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Higher wages or lower expectations? Adjustments of German firms in the hiring process

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Articles on labour market issues

Higher wages or lower expectations?

Adjustments of German firms in the hiring process

Hanna Brenzel
Anne Müller

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Adjustments of German firms in the hiring process

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Abstract

Labour shortages are a field of research that has been investigated quite thoroughly. The reactions of firms facing problems during the hiring process are, however, largely neglected in empirical literature. Our research will fill this empirical gap and shed light on the question of whether reactions according to the neoclassical theory or to the Reder Hypothesis are more common in reality.

We make use of a unique dataset, the German Job Vacancy Survey, which allows us to observe the entire operational recruitment process including potential problems, concessions made by firms as well as characteristics of the hired candidate, the vacancy and the firm itself.

Whether concessions are made mainly depends on the labour market situation and on the specific hiring problems of a firm. We also find that firms are rather flexible in their reactions in accordance with the specific hiring problem. Therefore, both theories seem to apply in reality.

Zusammenfassung

Das Thema Arbeitskräfteengpässe wurde bereits umfangreich erforscht, allerdings blieben dabei die Reaktionen von Betrieben mit Schwierigkeiten im Einstellungsprozess weitestgehend unberücksichtigt. Unsere Forschung soll diese Lücke schließen und Aufschluss darüber geben ob auf dem deutschen Arbeitsmarkt eher die neoklassische Theorie oder aber die Reder-Hypothese Anwendung findet.

Für unsere Analysen greifen wir auf die IAB-Stellenerhebung zurück. Dieser Datensatz ermöglicht es den gesamten Rekrutierungsprozess zu beobachten, einschließlich der Probleme die dabei auftreten können, mögliche Zugeständnisse seitens der Unternehmen als auch personen-, stellen- und firmenspezifische Charakteristika.

Ob Zugeständnisse gemacht werden hängt vor allem von der Arbeitsmarktlage und den spezifischen Einstellungsproblemen eines Unternehmens ab. Die Ergebnisse zeigen auch, dass die Unternehmen entsprechend den spezifischen Einstellungsproblemen flexibel reagieren. Daraus lässt sich ableiten dass beide Theorien Anwendung auf dem deutschen Arbeitsmarkt finden.

JEL classification: J33, J01, D22

Keywords: Hiring process, vacancy, wage and qualification adjustments, establishment survey

1 Introduction

After the financial crises in the late 2000s and the following economic boom in Germany, research fields such as labour shortages and related labour market adjustments and their corresponding determinants and consequences have spurred a strong interest in Germany. One driving force can be seen in the increased labour demand and the fact that the number of vacancies has almost returned to pre-crisis levels. Moreover, the looming demographic change and its impact on the labour market is heating up the labour shortages debate. Despite the fact that the effects of the demographic change are not discernible yet all over the German labour market, they stir up fear amongst the population, the firms and politics. So, there is a risk of facing labour shortages and in particular skill shortages in the near future. We can already observe a sharp increase in the number of firms facing problems during the hiring process. In 2013, the share of these firms compared to all firms with at least one new hire reached over 33 per cent, which implies an increase of about 10 percentage points during the last seven years.¹

These developments have led a number of researchers to investigate both the determinants and the consequences of difficulties during the hiring process and in particular of the alleged skill shortages. Nevertheless, empirical studies largely neglected the firms' responses. There are, however, different theories on how firms can react when they face difficulties in hiring new employees. We focus on two of them: the neoclassical approach – firms pay higher wages – and the Reder Hypothesis – firms lower their demands regarding skills. This paper 1) tries to fill the research gap that exists when it comes to firms' reactions and 2) sheds light on the question which theory is more supported by the empirical results. We make use of a unique dataset, the German Job Vacancy Survey, which allows us to examine whether firms make concessions while hiring new employees. We control for difficulties within the hiring process, the firms' characteristics as well as attributes of the respective vacancy and the applicants' characteristics. Our aim in this article is not to explain the alleged skill shortages or to restrict the problems during the hiring process to skill shortages only. In fact, analyzing what determines concessions in general as well as the type of concession is the main contribution of this paper.

The main challenge will be to expose the determinants which may affect the firms' reactions or to detect that there are no specific characteristics which determine the different concessions firms make.

The paper is organized as follows: Initially, a brief overview of the underlying theory and the related literature is given. From these, a series of hypotheses will be derived and embedded in the theoretical framework of the investigation. Subsequently, the data used will be presented and discussed. The fourth part analyses the results of the binary and the multinomial logit model. The paper closes with a conclusion.

¹ See Appendix Figure 1.

2 Theoretical background and related literature

Our work is essentially based on the well-known traditional neoclassical theory and an extension of this theory, the so called “Reder Hypothesis”. The neoclassical theory implies the existence of a perfect labour market with the inherent characteristic of balancing supply and demand: if the labour demand exceeds the labour supply, wages will increase until a new labour market equilibrium is reached and demand and supply of labour are balanced again. So the adjustment of wages can be seen as an equalization mechanism in order to balance the differences between supply and demand. The Reder Theory is an extension of this theory and opens up an alternative way to handle the discrepancies of the labour market. The idea behind this approach is that firms not only adjust wages and take qualification and skills for granted, but also use qualification and skills as an equalization mechanism.

Established in 1955, the hypothesis states that in times of high-skilled workers shortage firms try to fill their vacancies by promoting medium-ability workers (Ludsteck and Haupt 2007). That means employers tend to reduce their pre-established minimum requirements in order to find new employees. Thus, wage bargaining power of the higher skilled will be reduced. But this mechanism only operates if every vacancy on the labour market can be filled with a worker. Ludsteck and Haupt (2007) and Büttner et al. (2010) review the Reder Hypothesis empirically for Germany. The authors conclude that lower quantiles of the wage distribution respond more sensitively to labour demand changes than the upper part of the wage distribution. Büttner et al. (2010) reach the same conclusion: the occupational wage composition is, as the Reder Hypothesis assumes, pro-cyclical. In times of recessions, the skill level of new hires rises significantly within the occupational structure and decreases in times of upturns. However, the effect is much lower in small firms than in large firms.

As mentioned in the introduction, there are a number of studies which deal with related issues but rarely with the operational responses that can be observed when a vacancy was difficult to fill. The following sections outline thematically related literature. Nevertheless, these findings can only provide clues about determinants that may be influential since they focus on difficulties in the search and hiring process and on the duration of the search but not on operational reactions. Furthermore, the literature stock differs vastly in its research design.

One stock of literature deals with the determinants of an expected labour shortage (Haskel and Martin 1993; Green et al. 1998; Haskel and Martin 2001; Watson et al. 2006). Building on that, others analyse influencing factors on the search duration and recruitment problems associated with resulting adjustment mechanisms (Brencic 2009; Stevens 2007; Andrews et al. 2008; Baldwin et al. 1995; Gorter and Van Ommeren 1999). Baldwin et al. (1995), for example, used descriptive analysis and found out that recruitment problems mainly occur due to a lack of suitable applicants, but other problems such as wages and working conditions also play a central role.

Watson's et al. (2006) conclusion implies that the firms' size is a significant determinant in skills shortages perception: the larger the firm the greater the expectation to face hiring problems. One reason can be seen in the context of more foresighted human resources planning of larger firms compared to smaller ones. Furthermore, Watson et al. (2006) concludes that growing firms have a higher skill shortage perception. Haskel and Martin (2001) distinguish between skill shortages, hard-to-fill vacancies, and hiring difficulties. They reason that firms operating in the high-tech sector complain about a skills shortage in particular, whereas firms which use microelectronics in word processing announce problems or difficulties in the process of hiring. Arrow et al. (1959) analysed the set of problems in terms of required skilled labour from a differentiated perspective. In doing so, they developed a model which explains the dynamics of the market adjustment process in order to analyse the scientist-engineer "shortage" in the US in the 1950s. Their research is based on the neoclassical theory approach which leads them to the conclusion that the interaction between the rising demand of engineers and the lagging adjustment concerning the wages might be a feasible explanation for what happened at that time. Wieling and Borghans (2001) refer to the neoclassical approach, too, and argue that the discrepancies between supply and demand in segments of the labour market can occasionally be balanced by wage adjustments, but also adjustments via flexible working hours and lower qualification requirements can be witnessed. The paper by Fang (2009) is of great importance for our study. He examines the responses of Canadian firms to difficulties during the hiring process by using linear probability models and probit models. He concludes that employers rather tend to consider short-term and less costly solutions. However, he finds no evidence for wage increases or voluntary fringe benefits. The actual reactions which may be used by companies with staffing problems remain unclear in almost all studies.

Based on this overview we can state that labour shortages and their reception are caused by various factors. If they occur, different reactions are imaginable: for example professional training programs, adoption of flexible working hours, increase in overtime hours, implementation of self-directed work groups, adjustments in the requirements for qualification or work experience, and as the neoclassical approach suggests, wage concessions (Fang 2009).

In this paper we concentrate on two of these possibilities – wage concession and adjustment of the required qualification or work experience of the applicant. We focus on these reactions because compared to the other possibilities, adjustment in wages and requirements are easily observable and present the most widespread reactions to solve insufficient labour supply. Furthermore, the two adjustments could also appear simultaneously, as has been emphasized in the classical contribution by Reder (1955). Identifying potential determinants for the different reactions will be our effort in the following.

3 Data and assumptions

Our investigation is based on the German Job Vacancy Survey (JVS) of the Institute for Employment Research (Kettner et al. 2011). This written cross-sectional establishment survey has been conducted every fourth quarter of a year since 1989. It allows representative statements about the total number of vacancies for East and West Germany according to the size of firms and 23 economic branches. As such it is unparalleled for the German labour market in this regard. The JVS also contains detailed information about the recruitment process of firms.² We use data from the fourth quarter of 2011 and 2012, when a set of questions treating the wage setting process was introduced. In total, over 15,000 establishments participated each year. Almost 10,000 of them had at least one new hire in the past 12 months and hence represent our sample of interest.

In the questionnaire, firms answered questions about the most recent case of a new hire. They were asked whether wage concession and/or adjustments of qualification and work experience took place in this case. For our analysis we use two different questions about remuneration or adjustments within the hiring process. The first corresponding question in the survey is: “Does the employee differ in qualification, work experience, age or other important aspects from what you primarily searched for?” First of all, the respondents had to answer “Yes” or “No”. In a second step, the firms were asked: “If yes, how does she/he differ?” Possible answers were: “Qualification is higher or lower” and “Experience is greater or smaller”.³ We recoded these answers and generated a binary variable which is one if the firm indicated that either the minimum qualification or the experience of the newly hired employee was lower than primarily scheduled. This variable shall reflect the already mentioned Reder Hypothesis.

Despite the issue of work or experience adjustments, we are also interested in knowing whether a firm had to pay more in order to fill a certain vacancy. The second question of interest in the survey is therefore: “Was higher payment required in order to fill this vacancy?” Again, the firms had two choices of answers: “Yes” or “No”.

Our empirical analysis is divided into two main steps: First, a multivariate logit model is used to find influencing factors on the probability to make concessions in the first place. In a second step, we use a multinomial model to find out which variables explain whether concessions are made via wage adjustments, adjustments of qualifi-

² Further information about the JVS can be found at <http://www.iab.de/en/befragungen/stellenangebot.aspx>.

The JVS data are available for non-commercial empirical research via the Data Research Centre of the Federal Employment Agency: <http://fdz.iab.de/en.aspx>.

³ Also, the options “Employee is younger or older” or “Other differences” were given. Note that the last item offers an open answer which was given in 30 cases. We defined these cases as missing.

cation and/or experience or both. The following paragraphs present possible influencing factors regarding vacancy-specific, person-specific, firm-specific, as well as labour market characteristics and their assumed effect.⁴

For the first step, a binary variable was generated which is 1 if either qualification or experience concessions were made or if the firm had to raise the salary and 0 if no adjustments at all were made.

We assume that concessions are more likely if it was hard to fill a vacancy. The JVS includes a question concerning possible problems that occurred during the hiring process. The information derived from this question represents our measure for a difficult staffing process and should be one main determinant for adjustments made. We assume that the existence of problems leads to a higher probability to make adjustments in order to successfully fill the vacancy.

As vacancy-specific characteristics we use information about the required minimum qualification of the new employee, about further special requirements such as managerial skills, the possibility to negotiate the payment, and information about the type of the contract. We expect a positive influence on concessions for an increase of the required qualification as well as for the possibility of salary negotiation driven by an increase in wage adjustments. If a temporary contract exists firms might have to make more concessions because the vacancy is less attractive. The same should be true for part-time jobs.

The age of the new employee, the gender and his or her prior employment status reflect the person-specific characteristics in our model. For these variables we can only tell whether they correlate with concessions or not, but we cannot prove whether they influence the probability of concessions. The reason is that the characteristics of the hired new employee can either be the reason for the concessions that were made but can also be the result of problems and the corresponding concessions. Nevertheless, we control for these variables since we cannot exclude that they might influence the outcome. While it is hard to make assumptions on whether existing correlations will be positive or negative, we certainly will interpret the results.

Finally, we include various firm-specific characteristics in our models. One of the strongest arguments against observing concessions can be seen in the collective bargaining coverage of a firm, which may hinder individual wage adjustments. We included the existence of collective bargaining agreements as a dummy variable. We also included the firms' expected employment trend for the near future as an explanatory variable. It is imaginable that an increase in the expected number of

⁴ Please note that our sample contains only successful recruitment processes, even if they might have been difficult. We therefore know who was finally hired and can include characteristics of this new employee into our models.

employees will influence concessions in a positive way. The expected growth in a firm's workforce could increase potential skills shortages and increase the necessity to make concessions in order to attract applicants.

Furthermore, characteristics of the firms' staff are included, such as the proportion of employed minors and the proportion of temporary workers in a firm. Our expectation is that a high share of minor employment or temporary employment – which is on average cheaper than permanent, full-time employment – is connected to more concessions since vacancies in such a firm might be less attractive. Also, we include the share of female staff. Since women still often earn less than men, one can assume that a higher share of women in a firm may correlate with a lower average payment and therefore more possibilities to make wage concessions if necessary.

The size of the firm, measured by the number of employees, functions as a proxy for the financial scope of the firm giving it more or less scope to pay higher wages. Also, the branch of industry of a firm and its location in East or West Germany as well as the regional unemployment rate are taken into account. We expect that a higher regional unemployment rate leads to fewer concessions because the large supply of potential new employees makes it easier for firms to recruit.

In order to account for the interactions between the two different adjustments – wage or qualification/experience – a second step of analysis is conducted. The dependent variable in this case is measured on a nominal scale, that is only wage adjustments, only qualification and/or experience adjustments, or both types of adjustments simultaneously. On the one hand, this enables us to identify the influential determinants on the particular responses of the firms, and on the other hand, allows statements in which cases the firms tend to react via wage concessions or via adjustments respecting qualification and experience, or if the firms use both channels of adjustment.

One of the most important independent variables in our model again can be seen in the difficulty to fill the vacancy. To find out whether the firms' reactions depend on the type of hiring difficulty they face, we not only include the presence of hiring difficulties in our second model, but rather take the different reasons for these difficulties into account. The firms were asked whether they had problems filling the respective vacancy and if so, what caused these problems. The questionnaire asked about four different reasons:⁵ an inadequate occupational qualification of the applicants, an insufficient number of applicants, a lack of willingness to accept the standard working conditions, and the fact that the applicants required too high wages (or any combination of these causes).

⁵ An overview of the distribution of the different adjustments according to the reasons of difficulties is given in Appendix Table 1.

To examine further determinants and factors that play a significant role in the decision-making process of a firm, we again include vacancy-specific, person-specific and firm-specific variables described above in this second step.

4 Descriptive analysis

A total of 9.4 million vacancies were filled externally in Germany in 2011 and 2012. This corresponds to around 1.4 million firms. Around 24 per cent of the firms which had at least one new hire in 2011 or 2012 react via wage concession or lowering the required qualification or work experience. If we distinguish between the different possibilities of concessions, we find that ten per cent of the firms react with paying higher wages. In 12 per cent, the adjustments made concerned work experience or qualification and only around two per cent of firms responded with both types of concession. These findings are highlighted in Table 1.

Table 1
The frequencies and weighted shares of the different adjustments

	Frequency	Weighted	Weighted share (in %)
No concessions	11,979	1,057,700	76
Only wage concessions	1,072	134,719	10
Only qualification/experience adjustments (lower)	1,299	163,213	12
Both type of concession	257	34,031	2

Source: German Job Vacancy Survey 2011 and 2012. The survey weights vary across 23 economic sectors and 7 firm size classes. Weighted share is conducted according to the firms with at least one new hire in 2011 or 2012.

Table 2 shows some descriptive evidence concerning the existence of concessions within a firm considering vacancy-specific, person-specific and firm-specific characteristics which might determine the decision of a firm to react using at least one of the three possible mechanisms. In order to take into account the sampling frame, we weight the share of concessions. In line with our expectations, 48 per cent of the firms facing difficulties to fill the vacancy react by adopting at least one of the three possible mechanisms. Surprisingly, more than 13 per cent of firms which do not report difficulties during the hiring process also report concessions. Regarding the vacancy-specific characteristics we find a clear connection between the required skills and the concessions firms make: The higher the minimum required qualification, the higher the share of concessions. Around 27 per cent of firms which demanded at least a higher qualification for the vacancy conceded. If we take other requirements such as special skills and knowledge into account, we also observe higher shares of concessions. For example, if a firm requires managerial skills or long-term experience, concessions were made in around 29 respectively 27 per cent compared to 23 respectively 20 per cent if those skills are not required. Of course, if a firm is willing or able to negotiate the wage, the share of concession rises from 16 to 36 per cent. This might mostly be driven by wage rather than qualification and/or experience adjustments. Other vacancy-specific characteristics concerning the contract such as temporal dimensions or working hours show quite different results.

According to our descriptive analysis, it does not matter whether the contract is temporary or not, whereas it does matter whether the job is a part-time job.

If we switch to person-specific characteristics, we observe no noteworthy differences between male and female new employees, but we do find differences according to the previous employment status of the hired person. The share of concessions is rather small if the person was self-employed or in apprenticeship in the corresponding firm compared to persons who were employed elsewhere, who were unemployed or out of labour force. On the face of it, this may seem a bit peculiar, but we have to remember that the options for adjustments are quite diverse. On the one hand, a high number of concessions made in case of previously unemployed persons can be driven by the adjustments via lower qualification or experience whereas a high number of concessions can be attributed to wage concession when previously employed persons are concerned.

Surprisingly, if a firm is bound by a collective wage agreement, the share of concessions does not differ much. This could be put down to difficulties paying a higher wage than the union wage. So, the only mechanism available for these firms is to lower qualification or experience. Firms not bound by collective wage agreements also have the option to react by making wage concessions. In the end, the probability to react by implementing at least one of the possible mechanisms should be more or less the same.

Firms with an expected increase in their workforce show the highest share of concessions. An expected employment increase should imply more frequent search processes and hence the firms' risk of facing skills shortages and hiring difficulties might also increase. Furthermore, also firms with an expected decrease in their workforce make more concessions than firms with an expected stable number of employees. This might be due to a lack of attractiveness of shrinking firms, making concessions necessary to find applicants.

If we distinguish between five firm sizes, we can identify the smallest firms with less than ten employees as those with the highest share of concessions. With an ascending employment stock the share of concessions decreases. This can be explained by the fact that large firms rather tend to offer higher wages right from the beginning. Smaller firms may start with a lower wage offer, making it possible that they have to adjust their wages more often in order to find a new employee. The frequency of concessions across industries ranges from eight per cent in public administration to 29 per cent in firms belonging to the construction sector.

Finally, on the regional level we do not find extensive differences between the shares of concessions. Summing up, it seems that vacancy-specific as well as person-specific and firm-specific characteristics correlate with the share of concessions.

Table 2
Concession according to firm-specific characteristics

		No concession	Concession	Share of concessions (in %)	
				raw	weighted
Difficulties to fill the vacancy	Yes	2,143	1,511	41	48
	No	9,836	1,117	10	13
Minimum required qualification	Unqualified (without occupational training)	1,433	200	12	20
	Intermediate qualification	8,468	1,897	18	24
	Higher qualification	2,078	531	20	27
Managerial skills	No	10,896	2,280	17	23
	Yes	1,083	348	24	29
Long-term experience in occupational field	No	5,912	1,040	15	20
	Yes	6,067	1,588	21	27
Wage negotiation	No	8,880	1,200	12	16
	Yes	3,099	1,428	32	36
Fixed-term employment contract	No	6,562	1,585	19	24
	Yes	5,417	1,043	16	24
Part-time job	No	8,400	2,065	20	27
	Yes	3,579	563	14	17
Female	No	6,154	1,511	20	25
	Yes	5,825	1,117	16	22
Previous employment status	Employed outside the firm	6,039	1,266	17	24
	Unemployed	3,228	883	21	26
	Temporary agency worker in this firm	356	40	10	23
	Self-employed	405	79	16	16
	Apprentice in this firm	358	24	6	11
	Elsewhere in apprenticeship/ education	1,136	273	19	23
Collective wage agreement	No	6,256	1,687	21	25
	Yes	5,723	941	14	22
Expected employment trend...	increase in employees	2,854	912	24	33
	no change	7,807	1,435	16	20
	decrease in employees	1,318	281	18	29
Firm size	<10	1,410	396	22	26
	10 - 49	5,901	1,426	19	24
	50 - 249	3,316	596	15	19
	250 - 500	665	121	15	14
	500+	687	89	11	14
Economic sectors	Agriculture, hunting and forestry	362	79	18	25
	Mining and quarrying, electricity, gas and water supply, recycling	1,014	158	13	18
	Manufacturing	2,356	632	21	24
	Construction	452	116	20	29
	Trade, maintenance and repair of motor vehicles, motor	451	115	20	24
	Transportation and storage	508	126	20	27
	Information and communication	444	130	23	21
	Financial intermediation, insurance	410	67	14	17
	Industry-related services	1,355	369	21	28
	Other services	3,614	755	17	21
Public administration	1,013	81	7	8	
Region	West	6,566	1,398	18	24
	East	5,413	1,230	19	22
Total		11,979	2,628	18	24

Source: German Job Vacancy Survey 2011 and 2012. The survey firm-weights vary across 23 economic sectors and 7 firm size classes. Regression sample (see Table 3) with 14,607 observations.

5 Empirical results

In order to verify whether the identified determinants also influence the probability of adjustments in a multivariate analysis and under control for other variables, we estimated a binary logit model with concession/no concession as the dependent variable.⁶

As Table 3 shows, the econometric results are in line with our previous descriptive evidence. If firms report difficulties in the hiring process, the probability of adjustments via one of the three possibilities increases by almost 20 percentage points. We also find a significant but small increasing effect in terms of the required minimum qualification. If the firm requires a higher qualification instead of no qualification, the probability to observe concession increases by around two percentage points. The same holds true for special skills and knowledge requirements: if the vacancy requires managerial skills or long-term experience in an occupational field, the probability to concede increases by 1.3 respectively 1.4 percentage points. As we have already seen in the descriptive part, the probability to concede increases by around ten percentage points if the firm is able or willing to negotiate the wage. However, if the contract is fixed-term or if the job is part-time, the effect is rather small but points in the same direction as the descriptive results.

Person-specific characteristics such as the gender variable or the age of the person who was hired do not influence the probability of adjustments. In contrast, the previous employment status does show significant results although the effects are not big. However, we need to be careful in interpreting these results. The problem here is that it is impossible to identify the direction of causality. To give an example: It is possible for a firm to lower its skills requirements because the specific person who is to be hired was previously unemployed and lacks some skills. Simultaneously, it could be that the firm was not able to find any applicants and consequently had to lower the requirements and only subsequently found a previously unemployed person who was finally hired.

Firms bound by a collective wage agreement are significantly less likely to make any concessions although the effect here is really small: the probability decreases by not even one percentage point. Also, the workforce composition does not play a major role in terms of adjustments. We only find a small however significant effect for the share of female employees. The higher the share of female employees, the higher the probability to concede is. As we have already seen in Table 2, establishments with an expected increase or decrease in their workforce are more likely to react by using one of the adjustment mechanisms compared to firms expecting a stable number of employees. As before, the effect is a bigger if the firm expects an increase instead of a decrease. According to the findings concerning firm size, we find a significant and negative effect with an ascending employment stock. In other

⁶ The estimation is based on unweighted data. The key results do not change when estimating a probit or complementary log log model.

words, smaller firms are significantly more likely to concede and the probability decreases with an increase in firm size. Of course, one might argue that bigger firms are in a better position to pay higher wages. Therefore, they would have a smaller probability to face difficulties and hence do not have to make wage concessions at all. But since our model controls for difficulties during the hiring process, we only compare firms of different sizes but facing exactly the same problems or difficulties.

Compared to the manufacturing sector, establishments in most branches show a lower probability to make adjustments. The largest effect can be seen for public administration which is government-financed and often uses very strict and detailed job descriptions.

We also find a highly significant relationship between the regional unemployment rate and the probability of concessions. If the regional unemployment rate increases by one per cent, the probability for concessions decreases by 2.1 per cent. This might be due to the strengthened bargaining power of employers when unemployment rates are high.

Finally, we see a significant effect depending on whether the firm is located in East or West Germany. According to our results, firms located in East Germany have a one per cent higher probability to concede, independently of the difficulties they have during the hiring process. Overall, we can conclude that all types of characteristics – vacancy-specific, person-specific and firm-specific – influence the probability of concession. However, difficulties to fill the vacancy along with external circumstances such as tight labour markets are the main driving forces, of course.

Table 3
Probability of concessions - Marginal effects based on a logit model

	dy/dx		Standard error
Difficulties to fill the vacancy (dummy)	0.191	***	0.019
Minimum required qualification (dummy)			
Unqualified (without occupational training) (reference)	---		---
Intermediate qualification	0.016	***	0,005
Higher qualification	0.018	***	0,006
Special skills and knowledge (dummy)			
Managerial skills	0.013	**	0.006
Long-term experience in occupational field	0.014	***	0.004
Wage negotiation (dummy)	0.092	***	0.012
Fixed-term employment contract (dummy)	0.006	*	0.003
Part-time job (dummy)	-0.008	**	0.003
Female (dummy)	-0.005		0.003
Age	0.000	*	0.000
Previous employment status (dummy)			
Employed outside the firm (reference)	---		---
Unemployed	0.026	***	0.004
Temporary agency worker in this firm	-0.016	*	0.008
Self-employed	-0.001		0.008
Apprentice in this firm	-0.023	***	0.007
Elsewhere in apprenticeship/education	0.018	***	0.006
Out of labour force (housewife etc.)	0.000		0.009
Collective wage agreement (dummy)	-0.007	**	0.003
Share of female employees	0.016	*	0.008
Share of part-time employees	-0.009		0.007
Share of temporary employees	-0.014		0.009
Expected employment trend...(dummy)			
increase in employees	0.022	***	0.006
no change (reference)	---		---
decrease in employees	0.017	**	0.007
Plant size (dummy)			
< 10 (reference)	---		---
10 - 49	-0.010	**	0.004
50 - 199	-0.016	***	0.004
200 - 499	-0.017	***	0.006
500+	-0.028	***	0.006
Economic branches (dummy)			
Agriculture, hunting and forestry	-0.005		0.008
Mining and quarrying, electricity, gas and water supply, recycling	-0.012	**	0.005
Manufacturing (reference)	---		---
Construction	0.000		0.007
Trade, maintenance and repair of motor vehicles, motor	-0.003		0.008
Transportation and storage	-0.001		0.007
Information and communication	-0.013	**	0.006
Financial intermediation, insurance	-0.013	*	0.007
Industry-related services	-0.003		0.006
Other services	-0.006	*	0.005
Public administration	-0.021	***	0.006
East Germany (dummy)	0.009	**	0.004
Regional unemployment rate	-0.213	***	0.056
Year (dummy)			
Year 2011	-0.004		0.003
Year 2012 (reference)			
McFadden's Adj. R2		0.171	
Area under ROC curve		0.793	

Source: German Job Vacancy Survey 2011 and 2012. 14,607 observations; regional unemployment rates are for 418 administrative districts (Landkreise und kreisfreie Städte – NUTS3 regions); Standard errors clustered at regional level. Marginal effects calculated for the reference group where dummies are zero and the values of the shares and the unemployment rate are at the mean. The probability of negotiation for the reference group is 0.179.

After examining the determinants which influence the probability of any of the abovementioned concessions, we are now interested in what influences the firms' choice of concession. For this purpose, we make use of a multinomial logit model and restrict our sample to those firms which report at least one of the concession possibilities.⁷ The dependent variable now includes three different categories: Only wage concession, only adjustment in qualification or experience, and both types of concessions. This enables us to set all three possible reactions of a firm in relation to each other. In order to gain a clear picture, we distinguish between the different causes of hiring difficulties. Table 4 shows that if the reason is "inadequate occupational qualification of the applicants", the probability to observe only wage concessions decreases by about 12 per cent, while the probability of both types of concession is not affected and the probability of only qualification/experience adjustment increases by about 12 per cent. So, if the labour supply is inadequately qualified, firms tend to lower their requirements and hire a person who does not completely conform to what the firm wanted.

On the other hand, if the difficulty to fill the vacancy is caused by too high wage demands of the applicants, the probability to adjust the requirement regarding qualification or work experience declines by around 17 per cent. At the same time, this type of hiring difficulties increases the probability to observe only wage concessions by almost ten per cent and both types of concessions by seven per cent. Here, in line with the previous results, firms also show a reaction which can be linked directly to the particular reason of hiring difficulties. If the problem is seen in the lack of willingness to accept the standard working conditions, neither the probability of wage concession nor the probability of qualification or experience adjustments change significantly. An interesting issue arises in cases where an insufficient number of applicants is the reason for problems. Here we cannot anticipate *ex ante* which concessions the firms might make. As Table 4 shows, the probability for wage concessions only decreases to a small five per cent and the probability for qualification or experience adjustments increases by almost the same percentage. If only an insufficient number of applicants is available, firms seem to anticipate that paying more alone might not lead to any results. On the other hand, reducing the requirements can attract a different group of potential workers who did not respond to the job offer before.

⁷ Summary statistics of the multinomial regression sample are provided in Appendix Table 2.

Table 4
Results of the multinomial logit model

	Only wage concession			Qualification and/or Experience is lower			Both types of concession		
	Marginal effects	Standard error		Marginal effects	Standard error		Marginal effects	Standard error	
Difficulties to fill the vacancy (dummy)									
Inadequate occupational qualification of the applicants	-0.121	***	0.029	0.119	***	0.030	0.002		0.008
Too high wage demand	0.101	***	0.034	-0.170	***	0.037	0.069	**	0.030
Lack of willingness to accept the standard working conditions	0.011		0.024	-0.020		0.028	0.009		0.011
Insufficient number of applicants	-0.046	**	0.020	0.042	**	0.021	0.004		0.008
Minimum required qualification (dummy)									
Unqualified (without occupational training) (reference)	---		---	---		---	---		---
Intermediate qualification	0.018		0.036	-0.010		0.039	-0.008		0.013
Higher qualification	0.048		0.042	-0.028		0.046	-0.020		0.015
Special skills and knowledge (dummy)									
Managerial skills	0.087	**	0.037	-0.122	***	0.041	0.035	*	0.020
Long-term experience in occupational field	0.047	**	0.021	-0.056	**	0.022	0.008		0.008
Wage negotiation (dummy)									
Fixed-term employment contract (dummy)	0.385	***	0.035	-0.465	***	0.021	0.080	***	0.030
Part-time job (dummy)	-0.087	***	0.024	0.105	***	0.026	-0.018	**	0.009
Female (dummy)	-0.017		0.023	0.034		0.024	-0.017	**	0.010
Age	0.009		0.021	-0.021		0.025	0.012		0.010
Age	0.005	***	0.001	-0.004	***	0.001	0.000		0.000
Previous employment status (dummy)									
Employed outside the firm (reference)	---		---	---		---	---		---
Unemployed	-0.150	***	0.035	0.160	***	0.036	-0.010		0.008
Temporary agency worker in this firm	-0.087	*	0.050	0.083		0.059	0.004		0.026
Self-employed	-0.098	***	0.038	0.107	**	0.046	-0.009		0.017
Apprentice in this firm	-0.018		0.068	0.025		0.080	-0.008		0.031
Elsewhere in apprenticeship/education	-0.125	***	0.034	0.130	***	0.036	-0.004		0.012
Out of labour force (housewife etc.)	-0.137	***	0.038	0.137	***	0.045	0.000		0.021
Collective wage agreement (dummy)	-0.033	*	0.018	0.048	**	0.021	-0.015	*	0.009
Share of female employees	0.010		0.042	-0.022		0.047	0.012		0.019
Share of part-time employees	-0.064		0.050	0.117	*	0.060	-0.053	**	0.025
Share of temporary employees	0.161	**	0.074	-0.194	**	0.075	0.032		0.030
Expected employment trend...(dummy)									
increase in employees	-0.012		0.018	0.002		0.020	0.010		0.010
no change (reference)	---		---	---		---	---		---
decrease in employees	-0.003		0.028	-0.026		0.037	0.029		0.021

	Only wage concession		Qualification and/or Experience is lower		Both types of concession	
	Marginal effects	Standard error	Marginal effects	Standard error	Marginal effects	Standard error
Plant size (dummy)						
< 10 (reference)	---	---	---	---	---	---
10 - 49	0.060 **	0.029	-0.061 *	0.033	0.001	0.009
50 - 199	0.073 **	0.029	-0.072 **	0.034	-0.001	0.011
200 - 499	0.045	0.045	-0.035	0.046	-0.010	0.017
500+	0.136 **	0.064	-0.128 *	0.066	-0.008	0.019
Economic branches (dummy)						
Agriculture, hunting and forestry	0.051	0.054	-0.026	0.057	-0.025	0.017
Mining and quarrying, electricity, gas and water supply, recycling	0.025	0.041	-0.002	0.044	-0.022 *	0.013
Manufacturing (reference)	---	---	---	---	---	---
Construction	-0.057	0.041	0.088 **	0.043	-0.031 **	0.015
Trade, maintenance and repair of motor vehicles, motor	0.067	0.048	-0.059	0.053	-0.008	0.015
Transportation and storage	0.108 **	0.043	-0.118 **	0.048	0.010	0.018
Information and communication	0.173 ***	0.060	-0.173 ***	0.064	0.000	0.015
Financial intermediation, insurance	0.124 *	0.070	-0.154 *	0.083	0.030	0.034
Industry-related services	0.101 **	0.043	-0.108 **	0.045	0.007	0.012
Other services	0.084 **	0.034	-0.087 **	0.038	0.003	0.012
Public administration	-0.065	0.054	0.085	0.057	-0.020	0.018
East Germany (dummy)	0.063 **	0.029	-0.062 **	0.031	-0.002	0.010
Regional unemployment rate	-0.780 **	0.362	0.901 **	0.377	-0.121	0.137
Year (dummy)						
Year 2011	0.011	0.016	-0.009	0.018	-0.002	0.007
Year 2012 (reference)	---	---	---	---	---	---
N=2,643	y = Pr(outcome = 1) = 0.221		y = Pr(outcome = 1) = 0.732		y = Pr(outcome = 1) = 0.047	
LR chi2 = 1.252***						
McFadden's Adjusted R2 = 0.198						
Maximum Likelihood R2 = 0.377						
Count R2 = 0.695						

Source: German Job Vacancy Survey 2011 and 2012. 2,643 observations; regional unemployment rates are for 418 administrative districts (Landkreise und kreisfreie Städte – NUTS3 regions). Standard errors clustered at regional level. Marginal effects calculated for the reference group where dummies are zero and the values of the shares and the unemployment rate are at the mean.

In contrast to Table 4, the minimum required qualification does not affect the firm's choice significantly while special requirements such as managerial skills and long-term occupational experience raise the probability of wage concession by nine respectively five per cent. Meanwhile, the probability to observe concessions concerning qualification or work experience declines quite strongly by 12 per cent if managerial skills are required and by six per cent if experience is required. The effect on both types of concession simultaneously varies between the two coefficients. Requested managerial skills increase the probability of making both types of concessions, whereas long-term experience does not affect the probability of both concessions. These results do not surprise since the variables suggest that the firm was looking for a special type of qualification. In such case, lowering requirements concerning skills or experience as far as necessary to fill the vacancy does not seem to be the appropriate reaction.

Of course, if the potential new employee has the opportunity to negotiate the wage, the probability to face wage concessions or both types of concessions increases significantly. If possible, applicants use their bargaining power and therefore the probability to observe higher wage increases while qualification or experience adjustments become more unlikely. Contrariwise, if the bargaining power of the new employee is low because he or she is only needed for a limited period of time, firms rather react by adjusting qualification or experience requirements than by paying more. If the job is part-time, we do not find any significant effect on wage or qualification/experience adjustments. Only both types of concession simultaneously are slightly affected.

Person-specific characteristics play a significant role in the decision which concessions a firm makes, too. Again, we have to keep in mind that we cannot say anything about the direction of causality; the effects only reflect a correlation between the adjustments and covariates. According to the results, the older a person, the higher the probability of wage concessions is and the lower the probability of qualification or experience adjustments. If the hired person was previously unemployed, self-employed, in apprenticeship or somehow out of the labour force, lower requirements regarding qualification or work experience occurred more often, but higher wages decreased compared to a hired person who had been employed previously. Again, we cannot verify whether the characteristics of the hired person influence the firms' concessions or whether the concessions lead to hiring the respective person.

Firms bound by a collective wage agreement have a lower probability of making wage concession only or both concessions simultaneously but a higher probability of making qualification or experience adjustments. Our deliberations from chapter 4 apply here as well: paying salaries above the union wage is rather difficult and therefore firms have to respond by making qualification and experience adjustments.

The share of part-time employees and the share of temporary workers in the firm have a significant impact on the choice of concession. While a higher share of part-

time employment leads to a higher probability of qualification or experience adjustments and lowers the probability for a combination of both concessions, a high share of temporary employment increases the probability for higher wages and decreases the probability of qualification or experience adjustments. In contrast to our findings concerning the basic decision to make concessions in the first place, the firms' expected employment trend does not have any effect on the decision which concession to make. As we already found in our binary logit model, firm size plays a significant role in the decision process. The bigger the firm, the higher the probability is to make wage-related concessions, whereas the probability of qualification or experience adjustments only decreases. Only medium-sized firms with 200 to 499 employees do not differ significantly from small firms. However, our assumption that small firms with fewer than ten employees have less scope for pay raises and therefore reduce their qualification requirements more frequently can be confirmed altogether.

Also, the branch of industry influences the type of concession. In Transportation and storage, Information and communication, Financial intermediation and insurance, Industry-related services, and Other services the probability to make wage concessions is higher than in the manufacturing sector. At the same time, in all branches mentioned above, the probability for qualification or experience adjustments is lower than in Manufacturing. For firms in the tertiary sector it hence seems to be easier to adjust wages. Finally, also the external circumstances of a firm play a role: In Eastern Germany, firms rather raise the wage than lower their requirements. However, the effect is small and should not be over-interpreted. In contrast, the regional unemployment rate has a noteworthy influence: the higher the rate, the lower the bargaining power of an applicant and the lower the probability that a firm will adjust the wage. Simultaneously, as the unemployment rate increases, it becomes more likely that firms lower their requirements concerning qualification or work experience.

Our findings point to the fact that firms seem to be relatively flexible in their reactions to possible problems and that they adjust their strategy accordingly with respect to the corresponding hiring situation.

6 Conclusion

Our paper examines the determinants and characteristics that influence wage or qualification and work experience adjustments in the hiring process from a firm's perspective. This empirical analysis is based on the German Job Vacancy Survey. For the first time, it is conducted with a focus on wage concessions and qualification or work experience adjustments connected with difficulties during the hiring process. The overall findings support the assumption that difficulties to fill the vacancy along with external circumstances such as tight labour markets are the main driving forces when it comes to making concessions in the first place.

Our empirical results also point out that firms are rather flexible in choosing the appropriate reaction depending on the specific situation. Accordingly, firms are, for

example, likely to adjust their qualification or experience requirements if the applicants are inadequately qualified and tend to adjust the wage if hiring problems occur due to too high wage demands. Besides the hiring situation itself, characteristics of the vacancy (such as required managerial skills), of the hired person (such as the previous employment status), and of the firm (such as firm size) are linked to the different types of concessions.

All things considered, we found evidence for the Reder Hypothesis as well as for the neoclassical approach of dealing with hiring difficulties. Although we cannot say which theory is the “correct” one, concessions implied by the Reder Hypothesis – such as adjustments in qualification or experience – are much more probable than the neoclassical wage concessions. Furthermore, observing both concessions simultaneously is rather unlikely.

Skilled labour has recently become scarcer on the German labour market. One reason can be seen in the demographic change the country faces. The observation that firms concede in accordance with their specific hiring situation is a strong indicator that efficient market forces exist, making government intervention unnecessary. Nevertheless, especially small firms have to make a disproportionately high number of concessions. In light of the increasing labour market tightness it is arguable how long they will be able to remain successful in the competition for skilled labour.

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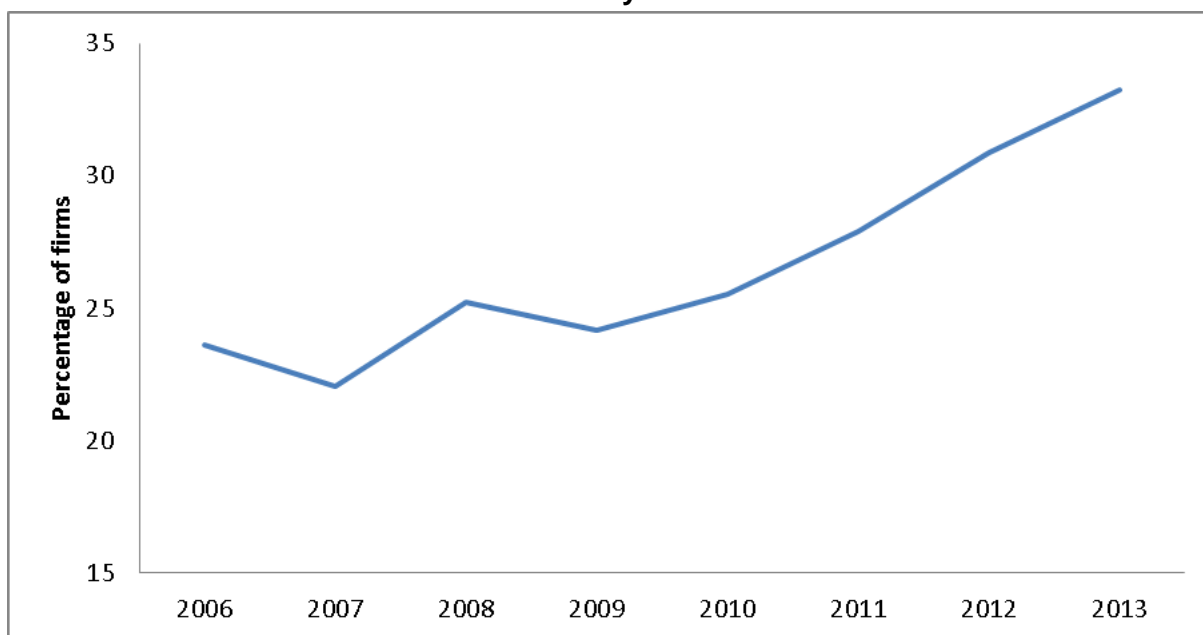
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Appendix

Appendix Figure 1

Share of firms with problems during the hiring process as percentage of all firms with at least one new hire in the listed year



Source: German Job Vacancy Survey

Appendix Table 1

The weighted shares of the different adjustments according to the hiring difficulties

Reasons for difficulties	No concession	Only wage concession	Qualification and/or Experience is lower	Both types of concession
Inadequate occupational qualification of the applicants	47	13	31	9
Too high wage demand	41	23	25	12
Lack of willingness to accept the standard working conditions	52	14	26	8
Insufficient number of applicants	50	16	26	8

Source: German Job Vacancy Survey 2011 and 2012. The survey weights vary across 23 economic sectors and 7 firm size classes. Weighted share is conducted according to the firms with at least one new hire in 2011 or 2012.

Appendix Table 2
Summary statistics of the multinomial regression sample

Variables	Mean	Std. Dev.
Dependent multinomial variable	1.693	0.641
Difficulties to fill the vacancy (dummy)		
Inadequate occupational qualification of the applicants	0.389	0.488
Too high wage demand	0.212	0.409
Lack of willingness to accept the standard working conditions	0.189	0.392
Insufficient number of applicants	0.362	0.481
Minimum required qualification (dummy)		
Unqualified (without occupational training)	0.076	0.265
Intermediate qualification	0.722	0.448
Higher qualification	0.202	0.401
Special skills and knowledge (dummy)		
Managerial skills	0.132	0.339
Long-term experience in occupational field	0.603	0.489
Collective wage agreement (dummy)	0.359	0.480
Wage negotiation (dummy)	0.543	0.498
Fixed-term employment contract (dummy)	0.397	0.489
Part-time job (dummy)	0.215	0.411
Female (dummy)	0.426	0.495
Age	35.707	10.556
Previous employment status (dummy)		
Employed outside the firm	0.482	0.500
Unemployed	0.335	0.472
Temporary agency worker in this firm	0.015	0.122
Self-employed	0.030	0.171
Apprentice in this firm	0.009	0.095
Elsewhere in apprenticeship/education	0.104	0.306
Out of labour force (housewife etc.)	0.024	0.154
Expected employment trend...(dummy)		
increase in employees	0.347	0.476
no change	0.546	0.498
decrease in employees	0.107	0.310
Share of female employees	0.427	0.291
Share of part-time employees	0.183	0.227
Share of temporary employees	0.082	0.146
Plant size (dummy)		
< 10	0.150	0.357
10 - 49	0.543	0.498
50 - 199	0.227	0.419
200 - 499	0.047	0.211
500 +	0.034	0.181
Economic branches (dummy)		
Agriculture, hunting and forestry	0.030	0.170
Mining and quarrying, electricity, gas and water supply, recycling	0.060	0.237
Manufacturing	0.241	0.428
Construction	0.044	0.205
Trade, maintenance and repair of motor vehicles, motor	0.045	0.207
Transportation and storage	0.048	0.213
Information and communication	0.049	0.216
Financial intermediation, insurance	0.026	0.158
Industry-related services	0.140	0.347
Other services	0.288	0.453
Public administration	0.031	0.172
East Germany (dummy)	0.468	0.499
Regional unemployment rate	0.080	0.034

Source: German Job Vacancy Survey 2011 and 2012. 2,643 observations; "unqualified" means without occupational training; "higher qualification" indicates college or university degree.

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