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Sectoral differences in wage freezes and wage cuts: evidence from a new firm survey

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Abstract:
The paper provides evidence concerning incidence and sources of nominal wage rigidity in services and manufacturing, using a new and large employer survey on wage and price setting behaviour for Germany. We observe that wage freezes are more frequent in services than in manufacturing, whereas wage cuts are less frequent. The significant sector gaps do not vanish after controlling for relevant firm characteristics influencing the incidence of wage freezes and wage cuts, notably coverage by collective agreements and the degree of price competition on the product market. An analysis of firms' view on the reasons preventing wage cuts suggests that specific fear of excess worker turnover could explain distinct wage setting behaviour in services.

Keywords: Nominal Wage Rigidity, Efficiency Wages, Manufacturing and Services, Germany
JEL Classification: J31

Non-technical summary

Downward rigid wages are of major importance in economic policy and are severely discussed in the public. Especially in Germany, where the nominal wage level is above that of its main international competitors, economists often recommend to freeze or lower nominal wages, at least in adverse economic conditions. This study first analyzes how often nominal wages are frozen or cut. Wage cutting appears as a rather rare event. Over a five year time span, only about 16% of firms in manufacturing and 13% of firms in services ever cut their wages. Compared to wage cuts, wage freezes are much more frequent. They occur three times as often as wage cuts in manufacturing, and more than four times as often in services. Taken together, the evidence suggests that German firms have become quite flexible in the last five years to adjust at the wage margin when poor business conditions required it.

Wage freezes are more frequent in services than in manufacturing, whereas wage cuts are less frequent. These significant sector differences do not vanish if one controls for individual firm characteristics influencing the incidence of wage freezes and wage cuts, notably coverage by collective agreements and the degree of price competition on the product market.

Which reasons prevent the firms from cutting their wages? In case of wage cuts, three-fourths of the employers fear the decreasing morale and the poorer effort and/or service of their employees. Additionally, about 60% of firms refer to labour legislation and 40% to collective wage agreements. The key difference between the responses of manufacturing and services appears in the realm of worker turnover. One third of the services firms fear increasing quits and excess worker turnover. This reason could explain fewer wage cuts in services. According to our empirical estimates, this argument is mentioned much more frequently by services firms than by manufacturing firms, even after accounting for the differences in relevant firm characteristics. The sector specific effect probably reflects the fact that actual worker turnover rates in services are much higher – more than twice as high, in our data – than in manufacturing.

The survey includes a wide range of services. Therefore, within the service sector the incidence of nominal rigidity broadly varies. Wage freezes are most frequent in the IT sector where the relevant labour market is generally very flexible, and least frequent in real estate activities. Results for wage cuts are the same, as the latter occur most often in the IT sector and quite rarely in real estate activities.

Nicht-technische Zusammenfassung

Starre Löhne sind häufig Gegenstand der wirtschaftspolitischen Diskussion. Aufgrund des im internationalen Kontext vergleichsweise hohen Lohnniveaus in Deutschland wird dort oft gefordert, die nominalen Löhne sollten nicht weiter steigen oder sogar sinken. In der vorliegenden Studie gehen wir anhand einer neuen Umfrage zum Lohn- und Preissetzungsverhalten deutscher Firmen zunächst der Frage auf den Grund, wie häufig Nominallöhne eingefroren oder gekürzt werden. In den letzten fünf Jahren wurden die nominalen Löhne im Verarbeitenden Gewerbe und im Dienstleistungsgewerbe in 16% bzw. 13% der befragten Unternehmen gekürzt. Wesentlich häufiger wurden die Löhne allerdings eingefroren, und zwar mit 46% dreimal so oft im Verarbeitenden Gewerbe und mit 57% viermal so oft im Dienstleistungssektor. Diese Ergebnisse zeigen, dass die deutschen Unternehmen im Beobachtungszeitraum flexibler geworden sind und ihre Löhne einer schlechten Geschäftslage entsprechend anpasst haben.

Während das Nominallohnniveau also häufiger im Verarbeitenden Gewerbe als im Dienstleistungssektor abgesenkt wird, verhält es sich mit stagnierenden Löhnen genau umgekehrt. Dieser Sektorenunterschied bleibt auch dann bestehen, wenn in Regressionen für individuelle Firmencharakteristika, welche auf die gekürzten und stagnierenden Löhne einwirken, kontrolliert wird, wozu insbesondere der Deckungsgrad der Tariflöhne und der Wettbewerbsgrad der Preise auf dem Gütermarkt gehören.

Welche Gründe halten Firmen davon ab, die Löhne ihrer Mitarbeiter zu kürzen? In den Antworten der Firmen zeigt sich, dass Dreiviertel der Arbeitgeber befürchten, die Stimmung der Belegschaft könne im Falle von Lohneinschnitten sinken und die Mitarbeiter könnten ihr Engagement deutlich einschränken. Auch arbeitsrechtliche Vorschriften (60%) und kollektive Tariflohnverträge (40%) hindern die Unternehmen daran, die Löhne ihrer Mitarbeiter zu kürzen. Der wesentliche Unterschied zwischen Dienstleistern und Industrie liegt allerdings in der befürchteten Personalfluktuation. Ein Drittel der Dienstleister sorgt sich vor einem Weggang der besser qualifizierten Mitarbeiter und damit verbundener höherer Kosten der Einstellung und Einarbeitung neuer Mitarbeiter. Diese Sorge vor übermäßiger Personalfluktuation dürfte ein entscheidender Grund dafür sein, weshalb unter den Dienstleistern seltener Lohnkürzungen beobachtet werden als im Verarbeitenden Gewerbe. Dieser Effekt spiegelt auch die höhere Fluktuation der Arbeitnehmer unter den Dienstleistern wieder.

Die in der Umfrage erfassten Dienstleisterbranchen sind sehr heterogen. Werden die einzelnen Branchen in ihrer Vielfalt genauer analysiert, so ist festzustellen, dass die jeweiligen nominalen Lohnrigiditäten sehr unterschiedlich ausgeprägt sind. Stagnierende Löhne sind beispielsweise auf dem flexiblen Arbeitsmarkt des IT-Sektors wesentlich häufiger anzutreffen als im Grundstücks- und Wohnungswesen. Analog fällt das Ergebnis bei den

Lohnkürzungen aus, die am häufigsten im IT-Sektor und am seltensten im Grundstücks- und Wohnungswesen auftreten.

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Sectoral Differences in Wage Freezes and Wage Cuts: Evidence from a New Firm Survey[1]

1. Introduction

This paper provides insight into the nature of wage rigidity using direct evidence from a new and large employer survey on wage and price setting behaviour for Germany. The core interest is in two dimensions. First, how frequent are wage freezes and wage cuts? Second, why do firms shy away from not raising wages? The paper adds to the literature which has concentrated on the manufacturing sector by focusing on services. In particular, we analyze whether there is less wage rigidity in services than in manufacturing where we expect wages to be less flexible due to a lower labour share and a higher degree of unionization. We also analyze whether the sources of wage rigidity are the same or different in the two sectors.

Downward wage rigidity, or rather the incidence of nominal wage cuts or freezes, is an emerging field of study. There are two strands in the literature. One is micro econometric studies, starting with Kahn (1997), which seek to estimate frequency and size of nominal wage rigidities on the basis of individual wage change data. The evidence from this literature is hard to generalize, due to country and time effects. Empirical estimates for the incidence of downward nominal wage rigidity in Germany are in the range of 2% to 28%.[2] It seems that results depend on the respective micro data base and especially on the methodological approach. For example, estimates by Beissinger and Knoppik (2001) suggest that nominal wage rigidity is quite common in Germany. In contrast, results presented by Bauer et al. (2007) imply that this type of nominal rigidity is rather infrequent, if one allows for a second type of downward wage rigidity, real or contractual rigidity, that may occur in the positive domain of the wage change distribution.

The micro econometric literature provides little evidence on sector-specific wage rigidity. An exception is Bauer et al. (2003) who observe substantial variation of real or contractual rigidity across twelve private sectors in West Germany. According to their estimates, wages are least flexible in societal services and most flexible in construction. For Belgium, Fuss and Wintr (2008) show that wages, employment and hours are less responsive to variations in firm-level productivity in the service sector than in other sectors. In a cross-country study, Messina et al. (2008) estimate sector effects on downward wage rigidity, and confirm that

[1] Corresponding Author: Daniel Radowski, Deutsche Bundesbank, email: daniel.radowski@bundesbank.de. The opinions expressed in this paper do not necessarily represent the views of the Deutsche Bundesbank or its staff. We thank the participants of the Eurosystem Wage Dynamics Network, the Joint Research Workshop at the Österreichische Nationalbank, the Research Seminar of the Deutsche Bundesbank, the Research Seminar of the RWI Essen and the Macro Workshop at The University of Tokyo for their helpful comments and suggestions. The usual disclaimer applies.

[2] Bauer et al. (2007) display 28.4% in 2000 in the private sector (Table 4, p.28), Beissinger and Knoppik (2005) 28% for 1994-2001 (Table 5, p.29), Cornelißen and Huebler (2008) an average of only 2% for 1984-2004 (Table 2, p.218). Bläs (2008) even discovers 59-78% for blue collars and 70-86% for white collars (p.47).

workforce composition and unions' role in wage negotiations are important drivers of downward nominal wage rigidity.

A second strand of the literature is based on firm level survey data. The focus of the survey literature is typically on the relevant sources of wage rigidity, i.e. not cutting wages when the firm would prefer to do so. This line of research started with case studies (Kaufman (1984), Blinder and Choi (1990)). Campbell and Kamlani (1997) focused on five prominent explanations of wage rigidity and introduced three skill groups of labour. The most important explanation according to their study is based on adverse selection in quits and on the effect of wages on effort. The latter effect is stronger for low-skilled than for high-skilled workers. Bewley (1999) carried out free-form interviews with stake holders to find that U.S. employers avoid wage cuts because they expect that they would demoralize workers and reduce workers' effort. A core result by Zoega and Karlsson (2006) is that managers avoid wage reductions in slumps because they fear that the most experienced or productive workers would leave the firm, and that there would be excess quitting. Agell and Bennmarker (2007) explore a random survey of Swedish human resource managers to show that the reasons for wage rigidity differ between larger and smaller establishments, and that there are significant complementarities between efficiency wages and bargaining strength. For Germany, studies by Pfeiffer (2003) and Franz and Pfeiffer (2005, 2006) find evidence for labour union contracts and implicit contracts as important sources of wage rigidity for the medium and less skilled. However, these results are drawn from a rather small survey of firms operating in a few sectors only.

This paper explores German data drawn from a new and comparatively large employer survey. This survey was initiated by the Wage Dynamics Network (WDN), a Eurosystem research network coordinated by the European Central Bank. Experts from 17 European National Banks developed a harmonized employer survey on wage and price setting behaviour, which was carried out independently in each country.

Two papers explore the international dimension of the survey. Babecký et al. (2008) show that European employers rarely cut wages. They make frequent use of other, more flexible components of compensation to adjust labour costs. According to Druant et al. (2008), wages are stickier, i.e. adjust less frequently, in services firms than in manufacturing firms.

This research, which has been undertaken as part of the WDN, focuses on the within country variation using the German part of the survey. It extends the literature by adding comparative information on the incidence and sources of nominal wage rigidity by sector.

The remainder of the paper is structured as follows. Section 2 describes the survey and data set. Section 3 presents the empirical results. Section 4 concludes.

2. Sample and Survey

The survey on wage and price setting was carried out, on behalf of the Deutsche Bundesbank, by the *ifo Institute*, Munich, in November 2007. The questionnaire was sent out in written form to the participants of the monthly ifo business cycle survey in manufacturing and services. The information was normally given by CEOs, controllers and personnel managers. Altogether, about 4,600 German firms were asked to participate, thereof 3,100 from manufacturing and 1,500 from service industries. Firms report for product groups, which in most cases coincide with plants. Most firms are single plant firms. Large plants reply for several product groups separately. In firms with several plants, the largest product group was selected for this special survey. The service sector covered in our sample is quite heterogeneous. It ranges from labour-intensive branches like hotels and restaurants to public-oriented branches like waste disposal.

The overall response rate in the survey was about 39% in manufacturing and 44% in services. Response rates were especially high among those firms that regularly participate in the standard ifo business cycle survey.[3] A disadvantage of the ifo business cycle survey is that sampling is not fully representative but "by purpose" due to historical reasons.[4]

The survey delivers a range of basic firm characteristics like firm size, firm age, location (East or West Germany), export share, labour cost share and worker turnover. The data also contains information on worker structure including employment by level of education, type of contract (permanent or fixed term) and working time (part-time or full-time). Some information on the relevant product market, like intensity of price competition and the price setting mechanism, is included.

Descriptive statistics in Table 1 reveal the expected differences between firms in industries and services. Services sector firms are much smaller and younger. Export shares are significantly higher in manufacturing. Services are usually more labour intensive. The labour cost share is on average about 43% in services, compared to 32% in manufacturing. To some degree, the labour cost gap reflects the markedly higher share of less educated, blue collar workers in manufacturing. Manufacturing firms are broadly covered by collective agreements (43%). In contrast, only 38% of services firms apply collective wage contracts, reflecting a lower degree of unionization.

[3] Quality of responses is in general very good. For the empirical analysis, we only lose 1.6% of the original data due to missing or inconsistent observations.

[4] Germany had no firm register before 1995, so random sampling was impossible. Instead, researchers had to decide deliberately which firm to ask, for example, based on published sales figures. This is called sampling by purpose or purposive sampling. In recent years, the sample has been refreshed carefully to make it more representative.

Table 1: Firm Characteristics

	Manufacturing			Services		
	Obs.	**Mean**	**Std.Dev.**	**Obs.**	**Mean**	**Std.Dev.**
Firm Size (1-19)	108	9.4	-	196	29.7	-
Firm Size (20-49)	248	21.6	-	173	26.2	-
Firm Size (50-199)	448	39.0	-	223	33.7	-
Firm Size (200-5,000)	345	30.0	-	69	10.4	-
Age of Firm (in years)	1,072	52.9	47.2	636	26.6	23.8
East German	1,149	26.8	44.3	661	18.5	38.8
Export Share	1,042	31.6	28.7	565	12.4	25.3
Labour Cost Share	931	32.3	14.4	554	43.2	22.2
Share of Blue Collar Workers	957	64.8	22.8	539	38.6	36.7
Share of Fixed Term Workers	787	7.1	12.2	348	10.5	16.5
Share of Part-Time Workers	926	7.4	7.8	493	11.5	13.1
Labour Shortage	1,142	17.1	37.6	648	25.9	43.9
Worker Turnover Rate	905	12.9	13.5	524	31.3	75.4
Employment Growth	905	0.8	9.1	524	1.2	15.4
Collective Wage Agreement	1,091	43.4	49.6	638	37.6	48.5

Source: Deutsche Bundesbank Wage and Price Setting Survey. Means in percentages. Sample: Altogether 1,810 observations, thereof 1,149 in manufacturing and 661 in services. Individual firms didn't answer every question.

Part-time work and fixed term contracts, facilitating adjustment to shocks, are more frequent in services. At the same time, employers perceive the labour market as tight more often in services (26%) than in manufacturing (17%). Worker turnover rates are much higher in services (31%) than in manufacturing (13%), too. Thus, we would hypothesize that services sector firms are more concerned with hold up problems.

3. Empirical Results

3.1 Incidence of Wage Freezes and Wage Cuts

In this study, we employ the frequency of wage freezes or wage cuts at the firm level as a proxy for wage flexibility. The survey directly asks about the incidence of wage freezes and wage cuts in the past. The specific question reads: "Over the past five years, has the base wage of some employees in your firm ever been frozen (cut) instead of being increased?" By linking the occurrence of wage freezes or wage cuts to the standard of a wage increase, we obtain a clear reference point for our interpretation.[5] Note that this benchmark is different from that common in micro econometric studies analyzing wage change distributions. In these studies zero nominal wage changes are seen as an alternative to (impossible) wage cuts and ergo seen as characteristic for wage *in*flexibility.

[5] This benchmark is peculiar to the German survey and missing in other surveys. It was included as a result of pre-test interviews showing that German firms usually experience and expect nominal wage increases. One would expect that by inclusion of a reference point the number of positive answers to the wage setting questions goes down rather than up.

Due to the five year time span covered, the annual rates of wage freezes and wage cuts will be smaller than the reported rates. Thus we tend to overestimate the amount of wage flexibility. On the other hand, as the survey questions refers to the ”base wage”, defined as the direct remuneration excluding bonuses (regular wage and salary, commissions, piecework payments), we may underestimate the degree to which wage compensation of labour is flexible.

Table 2: Incidence of Wage Freezes and Wage Cuts

	Wage Cuts			Wage Freezes		
	Obs	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Manufacturing	1,127	16.1	36.7	1,117	46.4	49.9
Services	651	13.2	33.9	649	56.7	49.6
thereof:						
Computers & related activities	177	22.6	41.9	177	67.8	46.9
Hotels & restaurants	102	6.9	25.4	101	63.4	48.4
Land transport	75	9.3	29.3	74	55.4	50.0
Real estate activities	68	2.9	17.0	67	34.3	47.8
Supporting transport activities; travel agencies	116	14.7	35.5	117	56.4	49.8
Waste disposal	53	11.3	32.0	53	47.2	50.4
Other business activities	60	11.7	32.4	60	48.3	50.4

Source: Deutsche Bundesbank Wage and Price Setting Survey.

Table 2 provides the descriptive statistics. Wage cutting appears as a rather rare event. Over a five year time span, only about 16% of firms in manufacturing and 13% of firms in services ever cut their wages. Thus the two sectors seem to differ only slightly regarding the incidence of downward adjustment of nominal wages.

Compared to wage cuts, wage freezes, i.e. zero wage changes, are much more frequent. They occur three times as often as wage cuts in manufacturing, and more than four times as often in services. Thus they are more common in services than in manufacturing.

Labour market conditions are quite diverse for the various services covered by our data. For example, restaurants basically face a close to free market where union power is weak. Wages are often bargained at the individual level. Conditions in computer services and related activities are similar. At the other extreme, wages in the highly regulated waste disposal sector are strongly driven by collective wage agreements, implying a less competitive labour market.

Table 2 also displays descriptive results within the service sector. Wage cutting policy differs broadly: While one fifth of all firms in computer services cut their wages over the past five years, only 3% in the real estate activities did. The same sectoral differences emerge regarding wage freezes. Up to 68% of firms in computer services froze their wages, compared to only 34% in real estate activities. Wage freezes are also quite common in hotels and restaurants (63%).

Tests on the equality of unconditional branch means with regard to wage freezes suggest that there is indeed substantial variation within the service sector.[6] In 17 of the 21 pair-wise combinations of branches, differences in means are statistically significant at conventional levels.

The international dimension of the WDN Wage and Price Setting Survey allows comparing these figures to those of 15 other European countries: Austria, Belgium, the Czech Republic, Estonia, France, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal Spain and Slovenia. Somewhat surprisingly, both the rate of wage freezes and wage cuts turns out much higher in Germany. According to our calculations, wage freezes occur with a frequency of only 3% in the EU average, whereas the incidence of wage cuts is about 9%. The reasons for the wide gap between Germany and the other EU countries are difficult to explain. One interpretation would be that the collective wage bargaining system in Germany has indeed become rather flexible. In some branches, for example, nominal wages have not been raised for a longer time period, as a result of collective agreement or holdout. Also opening clauses to keep the wage level constant in firms with economic difficulties have become more popular. A second explanation would be that over the five-year-period in retrospect, countries were captured at different stages of their business cycle. At least, the time frame covers a period of rather weak economic growth in Germany after the turn of the century.

Next, we control for factors that may explain the incidence of wage freezes by estimating binary probit models. For convenience, Table 3 reports marginal effects instead of parameter estimates. We employ four model specifications. Models 1-3 pool all observations from manufacturing and services. Model 1 includes a set of firm characteristics without the sector dimension, model 2 includes a single dummy to control for differences between services and manufacturing sectors, and model 3 includes a full set of individual service sector dummies to capture variation within the sector. Finally, model 4 estimates the same specification as model 1, but on a reduced sample representing the service sector.

[6] Test results are presented in Table A.1 in appendix.

Table 3: Probit Estimates on Incidence of Wage Freezes

	Wage Freezes			
	Full Sample (1)	**Full Sample (2)**	**Full Sample (3)**	**Service Sample (4)**
Firm Size	-0.047***	-0.040**	-0.042***	-0.052**
Age of Firm	0.001	0.001	0.001*	0.002
East German	-0.014	-0.002	0.005	-0.087
Export Share	-0.001**	-0.001	-0.001*	-0.000
Labour Cost Share	0.003***	0.003***	0.003**	0.004***
Collective Agreement	-0.200***	-0.207***	-0.211***	-0.204***
Share Blue Collar Workers	0.020	0.063	0.027	0.164*
Employment Growth Rate	-0.412**	-0.413**	-0.382**	-0.189
Strong Price Competition	0.097***	0.099***	0.089**	0.164***
Labour Shortage	0.036	0.036	0.046	-0.014
Worker Turnover	0.043	0.032	0.044	0.003
Sector Dummies				
Service Sector Dummy	No	0.092*	No	-
Individual Sectors				
Computers & related activities	-	-	0.077	-
Hotels and restaurants	-	-	0.203**	-
Land transport	-	-	0.122	-
Real estate activities	-	-	-0.151	-
Supporting transport activities; travel agencies	-	-	0.167**	-
Waste disposal	-	-	0.026	-
Other business activities	-	-	-0.045	-
Number of Observations	832	832	832	295
Pseudo R2	0.077	0.081	0.091	0.088

Source: Authors' calculations from Deutsche Bundesbank Wage and Price Setting Survey.
Note: *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level. Firm size is the logarithmic level of employees.
The "other" category merges firms active in post and telecommunication, renting of machinery and equipment, labour recruitment and provision of personnel, investigation and security activities, and call centre activities.

As expected, firms that are growing in employment exhibit systematically lower propensities to freeze wages. Assuming that employment growth indicates a favourable business situation for the firm, the necessity to freeze wages becomes smaller. Our econometric approach does not rule out, however, that firms hire more workers because they managed to reduce real labour costs by freezing nominal wages.

The estimation results also suggest that wages freezes are significantly less common in firms covered by an collective agreement. At the mean, the propensity of wage freezes is 20 percentage points smaller in covered firms compared to non-covered firms. One interpretation is that firms cannot or do not systematically use the potential means to circumvent collective

bargaining outcomes normally imposing wage growth, e.g. via opening clauses. A second explanation is that firms requiring wage freezes leave the collective agreement system.

Furthermore, we observe that wage freezes are more prevalent in smaller firms, firms with a higher labour cost share and firms facing strong price competition. Works councils (or trade unions) in large firms may have stronger ability to assert themselves and to fight wage freezes. Labour intensive firms tend to have a higher wage bill and thus incentives to adjust at the labour cost margin are relatively large. Firms in strong competition have more difficulties to adjust at the price margin and therefore may prefer the labour cost margin.

None of our models reveals significant correlation between wage freezes and labour shortages faced by the firm (approximated by the firm's reported difficulties to hire workers) and worker turnover (measured by the total of hiring and separation rates).

We find some weak evidence that in services, a higher share of blue collar workers raises the propensity to freeze wages. One hypothesis to explain this result is that bargaining power of unskilled workers is especially weak in this sector. Although parameters are less precisely estimated on the reduced sample in model 4, overall the estimated parameters on the firm characteristics are consistent with the estimates on the full sample. Thus identification of the parameters generally does not only come from the manufacturing sector data.

Looking at model 2, we find that after controlling for individual firm characteristics, there remains a marked difference between manufacturing and services concerning wage freezes. At the mean, the propensity to freeze wages is 9.2 percentage points higher in services than in manufacturing. This difference is large relative to the unconditional disparity between sectors (compare Table 2). Thus, the observable firm characteristics included in our model do not seem to contribute much to explain the behavioural gap between the two sectors.

The simple sector dummy considered in model 2 may hide relevant differences within the service sector. Model 3 including individual service sector dummies suggests that the services-manufacturing advantage is mostly driven by behaviour in the hotels and restaurants sector, the transport sector (including supporting activities), and to weaker extent also by the IT sector.

We now turn to the incidence of wage cuts. Table 4 summarizes the estimation results for the same four empirical models as above. Altogether, there is little systematic correlation between individual firm characteristics and the propensity of wage cuts. The factors that are significantly correlated with the incidence of wage freezes appear uncorrelated with the incidence of wage cuts, at least at conventional statistical levels.[7] Still the parameters estimated on coverage by collective agreement and employment growth seem to exhibit the

[7] Since wage cuts are a rather rare event, it is difficult to establish significant correlations in our sample.

same sign. The only impact variable that has a marked impact on both wage freezes and wage cuts is price competition. Stronger competition on the product market thus appears as an important key to enhance wage flexibility.

Table 4: Probit Estimates on Incidence of Wage Cuts

	Wage Cuts			
	Full Sample (1)	**Full Sample (2)**	**Full Sample (3)**	**Service Sample (4)**
Firm Size	0.011	0.007	0.004	0.005
Age of Firm	0.000	0.000	0.000	-0.001
East German	-0.062**	-0.068**	-0.056*	0.002
Export Share	-0.000	-0.000	-0.000	0.000
Labour Cost Share	0.000	0.000	-0.000	0.001
Collective Agreement	-0.043	-0.040	-0.025	-0.050
Share Blue Collar Workers	-0.025	-0.057	-0.017	-0.082
Employment Growth Rate	-0.205	-0.203	-0.200	-0.085
Strong Price Competition	0.044*	0.045*	0.046*	0.079*
Labour Shortage	0.048	0.048	0.040	-0.016
Worker Turnover	-0.161*	-0.127	-0.104	-0.079
Sector Dummies				
Service Sector	No	-0.064*	No	-
Individual Sectors				
Computers & related activities	-	-	0.049	-
Hotels and restaurants	-	-	-0.098	-
Land transport	-	-	-0.086	-
Real estate activities	-	-	-0.129**	-
Supporting transport activities; travel agencies	-	-	-0.04	-
Waste disposal	-	-	-0.05	-
Other business activities	-	-	-0.099	-
Number of Observations	837	837	837	295
Pseudo R2	0.032	0.037	0.051	0.069

Source: Authors' calculations from Deutsche Bundesbank Wage and Price Setting Survey.
Note: *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level

Some specific features emerge looking at wage cuts. First, wage cuts have been significantly less common in East Germany in the observation period. Comparing the results of models 1-3 to that of model 4, this regional disparity is attributable to the behaviour in manufacturing. A tentative explanation is that the wage level in East German manufacturing is still below the West German level, and that wages and productivity are still catching up, making the

necessity to cut wages less likely. Second, taking into account that reverse causality might yield parameter estimates with a downward bias, there is some weak evidence that worker turnover rates are negatively correlated with the propensity to cut wages, especially in manufacturing. Firms that experience high worker turnover rates could avoid wage cuts to prevent further quits.

Model 2 shows that at the mean, wage cuts are 6.4 percentage points less frequent in services than in manufacturing. It appears that controlling for firm characteristics renders the services-manufacturing-gap larger – compare the unconditional means in Table 2. Model 3 shows that the gap mostly emerges from fewer wage cuts in the real estate, hotel and restaurants, and transport (except supporting activities) sectors. If we compare the estimates of model 3 for wage cuts, we see that these are the sectors with a stronger propensity of wage freezes.

Looking at the estimated sector differentials for wage cuts and wage freezes combined, one could set up the hypothesis that the higher rate of wage freezes in services is a product of the lower rate of wage cuts. This is indeed the fundamental assumption underlying much of the wage rigidity literature investigating distributions of individual wage changes, quoted in the introduction. The supposition is that firms that could not cut wages resort to the smallest possible wage change instead, i.e. do freeze wages instead of cutting them. However, in our data, we do not find a significant negative correlation between the incidence of past wage cuts and freezes at the firm level.

In any case, our estimates suggest that there is an especial aversion against wage cuts in services compared to manufacturing. Next, we turn to firms' perception of reducing nominal wages, in order to check whether there are sector-specific reasons preventing wage cuts.

3.2 Reasons for Preventing Wage Cuts

In order to learn about firms' attitudes towards wage cuts, we introduced this subject into our questionnaire asking directly:

> *"Even in times of bad economic conditions or high unemployment firms tend to cut their employees' wages rarely - although this could help firms to survive on the market and help to save jobs. Which reasons prevent you from cutting base wages? Please tick the three most important reasons."*

It follows a list of seven reasons for downward wage rigidity. The potential reasons are rooted in the literature. They include the possibility of:

- **Efficiency Wage Considerations**: Firms may not want to cut wages because they fear that employees' morale decreases, in line with the theoretical arguments by Akerlof (1982), Shapiro and Stiglitz (1984), and Bewley (1999).[8]
- **Labour Regulation**: Firms may not have the possibility to cut wages because they are, or at least they think that they are, constrained by labour market legislation.
- **Collective Agreements**: Firms may not be allowed to cut wages because they signed a collective agreement prescribing the wage adjusting and excluding an opening clause to deviate if the firm is in a poor state of business.
- **Loss of Reputation**: Firms may be afraid that cutting wages would damage their reputation as an employer, making it more difficult to hire good workers in the future, an argument put forward by Weiss (1980).
- **Excessive Worker Turnover**: According to Schlicht (1978) and Salop (1979), wage cuts could impose costs on the firm, if it yields an increase in the number of employees who quit, increasing the cost of hiring and training new workers in the future.
- **Implicit Wage Smoothing**: Assuming that workers dislike unpredictable reductions in income, workers and firms could reach an implicit understanding that wages will not fall in recessions and instead increase less in expansions (Azariades (1975), Rosen (1985)).
- **Improved Outside Options for Workers**: Workers may compare their wages to those of similarly qualified workers in other firms in the same market, and move to these firms (Lindbeck and Snower (1988), Agell and Bennmarker (2007)).

The question was posed to all firms. The responses therefore cover firms that have cut wages in the past as well as the vast majority of firms that did not. Table 5 displays the frequencies of the mentioned reasons in percent. They do not add up to unity, as firms were allowed to mention more than one reason.

Table 5: Share of Firms Mentioning a Reason as Relevant for Preventing Wage Cuts

	Manufacturing	Services
Employees' morale decreases	76.7	73.6
Labour regulation	60.8	60.4
Collective agreements	45.0	32.8
Firm looses reputation	23.5	24.1
Worker turnover	18.9	31.6
Implicit wage smoothing	15.7	17.5
Relative wages (outside)	5.9	7.6

Source: Authors' calculations from Deutsche Bundesbank Wage and Price Setting Survey.
Note: 1,054 observations in manufacturing, 594 in services.

[8] We implemented only one version of efficiency wages in our survey, as according to Franz and Pfeiffer (2006), the incremental contribution of additional versions of efficiency wages for the explanation of wage rigidity seems to be rather small.

Altogether the responses by sector are similar. In both manufacturing and services, loss of reputation, implicit wage smoothing and improved outside options arguments are only relevant for a minority of firms. Around three quarter of firms mention the efficiency wage argument against wage freezes as important. This survey thus confirms the high importance of the efficiency wage explanation for preventing wage cuts, as already found by Bewley (1999) for the U.S. and Franz and Pfeiffer (2006) for Germany. According to our data, the argument appears more relevant in firms not following a collective agreement. If one conditions on our standard set of firm characteristics, firms without an agreement, at the margin, mention the efficiency rate argument about 11 percentage points more often.[9] This correlation is probably due to a selection process. Firms that seek flexible wages as a means of incentive pay in general will probably rather avoid collectively agreed pay schemes.

Reverse causality may also drive a significant negative correlation between the difficulty of firms to hire workers and their attitudes toward the efficiency wage argument. Firms that care little about employee morale might be less attractive to workers and thus face shortages in labour supply. The difference between manufacturing and services in the propensity to mention the efficiency wage argument remains statistically insignificant after controlling for the sector-specific firm characteristics, confirming the impression from the raw data.

A clear majority of firms also mentions labour regulation as a reason preventing wage cuts. The result is somewhat surprising. Strictly speaking, there is no general regulation in German labour law inhibiting wage cuts. One interpretation is that firms generally perceive collective agreements as universally binding.[10] This would be an information error, as this is true only in very few sectors, e.g. construction. An alternative interpretation would be that employers mean that individual work contracts do not accommodate the possibility of wage cuts. And even if they do, employers can not cut individual wages without approval from a works council, which exist in most of the larger firms and are typically dominated by trade unions.

A direct influence of trade unions on wage flexibility is via collective agreements. 45% of firms in manufacturing and 33% of firms in services mention collective agreements as a core reason for preventing wage cuts. The sector difference basically reflects the difference in collective agreement coverage between services and manufacturing, see Table 2. From a probit regression that contains our standard firm characteristics, we obtain that at the margin, the fact that a firm is being covered by a collective agreement implies a 60 percentage point higher propensity to mention the collective bargaining argument against wage cuts. We therefore confirm the result stressed by Pfeiffer (2003) that in Germany collective bargaining agreements seriously hinder firms from cutting wages. In fact, after controlling for differential collective bargaining coverage between sectors, the gap between manufacturing and services

[9] The results of this and the next regression are on display in the Appendix in Table A.2.
[10] As firms give more than one reason, we can compute a correlation matrix. In the tendency, firms mention the labour regulation argument and the collective bargaining argument together.

regarding the incidence of the collective bargaining argument becomes statistically insignificant (s. Table A.2).

A key difference between manufacturing and services, however, emerges with regards to the perception of the worker turnover argument. The fear of increasing quits and excess worker turnover is much higher among service sector firms. This fits with the high labour intensity of the service sector, relatively higher general worker turnover, and the perception of a tighter labour market among service sector firms. Considering the higher share of white collar workers in services, the result is also consistent with a finding by Franz and Pfeiffer (2006), namely that negative signals for new hires are a more important cause of wage rigidity for better skilled workers.

A closer look reveals some variation regarding the worker turnover argument within the services sector. It is the least relevant in the waste disposal sector, characterised by little product market competition and a high share of firms in public ownership, where only one in five firms mentions the argument. At the other extreme, one in two firms operating in the IT sector fear increased worker turnover in response to wage cuts. The IT sector in fact turns out to be rather special among services also in other dimensions. As unionization is very low, only very few firms (5%) mention the collective bargaining argument, and also the rate of firms mentioning the labour regulation argument (50%) is lower than in any other services branch covered. On the other hand, the rate of firms mentioning the loss of reputation (29%), outside options for workers (12%) and implicit wage smoothing (20%) arguments is larger than anywhere else in the service sector. These observations are consistent with the IT sector being a very dynamic branch with high worker turnover, shortage of qualified workers and no tradition of collective bargaining or works council institutions.

In Table 6 we focus on the factors potentially driving the worker turnover argument using our four regular empirical models. A number of individual firm characteristics systematically impact on firms' awareness of the worker turnover argument. The empirical findings are generally consistent with our expectations. First, the higher the share of white collar workers, the more relevant is the worker turnover argument. Better qualified workers tend to have more outside options, and the costs of replacing more productive workers associated with hiring and training tend to be higher. Second, firms that grow in employment are markedly more aware of excess worker turnover due to wage cuts. They have an interest in keeping quit rates low to facilitate their growth process. Third, the worker turnover argument is significantly less relevant in East Germany where there are fewer outside options for workers in view of the still high level of unemployment compared to West Germany.

Table 6: Probit Estimates on Worker Turnover Reason for Preventing Wage Cuts

	Worker Turnover			
	Full Sample (1)	**Full Sample (2)**	**Full Sample (3)**	**Service Sample (4)**
Firm Size	0.025*	0.036***	0.033**	0.039
Age of Firm	-0.001*	-0.000	-0.000	0.000
East German	-0.090**	-0.076**	-0.073*	-0.177**
Export Share	-0.000	0.000	0.000	0.003***
Labour Cost Share	0.001	0.000	-0.000	-0.000
Collective Agreement	-0.157***	-0.165***	-0.158***	-0.276***
Share Blue Collar Workers	-0.252***	-0.185***	-0.174***	-0.207**
Employment Growth Rate	0.284*	0.285*	0.296*	0.216
Strong Price Competition	0.001	0.001	0.001	-0.042
Labour Shortage	0.010	0.015	0.013	0.016
Worker Turnover	0.015	0.002	0.000	0.025
Sector Dummies				
Service Sector	No	0.147***	No	-
Individual Sectors				
Computers & related activities	-	-	0.206***	-
Hotels and restaurants	-	-	0.066	-
Land transport	-	-	0.203**	-
Real estate activities	-	-	0.105	-
Supporting transport activities; travel agencies	-	-	0.192***	-
Waste disposal	-	-	0.086	-
Other business activities	-	-	0.211*	-
Observations	792	792	792	280
Pseudo R2	0.095	0.101	0.112	0.148

Source: Authors' calculations from Deutsche Bundesbank Wage and Price Setting Survey.
Note: *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level.

Two other significant impact variables might proxy worker turnover. Larger firms tend to be more aware of the holdup problem associated with wage cuts. The highly significant negative impact of collective agreements in the firm on the incidence of the worker turnover argument may work via two channels. On the one hand, quitting from a unionized firm is less attractive. There is a risk to move to a non-unionized firm with less employment security or lower wages. For example, Lucifora (1998) shows that trade unions reduce the individual firm's labour turnover. On the other hand, unionized firms are a non-random sample of firms. High turnover firms have a certain incentive to leave the collective bargaining system to facilitate adjustment of labour.

Somewhat surprisingly, the rate of worker turnover in the individual firm does not have an independent impact on the relevance of the worker turnover argument. However, as explained

above, the significant impact factors probably already cover much of the variation in quit rates across firms.

The different observed firm specific characteristics do not explain the different prevalence of the excess worker turnover argument in services and manufacturing. The positive and significant sector gap estimated with model 2 (14.7 percentage points) is even slightly larger than the gap in the raw data (12.7 percentage points). As we control for individual firm level worker turnover, the estimated disparity might capture the general difference in worker turnover between sectors (18.4 percentage points, cf. Table 1). This interpretation is supported by the fact that the parameter on the worker turnover variable estimated on the full sample becomes smaller by inclusion of the services sector dummy, compare model 1 to models 2-3. Model 3 shows that the difference between services and manufacturing is mostly driven by the computer and land transport (including supporting activities) services, but also other business activities covering especially labour intensive branches like labour recruitment and provision of personnel, investigation and security activities, and call centre activities.

4. Conclusions

According to the information obtained from a new and relatively large-scale survey covering firms in manufacturing and services, wage freezes appear rather frequently in Germany, especially in comparison to other European countries. Over the past five years, wage freezes instead of wage increases have occurred in about one in two firms. In comparison, wage cuts instead of wage increases are a rather rare event. They have occurred in only about one in seven firms. Taken together, the evidence suggests that German firms have become quite flexible during the last five years to adjust at the wage margin when poor business conditions required it.

Beyond these basic facts, we observe clearly distinct sector behaviour. Wage freezes are more frequent in services than in manufacturing, whereas wage cuts are less frequent. The significant sector differences do not vanish if one controls for individual firm characteristics influencing the incidence of wage freezes and wage cuts, notably coverage by collective agreements and the degree of price competition on the product market.

A reason preventing wage cuts that is especially important in this sector could explain fewer wage cuts in services, namely fear of excess worker turnover. According to our empirical estimates, this argument is mentioned much more frequently by services firms than by manufacturing firms, even after accounting for the differences in relevant firm characteristics. The sector specific effect probably reflects the fact that actual worker turnover rates in services are much higher – more than twice as high, in our data – than in manufacturing. With regard to the core reasons preventing wage cuts, i.e. efficiency wage arguments and institutional constraints, in contrast, we do not find any differences in firms' attitudes between sectors.

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Appendix

A.1 Tests on the Equality of Sample Means

	Hotels and restaurants	Land transport	Supporting transport activities; travel agencies	Real estate activities	Computers & related activities	Other business activities
Hotels and restaurants	--	--	--	--	--	--
Land transport	**2.158**	**--**	**--**	**--**	**--**	**--**
Supporting transport activities; travel agencies	-0.805	**2.958**	--	--	--	--
Real estate activities	**2.819**	-0.753	**3.615**	--	--	--
Computers & related activities	**-4.466**	**6.578**	**-3.668**	**-7.212**	--	--
Other business activities	**3.337**	**-1.192**	**-4.129**	-0.526	**-7.707**	--
Waste disposal	**4.156**	**2.027**	**4.940**	**1.364**	**8.482**	0.839

Note: The table presents t-statistics. Bold font is used where there is significant difference within services.

A.2 Probit Estimates on Collective Agreement and on Efficiency and Morale as Reasons for Preventing Wage Cuts

	Collective Agreement			Efficiency and Morale		
	Full Sample (1)	**Full Sample (2)**	**Full Sample (3)**	**Full Sample (1)**	**Full Sample (2)**	**Full Sample (3)**
Firm Size	0.094***	0.093***	0.099***	0.018	0.015	0.016
Age of Firm	0.00	0.001	0.001	-0.001	-0.001*	-0.001
East German	-0.036	-0.036	-0.053	-0.012	-0.017	-0.020
Export Share	-0.000	-0.000	-0.000	-0.001*	-0.001**	-0.001**
Labour Cost Share	-0.001	-0.001	0.000	-0.001	-0.000	-0.000
Collective Agreement	0.6***	0.601***	0.607***	-0.115***	-0.112***	-0.122***
Share Blue Collar Workers	0.071	0.065	0.101	-0.034	-0.055	-0.067
Employment Growth Rate	-0.294	-0.295	-0.316	-0.078	-0.078	-0.078
Strong Price Competition	0.024	0.023	0.028	-0.007	-0.007	-0.010
Labour Shortage	-0.102*	-0.103*	-0.109**	-0.068*	-0.070*	-0.064
Worker Turnover	0.066	0.069	0.092	0.000	0.005	0.000
Sector Dummies						
Service Sector	No	-0.014	No	No	-0.047	No
Individual Sectors						
Computers & related activities	-	-	-0.023	-	-	-0.094
Hotels and restaurants	-	-	-0.103	-	-	0.081
Land transport	-	-	0.124	-	-	-0.086
Real estate activities	-	-	0.319**	-	-	-0.048
Supporting transport activities; travel agencies	-	-	-0.175**	-	-	-0.068
Waste disposal	-	-	-0.042	-	-	-0.061
Other business activities	-	-	-0.078	-	-	-0.057
Observations	792	792	792	792	792	792
Pseudo R2	0.380	0.380	0.394	0.026	0.028	0.032

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