Social Inference and Occupational Choice: Type-Based Biases in a Bayesian Model of Class Formation

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Abstract

Beliefs are a key motivator of individual behavior. As such, an understanding of how individuals' beliefs develop is a prerequisite to understanding decision-making and behavior. While rational choice theory posits a Bayesian model framework for belief formation, status construction theories argue that beliefs are strongly influenced by status typifications. In this paper, we develop a Bayesian model of belief formation in which individuals use irrelevant information on others' observable type to bias their beliefs. This model is used to analyze a simple occupational choice setting, thereby shedding light on the micro-macro inter-relationship between observable type (e.g. race, gender) and social class.

JEL Codes: D63, D83, J64, J70

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1 Introduction

Across disciplines, researchers have been concerned with the distribution and inequities of status, earnings, health and other components of socio-economic well-being. This research has not only focused on empirical analyses of educational and labor market outcomes, but also on developing theories aimed at understanding how these distributions change over time and are affected by both individuals' behavior and structural aspects of society. However, a significant portion of this research has chosen to focus on either the structural and institutional aspects of society that lead to these distributions or, alternately, the micro-level rational choice analysis of individual decision-making. Thus, much of this research has paid scant attention to the interrelationships between social structures and individuals' behaviors in shaping one another.

Building on the work of Baron and Pferrer (1994), we agree that

> Missing in most of the literature on reward distributions is any attention to the "micro-macro" connection – the links between social structures, institutions, and organizations, on the one hand, and, on the other, cognitions, perceptions, interests, and behaviors at the individual or small-group level. (p. 191)

Here, we begin to look at this link, positing a model of individual belief formation tying together social structure with individuals' cognitions and self-perceptions. Our focus here is on the ways in which structural aspects of society may influence individuals' beliefs, and thereby affect individual's behavior. In turn, these behaviors feedback on society's structures, changing the distribution of rewards (here, occupations) among the population. Thus our model is intended as a step in developing a theoretical and analytical foundation for the needed "micro-macro" connection in social research.

Most decision-making takes place under some degree of uncertainty. For example, when undertaking an investment in human capital, individuals are uncertain not only of the return from this investment (e.g. via the job market), but also about their ability to make the most of such an investment (e.g. their abilities or skills). Thus, an individual's beliefs play a significant role in determining her choices regarding education, occupation, and hence, social class. As such, understanding how beliefs develop is essential in understanding individual and group decision-making. We therefore focus on the ways in which social structures are internalized in individuals' belief processes. The behavioral manifestation of these beliefs in turn shapes these social structures.

Much of the analysis regarding beliefs has centered on the process of belief formation. For example, in economics the study of individuals' beliefs has focused on Bayesian learning mechanisms whereby individuals use observed outcomes (arising from their own experience or those of others) to update and refine their subjective beliefs. On the other hand, sociologists often cast beliefs as the result of socialization processes or the internalization of behavioral norms. In either case, differences in information or the social environment will lead individuals to form different beliefs and therefore choose different behaviors.

Given the import of belief formation, two key questions exist. First, how is new information used or internalized in belief formation? For example, do individuals use statistical methods to update beliefs or, rather, rely on heuristics and rules of thumb to "choose" beliefs in light of new information? Secondly, what type of information is used in shaping individuals' beliefs? That is, given a task or event around which individuals have beliefs, what types of information do individuals use in updating their subjective probabilities regarding that task or event?

A frequent answer to the first questions is through the use of Bayesian learning mechanisms. While these mechanisms have been used frequently in economics and game theory (see Jordan, 1991; Kalai and Lehrer, 1993; Piketty, 1995, 1998), they are increasingly finding support in sociology and psychology (for example, see Breen, 1999). Indeed, there is growing experimental evidence that individuals' beliefs approximate the outcome of Bayesian learning mechanisms (see, for example, Cox et al., 2001).[1]

The answer to the second question is more complicated. Research in psychology and economics has demonstrated that individuals often use information in conflicting ways, using seemingly irrelevant information to anchor or justify their beliefs. Indeed, Tversky and Kahneman (1974) demonstrated how obviously irrelevant information (the spin of a wheel) could influence individuals' judgements (estimates of the number of African countries in the United Nations). As a result, individuals with initially identical prior beliefs and information may arrive at very different subjective beliefs as they incorporate information in inappropriate or contradictory ways. Most germane to our purposes, the theory of status characteristics and expectation states (Berger et al., 1998), the theory of stereotype threat (Steele and Aronson, 1995), and status construction theories (e.g. Berger et al., 2002; Ridgeway, 1991) posit that individuals' beliefs may incorporate information on social hierarchies and the observable characteristics of others, even when such information is irrelevant to the object of their beliefs. Thus, following Berger et al. (1998), an individual of low social status may bias her beliefs about success in a status worthy task (e.g. success in education or employment) downward.[2] Alternately, as in Steele and Aronson (1995), individuals may internalize stereotypes based on observable criteria when engaging in an activity within a group of individuals of different observable types. Similarly, Ridgeway (1991) discusses how the salience of a status attribute can lead beliefs to be dominated by status typifications: beliefs about individuals'

[1] Of course, Bayesian learning does not necessarily imply that individuals choices are correct. As addressed in the literatures on herding and information cascades (in which individuals incorporate observable information on the actions of others) Bayesian learning may lead to individuals conforming to the decisions of others, even when their private information would imply a different course of action (Banerjee, 1992; Bikhchandani et al., 1992).

[2] Jemmott and Gonzalez (1989) and Lovaglia et al. (1998) have documented in experimental settings how individuals' beliefs, and hence their behaviors, can be influenced by ersatz status hierarchies.

abilities and qualities that are based on their status characteristics.

These theories imply that individuals are likely to exhibit behaviors that are consistent with their existing positions in the status hierarchy. This occurs through the internalization of information on observable characteristics in accord with a diffuse status hierarchy (see discussion in Berger et al., 2002). The key point here is that information on social position may be used to augment an individual's beliefs even if that information is irrelevant to the task at hand.[3] Such "errors" or "biases" in learning may lead individuals to act in ways which might not be expected given their knowledge and available information.

As examples of these belief processes, consider gender as the observable characteristic under study. In the analysis of labor markets, Sewell et al. (1980) find marked differences in the maintenance and acquisition of occupational status between men and women. At a more micro level, Gerber (1998) finds gender exerts significant effects on individuals' displayed attitudes and dispositions in mixed-gender police team dyads. Furthermore, Pergamit and Veum (1999) find that men are more likely to receive promotions than women. Rather than this being solely the result of promotion practices, they find that individuals ranked lower in social hierarchies display less job attachment. Experimentally, Correll (2004) has demonstrated that when primed with status characteristic information (e.g. men are better at a particular task), participants assess their ability and develop aspirations which are biased by this status information. All these behaviors may be the natural result of individuals making rational choices in the presence of biased beliefs: existing (or perceived) social hierarchies may influence one's beliefs about self-efficacy thereby resulting in less status acquisition, less dominating or expressive dispositions, and less attachment to an occupation. These behaviors are in turn reflected in the observed representation of genders in

[3]Webster and Foschi (1988) argue that status related information is used by individuals even when this information is irrelevant to the object of one's beliefs. See Ridgeway and Walker (1995) for a thorough review of this literature.

various occupations.[4]

In this paper, develop a theory of learning in which individuals incorporate irrelevant information regarding the distribution of observable types into their beliefs. Specifically, we use a simple occupational choice model to explore the consequences of individuals using information on observable type (e.g. race, gender) in forming beliefs about own ability. Interpreting observable types as representing different social classes, our model follows closely along the lines of expectation states theories. These *type-based biases* can result in the evolution of endogenous classes and occupational segregation in which agents of different observable types choose different sectors of the labor market regardless of their private information regarding own ability. As a result, there is an inefficient matching of skills in the labor market and policies which alter the incentives faced by individuals of different types (e.g. redistributive taxation, affirmative action) may play efficiency enhancing roles.[5] Beyond the labor market, the process discussed here similarly affects occupational attainment, earnings behaviors, human capital formation and self-rated competence.

The remainder of the paper is organized as follows: in section 2 we present a model of belief formation rooted in Bayesian inference. We modify the model to analyze how individuals beliefs may be biased through the incorporation of social information regarding the distribution of agents' observable types. To explore the effects of these biased beliefs, section 3 presents a simple model of occupational choice. We show how the presence of type-based biases introduces inefficient matching between individuals' skills and the labor market. This results in a distribution of individual types across occupations that inaccurately represents the efficient distribution based on

[4]Beliefs regarding status characteristics and typifications have also been implemented experimentally. See Ridgeway and Erickson (2000).

[5]In this context, the model presented here is related to models of statistical discrimination (Arrow, 1973; Phelps, 1972). The key difference here is that our object of interest are *employees'* beliefs about their abilities rather than *employer's* beliefs about employees' abilities. See section 4.

matching individuals' skills with occupations. As a result, there may be a role for policies which alter the incentives of different types of agents in order to facilitate efficient job matching. Sections 4 and 5 discuss these policies and provide a brief conclusion.

2 Belief Formation

In this section we describe the mechanism by which individuals incorporate information on observable types into their beliefs. We consider a finite population of agents, each differentiated with respect to two characteristics: observable type and innate ability. Individuals' observable types are denoted $t \in \{1, 2\}$, with $m_t \in (0, 1)$ representing the fraction of type t agents in the population and $m_1 + m_2 = 1$.

We denote by $a \in \{A, U\}$ an individual's innate ability. While each agent knows her type and can observe that of other agents, each is uncertain as to her own ability. That is, each agent receives a private and imperfect signal $\theta \in [0, 1]$ of her ability. While these signals may arise from formal processes (e.g. test scores in education), they may also be interpreted as the result of prior experiences. Thus the signal θ represents the amalgam of one's experiences in, say, education and employment (verifiable and unverifiable information) that indicate towards one's ability. Our key assumption here is that these signals are private information: no individual can observe the full range of information necessary to confirm another's signal.

We assume that signals θ for agents of ability a are distributed according to $F_a(\theta)$, with density $f_a(\theta)$. We assume $f_U(\theta)/f_A(\theta)$ to be non-increasing, implying $F_A(\theta) < F_U(\theta)$ for all θ. Thus, higher values of θ imply an agent is more likely to be able ($a = A$) than unable ($a = U$). We further assume that the distributions of signals $F_A(\theta)$ and $F_U(\theta)$ are independent of observable type (i.e. there is no differences in ability across types) and, for notational simplicity, that agents' initially believe they are equally likely to be able or unable.[6] That is, $F_A(\theta|t) = F_U(\theta|t)$ for all $t \in \{1, 2\}$ and $a \in \{A, U\}$.

In the absence of any additional information or biases, agents apply Bayes' rule in forming their beliefs. Thus, an agent's (objective) probability of having ability $a = A$ upon receiving the signal θ is given by

$$p(\theta) = \frac{f_A(\theta)}{f_A(\theta) + f_U(\theta)}. \tag{1}$$

2.1 Type-Based Biases

We now allow for beliefs in which agents incorporate information on observable types in to their beliefs. In particular, we will assume that agents use observable information in the following way: we characterize a *type-based bias* as a bias in which individuals use information on the distribution of observable types to infer ability. Following Berger et al. (1998) individuals may use information on diffuse characteristics (here, observable types) when forming expectations about future tasks that are deemed status worthy (in what follows, occupations). Alternately, following theories of social inference and role modelling (Manski, 1993; Chung, 2000) individuals may use information on the distribution of observable types across occupations in the labor market to estimate their own abilities and probabilities of success in various occupations.

To characterize these types of phenomena, we assume a simple overlapping generations model in which individuals of one generation costlessly observe the previous generation's distribution of observable types across social classes or occupations. We assume that agents observe only the distribution of types, not the outcomes (i.e. payoffs) received by individuals in the previous generation.[7] For example, one knows that the majority of partners in

[6] One could assume an initial prior representing agents' beliefs that they are able. This prior would then be carried into the updating procedure explained below. Such a change does not affect the analysis. Even if different types of agents had different priors over own ability, the biasing of new information into their beliefs would remain.

[7] Thus, we are assuming individuals' wealth levels are not directly observable.

U.S. law firms (a socially prestigious occupation) are men (a diffuse status characteristic), but does not know how successful the individual partners are in terms of the payoffs they receive. As a result of such knowledge, one may infer something about one's likelihood of success as a law partner based on one's gender. That is, one may form biased beliefs in which gender information is used in discerning one's abilities as a law firm partner.[8]

We assume that individuals use the distribution of observable types when forming beliefs. That is, based on the distribution of observable types across, say, occupations, individuals infer information about their probability of success in those occupations. Formalizing, let μ_t be the fraction of type t agents considered able or, following expectation states theories, of high status. For example, μ_t may represent the fraction of men among law partners. We characterize a *type based bias* by the function $\beta_t \equiv \beta(\mu_t, \mu_{-t})$ where

$$\beta : [0,1]^2 \to [0,1]. \tag{2}$$

We assume that the function $\beta(\mu_t, \mu_{-t})$ is increasing in μ_t, decreasing in μ_{-t} and satisfies $\beta(\mu_t, \mu_t) = \frac{1}{2}$. Thus, if an individual of type 1 observes a relatively larger share of individuals of her own type in a socially prestigious occupation (i.e. $\mu_1 > \mu_2$), the type based bias is $\beta_1 = \beta(\mu_1, \mu_2) > \frac{1}{2}$.

A type based bias influences an individuals' beliefs about her own ability as follows: given her private signal θ and the observations μ_t and μ_{-t} (from the previous generation), an individual's (subjective) belief that she is able (i.e. $a = A$) is given by

$$p_t(\theta) = \frac{f_A(\theta)\beta_t}{f_A(\theta)\beta_t + f_U(\theta)(1-\beta_t)}, \tag{3}$$

[8]Throughout our analysis, we abstract from the potential for direct discrimination in which, say, male law partners discriminate against female candidates for partnership. Our interest here is on the role of an individual's biased probability of success. The presence of overt discrimination (e.g. discrimination on the part of employers against employees) will magnify the effects described here.

where, as opposed to equation (1), the subscript t in equation (3) indicates that the individual's beliefs are biased in accord with $\beta_t \equiv \beta(\mu_t, \mu_{-t})$.

Analyzing the bias β_t is straightforward. To begin, notice that if $\mu_t = \mu_{-t}$ then $\beta_t = \frac{1}{2}$ and an individual's subjective belief (equation 3) is equal to the objective probability (equation 1 based solely on θ). However, as μ_t and μ_{-t} diverge, the individual's subjective belief diverges from the objective probability. If $\mu_t > \mu_{-t}$, a type t individual is overconfident in her ability and $p_t(\theta) > p(\theta)$. On the other hand, if $\mu_t < \mu_{-t}$, a type t individual is under-confident in her ability and $p_t(\theta) < p(\theta)$. Thus, if one type of individual is over-represented in an occupation, individuals of that type tend to over-estimate their probability of success in that occupation. Similarly, if a particular type of individual is under-represented in an occupation or field, individuals of similar type will under-estimate their probability of success in that occupation or field. Thus, one can think of the distribution of types across occupations as a social structure around which individuals organize their beliefs. Individual's choice, in turn, determine this distribution and hence the social structures used by subsequent decision-makers.

Note that this formalization captures some basic tenets of expectation states theories. In particular, interpreting $\beta(\mu_t, \mu_{-t})$ as correlating the distribution of observable types within the hierarchy of social status captures many of the ideas discussed in Berger et al. (1998), Ridgeway (1991), and Webster and Foschi (1988), among others: if we consider ability to be a socially prestigious characteristic, individuals who's type is deemed of lower status (i.e. t such that $\mu_t < \mu_{-t}$) bias their beliefs downward from what their private information θ would otherwise dictate. Similarly, we may think of the bias $\beta(\mu_t, \mu_{-t})$ arising through a process akin to that described in Faunce (1989). When the difference $\mu_t - m_t > 0$ is greater, an individual is more likely to encounter or be reminded of individuals of similar observable type who are deemed of lower status. As in Faunce (1989), a higher frequency of these encounters will depress an individual's self-esteem. In a similar way, an individual may bias downward her perceived ability, something constituting an important aspect of self-esteem.

3 Occupational Choice and Class Formation

In this section we analyze the effect of type-based biases described above via a model of occupational choice model. For simplicity, we consider a simple two sector (skilled and unskilled) labor market.[9] In each sector, agents earn different expected returns, which we assume to be directly related to their productivity in those sectors.

Following evidence on the strong relationship between occupation and social prestige, we assume that each sector of the labor market represents a social class. That is, we assume that employment in the skilled sector represents membership in the higher social class and employment in the unskilled sector represents membership in the lower class. This follows Weber (1909) who argued that occupations serve as "status groups" where status depends on occupations' required skill levels and earnings opportunities. Empirically, Treiman (1977) finds that individuals view occupational status the same way, ranking occupations such as judges and scientists above occupations such as plumbers and janitors. Moreover, these rankings of occupations by social prestige are stable across countries and time. Notice that within these occupations, although average earnings may be publicly known, there exists a substantial spread of wages that are typically private information. Thus status is largely assigned by one's association with others via occupation, not directly through the observation of earnings.[10] To capture this phenomenon,

[9] It is straightforward to expand the analysis into a multi-sector labor market with multiple agent types. However, such an analysis does little to enrich the conclusions of the two-sector model.

[10] Bagwell and Bernheim (1996) argue that although relative wealth may be the centerpiece on which social status is awarded, such information is not directly observable. Therefore, individuals focus social recognition on observable criterion such as occupations. See Basu (1989) and Fershtman and Weiss (1993) for rational choice based analyses

we let μ_t be the fraction of type t agents in the skilled sector in any given generation. Thus, in addition to their private signals θ, agents look to the previous generation's distribution of agent types in the skilled sector (μ_1, μ_2) when forming beliefs about success in the skilled sector.

Returns from employment in each sector are parameterized as follows: in the unskilled sector, agents earn certain the return (e.g. utility) $V > 0$. By contrast, an agent's return from employment in the skilled sector depends on her innate ability. If an agent is of skill level $a = A$ (i.e. able), she earns a return of $H > V$ in the skilled sector. However, if the agent is of skill level $a = U$ (i.e. unable), she earns a return $L < V$ in the skilled sector. Thus, able agents are better off choosing employment in the skilled sector while unable agents fare worse in the skilled sector than the unskilled sector. Note that since $H > V > L$, efficient matching would dictate that able agents seek employment in the skilled sector while unable agents opt for the unskilled sector.

We assume agents make employment decisions to maximize expected utility. In the absence of type based biases, this implies than an individual with private signal θ will choose the skilled sector if

$$p(\theta)H + \big(1 - p(\theta)\big)L \geq V. \tag{4}$$

That is, the individual will choose the skilled sector if her belief in her ability is such that

$$p(\theta) = \frac{V - L}{H - L}. \tag{5}$$

This implies the existence of a threshold signal $\tilde{\theta}$ solving

$$p(\tilde{\theta}) = \frac{V - L}{H - L}. \tag{6}$$

Agents with signals $\theta \geq \tilde{\theta}$ choose employment in the skilled sector while

of the association effect of occupations.

agents with signals $\theta < \tilde{\theta}$ choose employment in the unskilled sector. Notice that such a distribution of agents between the sectors of the labor market is efficient in the sense that agents are allocated to the sectors in which they derive the highest expected benefits. Thus, we have the following:

Result 1 *In the absence of type-based biases, an efficient allocation of agents between the skilled and unskilled sectors will be realized.*

As compared to result 1, an efficient allocation of agents across the sectors will typically not be implemented in the presence of type based biases. Note that with type based biases, an agent will choose to work in the skilled sector if

$$p_t(\theta)H + \big(1 - p_t(\theta)\big)L \geq V. \tag{7}$$

This implies a new threshold signal for each type of agent, $\tilde{\theta}_t$, satisfying

$$p_t(\tilde{\theta}_t) = \frac{V - L}{H - L}. \tag{8}$$

As before, type t agents with private signals $\theta \geq \tilde{\theta}_t$ choose to work in the skilled sector while those with signals $\theta < \tilde{\theta}_t$ opt for the unskilled sector.

Associating occupations with social standing (i.e. class), the biases β_1 and β_2 lead to a natural segregation of types between the sectors (μ_t and μ_{-t} diverge). Without loss of generality, suppose $\mu_1 > \mu_2$. That is, there is a higher fraction of type 1 workers in the skilled sector than there are type 2 workers. Thus,

$$\beta_1 > \frac{1}{2} > \beta_2. \tag{9}$$

Upon observing this, individuals in the subsequent generation make occupational choices in accord with equation (7). The presence of the type based bias $\beta_t \neq \frac{1}{2}$, $t \in \{1, 2\}$, implies

$$\tilde{\theta}_1 < \tilde{\theta} < \tilde{\theta}_2. \tag{10}$$

That is, the threshold which type 1 agents use in deciding to enter the skilled sector is lower than that used by type 2 agents. Thus, type-based biases lead individuals to mis-interpret their signal's informational content regarding own ability. Given the independence between the distribution of signals (via the allocation of skills) and the distribution of types, this implies that more type 1 agents will choose the skilled sector and more type 2 agents will choose the unskilled sector. Thus, we have the following

Result 2 *For any type t, the presence of type based biases and any divergence between μ_t and μ_{-t} will result in an inefficient allocation of agents between the skilled and unskilled sectors. In particular, if*

$$\mu_t\,(<)\mu_{-t} \;\; \textit{then} \;\; \tilde{\theta}_t < (>)\tilde{\theta}.$$

Thus, type-based biases give a natural explanation for the concentrations of agents of particular observable types in various occupations and social classes. Once again, assume that $\mu_1 > \mu_1$. Result 2 implies that there are individuals of type 2 who are sufficiently skilled but opt for the unskilled sector. Specifically, type 2 agents receiving signals $\theta \in (\tilde{\theta}, \tilde{\theta}_2]$ choose the unskilled sector (with certain return V) although efficient matching would dictate they choose the skilled sector. Similarly, there exist type 1 agents with signals $\theta \in (\tilde{\theta}_1, \tilde{\theta}]$ who have opted for the skilled sector. These agents, while they may be viewed as status worthy given their observed occupation, earn expected returns less than that they would receive in the unskilled sector. Efficient matching of skills and occupations would dictate that these individuals seek employment in the unskilled sector.

Notice that the presence of type-based biases may have direct policy-making implications. For example, if the skilled sector is viewed as the predominant engine for technological advancement or economic growth, policy-makers may funnel resources into supporting this sector. The presence of unskilled type 1 agents in this sector (i.e. type 1 agents with $\theta < \tilde{\theta}$) implies that these resources are in some sense inefficiently allocated. Further, since some skilled type 2 agents have chosen the unskilled sector (i.e. those with signals $\theta \geq \tilde{\theta}$), there exists a class of agents who's full potential is not realized. Thus, with an eye towards an efficient allocation of resources (here, human capital), there may be reasons to shift public resources from the skilled sector to the unskilled sector. Moreover, there is an efficiency enhancing role for policies which alter the incentives faced by agents of different types to choose employment in the various sectors of the labor market.

As a final point, consider the long-run effect of type-based biases. Notice that once μ_t diverges from μ_{-t}, the divergence will continue to grow until β_t reaches its maximum or minimum. To see this, consider again the case in which $\mu_1 > \mu_2$. This implies that more type 1 agents will opt for the skilled sector than type 2 agents. This, assuming a stable distribution of types (m_1, m_2) in successive generations, in turn will increase the difference $\mu_1 - m_1$ internalized through $\beta(\mu_t, \mu_{-t})$ by the next generation. This implies a dynamic process in which the effect of the type-based bias (i.e. the size of $\beta(\mu_t, \mu_{-t})$) increases over time and a more inefficient matching of skills to occupations occurs in subsequent generations. Notice that such a distribution will be stable in that small variations in the distribution of types across occupations will not significantly alter the magnitudes of $\beta(\mu_t, \mu_{-t})$. Thus we have the following:

Result 3 *In the presence of type based biases, the inefficient segregation of types between the skilled and unskilled sectors of the labor market will grow over time.*

Notice that if β_t can achieve the end point in $\{0, 1\}$ agents may eventually completely disregard their signals when making occupational choices. This implies that the inefficient distribution of agents in which only one type is present in each sector is stable.

Result 4 *An efficient distribution of agents across the labor market (i.e. $\mu_t = m_t$ for all t) is unstable. The inefficient distribution of agents arising when $\beta(\mu_t, m_t)$ assumes the maximum and minimum values in its permitted range is stable.*

4 Discussion

The concentration of different races and genders in various social classes is well documented. For example, a large literature on the underclass has documented the concentration of racial minorities (particularly African Americans) among the poor and those living in poverty.[11] Particularly relevant here is the work in Kelso (1994) in which it is argued that changes in the distribution of occupations and wealth have left those at the lower rungs of the status hierarchy in a state of anomie. This leads individuals living in poverty to become fatalistic regarding their opportunities for success via the labor market and, more generally, investments in human capital. It is from this vantage that the formation and behaviors of the underclass are characterized. Empirically, Juhn et al. (1991) have documented the concentration of racial minorities in low skill, low wage occupations. Similarly, Sewell et al. (1980) find significant differences in the occupational status of men and women, both in terms of maintenance and acquisition of this status. A type-based bias results in minority individuals (who are ranked lower on a diffuse status characteristic) underestimating their ability to succeed in the skilled sector (a socially prestigious class). This pessimism drives them to choose low skilled, low wage occupations.

Our model predicts this concentration of individuals among the lower class and the unskilled sector as the result of individuals observing relatively few predecessors of their same type choosing the skilled sector. This leads

[11] This literature has early roots in the work of Liebow (1967), Rainwater (1970), and Auletta (1982).

individuals of high ability to choose the unskilled sector since they are ranked lower on a diffuse status characteristic (their type t) or observe few successful predecessor.

In a world of externalities, this may have significant social and economic effects. For example, if aggregate economic growth is a function of the educational or occupational choices individuals make, type based biases imply that a large number of skilled individuals may grow pessimistic about their opportunities for success in the skilled sector. This implies a class of individuals will not be contributing to their fullest to economic growth. Perhaps more importantly, our model predicts a substantial number of unskilled workers may choose the skilled sector. These individuals, who are likely to receive the payoff $L < V$, fail to contribute to growth in a manner policy-makers would expect from supporting the skilled sector.

A natural policy implication of our analysis is support for programs that alter the incentives for individuals of different types to enter the skilled sector. Thus, one could argue that programs like affirmative action, which increase the incentives for minority individuals to enter higher status endeavors (e.g. seek education or enter certain occupations) may be efficiency enhancing and implement better job matching by counteracting type based biases when $\mu_t \neq \mu_{-t}$. These programs tend to increase the number of minority members in status worthy areas, thereby reducing the size and effect of type-based biases. This in turn has efficiency implications for the distribution of types (and skills) across the labor market. One can therefore think of such programs not as trying to correct for past discrimination or implementing undue favoritism, but rather as an attempt to correct for a process of belief formation that leads individuals of both types to make inefficient choices. This view of affirmative action differs from those based on statistical discrimination (Lundberg and Startz, 1983; Bielby and Baron, 1986) and on the presence of productive mentoring or role modelling relationships (Athey et al., 2000; Chung, 2000).

These effects of type-based biases may affect judgement and behavior beyond the labor market example described above. Indeed, the aforementioned labor market example is general enough to characterize other behavior. For example, similar processes may affect behavior in the processes of human capital formation (Steele and Aronson, 1995) or occupational attainment (Gerber, 1998). More generally, in any arena in which decision making may be influenced by self-rating of performance, the presence of status characteristics and stereotypes may cause decision makers to bias new information on ability when forming judgements about their own competencies.

5 Conclusion

Much ink has been spilt addressing and analyzing the distribution of different observable types (e.g. genders and races) across occupations and social classes. In this paper we have tried to demonstrate analytically how structural aspects of the status hierarchy may lead individuals to choose occupations in which there is a majority of their type. Thus our model provides a link between the rational choice techniques employed in economics and the status structure and construction theories employed in sociology.

As a result of this information being internalized through beliefs, we observe an endogenous formation of social classes characterized a concentration of various types in each sector of the labor market. Such a concentration of types in each occupation does not ostensibly rely on overt discrimination or a preference among individuals to be with others of similar types. Rather, our analysis employs a naturally occurring bias and Bayesian learning techniques. Given the bounded rationality employed by most individuals, it seems reasonable for information on observable types to at least influence the beliefs individuals hold regarding various occupations. Particularly striking is the potential of such biases to lead to a complete segregation of types in which individuals ignore the import of their private signals on estimating their abilities.

While normative issues of justice and fairness are often discussed in the literature on class formation, there may also be issues regarding efficiency and economic performance that are aptly important when considering the role of status structures on individuals' occupational choices. Although issues of distributive and social justice are important in this debate, issues of efficiency and skill matching are often more powerful when considering the role of policies that alter the incentives for individuals of different types to choose various occupations.

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