Interpersonal Styles and Labor Market Outcomes*

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Abstract

Interpersonal interactions are important for understanding individual labor-market outcomes. This paper develops a framework to understand the role of interpersonal interactions in the labor market including task assignment and wages. Interactions between people are modeled as a trade-off between caring and directness, both of which can be either beneficial or detrimental. Caring is needed to establish cooperation; directness is needed to provide information in a non-evasive manner. 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. Estimates of the assignment model show that this negative effect results from an oversupply of one attribute relative to the other. In addition, evidence is presented indicating that higher levels of sociability at young ages are associated with assignment to jobs emphasizing interpersonal interactions. The returns to interpersonal interactions are consistent with the assignment model.

Keywords: Interpersonal Interactions; Wage Level and Structure; Assignment
JEL codes: J21; J24; J31

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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. 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 (e.g., Bowles, Gintis and Osborne, 2001). However, the estimated relationship between psychological traits and outcomes varies substantially across studies, and their effects are much smaller than one might expect given the evidence from the psychological literature (e.g., Borghans, Heckman and ter Weel, 2006). 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 labor-market outcomes from the economics literature.

This paper studies the importance of personality in determining labor-market outcomes, focusing on interpersonal styles. 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, which yields an assignment of relatively caring people to caring jobs and relatively direct people 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 for certain people. People who have to work in jobs that suit their personality less are able to adjust to new circumstances, but only partially.

We study three of our model's implications using British data (covering 1997-2001) and German data (covering 1979-1998). First, 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 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 the importance of directness has increased more than the importance of caring, and that this shift has increased the labor-market returns to directness relative to caring.

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 messages accurately. Especially in non-hierarchical 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 (e.g., Aronson, 1995). The real trade-off is to provide adequate feedback and to convince people about different ideas, without loosing 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 the importance of caring neglecting the importance of directness in explaining outcomes.

People differ in the trade-off 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 damaging the cooperative relationship, but have problems building 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 trade-off 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 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. The model and evidence presented in this paper suggest that different interpersonal styles vary in effectiveness across jobs. Some might be useful in some jobs, but detrimental in others, which makes it difficult to interpret estimates of average effects. Other work has focused on the development of noncognitive skills. Cunha, Heckman, Lochner and Masterov (2005) and Cunha and Heckman (2006) focus on the life-cycle 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. This 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.

The paper proceeds as follows. The next section describes different types of

interpersonal interactions and presents our model. Section III discusses the empirical implementation and discusses the data. Section IV presents estimates of the effect of interpersonal styles on wages in Germany and Britain and on job assignment in Britain. Section V concludes.

II. Interpersonal Interactions

A. Different Kinds of Interpersonal Task Inputs

We start from, but move beyond, the view of interpersonal interactions in psychology and management, 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. Linde (1988) illustrates the varying role of interpersonal relationships in different situations, showing that aircrews with successful safety records had a higher level of mitigation when addressing superiors, which 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. This example illustrates that people tend to modify their behavior depending on the situation. 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 (e.g., 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.

Many work relationships consist of cooperation but go no further than this. They also have to be sustained even though people 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 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.[1]

This analogy ignores the different facets of interpersonal skills, which makes it important to find the right balance between them. Interpersonal relationships at work involve being helpful and cooperative, but require directness. Thus, in any work relationship it is not enough to agree with the other person all the time – this would lead to frustration and eventual discontent. The most effective way of interacting with others is to be sufficiently assertive without damaging the relationship.[2]

In our translation of these psychological principles, interpersonal relationships require two inputs, the value of which depends on the occupational setting and the specific situation at hand. Both are related to the degree of affiliation between the persons interacting. The first

[1] Some economists have taken a similar view by including behavioural traits into wage equations. They have established correlations, but there is no theoretical reasons why some traits are rewarded more than others (e.g., 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 (e.g., Goleman, 1996). We take a different route by emphasizing caring as one input and decisiveness as the other input into interpersonal interactions.

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. 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 trade-off between the two inputs and that the balance between the two determines productivity. Everyone can adjust his behavior to the circumstances, but depending on *personality* some people are better in being caring and find it hard to be direct and criticize others, while others have fewer problems being direct, but are not very talented supporting and caring for others.

B. Model

This informal framework has a number of predictions about how interpersonal relationships affect productivity and the effectiveness of different interpersonal styles at work. The first is that the most caring persons will not be best suited to many jobs because of their high level of affiliation towards others prevents them from providing criticism. The same argument goes for people with very low levels of affiliation because they are likely to offend others and will not be able to cooperate effectively. Second, people with relatively high levels of affiliation have a comparative advantage in jobs that require caring persons (e.g., nurses and kindergarten teachers), while people with relatively low levels of affiliation have a comparative advantage in jobs that require exerting influence, making decisions and providing feedback (e.g., purchasing agents, journalists, and engineers).

The formal implications of our framework can be captured in a simple model with two

inputs that are used to determine productivity or the effectiveness of interpersonal interactions in a job. It is assumed that the effectiveness of interpersonal interactions (*Y*) in every job depends on the degree of affiliation a worker puts in when interacting, which is labeled caring (*C*), and on the influence he exerts on the behavior of the other persons, which is defined as directness (*D*), according to a Cobb-Douglas production function

$$(1) \qquad Y = C^{1-a} D^{a},$$

where the a reflects the relative importance directness in the a job. The parameter a describes the *circumstances*, while *C* and *D* are variables describing the interpersonal *behavior* of a worker.

Workers face a trade-off in their interaction with others in the sense that they can gain cooperation by avoiding giving criticism and by deemphasizing potential disagreements. Thus, the gain in caring is detrimental to communicating the worker's core interest in the interaction. In a situation of another worker making mistakes, emphasizing caring could be seen as hinting indirectly at these mistakes and taking for granted that the other worker will understand what is meant instead of pointing out the mistakes directly. By being direct one makes sure that the other person understands the point, but at the risk of offending the other worker, which is detrimental for future interactions and productivity. This trade-off can be written as

$$(2) \qquad D = p_1 - p_2 C.$$

The p -parameters reflect the trade-off between establishing a caring relationship by affiliation and influencing the other by being direct. So, p reflects the worker's *personality.* Some people may be better in both tasks, but the focus here is on the trade-off between both inputs, so we assume that p_2 is increasing with p_1. For tractability $p_2 = pe^{p}$ and $p_1 = p$, are convenient. Substitution into equation (2) yields $C = p \quad - p \;\; e^{p} D$.

Maximizing Y given a and p yields the following results:

1. $D = ap$: Every worker who is assigned to a job in which directness for the other party is relatively important, will put more emphasis on being a direct person in every situation involving interpersonal interactions. At the same time, workers who have a natural comparative advantage in being direct will be more direct in any given job.

2. $C = (1-a)/e^{p}$: In a job that emphasizes the ability to be caring, workers shift the balance towards caring when engaged in interpersonal interactions. Workers with a natural comparative advantage in being caring will be more caring in every job.

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

$$(3) \qquad Y = e^{a\ln(ap)+(1-a)\ln\left(\frac{1-a}{e^{p}}\right)}.$$

From equation (3) one can derive an expression for the wage as a function of job or personal characteristics. By making some distributional assumptions, an analytical solution can be derived. Assume that p and $a/(1-a)$ have a lognormal distribution: $\ln(p) \sim N(m_p, s_p^2)$ and $\ln(a/(1-a)) \sim N(m_a, s_a^2)$.

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 p is matched to the job with highest value of a, and so on. Making use of the log-normal distributions, the optimal assignment in terms of p and a is

(4) $$p = e^{\frac{s_p}{s_a}\left(\ln\left(\frac{a}{1-a}\right)-m_a\right)+m_p}.$$

Under competition the wage structure $w(p)$ 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 in Sattinger (1993) this leads to

(5) $$\frac{dw}{dp}=\frac{dY}{dp}=Y\left(\frac{a}{p}-1+a\right).$$

Substitution of the optimal assignment (4) in equation (5) yields

(6) $$\frac{dw}{dp}=\frac{dY}{dp}=Y\left(a\left(\frac{1-a}{a}\right)^{s_p/s_a}e^{\frac{s_p}{s_a}m_a-m_p}-1+a\right).$$

When p and $a/(1-a)$ have exactly the same distribution the derivative of the wage with respect to p equals 0. Each job is filled by the worker who is best suited to it.[3] When both distributions have the same standard deviation, but $m_a > m_p$ 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 $s_a = s_p$ and $m_a < m_p$.

Differences in the standard deviation of the distributions will lead to non-monotonic effects. When $m_a = m_p$ and s_a is large compared to s_p there will be shortages for both very caring and very direct workers. Consequently, people with extreme characteristics will earn more than people in the middle. When $m_a = m_p$ and s_a is small compared to s_p 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

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

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.

Our model also generates intuitive comparative statics implications. Shifts in the wage structure will depend on changes in the supply and demand for these two inputs. Recent technological developments in information and communication technologies have increased the importance of interpersonal relationships (See Borghans, ter Weel, and Weinberg, 2006). Nevertheless, it remains an empirical question whether these technological developments have had a larger impact on caring or directness.

Countries differ greatly in terms of the homogeneity of their populations. An increase in homogeneity will likely decrease the importance of directness relative to caring, by making people more sensitive to information provided by others. Because workers adjust their behavior to some extent in response to changes in job requirements, a shift in the distribution of job requirements in favor of caring and away from directness will make workers put less emphasis on directness and more on caring. Nonetheless, the labor-market returns to directness will be lower in these societies. In the United States, research on social capital has found a trend towards lower levels of trust (e.g., Costa and Kahn, 2003). This trend is usually associated with increased heterogeneity of the U.S. society. The increased heterogeneity of the United States population should have increased the returns to directness, leading workers to put more emphasis on directness. Thus our model can generate a shift toward directness endogenously.

C. Empirical Implications

In general the distribution of p and a 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 p and a can be described by the function $p(a)$. The relationship between the wage and job characteristics a can then be described by:

$$(7) \qquad \frac{dw}{da} = \frac{dY}{da} = Y\left(g(a) + \left(\frac{a}{p} - 1 + a \right) \frac{dp}{da} \right)$$

The function $g(a)$ represents differences in compensating wage differentials between occupations. Several authors have noted that caring jobs might be less stressful and therefore pay lower wages (e.g., Elger, 1990 and Green and McIntosh, 2001). By constructing non-parametric estimates for $\frac{dw}{da}$ and $\frac{dp}{da}$, the function $\left(\frac{a}{p} - 1 + a \right)$ can be estimated under assumptions about the functional form of $g(a)$.[4] When $\left(\frac{a}{p} - 1 + a \right)$ is negative, there is oversupply of direct workers; when this parameter is positive, there is a shortage.

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. Empirical Implementation

A. Data Sources

We perform a number of analyses, with a variety of data requirements. We study wage premiums associated with jobs requiring people skills at a point in time and how they 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 a longitudinal data set with information on youth

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

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 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 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.

B. Selecting 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 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 importance of the following job tasks: Instructing, training or teaching people; making speeches or presentations; persuading or influencing others; and selling a product. 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. Dictionary of Occupational Titles on language, reasoning and mathematical development. Job tasks on the occupational importance of planning job activities, knowledge about the organization and products, problem solving, noticing problems and (procedural)

faults, and physical skills and work are also constructed.

In our German data, caring is defined as serving and accommodating; advising customers and clients; and helping out others. Directness is defined as the weighted sum of negotiating, lobbying, coordinating and organizing; teaching or training; selling, buying, or advertising; and entertaining or presenting. To obtain a consistent series over time this information is aggregated at the two-digit occupational level. The data appendix contains additional information about the data. Tables A1 and A2 give the definitions and descriptive statistics (see also Spitz-Oener, 2006).

IV. Results

A. Differences between Occupations

For most jobs interpersonal tasks are important. Nevertheless there are large differences between jobs in terms of the importance of interpersonal tasks. Table A4 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 two, and the fourth column reports the absolute difference between the importance of directness and the importance of caring. The occupations are ranked by the importance of directness relative to caring (ratio). Service jobs, in which dealing with others and taking care of others is important, are the most caring occupations. In these jobs not only caring important, but also 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. The absolute difference between directness and caring is smallest in these occupations.

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

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 that showed a relationship was math for which the coefficient (standard error) is equal to 0.101 (0.043).

B. Early Sociability and Employment

Our model suggests that sociability at young ages will be related to the occupations in which people work as adults. Youths who are more caring are expected to be allocated to occupations where caring tasks are more important as adults. More outgo ing and popular children are expected to be employed in occupations where directness is most important . Evidence that sociability as a youth is correlated with the importance of interpersonal tasks in the adult occupation will validate our measures of the importance of interpersonal tasks and show that variations in the importance of interpersonal tasks are an important determinant of occupational choice. How sociability as a youth 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 found jobs where other tasks are more important even if sociability is uncorrelated with ability or motivation. 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 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 non-social 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 social behavior 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 respondent's adult jobs. We have two self-descriptions, one focuses on caring, which we expect to be correlated with taking a job where caring is important. The other self-description is being popular or out-going. We also know the number of friends the person has. Given the often-difficult dynamics of the adolescent society, we expect these variables to be more closely related to directness (see Eder, Evans, and Parker, 2003). The second and third rows show these results. It is striking that differences in social character in terms of being a caring are strongly related to the importance of caring in the current occupation, but not to the importance of directness. Being a popular/outgoing person 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 sociability is not capturing differences in ability. Below we show that, once one accounts for

their multi-faceted nature, people skills have stronger effects on wages.

These finding of youth sociability being strongly related to the importance of interpersonal tasks in peoples' subsequent occupations provides validation 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

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

$$w_{ijt} = x_{jt}\beta_t + z_i\Gamma + \alpha_i + \varepsilon_{ijt}.$$

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; α_i denotes his unobserved; and ε_{ijt} gives the error term.

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

Table II and III present cross-sectional wage regressions for Britain and Germany. The coefficients for the importance of directness relative to caring are statistically significant in all years. Moreover they increase over time. 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.

To better understand these shifts, we decompose the increase in the relative importance of directness into within and between occupation components. Overall, there is an increase in the relative importance of directness from 0.719 to 0.726 in the UK between 1997 and 2001, which is statistically significant at the one percent level. When the relative importance of directness in occupations in 1997 is weighted by employment in 1997 and 2001, the relative importance of directness increased from 0.719 to 0.740; 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 from 0.740 to 0.726.

In Germany, the importance of directness relative to caring rose substantially, from 0.765 in 1979 to 1.033 in 1997. Between-occupation shifts account for an increase in the relative importance of directness from 0.765 to 0.822, which is significant at the one percent level. The importance increased from 0.822 in 1979 to 1.033 in 1998 within occupations. The estimated coefficients from both data sources are not directly comparable because of the different definitions of directness and caring in both countries (see the data appendix).

These estimates suggest that directness has larger wage returns than caring. One concern with these estimates is that there may be a correlation between the importance of directness relative to caring in an occupation and the unobserved ability, a_i, of the people in that occupation. While the estimates 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 the distribution of unobserved ability among the people in an occupation does not change substantially over time.

Figures I and II plot 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) and Germany (between 1979 and 1998). The size of the bubbles is proportional to occupational employment. The picture for Britain yields 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: A one-standard deviation change in the relative importance of directness increases wages by 15.6 percent.

Figure II reports similar results for Germany in 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 relative directness raises wages by 19.8 percent.

Table V presents panel estimates of the returns to interpersonal interactions in Germany. It turns out that the returns to interpersonal interactions are relatively large and statistically significant in this period. The estimates are such that a one-standard deviation increase in relative directness increase log wages by about 20 percent.

While we do not have panel data on individuals, we do have information on previous occupations, which we can use to address concerns with changes in the distribution of unobserved ability in occupations. Dropping the observable characteristics, z_i, and including them in the unobservable, a_i, we let $\overline{w}_{jt}$ denote the mean log wage in occupation j at time t, which equals

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

Here $\overline{\alpha}_{jt}$ and $\overline{\varepsilon}_{jt}$ denote the mean of the unobserved characteristics and the error term in occupation j at time t.

Let $j(i,0)$ denotes individual i's occupation at time 0. Using our data on previous

occupations, we can estimate $\overline{w}_{j(i,0)0}$, the mean log wage in individual *i*'s occupation at time *0*, which equals,

$$\overline{w}_{j(i,0)0} = x_{j(i,0)t} b_t + \overline{a}_{jt} + \overline{e}_{jt}.$$

We estimate $\overline{w}_{j(i,0)0}$ for people who will still be in prime working years at time 1.

The difference between person *i*'s log wage at time 1 and the mean log wage in his time 0 occupation at time 0 is,

$$w_{ij1} - \overline{w}_{j(i,0)0} = x_{ij1} b_1 - x_{j(i,0)0} b_0 + a_i - \overline{a}_{j(i,0)0} + e_{ij1} - \overline{e}_{j(i,0)t}.$$

This expression can be rewritten as,

$$w_{ij1} - \overline{w}_{j(i,0)0} = \left(x_{ij1} - x_{j(i,0)0}\right) b_1 + x_{j(i,0)0}\left(b_1 - b_0\right) + \left(a_i - \overline{a}_{j(i,0)0}\right) + \left(e_{ij1} - \overline{e}_{j(i,0)t}\right).$$

Given the synthetic cohort structure, and the assumption that the heterogeneity is time-invariant, $Cov\left(x_{j(i,0),0}, a_i - \overline{a}_{j(i,0),0}\right) = 0$. This result obtains, because $\overline{a}_{j(i,0),0}$ is the mean of a_i across all of the people in occupation *j* at time *0*, and $x_{j(i,0),0}$ is constant across all people for in occupation *j* at time *0*.

Unfortunately, $Cov\left(x_{ij1} - x_{j(i,0),0}, a_i - \overline{a}_{j(i,0),0}\right) \neq 0$ because some of the people in occupation *j* at time 1 were in different occupations at time 0. To address this problem, we estimate the equation by two stage least squares. 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 $Cov\left(x_{j(i,0)1} - x_{j(i,0),0}, a_i - \overline{a}_{j(i,0),0}\right) = 0$ because $\overline{a}_{j(i,0),0}$ is the mean of a_i across all of the people in occupation *j* at time *0.*

Table VI contains estimates for Britain. As shown, the change in the task variables gives the wage premiums associated with them in 2001, while their levels give the change between 1997 and 2001. The estimate for 2001 is slightly beneath that shown in Table II, as is the implied estimate of 0.251 for 1997. Nevertheless, they are quite similar to the previous estimates suggesting a strong premium for jobs where directness is important relative to caring.

D. Wages in an Assignment Model

To estimate the assignment model given in equation (7), we estimate (non-parametrically) the derivatives of the wage function and the matching function, which links how caring workers are to the relative importance of caring in their jobs. These functions are estimated using kernel regressions.[5] Figure III shows the density of the importance of directness relative to caring across jobs. The figure shows that virtually all jobs have score between 0.25 and 1.25 of directness relative to caring. Figures IV and V provide the results of the estimated derivatives. The horizontal axes provide the importance of directness relative to caring. Figure IV shows that wages tend to be higher in jobs that require relatively more directness. Only when the relative importance of directness is larger than 1.25 the pattern does not follow this monotonic relationship anymore, but as shown in Figure III these estimates are based on very few observations. Figure V provides the 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 of these points. These derivatives are depicted in Figures VI and VII. Figure VI shows the derivative of the wage function is consistent with Figure IV. The derivate of the matching function in Figure VII shows the change in workers' ability to be direct relative to caring when moving from one job to a job that requires slightly more directness. When the derivative is relatively high, this implies a low supply of workers with the usual set of characteristics in these jobs. In these cases small changes in job requirements are associated with large changes in workers'

[5] 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.

characteristics. Both figures reveal that estimates beyond 1.25 are imprecise. In the analysis we use the kernel density depicted in Figure III as weights.

We use these derivatives to estimate equation (7). Table VII reports the results. Taking the grid points as observations, we estimate weighted OLS 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). Formally, we estimate,

$$(8) \qquad \frac{d \ln w}{da} = C + b_1 \frac{dp}{da} + b_2 p + e \ .$$

A high value of $\frac{dp}{da}$ 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 interpersonal styles as such determine wages, the observed ratio of directness and caring would be the relevant covariate in the wage equation. However, if relative supply and demand determine wages, a low supply (revealed by a high value of the derivative of the matching function) will be associated with a strong change in wages. If the profile of the derivative of the wage function fits to the profile of the derivative of the matching function, this suggests that relative supply and demand of interpersonal styles determine wages.

The estimate of b_1 in Table VII is significant consistent 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.

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 also without weights similar results are obtained. Our use of kernel estimates might lead to 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 confirm that the relationship between wages and the interpersonal task requirements of a job are largely explained by the supply and demand for directness relative to caring. The required level of caring or directness does not influence wages per se, suggesting that supply and demand considerations, rather than compensating wage differentials, determine wages. The estimates imply that the evidence from cross-sectional wage regressions, in which wages are explained by personal characteristics, should not necessarily be interpreted as evidence that certain personal characteristics are generally more or less favorable. These estimates can also reveal that at a certain point in time and in certain labor markets, these characteristics are either in relatively high demand or supply. This is the case in our example of different interpersonal styles.

V. Conclusion

Despite informal arguments that interpersonal interactions 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 into this direction, developing a framework to understand the labor-market consequences of interpersonal interactions and demonstrating the relationship between interpersonal interactions and labor-market outcomes.

The framework focuses on trade-off between directness, which facilitates clear communication, and caring, which establishes cooperation. Workers are assumed to be heterogeneous with respect to these inputs and occupations require different levels of both inputs. Workers are most productive when they work in a job that best matches their personality best, but any given worker adjusts the extent to which he is direct relative to caring to suit his circumstances. This 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. 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 interpersonal interactions have become more important and that the importance of directness has increased relative to caring. Hence, interpersonal interactions seem to increasingly demand workers who are able to present messages in a clear way.

Data Appendix

A.1. British Skills Survey

The First (1997) and Second (2001) British Skills Surveys (BSS) are two cross-sections of 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 the workplace and interpersonal interactions. Nine job task categories are constructed from these detailed job tasks, which 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 that experts visit people at their workplace to evaluate the job requirements. In practice each occupation is evaluated based only upon a

couple of representative examples, and these evaluation studies are updated at an infrequent rate. Information from job analyses therefore reflects experiences gathered over a long period of time, and might miss evolutions in occupations that differ from the typical job the occupation title refers to. The main advantage of the BSS data is that information is obtained about job requirements at two distinct points in time for all jobs, representative for all occupations within each category. The two waves of the BSS also offer the respondents to characterize job requirements on a five-point scale, which gives us a much more nuanced picture compared to bipolar information in most job-analyses.

For some of the empirical analysis the individual data of both years are aggregated into 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 for non-self employed workers, ages 20 to 60, are used.

Standard U.K. measures of education are used, which are university degree, professional degree, NVQ3, NVQ2, NVQ1, and no degree. Relative to the U.S. educational system a university and professional degree 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.B. 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 have not been included in the 2001 wave of the BSS. The means (standard deviations) of these effectiveness variables on a 1-5 scale are the following: 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 Arbe*it (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 but are also particularly rich in details 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 German employed population age 16 to 65. Each survey has about 30,000 respondents. The largest possible sample is used, only removing workers from former East Germany included since 1991 in the survey, and the self-employed and 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.B.

The German education system identifies 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 but or currently working). Investigating educational developments in Germany by including 1985 and 1991 yields a steady increase 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 of time in Germany.

For the empirical analysis over time the analysis follows 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) has been developed on lines similar to the earlier 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. The NCDS follows people born in the week 3-9 March 1958. Surviving members of this birth cohort have been surveyed on five further occasions in order to monitor their changing health, education, social circumstances, and economic performance. This survey is not used here since sociability is absent in the NCDS.

Subsequently, four further major surveys have monitored the changing health, education, social and economic circumstances of the surviving cohort members – in 1975, 1980, 1986, and 1996. The 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 reviews the members' labor-market status at the age of 30. Cohort members that were are in paid work and non-self employed in 2000.

In the empirical analyses the 2001 BSS is appended to the 2000 BCS, acknowledging the one-year difference between the two surveys. To do so, the mean importance of the nine job tasks is assigned by occupation from the BSS to each individual cohort member in the BCS working in that occupation. Then the effects of sociability at age 16 are estimated on the importance of job tasks. The returns to sociability are also estimated by using log hourly wages from the 2000 BCS. Using log hourly wages from the BSS, adjusted for age, yields qualitatively similar results. Table A3 presents the definitions and some descriptive statistics of our constructs of sociability.

A.4. Occupations

Tables A4 and A5 present information about specific occupations in terms of their

importance of job tasks in 1997. There are 344 occupations identified in the BSS at the three-digit level. Table A4 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. Doing the analysis for 2001 yields comparable results.

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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 British Cohort Study. The task measures in the current occupation are occupational averages appended from the British Skills Survey 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 II
Cross-Sectional Wage Regression for Britain, 1997-2001
(Dependent Variables: Log Wages)

	OLS		2SLS	
	1997	2001	1997	2001
Interpersonal interactions (directness/caring)	0.283	0.327	0.363	0.393
	(0.124)	(0.162)	(.0121)	(0.093)
Math	0.084	0.090	0.062	0.055
	(0.027)	(0.030)	(0.017)	(0.014)
Reading	0.084	0.085	0.092	0.091
	(0.052)	(0.056)	(0.041)	(0.045)
Writing	0.067	0.057	0.052	0.055
	(0.050)	(0.051)	(0.030)	(0.050)
Physical strength and Stamina	-0.068	-0.120	-0.073	-0.111
	(0.025)	(0.026)	(0.015)	(0.012)
Problem solving	0.122	0.155	0.095	0.154
	(0.056)	(0.057)	(0.035)	(0.027)
Noticing mistakes	-0.007	0.004	0.008	0.005
	(0.068)	(0.071)	(0.044)	(0.032)
Planning of activities	-0.048	0.035	-0.032	0.038
	(0.043)	(0.048)	(0.027)	(0.042)
Knowledge of the organization	0.016	-0.009	0.032	0.007
	(0.054)	(0.026)	(0.035)	(0.026)
n	247	265	247	265

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. All data are taken 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.

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

	2SLS			
	1979	1985	1991	1998
Interpersonal interactions (directness/caring)	0.101 (0.026)	0.121 (0.051)	0.164 (0.069)	0.179 (0.071)
Analytical	0.093 (0.041)	0.092 (0.044)	0.114 (0.045)	0.120 (0.049)
Routine cognitive	0.083 (0.035)	0.084 (0.036)	0.099 (0.036)	0.104 (0.045)
Routine manual	-0.011 (0.005)	-0.010 (0.005)	-0.018 (0.008)	-0.019 (0.009)
Non-routine manual	-0.022 (0.011)	-0.030 (0.013)	-0.037 (0.018)	-0.038 (0.021)
n	65	65	65	65

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 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.

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)	0.085 (0.032)
Math	-0.018 (0.029)	-0.017 (0.020)
Reading	0.059 (0.043)	0.048 (0.028)
Writing	0.062 (0.038)	0.067 (0.024)
Physical strength and Stamina	-0.083 (0.035)	-0.089 (0.022)
Problem solving	0.024 (0.050)	0.023 (0.032)
Noticing mistakes	0.013 (0.069)	0.010 (0.044)
Planning of activities	-0.019 (0.044)	-0.019 (0.029)
Knowledge of the organization	0.050 (0.052)	0.057 (0.035)
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. The definitions of the variables are available from the Data Appendix.

Table V

Relationship between Wages and Interpersonal Interactions in Germany, 1979-1998
(Dependent Variables: Change in Log Wages)

	Fixed effects	Random effects	Maximum likelihood	GLS
Interpersonal interactions (directness/caring)	0.135 (0.024)	0.135 (0.041)	0.136 (0.041)	0.138 (0.043)
Analytical	0.085 (0.031)	0.083 (0.031)	0.083 (0.031)	0.084 (0.031)
Routine cognitive	0.067 (0.030)	0.063 (0.031)	0.063 (0.031)	0.062 (0.031)
Routine manual	-0.032 (0.015)	-0.033 (0.015)	-0.033 (0.015)	-0.033 (0.015)
Non-routine manual	-0.013 (0.010)	-0.015 (0.011)	-0.015 (0.012)	-0.022 (0.011)
n	260	260	260	260

Note: Robust standard errors in brackets. The GLS estimates use the male importance of job tasks as instruments for the task measures. 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.

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.

Table VII

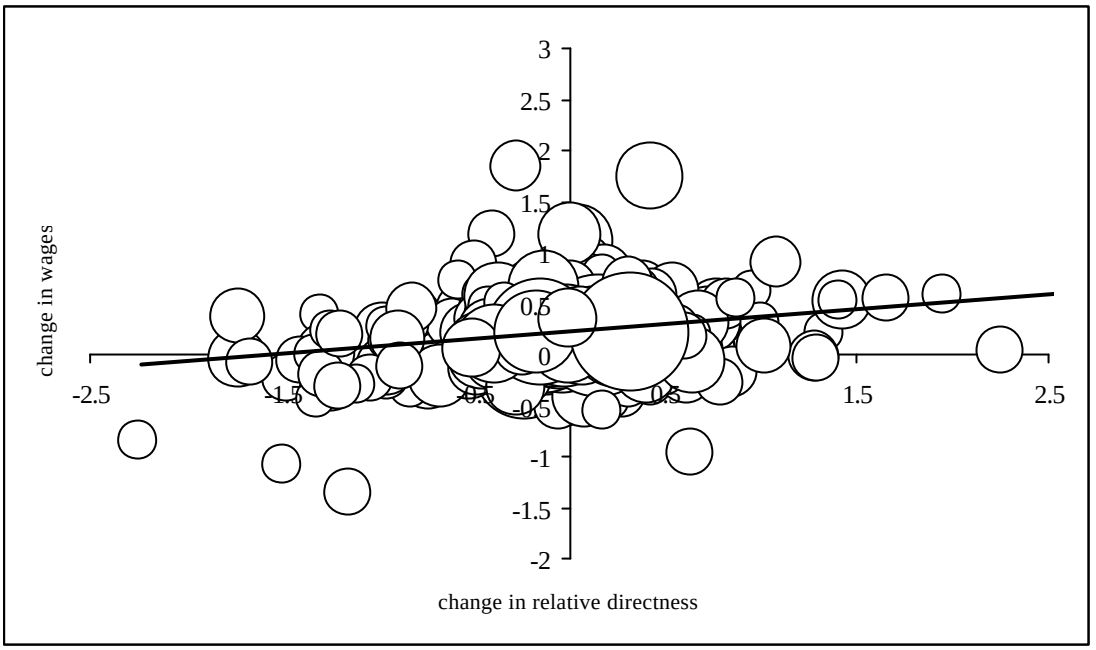
The Relationship Between the Derivative of the Wage Function and Matching Function

	(1)	(2)	(3)	(4)	(5)	(6)
Derivate of the matching function (dp/da)	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 $\frac{d \ln w}{da}$, 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. $\frac{dp}{da}$ is based on the first difference of the kernel estimate of the matching function, i.e. 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.

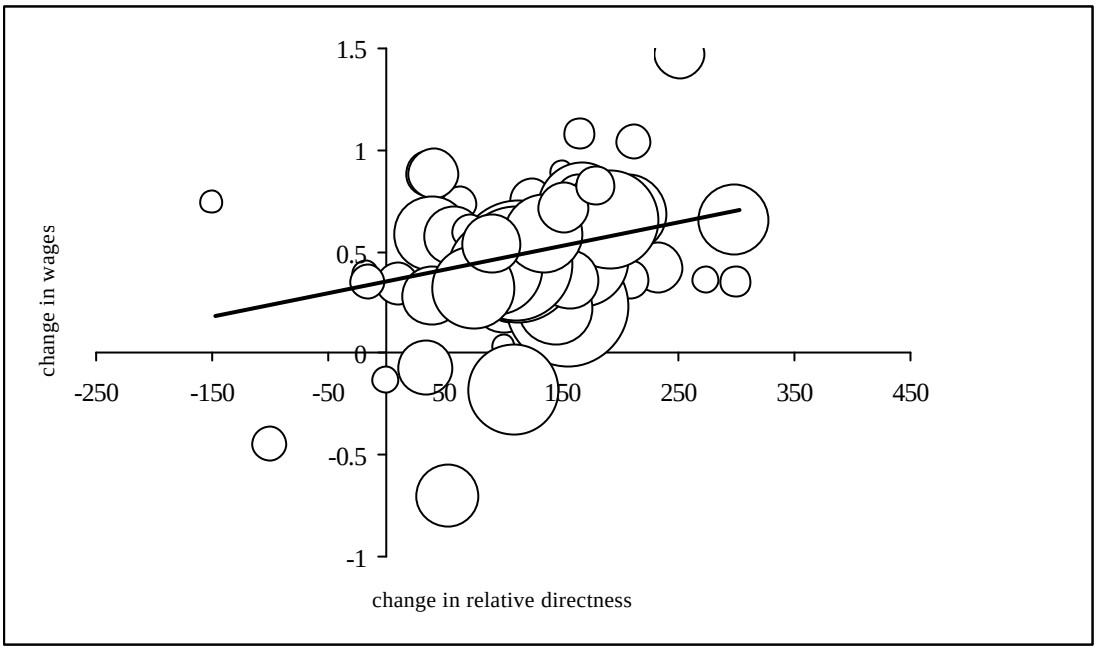
Figure I

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, 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



Note: The size of the bubbles indicates the relative size of the occupation. See the Data Appendix, Table A2, for more details on the definition of interpersonal tasks.

Figure III

Kernel Estimation of the Density of the Importance of Directness Relative to Caring

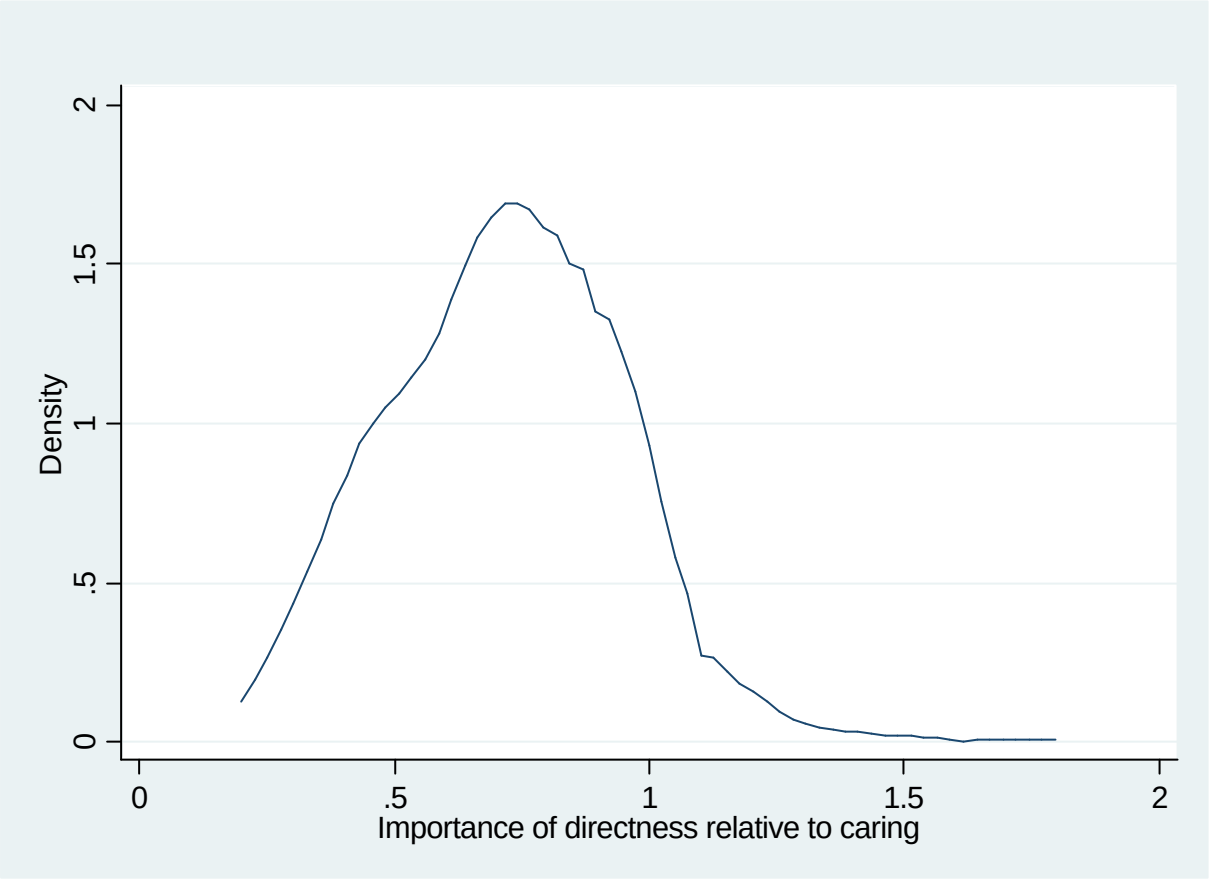


Figure IV

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

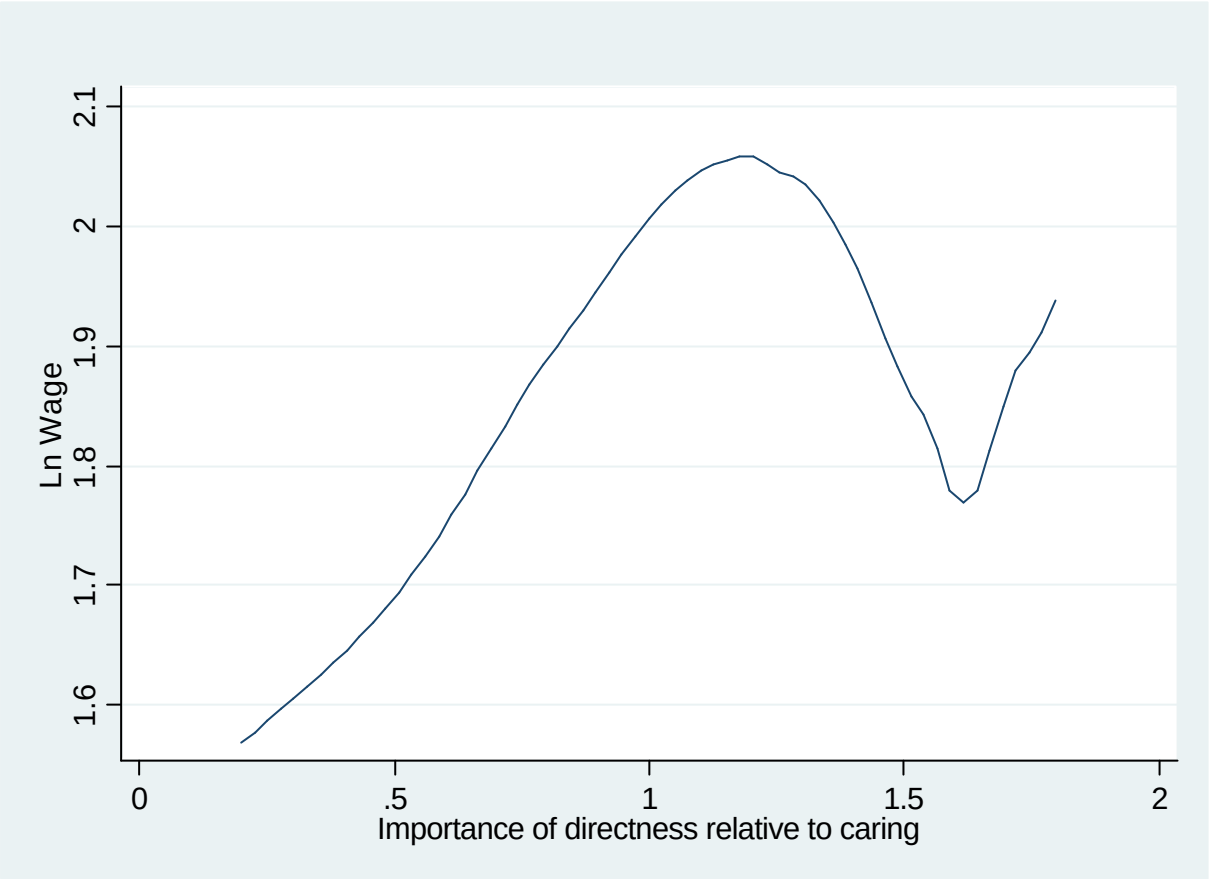


Figure V

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

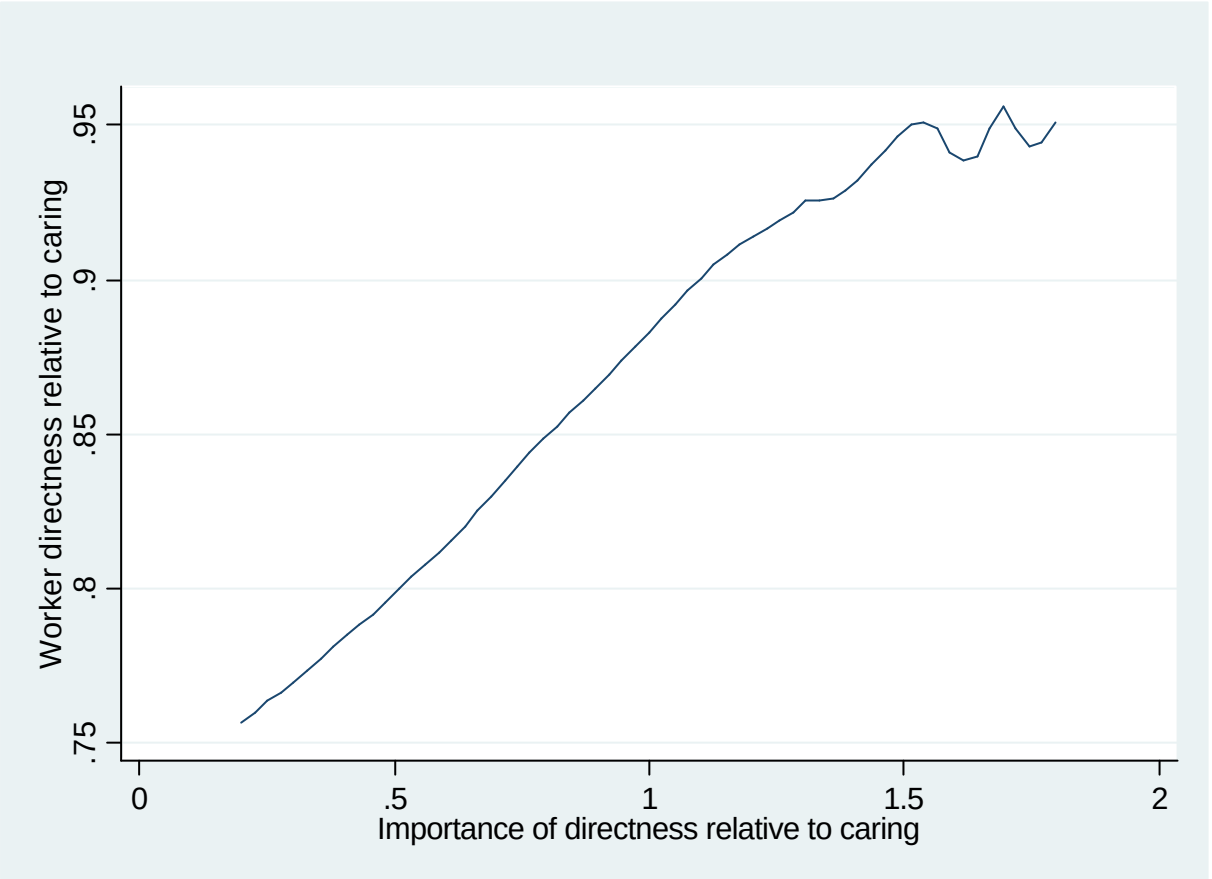


Figure VI
Derivative of the Estimated Wage Function

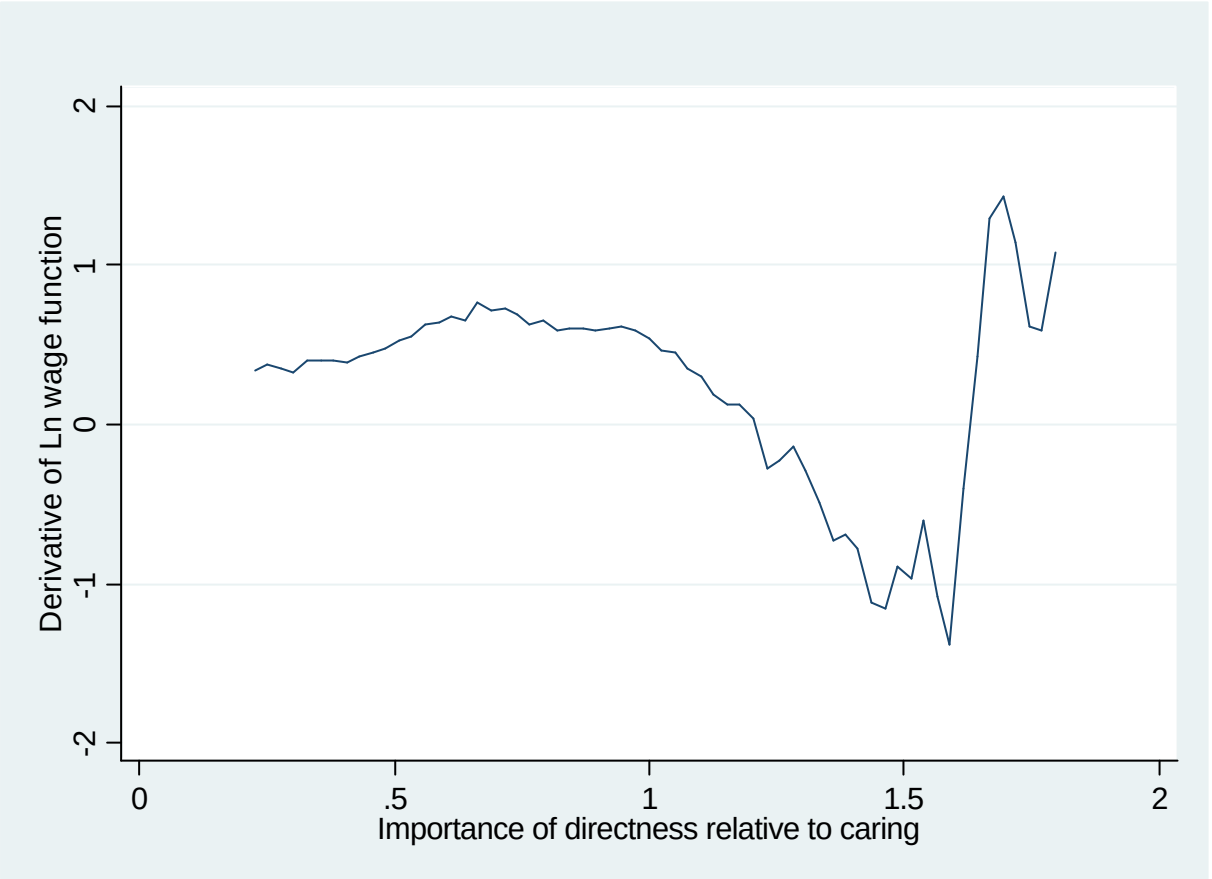


Figure VII
Derivative of the Estimated Matching Function

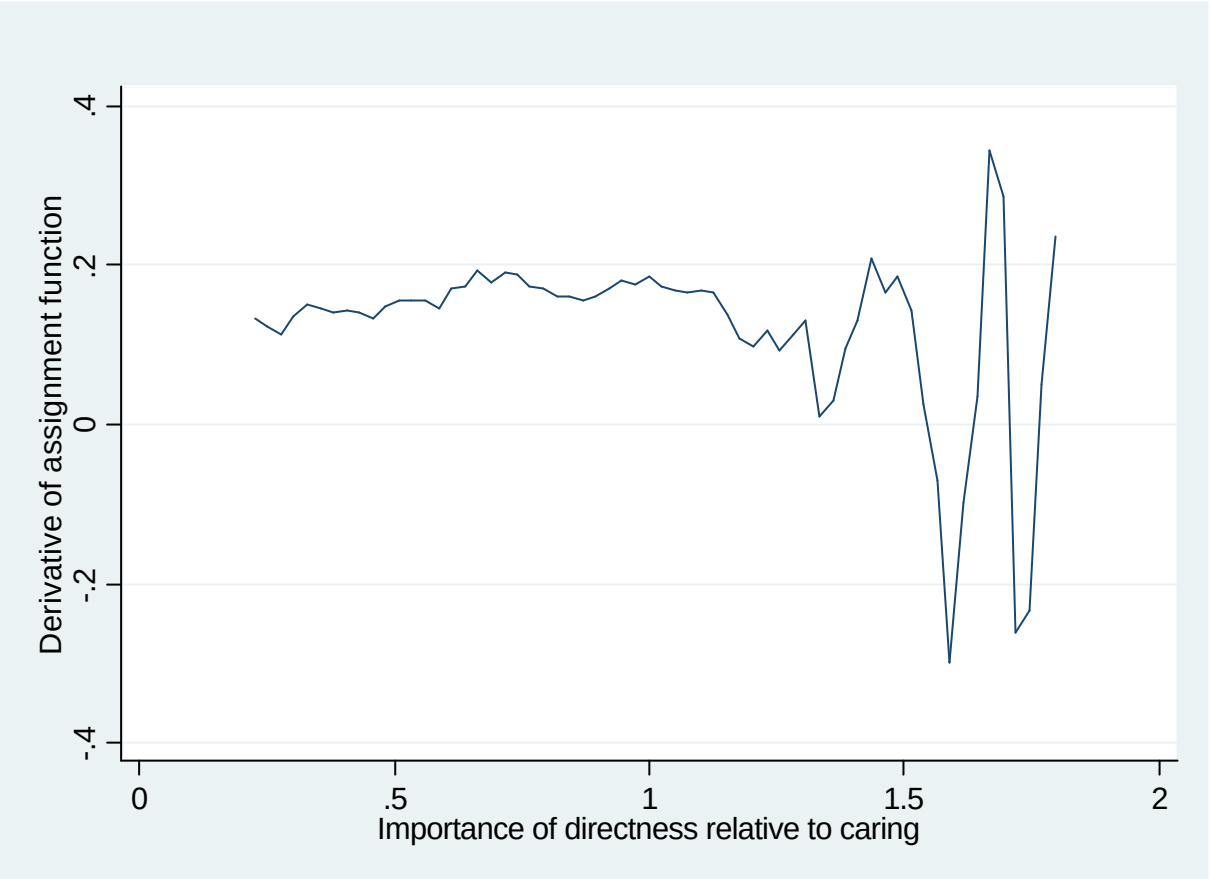


Table A1

Definitions of Job Task Measures from the British Skills Surveys (BSS) in 1997 and 2001

Tasks	Definition	Mean (st.dev.)	
		1997	2001
Interpersonal Interactions	Dealing with people; working in a team of people; instructing, training or teaching people; making speeches or presentations; persuading or influencing others; selling a product; counseling, advising or caring for customers; and listening carefully to colleagues	3.468 (0.933)	3.545 (0.875)
- Directness	Instructing, training or teaching people; making speeches or presentations; persuading or influencing others; and selling a product	2.828 (1.129)	2.937 (1.112)
- Caring	Dealing with people; working in a team of people; counseling, advising or caring for customers; and listening carefully to colleagues	3.915 (0.895)	4.017 (0.835)
Math	Adding subtracting, multiplying or dividing numbers; calculations using decimals, percentages or fractions; and calculations using more advanced mathematical or statistical procedures	2.753 (1.290)	3.130 (1.108)
Reading	Reading written information such as forms, notices or signs; reading short documents such as short reports, letters or memos; and reading long documents such as long reports, manuals, articles or books	3.688 (1.020)	3.752 (0.996)
Writing	Writing materials such as forms notices or signs; writing short documents (for example, short reports, letters or memos); and writing long documents with correct spelling and grammar (for example, long reports, manuals, articles or books)	3.303 (1.064)	3.374 (1.066)
Physical ability	Physical strength (for example, to carry, push or pull heavy objects; physical stamina (to work for long periods on physical activities); and skill or accuracy in using your hands or fingers (for example, to mend, repair, assemble, construct or adjust things)	2.807 (1.213)	2.893 (1.200)
Problem solving	Working out the cause of problems or faults; thinking of solutions to problems; and analyzing complex problems in depth	3.577 (1.133)	3.683 (1.000)
Noticing mistakes	Paying close attention to detail; spotting problems or faults; checking things to ensure that there are no errors; and noticing when there is a mistake	4.211 (0.822)	4.260 (0.740)
Planning	Planning your own activities; planning the activities of others; organizing your own time; and thinking ahead	3.588 (1.003)	3.701 (0.943)
Organizational knowledge	Knowledge of how to use or operate tools/equipment; knowledge of particular products or services; specialist knowledge or understanding; knowledge of how your organization works; and using a computer, pc, or other types of computerized equipment	3.505 (0.872)	3.673 (0.828)
n		2,467	4,470

Note: All data are taken from the British Skills Surveys of the ESRC Centre on Skills, Knowledge and Organisational Performance (SKOPE) in Oxford (1997 and 2001).

Table A2

Definitions of Job Task Measures from the BIBB/IAB and Descriptive Statistics for 1979 and 1998

Tasks	Definition	Mean (st.dev.)	
		1979	1998
Interpersonal Interactions	Negotiating, lobbying, coordinating and organizing; teaching or training; selling, buying, advising, or advertising; entertaining or presenting; serving and accommodating; and helping others	5. 862 (10.101)	35.034 (31.795)
- Directness	Negotiating, lobbying, coordinating and organizing; teaching or training; selling, buying, or advertising; and entertaining or presenting	4.728 (9.208)	31.213 (28.928)
- Caring	Serving and accommodating; advising customers and clients; and helping out others	6.996 (14.474)	38.855 (48.743)
Non-routine analytic	Research, evaluation, and planning; making plans, constructions, designing, and sketching; and working out rules/prescriptions	4.431 (13.285)	15.946 (26.701)
Routine cognitive	Calculating, and bookkeeping; correcting of texts/data; measuring length/weight/temperature	14.021 (20.384)	20.429 (40.319)
Routine manual	Operating or controlling machines, and equip machines	33.619 (47.241)	13.735 (34.422)
Non-routine manual	Repairing or renovation of houses/apartments/machines/vehicles; and restoring of art/monuments	5.457 (13.228)	16.111 (36.764)
n		25,105	34,343

Note: All data are taken from the Bundesinstitut für Berufsbildung (BIBB), Berlin and Institut für Arbeitsmarkt- und Berufsforschung der Bundesanhalt fur Arbeit (IAB), Nürnberg (1979 and 1998).

Table A3

Definitions of Sociability from the British Cohort Study at Age 16 (1986 Wave)

Sociability Variables		Variable Construction	Mean (Standard Deviation)
Measure	Definition		
Self description of character: caring	Loving; Taking part in charity Shy (reversely entered); and Quiet (reversely entered)	The questions asked are whether you are engaged in the social activities listed in the previous column. The response categories of the social activities are generally ranging from 0 tot 5. We made dummy variables 0=0 and 1=1-5. For the number of friends we just used the absolute number of friends. Other individual variables, such as having a boy/girlfriend are dummy variables	2.270 (1.102)
Self description of character: popular/outgoing	Friendly; Outgoing; Shy (reversely entered); and Quiet (reversely entered)		2.772 (0.861)
Number of friends	Boy or Girlfriend; Number of best friends; Number of friends in school; and Number of friends outside school		12.780 (5.482)
Social behavior during school term and holidays	Stay at home with boy/girlfriend; Stay at home of boy/girlfriend; Go to the cinema etc. with boy/girlfriend; Stay at home with other friends; Spend time at the homes of other friends; Go with friends to cinema, disco etc.; Go out with friends do nothing special; Stay at home by yourself or with family; Go out by myself or with family; Go to a friend's house; Have friends round to my house; Go to a youth club/organization; Go out with brothers/sisters; Do community/volunteer work; Go to a meeting/political club; Go out with my boy/girlfriend; and Go out with friends		19.118 (9.513)
Social behavior during leisure time	Go to a friend's house; Have friends round to my house; Go to a youth club/organization; Go out with brothers/sisters; Do community/volunteer work; Go to a meeting/political club; Go out with my boy/girlfriend; and Go out with friends		17.023 (4.048)

Note: All data are taken from the 1986 wave of the 1970 British Cohort Study.

Table A4

The Mean Importance of Caring and Directness for the 25 Largest Occupations in Britain

Occupation Name	Job Tasks						
	Interpersonal				Math	Reading/ Writing	Physical
	Directness	Caring	Ratio	Absolute			
Technical and wholesale sales representatives	3.983	4.394	0.906	0.411	3.895	3.999	2.408
Marketing and sales managers	3.727	4.298	0.867	0.571	3.485	3.716	1.944
Software engineers	3.350	3.949	0.848	0.599	3.265	3.787	1.803
Production, works and maintenance managers	3.510	4.243	0.827	0.733	3.716	3.861	2.265
Managers and proprietors in service industries n.e.c.	3.321	4.179	0.795	0.858	3.297	3.305	2.754
Other financial institution and office managers n.e.c.	3.407	4.332	0.786	0.925	3.765	3.912	1.947
Computer analyst/programmers	3.035	3.920	0.774	0.885	3.466	3.449	2.096
Metal working production and maintenance fitters	2.800	3.685	0.760	0.885	3.224	3.638	3.856
Storekeepers and warehousemen/women	2.743	3.620	0.758	0.877	3.043	3.353	3.514
Secondary (and middle school deemed secondary) education teaching professionals	3.495	4.621	0.756	1.126	3.485	4.233	2.691
Nurses	3.484	4.816	0.723	1.332	3.030	4.165	3.412
Welfare, community and youth workers	3.231	4.597	0.703	1.366	2.804	4.051	2.403
Educational assistants	3.099	4.421	0.701	1.322	3.279	3.336	2.807
Accounts and wages clerks, book-keepers, other financial clerks	2.649	3.813	0.695	1.164	4.136	3.691	1.926
Primary (and middle school deemed primary) and nursery education teaching professionals	3.080	4.663	0.661	1.583	3.530	4.230	2.683
Clerks (n.o.s.)	2.705	4.105	0.659	1.400	3.167	3.557	2.157
Counter clerks and cashiers	2.707	4.168	0.649	1.461	3.403	3.569	2.313
Cleaners, domestics	1.873	2.889	0.648	1.016	2.238	2.682	3.392
Care assistants and attendants	2.930	4.528	0.647	1.598	2.125	3.629	3.559
Filing, computer and other records clerks (including legal conveyance)	2.533	4.040	0.627	1.507	2.931	3.509	2.316
Sales assistants	2.488	4.167	0.597	1.679	2.884	2.976	3.224
Drivers of road goods vehicles	1.824	3.173	0.575	1.349	2.273	2.979	3.616
Local government clerical officers and assistants	2.430	4.276	0.568	1.846	3.000	3.754	2.518
Other secretaries, personal assistants, typists, word processor operators n.e.c.	2.167	4.000	0.542	1.833	2.719	3.643	2.293
Receptionists	2.304	4.517	0.510	2.213	2.583	3.628	2.341

Note: All data are from the British Skills Surveys of the ESRC Centre on Skills, Knowledge and Organisational Performance (SKOPE) in Oxford (1997). The measures of the importance of job tasks are the means of the importance of a task within the specific occupation. For reading/writing the occupational average of the two is taken. Ratio is computed as the ratio of directness and caring in an occupation. Absolute is defined as the absolute difference between directness and caring in an occupation.