

The Effects of Job Evaluation Systems on Wage Effects of Education and Over-education

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ABSTRACT

Unions are held responsible for various wage effects, such as higher wages and wage compression. In this paper we investigate another possible union effect on wages: are the actions of unions responsible for the observed relation between required education and wages? It is well known that wages are related to education, and there is also strong evidence that working in a job requiring a level of education below one's own level has a negative effect on wages. These effects are usually ascribed to productivity differences, but recent research indicates that at least some of these effects may be nonproductivity-related. In this paper we examine the extent to which relative wage levels of recent Dutch labour market entrants, and of workers in jobs requiring their own level compared to a lower level, are influenced by the institutional arrangements specified in collective bargaining agreements. In particular, we look at differences in the pattern of wages of those working under a bargaining agreement without a job evaluation system compared to those working under agreements containing clauses specifying a job evaluation system, the latter being further subdivided into systems excluding and systems allowing wage variability based on individual performance. In line with our expectations, we find that job evaluation systems without flexible components compress wage differences relative to the wages under collective agreements without job evaluation systems. Contrary to our expectations, flexible components in collective agreements do not decompress wage structures. In fact the opposite appears to be true: the wage differences between education levels are smallest for this group. Finally, in line with our expectations, in highly standardized systems (job evaluation systems without flexible components) wage penalties are lowest, and increase for higher educated workers when flexibility is introduced.

THEORETICAL BACKGROUND

The strong relation between education and labour market outcomes is often explained in terms of human capital theory (Becker 1964, Schultz 1963), which claims that people with more years of schooling earn more because the competencies they acquired in education have made them more productive. There is also a growing body of research emphasizing the idea that productivity not only depends on characteristics of workers, but also on the nature of the jobs they perform. A poor fit between the educational level

of a worker and that required in his/her job is seen as an important determinant of the wage differential observed in the labour market between comparable workers (Sicherman 1991, Alba-Ramirez 1993, Cohn and Khan 1995, Kiker *et al.* 1997; Cohn and Ng 2000, Ng 2001, Bauer 2002). Workers in jobs requiring a lower level of education than their own (overeducated workers) are penalised in terms of wages compared to similarly educated workers working in jobs that match their education (adequately educated workers). These findings have usually been justified by means of the assignment theory (Sattinger 1993), which predicts that productivity, and thus wages, depend on the match between actual and required education. The reasoning is that lower level jobs are thought to give workers less opportunity to utilize their competencies than jobs at the appropriate level.

Although wage effects of both workers' education and the educational requirements of their jobs is well established, recent analyses have cast doubt on the extent to which these wage effects can be accounted for by individual productivity. For example, scholars such as Spence (1973) and Arrow (1973) have pointed out that pay is often based directly on formal education as a proxy or signal of expected productivity rather than on actual productivity at the level of individual workers. Further, recent research by Allen and Van der Velden (2001), Green and McIntosh (2002) and Di Prieto and Urwin (2006) did not find empirical support for the assumption of assignment theory that wage penalties associated with over-education are actually due to diminished utilisation of competencies.

To the extent that wage effects of education and over-education are at least linked to expected productivity, the implications for workers may be relatively modest. Signalling effects are usually explained in terms of incomplete information and bounded rationality, and as such should diminish over time as employers accumulate more accurate information on the actual performance of individual workers. However, scholars such as Collins (1979) and Bills (2003) have cast doubt on whether wage effects of education are related to productivity at all, whether at the level of individuals or of groups. Collins asserts that workers engage in political as well as productive labour, and points to the importance of credentials such as formal education as a kind of entry ticket to the most privileged positions. They refer implicitly to institutional effects on wages. The institutional dimension of wage formation has been extensively explored by scholars of industrial relations.

Industrial relations research has found that unions reduce wage inequality within unionized sectors. This effect is attributed to unions' policy to promote standard rates and thereby create greater uniformity within and across firms (Reynolds and Taft 1956, Freeman 1980, 1982, Lemieux 1998). Unions favour standard rates and seniority based progression in order to prevent subjective judgement on the basis of personal characteristics (Freeman 1980, 1982). This compresses wage structure and would favour less skilled workers relative to their more skilled counterparts. Thus, unions' policy to standardize wages disconnects pay from actual productivity. However, the effects found may be due to (self-)selection rather than to policies of unions per se (Kahn 2000, Card *et al.* 2007.): unions jobs are less attractive for highly skilled workers than non-unions jobs, since their higher productivity due to *unobserved* skills (i.e. not measured in terms of educational level) is not rewarded in terms of higher wages. Therefore, highly educated workers with high unobserved skills have more to gain in a competitive non-union labour market, whereas the highly educated workers with low unobserved skills will be more inclined to accept a union job. This selection effect or unobserved heterogeneity-effect may be an alternative explanation for the observed flattening effect in unionized sectors.

Research on the effects of institutional factors simply uses union coverage as a predictor for wage fixation. However, such an indicator can not distinguish flattening effects resulting from explicit union policies from selection. In order to make such a distinction, we need to examine the actual clauses of collective agreements, in particular the different levels of wage rate standardization that are specified. If wage levels are influenced by union policies, we should observe strong differences in wage patterns across these different collective agreement clauses. We expect that a wage compression effect of collective agreement clauses that standardize wage rates (proposition I). When standardization of wages in collective agreements is based on education as an objective indicator for productivity, we expect wage penalties to decrease: equally educated school leavers will be more equally paid (proposition II).

DATA AND METHODS

We examined the relation between institutional arrangements and their effects on wage effects on over-education by comparing the wages of school leavers that are governed by different collective bargaining arrangements. Although the unionization rate is less than 25% in the Netherlands, 82% of employees are covered by a collective bargaining agreement. This high coverage of employees along with a relatively low unionization rate is primarily caused by the extension of collective agreement clauses to all workers in the sector by the Minister of Social Affairs. Collective agreements predominantly determine individual labor contracts and set the minimum wage levels by wage-scales. In traditional collective agreements (that is without a job evaluation system) employees' position in these scales are determined by the job title and years of experience. Job evaluation systems link wages to the tasks and responsibilities of the job. Variable components in these evaluations systems give the opportunity to relate wage levels or wage increases to individual performances. This option has become more common in collective agreements reached in the last two decades (Ministry of Social Affairs and Employment 2006).

For information on the existence and nature of job evaluation systems, we made use of the so-called Ducadam data-set.¹ This data-set contains all collective agreements signed by the largest Dutch labor union FNV, which make up approximately 92% of the population of Dutch collective agreements. This dataset contains a large set of indicators on various aspects of over 5000 collective agreements that were effective between 1995 and 2007. This dataset contained two variables that provide information on the presence of a job evaluation system and whether this system includes an individual variable wage component. Both variables are dichotomized variables. For examining whether collective bargaining agreements fix wages, we matched the Ducadam data-set to the SIS school-leaver data-set of the Research Centre for Education and the Labour Market (ROA). Since the early 1990s, ROA has conducted annual surveys of recent school-leavers at secondary and tertiary education. Since the late 1990s these surveys are representative for the population of school-leavers in the school year prior to the survey. They are strongly focused on the labor market position that school-leavers have attained some 1-2 years after entering the labor market. For this study we make use of data on school-leavers who participated in the survey in the period 1996 through 2007. We selected those school-leavers who were working in an economic sector that was covered by a sector-level collective bargaining agreement as specified in the Ducadam database. To achieve an optimum degree of comparability, we restricted the analyses to those working in jobs requiring precisely one's own level of education and those working in

¹ The DUCADAM data-set made available through the Amsterdam Institute for Advanced Labour Studies.

jobs requiring the level directly below one's own level. Those working in jobs above, or more than one level below, their own level have been excluded. In total some 21,659 school-leavers were retained for analysis, of which 18% had graduated from secondary vocation education (in Dutch: *middelbaar beroepsonderwijs* or MBO), 49% from higher vocational education (in Dutch: *hoger beroepsonderwijs* or HBO), and the remaining 33% from academic universities.

The data from the two data-sets has been linked via the economic sector code and year. In the Ducadam dataset year was identified as the year in which the agreement was reached, while in the SIS data it was the year of the survey. If there was no collective bargaining agreement in a sector in the survey year, the data of the most recent collective bargaining agreement – which was then still in effect – was used. In this way all school-leavers in a given sector are assigned all of the collective bargaining characteristics that applied in their sector in the year of the survey.

For the analyses we use a 3-level hierarchical loglinear regression model in which individual workers are nested within collective bargaining agreement years, which are in turn nested within collective bargaining agreements. The dependent variable is (the natural logarithm of) inflation-corrected hourly wages. Education and over-education are indicated by a series of dummies indicating the combination of worker's level of education and the level of the job in which he/she is working (with the largest category, HBO graduates working at HBO level being the reference category). An additional two dummies indicate respectively the existence of a job evaluation system without and with variable wage clauses, with no job evaluation system being the reference category. To indicate differential effects of education and over-education in sectors governed by the different institutional arrangements, the interactions between the education/over-education dummies and the institutional dummies have been included. Finally, we included four control variables, one at the level of agreement year (the year of the agreement, counting from 1995), and three at the individual level (gender, age and years elapsed since the agreement was reached).

RESULTS

Table 1 shows the results of the multilevel analyses of the effects of different collective agreements clauses on the wages of school leavers. The importance of collective agreement level factors is shown by the results of model 0. This model, which includes no explanatory variables, shows the degree to which collective agreement level factors and agreement year level and individual level factors respectively are responsible for the variance in wages of school leavers. As can be expected, most variance (around two thirds) is accounted for by individual differences between school leavers. Differences at the level of collective agreements account for about 30% of the differences in wages, while the remaining 3% of variance is at the level of agreement years.

Model 1 investigates the relationship between education and job level, by introducing dummies indicating the combination of worker's level of education and the level of the job in which he/she is working. HBO educated workers in HBO-level jobs form the reference group. The parameters of these dummies are highly significant and show a plausible sequence of wage differences: higher educated school leavers working at the appropriate job level earn more their counterparts in lower level jobs, and higher educated school leavers earn higher wages than lower educated. Model 1 also includes four control variables, one at the level of agreement year (the year of the agreement, counting from 1995), and three at the individual level (gender, age and years elapsed since the agreement was reached). The parameters of the control variables in model 2 are all significant ($p < 0.1$). Women earn less than men and older school leavers earn

more than younger ones. In addition, employees covered by a later version of a contract and those started in subsequent years of the same contract earn more, reflecting collective, structural wage increases. The introduction of the education and control variables reduced the variance by around 50%, which improved the model significantly ($p < 0.1$). This reduction results predominantly from a reduction at the collective agreement level.

Table 1 Effect of overeducation by level of collective agreement clauses

PARAMETER	Model 0		Model 1		Model 2		Model 3	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
University educated								
- <i>university-level job</i>			0.145	0.005	0.145	0.005	0.118	0.030
- <i>HBO-level job</i>			0.084	0.009	0.084	0.009	0.026	0.030
HBO educated								
- <i>HBO-level job (ref.)</i>								
- <i>MBO-level job</i>			-0.099	0.006	-0.099	0.006	-0.169	0.018
MBO-educated								
- <i>MBO-level job</i>			-0.289	0.007	-0.289	0.007	-0.393	0.017
- <i>lower secondary-level job</i>			-0.387	0.011	-0.387	0.011	-0.497	0.020
Gender (female)			-0.040	0.005	-0.040	0.005	-0.039	0.005
Age			0.020	0.000	0.020	0.000	0.020	0.000
Agreement year (1995=0)			<u>0.003</u>	0.002	<u>0.003</u>	0.002	0.003	0.002
Years since agreement			0.008	0.002	0.008	0.002	0.008	0.002
Job rating system (ref. no JRS)								
- <i>without flexible wages</i>					0.023	0.021	-0.058	0.024
- <i>with flexible wages</i>					0.005	0.024	-0.036	0.029
Interaction non-flexible job rating system								
X University educated								
- <i>university-level job</i>							0.038	0.030
- <i>HBO-level job</i>							<u>0.073</u>	0.032
X HBO educated								
- <i>MBO-level job</i>							0.081	0.019
X MBO-educated								
- <i>MBO-level job</i>							0.119	0.019
- <i>lower secondary-level job</i>							0.139	0.025
Interaction flexible job rating system								
X University educated								
- <i>university-level job</i>							-0.052	0.035
- <i>HBO-level job</i>							-0.025	0.039
X HBO educated								
- <i>MBO-level job</i>							0.021	0.029
X MBO-educated								
- <i>MBO-level job</i>							0.101	0.026
- <i>lower secondary-level job</i>							0.184	0.058
Constant	2.346	0.029	1.968	0.021	1.956	0.023	2.028	0.025
Variance components								
- bargaining agreement level	0.0485	0.0096	0.0102	0.0023	0.0095	0.0022	0.0090	0.0021
- agreement year level	0.0051	0.0010	0.0021	0.0005	0.0022	0.0005	0.0022	0.0005
- individual level	0.1089	0.0011	0.0716	0.0007	0.0716	0.0007	0.0713	0.0007
Model fit	0.1625	13854.4		4651.9		4650.7		4560.6
Change in model fit				9202.5		1.2		90.1

Underline = significant at 5%; **Bold** = significant at 1%

Model 2 introduces the main effects of job evaluation systems. The parameters of the variables indicating the presence of a job evaluation system are not significant. More interesting are the interactions in model 3 between job evaluation systems on one hand and education and job level on the other. With the exception of university graduates working at their own level, the parameters of the dummies for job evaluation systems without flexible components are all positive and significant and indicate an improvement

in the wage position of workers in the categories mentioned, relative to HBO graduates working in a HBO job. The coefficients are highest for the lower level workers and jobs, suggesting a relative improvement in wage levels for MBO school-leavers, and for those working below their level relative to this working at their own level. However, it is somewhat misleading to focus on only these coefficients, since the main effects of both the education-job level dummies and the job rating system dummies have also changed. We will return to this below. The parameters for the dummies for interaction effects of the flexible wage clauses with education/job level matches are only significant for MBO-school-leavers. Again, the results indicate an improvement in the wage position of these school-leavers relative to their higher-education counterparts, and a decrease in the wage penalty for MBO school leavers working in lower level jobs. But again, it is misleading to look at only these results in isolation from the changed parameters for the main effects. It can be remarked that the model fit has improved significantly with the addition of these interaction effects.

In order to gain a clearer picture of the net effects of job rating systems on wages, we have calculated the estimated wages for each of the education-job level categories under the three different arrangements. Figure 1 shows these estimates in terms of hourly wage in Euro's. It shows that flexible wage components increase wages for the lower level educated, while they reduce wage for the higher educated school leavers. They reduce the effects of education of university level educated school leavers working in HBO level jobs, and increase the effect of education for lower level education (MBO).

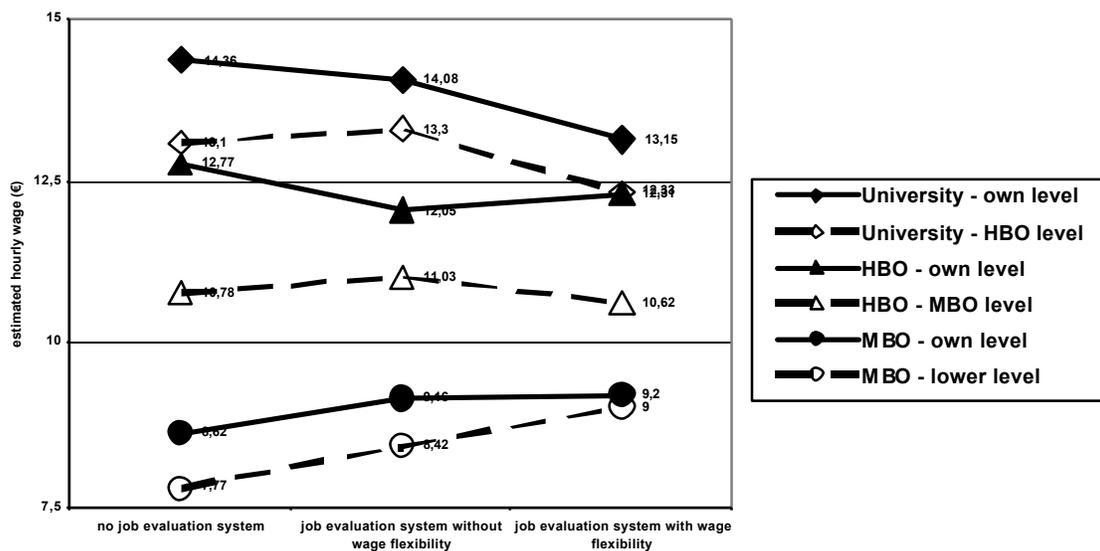


Figure 1: estimated hourly wages by collective agreement clause

Compared to collective bargaining agreements without an explicit job rating system, university and HBO graduates working in jobs requiring their own level of education earn somewhat less per hour when they are subject to a job rating system without wage flexibility. In contrast, the wage position of MBO school-leavers working at their own level improves slightly when such arrangements are in place. The wage position of all three levels of school leavers working below their own level is somewhat better when a non-flexible rating system is in place. The improvement is most pronounced for MBO-school-

leavers, suggesting that these workers also see an improvement compared to their higher educated counterparts. However, because of the opposing effects for university and HBO graduates working at their own level and those working below their own level, the wage penalty for over-education is diminished for these categories.

The tendency to decrease overall wage differences is even more pronounced under job-rating systems with wage flexibility. Especially university graduates – both those working at their own level and those working at HBO level – earn markedly less under such arrangements. In contrast, HBO graduates working at their own level and both categories of MBO school leavers do somewhat better when the job rating system contains clauses allowing wage flexibility (although the HBO graduates still do slightly worse than when there is no job rating system at all). Of those working below their own level, it is again the MBO school-leavers who benefit most from flexibility clauses, to the extent that there is hardly any difference any more between those working at and those working below their own level. In contrast, university and HBO graduates working below their own level are somewhat worse off under more flexible arrangements. In the case of HBO graduates, this increases the difference between those working at and those working below their own level. In the case of university graduates, the difference remains about the same, but interestingly, the difference between university graduates and HBO graduates working in HBO jobs all but disappears.

CONCLUSIONS

In this paper we distinguished two effects of collective agreement clauses on wages. The first effect is the wage compression effect of standardization of wages (proposition I). Collective agreements with job evaluation systems but without flexible components seem to increase the link between education and wages. This suggests that job evaluation systems imply further standardization of wages on the basis of education, as an objective indicator. This further standardization of wages by job evaluation systems indeed compresses wage differences relative to the wages under collective agreements without job evaluation systems, comparable with findings in research on the effect between union and non-union sectors. Although we expected that flexible components in collective agreements would decompress wage structures, the opposite appears to be true: the less flexible systems (no job evaluation systems and job evaluation systems without flexible components) show larger wage differences between University level and MBO educated employees. This particular finding creates a puzzle that calls for further theoretical investigation. Finally, the flattening effect of flexible components on wages appears to be to the advantage of lower educated and to the disadvantage of higher educated school leavers.

The second effect we expected was that institutional rigidity based on education reduces wage penalties of over-education (proposition II). We found that wage penalties of over-education in systems for flexible systems shrink for the lower education MBO school leavers, while they first decrease less for higher educated workers. In fact, in highly standardized systems (job evaluation systems without flexible components) wage penalties are lowest, and increase for higher educated workers when flexibility is introduced. This finding is line with proposition II.

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