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Compensating Wage Differentials, Sorting into Occupations and Job Tasks

by Alexandra Fedorets¹

Preliminary. Do not quote.

March 1, 2016

Abstract

The theory of wage premia for job disamenities exhibits mixed evidence in empirical analysis. In the current study, I employ a rich data set of workplace attributes for 1979-2012 in Germany to show that only those disagreeable workplace characteristics that are related to non-routine cognitive tasks receive a positive payoff. Moreover, sorting in occupations and job tasks explains a substantial part of both positive and negative returns to disamenities. Thus, the mixed evidence on returns to disamenities can be explained by the type of jobs they are related to and by the magnitude by which technological progress has affected these jobs.

JEL-Classification: J24, J28, J31, (J51)

Keywords: Wage Formation, Compensating Wage Differentials, Task-Based Approach, (Trade Unions)

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1 Introduction

The notion of compensating wage differentials was introduced by Adam Smith, who stated that jobs with disamenities must pay higher wages in order to attract workers. The respective theoretical framework of “hedonic wage regression” was developed by [Rosen \(1974\)](#) and is included in most of modern textbooks on labor economics. However, the empirical evidence is mixed with regard to the existence of monetary compensation to disamenities at work. Mainly, the differences in findings are highly dependent on the applied definition of disamenities. For instance, early studies find a compensating payoff to being employed in jobs with high risks of fatal accidents ([Thaler and Rosen, 1976](#)). However, the literature has been inconclusive on the existence of positive payoff to non-fatal accidents and various types of disamenities (for an overview of studies see [Smith, 1979](#); [Bonhomme and Jolivet, 2009](#)).

The theory of compensating wage differentials derives positive relation between disamenities and wages from both individual preferences and firms’ production functions. [Smith \(1979\)](#) rightfully notes that both the individual preferences and the firms’ costs of compensation for disamenities can change over time. However, the empirical evidence on compensating wage differentials over a longer period of time is lacking in literature. In the present paper, I analyze a time span from 1979 to 2012 during which major adoption of computer technology took place. The literature on the recent technological progress convincingly shows that it has changed demand for particular tasks, as well as induced major changes in employment and wage structure. One of the prominent findings of the task-based literature documents growing importance of analytical and interactive tasks that are complementary to computer technology and exhibit high returns to wages. These changes in demand for particular tasks are also likely to induce changes in the returns to disamenities related to different types of jobs.

In the present paper, I argue that the mixed empirical evidence can be explained by the type of occupations where different types of disamenities occur. Using individual-level data for Germany that contains rich information on workplace characteristics, I am able to analyze different types of disamenities as well as occupations and job tasks performed by workers.² I employ the task-based approach to classify disamenities by their correlation with different types of tasks that can be either complemented or substituted by technology. The analysis shows that returns to disamenities are largely driven by sorting into occupations and job tasks.

This paper makes several contributions to the literature. First, I analyze the role of sorting into occupations on the returns to disamenities. Second, I establish the link between different types of disamenities with job tasks that explains the mixed evidence on the returns to disamenities. Thirdly, I deliver evidence on returns to disamenities over more than three decades, which helps to study both the role of technological progress as well as the change of the selection rule into jobs with disamenities.

The paper departs with the replication of the mixed evidence on returns to different types of disamenities, closely following the approach by [Duncan and Holmlund \(1983\)](#). In particular, I define four disamenity indexes: (1) time constraints, (2) hard physical work, (3) dangerous work, (4) stressful work. Out of these four indexes, time constraints and stressful work exhibit growth in the observed period of time from 1979 to 2012. The indexes on dangerous and hard physical work decrease over the same period of time. This finding confirms the hypothesis that machines were especially successful in making workplaces safer, but at the same time the overall level of stressfulness measured by performance and deadline pressure has risen. However, wage

²Future work on this project will include analysis at the industry level to capture the potential effect of the downturn of collective bargaining on wage formation and returns to disamenities.

returns to these four indexes are heterogeneous. For instance, the returns to hard physical work are negative (up to 20 percent wage loss), whereas the returns to stressful work are positive (up to 13 percent higher wage). This mixed evidence, though being in line with literature, states a puzzle on why some types of disamenities do not follow the predictions of the model of hedonic wages. In order to shed light on this puzzle, I employ the task-based approach and compute an individual profile of tasks performed in the jobs for every respondent. Calculation of the partial correlation of tasks with disamenities shows that only the index of stressful work exhibits positive correlation with non-routine cognitive tasks that enjoyed an enormous increase in demand in the course of the technological progress. Moreover, jobs intensive in non-routine cognitive tasks also experienced substantial wage growth in the observed period on time, which also might have had an effect on the returns to disamenities.

Indeed, when looking at the returns to disamenities over time, the positive returns to disamenities related to non-routine cognitive tasks have grown. At the same time, negative returns to other disamenities have also grown in their absolute value over time. In the context of an OLS regression this might result from a change of the causal effect of disamenities on wages, or the change in the selectivity of workers into the jobs with particular disamenities, or both. In order to empirically elucidate this hypothesis, I analyze returns to disamenities both within occupations as well as under consideration of individual task profiles. Selection both into occupations and into job tasks has a substantial impact on the estimates of returns to disamenities. However, the qualitative outcome remains unchanged: different types of disamenities exhibit both positive and negative returns to disamenities.

For a better discussion of the results, I am planning to deliver more detailed evidence on the correlation of disamenities with tasks and wages. First, I am planning to look more carefully into the incidence of disamenities along the wage distribution (following the relation of inequality growth in both monetary and non-monetary job attributes found by [Hamermesh, 1999](#)). Second, the harmonization of the industry codes for the observed period on time would provide the opportunity to control for industry-specific wage returns, but also allow to expand the argument to take account of the dramatic drop in the unionization share observed during the same period of time ([Fitzenberger et al., 2006](#)). Incorporation of unionization might have an additional impact on the estimates as it was shown that unionization is correlated with higher compensating differential ([Brown, 1980](#)). Third, at the level of occupations and industries the data set allows to apply panel estimation. By now, the occupational codes allow to analyze about 70 groups over time, which is insufficient to deliver significant results. With the inclusion of the harmonized industry codes, this problem must be solved.

The paper is structured as follows. In section 2 I describe the Qualification and Career Survey and introduce definitions of disamenities and tasks. Section 3 contains both the replication of the mixed evidence on returns to disamenities, and the incidence of correlation of different disamenities with particular types of jobs. Section 4 concludes.

2 Data

In the analysis I employ the German Qualification and Career Survey that contains detailed information on individual and workplace characteristics including a wide range of information on disamenities and tasks. The data set consists of repeated cross-sections (1979, 1985, 1992, 1998, 2006, 2012) that were launched by the German Federal Institute for Vocational Training (Bundesinstitut für Berufsbildung, BIBB), the Research Institute of the Federal Employment

Service (Institut für Arbeitsmarkt- und Berufsforschung, IAB) and Federal Institute for Occupational Safety and Health (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, BAuA). The data set has been widely used to study employment polarization and occupational mobility induced by technological progress (DiNardo and Pischke, 1996; Spitz-Oener, 2006; Gathmann and Schönberg, 2010; Black and Spitz-Oener, 2010).

The main advantage of this data set is that it contains both task and disamenity information at the level of individuals, together with classification of occupations that is consistent over time. Early studies on compensating wage differentials argue that returns to disamenities observed only at the level of industries cannot be disentangled from industry-specific wage premium (Hamermesh, 1999). Similar criticism of lacking variation between individuals applies to the data on tasks stemming from the Dictionary of Occupational Titles, which is broadly used in the task-related literature.

The analyzed sample is restricted to contain West-German male employees aged 20 to 55 and working in private sector. I also exclude migrant workers since they are not present in some survey years and are likely to exhibit a different pattern of exposure to disamenities and involvement in particular job tasks.

2.1 Definition of Disamenities

In the present paper, I employ differentiated notion of bad working conditions as introduced in Duncan and Holmlund (1983) based on four indexes: (1) Hours constraint, (2) Hard physical work, (3) Dangerous work, and (4) Stressful work. Using the QCS, I construct these indexes based on the following survey questions about the workplace:

1. Hours constraints

- Minimum output requirements: How often does it occur that you have a specified requirement on minimum output or the quantity of units to produce?

2. Hard physical work

- Heavy lifting: How often does it occur that you lift or carry weights of more than 20 kg?

3. Dangerous work

- Exposure to pollution: How often are you exposed to smoke, dust, gases or steams?
- Exposure to noise: How often are you exposed to noise?

4. Stressful work

- Performance pressure: How often are you exposed to substantial deadline or performance pressure?

For each question, I code the answers by 1 if the answer category “often” or “very often” applies.³ Three out of four indexes are based on a single question and are thusly represented by a binary variable. In case of Dangerous work, I compute a simple average based on the two survey questions. The study of Duncan and Holmlund (1983) features same four indexes that are constructed based on one to four survey questions. However, their analysis shows that the correlation between the binary variables entering each index is high, so that only one of the

³Note: Unlike in other survey years in the German data, the answering options in 1992 were dichotomous “yes/no” instead of including 5 categories. Therefore, 1992 is excluded from the analysis.

binary variables is significantly related to wages, when they simultaneously enter the regression specification. Also when employing more information on disamenities available in the QCS,⁴ it can be shown that particular disamenities strongly correlate with each other. For the sake of comparability, I stick with the notation of disamenities as applied in the study of [Duncan and Holmlund \(1983\)](#).

Table 1 contains the unconditional mean shares of workers who reported to be exposed to bad working conditions. The naïve comparison of the means suggests that, over time, only the indexes for being involved in hard physical and dangerous work have decreased. This development suggest that the shares of jobs that are dangerous or physically demanding are indeed shrinking over time. At the same time, the indexes for hours worked and stressful jobs that are not directly related to the production process, do exhibit increasing shares, though non-monotonically.

Table 1: Average disamenity indexes, by year

Disamenity indexes	1979	1985	1992	1998	2006	2012
Hours constraint	0.19	0.28	.	0.33	0.36	0.31
Hard physical work	0.26	0.34	.	0.33	0.23	0.20
Dangerous work	0.31	0.30	.	0.28	0.26	0.22
Stressful work	0.57	0.42	.	0.45	0.63	0.62

2.2 Definition of Job Tasks

The QCS contains large blocks of questions regarding tasks that respondents perform in their jobs. Following the seminal paper of [Autor et al. \(2003\)](#), job tasks can be classified into categories according to their complementarity with computer technology. For the analysis, I divide the tasks into three main categories: routine tasks (R), non-routine cognitive tasks (NRC) and non-routine manual tasks (NRM), that have evolved differently in the course of technological progress. Routine tasks are, by definition, easy to program and, thusly, they are likely to be substituted by machines. Non-routine cognitive tasks are complementary to computer technology and are subject to rising demand due to ongoing technological progress. Non-routine manual tasks exhibit a limited potential to complementarity to or substitutability by machines. Table 2 shows how the items from the QCS questionnaire can be classified in the broad task categories.

Using this categorized task information, an individual share for each task category can be calculated based on [Antonczyk et al. \(2009\)](#):

$$TS_{ijt} = \frac{\text{number of activities in category } j \text{ performed by } i \text{ at time } t}{\text{total number of activities performed by } i \text{ over all categories at time } t}, \quad (1)$$

with $j \in \{\text{non-routine cognitive, routine, non-routine manual}\}$. Note that the resulting shares of tasks sum up to a one by construction.

⁴In all survey years, I am disposing of the additional information on work in standing, exposure to unusual temperatures or humidity. Information on being involved in night and shift work is collected either in one or in two separate questions, distorting their direct comparison over time. In several survey years there is also information on working with oil, fats, dirt, exposure to vibration, harsh or low light conditions, hazardous materials, rays.

Table 2: Classification of task information from QCS into task categories

Task categories	Task information from QCS
Non-routine cognitive (NRC)	Human resources management: recruiting, negotiating, prescribing rules, instructing.
	Research and development: researching, analyzing, evaluating, construction, designing, developing.
	Public relations: marketing, publishing, acquisition, presenting, consultation, lobbying.
	Management and organization: purchasing, sales, coordinating, planning, legal interpretation.
Routine (R)	Education: teaching, training.
	Accounting and controlling: calculating, bookkeeping, archiving, sorting, correction.
	Quality management: measuring, monitoring, quality checks.
	Production: producing, packaging, loading, transporting, sending, operate machines.
Non-routine manual (NRM)	Maintenance: repairing, renovation, servicing machines, restoring.
	Construction: building, installing.
	Hotel and restaurant: serve, accommodating, catering.
	Other Services: cleaning, security, care.

The three task categories have evolved differently in the course of the technological progress (Table 2). In particular, the share of workers involved in routine tasks has dramatically decreased from 48 percent in 1979 to 25 percent in 2012. At the same time, the share of non-routine cognitive tasks has substantially risen from 25 percent to more than 50 percent. The non-routine manual tasks did not exhibit a pronounced trend over the observed period of time. Similar trends in the evolution of tasks are well documented in the literature (Spitz-Oener, 2006).

Table 3: Evolution of average task profiles over time

Year	1979	1985	1992	1998	2006	2012
Routine (R)	0.48	0.42	0.36	0.27	0.27	0.25
Non-routine cognitive (NRC)	0.25	0.29	0.36	0.42	0.51	0.53
Non-routine manual (NRM)	0.27	0.28	0.28	0.31	0.23	0.22

3 Returns to Disamenities

According to the theory of compensating wage differentials, the disamenity indexes should be positively correlated with wages. Thus, I introduce the four disamenity indexes into the wage regression that closely follows the specification by Duncan and Holmlund (1983) and estimates returns to disamenities for each survey wave separately. The estimation results are displayed in table 4.

Table 4: Returns to disamenities 1979-2013 estimated by OLS

Dep. Var: log real hourly wage	1979	1985	1998	2006	2012
Index: Hours constraint	-0.004 (0.010)	-0.004 (0.009)	-0.019* (0.009)	0.006 (0.013)	-0.028 (0.018)
Index: Physically demanding	-0.083*** (0.010)	-0.110*** (0.009)	-0.141*** (0.010)	-0.202*** (0.016)	-0.191*** (0.021)
Index: Dangerous conditions	-0.048*** (0.011)	-0.025* (0.011)	-0.026* (0.012)	-0.018 (0.019)	-0.090*** (0.025)
Index: Stressful work	0.075*** (0.008)	0.098*** (0.008)	0.114*** (0.009)	0.099*** (0.013)	0.130*** (0.017)
Work experience	0.021*** (0.002)	0.029*** (0.001)	0.020*** (0.002)	0.030*** (0.003)	0.030*** (0.004)
Work experience ²	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Married	0.106*** (0.011)	0.101*** (0.010)	0.104*** (0.010)	0.089*** (0.013)	0.093*** (0.017)
Constant	1.860*** (0.027)	1.911*** (0.019)	2.154*** (0.024)	2.178*** (0.040)	2.112*** (0.053)
Observations	5578	7991	6366	3284	2790

The estimation results reveal that, with the exception of hours constraint, the disamenity indexes are significantly correlated with individual wage. The signs of the coefficients are corresponding to the estimates presented in table 1 in [Duncan and Holmlund \(1983\)](#). Thus, compared to workers not exposed to disamenities, having the index of physically demanding work equal to one translates into a loss in hourly wages amounting to 8.3 percent in 1979 to about 20 percent in 2006 and 2012. The index on dangerous working conditions is related to 1.8 to 9.0 percent lower wages. Both these estimates are conflicting with the theoretical predictions of existing positive returns to disamenities. At the same time, the index of stressful work produces 7.5 to 13.0 percent payoff to wages, thus, confirming the theoretical predictions.

Interestingly, though the evidence on the returns to disamenities is mixed, there is a common trend of increasing magnitude of both positive and negative returns to disamenities over time. Given that the OLS estimation delivers the coefficients that contain both the causal effect and the bias, the interpretation of the increase in the magnitude of the coefficients is not straightforward.

3.1 Selection into Occupations

Different types of job disamenities are likely to be attributes of particular occupations. Therefore, as pointed out by [Hamermesh \(1999\)](#), only individual-level data can help to disentangle the returns to disamenities from the returns to other occupational attributes. In the table 5 below, I replicate the estimation of the wage regression including disamenities together with the set of dummies capturing 2-digit occupational codes.

The inclusion of the occupational dummies provides qualitatively similar results, but substantially alters the magnitude of the coefficients (compare table 5 to table 4). The coefficient related to hours constraint remains negligible. The indexes on physically demanding work as well as the index on dangerous conditions remain negative, though the latter index loses its

Table 5: Compensating wage differentials within occupations 1979-2012, estimated by OLS

Dep. Var: log real hourly wage	1979	1985	1998	2006	2012
Index: Hours constraint	-0.003 (0.010)	0.006 (0.008)	-0.008 (0.009)	-0.000 (0.013)	-0.024 (0.017)
Index: Physically demanding	-0.048*** (0.010)	-0.063*** (0.009)	-0.079*** (0.010)	-0.129*** (0.017)	-0.099*** (0.022)
Index: Dangerous conditions	-0.013 (0.012)	-0.007 (0.011)	0.004 (0.013)	-0.000 (0.020)	-0.060* (0.027)
Index: Stressful work	0.051*** (0.008)	0.076*** (0.008)	0.078*** (0.008)	0.073*** (0.013)	0.090*** (0.017)
Work experience	0.021*** (0.002)	0.028*** (0.001)	0.023*** (0.002)	0.032*** (0.003)	0.029*** (0.004)
Work experience ²	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Married	0.091*** (0.011)	0.093*** (0.009)	0.093*** (0.009)	0.082*** (0.013)	0.087*** (0.016)
Constant	1.751*** (0.045)	1.713*** (0.045)	1.927*** (0.054)	1.933*** (0.092)	1.576*** (0.108)
Observations	5578	7991	6366	3284	2790

significance in most survey years. The index of stressful work remains positive and significant. However, as mentioned above, the magnitude of the coefficients diminishes substantially. Thus, physically demanding jobs within occupations are related to 4.8 to 12.9 percent lower wages, which amount to the half of the negative return to this index measured without occupational controls. Stressful work is associated with a wage premium amounting to 5.1 percent in 1979 and 9 percent in 2012. These estimates correspond to about two thirds of the respective coefficients in the specifications without occupational controls.

Based on the comparison of the tables 4 and 5, it becomes apparent that occupational choices play a substantial role in the formation of compensating wage differentials, but are not exclusively decisive. Within occupational groups, compensating wage differentials still exist and, on the whole, exhibit the same pattern of correlation with wages. The similarities in the correlation pattern concern both the sign of respective coefficients and the increase in their magnitude over time.

3.2 Disamenities and Job Tasks

The present analysis embraces the time period of about 30 years, during which the wage structure changed. The task-related literature presents evidence that the observed wage growth substantially varies by tasks. Indeed, the QCS data are able to replicate this results from the literature (figures 1, 2, 3 in appendix A.1). Thus, the highest wage growth in 1979-2012 can be observed in occupations with higher proportion of non-routine cognitive tasks and low proportion of non-routine manual tasks.

During the same period of time, the wage growth was also heterogeneous in disamenity indexes. Figures 4-7 in appendix A.2 show the average wage growth in occupations by the percentiles of occupational mean indexes for hours constraint, hard physical work, dangerous work and stressful work. Strikingly, only the wage growth in the index for hours constraint

does not exhibit a specific pattern (figure 4). Concerning other indexes, the most wage growth was observed in occupations with the highest levels of stress (figure 7) and the lowest levels of danger or hard physical work (figures 6 and 5).

The discussed patterns in wage growth imply that only occupations with specific types of disamenities have benefited in the course of technological progress. Indeed, the classification of occupations by disamenity types and by tasks seem to be closely interrelated. As table 7 shows, all disamenity indexes exhibit strong and persistent correlation with particular types of tasks. For instance, the indexed for hours constraint, physically demanding and dangerous work are negatively correlated with non-routine cognitive tasks and are positively correlated with non-routine manual tasks. The negative correlation between NRC tasks and indexes for physically demanding and dangerous work is not only especially high in magnitude, it also grows over time. The positive correlation between NRM tasks with the two indexes is also particularly strong, though it grows over time only for physically demanding work. The index for stressful work exhibits a strikingly different pattern of correlation with tasks. Its correlation with non-routine cognitive tasks is positive and high in magnitude, whereas its association with both non-routine manual tasks and routine tasks is negative. Bearing in mind that stressful work is the only disamenity index that exhibits positive correlation with wages both across and within occupations (tables 4 and 5), the correlation pattern points to the fact that this might be due to the complementarity between stressful work by technological progress.

3.3 Returns to Disamenities and Selection into Tasks

Since wages in an occupation correlate both with tasks and disamenities, the estimation of compensating wage differentials must be reconsidered to take account for occupational task content. Table 6 displays the re-estimation of compensating wage differentials in the presence of individual task shares. Note that the task shares for each individual sum up to a one, therefore one of the task categories (routine tasks) is excluded from the specification. The left panel of the table displays the specification as in table 4 extended by individual tasks. The right panel additionally controls for 2-digit occupational codes.

The estimation of the correlation of tasks with wages delivers expected results. In both specifications and in all years, non-routine cognitive tasks exhibit strong positive correlation with wages being associated with 10 to 23 percent higher wages (compared to routine tasks as baseline category). Non-routine manual tasks also perform expectedly and exhibit negative correlation with wages, though the magnitude of the coefficients is substantially lower within occupations than on the whole.

Though job tasks exhibit a strong correlation with wages, their inclusion does not qualitatively change the coefficients on disamenity indexes. In particular, physically demanding work remains negatively associated with wages, whereas the index on stressful work shows positive correlation with wages. However, the magnitude of both coefficients in all years goes down.

Results from table 6 imply that within occupations, selection into particular tasks explains about 10 additional percent of the correlation of wages with disamenities. Inclusion of tasks shows that workers with stressful work positively select themselves into tasks, i.e. perform rather those tasks that are correlated with higher wages. On the contrary, workers experiencing physically demanding work are negatively selected into tasks.

Table 6: Returns to disamenities under consideration of task content and occupation

	Additional controls: Tasks					Additional controls Tasks & Occupations				
	1979	1985	1998	2006	2012	1979	1985	1998	2006	2012
Index: Hours constraint	-0.007 (0.010)	0.010 (0.009)	-0.007 (0.009)	0.009 (0.013)	-0.022 (0.017)	-0.005 (0.010)	0.011 (0.008)	-0.005 (0.009)	0.001 (0.013)	-0.024 (0.017)
Index: Physically demanding	-0.066*** (0.009)	-0.079*** (0.009)	-0.108*** (0.010)	-0.152*** (0.016)	-0.127*** (0.022)	-0.043*** (0.010)	-0.054*** (0.009)	-0.074*** (0.010)	-0.114*** (0.017)	-0.082*** (0.022)
Index: Dangerous conditions	-0.016 (0.011)	0.019 (0.011)	0.014 (0.012)	0.024 (0.019)	-0.027 (0.026)	-0.002 (0.011)	0.003 (0.011)	0.009 (0.013)	0.014 (0.020)	-0.036 (0.027)
Index: Stressful work	0.048*** (0.008)	0.066*** (0.008)	0.075*** (0.009)	0.062*** (0.013)	0.084*** (0.017)	0.038*** (0.008)	0.058*** (0.008)	0.062*** (0.009)	0.056*** (0.013)	0.071*** (0.017)
NRC tasks	0.172*** (0.014)	0.234*** (0.014)	0.156*** (0.017)	0.109*** (0.028)	0.164*** (0.035)	0.144*** (0.015)	0.187*** (0.016)	0.131*** (0.020)	0.114*** (0.032)	0.146*** (0.040)
NRM tasks	-0.046*** (0.011)	0.014 (0.012)	-0.112*** (0.018)	-0.284*** (0.035)	-0.297*** (0.044)	-0.011 (0.013)	0.025 (0.015)	-0.051* (0.020)	-0.134*** (0.037)	-0.153*** (0.047)
Work experience	0.020*** (0.002)	0.027*** (0.001)	0.021*** (0.002)	0.030*** (0.003)	0.028*** (0.004)	0.020*** (0.002)	0.027*** (0.001)	0.023*** (0.002)	0.031*** (0.003)	0.027*** (0.003)
Work experience ²	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Married	0.102*** (0.011)	0.100*** (0.009)	0.098*** (0.010)	0.084*** (0.013)	0.092*** (0.016)	0.088*** (0.011)	0.091*** (0.009)	0.088*** (0.009)	0.079*** (0.013)	0.086*** (0.016)
Constant	1.856*** (0.027)	1.863*** (0.020)	2.134*** (0.026)	2.211*** (0.043)	2.137*** (0.057)	1.748*** (0.045)	1.691*** (0.045)	1.919*** (0.055)	1.934*** (0.093)	1.591*** (0.111)
Observations	5578	7991	6366	3284	2790	5578	7991	6366	3284	2790

4 Conclusion

In the present paper, I aim at an explanation of the mixed evidence that is found in the literature on compensating wage differentials. Departing from a mere replication of the results from [Duncan and Holmlund \(1983\)](#), I argue that the sign of the correlation coefficient of a disamenity with wages can be explained by the type of the job this disamenity can be attributed to. For a classification of jobs, I apply a task-based approach and provide evidence that disamenities that are positively correlated with wages and thusly follow the theoretical predictions, also relate to non-routine cognitive jobs. Moreover, selection into tasks as well as selection into occupations can explain about the half of the magnitude of the correlation coefficients between disamenities and wages.

However, the mixed correlation pattern of disamenities with wages remains even after controlling for selection into occupations and tasks. Therefore, further work is planned to shed light on the evolution of returns to disamenities over time. First of all, a closer look at the industry classification is needed. Harmonization of industry classification and its inclusion into the regression specification will help to control for unionization trends. A possible extension of the analysis is then a direct inclusion of the imputed unionization shares based on the Socio-Economic Panel. Secondly, a closer look at the incidence of disamenities over the wage distribution and their evolution over time is planned. Thirdly, combination of occupation and industry cells would allow to apply panel methods.

A Figures

A.1 Average Wage Growth in 1979-2012 in Occupations Ranked by Task Intensity

Figure 1: Average wage growth in occupations in 1979-2012 sorted by the average share of non-routine cognitive tasks in 1979, weighted by occupational shares in 1979

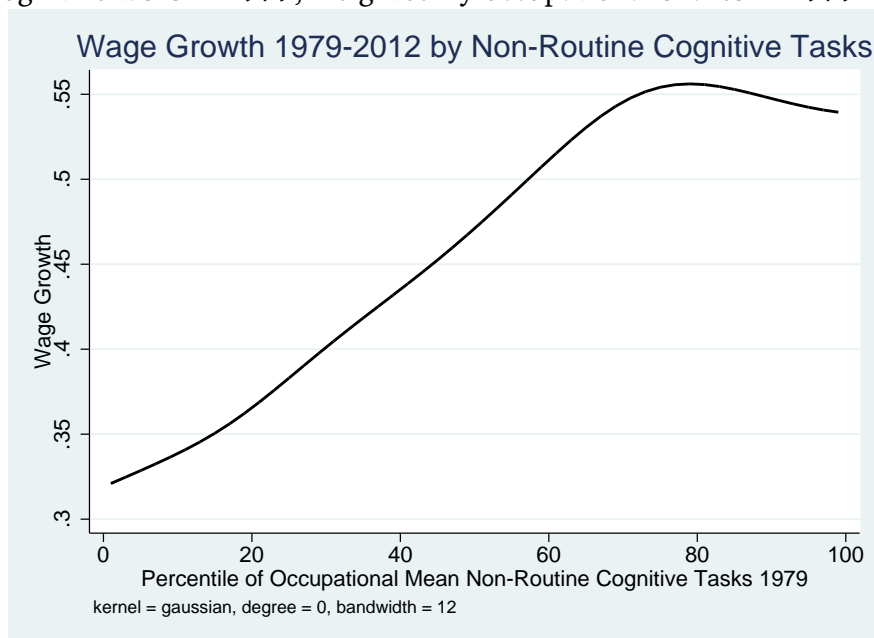


Figure 2: Average wage growth in occupations in 1979-2012 sorted by the average share of non-routine manual tasks in 1979, weighted by occupational shares in 1979

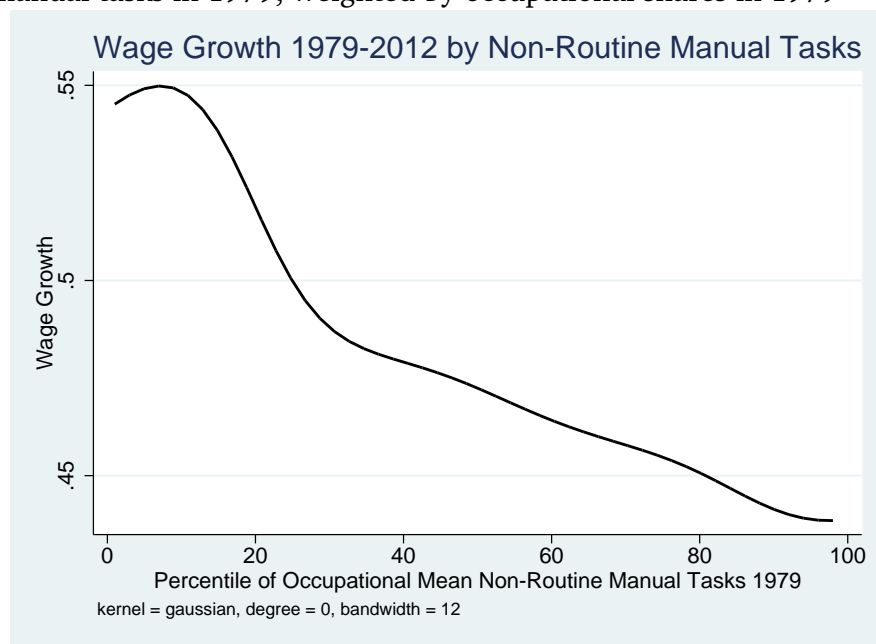


Figure 3: Average wage growth in occupations in 1979-2012 sorted by the average share of routine tasks in 1979, weighted by occupational shares in 1979



A.2 Average Wage Growth in 1979-2012 in Occupations Ranked by Exposure to Disamenities

Figure 4: Average wage growth in occupations in 1979-2012 sorted by the average index in hours constraint in 1979, weighted by occupational shares in 1979



Figure 5: Average wage growth in occupations in 1979-2012 sorted by the average index in hard physical work in 1979, weighted by occupational shares in 1979



Figure 6: Average wage growth in occupations in 1979-2012 sorted by the average index in dangerous work in 1979, weighted by occupational shares in 1979



Figure 7: Average wage growth in occupations in 1979-2012 sorted by the average index in stressful work in 1979, weighted by occupational shares in 1979



B Tables

Table 7: Partial correlation of disamenity indexes with tasks, 1979-2012

R tasks			NRC tasks		NRM tasks		N
Index: Hours constraint							
1979	0.084***	(0.011)	-0.072***	(0.010)	-0.012	(0.011)	8190
1985	0.125***	(0.008)	-0.125***	(0.008)	0.001	(0.008)	9133
1998	0.112***	(0.007)	-0.131***	(0.009)	0.019**	(0.007)	7568
2006	0.071***	(0.008)	-0.096***	(0.011)	0.025**	(0.008)	3776
2012	0.071***	(0.009)	-0.095***	(0.012)	0.024**	(0.009)	3315
Index: Physically demanding							
1979	0.011	(0.012)	-0.146***	(0.009)	0.135***	(0.011)	6217
1985	0.088***	(0.008)	-0.259***	(0.007)	0.171***	(0.008)	9094
1998	0.082***	(0.007)	-0.263***	(0.008)	0.181***	(0.007)	7567
2006	0.076***	(0.009)	-0.276***	(0.012)	0.200***	(0.009)	3776
2012	0.072***	(0.010)	-0.284***	(0.014)	0.213***	(0.010)	3314
Index: Dangerous work							
1979	-0.023*	(0.011)	-0.215***	(0.009)	0.237***	(0.011)	8021
1985	0.104***	(0.009)	-0.307***	(0.009)	0.203***	(0.009)	9075
1998	0.225***	(0.008)	-0.349***	(0.010)	0.125***	(0.009)	7563
2006	0.228***	(0.010)	-0.404***	(0.013)	0.176***	(0.010)	3775
2012	0.226***	(0.012)	-0.402***	(0.015)	0.176***	(0.012)	3314
Index: Stressful work							
1979	-0.051***	(0.009)	0.151***	(0.008)	-0.100***	(0.009)	8190
1985	-0.075***	(0.007)	0.187***	(0.007)	-0.113***	(0.007)	9133
1998	-0.023***	(0.007)	0.179***	(0.008)	-0.156***	(0.007)	7568
2006	-0.092***	(0.008)	0.202***	(0.011)	-0.110***	(0.008)	3776
2012	-0.067***	(0.009)	0.182***	(0.011)	-0.115***	(0.008)	3315

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