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Diskussionspapiere Discussion Papers

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Deutsches Institut für Wirtschaftsforschung

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Berlin, August 1991

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Some New Insights on the Interindustry Wage Structure from the German Socioeconomic Panel

Michael C. Burda*

Abstract

This paper investigates the interindustry wage structure in the 1985 wave of the German Socioeconomic Panel. In addition to the usual controls, this survey contains detailed information on job characteristics and work conditions. Interaction of industry affiliation is significant with several individual attributes, especially job tenure; homogeneity of earnings equations across these attributes is decisively rejected. The industry wage structure is insignificant for workers with low job tenure. These results are consistent with the interpretation of interindustry wage differentials as shared rents from industry or firm-specific human capital.

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1. Introduction

This paper investigates the interindustry wage structure in the 1985 wave of the German Sociogconomic Panel (Deutsches Sozioökonomisches Panel, hereafter SOEP), a representative cross-section of West German households. In addition to the usual controls, the 1985 survey contains several questions about workplace characteristics and worker qualifications. With responses to these questions it is possible to control for an extended set of factors in "Mincer equations" relating earnings to human capital and other individual characteristics. Inclusion of such controls can explain between 8-10% of wage variation beyond that explained in similar recent studies.

Besides improving control for influences of workplace conditions and worker qualifications on pay, this paper investigates the stability of the interindustry wage structure across different groupings in the sample. To the extent that Mincer-style earnings equations differ across characteristics and these are correlated with industry, the estimated interindustry wage structure may merely reflects omitted variable bias. It is well-recognized that estimated coefficients are biased to the extent that excluded regressors are correlated with included ones. further: We pursue this issue one step could omitted. industry-specific interactions explain some part of the estimated interindustry wage structure?

Industry wage differentials in the SOEP are significantly estimated in the full sample, but show some differences with those

-1-

estimated by Krueger and Summers (1988) in the US Current Population Survey. We also find that earnings functions are firm size, full versus sex, statistically different across tenure groupings. Tests for especially job part-time, and earnings equations across these groups are homogeneity of decisively rejected. When the sample is reduced to full-time workers with less than five years experience in their current job, vanish, whereas they remain industry wage differentials economically and statistically significant for workers with more than five years tenure. These results, which analyze only a fraction of all potential interactions, militate against overinterpretation of industry wage differentials. They are more consistent with workers and firms' sharing rents of industry or firm-specific human capital, which accumulates only over time.

The paper is organized as follows. Section 2 reviews the literature interindustry wage on the structure and its interpretation. Section 3 elaborates one particular omitted variables interpretation of the interindustry wage structure. Section 4 describes the SOEP and its 1985 wave which includes detailed information on job characteristics and worker attitudes, and presents estimates the interindustry wage structure. Section 5 explores the robustness of wage structures across different groupings of the working population. Section 6 offers an interpretation of the results.

2. The Interindustry Wage Structure and its Interpretation: A Survey of the Literature

The fact that observationally similar workers with comparable

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skills and experience earn different wages in different industries has puzzled economists for a long time.¹ In the postwar period, labor economists around the world began to take particular notice of the durability of this wage structure.² Lebergott (1947) showed not only wages that wages were highly correlated across industries in the US, Canada, the United Kingdom and Sweden, but also the Soviet Union. These findings were later corroborated by Dunlop and Rothbaum (1955) in international comparisons, and more recently by Katz and Summers (1988).

The suspicion that the wage structure merely reflected distribution of observable skills was dispelled by the pioneering work of Krueger and Summers (1988), who employed survey data on individual workers to identify and track the interindustry wage structure, estimated as coefficients on industry affiliation dummy variables in standard Mincer earnings equations. By projecting the wage structure on a variety of measurable individual characteristics including human capital proxies, they find a large component of variance remains "explained" by industry affiliation.

The interindustry wage structure lends itself to several

See Murphy (1987) and Topel for a particularly evocative reference to the phenomenon by Adam Smith; for an early attempt at a neoclassical justification, see John Bates Clark (1899). Thaler provides a useful summary of (1988) recent explanations of the interindustry wage structure.

² See Dunlop (1944), Lebergott (1947), Slichter (1950) and Cullen (1956) for the United States; Turner (1952) and Huddy and Tolles the United Kingdom; Reynolds and (1957) for Taft (1956) for France; and Grumbach and Konig (1957) and Lampert (1968) for Germany.

economic interpretations. J.T. Dunlop (1944) and Sumner Slichter (1950) linked wages to ability to pay, that is, the profitability of the enterprise in question. Slichter (1950) wrote that "wages. within a considerable range, reflect managerial discretion, that where management can easily pay high wages they tend to do so, and that where managements are barely breaking even, they tend to keep wages down," p.88. This "ability to pay" view has been revived by recent work of Blanchflower and Oswald (1989) and Nickell and Alternatively, interindustry wage differences Wadhwani (1988). could derive from job characteristics (compensating differentials) or sorting on unobservable individual attributes. The first idea thus explains why the mining industry in this view pays higher wages than average, ceteris paribus, because miners work in dark places underground, while forestry workers earn less because they are outdoors. The second central idea says that the chemical industry pays more than the textile industry because certain unobservable characteristics are more valuable in that industry and are remunerated in equilibrium by higher wages.

More recently, Katz (1986), Krueger and Summers (1988), and Katz and Summers (1988) have attributed industry pay differences to the broad heading of "efficiency wage considerations." In this view managers set pay in order to solve an optimizing problem. Higher wages reduce job turnover (Pencavel 1972), spur worker effort by increasing the cost of job loss (Shapiro and Stiglitz 1984), increase loyalty and productivity (Akerlof 1984), and improve the quality of job applicants (Weiss 1980). To these can be added the "fair wage hypothesis" of Akerlof and Yellen (1990),

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which stresses perceptions of fairness among workers. In addition, Lindbeck and Snower's (1986) work can be interpreted as a type of efficiency wage payment to prevent workers from disrupting the production process.

Clearly, efficiency wages is not a single theory but rather a mosaic of ideas, some of which are more neoclassical than others. They share the common theme that firms set wages, and may find it against their profit maximizing interests to reduce them in the face of unemployment. To the extent that industries differ in the optimal efficiency wage that firms pay, an interindustry wage structure will arise.

3. Omitted Variable Bias and the Industry Wage Structure

The mere existence of significant coefficients on industry dummy variables is not conclusive evidence of efficiency wages. Estimated industry dummies may simply be a by-product of unobserved differences in worker quality as well as other characteristics which are correlated with particular industries. Cross-section and panel data sets can only obtain a limited amount of information about worker attributes. This can be seen in the large amount of variance in earnings that remains unexplained by measured variables such as age, experience, education, and other identifiable attributes.³

If verifiable characteristics unobservable to econometricians are more valuable to industry x than to others, and if workers

³Katz and Summers (1989) concede that some of this unexplainable variance is correlated with the effect of controls on the uncorrected interindustry age structure, suggesting that some of the former may be indeed unmeasurable quality.

possessing these attributes were indifferent between working in industry x and elsewhere, firms should offer higher wages to these workers to attract them from other industries. In equilibrium one would observe a premium for working in industry x as long as the characteristics in question were not included as a right had side variable. While Blackburn and Newmark (1988) show that intelligence --as measured by IQ-- is not positively associated with high wage industries, this does not rule out other forms of unobservable heterogeneity, including such unquantifiable traits as loyalty, perseverance, and carefulness, all of which are likely to be important to an employer. To the extent that these unobserved attributes are valued differently by different industries, they will surface in estimated industry dummy coefficients.4

The point is more general than this. Suppose that each employment relationship consists of a "match" of a worker and a firm. Each firm operates in one of k=1,...,K industries, each of which with a revenue function $R^{K}(\mathbf{x}_{i}, \mathbf{y}_{j}, t)$ where \mathbf{x} is a list of worker attributes, \mathbf{y} is a list of firm attributes, and t is the time the match has existed. Few restrictions are imposed on the derivatives of R except that $\partial R^{K}/\partial t$ is positive for all K; that

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⁴ Following Griliches (1957), (1957) and Theil if the analyst the model $y=X\beta+u$ where the true specification is estimates $y=X\beta+Z\gamma+u$, the OLS estimate of β is given by $b = (X'X)^{-1}X'y = \beta + (X'X)^{-1}X'(Z\gamma+u)$, so $Eb=\beta + P\gamma$, where $P\equiv (X'X)^{-1}X'Z$ is the matrix "auxiliary regression" coefficients of left-out variables of Ζ on the columns of X. The OLS estimator is biased as long as the elements of Z are correlated with the j columns of X, and the bias of the ith element b_i is equal to $\sum_{i} cov(x_i, z_i)\gamma_i$.

is, there is an element of firm specific human capital in the production process. Workers have their own fallback or reservation wage w_{i}^{*} which may be determined by outside offers or the level of unemployment benefits. If the jth firm and ith worker set the wage according to a simple Nash bargaining rule, we have

(1)
$$\mathbf{w} = [\mathbf{R}^{K}(\mathbf{x}_{1},\mathbf{y}_{1},t) + \mathbf{w}_{1}^{*}]/2$$

To the extent that R's differ across industries, so in principle could the derivatives of R with respect to their arguments and thus the estimated earnings function as well.

There are many reasons to believe that R might be different across industries. It is hard to understand, a priori, why the individual return to an additional year of schooling in the chemical industry is equal to that in the personal services sector. Moreover there may be interactions here, so that the effect of characteristics may depend on other other variables, such as tenure t.

The common response to this line of reasoning is that labor should reallocate itself until these differences are eliminated at the margin, as would be the case if labor mobility is perfect across industries and R is characterized by decreasing return on all margins. Yet there are many potential reasons why, even under conditions of mobility, that industry dummies may be estimated with significant coefficients where there is in fact no "industry effect," but simply a misspecified wage equation.

One is the desirability of the particular industry to particular workers. Women, because of an exogenously given option

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of childbearing, may prefer industries in which long cumulative tenure or experience is unnecessary and work career interruptions are possible. An increased willingness of women to be in this group leads to lower bargained wages for them, vis-a-vis men. This will lead to an "industry sex effect". To the extent that women are actually concentrated in those industries, leaving out an interaction term for women in a wage equation with industry dummies will induce biased estimates of any industry effect. Simply controlling for sex will not solve this problem.⁵

A second reason is discrimination. Suppose that certain industries discriminate against women. For example the construction industry is well-recognized as a male-dominated industry. Suppose further, in contrast, that other industries do not discriminate. If underpaid women are also underrepresented in the construction industry, then a construction dummy in the absence of a construction industry-sex interaction will be estimated with with a wage premium.

A third reason is rent sharing.⁶ Suppose that a certain match modelled in equation (1) has existed for a long time, and that $\partial R^{K}/\partial t$ is positive. It may simply be the case that the firm does not want to replace its worker with some other; there is simply

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similar example arises in the case of residents of foreign nationality. Foreigners generally don't speak the language as well natives. These individuals may prefer as industries where on-the-job communication is less important, and be willing to accept lower pay, all other things equal. For given employer's preferences, a Nash bargaining outcome will lead to a lower wage for foreigners in that particular industry. Thus an "industry effect" may be detected where it is really an nationality-industry outcome of a voluntary interaction, and the matching process.

⁶This is stressed by Katz and Summers (1989).

too much value in the existing employment relationship. Thus neither of the two parties are willing to allow third parties to underbid, at least for some range of wages. To the extent that different industries value this firm or industry specific capital differently, $\partial R^{K}/\partial t$ will vary across industries because there is no arbitrage opportunity across this margin, and industry dummey variables will simply pick up this effect in a misspecified wage equation.

It is at least possible that the industry wage structure is simply a series of omitted interactions with sex, race, and other variables. To see this, consider the simple case in which the unconditional industry wage effect is in fact zero, but each industry i rewards binary attribute j, j=1...J differently by γ_{ij} . The expected value of the coefficient of an industry dummy i in an otherwise correctly specified equation is approximately

 $Eb_i = \sum_i (fraction of individuals in industry i with attribute j) \gamma_{ij}$

This "wastebasket effect" should be distinguished from that suggested by Murphy and Topel (1987a,b), who stress voluntary sorting by workers into industries on the basis of unobserved ability and this sorting is highly correlated with that observed for measurable skills. Curiously, this possibility has not been raised in the heated debate over the industry wage structure.

4. The Interindustry Wage Structure of the SOEP

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The German Socioeconomic Panel (SOEP) is a representative annual survey of roughly 6000 households in the Federal Republic of Germany, involving more than 10,000 individuals. The SOEP offers a unique alternative to already extensively investigated US data sets. The design of the SOEP is similar to the Panel Survey of Income Dynamics (PSID) and the Survey of Income and Program Partipation (SIPP) and as second mover to these panel studies has improved on some aspects of the former, for example, by interviewing all working individuals in a household.⁷ Second. a variety of information has been gathered about quality of the workplace and workplace attitudes. In 1985 these included a set of thirteen questions regarding the quality of the workplace and worker attitudes. Furthermore the respondent was allowed to distinguish between "somewhat agree" and "fully agree" to the extent these characteristics were applicable. The attributes are listed in Table 1.

Several of these questions in Table 1 are obvious proxies for attributes described in the literature on earnings determination. For example, the compensating differentials literature would predict positive signs for questions 2, 6, 7, 12, and 13 and possibly negative signs for 1, 3, 9, and 11. Question 5 is directly related to one interpretation of the efficiency wage hypothesis; workers who are supervised more should receive lower wages, whereas the unsupervised will receive supra-normal wages to deter shirking.

For an excellent survey of the comparability of the SOEP and the US Survey of Income and Program Participation (SIPP), see Witte (1990).

There were 4599 individuals in the 1985 SOEP survey who responded that they were working and reported their gross income with complete data for all controls. Of these, 3422 were German citizens and 1177 were foreigners. Of the grand total, 4030 were working full time and of these, 2866 were of German nationality.⁸ Using these data, OLS regressions of log hourly gross earnings on one-digit industry dummy variables were employed to obtain raw estimates of the interindustry wage structure for all employed individuals in the SOEP for hourly wages (gross of deductions and withholding). The results are reported in the first column of Table 2. Similar unreported results were obtained throughout this paper for hourly compensation, which included employer bonuses, but still excluded employee contributions to social insurance. The control group was the no response group.

Following Krueger and Summers (1988), a Mincer wage equation was estimated that included the following controls: education and its square, age, experience, occupation dummies (10), regional dummies (8), a sex dummy, a central city dummy, a unionization dummy, an ever married dummy, interactions of sex with ever-married, education, education squared, and a constant.⁹ Because education variables cannot be compared, foreign citizens are excluded. These results are presented in the second column of

⁸ The distinction is important because key variables such as schooling are not comparable across German nationals and residents of foreign nationality.

⁹Krueger and Summers actually controlled for education and its square, 6 age dummies, 8 occupation dummies, 3 regional dummies, a sex dummy, a central city dummy, a unionization dummy, an ever married dummy, veteran status, interactions of sex with marriage, education squared, and six wage brackets, and a constant (see Table 1, p. 264).

Table 2.

Direct control for human capital and workplace conditions can be enhanced in the SOEP as a result of several questions in the 1985 survey described above. The third column of Table 2 presents estimates of the structure after adding the wage to Krueger-Summers controls tenure the current job. on experience-squared, training/qualification dummies (6), guild membership, job characteristics (26), dummies for and self-employed and civil servant status.

The last column of Table 2 displays the estimated industry wage structure given a set of "preferred controls," which simply drop from the extended controls the following interactions: sex-marriage, sex-education, sex-education-squared, and sexexperience. An F-test of the joint significance of estimated coefficients on the industry dummy variables confirms the existence of the interindustry wage structure. On the other hand, the weighted standard deviation of the estimated coefficients falls considerably. Furthermore the percentage of variance explained by the equation rises by 8-10% vis-a-vis the KS controls, suggesting that job quality can explain more variance in the wage structure than otherwise thought.¹⁰

The results in general confirm the hypothesis that the interindustry wage structure in Germany is tighter than in the United States, controlling for the same factors. These estimates

¹⁰ Edin and Zettenberg (1989) recently investigated the interindustry wage structure using Swedish data with a detailed set of controls and reached similar conclusions.

are compared in Table 3. As in Krueger and Summers (1988), we find that in unreported results on "near 2-digit classifications," durables goods manufacturing and chemicals are high wage industries, whereas the trade sectors pay statistically significant lower wages.¹¹ On the other hand the personal services sector in Germany and wholesale-retail trade seem to have changed places, ie the former paying considerably better than the latter.

5. Testing for homogeneity in the earning equations

The possibility of heterogeneous earnings functions suggested in Section 3 can be tested.¹² Two approaches are taken. First, a Chow test of subsample stability can be performed. Significant variability across estimated earnings functions, as detected by a statistically significant F-statistic, would signal a potential "wastebasket" function performed by industry dummies. Tests for homogeneity of the wage equation were performed across the following subgroupings: male versus female; full-time versus part-time; small versus large firms; and fewer than 5 years versus more than 5 years tenure at current job. The results are reported in Table 4. The test results allow the rejection at very low significance levels of the null that the wage equations are the same across the two groups. These results can only serve as a warning against potential interactions.

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¹¹ For aggregate evidence on West German industry wage differentials see Fels and Gundlach (1990).

¹² Krueger and Summers (1988) do not test for equality of coefficients across subgroups in their tables.

Despite the suggestive examples of the previous section, there is no compelling reason to believe that these interactions are correlated with industry grouping.¹³ It is possible, of course, to test directly for interaction effects for the groupings Table 5 presents F-tests for exclusion analyzed above. interactions of industry with sex, restrictions for full-time/part-time, firm size, and job tenure (more or less than 5 year affiliation with present firm). For sex, tenure, and full time/part time, the interaction effect is significant at the 0.0001 level. It is also noteworthy that for full-time male employees of large firms with low current job tenure, the joint statistical significance of the industry dummies is attenuated significantly.

In general it seems that the industry wage structure is less robust the finer the division applied to the data. This is consistent with "wastebasket" interpretation of the industry dummies. At the same time, the job quality variables remain consistently significant. Results to this effect presented in Table 6, especially with respect to tenure, suggest that the wage structure might be fruitfully estimated on a narrower sample. In Table 7 we present the interindustry wage structure for low (less than 60 months) and high (more than 60 months) job tenure for all employees. The confirms the suspicion that significant interaction exists between industry and tenure in the wage

¹³ Unfortunately there were insufficient observations to perform Chow tests for each industry grouping.

equation. While the interindustry wage structure is robust for workers of long tenure, it is statistically insignificant for workers with little experience within their current firm.

That interindustry wage differentials are exhibited only for employees with extended tenure in a given enterprise, if robust for other data sets in other countries, has important implications for the interindustry wage structure. It seems to favor interpretations stressing sharing of rents from industry or firm specific human capital formation, both of which will be correlated with tenure.¹⁴ For example, it is reasonable that in-house experience is more valuable in chemical and metal industries than in trade or personal services, and as result apparently identical workers in different industries are not the same.¹⁵ If such human capital has different productivity in different industries, then it will pay for high productivity industries to attempt to bid for this resource. As a state variable, job tenure cannot be simply purchased, but rather created in a time intensive process. Here the job turnover interpretation of the interindustry wage structure is closest to our point here: to increase firm or

¹⁴ It should be remarked that the continuous variable tenure variable was invariably significant in the regression results, corroborating findings of of Löwenbein (1989), Hübler and Gerlach (1990) and Schwarze (1990).

¹⁵ Slichter (1950) wrote: "..jobs and occupations which bear the same name do note necessarily involve the same kinds of duties or degree of responsibility. first-class the same Machinists in a. candy factory do not necessarily need the same knowledge of the trade as machinists first-class in an oil refinery. Loom fixers have essentially the same duties in different mills, but the may skill required of them may vary greatly depending upon the kind and quality of goods which the mill produces." [p.80]

industry specific human capital, firms invest by paying higher wages and reducing the rate of attrition through quits into other jobs. The key difference is that turnover reduction is a determinant, rather than a byproduct of the process by which wages are set.

The average tenure of workers in various industries in the 1985 SOEP is shown in Table 8. Chi-squared tables for distribution of tenure (uncompleted spells) are also displayed in Table 9. Both reveal striking differences across both one and two digit industries. Clearly other things matter as well such as industry history and changes in hiring policies over time. While some industries indeed seem to possess workers of higher than average tenure while others need less tenure, the pattern of tenure concentration is less pronounced at the one-sector industry level.

On this interpretation, it need not be the case that high wage industries necessarily have higher tenure profiles. When tenure is created it will be impossible for the firm not to share the rents with the worker, since such workers cannot be replaced overnight. As a result the very indispensibility of workers will contribute to the cost of tenure (firm specific human capital). It is not implausible that firms in these industries move up their demand curve for this "input." Thus, following the interpretation of Katz and Summers (1989), this form of rent sharing shows up as the interindustry wage structure.

This interpretation is consistent with other aspects of the industry wage structure. Krueger and Summers (1988) found that

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involuntary industry changers in the CPS Displaced Workers Survey sustained wage changes equivalent to those estimated in their equations. This is consistent with the wage differential as the rent from firm or industry-specific human capital formation; by definition, firm-specific capital disappears when the worker leaves the firm, and industry-specific capital is destroyed when a worker exits the industry.¹⁶ On the other hand, the specific human capital explanation requires an extreme complementarity in the production function. Secretaries in the textile or wood/paper/pulp industries would require less firm or industry-specific training than say in the chemical industry. Yet, there is no compelling reason why this degree of complementarity should be constant across industries. The results suggest that this avenue of explaining the occupational wage structure should be explored, as alternative to the "fairness" or sociological possible a explanations popular in the literature.¹⁷

6. Concluding Remarks

As measured by the coefficients on industry dummy variables, The SOEP data set exhibits a similar interindustry wage structure as found in the US, albeit with tighter variance.¹⁸ The addition of

¹⁶ Our results are not consistent with involuntary changers into high wage industries receiving immediately higher This wages. could be the case if workers received a wage that exceeeded the opportunity cost of their labor in industries with high productivity of firm-specific human capital. Our suggest that workers must first accumulate the necessary experience before receiving tenure-related rents.

¹⁷ See Akerlof (1982) and Akerlof and Yellen (1990).

¹⁸ This confirms the aggregate findings of Burda and Sachs (1988).

better controls for job quality, however, reduce significantly this variability within margins estimation error. The results of this investigation suggest that there are statistically significant differences in wage equations across groupings, and that industry interactions with these groups are significant. This raises the prospect that the industry wage structure is merely a wastebasket for omitted interaction effects of various groupings with industry.

Although we do not stress the result here, one version of the efficiency wage hypothesis finds support in our results. Estimated coefficients on "strict job supervision: fully agree" (question 5 in Table 1) were always statistically significant and negative in the regressions reported in this paper, ranging from 9-15% of the gross wage. On the other hand, by controlling for this factor directly --based on individual's response to the questioner rather than matching job attributes from other data sets-- we reduce its plausibility as a the sole explanation of the interindustry wage structure. The results, especially those with respect to job tenure, are supportive of a shared-rent interpretation of interindustry wage differentials, with rents deriving from industry or firm-specific human capital which accumulates only over time. The robustness of these rents over time and space can be explained by that with which this human capital is employed.

Perhaps the most durable conclusion of the paper is that simple earnings equations, which are reduced forms anyway, may not be capably of capturing the rich economic processes that underly wage determination. There is simply not enough information in

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existing surveys. The sensitivity of the earnings equation to the sample with which it is estimated should serve as a warning against overinterpretation of industry wage differentials.

Table 1

Job Quality Questions in the 1985 SOEP

1. Does your work involve variation in tasks?

2. Is your work physically strenuous?

3. Can you organize your work independently?

4. Does your work vary with demand?

5. Does your work involve strict supervision?

6. Do you have to work variable shifts?

7. Are you required to work nights regularly?

8. Do you often have conflicts with your supervisors?

9. Do you get along well with your colleagues on the job?

10. Are you involved in decision making about the promotion and salaries of others?

11. Are you able to acquire skills on the job that will help you advance in the future?

12. Does your work involve usually bothersome or environmentally hazardous conditions?

13. Does your job involve a high degree of mental concentration or nervous tension?

Table 2.	The SOR	P Interindustry	Wage	Structure	(1-digit)	
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Industry	NO	K-S	EXTENDED	PREFERRED
	CONTROLS	CONTROLS	CONTROLS	CONTROLS
Agriculture	-0.29	-0.19	-0.14	-0.17
	(0.09)	(0.11)	(0.11)	(0.11)
Mining	0.413 (0.15)	0.253 (0.16)	0.112 (0.15)	0.099 (0.15)
Manufacturing	0.121	0.068	0.028	0.023
	(0.03)	(0.03)	(0.03)	0.03
Construction	0.088	0.022	0.035	0.028
	(0.05)	(0.04)	(0.04)	(0.04)
Wholesale/Retail Trade	-0.20	-0.12	-0.12	-0.14
	(0.04)	(0.04)	(0.04)	(0.04)
Transport/Communication	0.104	-0.02	-0.07	-0.07
	(9.05)	(0.04)	(0.04)	(0.04)
Finance/Insurance	0.2 4 2	0.115	0.101	0.086
	(0.06)	(0.05)	(0.05)	(0.05)
Other Services	0.114	0.000	-0.01	-0.01
	(0.04)	(0.03)	(0.03)	(0.03)
Unweighted std dev	0.211	0.130	0.091	0.093
Adjusted†	0.198	0.102	0.051	0.054
Weighted std dev	0.113	0.065	0.056	0.058
Adjusted†	0.086	0.051	0.039	0.043
dummies	10.33	3.037	4.155	4.940
R-squared	0.027	0.399	0.489	0. 475
Sample size	4598	3342	3342	3342

(standard errors in parentheses)

Dependent variable: log of hourly earnings excl. fringes Reference Group: unclassified

*Adjusted for estimation error
*F-statistic significant at the 0.0001 level

K-S controls: after Krueger and Summers (1988): education and its square, age, experience, occupation dummies (10), regional dummies (8), sex dummy, central city dummy, unionization dummy, ever married dummy, interactions of sex with ever-married, education, education squared, and a constant (see Table 1, p. 264). Extended controls: K-S controls plus tenure, experience squared, training dummies (6), guild membership, job characteristics (26), self-employed dummy, civil servant. Preferred controls: extended controls except the interactions sex-marriage, sex-education, sex-education-squared, and sexexperience.

	SO	EP	CPS
Industry	K-S CONTROLS	PREFERRED CONTROLS	KRUEGER- SUMMERSt
Agriculture	-0.19	-0.17	
	(0.11)	(0.11)	
Mining	0.253	0.099	0.222
	(0.16)	(0.15)	(0.75)
Manufacturing	0.068	0.023	0.091
	(0.03)	0.03	0.03
Construction	0.022	0.028	0.108
	(0.04)	(0.04)	(0.03)
Wholesale/Retail Trade	-0.12	-0.14	-0.11
	(0.04)	(0.04)	(0.03)
Transport/Communication	-0.02	-0.07	0.145
	(0.04)	(0.04)	(0.03)
Finance/Insurance	0.115	0.086	0.055
	(0.05)	(0.05)	(0.03)
Other Services	0.000	-0.01	-0.078
	(0.03)	(0.03)	(0.03)
Weighted std dov	0.065	0.059	
Adjusted	0.000	0.038	0.094
F-tost for industry	5 057*	0.045	0.094
dummico	5.057	4.040	(n, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
auninies			(p<.000001)
R-squared	0.399	0.475	n.r.
Sample size	3342	3342	3342
†Industry wage equation	differentials	estimated	by Krueger and
Summers (1988) in the	May 1984 (IS Current	Population Survey.
Classifications not exactly	comparable acr	oss countries	5.

and

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Table 3. SOEP and CPS Interindustry Wage Structures Compared (1-digit)

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Table 4 F-tests for Homogeneity of Slope Coefficients in Wage Equations

Grouping	SSRU	F:chow(72,3198)
Men v Women	613.8	7.938
Full-time v Part-time	593.7	9.683
Firmsize>20 v <20 employees	692.8	2.033
Tenure≥60months v <60 months	658.0	4.457

.

Total SSR restricted (pooled sample): 724.9758

Hourly wages, employed Germans, n=3342

Table 5. F-tests for Industry Interactions

Hourly wages, preferred controls, German citizens, full sample n=3342 All employees Industry interacted with: F-statistic (8,3239) (MB009) Constant (Industry dummy) 8.0956 (p<.0001) 4.0408 (p<.0001) Sex Full-time 8.4793 (p<.0001) Firmsize>20 2.8051 (p=.0067) Tenure>60 4.8507 (p<.0001) All full time employees (MB010) Industry interacted with: F-statistic (8,2771) Constant (Industry dummy) 4.1039 (p<.0001) Sex 3.6503 (p=.0003) Firmsize>20 3.0873 (p=.0032) Tenure>60 4.8365 (p<.0001) Male full-time employees (MB011) Industry interacted with: F-statistic (8,1911) Constant (Industry dummy) 3.9971 (p<.0001) Firmsize>20 2.1431 (p=.0363) Tenure>60 4.1991 (p<.0001) Male full-time employees, FIRMSIZE>20 (MB012) Industry interacted with: F-statistic (8,1518) Constant (Industry dummy) 3.7626 (p=.0002)Tenure>60 4.1429 (p<.0001) Male full-time employées, FIRMSIZE>20, TENURE<60 (MB014) and with less than 60 months job tenure Industry interacted with: F-statistic (8,396) Constant (Industry dummy) 2.2715 (p=.0220)

Table 6. F-tests for Industry and Job Quality Dummy Variables on Different Subsamples

.

Hourly wages, preferred controls, Germa	an citizens
Sample	F-statistic
All employees n=3342, no interactions Industry dummies Job Quality dummies	F(8,3269)=4.3449 (p<.0001) F(26,3269)=5.7977 (p<.0001)
All employees n=3342, with interaction	s*
Industry dummies	F(8,3239)=8.0956 (p<.0001)
Job Quality dummies	F(26,3239)=5.7173 (p<.0001)
All full-time employees, with interact	ions*
Industry dummies	F(8,2771)=4.1039 (p<.0001)
Job Quality dummies	F(26,2771)=7.1844 (p<.0001)
Male full-time employees, with interac	tions*
Industry dummies	F(8,1911)=3.9971 (p<.0001)
Job Quality dummies	F(26,1911)=5.2794 (p<.0001)
Male full-time employees, FIRMSIZE>20,	with interactions*
Industry dummies	F(8,1518)=3.7626 (p=.0002)
Job Quality dummies	F(26,1518)=4.0130 (p<.0001)
Male full-time employees, FIRMSIZE>20,	TENURE<60
Industry dummies	F(8,396)=2.2715 (p=.0220)
Job Quality dummies	F(26,396)=3.0437 (p<.0001)
All full-time male employees, TENURE<6	0
Industry dummies	F(8,578)=2.0564 (p=.0382)
Job Quality dummies	F(26,578)=4.0496 (p<.0001)
All male employees, TENURE<60 Industry dummies Job Quality dummies	F(8,617)=0.9611 (p=.4655) F(26,617)=3.228 (p<.0001)
All employees, TENURE<60 Industry dummies Job Quality dummies	F(8,1193)=1.1558 (p=.3229) F(26,1193)=3.9861 (p<.0001)

Controls are the same as in previous tables.

*When admissible: industry \times sex, industry \times fulltime, industry \times firmsize>20, firm \times tenure<60.

Table 7.SOEP Interindustry Wage Structure By Employment Tenure,1-Digit industries, preferred Controls, all German employees(standard errors in parentheses)

	Tenu	re
Industry	<60 months	>60 months
Agriculture	-0.18	-0.09
	(0.18)	(0.13)
Mining	0.390	0.034
2	(0.38)	(0.15)
Manufacturing	-0.01	0.060
	(0.06)	(0.04)
Construction	0.051	0.065
	(0 .07)	(0.05)
Wholesale/Retail Trade	-0.12	-0.15
	(0.07)	(0.05)
Transport/Communication	-0.07	-0.01
	(0.09)	(0.05)
Finance/Insurance	-0.02	0.146
	(0.09)	(0.06)
Other Services	-0.06	0.026
	(0.06)	(0.04)
Unweighted std err	0.164	0.090
Adjusted*	0.024	0.037
Weighted std err	0.054	0.071
Adjusted*	n.c.	0.055
F-test for industry		
dummies	1.18	4.730
	p=0.3076	p<.0001
R-squared	0.485	0.445
Sample size	1279	2062

.

Table 8. Mean Tenure (incomplete spells) by Industry (months)

"2-digit"	Sector (number of individuals) ¹⁹	Mean	Std(Mean)
	-1 Unclassified (205)	128.4	7.2
	O Insufficient info (32)	18.8	5.7
	1 Agriculture/Forestry (36)	159.8	26.9
	2 Fishing (2)	59.5	51.5
	3 Energy and Water (34)	156.4	24.7
	4 Mining (10)	176.5	43.9
	5 Chemicals (95)	144.1	12.1
	6 Plastics (34)	134.1	20.0
	7 Stone Clay and Glass (38)	170.1	21.9
	8 Primary Metals (188)	136.3	8.5
	9 Machine tools (213)	141.3	8.8
	10 Machinery, elec/prec (153)	112.8	8.6
	11 Wood, paper, printing (93)	114.3	11.3
	12 Apparel (83)	138.4	14.0
	13 Food, Drink and Tobacco (111)	112.7	9.8
	14 Construction: HAUPT (150)	119.3	9.0
	15 Construction: HILFS (80)	109.5	13.3
	16 Wholesale Trade (85)	98.8	11.1
	17 Brokering (4)	105.5	32.5
	18 Retail Trade (240)	94.7	6.0
	19 Federal Railroad (44)	252.7	18.9
	20 Federal Post (67)	194.0	15.7
	21 Other comm and transport (77)	113.9	12.0
	22 Banking (89)	124.9	10.1
	23 Insurance (44)	118.9	16.2
	24 Eating and drinking (56)	91.8	14.3
	25 Personal Services (21)	54.7	17.5
	26 Building maintenence, garb (15)	113.5	32.4
	27 Education (246)	125.7	6.3
	28 Medical services (164)	100.8	8.4
	29 Legal professions (81)	78.9	9.3
	30 Other services (9)	67.4	27.8
	31 Churches, clubs (102)	79.9	7.2
	32 Private Household (7)	61.4	23.5
	33 Government/Admin (338)	149.3	6.1
	34 Social Insurance (44)	150.6	19.7
	36 incorrect answers (55)	112.8	13.7

Average Tenure, n=3422

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^{123.7}

¹⁹Industry 35 "other nonclassified branch" contained one observation who had worked at the company for 324 months.

Table 9. ChiSquare 2X2 Contingency Tests, Concentration of Tenured Workers by industry

1-digit:

TENURE60 BY	AGR				
	1251	16			
	2054	22	CHISQ:	0.289	(P=.591)
TENURE60 BY	MIN				
	1265	2			
	2068	8	CHISQ;	0.243	(p=.243)
TENURE60 BY	MAN				
	905	362			
	1430	646	CHISQ;	2.422	(p=.120)
TENURE60 BY	CON				
	1166	101			
	1947	129	CHISQ;	3.794	(p=.051)
TENURE60 BY	WRT				
	1118	149			
	1896	180	CHISQ;	8.464	(p=.004)
TENURE60 BY	TPU				
	1208	59			
	1913	163	CHISQ;	12.955	5 (p<.001)
TENURE60 BY	FIR				
	1220	47			
	1990	86	CHISQ;	0.386	(p=.532)
TENURE60 BY	SER				
	854	413			
	1409	667	CHISQ;	0.079	(p=.779)

"2-digit"

-

TENURE60	BY:	CHISQ:	p=
0	Insufficient info	42.819	0.000
1	Agriculture/Forestry	0.219	0.640
2	Fishing	0.124	0.724
3	Energy and Water	0.002	0.968
4	Mining	1.365	0.243
5	Chemicals	0.738	0.390
6	Plastics	0.449	0.503
7	Stone Clay and Glass	1.309	0.253
8	Primary Metals	1.259	0.262
9	Machine tools	2.452	0.117
10	Machinery, elec and prec	1.431	0.232
11	Wood, paper, and printing	0.356	0.551
12	Apparel	1.043	0.307
13	Food, Drink and Tobacco	0.148	0.701
14	Construction: HAUPT	0.294	0.588
15	Construction: HILFS	6.206	0.013

Table 9. ChiSquare 2X2 Contingency Tests, Concentration of Tenured Workers by industry (continued)

16	Wholesale Trade	3.108	0.078
17	Brokering	0.283	0.595
18	Retail Trade	5.538	0.019
19	Federal Railroad	13.34	0.000
20	Federal Post	11.608	0.001
21	Other comm and transp	0.002	0.965
22	Banking	1.611	0.204
23	Insurance	0.528	0.467
24	Eating and drinking	7.375	0.007
25	Personal Services	20.528	0.000
26	Building maintenence, gar	ь 3.127	0.077
27	Education	3.777	0.052
28	Medical services	7.73	0.005
29	Legal professions	6.865	0.009
30	Other services	3.173	0.075
31	Churches, clubs	4.595	0.032
32	Private Household	3.35	0.067
33	Government/Admin	28.477	0.000
34	Social Insurance	1.314	0.252
36	incorrect answers	0.002	0.965
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