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Conference Paper

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2018: Digitale Wirtschaft - Session: Labor and Unemployment II, No. B17-V2

Provided in Cooperation with:

Verein für Socialpolitik / German Economic Association

Suggested Citation: Schottke, Alessa K.; Siemering, Christian (2018) : The Effects of Status Concerns on Labor Markets for Different Types of Workers, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2018: Digitale Wirtschaft - Session: Labor and Unemployment II, No. B17-V2, ZBW - Leibniz-Informationszentrum Wirtschaft, Kiel, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/181601>

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The Effects of Status Concerns on Labor Markets for Different Types of Workers

Schottke, Alessa K.* Siemering, Christian†

September 2018

Abstract

Based on people's ambition to be viewed as intelligent and the findings on social status and social identity we assume that higher education is associated with high social esteem. We incorporate these findings into people's educational decision and aim to explore the effects of status concerns on labor supply, wages and production. We discover that social status associated with higher education induces more workers to attend the higher educational path. In turn, labor supply of highly educated workers increases, which decreases the respective wage in equilibrium. Moreover, the wage for less educated workers increases in status concerns. There is a unique level of status concerns maximizing the product market's output. Whether production increases or decreases in status concerns depends on whether this level is exceeded or not.

JEL classification: J20, J31, A13

Keywords: Social Status, Labor Market, Educational Choice

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1 Introduction

Over the last decades the average years of schooling have increased all over the world. According to the International Standard Classification of Education (ISCED) (OECD, European Union, UNESCO Institute for Statistics, 2015), Barro and Lee (2013) discover that in advanced countries the increase in average years of schooling is accounted for by higher secondary and tertiary completion and enrollment rates. Furthermore, data published by the OECD shows that the share of 25- to 34-years-olds who had attained a higher education degree, i.e., tertiary level of education (ISCED 5-8), has increased from 26% in 2000 to 43% in 2016 (OECD, 2017). This trend in higher education demand is also observable in Germany in the permanently increasing number of enrolled German students (Statistisches Bundesamt (Destatis), 2018c). In contrast, the participation of Germans in the dual vocational training system¹, classified as upper secondary education (ISCED 3) and for decades considered as the normally chosen career path after school in Germany, has shown a negative trend in the last years (Statistisches Bundesamt (Destatis), 2018a, 2015, 2011; for illustration see Figure 2 in Appendix A).

The reasons why people go to school have been widely examined. On the one hand, the demand for education is affected by social or economic conditions beyond individual control such as an individual's family background (Björklund and Salvanes, 2011; Black and Devereux, 2011). On the other hand, individuals consider costs and benefits or payoffs entailed by investments in human capital to maximize their utility (Becker, 1964). From an economic perspective, anticipated benefits might be higher future earnings or better job opportunities. A variant of the standard theory of utility maximization is to regard higher education as providing social status (Cecchi, 2006; Fershtman et al., 1996).

Many people care about their standing in society. Following the Social Identity Theory developed by Tajfel and Turner (1979), people aim at obtaining or maintaining a positive image of the self. They differentiate themselves and others into categories or social groups

¹The German vocational education system, which is also known as the dual system, combines theory offered by a vocational school and on-the-job training at a company. In all industries in Germany the training, testing and certificates are standardized so that all apprentices receive the same quality of training.

and enhance a positive self-concept by evaluating their own group on dimensions that lead the own group to be judged positively compared to another group. A large body of social psychological studies (e.g. Ellemers et al., 1988; Roccas, 2003) provides evidence that people prefer to be identified with high status groups to achieve high personal prestige. Shayo (2009) defines social status as the relative position of a group on valued dimensions of comparisons such as wealth, occupational status or educational achievement (Shayo, 2009, p. 147). For example, people demand goods to signal high income or wealth and thereby attain social status (Ireland, 1994; Corneo and Jeanne, 1997; Veblen, 1899; Leibenstein, 1950). The two dimensions occupational status and educational achievement mentioned by Shayo (2009) are highly linked in the literature in which social status is related to education. In the context of social mobility, education is demanded to maintain the parents' social class (Breen and Goldthorpe, 1997). Social status is gained by association with a prestigious occupation and the social status of an occupation is mainly influenced by average wage and average level of education (Stocke, 2007; Fershtman et al., 1996; Fershtman and Weiss, 1993). Regarding the relation between occupational prestige and educational achievement we should consider that in previous times the disciplines of study were focused on particular occupational areas. Nowadays there are more courses to study which are not necessarily related to high prestigious occupations. However, to study at an institution of higher education may still be associated with high ability and therefore concurs with Piketty's definition of social status. He notes that people care about being viewed as intelligent and defines social status as the public beliefs of one's ability (Piketty, 1998). Thus, it might not only the expected occupational prestige but the educational path *per se* that is associated with social status.

In parts the findings on social status may explain the increase in demand for higher education. It may also explain part of the gap in demand for vocational and academic education that is observed in Germany. The different classification of vocational training and higher education degrees by the ISCED reflects the differences in educational levels and is therefore associated with different abilities. If we assume that the different educational levels divide people into categories and additionally consider the findings on social status related to education, one could conclude that those people with higher education form the high status group. Then, vocational education might be reduced to a second

choice to academia. For example, a report on data from the German School Leavers Survey with a Higher Education Entrance Qualification, which has been carried out by the German Centre for Higher Education Research and Science Studies (DZHW) discovers that young people care for social esteem associated with their educational path. Persons who left upper secondary school in 2010 with a higher education entrance qualification were asked to evaluate benefits associated with vocational training and studies six months after graduating from upper secondary school. Social esteem expected from studies was stated to be higher than social esteem expected from vocational training (42% vs. 4%) (Lörz et al., 2012, for more details see Figure 3 in Appendix A). Furthermore, Menon (2010) refers to the ancient Greek civilization having a higher social esteem for theoretical knowledge than for the knowledge of practical skills. She remarks that in Cyprus, vocational education still is generally chosen by students of lower ability and unfavorable social background. Thus, a higher education degree might function as a signal, not only to reveal information on the applicants' personal attributes to potential employers as in Spence's (1973) labor market model but to dissociate from people who have chosen educational paths associated with lower ability and, as a result, lower social status.

In our model we incorporate the findings on social status and social identity into people's educational decision and aim to explore the effects of status concerns on the labor markets for two types of workers. The two types of workers differ in their ability level and are interpreted as non-academically and academically educated workers. Workers choosing the academic path obtain the wage for academics and incur an education cost, which is decreasing in the workers ability. Additionally, the academic path is associated with a non-monetary utility from social status, which is decreasing in the number of workers choosing the academic path. Choosing the non-academic path is associated with the wage for non-academics only. Labor supply for (non-)academics is given by the share of workers choosing the (non-)academic path. Labor demand is the profit maximizing production plan of a single firm. When keeping wages constant, we show that the individual labor supply decision leads to an inefficient labor market allocation. Due to the fact that social status decreases in the number of academics, a lower number of individuals allocated to the labor market for academics would be a Pareto improvement compared to the *laissez-faire* allocation. Moreover, we investigate a more general framework where wages and the

product market's output adjust so that the labor markets clear and the firm maximizes its profits. Comparative statics exercises are conducted with respect to changes in status concerns, which are captured by changes of an intensity parameter. Around equilibrium, it can be shown that an increase in the importance of social status decreases the wage for academics and the number of non-academics, and increases the wage for non-academics and the number of academics. Furthermore, for small levels of status concerns, production increases in status concerns. This is the case as long as the wage for academics exceeds the wage for non-academics. If the wage for non-academics exceeds the wage for academics, production decreases in status concerns.

Our results indicate that there is a unique level of status concerns that maximizes the product market's output. At this level the equilibrium wages for academic and non-academic workers are equal. Whether status concerns decrease or increase the product market's output depends on whether this level is exceeded or not.

The rest of this paper is organized as follows: Section 2 presents the model. Section 3 presents the equilibrium analysis. We discuss our results in Section 4. Section 5 concludes.

2 Model Setup

We consider an economy populated by many workers with mass normalized to one. Workers differ in their ability a , which is distributed according to the cumulative distribution function $F(a)$, $F'(a) = f(a) > 0$. Each worker chooses between two educational paths: the academic or the non-academic path. Let H_S (L_S) be the total number of workers that join the (non-)academic labor market, i.e., the labor supply on the respective market. Let w_h (w_l) denote the wage for (non-)academics, $w_h, w_l > 0$. Then workers derive the consumption utility $u(w)$, $w \in (w_h, w_l)$, where $u'(w) > 0$. Choosing the academic education is associated with an education cost $C(a)$, $C'(a) < 0$. Thus, academic education is assumed to be acquired more easily by workers with higher ability. Additionally, workers choosing the academic education obtain the extra utility $\sigma S(H_S)$, which is interpreted as utility from social status. This extra utility follows the assumption of Social Identity Theory (Tajfel and Turner, 1979). If the workers value education, the academic group characterized by higher levels of education is associated with higher social status than

the non-academic group characterized by a comparatively lower level of education. We assume that status gains decrease in the number of academic workers, i.e., $S'(H_S) < 0$. Our assumption follows Hirsch's (1977) concept of the positional good where satisfaction from consumption is influenced by the extent of the consumption of others. An extensive use by others reduces the perceived value of the consumer. The intensity parameter $\sigma \geq 0$ is used to measure the importance of social status. The total utility from choosing the non-academic education, therefore, is $u(w_l)$, whereas the total utility from choosing the academic education is given by

$$u(w_h) - C(a) + \sigma S(H_S). \quad (1)$$

There is a single firm that hires academic and non-academic workers. The firm's objective is to maximize its profit. The firm produces X units of a single good by using the following Cobb-Douglas production function (with constant returns to scale):

$$X = H^\alpha L^{1-\alpha}, \quad \alpha \in \left(\frac{1}{2}, 1\right), \quad (2)$$

where H (L) is the number of (non-)academic workers employed. We assume that the firm is a price taker on the product market and let the single good's price be exogenously given by p . The factor-demand functions for academic and non-academic workers, H_D and L_D , represent the profit maximizing production plan.

3 Equilibrium Analysis

3.1 Labor Supply

First, we investigate the labor supply decision and its efficiency. For that purpose we let the wages w_h, w_l be given exogenously. A plausible labor supply is a Nash equilibrium in which each worker plays a best response to the decisions of all other workers. That is, each worker with ability a maximizes his utility by either choosing the academic education associated with the payoff $u(w_h) - C(a) + \sigma S(H_S)$ or choosing the non-academic education associated with the payoff $u(w_l)$. By assumption, each worker who chooses the (non-)academic education joins the (non-)academic labor force. Suppose there exists a

threshold ability $\tilde{a}(w_h, w_l, \sigma)$ such that each worker with ability $a \geq \tilde{a}$ becomes an academic. Labor supply is then given by $H_S = 1 - F(\tilde{a})$ and $L_S = F(\tilde{a})$. Note that a single worker is atomistic and has to take \tilde{a} as given. The worker's payoff is maximized by choosing the academic path if and only if

$$u(w_h) - C(a) + \sigma S(1 - F(\tilde{a})) \geq u(w_l). \quad (3)$$

The worker is indifferent between both educational paths if he has the ability \tilde{a} . In this case (3) holds with equality and we have

$$\begin{aligned} u(w_h) - C(\tilde{a}) + \sigma S(1 - F(\tilde{a})) &= u(w_l), \\ \tilde{a} &= C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(\tilde{a}))). \end{aligned} \quad (4)$$

Note that \tilde{a} is only implicitly defined by (4). In what follows, the analysis is restricted on cases in which $\tilde{a}(w_h, w_l, \sigma)$ is unique. We show the following proposition.

Proposition 1. *Each threshold ability $\tilde{a}(w_h, w_l, \sigma)$ that solves (4) has the following characteristics:*

$$\frac{\partial \tilde{a}}{\partial w_h} < 0, \quad \frac{\partial \tilde{a}}{\partial w_l} > 0, \quad \frac{\partial \tilde{a}}{\partial \sigma} < 0.$$

A sufficient condition for $\tilde{a}(w_h, w_l, \sigma)$ to be unique is $\sigma f(a)S'(1 - F(a))/C'(a) < 1$ for each a .

For the proof: see Appendix B.

We now turn to the efficiency analysis of labor supply.

Suppose workers with ability a choose the academic path if and only if $a \geq b$. Then the total utility of all workers is given by

$$\begin{aligned} U &= \int_b^{+\infty} [u(w_h) - C(a) + \sigma S(1 - F(b))]f(a)da + \int_{-\infty}^b u(w_l)da \\ &= u(w_l)F(b) + [1 - F(b)][u(w_h) + \sigma S(1 - F(b))] - \int_b^{+\infty} C(a)f(a)da. \end{aligned}$$

Differentiation with respect to b leads to:

$$\frac{dU}{db} = [u(w_l) - u(w_h) - \sigma S(1 - F(b)) - \sigma[1 - F(b)]S'(1 - F(b)) + C(b)]f(b). \quad (5)$$

Denote b^* the threshold ability that maximizes U . Then b^* must solve the first order condition:

$$\left. \frac{dU}{db} \right|_{b=b^*} = 0,$$

which is equivalent to

$$u(w_h) + \sigma S(1 - F(b^*)) - C(b^*) = -\sigma[1 - F(b^*)]S'(1 - F(b^*)) + u(w_l) \quad (6)$$

by (5) and $f(b) > 0$. The optimal threshold rule equates the marginal benefit associated with a slightly higher labor supply for academics (left-hand side of (6)) with the marginal cost (right-hand side of (6)). The marginal benefit is given by the utility obtained by the last worker who switches from the non-academic to the academic path. The marginal cost is given by the utility from the non-academic wage that the switching worker forgoes plus the total utility loss suffered by all academic workers from the decreasing social status associated with an increasing labor supply for academics. By comparison of (6) with (4) it follows that $\tilde{a} \leq b^*$, with equality only if $\sigma = 0$. Accordingly, we can state the following proposition.

Proposition 2. *If workers concern about social status ($\sigma > 0$), the labor supply decision does not maximize the workers' total utility.*

The reason is that a single worker who decides to become an academic does not consider the negative externality his decision imposes on all other workers who also choose the academic path, namely, the status decrease associated with a higher number of academics which reduces the exclusiveness of that group.

3.2 Labor Demand

The labor demand for academics and non-academics is determined by the profit maximizing firm. Profit maximization requires that each output is produced with factors of production that minimize the costs. Taking the wages as given, the firm faces the following cost-minimization problem:

$$\min_{L,H} w_l L + w_h H \quad \text{s.t.} \quad X = H^\alpha L^{1-\alpha}. \quad (7)$$

By using the method of Lagrange multipliers, it can be shown that the solution of problem (7) is given by the following labor demand functions for academics, H_D , and non-

academics, L_D :

$$H_D = \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X, \quad (8)$$

$$L_D = \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-\alpha} X. \quad (9)$$

It follows that the firm's cost function is given by

$$w_l L_D + w_h H_D = \left[w_l \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-\alpha} + w_h \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-\alpha} \right] X. \quad (10)$$

Recall that the price on the product is given by p . Therefore, a profit maximizing firm produces the quantity X such that

$$p = w_l \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-\alpha} + w_h \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-\alpha}, \quad (11)$$

i.e., the price equals the marginal cost.

3.3 Equilibrium on Interdependent Labor Markets

We now turn to the equilibrium analysis. An equilibrium in our model is a tuple (w_h, w_l, X, \tilde{a}) if and only if it solves

$$1 - F(\tilde{a}) - \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X = 0, \quad (12)$$

$$F(\tilde{a}) - \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-\alpha} X = 0, \quad (13)$$

$$p - w_l \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-\alpha} - w_h \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-\alpha} = 0, \quad (14)$$

$$u(w_h) - u(w_l) - C(\tilde{a}) + \sigma S(1 - F(\tilde{a})) = 0. \quad (15)$$

Accordingly, in an equilibrium the labor markets for academics and for non-academics clear, ensured by (12) and (13), respectively. The firm produces the profit maximizing quantity (Condition (14)) and each worker chooses the educational path that maximizes his utility (Condition 15).

Note that our equilibrium values depend on the exogenously given parameter σ measuring status concerns. Next, we conduct a comparative statics analysis and assess how our equilibrium values are affected by changes in status concerns.

The Jacobian determinant $|\mathbf{A}|$ of (12) - (15) w.r.t. (w_h, w_l, X, \tilde{a}) is given by²

$$\begin{aligned}
|\mathbf{A}| = & [C'(\tilde{a}) + \sigma S'(1 - F(\tilde{a}))f(\tilde{a})] \left[\frac{1}{w_h} \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-3\alpha} + \frac{1}{w_l} \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{2-3\alpha} \right] \\
& - f(\tilde{a})u'(w_l) \left[\left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{2-2\alpha} + \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} \right] \\
& - f(\tilde{a})u'(w_h) \left[\left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} + \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-2\alpha} \right].
\end{aligned} \tag{16}$$

Note that by $C'(\tilde{a}) < 0$, $S'(1 - F(\tilde{a})) < 0$ and $f(\tilde{a}) > 0$, (16) becomes strictly negative so that Cramer's rule can be applied.

Using Cramer's rule³, the wages react on changes in status concerns as follows:

$$\frac{dw_h^*}{d\sigma} = \frac{S(1 - F(\tilde{a}))f(\tilde{a}) \left[\left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} + \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{-2\alpha} \right]}{|\mathbf{A}|}, \tag{17}$$

$$\frac{dw_l^*}{d\sigma} = \frac{-S(1 - F(\tilde{a}))f(\tilde{a}) \left[\left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{2-2\alpha} + \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} \right]}{|\mathbf{A}|}. \tag{18}$$

Recall that $S(1 - F(\tilde{a})) > 0$ and $f(\tilde{a}) > 0$. Thus, the numerator is positive in (17) and negative in (18). The Jacobian determinant $|\mathbf{A}|$, defined in expression (16), is negative, so that the wage for academics decreases in status concerns and the wage for non-academics increases around equilibrium.

The effect of status concerns on the number of (non-)academics is given by

$$\frac{d\tilde{a}^*}{d\sigma} = \frac{S(1 - F(\tilde{a}))X \left[\frac{1}{w_l} \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{2-3\alpha} + \frac{1}{w_h} \left[\frac{\alpha}{1 - \alpha} \frac{w_l}{w_h} \right]^{1-3\alpha} \right]}{|\mathbf{A}|}. \tag{19}$$

The numerator becomes positive and with $|\mathbf{A}| < 0$, \tilde{a} decreases in σ . Recall that \tilde{a} is the threshold ability such that each worker with an ability level $a \geq \tilde{a}$ chooses the academic path. Then, labor supply for academics is given by the number of workers

²For the calculation of the Jacobian determinant see Appendix C.

³For calculations of $\frac{dw_h^*}{d\sigma}$, $\frac{dw_l^*}{d\sigma}$, $\frac{d\tilde{a}^*}{d\sigma}$ and $\frac{dX^*}{d\sigma}$ see Appendix C.

choosing the academic path, $H_S = 1 - F(\tilde{a})$, and labor supply for non-academics is given by $L_S = F(\tilde{a})$. Thus, an increase in status concerns increases the number of academics around equilibrium, while the number of non-academics decreases in status concerns.

Next, we are interested in the effect of status concerns on the product market's output. Applying Cramer's rule yields

$$\frac{dX^*}{d\sigma} = \frac{S(1 - F(\tilde{a}))f(\tilde{a})X \left[\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} \left[\frac{1}{w_h} - \frac{1}{w_l} \right] \right]}{|\mathbf{A}|}. \quad (20)$$

The direction of (20) is directly related to the wage differential $w_h - w_l$. Note that (15) implies that the wage differential is positive for values of σ close to zero. For small levels of status concerns, (20) says that the product market's output increases in status concerns. This is the case as long as the wage for academics exceeds the wage for non-academics, i.e., $w_h - w_l > 0$. If the wage differential becomes negative, output decreases in status concerns. Furthermore, (20) indicates that there is a unique level of status concerns that maximizes the product market's output, i.e., $\frac{dX^*}{d\sigma} = 0$. At this level the equilibrium wages for academic and non-academic workers are equal.

We have the following proposition:

Proposition 3. *The equilibrium values $(w_h^*, w_l^*, X^*, \tilde{a}^*)$ have the following characteristics:*

$$\frac{dw_h^*}{d\sigma} < 0, \quad \frac{dw_l^*}{d\sigma} > 0, \quad \frac{d\tilde{a}^*}{d\sigma} < 0, \quad \frac{dX^*}{d\sigma} \begin{matrix} \leq \\ \geq \end{matrix} 0 \quad \text{if } \sigma \begin{matrix} \geq \\ \leq \end{matrix} \tilde{\sigma},$$

where $\tilde{\sigma}$ is such that $w_h^*(\tilde{\sigma}) = w_l^*(\tilde{\sigma})$.

Figure 1 illustrates a numerical example. In this example, the ability is distributed according to the normal distribution with mean 0.5 and standard deviation 0.1. The other parameter values and functions are given by $\alpha = 0.7$, $p = 0.5$, $C(a) = (1 - a)^2$, $u(w) = \sqrt{w}$, $S(H_S) = \sigma(1 - H_S)$. As Proposition 3 predicts, the wage for academics decreases and the wage for non-academics increases if we increase the intensity of social status associated with academic education. The production level increases, reaches its maximum value if both wages are equalized, and decreases afterwards.

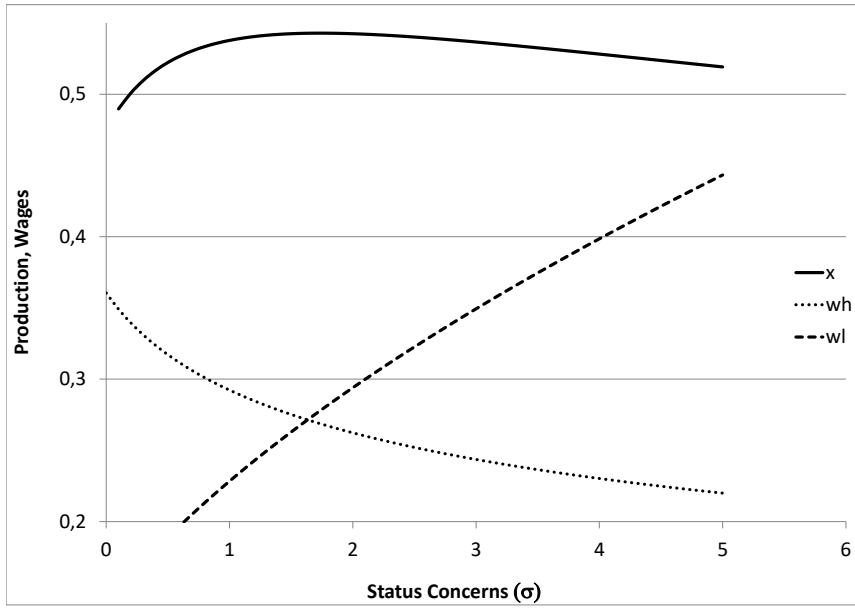


Figure 1: Effect of Status Concerns on Wages and Production

4 Interpretation and Discussion of Results

Our analysis shows that the number of academics increases if social status becomes more important. Consequently, the wage for academics decreases due to a lower bargaining power. Simultaneously, the number of non-academic workers decreases in status concerns and the higher bargaining power is reflected by an increasing wage for non-academic workers. The product market's output reacts on increasing status concerns in two different ways. If the wage for academics exceeds the wage for non-academics, output increases in status concerns. Such a positive wage differential is possible for small levels of status concerns. Due to the opposite movements of the wages there is a unique level of status concerns where both wages are equal. At this point, the output reaches its maximum. When status concerns increase from this point, the wage differential becomes negative, i.e., the wage for non-academics exceeds the wage for academics. Our results show that output decreases in status concerns if the wage differential is negative.

The results indicate that people are induced to demand higher education if they care about their social standing in society and social status is associated with a higher level of education. However, the change in the product market's output reflects the necessity that both types of workers are represented in the labor market in a particular composition.

Regarding this result it has to be taken into account that the optimal composition of workers depends on the level of economic development of a country. The composition of differently skilled workers necessarily varies with the level of technological advance. Especially the rapid progress in computer technology shows that the skills needed to meet new challenges and to remain competitive in the global economy have changed over time.

The economic structural change might be a valid argument for the need of more highly educated workers. However, more people holding the same degree might weaken the perceived quality of the educational level attained. Our efficiency analysis shows that the labor supply decision does not maximize the workers' total utility if workers concern about their social status. This is based on the fact that a single worker deciding to become an academic does not consider the negative externality his decision imposes on all other workers who also choose the academic path. This results may reflect the worries about a possible devaluation of higher education degrees if there is an excessive demand for higher education. For example, an excessive demand of higher education might change the structure of jobs. Between many jobs there is a hierarchical relationship and jobs at the upper end of the hierarchy are often associated with higher education degrees. If the occupational structure of the labor market fails to handle the increasing number of highly educated workers so that they cannot be absorbed into traditional graduate occupations, employers have the possibility to recruit applicants with a level of education that is not necessarily required for the job. This phenomenon referred to as over-education and its consequences on the wage structure for graduates has received considerable attention in the literature (e.g. Dolton and Silles, 2008). Another consequence of an increase in the number of highly educated people might be a different valuation of the same educational level. On the one hand, the screening process for employment might be done on the basis of grades, i.e., employers prefer those applicants, who graduated with distinction. On the other hand, the same education degree might be associated with higher quality if it is awarded by a university considered as an elite university.

In our model, we do not consider these possible consequences and assume that all workers who choose the academic path enter the labor market for academics. This assumption might be debatable because actually some students do not finish their studies.

However, the number of graduates in Germany have been permanently increasing since 2002, both in total and for German students (Statistisches Bundesamt (Destatis), 2018b), so that an increasing amount of graduates has been entering the labor market over time. Furthermore, we assume that workers make their educational decision by maximizing their utility and that the decisive factor for this decision is an ability threshold. Indeed there are such ‘thresholds’ for people who would like to go to university. First, people usually need a higher education entrance qualification to enroll at university. Additionally, access to university education often is limited by further restrictions such as a university’s capacity limit. This contradicts with our assumption that the educational decision depends on the utility maximizing behavior only and that the ability threshold is not fixed. However, there is a positive trend in the number of beginning students in Germany so that a large amount of people seem to fulfill the requirements. One explanation might be that nowadays a large proportion of children required to attend school in Germany aim at getting a higher education entrance qualification and that this qualification can be achieved by second-chance education as well. At this point it should be mentioned that even the decision whether to graduate from lower secondary or upper secondary school might be influenced by status concerns. For example, in Germany a higher education entrance qualification (*German Abitur*, ISCED 3) is higher classified by the ISCED than a school certificate after lower secondary school (*German Haupt-/Realschulabschluss*, ISCED 2). Then children required to attend school would choose to aim at a higher education entrance qualification rather than to aim at graduation after lower secondary school if social status is associated with ability even at the secondary school level.

Our model shows that more people prefer to demand higher education if they concern for social status and social status is induced (or assumed to be) by higher education. Considered in the context of the dual system in Germany such a change in education demand and, thus, in labor supply may have drastic consequences for the vocational education system and it will be necessary to intervene politically. If an increasing demand for higher education is strongly influenced by status concerns the most obvious policy would be to equalize the social esteem for academic and vocational education. However, once there is a difference in social esteem, an alignment process would take time. If schools promote both educational paths equally, such a change could take place more immediately.

Moreover, schools could act as an information source for parents to ensure that parents judge both educational paths equally and encourage their children to choose the education corresponding with their abilities. As long as university education is seen as the ‘better’ educational path to move up the social ladder or to achieve high status jobs, parents are more likely to encourage their children to aim at a university degree. Therefore, involving parents in the alignment process is necessary since parents have a strong impact on children’s educational decision. Additionally, it is important that teachers, playing an important role in promoting equal valuation for vocational and university education in schools, actually judge both paths equally. However, a study conducted by the National Foundation of Educational Research in England and Wales (NFER) reveals that many teachers have a higher valuation for university education if students possess the necessary requirements for university entry (e.g. McCrone, 2014).

Another policy might be to raise the education cost since the education cost associated with attending university may be over-compensated by social status. However, such an intervention harms the aim of social justice because members of families with low socio-economic background would be restricted in their possibility to attend university. Increasing the education cost would contradict those policies which aim at reducing the impact of one’s family background on educational achievement to ensure equality of opportunity.

The discussion suggests that it might be difficult to limit the increasing demand for higher education once it has started to rise due to status concerns. If a country is interested in increasing the number of highly educated workers, e.g. to meet the requirements of the economic structural change, it might be easier to subsidize university education for a particular period of time. Differences in social esteem associated with education or even stigmatization should be avoided since it could be difficult to stop the process of a growing gap once it has begun.

5 Conclusion

Choosing an educational path is affected by many reasons. In our model, we consider both a monetary and a social incentive for the educational decision. Our model highlights that

in equilibrium labor supply of highly educated workers increases if higher education is associated with social esteem, while labor supply of workers without higher education decreases. Furthermore, the change in status concerns affects the wage structure and the product market's output. In times of technological advance countries might be interested in increasing the number of highly educated workers because of the change in needed skills due to the rapid progress in technology. However, our model shows that production might be negatively affected if the importance of social status exceeds a particular level. The problem with social values, e.g. social esteem associated with education, is that they are hardly to change once they exist in people's mind so that the probability of exceeding the critical value of social status is relatively high. Thus, differences in social esteem associated with education or even stigmatization of particular educational paths should be avoided since it could be difficult to stop the process of a growing gap once it has begun. To increase the demand for an particular educational path, policies should concentrate on incentives such as subsidies which are easier to adjust temporally.

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A Figures

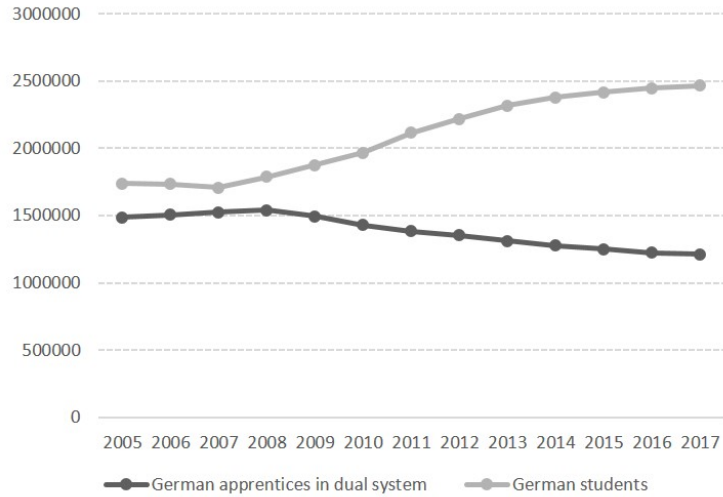


Figure 2: Demand for educational paths in Germany, 2005-2017.

Source: Statistisches Bundesamt (Destatis), 2018a, 2018c, 2015, 2011.

Apprentices: persons who, based on a contract, undergo a formal training in a company and spend part of the time in a vocational school (dual system).

Students: persons registered at a university. The stated year is the beginning of the corresponding winter term, e.g. 2017 = Winter term 2017/18

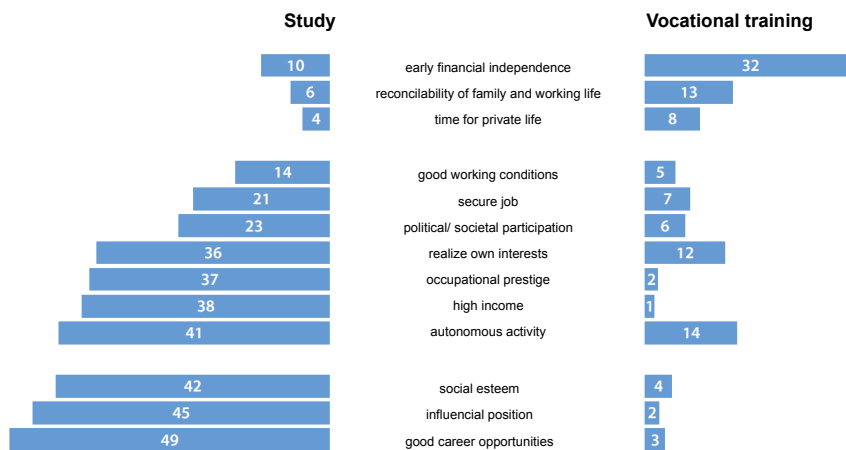


Figure 3: Benefits associated with vocational training and study.

Source: Based on Lörz et al. (2012).

Benefits associated with vocational training and study by school leavers with a higher education entrance qualification (Abitur), six months after graduating from upper secondary school (Gymnasium) in 2010. The shown benefits are valued by 5 on a scale of 1 *not at all* to 5 *greatly*.

B Proofs

Proof of Proposition 1

We first prove that \tilde{a} is a function depending on w_h, w_l, σ . Define $g(\tilde{a}, w_h, w_l, \sigma) = u(w_h) - u(w_l) - C(\tilde{a}) + \sigma S(1 - F(\tilde{a}))$ and let $(\tilde{a}^0, w_h^0, w_l^0, \sigma^0)$ be a solution to $g(\tilde{a}, w_h, w_l, \sigma) = 0$. Differentiation with respect to \tilde{a} leads to $\frac{\partial g}{\partial \tilde{a}} = -C'(\tilde{a}) - \sigma S'(1 - F(\tilde{a}))f(\tilde{a})$. Recall that $C'(a) < 0$, $\sigma \geq 0$, and $S'(1 - F(\tilde{a})) < 0$, which implies that $\frac{\partial g}{\partial \tilde{a}}$ is strictly positive. In particular, this is also true at $(\tilde{a}^0, w_h^0, w_l^0, \sigma^0)$. Then, according to the Implicit Function Theorem, $g(\tilde{a}, w_h, w_l, \sigma) = 0$ defines \tilde{a} as a function of w_h, w_l, σ in some neighborhood of $(\tilde{a}^0, w_h^0, w_l^0, \sigma^0)$. Furthermore, the derivatives with respect to w_h, w_l and σ are given by

$$\left(\frac{\partial \tilde{a}}{\partial w_h}, \frac{\partial \tilde{a}}{\partial w_l}, \frac{\partial \tilde{a}}{\partial \sigma} \right) = -\frac{1}{\frac{\partial g}{\partial \tilde{a}}} (u'(w_h), -u'(w_l), -S(1 - F(\tilde{a}))).$$

By $u'(w) > 0$, $\frac{\partial g}{\partial \tilde{a}} > 0$, we have $\frac{\partial \tilde{a}}{\partial w_h} < 0$, $\frac{\partial \tilde{a}}{\partial w_l} > 0$, $\frac{\partial \tilde{a}}{\partial \sigma} < 0$.

It remains to be shown that \tilde{a} is unique if $\sigma f(a)S'(1 - F(a))/C'(a) < 1$ for each a . For given w_h, w_l, σ ,

$$\tilde{a} = C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(\tilde{a}))) \quad (21)$$

describes a mapping $\tilde{a} : \mathbb{R} \rightarrow \mathbb{R}$. By using $d(a_0, a_1) = |a_0 - a_1|$ for any $a_0, a_1 \in \mathbb{R}$ as a metric, (\mathbb{R}, d) is a metric space. Then $\tilde{a} : \mathbb{R} \rightarrow \mathbb{R}$ is a contraction mapping on \mathbb{R} if there exists $q \in [0, 1)$ such that $d(\tilde{a}(a_0), \tilde{a}(a_1)) \leq qd(a_0, a_1)$ for all $a_0, a_1 \in \mathbb{R}$. Accordingly, \tilde{a} is a contraction mapping if

$$|C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(a_0))) - C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(a_1)))| \leq q|a_0 - a_1|.$$

This condition is fulfilled if

$$\frac{C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(a_1))) - C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(a_0)))}{a_0 - a_1} \geq 1,$$

which holds for arbitrary a_0, a_1 if and only if

$$-\frac{d}{da} C^{-1}(u(w_h) - u(w_l) + \sigma S(1 - F(a))) = \sigma f(a) \frac{S(1 - F(a))}{C'(a)} < 1, \quad (22)$$

for each a . Thus, if (22) holds, (21) is indeed a contraction mapping. Then, according to the Contraction Mapping Theorem, (21) has a unique fixed point. \square

C Calculations

Calculation of the Jacobian determinant

The Jacobian matrix of (12)-(15) w.r.t. (w_h, w_l, X, \tilde{a}) is given by

$$\mathbf{A} = \begin{pmatrix} \frac{1-\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & -\frac{1-\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & -f(\tilde{a}) \\ -\frac{\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & \frac{\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & f(\tilde{a}) \\ -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & 0 & 0 \\ u'(w_h) & -u'(w_l) & 0 & -C'(\tilde{a}) - \sigma S'(1 - F(\tilde{a}))f(\tilde{a}) \end{pmatrix}.$$

From \mathbf{A} we obtain the Jacobian determinant given by

$$\begin{aligned} |\mathbf{A}| &= [C'(\tilde{a}) + \sigma S'(1 - F(\tilde{a}))f(\tilde{a})] \left[\frac{1}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-3\alpha} + \frac{1}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{2-3\alpha} \right] \\ &\quad - f(\tilde{a})u'(w_l) \left[\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{2-2\alpha} + \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} \right] \\ &\quad - f(\tilde{a})u'(w_h) \left[\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} + \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-2\alpha} \right]. \end{aligned} \quad (23)$$

Comparative statics analysis

Implicit differentiation of (12)-(15) w.r.t. σ yields:

$$\begin{aligned}
\frac{1-\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X \frac{dw_h}{d\sigma} - \frac{1-\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X \frac{dw_l}{d\sigma} - \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} \frac{dX}{d\sigma} - f(\tilde{a}) \frac{d\tilde{a}}{d\sigma} &= 0 \\
-\frac{\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X \frac{dw_h}{d\sigma} + \frac{\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X \frac{dw_l}{d\sigma} - \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} \frac{dX}{d\sigma} + f(\tilde{a}) \frac{d\tilde{a}}{d\sigma} &= 0 \\
-\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} \frac{dw_h}{d\sigma} - \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} \frac{dw_l}{d\sigma} &= 0 \\
u'(w_h) \frac{dw_h}{d\sigma} - u'(w_l) \frac{dw_l}{d\sigma} + [-C'(\tilde{a}) - \sigma S'(1-F(\tilde{a}))f(\tilde{a})] \frac{d\tilde{a}}{d\sigma} &= -S(1-F(\tilde{a}))
\end{aligned}$$

Applying Cramer's rule, the effect of status concerns on the wage for academics is

$$\frac{dw_h^*}{d\sigma} = \frac{|\mathbf{A}_{w_h}|}{|\mathbf{A}|},$$

where $|\mathbf{A}|$ is given by (23) and

$$|\mathbf{A}_{w_h}| = \begin{vmatrix} 0 & -\frac{1-\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & -f(\tilde{a}) \\ 0 & \frac{\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & f(\tilde{a}) \\ 0 & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & 0 & 0 \\ -S(1-F(\tilde{a})) & -u'(w_l) & 0 & -C'(\tilde{a}) - \sigma S'(1-F(\tilde{a}))f(\tilde{a}) \end{vmatrix}.$$

Thus, we get

$$\frac{dw_h^*}{d\sigma} = \frac{S(1-F(\tilde{a}))f(\tilde{a}) \left[\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} + \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-2\alpha} \right]}{|\mathbf{A}|}.$$

Applying Cramer's rule, the effect of status concerns on the wage for non-academics is

$$\frac{dw_l^*}{d\sigma} = \frac{|\mathbf{A}_{w_l}|}{|\mathbf{A}|},$$

where $|\mathbf{A}|$ is given by (23) and

$$|\mathbf{A}_{w_l}| = \begin{vmatrix} \frac{1-\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & 0 & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & -f(\tilde{a}) \\ -\frac{\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & 0 & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & f(\tilde{a}) \\ -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & 0 & 0 & 0 \\ u'(w_h) & -S(1-F(\tilde{a})) & 0 & -C'(\tilde{a}) - \sigma S'(1-F(\tilde{a}))f(\tilde{a}) \end{vmatrix}.$$

Thus, we get

$$\frac{dw_l^*}{d\sigma} = \frac{-S(1 - F(\tilde{a}))f(\tilde{a}) \left[\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{2-2\alpha} + \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} \right]}{|\mathbf{A}|}.$$

Applying Cramer's rule, the effect of status concerns on the product market's output is

$$\frac{dX^*}{d\sigma} = \frac{|\mathbf{A}_X|}{|\mathbf{A}|},$$

where $|\mathbf{A}|$ is given by (23) and

$$|\mathbf{A}_X| = \begin{vmatrix} \frac{1-\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & -\frac{1-\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & 0 & -f(\tilde{a}) \\ -\frac{\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & \frac{\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & 0 & f(\tilde{a}) \\ -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & 0 & 0 \\ u'(w_h) & -u'(w_l) & -S(1 - F(\tilde{a})) & -C'(\tilde{a}) - \sigma S'(1 - F(\tilde{a}))f(\tilde{a}) \end{vmatrix}.$$

Thus, we get

$$\frac{dX^*}{d\sigma} = \frac{S(1 - F(\tilde{a}))f(\tilde{a})X \left[\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-2\alpha} \left[\frac{1}{w_h} - \frac{1}{w_l} \right] \right]}{|\mathbf{A}|}.$$

Applying Cramer's rule, the effect of status concerns on \tilde{a}^* is

$$\frac{d\tilde{a}^*}{d\sigma} = \frac{|\mathbf{A}_{\tilde{a}}|}{|\mathbf{A}|},$$

where $|\mathbf{A}|$ is given by (23) and

$$|\mathbf{A}_{\tilde{a}}| = \begin{vmatrix} \frac{1-\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & -\frac{1-\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} X & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & 0 \\ -\frac{\alpha}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & \frac{\alpha}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} X & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & 0 \\ -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-\alpha} & -\left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{-\alpha} & 0 & 0 \\ u'(w_h) & -u'(w_l) & 0 & -S(1 - F(\tilde{a})) \end{vmatrix}.$$

Thus, we get

$$\frac{d\tilde{a}^*}{d\sigma} = \frac{S(1 - F(\tilde{a}))X \left[\frac{1}{w_l} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{2-3\alpha} + \frac{1}{w_h} \left[\frac{\alpha}{1-\alpha} \frac{w_l}{w_h} \right]^{1-3\alpha} \right]}{|\mathbf{A}|}.$$