2\xi}{1-\xi} t_2^2 (1 + \beta)$. In this case, $E(w_2) < t_2^2 (1 + \beta)$, because the type 2 workers in an heterogenous firms are induced to reduce their effort in exchange for lower wages. Therefore, an increase in ξ reduces the average wage of the type 2 workers, $\bar{w}_2$.
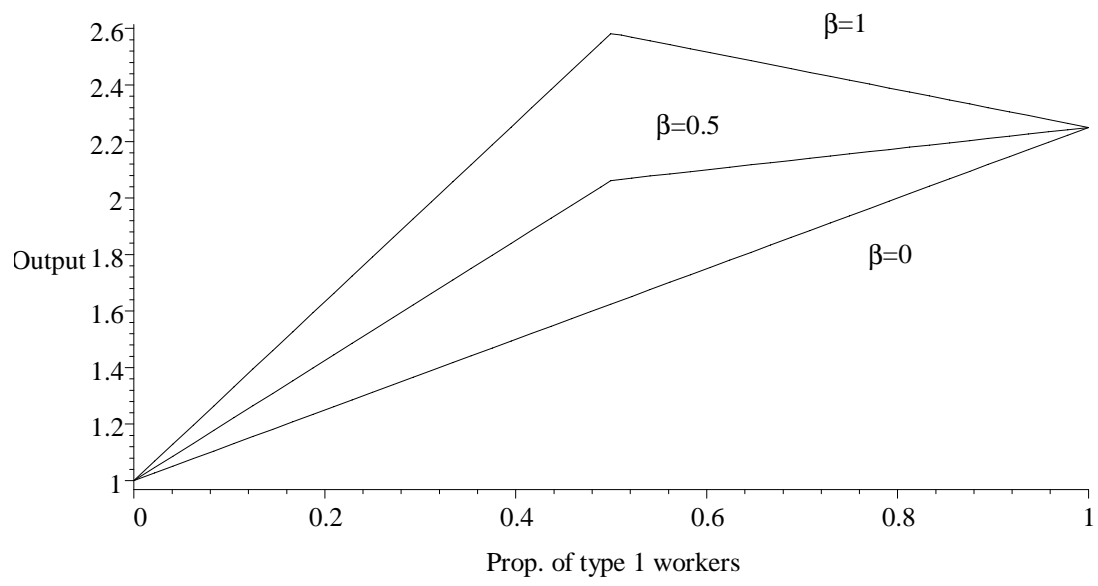
Figure 1: Output per worker for different level of status concerns, β