INTERPERSONAL STYLES AND LABOR MARKET OUTCOMES

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ABSTRACT

This paper develops a framework to understand the role of interpersonal interactions in the labor market including task assignment and wages. Effective interpersonal interactions involve caring, to establish cooperation, and at the same time directness, to communicate in an unambiguous way. The ability to perform these tasks varies with personality and the importance of these tasks varies across jobs. An assignment model shows that people are most productive in jobs that match their style and earn less when they have to shift to other jobs. An oversupply of one attribute relative to the other reduces wages for people who are better with the attribute in greater supply. We present evidence that youth sociability affects job assignment in adulthood. The returns to interpersonal interactions are consistent with the assignment model.

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I. Introduction

There is a growing consensus that noncognitive skills are important for understanding individual labor market outcomes. From the psychological literature it is known that differences in personality have strong effects on individual behavior (John and Srivastava, 1999). In the economic literature, simple correlations between personality traits and outcomes suggest that noncognitive skills are important in predicting individual labor market outcomes, such as behavior and labor market success (Bowles, Gintis and Osborne, 2001). However, the estimated relationship between psychological traits and outcomes varies substantially across studies, and their effects are remarkably small. Understanding the role of noncognitive skills for individual labor market outcomes requires an understanding of different types of personalities from psychology as well as an understanding of behavior and assignment from the economic literature.

Jobs vary in the types of interactions that are important. For instance, teachers and nurses need cooperation and have to be relatively *caring* in dealing with pupils and patients. Salespeople and managers have to be more *direct* in their interactions. Our model includes both styles. In our model, different jobs emphasize different styles. While people can adjust their behavior to suit their jobs to some extent, the most caring people will be assigned to jobs where caring is relatively important and relatively direct people will be assigned to jobs in which directness is important. Supply and demand determine prices and allocations, so imbalances in supply and demand induce shifts of people to jobs in which they are less effective, which lowers wages.

We study four of our model's implications using British data (covering 1997-2001) and German data (covering 1979-1998). We show that personality at age 16 is a good predictor of later job assignment in the sense that relatively caring (direct) people end up working in more caring (direct) jobs. Second, estimates from our assignment model reveal

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that the relative supply and demand for directness – measured as the ratio of directness to caring – determines wages. Third, we show that changes over time in the relative importance of the styles are reflected in prices. We show that directness has become more important relative to caring, and that this shift has increased the labor market returns to directness relative to caring. Lastly, we show that the returns to interpersonal styles vary across jobs with the types of interpersonal tasks performed.

The approach in this paper builds on intuitive observations in the psychological and management literatures. Caring is needed to create a cooperative environment in which tasks have to be carried out; directness is needed to communicate accurately. Especially in nonhierarchical settings interpersonal interactions are essential because workers can benefit from each other provided that they are able to communicate effectively. The main argument of the model is that effective communication depends mainly on the balance between caring and directness. Psychologists report that by agreeing with someone's ideas and by praising someone's achievements, cooperation can be gained easily (Aronson, 1995). Interactions are complicated because it is also important to provide adequate feedback and to convince people about different ideas, without losing too much cooperation. Some people's personalities are more suited to building cooperation, while others are best when clear feedback has to be provided. Most research, management training books, self-help books, and anecdotal evidence has focused on caring, ignoring directness and the interplay between caring and directness.

People differ in the tradeoff between caring and directness. Caring people are relatively good in establishing cooperation, but have difficulty being critical. Direct people are able to provide plain comments without reducing cooperation, but generate less cooperation.

Jobs also differ in their importance of caring and directness. Empathy can be a disadvantage for salesmen, engineers have to be very clear in their communication and

effective performance in managerial jobs often requires making tough decisions regarding others, such as discipline or even dismissal. Empathy can hamper performance in these jobs and the relatively least caring people will be assigned to those jobs. Being relatively direct will be particularly valuable in such jobs because making others take costly actions in the manager's interest requires the ability to persuade, convince and maybe even overrule others' interests. The model exhibits a tradeoff between caring and directness in which both types of interpersonal interactions can be either beneficial or detrimental in terms of labor market outcomes.

There is now a small but burgeoning economic literature on people skills. Most economic studies do not find particularly large effects of interpersonal interactions on wages. For example, Machin, McIntosh, Vignoles and Viitanen (2001) find positive but rather small labor market returns to sociability variables in Britain, but they do not consider the assignment of different types of workers to different jobs. Mueller and Plug (2006) estimate the effect of personality on earnings. Using the five factor model of personality they find that some personality traits are penalized whereas others have positive returns. Fortin (2006) investigates the impact of a variety of soft skills on earnings and finds that some have positive premiums, while others do not. Krueger and Schkade (2005) show that workers who are more gregarious, based on their behavior off the job, tend to be employed in jobs that involve more social interactions. Kuhn and Weinberger (2005) provide evidence that people who held leadership positions in high school earn higher wages and are more likely to be employed as managers. Finally, early work by Filer (1983) suggests that personality is important in explaining labor market outcomes and gender wage differentials.

Other work has focused on the development of noncognitive skills. Cunha, Heckman, Lochner and Masterov (2005) and Cunha and Heckman (2006) focus on the lifecycle development of noncognitive skills; Urzua (2006) on racial gaps; and Borghans, ter Weel and

Weinberg (2006) on whether changes in the importance of noncognitive skills can explain trends in the gender and racial wage gaps in the United States. Postlewaite and Silverman (2006) model investments in people skills. Finally, Borghans, Meijers and ter Weel (2006) and Segal (2006) investigate the role of noncognitive skills in explaining cognitive test scores. The present paper deviates from this literature by focusing on different types of interpersonal styles and their effects on labor market outcomes, including the assignment of workers to jobs and wages.

II. Interpersonal Interactions

This section develops the theoretical background, model and empirical implications. We begin by discussing the literature on interpersonal interactions, on which we rely in building our economic model of interpersonal interactions.

A. Different Kinds of Interpersonal Task Inputs

We start from, but move beyond, the view of interpersonal interactions in psychology, management and the personality literature, which views interpersonal skills as being friendly, accommodating others' feelings, taking the role of the others by being empathetic, communicating effectively without upsetting others and influencing others by presenting opinions about situations or how to solve problems. The aim is to uncover if there are different kinds of interpersonal interactions that are effective in different situations, in different occupations, and for different persons.

Many work relationships consist of cooperation but go no further than this. They also have to be sustained even though people may or may not like each other. There are often conflicts between those at work, arising from opposing roles, competition and rivalry, or conflicting views about how work should be done. The importance of interpersonal

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interactions is a major subject of study in social psychology (Argyle, 1967; and Aronson, 1995). Social psychologists look at interpersonal interactions from a skills point of view, drawing an analogy between people skills and motor skills. Just as someone with good motor skills may know how to operate a machine, people with good interpersonal skills are thought to know what to say and how to act in interpersonal relationships. And, just as people with good motor skills are expected to earn higher wages, social psychologists expect a relationship between interpersonal ability and pay. The estimates presented in these studies are not conclusive and often consider one personality trait in isolation (see Mueller and Plug, 2006, for a brief discussion of these studies).[1]

The analogy between people skills and motor skills ignores the different facets of interpersonal skills, which makes it important to find the right balance between them. As discussed, interpersonal relationships at work involve being helpful and cooperative, but also require directness and greater ability in one can interfere with the other.[2]

The multidimensionality of interpersonal styles is reflected in the personality literature where the Five Factor Model (FFM) of personality is often used as an integrated framework to study the effects of personality traits on behavior. The FFM contains five independent categories sufficient to describe individual differences in personality (see McCrae and John, 1992, John and Srivastava, 1999, and Funder, 2001, for comprehensive overviews and different taxonomies of traits). The dimensions include extraversion, agreeableness, conscientiousness, neuroticism and openness. In particular, the separate dimensions of extraversion and agreeableness are strongly related to interpersonal interactions. Extraversion is characterized by facets such as gregariousness, assertiveness, activity and outgoingness.

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[1] Some economists have taken a similar view by including behavioral traits into wage equations. They have established correlations, but there is no theoretical reason why some traits are rewarded more than others (see for example Bowles, Gintis and Osborne, 2001, for an overview of this literature).

[2] Another phenomenon in psychology is that caring or cooperation is contrasted with destruction in the sense that if a person does not cooperate he will destroy (part of) the relationship (Goleman, 1996). We take a different route by emphasizing caring as one input and directness as the other input into interpersonal interactions.

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Agreeableness includes facets such as forgivingness, altruism, compliance and tender mindedness. Studies consistently find that extraversion and agreeableness are distinct traits (Eyseneck, 1991).

The literature in psychology has studied the labor market effects of personality traits, but it does not find strong and consistent effects. For instance, many studies find significant contributions of or penalties for neuroticism, openness and conscientious to behavioral outcomes but not to agreeableness or extraversion. Often neuroticism is associated with penalties in terms of job performance (Barrick and Mount, 1991) and higher values of openness and conscientious are strongly correlated with higher cognitive and mental ability which yield behavioral success (McCrea and John, 1992). Mueller and Plug (2006) find insignificant returns to agreeableness and extraversion in their wage regressions for males and females. We hypothesize that part of the reason for these weak results is that the studies do not consider the assignment of workers to jobs.

In translating these findings in psychology into economics, we focus on two inputs, the value of which depends on the occupational setting. The first is an input of high affiliation related to the degree of acquiescing, agreeing, assisting, cooperating, obliging, initiating, counseling, and advising. This input is needed to establish caring and liking. The other input is one of low affiliation related to the degree of analyzing, criticizing, directing, judging, instructing, and resisting. This input is necessary to provide assertiveness and to communicate clearly. These inputs are a description of the interpersonal *behavior*. For simplicity these two inputs are termed caring and directness, which is consistent with the definition of extraversion and agreeableness from the FFM in the personality literature.

Job *circumstances* vary – while some jobs mainly require caring, other jobs mainly require directness or a mix of the two. We argue that there is a tradeoff between the two inputs and that the balance between the two determines productivity. People adjust their

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behavior to the circumstances, but the ability to tradeoff between caring and directness depends on *personality*.

Linde (1988) shows that aircrews with successful safety records had a higher level of mitigation when addressing superiors. This level of mitigation was maintained in social relationships. In accident and emergency situations (real and simulated), there was less mitigation because messages delivered with mitigation are much less likely to be acted on, which is consistent with some ability to adjust behavior. Several case studies suggest that senior employees speak considerably faster and in ways that are more sophisticated than more junior personnel but adjust their speech style to establish more effective cooperation when engaged in cooperative projects (for example Thakerar, Giles and Cheshire, 1982). On the other hand, sometimes there is no accommodation of interpersonal behavior when people interact. For example, in professional situations where a certain distance between two parties preserves identity rather than acceptance, people are less likely to accommodate their behavior to establish cooperation (Giles and Coupland, 1991). Also, in a hierarchical situation it is often more appropriate for a manager to behave like this towards a worker.

B. Model

In our model, two inputs determine productivity. It is assumed that productivity depends on the effectiveness of interpersonal interactions (Y), which is a Cobb-Douglas function of the degree of affiliation a worker puts in when interacting, caring (C), and on the influence he exerts on the behavior of the others, directness (D):

$$(1) \qquad Y = C^{1-\alpha} D^{\alpha}.$$

In equation (1) α reflects the relative importance directness in a job.[3] The parameter α

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[3] This way of approaching interpersonal relationships at work is related to Lazear (1989). He argues that the tradeoff between cooperation and competition in a two-person game leads to an efficient wage structure that is more compressed because it discourages conflicts. A similar argument is developed in Dewatripont and Tirole

describes the *circumstances*, and C and D are variables describing the interpersonal *behavior* of a worker. The economy is characterized by competitive markets in which there is perfect information about job requirements and worker skills.

Workers face a tradeoff in their interactions with others in that in any given situation they can gain cooperation by avoiding giving criticism and deemphasizing potential disagreements. This tradeoff can be written as

$$(2) \qquad D = \pi_1 - \pi_2 C .$$

The π parameters reflect the tradeoff between establishing a caring relationship by affiliation and influencing the other by being direct. So, the π parameters reflect the worker's *personality*. Some people may be better in both tasks, but we focus on the tradeoff between both inputs and assume that π_2 is increasing with π_1. More specifically, $\pi_2 = g(\pi)$ and $\pi_1 = \pi$. It is reasonable to assume that workers who are less effective in pure caring jobs have an absolute advantage in jobs where directness is important. Formally we assume that $\dfrac{\pi}{g(\pi)}$ is decreasing in π (that is $\pi g'(\pi) > g(\pi)$), where $\dfrac{\overline{\pi}}{g(\overline{\pi})}$ is the maximum level of caring a worker can achieve. Substitution into equation (2) yields $D = \pi - g(\pi) C$.

Maximizing Y given α and π yields the following results:

1. $D = \alpha \pi$: Any given worker will put more emphasis on directness in a job in which directness is relatively more important compared to a job where caring is relatively more important. At the same time, workers who have a natural comparative advantage in being more direct will behave more direct in any given job.

(1999) related to advocates. Our approach is also related to the approach in Prendergast (2003) where communication is worse when people do not trust each other, but relations are improved when there is trust.

2. $C = (1-\alpha)\dfrac{\pi}{g(\pi)}$: In a job that emphasizes the ability to be caring, workers shift the balance towards caring when engaged in interpersonal interactions. Since $\dfrac{\pi}{g(\pi)}$ is decreasing in π, workers with a natural comparative advantage in being more caring will be more caring in every job.

These expressions show that behavior is determined by circumstances and personality.

Substituting the optimal D and C into the production function (1) for a person with a given value of π yields

$$(3) \qquad Y = e^{\alpha\ln(\alpha\pi)+(1-\alpha)\ln\left((1-\alpha)\frac{\pi}{g(\pi)}\right)}.$$

From equation (3) one can derive an expression for the wage as a function of job and personal characteristics. By making distributional assumptions, an analytical solution can be derived. We assume that π and $\alpha/(1-\alpha)$ have a lognormal distribution: $\ln(\pi) \sim N(\mu_\pi, \sigma_\pi^2)$ and $\ln(\alpha/(1-\alpha)) \sim N(\mu_\alpha, \sigma_\alpha^2)$.

Workers with a comparative advantage in directness will be relatively more productive in jobs demanding directness. In equilibrium the worker with the highest value of π is matched to the job with highest value of α, and so on. Making use of the lognormal distributions, the optimal assignment in which higher values of π are matched to higher values of α is

$$(4) \qquad \pi = e^{\frac{\sigma_\pi}{\sigma_\alpha}\left(\ln\left(\frac{\alpha}{1-\alpha}\right)-\mu_\alpha\right)+\mu_\pi}$$

Under perfect competition with complete information the wage structure $w(\pi)$ is such that at the margin the difference between two workers' wages equals their productivity differential in the jobs they are assigned to.

Following an approach developed by Sattinger (1993), the premium associated with increasing π at the margin equals the marginal product of π in the job to which the worker is assigned in equilibrium. This leads to

$$(5) \quad \frac{dw}{d\pi} = \frac{dY}{d\pi} = Y \left(\frac{\alpha}{\pi} + (1-\alpha) \left(\frac{g(\pi) - \pi g'(\pi)}{\pi g(\pi)} \right) \right) = Y \left(\frac{\alpha}{\pi} + (1-\alpha) h(\pi) \right)$$

The term $h(\pi) = \frac{g(\pi) - \pi g'(\pi)}{\pi g(\pi)}$ is the elasticity of substitution between ability in directness and caring. Substitution of the optimal assignment (4) in equation (5) yields

$$(6) \quad \frac{dw}{d\pi} = \frac{dY}{d\pi} = Y \left(\alpha \left(\frac{(1-\alpha)}{\alpha} \right) \frac{\frac{\sigma_\pi}{\sigma_\alpha} - \frac{\sigma_\pi}{\sigma_\alpha} \mu_\alpha - \mu_\pi}{e^{\sigma_\alpha}} + (1-\alpha) h(\pi) \right)$$

When everyone is equally good in caring jobs, when $\pi_1 = \pi_2 = \pi$, $h(\pi) = 0$ and the earnings of relatively direct people will always be higher. It is more plausible to assume that relatively caring people are more productive in caring jobs. This is the case when $h(\pi) < 0$. When people who perform better in direct jobs are equally less productive (in relative terms) in caring jobs, $h(\pi) = -1$. In that case, when π and $\alpha/(1-\alpha)$ have the same distribution, wages are independent of π. Each job is filled by the worker who is most productive in it.[4] When both distributions have the same standard deviation, but when $\mu_\alpha > \mu_\pi$, there is a shortage of direct people and consequently the wage will be increasing in directness. Conversely, the slope of the wage function will be negative when $\sigma_\alpha = \sigma_\pi$ and $\mu_\alpha < \mu_\pi$. When more direct workers are more productive in general (that is when $h(\pi) > -1$) there will be an additional positive term in this wage equation that is not related to the relative supply and demand of personal characteristics.

Differences in the standard deviation of the distributions will lead to non-monotonic

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[4] A job with technology α would have the highest output if it were filled with a worker satisfying $\pi = \alpha/(1-\alpha)$. Employing a worker with a higher or lower value of π will lead to a lower level of productivity.

effects. When $\mu_\alpha = \mu_\pi$ and σ_α is large compared to σ_π there will be shortages for both very caring and very direct workers. Consequently, people with extreme characteristics will earn more than people with average characteristics. When $\mu_\alpha = \mu_\pi$ and σ_α is small compared to σ_π there are too many workers with extreme characteristics and wage for people with average characteristics will be relatively high.

Our model implies that wages will depend on the supply and demand for directness relative to caring in an intuitive way. Although caring is likely to be of importance in many jobs, people who have a natural advantage in this input might get lower wages when the relative supply of this type of people exceeds demand.

C. Empirical Implications

In general the distribution of π and α will not be as well shaped as assumed above to obtain an analytical solution. Ekeland, Heckman and Nesheim (2004) show that differences in the shape of both distributions can be used to identify assignment models. Given two continuous distributions the optimal match between π and α can be described by the function $\pi(\alpha)$. The relationship between the wage and job characteristics α can then be described by:

$$(7) \qquad \frac{dw}{d\alpha} = \frac{d\gamma}{d\alpha} = \gamma\left(f(\alpha) + \left(\frac{\alpha}{\pi} - 1 + \alpha\right)\frac{d\pi}{d\alpha}\right).$$

The function $f(\alpha)$ represents differences in compensating wage differentials between occupations and productivity differentials between different types of workers as represented by $(1-\alpha)h(\pi)$. Several authors have noted that caring jobs might be less stressful and therefore pay lower wages (for example Elger, 1990 and Green and McIntosh, 2001). Inclusion of this function in the regression will pick up differences in non-pecuniary

preferences. The function $\left(\dfrac{\partial \dfrac{w}{\pi}}{\partial \alpha}=1+\alpha\right)$ reflects the match for certain values of α. When this function is negative relatively direct workers are matched to relatively caring jobs. When it is positive relatively caring workers are assigned to jobs requiring relatively more directness. By constructing non-parametric estimates for $\dfrac{dw}{d\alpha}$ and $\dfrac{d\pi}{d\alpha}$, the function $\left(\dfrac{\partial \dfrac{w}{\pi}}{\partial \alpha}=1+\alpha\right)$ can be estimated under assumptions about the functional form of $f(\alpha)$.[5] The sign of this function at certain values of α indicates the relative shortage or oversupply of relatively direct or caring workers.

A fundamental assumption is that people are heterogeneous making some workers more suited to caring jobs while others are more suited for jobs requiring directness. To test this assumption, we relate youth behavior, as an indicator of personal characteristics, to occupational choice.

III. Data

We perform a number of analyses, with a variety of data requirements. We study wage premiums associated with jobs requiring interpersonal skills at a point in time and how these skills change over time. These analyses require cross-sectional data and repeated cross-sectional data with information on job tasks and wages. We also study how youth sociability is related to the choice of adult jobs. This analysis uses a longitudinal data set with information on youth sociability, in which it is also possible to observe adult job choice.

All of our analyses require measures of the tasks performed by workers in jobs. We obtain measures of job tasks for Britain from the First (1997) and Second (2001) British Skills Survey (BSS) of the ESRC Centre on Skills, Knowledge and Organisational Performance (SKOPE). SKOPE initiated the first edition of the BSS in 1997 with the goal of ``investigating

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[5] We use a linear specification because a quadratic term was statistically insignificant.

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the skills used at work in Britain … [and] to collect data from individual jobholders on a rich array of variables characterizing British jobs. The intention is that the survey generates a more valid and detailed picture of skills than is normally available from examining individuals' qualifications or their occupations" (Ashton, Davies, Felstead and Green, 1998, p.5). The most innovative feature of the data is that it embeds principles and procedures for job analysis in a representative survey. The second BSS is an update of the first and has a similar structure.

A representative sample of 2,467 individual jobholders was interviewed face-to-face in 1997. In 2001 the survey was increased to include 4,470 workers. Both surveys give the importance of 36 job activities and key skills (coded into five levels), including problem solving, noticing mistakes, mathematical ability, reading and writing, physical skills, the ability to plan activities, knowledge about products and the workplace and interpersonal interactions. The first BSS contains question about individual performance in the tasks that are investigated.

For Germany we use four waves of data collected by the *Bundesinstitut für Berufsbildung* (BIBB), Berlin and *Institut für Arbeitsmarkt- und Berufsforschung der Bundesanhalt fur Arbeit* (IAB), Nürnberg. These BIBB/IAB data include a wealth of information on job tasks in 1979, 1985, 1991 and 1998. The main advantage of the BIBB/IAB is that it contains four waves of data on job tasks over a relatively long period of time (1979-1998). Each round contains around 30,000 observations. These data contain information about job tasks similar to the BSS. The task measures in the BIBB/IAB are binary indicators for whether a particular task is performed. Besides interpersonal interactions – divided in to caring and directness – four other job tasks have been identified: non-routine analytic, routine cognitive, routine manual and non-routine manual job tasks. To maintain a comparable sample, we restrict the sample to people living in West Germany.

To study the relationship between youth sociability and adult job choice, we use the 1970 British Cohort Study (BCS), which contains information about youth sociability. The BCS follows people born in the week of 5-11 April 1970. The 1986 wave, conducted at age 16 contains information about sociability and personality. We relate these measures of youth sociability to labor market outcomes at age 30 in 2000. To obtain measures of job tasks for BCS respondents, we merge data on job tasks from the BSS into the BCS, at the occupation level. Table A3 in the Data Appendix shows the definitions of the sociability constructs and presents some descriptive statistics.

A. Job Task Measures

In our British data, we construct a variable that combines caring and directness and then break these components apart. Caring is defined as the average of the importance of job tasks on dealing with people; working with a team of people; counseling, advising or caring for customers or clients; and listening carefully to colleagues. Directness is defined as the average importance of the following job tasks: Instructing, training or teaching people; making speeches or presentations; persuading or influencing others; and selling a product. Factor analysis reveals that this split of interpersonal styles into caring and directness is a valid distinction. Using the principal components in the empirical analysis instead of the averages does not change the results qualitatively.

The importance of task measures is self-assessed by the respondents to the survey on a five point scale. The question asked is the following: "In your job, how important is …?" The response scale offered is the following: Essential, very important, fairly important, not very important, and not at all important. Table A1 in the Data Appendix presents the average importance of the aggregated task measures for both years (1997 and 2001).

The effectiveness of job tasks is measured by the answers to the following question:

"When your job involves …, are you able to do this effectively?" Five possible categories were offered: Always, nearly always, often, sometimes and hardly ever. We use the answers to this question as a measure of skill in estimating the assignment model. Questions used to measure skill have been subject of substantial debate among economists, psychologists and sociologists, especially in the literature regarding the importance of language skills (see Borghans and ter Weel, 2006 for a brief discussion). Answers to self-assessed skill questions may be influenced by social desirability and self-referencing motives. It is not clear how such biases will affect our estimates. The questions focus on respondents' ability to perform job tasks as opposed to their general ability because these questions are less subject to self-esteem biases. Furthermore, the questions are directly linked to the tasks that must be fulfilled, which is likely to directly influence the performance of the job and therefore wages. Rather than collecting information about an abstract skill, the question is competence based. Finally, Spenner (1990) reports evidence from a number of studies finding high correlations between self-assessed measures of skill obtained by this method and similar ways of questioning and measures obtained from objective judgments by experts and external expert systems used to develop for example the Dictionary of Occupational Titles (DOT).

Three variables are selected to measure general educational development (GED): reading, writing, and mathematical ability. These variables are comparable to the GED definitions provided in the U.S. DOT on language, reasoning and mathematical development. The importance of planning job, knowledge of the organization and its products, problem solving, noticing problems and (procedural) faults, and physical skills and work are also constructed.

In our German data, task measures are also self-assessed. Respondents in the surveys have to indicate whether they carry out a certain task or not. Occupational requirements are measured by respondents' job tasks, depicted in the survey by the activities that employees

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have to perform at the workplace. Following Spitz-Oener (2006) we aggregate these activities into five task categories: Interpersonal tasks (split into directness and caring), non-routine analytical tasks, routine cognitive tasks, routine manual tasks, and non-routine manual tasks. Caring is defined as serving and accommodating; advising customers and clients; and helping out others. Directness is defined as the average of negotiating, lobbying, coordinating and organizing; teaching or training; selling, buying, or advertising; and entertaining or presenting. The individual score on a task measure is defined as the number of tasks a respondent carries out divided by the total number of tasks in a category multiplied by 100. To obtain a consistent series over time we have aggregated this information at the two digit occupational level.[6]

The Data Appendix contains additional information about the data. Tables A1 and A2 give the definitions and provide relevant descriptive statistics (see also Ashton, Davies, Felstead and Green, 1998 and Spitz-Oener, 2006 for a detailed description of the British and German data).

Table A4 in the Data Appendix presents correlations between our measure of interpersonal styles and a number of main worker characteristics for Britain and Germany. The correlation coefficients suggest that directness and caring are positively correlated with the level of education and hourly wages. The correlation coefficient for directness is generally higher. In addition, the level caring in an occupation is positively correlated with the fraction of women in that occupation. In the empirical analysis we always control for the fraction of women in an occupation and include dummies for educational levels. Note that we are interested in the tradeoff between caring and directness and not in differences in absolute levels of caring and directness. A person who is better in both caring and directness will face similar tradeoffs compared to a person who is worse on both.

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[6] It is not possible to create series at the three digit level because of the relatively long time span of the data.

Finally, more background information about the data sources used in this paper is described in Data Appendix A1-A4.

IV. Results

The empirical results come in four parts. First we document differences in the importance of caring and directness across occupations, and then present estimates relating early sociability to current employment. As a third piece of evidence we present reduced form wage equations. Finally, we document the results from estimating the assignment model.

A. Differences between Occupations

For most jobs interpersonal tasks are important. Nevertheless there are large differences in the importance of interpersonal tasks across jobs. Table A5 lists the importance of interpersonal tasks in the 25 largest occupations in Britain in 1997. The first column reports the importance of directness, the second column reports the importance of caring, the third column reports the ratio of the importance of directness relative to caring, and the fourth column reports the absolute difference between the importance of directness and the importance of caring. The occupations are ranked by the ratio of the importance of directness relative to caring. Service jobs, in which dealing with others and taking care of others is important, are the most caring occupations. In these jobs not only is caring important, but directness is relatively unimportant. At the other side of the spectrum, jobs that involve selling and influencing others place the most weight on directness. Although these jobs also require caring (to establish relationships with others), the mean directness in these occupations is among the highest and the absolute difference between directness and caring is largest in these occupations.

The importance of the other job tasks is largely unrelated to relative importance of

directness relative to caring. We have investigated how the relative importance of directness is related to the other task variables formally by regressing each task variable on the ratio of directness and caring, controlling for level of education and gender. The only task showing a relationship was math for which the coefficient (standard error) was equal to 0.101 (0.043).

B. Early Sociability and Employment

A person's abilities in interpersonal tasks will affect the occupation in which he works. We check for this assignment by estimating the relationship between youth sociability and the importance of caring and directness in the occupation in which a person works as an adult. Youths who are more caring are expected to be in occupations where caring tasks are more important as adults. Given the often difficult dynamics of adolescent society, we expect popularity to be more related to directness (see Eder, Evans, and Parker, 2003), and more popular children to be employed in occupations where directness is most important. Evidence that these aspects of youth sociability are correlated with the importance of interpersonal tasks in adult occupations will validate our measures of the importance of caring and directness and show that variations in the extent to which people are caring and direct are an important determinant of occupational choice. How youth sociability is related to the importance of other tasks will depend on whether interpersonal skills complement other skills. If they do, people with stronger interpersonal skills will tend to be in jobs where other tasks are more important. The relationship will also depend on whether youth sociability is associated with uncontrolled aspects of ability and motivation.

We test our model's assignment implications by regressing the importance of job tasks in a person's occupation on measures of youth sociability. Our measures of sociability come from the 1986 wave of the BCS, which includes a variety of behavioral measures of sociability, including the number of friends the respondent has; the frequency with which the

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respondents spent time with friends during the school year and during holidays; and the frequency with which the respondents spent time with friends during their leisure (as opposed to nonsocial leisure activity). Also included are self-descriptions of sociability. The 2000 wave of the BCS includes data for these individuals when they are 30 years old. To obtain measures of the importance of directness and caring and other tasks, each BCS respondent was assigned the mean of the task variables for his three digit occupation calculated from the 2001 BSS.

Table I presents the regression results. The first row shows that all of the indicators of sociability are positively correlated with the importance of interpersonal tasks in a person's three digit occupation. We next focus on how youth sociability is related to the importance of directness and caring on the respondents' adult jobs. We have a self-description as having a caring nature, which we expect to be correlated with taking a job where caring is important. We have two variables that capture popularity, a self-description as being popular or outgoing and the number of friends the person has. The second and third rows show these results. It is striking that differences in social character in terms of being a caring person are strongly related to the importance of caring in the current occupation, but not to the importance of directness. Being popular, as measured by the self-descriptions or the number of friends, is strongly related to being in an occupation where directness is important, but not to the importance of caring. The other behavioral measures of sociability, which presumably do not pick up specific types of sociability, are related to the importance of both directness and caring.

The remaining rows report the relationship between the youth sociability measures and the importance of other job tasks. With the exception of planning activities, which likely have an interactive component, there are no systematic relationships.

The last row replicates studies that simply include sociability in an earnings

regression. Behavioral indicators are not correlated with wages, which suggests that youth sociability is not capturing differences in ability. Below we show that, once we account for their multifaceted nature, people skills strongly affect wages.

A potential concern with the way in which we relate sociability indicators at age 16 to jobs with particular features at age 30 is that more direct people put more emphasis on the direct tasks they carry out rather than on the caring tasks in their jobs. The same might be true for more caring people putting more emphasis on caring tasks when they are interviewed. This concern derives from the fact that the information on the task content of the job comes from self-reported declarations of the workers themselves. To investigate whether our estimates are biased in this way, we constructed caring and directness indicators from the fourth edition of the *Dictionary of Occupational Titles* (DOT), which was collected in 1977. Job tasks in the DOT were determined by trained examiners from the U.S. Department of Labor using a unified framework. 12,000 occupations were assessed along 44 objective and more subjective dimensions. We selected variables from the DOT temperaments and variables from the DOT interest factors to signify interests, tastes and preferences for certain kinds of activities that are entailed in job performance.[7] We constructed a crosswalk between the U.S. and U.K. occupations, which is available upon request, to append the DOT occupation characteristics to the 2001 BSS. Table A6 presents the definitions of caring and directness from the DOT. We use the sum of these variables normalized by their standard deviations.

The correlation between the importance of directness (caring) from the BSS and that from the DOT is 0.437 (0.233), which are both significant at the 1 percent level. The correlation between the preferred measure of interpersonal styles from both sources equals 0.477 and is also significant at the 1 percent level. Our measures of youth sociability from the BCS are all statistically significantly related to the DOT measures of job tasks in the expected

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[7] See Borghans, ter Weel and Weinberg (2006) for a detailed description of the DOT measures of interpersonal styles.

way.

Our finding that youth sociability is strongly related to the interpersonal tasks in peoples' subsequent occupations validates for our measures of interpersonal tasks. It also validates our division between caring and directness in that both job tasks are associated with different aspects of social character. Finally, these results suggest that the importance of interpersonal tasks and the ability to perform those tasks are important determinants of occupational choice.

C. Reduced-Form Wage Estimates

In this section we present reduced-form wage estimates. We first document the estimates from cross-sectional wage regressions. Secondly, we present panel estimates. Thirdly, we show results controlling for changes in the distribution of unobservable ability in occupations by investigating how changes in job tasks affect wages. Finally, we present estimates showing that the prices of directness relative to caring vary across jobs.

C.I. Cross-Sectional Estimates

We begin by estimating reduced-form models of the relationship between wages and interpersonal tasks. Consider the model

$$w_{ijt} = x_{jt}\beta_t + z_i\Gamma_t + \gamma_i + \varepsilon_{ijt}.$$

In this formulation, w_{ijt} denotes the log wage of worker i employed in occupation j at time t; x_{jt} denotes the tasks performed in occupation j at time t; z_i denotes the observable characteristics of worker i; γ_i denotes unobserved characteristics that affect his wage; and ε_{ijt} gives the error term. Our main interest is the coefficient on the importance of directness relative to caring on the wages of the people in an occupation, β_t.

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Provided that individual ability is not correlated with the interpersonal tasks, a regression of w_{ijt} on x_{jt} and z_i at a point in time will give the price of interpersonal tasks. By running these regressions on data from a variety of years, it is possible to determine how the prices of interpersonal tasks have changed over time.

Tables II and III present cross-sectional wage regressions for Britain and Germany. The coefficients for the importance of directness relative to caring are positive and statistically significant in all years for both countries, indicating that directness has a positive return relative to caring. The measures for the two countries are different, making it difficult to compare the results directly, but we find that directness has a higher return than caring in both countries, increasing our confidence in the estimates. Moreover the return to directness relative to caring increases over time in both countries. For Britain a one standard deviation increase in relative directness increases wages by 9.6 percent in 1997 and 10.8 percent in 2001. For Germany a one standard deviation increase in the relative importance of directness would increase wages by 3.8 (1979), 5.2 (1985), 8.5 (1991), and 10.2 (1998) percent.

In keeping with our estimates, the reported importance of directness increases relative to caring. To better understand these shifts we decompose this increase in the relative importance of directness into within and between occupation components. Overall, there is an increase in the relative importance of directness by 0.002 points per year between 1997 and 2001 (from 0.719 to 0.726) in the UK, and this increase is statistically significant at the one percent level. When the relative importance of directness in occupations in 1997 is weighted by the change in employment in each occupation between 1997 and 2001, the relative importance of directness increased by 0.005 points per year due to shifts in employment between occupations, and this increase is significant at the one percent level. The within occupation change is negative: when we weight the importance of people skills in occupations in 1997 and 2001 by employment in 2001, the relative importance of directness falls by 0.003

points per year.

In Germany, the importance of directness relative to caring rose substantially by some 0.015 points per year between 1979 and 1997 (from 0.765 to 1.033). Between occupation shifts account for an increase in the relative importance of directness of 0.003 points per year; this is significant at the one percent level. The importance increased by 0.013 points per year within occupations. Thus, in contrast to Britain, the within occupation change is larger than the between occupation change in Germany.

C.II. Panel Estimates

One concern with our estimates of the returns to directness relative to caring is that there may be a correlation between the importance of directness relative to caring in an occupation and the unobserved ability, γ_i, of the people in that occupation. Although the cross-sectional wage estimates combined with the within and between occupations components discussed above do not suggest such a relationship, we probe these results in a number of ways. First, we relate changes in wages to changes in the importance of the interpersonal tasks within occupations. Implicit in this approach is that any differences in unobserved ability across occupations do not change substantially over time.

Figure I plots changes in log hourly wages against changes in the importance of directness relative to caring at the occupation level in Britain between 1997 and 2001. The size of the bubbles is proportional to occupational employment. There is a positive relationship between changes in the relative importance of directness and changes in log hourly wages. The slope (standard error) of this relationship (weighted by the square root of employment in the occupation) is 0.141 (0.035).

Table IV reports regressions of changes in log wages on the importance of the interpersonal tasks in Britain for the period 1997-2001. Also included are changes in the other

task measures and human capital variables. The estimates show a strong relationship between changes in the relative importance of directness and changes in wages, although one that is weaker than the cross-sectional estimates. A one standard deviation change in the relative importance of directness increases wages by 15.6 percent. The second column in Table IV reports 2SLS estimates in which we instrumented the importance of job tasks by the self-assessed importance of males. By doing so, we want to exclude the possibility that we are picking up differences between men and women in reporting the importance of job tasks. The results are similar to the OLS estimates.

Figure II reports similar results for Germany for the period 1979-1998. The slope (standard error) of the relationship (weighing occupations by the square root of their 1979 employment) between the 1979-1998 change in relative importance of directness and the change in log wages is 0.0012 (0.0003). Given these estimates, a one standard deviation increase in the relative importance of directness raises wages by 19.8 percent.

Table V presents fixed effect estimates of the returns to interpersonal interactions in Germany. The returns to directness relative to caring are relatively large and statistically significant in this period. The estimates are in the range of the cross-sectional estimates. A one standard deviation increase in the relative importance of directness increase log wages by about 20 percent.

C.III. Controlling for Worker Flows

The preceding estimates look at changes in the importance of tasks within occupations, but workers may be moving between occupations as the tasks required by jobs change. Although we do not have panel data on individuals, the 2001 BSS contains information on respondents' previous occupations. We use this information to address concerns with changes in the distribution of unobserved ability in occupations by looking at

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how changes in job tasks affect wages for people who were in an occupation before the change.[8]

Dropping the observable characteristics, z_i, and including them in the unobservable, γ_i, we let $\overline{w}_{jt}$ denote the mean log wage in occupation j at time t, which equals

$$\overline{w}_{jt} = x_{jt}\beta_t + \overline{\gamma}_{jt} + \overline{\varepsilon}_{jt}.$$

Here, γ_{jt} and ε_{jt} denote the mean of the characteristics and the error term in occupation j at time t.

Let $j(i,\tau)$ denote individual i's occupation at time τ. Using the 1997 BSS, we estimate wages and tasks for each occupation, restricting the sample to those who will still be in their prime working years in 2001. Using our data on the previous occupation, we match each 2001 respondent to the mean log wage, $w_{j(i,1997)1997}$, and tasks, $x_{j(i,1997),1997}$, for his 1997 occupation estimated from the 1997 BSS, which equals

$$\overline{w}_{j(i,1997)1997} = x_{j(i,1997)1997}\beta_{1997} + \overline{\gamma}_{j1997} + \overline{\varepsilon}_{j1997}.$$

The difference between person i's log wage in 2001 and the mean log wage in 1997 in his 1997 occupation is

$$w_{ij1} - \overline{w}_{j(i,1997)1997} = x_{ij2001}\beta_{2001} - x_{j(i,1997)1997}\beta_{1997} + x_i + \gamma_{j(i,1997)1997} + \varepsilon_{ij2001} - \overline{\varepsilon}_{j(i,1997)1997}$$

This expression can be rewritten as,

$$w_{ij2001} - \overline{w}_{j(i,1997)1997} = \left(x_{ij2001} - x_{j(i,1997)1997}\right)\beta_{2001} + x_{j(i,1997)1997}\left(\beta_{2001} - \beta_{1997}\right) + \left(\gamma_i - \overline{\gamma}_{j(i,1997)1997}\right) + \left(\varepsilon_{ij2001} - \overline{\varepsilon}_{j(i,1997)1997}\right)$$

Given the synthetic cohort structure, and the assumption that the heterogeneity is time

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[8] The 2001 survey gives each respondent's occupation 5 years earlier, which is close to the time of the 1997 survey.

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invariant, $Cov\left(x_{j(i,1997),1997}, \gamma_i - \gamma_{j(i,1997),1997}\right) = 0$. This result is obtained, because $\bar{\gamma}_{j(i,1997),1997}$ is the mean of γ_i across all of the people in occupation j at time 1997, and $x_{j(i,1997),1997}$ is constant across all people for in occupation j in 1997.

Unfortunately, $Cov\left(x_{ij2001} - x_{j(i,1997),1997}, \gamma_i - \gamma_{j(i,1997),1997}\right) \neq 0$ because some of the people in occupation j in 2001 were in different occupations in 1997. To address this problem, we estimate the equation by 2SLS. Our instrument for $x_{ij1} - x_{j(i,0),0}$ is the change between 0 and 1 in the tasks in the person's time 0 occupation, $x_{j(i,0)1} - x_{j(i,0),0}$. As with $x_{j(i,0),0}$, this quantity takes on the same value for all people in occupation j at time 0, so $Cov\left(x_{j(i,0)1} - x_{j(i,0),0}, \gamma_i - \bar{\gamma}_{j(i,0),0}\right) = 0$ because $\bar{\gamma}_{j(i,0),0}$ is the mean of γ_i across all of the people in occupation j at time 0. Thus the identification of β_{2001} comes from changes in tasks within a worker's original occupation, which eliminates potentially endogenous mobility.

Table VI contains estimates for Britain. As shown, the change in the task variables gives the wage premiums associated with them in 2001, and their levels give the change between 1997 and 2001. The estimate for 2001 is quite close to that shown in Table II, as is the implied estimate of 0.251 for 1997. Taken as a whole, these estimates indicate a large premium for jobs where directness is important relative to caring.

C.IV. Interactions between Skills and Job Tasks

The preceding results show that people skills affect job assignments, that there is a premium associated with directness relative to caring, and that this premium has increased over time. Before turning to our structural estimates, we provide reduced-form evidence that the returns to directness relative to caring vary systematically across jobs.

To do this, we estimate wage regressions for individual occupations,

$$w_{ij} = \pi_i \beta_j + z_i \Gamma_j + \varepsilon_{ij}.$$

In this formulation, w_{ij} denotes the log wage of worker i employed in occupation j; π_i denotes his effectiveness in direct tasks relative to caring tasks, which is available on the 1997 BSS; z_i denotes the observable characteristics of worker i; and ε_{ij} gives the error term, which we assume is uncorrelated with z_i. We allow the effect of directness relative to caring, β_j to vary across occupations.

We retain these occupation specific premiums for directness relative to caring, β_j, and in a second stage regress them on the importance of directness relative to caring in the occupation. Formally, we estimate

$$\beta_j = \alpha_j \phi + \xi_j.$$

Here α_j gives the relative importance of directness in occupation j and ϕ gives the premium to directness relative to caring in occupation j. We expect the relative premium to directness to be highest in occupations where directness is relatively important.

Figure III plots the premium to directness relative to caring, β_j, against the importance of directness relative to caring, α_j, for the 277 occupations in the 1997 BSS. The figure shows that in occupations when directness is relatively important, the premium for directness is higher. The slope (standard errors) of the estimated relationship in Figure III is 1.210 (0.605) with a constant of −0.838 (0.442). In occupations where caring is important relative to directness, there is a positive premium to caring relative to directness. The premium for directness increases with its importance, so that there is a positive premium to directness relative to caring in the occupations where directness is most important.

Repeating the analysis including the square of π_i, not just a linear term, allows us to calculate the mix of directness relative to caring among workers at which wages are the highest in each occupation. Formally, we estimate,

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$$w_{ij} = \pi_i \beta_{1,j} + \pi_i^2 \beta_{1,j}^2 + z_i \Gamma + \varepsilon_{ij}.$$

We then construct $Peak_j = -\dfrac{\beta_{1j}}{2\beta_{2j}}$ for each occupation. Figure IV plots these points against

the relative importance of directness in that occupation. The graph shows that the relative effectiveness of directness at which wages are highest increases with the importance of directness in a job. The slope (standard errors) of the estimated relationship in Figure IV is 5.446 (1.517). This confirms our assumption that different jobs require different mixes of directness relative to caring.

D. Wages in an Assignment Model

Our reduced-form results show a substantial, positive wage premium to directness relative to caring. This section provides structural estimates of our assignment model. We estimate the relationship between wages and the relative importance of directness and also the matching function, which links workers' styles to the relative importance of directness in their jobs. These functions are estimated using kernel regressions.[9] Figure V shows the density of the importance of directness relative to caring across jobs. The figure shows that the importance of directness relative to caring is between 0.25 and 1.25 in virtually all jobs.

The relationship between the importance of directness relative to caring and wages is shown in Figure V. The horizontal axis gives the importance of directness relative to caring. It shows that wages tend to be higher in jobs that require relatively more directness. Only in the extreme right tail, where the relative importance of directness is larger than 1.25 (and there are few observations) does the relationship reverse.

Figure VII plots the relationship between the importance of directness relative to caring and workers' styles, indicating how workers are matched to jobs. It shows the

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[9] The estimates are based on Epanechnikov weights, with bandwidth of 0.5, calculated at 100 points in the range of the relative importance of caring in a job. The data used to carry out this analysis are taken from the 1997 BSS.

matching function relating peoples' performance in direct tasks relative to caring tasks to the requirements of their job. In the relevant segment there is a strong, positive relationship between job requirements and abilities.

The derivatives of the wage and matching functions can be obtained from these kernel estimates. For every grid point, we estimate the derivative by taking the difference in the kernel estimates between two consecutive grid points divided by the distance between these points. These derivatives are shown in Figures VIII and IX. Figure VIII shows that the derivative of the wage function is positive in the range where most observations lie. The derivate of the matching function in Figure IX shows the change in workers' ability to be direct relative to caring when moving from any given job to a job that requires slightly more directness. A large derivative implies a low supply of workers with the usual set of characteristics in these jobs, in that small changes in job requirements are associated with large changes in workers' characteristics. Estimates beyond 1.25 are imprecise.

We use these derivatives to estimate equation (7). Table VII reports the results. Taking the grid points as observations, we estimate WLS regressions of the derivative of the wage function on the derivative of the matching function, controlling for the importance of directness relative to caring (to control for compensating differentials). The kernel densities shown in Figure V are used as weights. Formally, we estimate,

$$(8) \quad \frac{d\ln w}{d\alpha} = \beta_0 + \beta_1 \frac{d\pi}{d\alpha} + \beta_2 \pi + \varepsilon$$

A high value of $\frac{d\pi}{d\alpha}$ implies that when directness is slightly more important in a job, employers hire workers that are much more direct. This means that there is a relatively low supply of direct workers compared to the demand for this type. If relative supply and demand determines wages, a low supply will be associated with a large increase in wages. If the derivative of the matching function explains much of the variation in the derivative of the

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wage function it indicates that the relative supply and demand of interpersonal styles determines wages.

The estimate of β_1 in Table VII is positive and significant in keeping with the relative supply-demand explanation. The positive sign of this parameter implies that there is on average an oversupply of relatively caring workers, yielding a premium for relatively direct workers. The level of directness itself is generally insignificant and unstable, suggesting that there are no compensating wage differentials. When we include an interaction between the derivative of the matching function and the importance of directness (results not reported), the interaction is insignificant, indicating that the negative relationship is rather constant across the job distribution. These results suggest that workers are on average less direct than jobs require. On the other hand, there do not appear to be substantial differences between workers' abilities and job requirements in the variance of directness relative to caring. In the assignment this implies that every worker is matched to a job that requires more directness, with roughly the same gap throughout the population.

As shown in column (2), regression-adjusting wages for age (and its square) and educational attainment yields similar, but somewhat smaller, effects for the derivative of the matching function. The estimates in columns (3) and (4) show that the results are similar without weights.

Our kernel estimates may generate autocorrelation in the variables. To address this problem, we allow for a moving average structure in the error term. As shown in the remaining columns (5) and (6), including a lag in the estimation model does not affect the results.

The estimates indicate that the relationship between wages and the interpersonal requirements of a job are largely explained by the supply and demand for directness relative to caring. Confirming the importance of supply and demand relative to compensating

differentials, for instance, the required level of caring or directness does not influence wages directly. Our estimates also suggest that the failure to account for differences in the returns to the various types of interpersonal skills across jobs and the assignment of people to jobs may explain the weak effect of simple regressions in which wages are regressed on personal characteristics (see Machin, McIntosh, Vignoles and Viitanen (2001), Mueller and Plug (2006) and Fortin (2006)). Our results also indicate that the returns to interpersonal styles may change over time with shifts in supply and demand.

V. Conclusion

Despite informal arguments that interpersonal styles are important for understanding individual labor market outcomes and are becoming more important, economists have done little to analyze their economic consequences in terms of wages and job assignment. This paper provides a first step in this direction, developing a framework to understand the labor market consequences of interpersonal styles and demonstrating the relationship between interpersonal styles and labor market outcomes.

The framework focuses on tradeoff between directness, which facilitates clear communication, and caring, which establishes cooperation. Workers are assumed to be heterogeneous with respect to these inputs and occupations are assumed to require different levels of both inputs. Workers are most productive when they work in a job that best matches their style best, but any given worker adjusts the extent to which he is direct relative to caring to suit his circumstances. Our model yields a number of results for wages and the assignment of workers to jobs. For instance, workers with a comparative advantage in caring will be assigned to relatively caring jobs, within which they earn higher wages. The returns to caring and directness will be determined by relative supply and demand.

We test the model's implications for occupational assignment using British data.

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Behavioral measures of youth sociability are good predictors of the jobs that people hold as adults. Estimates from an assignment model indicate that the demand and supply for direct relative to caring workers determines wages. British data (covering 1997-2001) and German data (covering 1979-1998) show that directness has a higher wage premium than caring and that the premium to directness has increased relative to caring.

Data Appendix

A.1. British Skills Survey

The British Skills Surveys (BSS) comprise two cross-sectional surveys conducted in 1997 and 2001; each contains a representative sample of the British population. The interviewers assess the importance of 36 job activities and key skills, including problem solving, noticing mistakes, mathematical ability, reading and writing, physical skills, the ability to plan activities, knowledge about products and workplace and interpersonal interactions. Nine job task categories are constructed from these detailed job tasks. These are listed in Table A1. The changes in the importance of job tasks are analyzed in Section IV. Ashton, Davies, Felstead and Green (1998) provide a detailed overview of the interview set up and the design of the BSS survey. They also present basic analyses of the core variables. Felstead, Gallie and Green (2002) provide an overview of the second BSS.

The usual approach in job analyses is for experts to visit people at their workplace to evaluate job requirements. In practice each occupation is evaluated based only upon a couple of representative examples, and these evaluation studies are updated infrequently. Information from job analyses therefore reflects experiences gathered over a long period of time, and might miss changes in portions of an occupation that differ from the typical job in the occupation title. The main advantage of the BSS data is that information is obtained about job requirements at two distinct points in time for all jobs, with the data being representative of all people within each category. The two waves of the BSS codes job requirements on a five point scale, which gives us a much more nuanced picture compared to the binary information in most job analyses.

For some of the empirical analyses the individual data are aggregated to three digit 1990 U.K. Standard Occupational Classification (SOC90) codes, of which there are 371. For Britain samples of the Standard Occupational Classification 1990 (SOC90) are available. The SOC90 was published to replace both the Classification of Occupations 1980 (CO80) and the Classification of Occupations and Dictionary of Occupational Titles (CODOT). The SOC90 includes nine major groups divided into 22 sub-major groups of occupations. These 22 groups can be divided into 371 unit groups, which are defined as occupations. These unit groups are the aggregate results of over 26,000 job titles. All observations used are for workers who are not self-employed and aged 20 to 60.

Standard U.K. measures of education are used. These are university degree, professional degree, NVQ3, NVQ2, NVQ1, and no degree. University and professional degrees are equivalent to a U.S. college degree. NVQ3 would be similar to some college, NVQ2 and NVQ1 are comparable to a high school degree, and workers without a degree are dropouts. In 1997 (2001) 22.3 (30.4) percent of the respondents in the survey had obtained a university or professional degree, 15.2 (19.0) percent a NVQ3 degree, 43.3 (37.0) percent a NVQ2 or NVQ1 degree, and 19.2 (14.6) percent of the respondents had no degree. The

average (standard deviation) age of the respondents is 39.0 (10.3) in 1997 and increases to 40.3 (10.4) in 2001. The average (standard deviation) gross hourly wage is GB£ 7.43 (9.25) in 1997 and increases to GB£ 9.75 (10.95) in 2001.

The analysis in Section V.D. requires the use of both the importance and effectiveness of job tasks. In the 1997 BSS the effectiveness of the 36 job tasks is gathered by using the answers to the following question: "If your job requires … are you able to do this effectively?" The answers range from always to never. The answers to these questions are aggregated to the same categories as those presented in Table A1. Unfortunately, the effectiveness questions were not included in the 2001 wave of the BSS. The means (standard deviations) of these effectiveness variables on a 1-5 scale are: interpersonal skills 3.950 (0.633), directness 3.654 (0.815), caring 4.246 (0.574), math 4.101 (0.911), reading 4.274 (0.698), writing 4.078 (0.860), physical ability 4.066 (0.855), problem solving 3.986 (0.647), noticing mistakes 4.317 (0.535), planning of activities 4.185 (0.636), and knowledge of the organization 4.107 (0.585).

A.2. BIBB/IAB

The data collected by the *Bundesinstitut für Berufsbildung* (BIBB) in Berlin and *Institut für Arbeitsmarkt- und Berufsforschung der Bundesanstalt für Arbei*t (IAB) in Nürnberg are representative surveys of the German workforce. This BIBB/IAB database contains four waves of cross-sectional worker surveys: 1979, 1985, 1991 and 1998. The surveys contain standard demographic and labor market variables and are particularly rich in detail about workers' jobs, job attributes, the tools used in these jobs, the skills necessary to perform a job, and how these skills were obtained. The sampling frame for the survey is the employed German population age 16 to 65. Each survey has about 30,000 respondents. The largest possible sample is used. We only remove workers from the former East Germany, who were included in the last two surveys, self-employed people, and people who were unemployed. The questions in the three surveys are similar but not exactly comparable. We report details on the variables we use in Table A2 and have analyzed changes in the importance of job tasks in Section IV.C.

The German education system has three main levels of education, which are best classified according to vocational education classes. This classification yields a better proxy for level of education than years of schooling, since the German system requires most pupils to take training courses after graduation. In 1979 (1998) 8.2 (16.6) percent of the workers had acquired a high level of education (comparable to a college degree or higher in the United States), 73.4 (69.2) percent a medium level of education (comparable to some college and high school), and 18.4 (14.2) percent a low level of education (including those who dropped out of school). Investigating educational developments in Germany by including 1985 and 1991 yields a steady shift towards higher levels of education over the period 1979-1998.

The average (standard deviation) age of the workforce in 1979 equals 37.4 (11.6) and 38.9 (10.6) in 1998. The pattern of age is relatively constant over time. The average (standard deviation) gross hourly wage is equal to DM 11.5 (9.45) in 1979 and increases to DM 20.6 (21.9) in 1998. In 1985 the average gross hourly wage equals DM 14.1 (12.8) and in 1991 it is equal to DM 17.0 (17.9). These numbers suggest a relatively smooth pattern of wages over time in Germany.

For the analysis of changes over time, we follow Spitz-Oener (2006). The data are aggregated into consistent occupation cells at the two digit level. Because of changes in the German occupational classification it is impossible to match the data at a more disaggregated level. All four waves are categorized according to the 1988 German occupational classification, which yields 83 occupations in all four years.

A.3. British Cohort Study

The 1970 Birth Cohort Study (BCS) follows along the lines of the National Child Development Study (NCDS) and originates in the British Birth Survey of over 17,000 babies born in Britain in the week 5-11 April 1970. We use the BCS and not the NCDS because the NCDS does not contain sociability variables.

Four major follow-up surveys have monitored the changing health, education, social and economic circumstances of the surviving cohort members – in 1975, 1980, 1986, and 1996. Our focus is on the sociability questions asked in 1986 when the cohort members were 16 years old. The latest major survey was held in 2000 and contains data on respondents' labor market status at the age of 30, for people who were in paid work and not self-employed.

In the empirical analyses the 2001 BSS is appended to the 2000 BCS. We estimate the importance of the nine job tasks in each three digit occupation in the 2001 BSS. Each BCS respondent is then assigned the mean of these task variables for his three digit occupation. We the estimate the effect of sociability at age 16 on the choice of occupation as measured by these job tasks. Table A3 presents the definitions and descriptive statistics for our sociability variables.

A.4. Occupations

Tables A5 presents information about the job tasks in specific occupations in 1997. There are 344 occupations identified in the BSS at the three digit level. Table A5 splits interpersonal skills into caring and directness and reports the mean importance of these job tasks for the 25 largest occupations in Britain in 1997. Performing the same analysis for 2001 yields comparable results.

References

Argyle, M. 1967. *The Psychology of Interpersonal Behaviour*. London: Pelican Books.

Aronson, E. 1995. *The social animal*. New York: W.H. Freeman & Co.

Ashton, D., B. Davies, A. Felstead, and F. Green. 1998. "Work Skills in Britain." SKOPE Monograph No. 1, University of Oxford.

Barrick, M.R., and M.A. Mount. 1991. "The Big Five Personality Dimensions and Job Performance: A Meta Analysis." *Personnel Psychology* 44(1):1-26.

Borghans, L., H. Meijers, and B. ter Weel. 2006. "The Role of Noncognitive Skills in Explaining Cognitive Test Scores." Discussion Paper No. 2429, Bonn: IZA.

Borghans, L., and B. ter Weel. 2006. "Do We Need Computer Skills to Use a Computer? Evidence from Britain." *Labour* 20(3):505-532.

Borghans, L., B. ter Weel, and B.A. Weinberg. 2006. "People People: Social Capital and the Labor-Market Outcomes of Underrepresented Groups." Working Paper No. 11985, Cambridge Mass.: NBER.

Bowles, S., H. Gintis, and M. Osborne. 2001. "The Determinants of Earnings: A Behavioral Approach." *Journal of Economic Literature* 39(4):1137–1176.

Costa, D.L., and M.E. Kahn. 2003. "Cowards and Heroes: Group Loyalty in the American Civil War." *Quarterly Journal of Economics* 118(2):519-548.

Cunha, F., and J.J. Heckman. 2006. "Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation." Working Paper, University of Chicago.

Cunha, F., J.J. Heckman, L. Lochner, and V. Masterov. 2005. "Interpreting the Evidence on Life Cycle Skill Formation." Working Paper No. 11331, Cambridge. Mass.: NBER.

Dewatripont, M., and J. Tirole. 1999. "Advocates." *Journal of Political Economy* 107(1):1-39.

Eder, D., C.C. Evans, and S. Parker. 2003. *School Talk: Gender and Adolescent Culture.* New Brunswick: Rutgers University Press.

Ekeland, I., J.J. Heckman, and L. Nesheim. 2004. "Identification and Estimation of Hedonic Models." *Journal of Political Economy* 112:S60-109.

Elger, T. 1990. "Technical Innovation and Work Reorganization in British Manufacturing in the 1980s: Continuity, Intensification or Transformation?" *Work, Employment and Society* 4:67-102.

Eysenck, H.J. 1991. "Dimensions of Personality: 16, 5, or 3? Criteria for a Taxonomic Paradigm." *Personality and Individual Differences* 12:773-790.

Felstead, A., F. Green, and D. Gallie. 2002. "Work Skills in Britain 1986-2001." Nottingham, DfES Publications.

Filer, R.K. 1983. "Sexual Differences in Earnings: The Role of Individual Personalities and Tastes." *Journal of Human Resources* 18(1):82-98.

Fortin, N. 2006. "Greed, Altruism, and the Gender Wage Gap." Working Paper, University of British Columbia.

Frank, R.H., T. Gilovich, and D.T. Regan. 1993. "Does Studying Economics Inhibit Cooperation?" *Journal of Economic Perspectives* 7(1):159-171.

Funder, D.C. 2001. "Personality." *Annual Review of Psychology* 52: 197-221.

Giles, H., and N. Coupland. 1991. *Language, Context and Consequences.* Cambridge: Open University Press.

Gilligan, C. 2001. *In A Different Voice: Psychological Theory and Women's Development.* Cambridge Mass.: Harvard University Press.

Goleman, D.P. 1996. *Emotional Intelligence. Why it Can Matter More than IQ.* London: Bloomsbury Publishing.

Green, F., and S. McIntosh. 2001. "The Intensification of Work in Europe." *Labour Economics* 8:291-308.

Heckman, J.J., J. Stixrud, and S. Urzua. 2006. "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior." *Journal of Labor Economics* 24(3):411-482.

John, O.P., and S. Srivastava. 1999. "The Big Five Trait Taxonomy: History, Measurement, and Theoretical Perspectives." in *Handbook of Personality: Theory and Research.* eds. O.P. John and L.A. Pervin. New York: Guilford Press.

Krueger, A.B., and D. Schkade. 2005. "Sorting in the Labor Market: Do Gregarious Workers Flock to Interactive Jobs?" Working Paper, Princeton, NJ.

Kuhn, P., and C. Weinberger. 2005. "Leadership Skills and Wages." *Journal of Labor Economics* 23(3):395-436.

Lazear, E.P. 1989. "Pay Inequality and Industrial Politics." *Journal of Political Economy* 97(3):561-580

Linde, C. 1988. "The Quantitative Study of Communicative Success: Politeness and Accidents in Aviation Discourse." *Language in Society* 17:357-399.

Machin, S., S. McIntosh, A. Vignoles, and T. Viitanen. 2001. "Basic Skills, Soft Skills and Labour Market Outcomes: Secondary Analysis of the National Child Development Study." Research Report No. 250, DfEE Research Centre, London.

McCrae, R.R., and O.P. John. 1992. "An Introduction to the Five-Factor Model and Its Applications." *Journal of Personality* 60(2):175-215.

Mueller, G., and E. Plug. 2006. "Estimating the Effect of Personality on Male-Female Earnings." *Industrial and Labor Relations Review* 60(1):3-22.

Ortmann, A., and L. K. Tichy. 1999. "Gender Differences in the Laboratory: Evidence from Prisoner's Dilemma Games." *Journal of Economic Behavior & Organization* 39:327-339.

Prendergast, C. 2003. "The Limits of Bureaucratic Efficiency." *Journal of Political Economy* 111(5):929-958.

Postlewaite, A., and D. Silverman. 2006. "Non-Cognitive Skills, Social Success, and Labor Market Outcomes." Working Paper, University of Pennsylvania.

Sattinger, M. 1993. "Assignment Models of the Distribution of Earnings." *Journal of Economic Literature* 31:831-880.

Segal, C. 2006. "Motivation, Test Scores and Economic Success." Working Paper, Harvard Business School.

Smith, P.C., and L.M. Kendall. 1963. "Retranslation of Expectations: An Approach to the Construction of Unambiguous Anchors for Rating Scales." *Journal of Applied Psychology* 57:149-155.

Spenner, K.I. 1990. "Skill: Meaning, Methods and Measures." *Work and Occupations* 17:399-421.

Spitz-Oener, A. 2006. "Technical Change, Job Tasks, and Rising Educational Demands: Looking outside the Wage Structure." *Journal of Labor Economics* 24(2):235-270.

Thakerar, J.N., H. Giles, and J. Cheshire. 1982. "Psychological and Linguistic Parameters of Speech Accommodation Theory." in *Advances in the Social Psychology of Language*, eds. C. Fraser and K. R. Scherer, 205-255. Cambridge: Cambridge University Press.

Urzua, S. 2006. "The Role of Abilities and Schooling Choices in Explaining Racial Labor Market Gaps." Working Paper, University of Chicago.

U.S. Department of Labor, Manpower Administration. 1972. *Handbook for Analyzing Jobs.* Washington, DC.

Table I

Correlation between Behavioral Indicators at Age 16 and the Importance of Job Tasks in Current Occupation at Age 30

(Dependent Variables: Importance of Job Tasks)

		Behavioral indicators at age 16				
Importance of tasks in current job at age 30	Standard deviation of the dep. variable	Self-described social character: Caring	Self-described social character: Popular/out going	Log of the number of friends	Social behavior during school term and holidays	Social behavior during leisure time
Interpersonal interactions	0.492	0.006	0.019	0.021	0.003	0.006
		(0.007)	(0.007)	(0.012)	(0.001)	(0.002)
- Caring	0.454	0.012	0.003	0.010	0.003	0.005
		(0.006)	(0.007)	(0.011)	(0.001)	(0.002)
- Directness	0.647	0.004	0.025	0.031	0.003	0.007
		(0.008)	(0.009)	(0.014)	(0.001)	(0.002)
Math	0.596	-0.009	0.001	-0.016	0.000	-0.005
		(0.010)	(0.010)	(0.018)	(0.001)	(0.002)
Reading	0.484	0.011	0.003	-0.014	0.000	0.001
		(0.006)	(0.007)	(0.011)	(0.001)	(0.001)
Writing	0.590	0.022	0.011	-0.006	0.001	0.003
		(0.007)	(0.008)	(0.013)	(0.001)	(0.002)
Physical strength and Stamina	0.833	-0.012	0.014	0.052	0.000	0.004
		(0.012)	(0.013)	(0.021)	(0.001)	(0.003)
Problem solving	0.502	-0.009	-0.004	0.005	0.000	0.000
		(0.006)	(0.007)	(0.012)	(0.000)	(0.002)
Noticing mistakes	0.311	-0.002	-0.004	-0.007	-0.000	-0.001
		(0.005)	(0.005)	(0.008)	(0.001)	(0.001)
Planning of activities	0.484	0.007	0.016	0.024	0.003	0.005
		(0.006)	(0.007)	(0.012)	(0.001)	(0.002)
Knowledge of the organization	0.412	-0.008	-0.004	-0.025	0.000	-0.001
		(0.005)	(0.006)	(0.010)	(0.001)	(0.001)
Log hourly wage	0.711	-0.011	0.011	-0.009	-0.001	-0.001
		(0.013)	(0.014)	(0.024)	(0.001)	(0.003)
n		2,655	3,670	3,915	3,344	3,267

Note: Standard errors in brackets. The data on sociability and wages are taken from the BCS. The task measures in the current occupation are occupational averages appended from the BSS 2001. All regressions are OLS and control for gender, marital status and level of education. The definitions of the variables are provided in the Data Appendix Table A1.

<div align="center">

Table II
Cross-Sectional Wage Regression for Britain, 1997-2001
(Dependent Variables: Log Wages)

</div>

	1997	2001
Interpersonal interactions (directness/caring)	0.283 (0.124)	0.327 (0.162)
Math	0.084 (0.027)	0.090 (0.030)
Reading	0.084 (0.052)	0.085 (0.056)
Writing	0.067 (0.050)	0.057 (0.051)
Physical strength and Stamina	-0.068 (0.025)	-0.120 (0.026)
Problem solving	0.122 (0.056)	0.155 (0.057)
Noticing mistakes	-0.007 (0.068)	0.004 (0.071)
Planning of activities	-0.048 (0.043)	0.035 (0.048)
Knowledge of the organization	0.016 (0.054)	-0.009 (0.026)
n	247	265

Note: Robust standard errors in brackets. All data are taken from the BSS 1997 and 2001. All regressions include controls for gender, marital status and level of education and are weighted by occupation size. The definitions of the variables are available from the Data Appendix A1 and Table A1.

Table III

Cross-Sectional Wage Regression for Germany, 1979-1998

(Dependent Variables: Log Wages)

	OLS			
	1979	1985	1991	1998
Interpersonal interactions (directness/caring)	0.098 (0.025)	0.114 (0.049)	0.161 (0.068)	0.175 (0.069)
Analytical	0.091 (0.042)	0.094 (0.041)	0.097 (0.043)	0.098 (0.045)
Routine cognitive	0.089 (0.032)	0.084 (0.031)	0.096 (0.037)	0.093 (0.041)
Routine manual	-0.012 (0.006)	-0.012 (0.005)	-0.012 (0.006)	-0.011 (0.006)
Non-routine manual	-0.025 (0.009)	-0.031 (0.011)	-0.031 (0.015)	-0.033 (0.017)
n	65	65	65	65

Note: Robust standard errors in brackets. The data are taken from the four waves of the BIBB/IAB data from Germany. All regressions include controls for gender, marital status and level of education and are weighted by occupation size. The definitions of the variables are available from the Data Appendix A2 and Table A2.

Table IV
Relationship between Changing Wages and Changing Importance of Interpersonal
Interactions in Britain, 1997-2001
(Dependent Variables: Change in Log Wages)

	OLS	2SLS
Interpersonal interactions (directness/caring)	0.087 (0.037)	0.112 (0.044)
Math	-0.018 (0.029)	-0.033 (0.033)
Reading	0.059 (0.043)	0.071 (0.048)
Writing	0.062 (0.038)	0.060 (0.039)
Physical strength and Stamina	-0.083 (0.035)	-0.080 (0.038)
Problem solving	0.024 (0.050)	0.026 (0.053)
Noticing mistakes	0.013 (0.069)	0.020 (0.066)
Planning of activities	-0.019 (0.044)	-0.032 (0.048)
Knowledge of the organization	0.050 (0.052)	0.069 (0.058)
n	247	247

Note: Robust standard errors in brackets. In the 2SLS estimates the male importance of job tasks for the task measures are used to instrument the task measures. The changes in task measures are occupational averages appended from the British Skills Surveys 1997 and 2001. All regressions include controls for gender, marital status and level of education and are weighted by occupation size in 1997. The definitions of the variables are available from the Data Appendix A1 and Table A1.
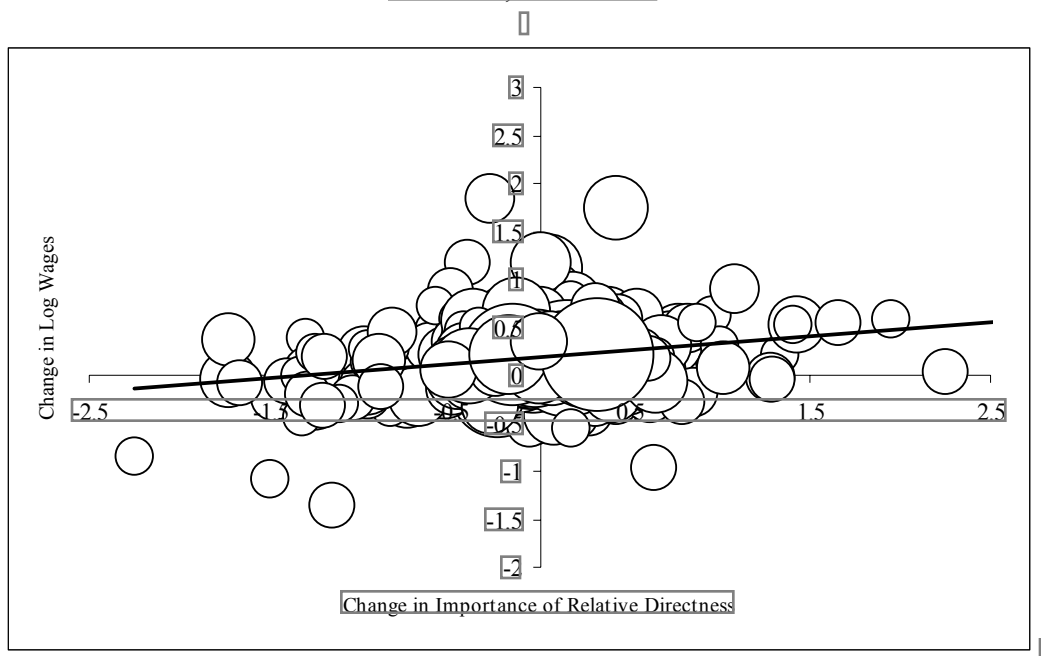
Table V

Relationship between Wages and Interpersonal Interactions in Germany, 1979-1998

(Dependent Variables: Change in Log Wages)

	Fixed effects
Interpersonal interactions (directness/caring)	0.135 (0.024)
Analytical	0.085 (0.031)
Routine cognitive	0.067 (0.030)
Routine manual	-0.032 (0.015)
Non-routine manual	-0.013 (0.010)
n	260

Note: Robust standard errors in brackets. The data are taken from the four waves of the BIBB/IAB data from Germany. All regressions include controls for gender, marital status and level of education and are weighted by occupation size. The definitions of the variables are available from the Data Appendix A2 and Table A2.

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Table VI
Relationship between Wages and the Importance of Interpersonal Interactions in Britain, 1997-2001
(Dependent Variables: Log Wage minus Log Wage in Old Occupation in Previous Survey)

	Coefficients (standard errors)
Δ Interpersonal interactions (directness/caring)	0.312 (0.153)
Δ Problem solving	0.140 (0.048)
Δ Noticing mistakes	0.057 (0.067)
Δ Math	-0.052 (0.030)
Δ Reading	0.083 (0.062)
Δ Writing	0.049 (0.054)
Δ Physical strength and Stamina	-0.128 (0.029)
Δ Planning of activities	-0.069 (0.047)
Δ Knowledge of the organization	0.091 (0.063)
Interpersonal interactions (directness/caring)	-0.061 (0.134)
Problem solving	0.069 (0.049)
Noticing mistakes	-0.058 (0.068)
Math	-0.022 (0.025)
Reading	0.053 (0.065)
Writing	0.039 (0.056)
Physical strength and Stamina	-0.028 (0.019)
Planning of activities	-0.008 (0.041)
Knowledge of the organization	0.027 (0.057)
n	3,951

Note: Robust standard errors in brackets. In the 2SLS estimates the male importance of job tasks for the task measures are used to instrument the task measures. The changes in task measures are occupational averages appended from the British Skills Surveys 1997 and 2001. All regressions include controls for gender, marital status and level of education and are weighted by occupation size. The definitions of the variables are available from the Data Appendix A1 and Table A1.

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Table VII
The Relationship between the Derivative of the Wage Function and Matching Function

	(1)	(2)	(3)	(4)	(5)	(6)
Derivate of the matching function ($d\pi/d\alpha$)	4.879 (0.728)	2.180 (0.499)	1.576 (0.510)	3.282 (0.608)	4.050 (1.171)	2.708 (1.05)
Average level of worker caring	-1.370 (.458)	3.511 (2.702)	-.541 (2.766)	-0.602 (0.382)	-1.423 (1.288)	-0.692 (1.071)
Constant	.908 (0.378)	-3.037 (2.418)	.297 (2.476)	0.305 (0.315)	1.087 (1.090)	0.473 (0.914)
Regression-adjusted wages	No	Yes	No	Yes	No	Yes
Weighted	Yes	Yes	No	No	Yes	Yes
MA	No	No	No	No	Yes	Yes

Note: Standard errors in brackets. The data are taken from the 1997 BSS. The explanatory variable is $\dfrac{d\ln w}{d\alpha}$, based on the first difference of the kernel estimate of the log of wages (or regression-adjusted wages) as a function of the relative importance of directness. Estimates are LS, with or without weights or regressions with MA1 structure for the error term. $\dfrac{d\pi}{d\alpha}$ is based on the first difference of the kernel estimate of the matching function, that is the function that describes the relative skills of people with respect to directness versus caring and as a function of the relative importance of directness.

Figure 1

Changes in Wages and the Importance of Interpersonal Tasks at Work
in Britain, 1997-2001

Note: The size of the bubbles indicates the relative size of the occupation. See the Data Appendix A1 and Table A1 for more details on the definition of interpersonal tasks.

Figure II

Changes in Wages and the Importance of Interpersonal Tasks at Work
in Germany, 1979-1998

Change in Importance of Relative Directness

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Figure III

Assignment: The Within-Job Returns to a Worker's the Effectiveness in Relative Directness and the Relative Importance of Directness in the Job
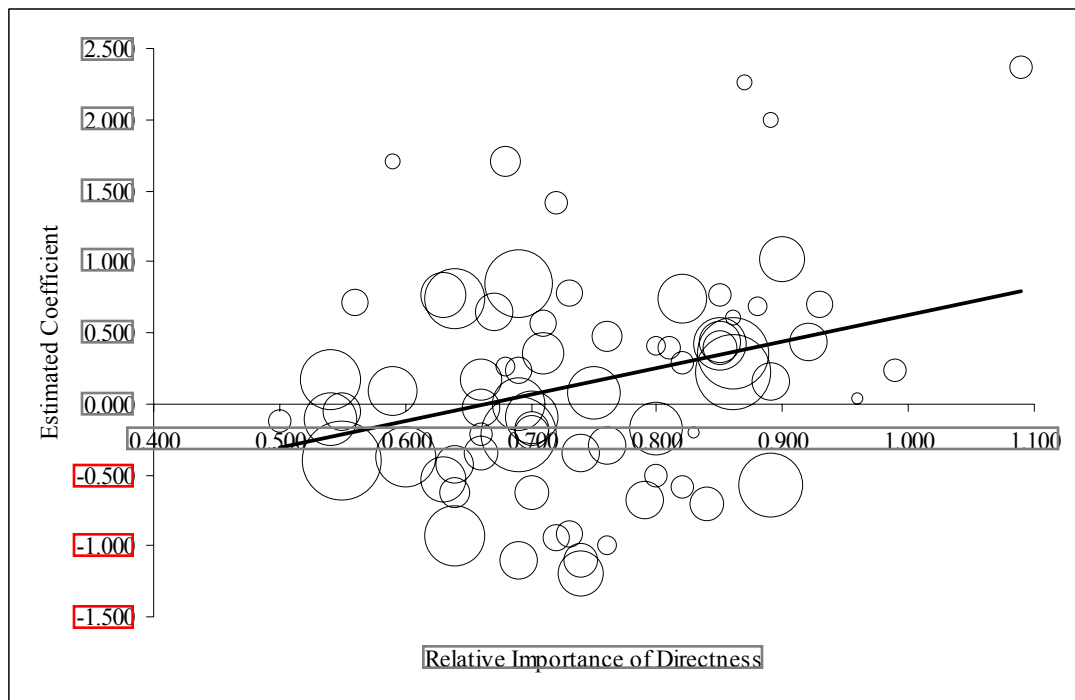
Figure IV

Assignment: The Effectiveness in Relative Directness for which the Within-Job Quadratic Wage Function Reaches a Maximum and the Relative Importance of Directness in the Job
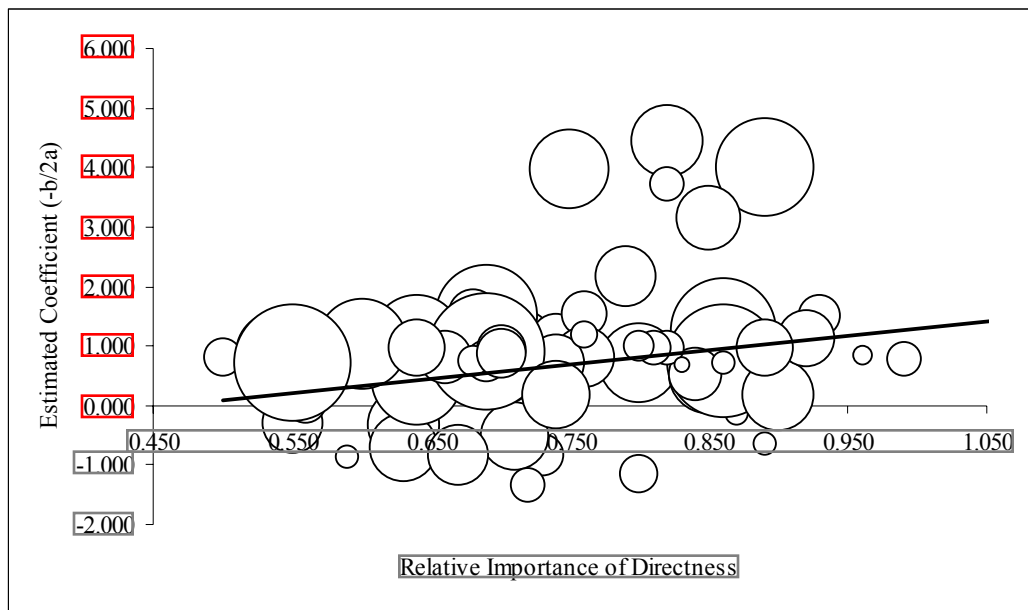
Note: *n*=277. The relative importance of directness is determined by dividing the individual score on the importance of directness by the importance of caring aggregated to the occupational level. The size of the dots is proportional to the number of workers in the occupation. The data used for this analysis are from the 1997 BSS.

Figure V

Kernel Estimation of the Density of the Importance of Directness Relative to Caring
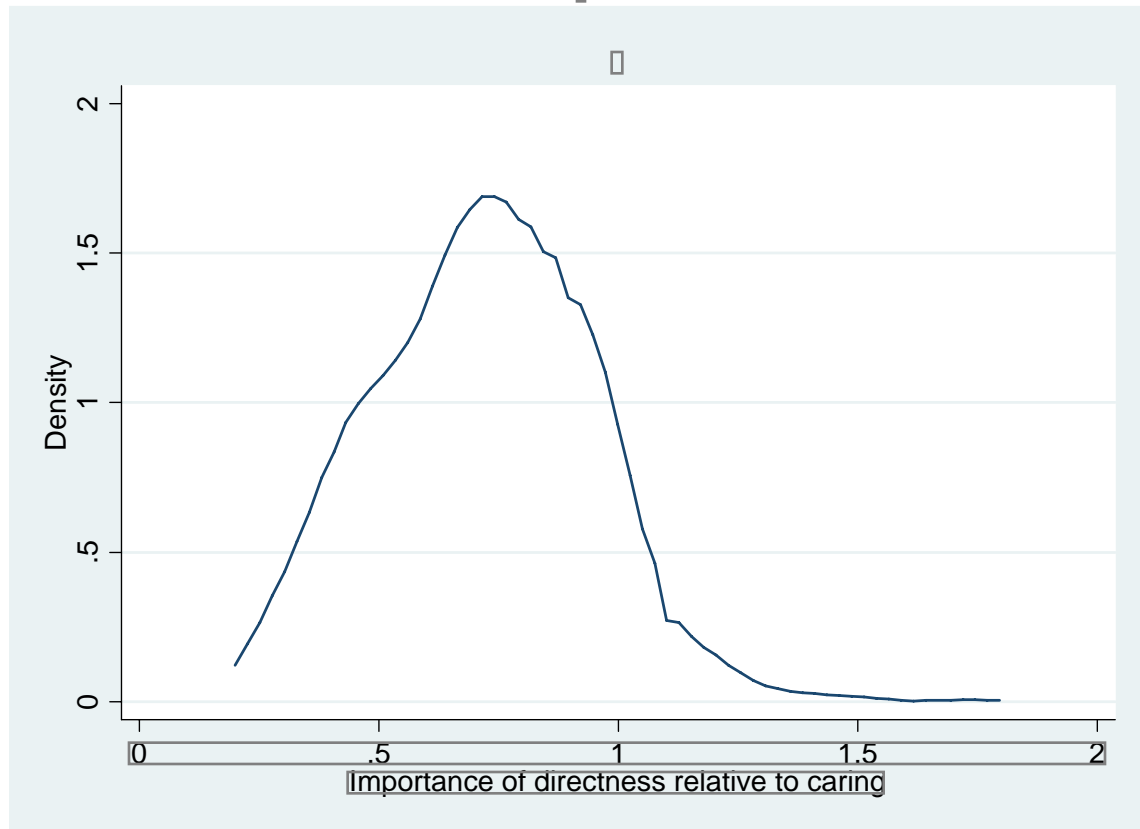
Note: n=277. The relative importance of directness is determined by dividing the individual score on the importance of directness by the importance of caring aggregated to the occupational level. The data used for this analysis are from the 1997 BSS.
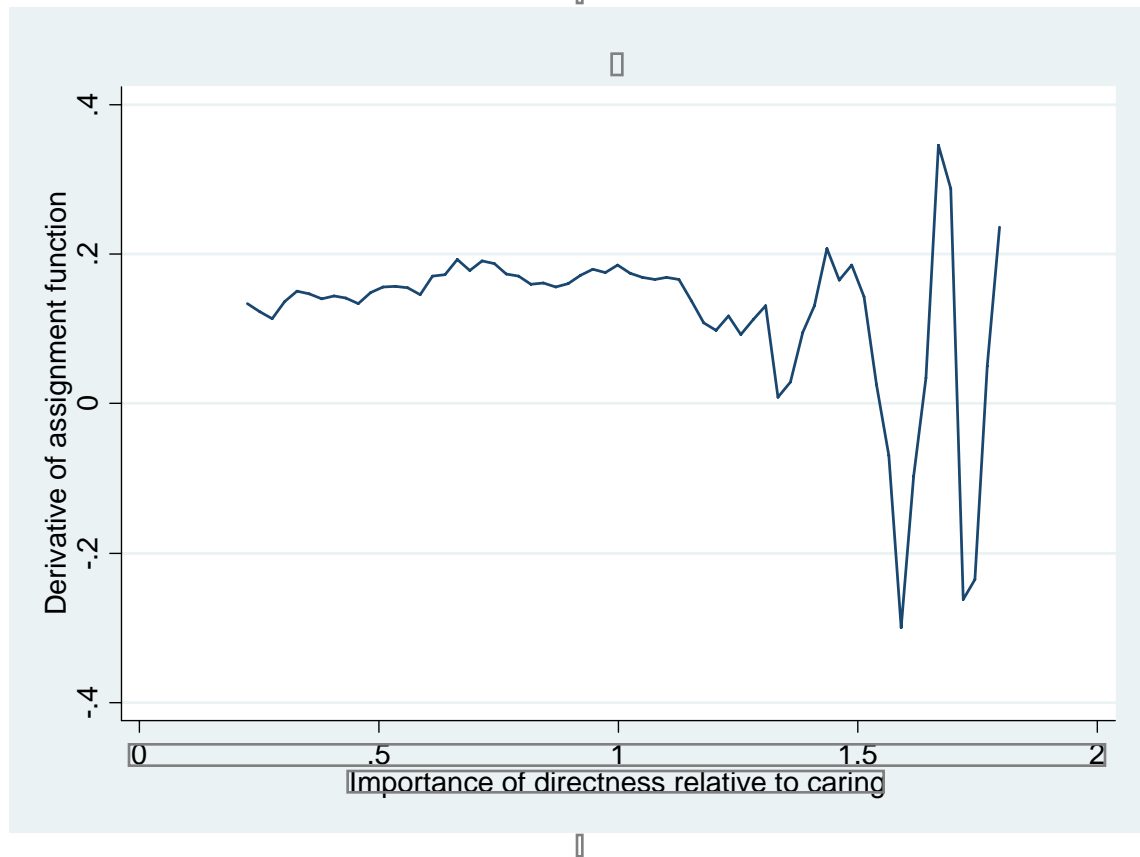
48

Figure VI
Kernel Estimate of the Wage as a Function of the Relative Importance of Directness in a Job
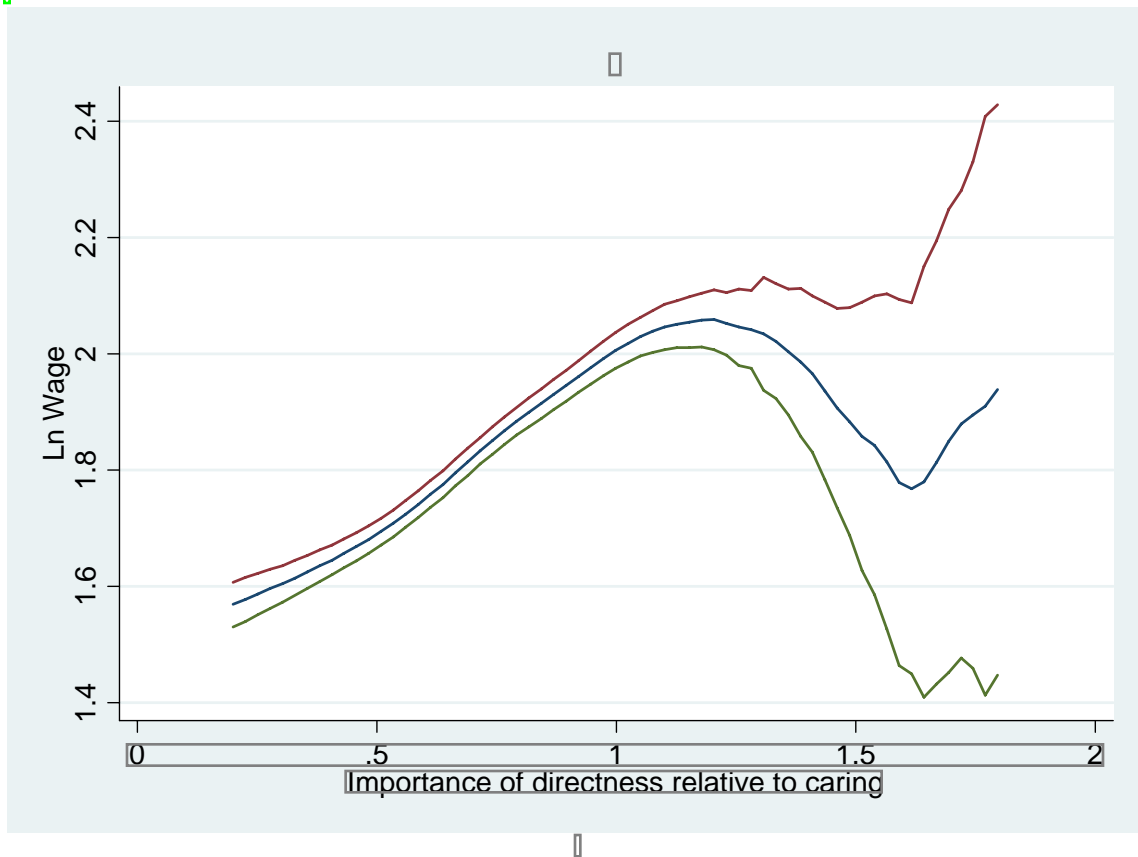
49

Figure VII
Kernel Estimate of the Matching Function, Describing the Relationship between the Relative Importance of Directness versus Caring in a Job and the Worker´s Degree of Directness versus Caring
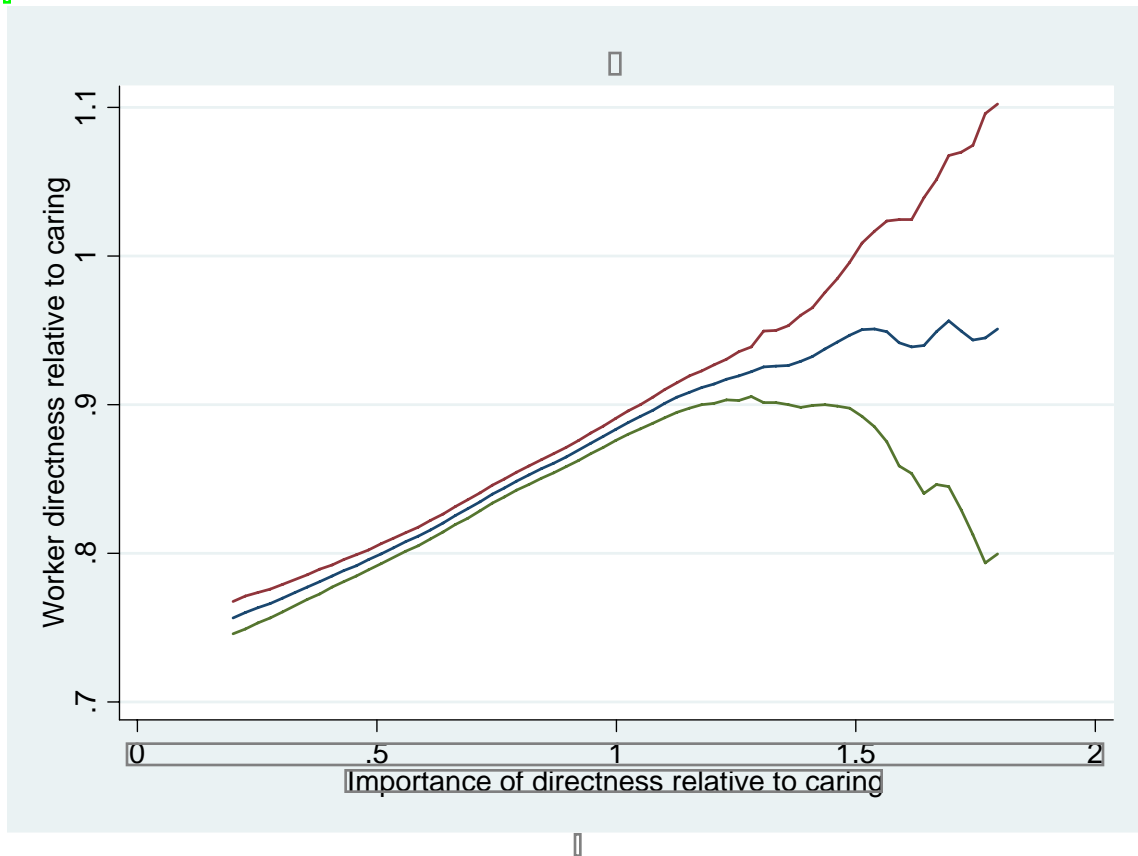
Note: *n*=277. The relative importance of directness is determined by dividing the individual score on the importance of directness by the importance of caring aggregated to the occupational level. The data used for this analysis are from the 1997 BSS.

Figure VIII
Derivative of the Estimated Wage Function
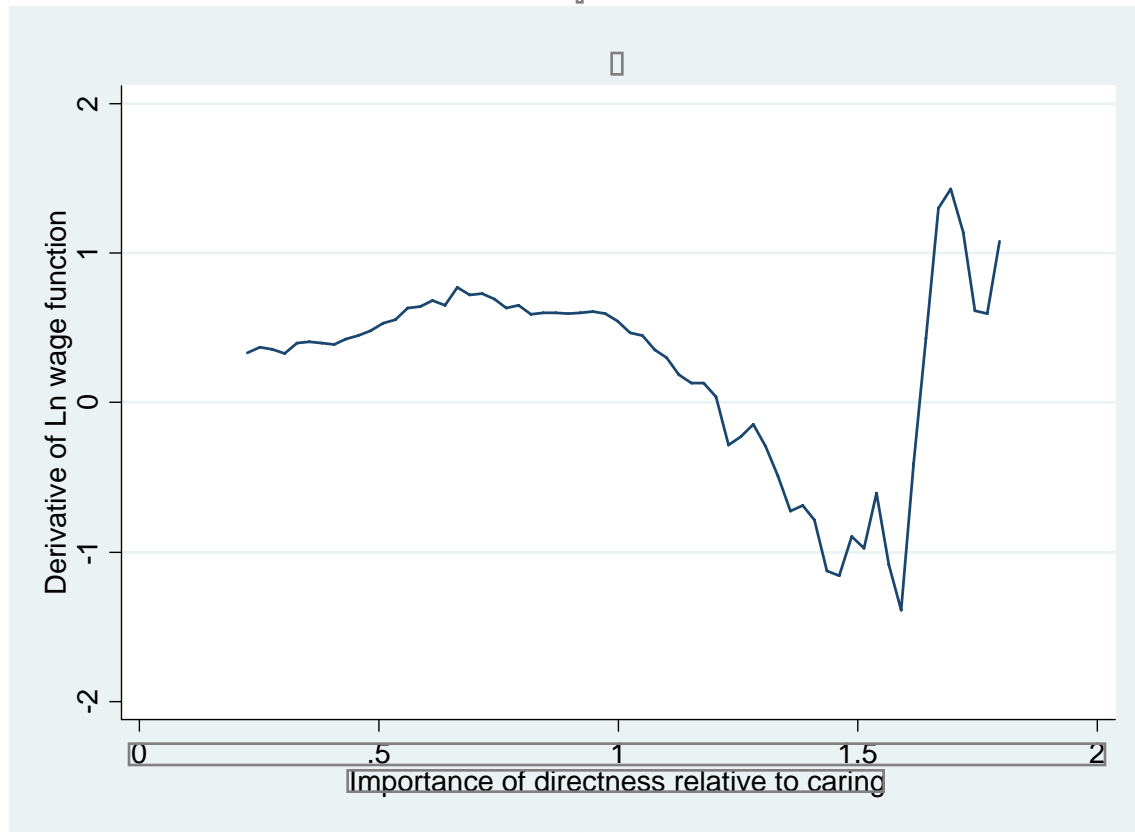
51

Figure IX

Derivative of the Estimated Matching Function

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