Reasons for Wage Rigidity in Germany

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Abstract. This study investigates institutional and economic reasons for downward wage rigidity regarding three occupational skill groups. Based on a survey of 801 firms in Germany and an econometric analysis, we find strong support for explanations based on the effects of labour union contracts and efficiency wages that differ between skill groups. Survey respondents indicate that labour union contracts and implicit contracts are important reasons for wage rigidity for the (less) skilled. Specific human capital and negative signals for new hires are causes of the stickiness of wages for the highly skilled. Compared with US evidence, German firms seem to attach more importance to labour union contracts and specific human capital.

1. Introduction

Despite high unemployment rates and strong competition for jobs among the unemployed, firms in Germany as well as in other industrialized countries rarely tend to cut wages. In recessions, hour's reductions and workers' displacements seem to be more common than wage reductions. As a result, labour markets appear to be rather imperfect. Given the costs of the resulting unemployment, the question arises why societies treat themselves to the luxury of wage rigidity.[1] Hence, as pointed out, for example, by Howitt (2002), explanations for wage stickiness are central to the

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great macroeconomic debates. As a prerequisite for constructing macroeconomic models, an understanding of the forces that prevent labour markets from clearing is essential.

Several studies aim to shed light on the relevance of institutional and theoretical explanations for wage rigidity in firms. For recent comprehensive discussions, see Bewley (1999), Howitt (2002), and Malcomson (1999). A special branch of these studies contributes to the literature by asking firms why they behave the way they do (see Table 1).[2] They indicate that economic theory provides well-founded explanations for wage rigidity, among them are efficiency wage theories, contract theory, implicit contract theory, and fairness theory. Note, however, that sample sizes in most of these surveys are small and firms are not always selected randomly. Furthermore, information concerning the type of labour contracts is rare and the methodology used differs between the studies that makes comparisons of the results difficult if not impossible.

Kaufman (1984) interviewed 26 small firms in Britain, Blinder and Choi (1990) 19 large firms in New Jersey and Eastern Pennsylvania. Campbell and Kamlani (1997) focus on five prominent explanations of wage rigidity (contract theory, implicit contract theory, efficiency wage theories, fair wage theory, and insider–outsider theory) and introduced three skill categories of labour. Their study is based on a survey of 184 mainly large US firms. Agell and Lundborg (1995, 2003) surveyed 159 relatively large unionized firms from the Swedish manufacturing sector in 1991 and again in 1998. In a further study, Agell and Bennmarker (2002) interviewed 885 representatively selected Swedish firms in 1999. Bewley (1995, 1998, 1999) interviewed 335 business and union leaders, counsellors of unemployed persons, and business consultants in the northeast of the USA.

Our study, which is the first survey of firms on wage rigidity for Germany, comes closest to the methodology used by Campbell and Kamlani (1997). We extend their work in different directions. Although the design of our questionnaire deliberately contains the questions, among others, raised by these authors in order to allow a direct comparison, we additionally collect detailed information on the legal type of collective wage agreements and labour contracts of the firms as control variables. Moreover, our findings are based on econometric methods and a larger and randomly selected sample of firms. In our study, the influence of firm-specific factors and labour contracts on the assessment of different explanations of wage rigidity is tested by using ordered probit models (rather than

Table 1. Results of previous surveys

Study	Sample composition	Main results
Kaufman (1984)	The sample consists of 26 British firms in Wales, the West Midlands, and the Greater London area, concentrating on small non-unionized firms. The median firm size is seven employees, and only six firms have more than 50 employees	Firms are asked whether they can find qualified personnel at less than current wages, and if so, what prevents the firm from cutting wages. The most common response to the latter question is that wage reductions would upset workers and that their response would be a reduction in work effort
Blinder and Choi (1990)	19 large firms in New Jersey and Eastern Pennsylvania are interviewed. These firms are selected from *Ward's Business Directory of US Firms*, which lists companies with annual sales of more than $11 million	Strong support is found for theories of wage rigidity, including fairness and labour turnover
Bewley (1995, 1998, 1999)	336 interviews with firms (246), temporary labour services (13), headhunters (15), advisors of the unemployed (26), labour leaders (19), labour lawyers (4) and management consultants (13) in the northwest of the USA. There is much variation between interviews in the topics discussed and in the questions asked of respondents, so most of the study involves anecdotal evidence. The sample is obtained by net working, starting with friends, relatives, and calls to local firms	The most important reason why firms generally do not cut pay during a recession is that they fear a pay cut would adversely affect workers' morale and motivation. Respondents indicate that morale is related more to wage changes and particularly wage decreases than to wage levels

Table 1. Continued

Study	Sample composition	Main results
Agell and Lundborg (1995, 2003)	179 Swedish manufacturing firms are surveyed first in 1991. The survey has been repeated with the same firms in 1998 of which 159 responded; the sample mainly consists of large firms with an overall unionization rate of 92 per cent	Workers' concerns about fairness and relative wages play an important role in explaining why firms do not normally cut wages in recessions. Despite a considerable rise in unemployment from 1991 to 1998, the mechanism generating wage rigidity remains stable in the Swedish manufacturing firms
Campbell and Kamlani (1997)	184 US firms, most of them large firms from the Business Week 1,000 corporations, are surveyed. Median employment size is 3,800, its mean 11,927.1. Three broad categories of labour are introduced: less skilled, blue-collar workers, white-collar workers; 14.7 per cent of the firms are unionized. Some small mid-sized firms are drawn from alumni of Colgate University (where Campbell was a professor at the time of the survey) and from personnel networking	The most important reason for wage rigidity is found for explanations based on adverse selection in quits and on the effect of wages on effort. The latter effect is found to be stronger for low-skilled than for high-skilled workers. Implicit contracts are an important explanation for wage rigidity for less skilled and blue-collar workers, whereas reducing turnover is an important one for white-collar workers
Agell and Bennmarker (2002)	The local unit of 885 representative Swedish firms from four branches (manufacturing, skilled services, unskilled services, and public sector administration) with more than employees, taken from the Business Register of Statistics Sweden, are surveyed in 1999	Wage rigidity is the result of 'exogenous' (primarily labour law and labour union contracts) and 'endogenous' factors (workers' morale and motivation, money illusion, and fairness). These two mechanisms tend to complement each other and are different between small and large firms and between branches

simply by bivariate *t*-tests as in other studies). Finally, we analyse the statistical correlation between different explanations for wage rigidity. This aspect is important, too, for the following reasons. For example, efficiency wage theories and contract theory may by themselves in principle provide a rationale on their own for not cutting wages. But if firms see labour union contracts as an important reason for wage rigidity, efficiency wages may lose part of their explanatory power or, alternatively, they may strengthen each other.

Firms in Germany and other countries under consideration operate in roughly comparable economic environments. Although the economic rationale for wage rigidity may be independent of national legislation, the relevance of each of these explanations may differ. Because German workers enjoy a higher degree of employment protection than, for example, workers in the USA do, and codetermination and collective bargaining are more common in Germany, their bargaining power is supposed to be higher, especially in collective wage bargaining rounds. Differences in legislation may also indirectly influence the relevance of efficiency wage explanations for wage rigidity, because more strict employment protection legislation or a wider application of collective wage agreements might impose more restrictions on firms' wage policies.

The paper is organized as follows. Section 2 describes our and some peculiarities of the structure of wage contracts in the responding firms. Section 3 discusses firm responses with respect to distinct explanations of wage rigidity and compares the results with those found for the USA, among others. Section 4 highlights the firms' support for each of the statements on wage rigidity. Section 5 investigates the issue of pay differentiation in labour union contracts. Section 6 concludes.

2. Overview of the survey and the structure of wage contracts in Germany

Between February and April 2000, 801 firms responded to a standardized written questionnaire that was sent to the head of the human resources department of 5,158 firms. These firms were selected randomly (after stratification) from about 160,000 firms (each with more than nine employees) operating in the following industries: chemical industry; metal industry, electrical goods industry, and machinery; wholesale and retail trade; finance and

insurance; firm-related services; and other sectors. Details of the sample design are relegated to the Appendix.

Table 2 contains descriptive statistics about the sample population and the respective population of all firms. The survey had a response rate of roughly 16 per cent, as well as a high item response rate. Descriptive statistics about the characteristics of all firms have been calculated under the assumption of a random response. It turns out that respondents' support for the reasons for wage rigidity does not differ substantially between the sample population and the respective population of all firms.

To begin with, 38 per cent of the firms apply labour union contracts. These firms employ 70 per cent of sample employees indicating that collective wage agreements rise with firm size, which confirms the findings of Kohaut and Schnabel (2003) based on the 'IAB-Betriebspanel' survey. Each of these firms has either industry- or firm-level bargaining, i.e. they are members of the bargaining employers' association or bargain individually with a union, or, to a lesser extent, they apply labour union contracts on a voluntary basis, in order to avoid costs associated with wage bargaining, for example. Although these numbers document the role of collective wage bargaining in Germany, readers should keep in mind that 62 per cent of the firms, employing 30 per cent of the workers, do not participate in this system. Furthermore, in roughly 50 per cent of the firms with collective wage agreements effective wages are significantly higher than wages collectively bargained (see, for example, Franz, 2003). The presence of collective wage agreements therefore does not necessarily indicate that wage determination at the firm level is absent. In 83 per cent of the responding firms, wages are bargained individually between employers and workers, either as an alternative or in addition to labour union contracts. Both industry-level and individual wage bargaining can be frequently observed in the same firm.

Taken together, there is a stronger emphasis on industry-level wage bargaining in Germany than, for example, in the USA. Although firms with industry-level bargaining are not forced legally to pay their non-union workforce wages as high as negotiated, as a rule, firms do so for obvious reasons (e.g. otherwise the employees would join the union). Around 80 per cent of the firms with labour union contracts responded that their pay schemes do not differ between union and non-union workers (see Table 2).[3] These figures differ remarkably from those in other countries.[4]

Table 2. Descriptive statistics

Variable (type of variables)	Sample mean (per cent)	Population mean[a] (per cent)	Observations[b]
Type of labour union contract (0, 1)			
No labour union contract (reference cat.)	43.0	62.0	797
Membership in the employer association	39.5	22.5	797
Firm-specific labour union contract	4.1	2.1	797
Governmental binding union contract wages[c]	3.9	3.4	797
Reference clause in individual contracts	2.4	1.4	797
Voluntary application	7.0	8.6	797
Only for firms applying a labour union contract			
Are there plants without application? (0 no, 1 yes)	12.3	12.6	454
Are there pay differences between union and non-union members? (0 no, 1 yes)	20.1	20.6	393
Skill composition of workers (in per cent)			
Highly skilled workers	21.9	19.8	683
Skilled workers	60.1	67.4	683
Less skilled workers	18.0	12.8	683
Industrial composition (0, 1)			
Chemical (reference cat.)	12.6	2.3	801
Metal and engine building, electrical industries	29.5	23.4	801
Wholesale and retail trade	15.9	43.2	801
Finance and insurance	11.0	1.6	801
Firm-related services	27.6	25.2	801
Others (construction, etc.)	3.5	4.3	801

Table 2. Continued

Variable (type of variables)	Sample mean (per cent)	Population mean[a] (per cent)	Observations[b]
Number of employees (firm size categories, 0, 1)			
500+ employees (reference cat.)	22.4	3.1	799
200–499	17.3	4.0	799
100–199	16.5	5.9	799
50–99	15.3	11.3	799
20–49	14.0	26.7	799
10–19	14.5	49.0	799
Location of firms' headquarter (0, 1)			
West Germany (reference cat.)	73.1	73.8	789
East Germany	17.2	20.3	789
Outside Germany	9.6	5.9	789
There is a workers' council in the firm (0, 1)			
Workers' council	52.6	18.4	794
Evidence of recruitment problems for highly skilled workers (0, 1)			
No evidence (reference cat.)	58.6	69.7	753
Evidence	23.1	12.0	753
Strong evidence	18.3	18.6	753
Evidence of recruitment problems for skilled workers (0, 1)			
No evidence (reference cat.)	48.1	45.9	772
Evidence	29.9	29.6	772
Strong evidence	22.0	24.5	772

Notes: [a] Mean calculated for the population of firms under the assumption of random response.
[b] Number of valid observations for the variable under consideration.
[c] 'Allgemeinverbindlicherklärung', i.e. all firms in a region and industry have to apply the labour union contracts of that region and industry.

The causes of wage rigidity may be subject to firm heterogeneity, as has been emphasized by Bewley (1999). Hence, the survey tries to capture essential parts of this heterogeneity. The reasons for wage rigidity might differ between firms with and without labour union contracts, as well as with respect to industry affiliation, firm size, skill level of the workforce, regional location of the (headquarter of the) firm, and whether firms have difficulties recruiting new staff, pointing to the labour market situation as an influence on firms' responses.

Three broad skill categories are distinguished — highly skilled, skilled, and less skilled. Less skilled are defined as workers without a formal occupational degree, skilled are workers who have been certified by the German Dual Vocational Training System, and highly skilled are workers who have received a degree from a (technical) university. Our definitions of skill groups differ from the ones used by Campbell and Kamlani (1997) in order to account for the German educational and vocational system. In contrast to the USA, the majority of blue-collar workers in Germany have been educated in the German Dual Vocational Training System, and should be categorized as being skilled. Hence, in the German survey the share of skilled workers with a more specific vocational training is higher than in the USA. The industrial composition between both countries is similar with respect to manufacturing and trade. In the German survey, however, there are more firms belonging to the firm-related service sector and fewer firms belonging to finance, insurance, and construction.

3. Explanations for wage rigidity

3.1 Introduction

Firms were given nine statements based on various theories of wage rigidity.[5] The introductory statement was: 'Even in economically bad times or in times of high unemployment, firms seldom reduce workers' pay, although that may help them survive and save working places. Please assess the following explanations as "not important", "of minor importance", "moderately important", or "very important" '. Respondents were asked to assess the statements for each of the three worker categories separately.

Table 3 reports the frequency distribution of the responses for the nine statements, two values for the average scores — one for the

Table 3. Reasons for wage rigidity in Germany and the USA

Statements	Response category	1: Not important (per cent)	2: Of minor importance (per cent)	3: Moderately important (per cent)	4: Very important (per cent)	Average scores: German population (sample)[a]	Average scores: USA (sample)[b]
a. 'Labour union contracts prevent wages from being cut.'	Highly skilled[c]	29.2	27.4	17.5	25.9	2.40 (2.46)	1.35
	Skilled[d]	13.4	16.0	34.1	36.5	2.94 (3.00)	2.40
	Less skilled[e]	12.8	13.0	17.7	56.6	3.18 (3.30)	2.05
	(sample of firms applying labour union contracts)						
	Highly skilled	27.7	28.6	13.0	30.8	2.47 (2.54)	—
	Skilled	8.7	15.3	34.3	41.7	3.09 (3.09)	—
	Less skilled	8.2	10.2	19.5	62.1	3.36 (3.45)	—
b. 'Workers dislike unpredictable changes in income. Therefore, workers and firms reach an implicit understanding that wages will neither fall in recessions nor rise in expansions.'	Highly skilled	13.6	32.4	31.7	22.2	2.63 (2.42)	2.59
	Skilled	6.8	20.2	47.2	25.9	2.92 (2.71)	2.79
	Less skilled	13.8	16.6	32.0	37.6	2.93 (2.86)	2.60
c. 'If your firm were to cut wages, people in the community would hear about it, making it more difficult to hire workers in the future.'	Highly skilled	5.0	9.0	27.4	58.6	3.40 (3.45)	2.30
	Skilled	6.6	15.4	39.1	38.9	3.10 (3.13)	2.36
	Less skilled	21.5	35.1	19.8	23.7	2.46 (2.38)	2.20

d. 'A cut in wages would decrease workers' effort, resulting in less output or poorer service.'	Highly skilled	8.8	30.6	30.7	29.9	2.82 (2.77)	2.77
	Skilled	5.4	25.5	42.8	26.3	2.90 (2.84)	2.99
	Less skilled	10.4	25.7	34.3	29.6	2.83 (2.70)	2.88
e. 'A cut in wages would increase the number of workers who quit, increasing the cost of hiring and training new workers in the future.'	Highly skilled	5.5	25.8	34.6	34.1	2.97 (3.07)	2.96
	Skilled	4.9	29.6	41.0	24.5	2.85 (2.84)	2.73
	Less skilled	14.7	45.0	21.6	18.7	2.44 (2.32)	2.56
f. 'If your firm were to discharge some of its current workers and to hire new workers at a lower wage, the workers who remain would harass and refuse to cooperate with the newly hired workers.'	Highly skilled	20.4	39.2	25.4	15.1	2.35 (2.28)	1.82
	Skilled	18.0	36.2	28.0	17.8	2.45 (2.40)	2.16
	Less skilled	18.9	35.1	31.5	14.5	2.45 (2.42)	2.05
g. 'If your firm were to cut wages, your most productive workers might leave, whereas if you lay off workers, you can lay off the least productive workers.'	Highly skilled	13.3	27.9	31.5	27.3	2.73 (2.69)	3.27
	Skilled	8.5	28.2	37.6	25.7	2.80 (2.69)	3.13
	Less skilled	11.0	24.4	34.3	30.3	2.84 (2.70)	3.10

Table 3. Continued

Statements	Response category	1: Not important (per cent)	2: Of minor importance (per cent)	3: Moderately important (per cent)	4: Very important (per cent)	Average scores: German population (sample)[a]	Average scores: USA (sample)[b]
h. 'Workers who have been with the firm for a long time have learned how the firm operates and have formed relationships with co-workers and clients. A cut in wages may cause some of your long-time employees to leave, and their replacements would not have this inside knowledge of the firm.'	Highly skilled	3.2	10.9	25.0	61.0	3.44 (3.34)	2.85
	Skilled	4.5	16.0	46.9	32.6	3.08 (2.95)	2.50
	Less skilled	28.8	39.0	17.3	14.9	2.18 (2.04)	2.24
i. 'Independent of the effect of wage cuts on profits, people in management positions would be reluctant to cut wages in order to avoid employees' resentment towards them.'	Highly skilled	7.4	16.7	40.5	35.4	3.04 (2.93)	2.52
	Skilled	5.9	15.5	41.2	37.4	3.10 (2.94)	2.48
	Less skilled	7.4	12.3	45.1	35.2	3.08 (2.86)	2.23

Notes: The number of observations with valid information per skill group and question varies between 744 and 792.

[a] Calculations for the population mean of the score are based on the assumption of random response (in brackets sample means for comparison).

[b] From Campbell and Kamlani (1997; Table 4).

[c] In Campbell and Kamlani (1997), this category is white collar.

[d] In Campbell and Kamlani (1997), this category is blue collar.

[e] In Campbell and Kamlani (1997), this category contains workers performing jobs requiring less than 2 years of college.

sake of comparison the sample and one for the population of firms — and the average scores from Campbell and Kamlani (1997; see Table 4). The number of observations with valid information per skill group and explanation varies between 744 and 792. The responses to statement *a* (labour union contracts) are reported separately for the groups of firms with labour union contracts. In order to allow for comparison, the four responses were converted into numerical scores: 1 (not important), 2 (of minor importance), 3 (moderately important), and 4 (very important). An average score over 2.5 is seen as strong support and an average over 3.0 as very strong support (see Blinder and Choi, 1990). In addition, Table 3 reports the whole frequency distribution of results.

For example, statement *a* (emphasizing labour union contracts as a reason for wage rigidity) received the highest score for less skilled workers. Nevertheless, for some 19 per cent of the surveyed firms applying labour union contracts, negotiated wages were unimportant or of minor importance to the explanation of wage rigidity. The significance of firm characteristics is tested with multivariate ordered probit models. Summary results are reported in Table 5. This methodology may document the relevance of firm characteristics more appropriately than bivariate *t*-tests of scores as found in the study of Campbell and Kamlani (1997), given the numerical conversions of qualitative statements and a possible presence of multicollinearity. The number of observations with valid information per skill group and explanation in these estimations varies between 689 and 726. The following discussion focuses on the German study and differences with results obtained for the USA.

3.2 Discussion

In Germany, as well as in the USA, some reasons for wage rigidity differ between skill groups, others do not. The exchange of pay and labour seems to be far away from the textbook model of one homogenous labour market. Human capital, labour regulation, and heterogeneity influence the wage distribution and wage rigidity.

In Germany, statements *a* (labour union contracts) and *b* (implicit contracts) received (very) strong support for less and medium skilled workers. For 57 per cent of respondents, labour union contracts are very important reasons for wage rigidity for the less skilled. A high degree of employment protection, codetermination in firms, and collective bargaining is quite common in Germany, which strengthens the bargaining power in collective

Table 4. Pay moderation and job security

	Response category	Yes (per cent)	No (per cent)	Not sure (per cent)	Number of valid observations
'Do you think that the workers in your firm would accept more moderate pay to secure their own working place?'	Highly skilled	38.6	23.3	38.1	776
	Skilled	42.3	27.7	30.0	788
	Less skilled	34.4	34.4	31.2	765
'Do you think that the workers in your firm would accept more moderate pay to create additional working places?'	Highly skilled	7.2	67.3	25.4	770
	Skilled	5.8	69.3	24.9	778
	Less skilled	3.6	74.9	21.5	755

Note: Calculations for the firm population (calculations for the sample of firms are available on request).

Table 5. Significant influences on firms' support for each explanation on wage rigidity

	a.			b.			c.			d.			e.			f.			g.			h.			i.		
Statement skill group	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**
Legal background for a labour union contract (reference cat.: no labour union contract)																											
Membership in the employer association	+	+	+						−							−											
Firm-specific contract	+	+	+								−	−	−														
Legally binding	+	+																									
Reference clause																											
Voluntary application																											
Industries (reference cat.: chemical)																											
Metal, electrical industry	+	+	+																	+							
Trade			+																				−				
Finance and insurance	+	+	+							+	+								+	+			−	−			
Firm-related services	+	+	+				+							+						+							
Others (construction, etc.)																							−				
Firm size (reference cat.: 500+)																											
10–19 employees										−			+	+													
20–49		+							−	−									−	−	−						
50–99																											
100–199									−	−																	
200–499										−																	

Table 5. Continued

	a.			b.			c.			d.			e.			f.			g.			h.			i.		
Statement skill group	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**	**H**	**S**	**L**
Location of firms' headquarter (reference cat.: West Germany)																											
East Germany			–									–															
Outside Germany																–	–										
There is a workers' council in the firm (reference cat.: no workers' council)																											
Workers' council									–			–							–	–							
Evidence of recruitment problems for highly skilled (reference cat.: no evidence)																											
Evidence			–	–																	–						
Strong evidence										+	+								+		–						
Evidence of recruitment problems for skilled (reference cat.: no evidence)																											
Evidence								+					+	+						+	+						
Strong evidence				+			+	+	+		+	+	+			+	+			+	+						
Significance[a]	+	+	+	+			+	+	+	+	+	+	+	+	+					+		+	+	+		+	

Notes: +/– indicates a positive/negative coefficient of one variable was different from zero at the 5 per cent level in an ordered probit model; the number of valid observations in these estimations varies between 689 and 726.

[a] The significance of all explanatory variables in the ordered probit model was tested based on a likelihood ratio test, + indicates that all explanatory variables together are significant at the 5 per cent level.

wage bargaining rounds. This is in line with Swedish evidence (Agell and Lundborg, 1995, 2003) and points to the role of collective wage bargaining legislation and the relatively high degree of labour regulation in Germany (see Botero *et al*., 2004).

For highly skilled workers, statements *c* (negative signals), *e* (fluctuation costs), and *h* (specific human capital) received very strong support. There is also strong support for statements *e* (fluctuation costs) and *h* (specific human capital) for skilled workers. Fluctuation costs therefore provide an important explanation for wage rigidity for skilled labour. In large German industrial firms, the costs of training in specific human capital, for example, can represent up to a 1-year salary (Franz and Soskice, 1995). There is more support for the explanation of wage rigidity based on specific human capital in Germany compared with the USA, which points to the higher relevance of specific human capital in the German economy (see Krueger and Kumar, 2004).

Statement *d* emphasizes the effect of wages on effort. In Germany, this statement receives strong support for all skill groups, while the values of the scores are rather similar. Campbell and Kamlani (1997) found a slightly higher support for less skilled and blue-collar workers. The responses to statements *b* on implicit contracts and *e* on the relevance of fluctuation costs are very similar in both surveys. Implicit contracts, wage-related effort variation, and fluctuation costs therefore seem to be lasting reasons for wage rigidity, despite different degrees of centralization in wage determination in both countries.

Major differences concern the effect of wages on quits and new hires. In the USA, statement *g* (adverse selection model applied to quits) received the strongest support for all skill groups. Responses did not differ much between skill groups in the German survey, although average scores are lower. One possible explanation for these differences may be due to employment protection legislation. According to German laws, employers must take social aspects into account when dismissing employees. Therefore, it might be more difficult to dismiss the least productive workers. Firms in the USA can put less emphasis on social aspects.

Further differences seem to exist in the responses to statement *i* (workers' resentments). A possible explanation for the stronger support for statement *i* in Germany rests on codetermination and collective wage bargaining legislation in Germany. Because of these specific workers' rights, the motive for conflict avoidance may be more relevant in Germany. This finding does not contradict the

assumption of profit-maximizing behaviour, but indicates more severe constraints, resulting from labour regulation, on firm behaviour in Germany.

There is also a difference related to statement c that emphasizes the effect of wages on new hires, which finds much stronger support in Germany. One possible explanation is that in Germany, information on wages and the wage structure is more transparent and readily available due to the broader application of labour union contracts. Therefore, German firms might be somewhat more concerned with negative signalling effects stemming from wage cuts, which undermine their attractiveness to skilled workers. Presumably this is reinforced by a compressed wage structure in Germany (see Blau and Kahn, 1999; Fitzenberger, 1999).

The stronger support for statement *f* (harassment) may confirm the view that the insider–outsider theory provides a foundation for collective rather than for individual behaviour (Fehr, 1990). Campbell and Kamlani (1997) also find a much stronger support for statement *f* (harassment) in unionized firms. To shed some more light on the relevance of insider–outsider mechanism in Germany, we asked respondents in our German survey whether workers would agree upon 'pay moderation' either 'for keeping their own job' or 'for creating additional working places'. Respondents were given three categories of responses: yes, no, and not known for certain. Table 4 reports the results. Although, in the opinion of respondents, a majority of workers would comply with lower pay in order to secure their jobs, very few workers would comply in order to create additional employment. However, there is no evidence how workers themselves would view this issue.

To test the relevance of firm characteristics for the responses, ordered probit models for each statement were estimated. Table 5 reports whether a variable has proved to be significantly different from zero at the 5 per cent level in the ordered probit model.[6] In the case of a significant coefficient, Table 5 reports '+' for positive values, and '–' for negative values.

Firm characteristics play a significant role in respondents' support for some but not all statements on wage rigidity, as indicated also by Agell and Lundborg (1995, 2003) and Campbell and Kamlani (1997). Firms joining the bargaining employers' association significantly more often expressed support for statement *a*, which emphasizes the relevance of labour union contracts for wage rigidity. There is no difference between firms that voluntarily apply these contracts and those that do not at all apply (the

reference category). This indicates that the type of labour union contract matters for the explanations of wage rigidity. For firms voluntarily applying collective wage agreements (around 20 per cent of all firms applying collective wage agreements, see Table 2), these contracts are not specific for the explanation of wage rigidity, which seems plausible. So even in the group of firms joining the collective wage system, economic reasons for wage rigidity are important.

Turning to the relevance of efficiency wage considerations, there is twofold evidence. First, the application of labour union contracts negatively affects the support for statements *c* [negative signals for hires; for (less) skilled workers] if the firm joins the employer association. Second, support for statement *d* [effort variation; for (less) skilled workers] and *e* (turnover cost; for highly skilled workers) is obtained only if the firm bargains with the union. These findings seem to indicate that firms that participate in the system of collective wage bargaining as members of the employers' association or with firm-specific contracts have less fear that wage reductions enhance the difficulty of hiring, raise fluctuation costs, or reduce effort. Because lowering wages in labour union contracts would apply to all firms, its specific impact on an individual firm is not that important, therefore.

Those firms that report strong evidence for recruitment difficulties for skilled staff support efficiency wage models with a higher probability, thereby reducing the room for wage cuts for the workers employed. However, this is not true for firms that report recruitment difficulties for highly skilled staff. From our point of view, this surprising result may mirror higher mobility cost for skilled labour compared with highly skilled labour in the German labour market.

There are only a few significant industry, firm size, and regional effects. Smaller firms seem to have more fear that wage reduction induces higher turnover (statement *e*) for (highly) skilled and a higher loss of specific human capital for all skill groups (statement *g*). However, smaller firms have less fear that lower wages reduces effort (statement *d*) for highly skilled. Otherwise there are no clear firm size effects. In addition, the location of the firms' headquarter seems to have only minor impacts for explanations of wage rigidity.

The presence of workers' councils reduces the support for explanations emphasizing the effect of wages on new hires (statement *c*), on effort (statement *d*), and of specific human capital (statement *g*),

mainly for (less) skilled workers. Workers' councils in Germany as a rule represent the group of (less) skilled workers and, therefore, it is not surprising that their impact on explanations for highly skilled labour is small.

In summing up, the following explanations for wage rigidity put forward by economic theory are approved by survey respondents. In both countries, firms see implicit contracts as a potential reason for wage rigidity for less skilled workers, as well as turnover costs and a negative influence of wage reduction on workers' effort for all skill groups. Major differences between firms in Germany and the USA concern insider–outsider behaviour, labour union contracts, and explanations based on specific human capital and adverse selection considerations.

4. The relationship between different statements

Although each of the theories may, in principle, provide a reasonable explanation for wage rigidity, different explanations might be complements or substitutes in practice. Wage rigidity resulting from labour union contracts may be observed even in the absence of such contracts because of the existence of (unobservable) implicit contracts. Various efficiency wage arguments may as a whole provide greater explanatory power than one specific efficiency wage theory alone, compared with insider–outsider considerations, for example. If respondents support two statements, a positive relationship between these responses would indicate (according to our interpretation) that the additional or incremental influence or explanatory power of one of the two statements may, in fact, be small (depending on the magnitude of the correlation). Otherwise, if there is no observable relationship between two statements, each of the two theories behind the statements has its own power in explaining wage rigidity. Finally, a negative relationship indicates that more support for one statement reduces the support for the other, hence, the two theories may not be relevant at the same time.

Although Campbell and Kamlani (1997) asked firms to indicate the most important statement for explaining wage rigidity, our correlation analysis provides an attempt to study the relationship between different explanations. Respondents were asked about their view on nine statements for three worker groups. Taken together, one obtains 351 possible bivariate relations, which are

quantified with Goodman's and Kruskal's γ. This measure of correlation takes account of the ordered nature of the responses. It varies between minus and plus one. For example, a value of 0.7 implies that from 100 firms that express full support for a specific statement, 70 firms do so for another statement, too. For practical purposes and space restrictions, Table 6 reports 27 correlation values between the worker categories for each statement and 108 correlation values between the statements for each worker group.[7]

The following findings deserve attention. First, there is a skill-specific pattern with respect to the reasons for wage rigidity (part 1 of Table 6). The reasons for wage rigidity are very similar between skilled and highly skilled labour for all nine statements, and fairly similar for medium and less skilled labour. Although the correlation between less and highly skilled labour is also significant, the numerical values, with the only exceptions of statement *f* (harassment) and *i* (workers' resentments), are lower.

The following discussion concerns part 2 of Table 6. The five statements emphasizing different versions of efficiency wages (statements *c*, *d*, *e*, *g*, and *h*) are positively correlated for all worker categories, with relatively high numerical values. These findings suggest that the incremental contribution of an additional version of efficiency wages for the explanation of wage rigidity seems to be rather small, although these five statements together receive a very strong support.

Third, there is a positive correlation between labour union contracts (*a*) and implicit contract (*b*) explanations for wage rigidity for all skill groups. This finding suggests that workers' desire for stable wages is met in part by labour union contracts. Fourth, there is mixed evidence on the correlation between labour union contracts and statements based on efficiency wages (*c*, *d*, *e*, *g*, and *h*). This suggests that labour union contracts as well as efficiency wages provide a rationale for wage rigidity on its own. Labour union contracts seem to be no substitute for efficiency wages. The same seems to hold for the relationship between implicit contracts and efficiency wages. Although there are some positive values of a correlation between efficiency wage and implicit contract explanations, the numerical values are rather small. Hence, although each of these three groups of theoretical explanations contributes to the understanding of wage rigidity, the incremental explanatory power of implicit and labour union contracts seems to be lower when both are relevant.

Table 6. Correlation analysis

Part 1: Correlation between the skill groups for each statement (γ)[a]

Statement	L–S	L–H	S–H
a.	**0.65**	**0.33**	**0.88**
b.	**0.75**	**0.23**	**0.81**
c.	**0.72**	**0.25**	**0.85**
d.	**0.72**	**0.38**	**0.93**
e.	**0.72**	**0.37**	**0.88**
f.	**0.83**	**0.60**	**0.93**
g.	**0.79**	**0.56**	**0.96**
h.	**0.70**	**0.24**	**0.91**
i.	**0.88**	**0.74**	**0.96**

Part 2: Correlation between the statements for each skill group (γ)[a]

Less skilled workers (L)

Statement	b.	c.	d.	e.	f.	g.	h.	i.
a.	**0.27**	**–0.04**	**0.15**	**0.10**	**0.08**	**0.19**	**–0.13**	**0.01**
b.	—	**0.12**	**0.23**	**0.16**	**0.13**	**0.06**	**0.19**	**0.13**
c.		—	**0.47**	**0.53**	**0.10**	**0.26**	**0.50**	**0.22**
d.			—	**0.55**	**0.27**	**0.43**	**0.42**	**0.44**
e.				—	**0.20**	**0.29**	**0.48**	**0.20**
f.					—	**0.38**	**0.22**	**0.10**
g.						—	**0.33**	**0.16**
h.							—	**0.24**

Skilled workers (S)

Statement	b.	c.	d.	e.	f.	g.	h.	i.
a.	**0.36**	**–0.04**	**0.04**	**–0.01**	**0.09**	**0.19**	**0.08**	**–0.04**
b.	—	**–0.01**	**0.13**	**0.14**	**0.07**	**0.19**	**0.16**	**0.28**
c.		—	**0.58**	**0.54**	**0.14**	**0.19**	**0.38**	**0.32**
d.			—	**0.59**	**0.17**	**0.34**	**0.60**	**0.36**
e.				—	**–0.01**	**0.39**	**0.56**	**0.31**
f.					—	**0.30**	**0.32**	**0.21**
g.						—	**0.41**	**0.11**
h.							—	**0.37**

Highly skilled workers (H)

Statement	b.	c.	d.	e.	f.	g.	h.	i.
a.	**0.27**	**0.04**	**0.12**	**–0.13**	**0.12**	**0.10**	**–0.04**	**0.04**
b.	—	**0.09**	**0.11**	**0.05**	**0.18**	**0.23**	**0.09**	**0.24**
c.		—	**0.47**	**0.51**	**0.19**	**0.21**	**0.42**	**0.32**
d.			—	**0.51**	**0.18**	**0.33**	**0.45**	**0.24**
e.				—	**0.13**	**0.30**	**0.58**	**0.23**
f.					—	**0.25**	**0.13**	**0.12**
g.						—	**0.36**	**0.16**
h.							—	**0.26**

Note: Calculations for the firm population (calculations for the sample of firms are available on request).
[a] γ is Goodman's and Kruskal's gamma for ordered variables calculated with STATA6.0; bold type values are significantly different from zero at the 5 per cent level.

Fifth, insider–outsider theory (*f*) and conflict avoidance (*i*) as possible explanations of wage rigidity are weakly positively correlated with each other and with the efficiency wage explanations. Therefore, the additional explanatory power of these two theories, given the efficiency explanations, is moderately lower compared with its average and unconditional explanatory power as measured by the average score. To some extent, these findings may confirm the relevance of fluctuation costs, specific human capital, and wage-related effort variation for the bargaining power of insiders and the conflict avoidance strategy of firms.

5. Pay differentials in labour union contracts

From a legal point of view, firms in Germany are free to join the collective wage bargaining system. According to survey respondents, labour union contracts are an important rationale for wage rigidity in Germany. Therefore, the future of the German system of collective wage bargaining will depend on firms choices. We asked firms that apply such contracts whether they are planning to escape from industry-level wage bargaining. Eighty-five per cent of survey respondents denied. From the remaining firms, 39 per cent planned to withdraw membership of the employers' association, 24 per cent aimed at outsourcing parts of the production, and 25 per cent wanted to bargain directly with the union. From these answers, it seems reasonable to conclude that there is some limited pressure on labour union contracts, possibly caused by the wage rigidity induced by negotiated wages.

This pressure may be the reason for the observed trend on negotiating more flexible pay structures in the annual bargaining rounds in recent years. Labour union contracts nowadays more often contain hardship clauses and the possibility for lower pay for new hires and the long-term unemployed. Whether there exist such possibilities for pay differentiation in labour union contracts and, if so, to what extent these firms take advantage of this flexibility is reported in Table 7. It contains the questions and the distribution of answers of respondents on hardship clauses, reduced pay for new hires, and reduced pay for long-term unemployed.

Only 11–15 per cent of the respondents confirm the existence of these flexible pay structures in labour union contracts, which is not that much. Surprisingly, however, the majority of firms that

Table 7. Pay differentiation in labour union contracts (percentages)

i.	*'Does your labour contract contain the possibility of reducing pay in recessions?'*		
	No	Yes	
	87.6	12.4	
		'If so: Did your firm take advantage of this possibility in 1998/99?'	
		No	Yes
		9.9	2.5
ii.	*'Does your labour contract contain the possibility of reducing pay for new hires?'*		
	No	Yes	
	84.5	15.5	
		'If so: Did your firm take advantage of this possibility in 1998/99?'	
		No	Yes
		9.6	5.9
iii.	*'Does your labour contract contain the possibility of reducing pay for hiring long-term unemployed workers?'*		
	No	Yes	
	89.0	11.0	
		'If so: Did your firm take advantage of this possibility in 1998/99?'	
		No	Yes
		9.3	1.7

Note: Calculations for the population of firms (calculations for the sample of firms are available on request).

can take advantage of pay differentiation do not make use of it. There are two possible explanations for that finding. First, at the time the survey was conducted (1999), Germany was not in an economy-wide recession, hence there was presumably no urgent need for applying the hardship clause. Second, differentiated pay with respect to new hires and long-term unemployed may be considered as being unfair by employees (see Agell and Lundborg, 2003; Bewley, 1999; Campbell and Kamlani, 1997).

As a result of our survey, the overwhelming share of firms that did not take advantage of differentiated pay answered that there was no economic necessity to do so, and only a minority feared disadvantages when operating on the labour market (multiple answers were possible). This result holds for hardship clauses as well as for differentiated pay for new hires and/or for the long-term unemployed. Because the number of respondents for these questions is rather small, the results should be taken with some caution. However, they are in line with the adverse selection model as applied to new hires and the relevance of fairness considerations in pay determination.

6. Conclusions

This study contributes to the literature concerning the empirical relevance of prominent explanations for wage rigidity, such as contract theory, implicit contract theory, efficiency wage theories, fair wage theory, and insider–outsider theory. Based on a survey of 801 firms in Germany, our findings rest on a unique set of questions on the type of labour union contracts in German firms and on econometric methods. Among others, the statistical correlation between various explanations for wage rigidity is analysed, because, say, two different explanations may by themselves provide a rationale for not cutting wages on their own, but lose part of their explanatory power when both are relevant.

Furthermore, we compare explanations for wage rigidity between Germany and the USA, two countries with diverse labour market legislations. Because German workers enjoy a higher degree of employment protection than American workers do and codetermination and collective bargaining are quite common in Germany, their bargaining power might be higher, especially in collective wage bargaining rounds. Differences in legislation may also indirectly influence the relevance of efficiency wage explanations for

wage rigidity, because a more strict employment protection legislation or a wider application of labour union contracts might impose more restrictions on firms' wage policies.

German firms strongly support labour union contracts as an explanation for wage rigidity for (less) skilled workers. Specific human capital and negative signals for new hires received strong support for highly skilled employees. Campbell and Kamlani (1997) found the strongest support in the USA for the adverse selection model as applied to quits of highly skilled white-collar workers. This is not the case in our study, which seems to be the consequence of stronger employment protection legislation in Germany. In both countries, firms support implicit contract theory as an explanation for wage rigidity for less skilled workers as well as turnover costs and a negative influence of wage reduction on workers' effort for all skill groups. Compared with the evidence in the USA, insider–outsider behaviour and labour union contracts are more relevant for the explanation of wage rigidity from the viewpoint of German firms, which is probably due to the higher degree of unionization in Germany compared with the USA.

Different causes of wage rigidity are related to each other. There is a positive correlation between labour union contracts and implicit contract explanations for wage rigidity for all skill groups. This finding suggests that workers' desire for stable wages is met in part by labour union contracts. There is also a relatively high correlation between five variants of efficiency wage theories. This finding suggests that the incremental contribution of an additional version of efficiency wages for explaining wage rigidity is rather small, although each of the five variants receives high average scores. Finally, labour union contracts and efficiency wage explanations provide a rationale for wage rigidity on its own. Labour union contracts are no substitute for efficiency wage explanations of wage rigidity, and efficiency wage explanations provide no substitute for implicit contracts.

The German experience seems to more similar to the Swedish one, where unionization is higher than in Germany. Despite the influence of labour market institutions and labour legislation on wage rigidity, however, the economic rationale concerning wage rigidity has its own weight.

Appendix

The present study uses a large firm address database at the Centre for European Economic Research (ZEW), Mannheim Germany. The database is an original data set established by a German credit rating association [Verband der Vereine Creditreform (VVC)], which has been widely used by economists (see, for example, Harhoff *et al.*, 1998). This data set contains information on firm size and industry. In the industries selected for the purpose of the current study, the database contains the addresses of 160,607 firms with more than nine employees in December 1999. The industries chosen represent manufacturing and service industries and firms from the sector of firm-related services. From these addresses, 5,100 were selected randomly on the basis of a two-way stratification scheme by five industries and six firm size categories.

Larger firms and firms in chemistry and finance and insurance were over-sampled to get a reasonable number of responses in these cells. Table A1 documents the number of randomly selected firms in each industry and firm size cell, their share in the population, and the number of respondents. Under the assumption of random response, weight factors had been calculated for inferences about the original firm population.

Notes

[1] See, for example, Bertola (1999) who compares employment, unemployment, and wage dynamics in a number of industrialized countries, including Germany and the USA. On the aggregate level, real wages in Germany have increased considerably in the last 40 years, while employment growth was only moderate. The USA has experienced a significant rise in employment, accompanied by a moderate rise in real wages.

[2] Evidence on the existence of wage rigidity based on pay histories of individual workers is provided, among others, by Altonji and Devereux (2000) and Card and Hyslop (1997) for the USA, Knoppik and Beissinger (2003) and Pfeiffer (2003) for Germany, and Fehr and Götte (2005) for Switzerland.

[3] From a legal point of view, firms with labour union contracts have to apply them only to members of the bargaining union. Only 30 per cent of the workforce population in Germany are a member of a union (Franz, 2003, p. 242).

[4] According to Campbell and Kamlani (1997, footnote 1), 12.3 per cent of workers in the USA are represented by labour unions. In their sample, 14.7 per cent of the firms are unionized. Although union membership declined in Germany (see Franz, 2003, p. 242 ff.) as well as in the USA and Great Britain (see Acemoglu *et al.*, 2001), the application of labour union contracts in Germany is rather stable.

Table A1. Sample selection, stratification, and response

Industry		Firm size					
		10–19	**20–49**	**50–99**	**100–199**	**200–499**	**500+**
Chemistry	1	100	100	100	100	100	100
	2	16.1%	16.7%	28.0%	38.8%	47.0%	54.4%
	3	11	7	11	22	22	28
Metal and engine building, electrical industries	1	200	200	200	200	200	200
	2	3.1%	3.3%	7.2%	11.5%	15.9%	25.5%
	3	22	40	28	44	50	52
Wholesale and retail trade	1	200	200	200	200	200	200
	2	0.8%	1.3%	4.0%	8.7%	16.0%	24.8%
	3	21	16	28	14	19	29
Finance and insurance	1	100	100	100	100	100	100
	2	14.6%	21.2%	54.0%	59.5%	59.2%	55.3%
	3	10	6	8	10	23	29
Firm-related services	1	250	250	250	250	250	250
	2	2.5%	3.9%	10.2%	18.7%	24.9%	38.2%
	3	47	37	42	41	20	34
Others[a]	3	5	6	5	1	4	7

Notes: 1: number of firms randomly selected per cell; 2: per cent of firm population selected per cell; 3: respondents.
[a] Twenty-eight respondents from other industries.

For example: in the finance and insurance industries, only 14 per cent of workers are unionized; however, 70 per cent of the firms apply labour union contracts to almost all relevant workers.

[5] The questionnaire is available on request.

[6] In addition to the firm characteristics reported in Table 5, we tested the influence of the skill structure, profit expectations in 2000 compared with 1998/99, and the share of flexible pay components. However, we could not find any evidence of the relevance of these variables.

[7] The other values deal with the correlation between a statement for skill group A and another statement for skill group B. It is well-known that labour demand between skill groups is not independent from each other, see Hamermesh (1993). Despite its importance for policy reasons, we are, however, not aware of any study that links skill specific explanations of wage rigidity and skill specific labour demand.

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