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Abstract

The paper estimates how wages respond to changes in regional unemployment using detailed Swedish micro data. The study is set in an economy with close to complete union coverage where real wages have grown continuously in all parts of the wage distribution for 15 years, and where the aggregate wage dispersion has remained constant for the same period. Our results show that this aggregate stability is coupled with non-trivial flexibility in terms of wage adjustments to changes in regional unemployment. These results are particularly strong after the data have been purged from compositional fluctuations. However, we also document that the industries with least flexible collective agreements cover a higher-than-average share of workers with a high risk of job-loss into unemployment. This institutional feature leads to additional wage rigidities for vulnerable workers.

1 Introduction

Judging from aggregate statistics, Sweden comes across as a country with remarkably successful wage setting institutions. During the past 15 years, all parts of the wage distribution have seen substantial real wage increases. In fact, very little changes in wage dispersion have taken place since 2000. This apparent stability has been achieved alongside employment rates that consistently remain at the top of the EU. But in recent years it has been argued that the stable wage evolution may mask considerable real and nominal wage rigidities which prevent relative wages from adjusting when market conditions change. Such rigidities may explain both why the nominal wage increases have been relatively small despite reported labor shortages in many sectors during the current economic boom, and why the relative wages of low skilled workers do not seem to adjust downwards despite increasingly poor employment opportunities for the least skilled workers.[5] Despite the first-order policy relevance of the question,[6] very little evidence exists on the degree of wage flexibility in Sweden (and in Europe in general) during the past two decades. This study therefore estimates the degree of regional wage flexibility in Sweden using rich micro data covering the period since the most recent overhaul of Swedish wage setting institutions in 1997. Furthermore, we relate the analysis to key aspects of the relevant bargaining institutions.

We study wage flexibility in the form of responsiveness of actual wages to regional unemployment. In doing so, we follow in the tracks of the (now somewhat dormant) Wage Curve literature of the 1990s and early 2000s, see e.g. Blanchflower and Oswald (1994) and Bell et al (2002). This literature, primarily motivated by the concern that lack of flexibility may contribute to persistently high unemployment rates, has seen relatively few recent contributions, Gregg et al (2014) for the UK is an exception. However, merging the wage curve approach with modern high-quality micro data can provide deep insights into how wage setting institutions shape the evolution of the actual wage distribution.

The older wage curve literature settled on a consensus estimate with an elasticity from regional unemployment to actual wages of −0.1 (or −0.07 according to the survey by Nijkamp and Poot, 2005). However, the Scandinavian economies appeared as somewhat of an outlier with much lower elasticities, often close to zero (see e.g. Albaek et al, 2000). As alluded to above, these studies mostly cover historical institutions, and many countries have seen non-trivial recent changes in formal institutions and wage setting practices. In the Swedish case, the current "Industrial Agreement" (IA) wage-setting model has been in place since 1997 and no previous study has assessed the degree of regional wage flexibility during this period. The IA-wage setting model lets the manufacturing industries set their wages first, generating a "benchmark" rate of wage increases that other parts of the economy should follow. If indeed the benchmark has a deterministic relationship to actual wages, we should see a balanced aggre-

[5] See e.g. Arbetsmarknadsekonomiska Rådet (2017) for a discussion.

[6] In recent years, wage setting institutions have been one of the most heavily discussed policy issues in Sweden. The same is true in Finland, where adopting Swedish institutions (described Section 2) have been presented as a one possible policy option for the future.

gate rate of wage growth *and* stable aggregate wage dispersion, but without relative wage adjustments within the distribution.

Our study uses detailed microeconomic panel data to estimate the empirical relationship between actual wages and regional unemployment within this setting. We begin from individual-level data in order to adjust wages for individual composition effects. This is potentially important as the composition of the employed individuals tends to vary over the business cycle (see e.g. Bils, 1985 and Solon et al, 1994). We use a regional differences-in-differences approach that controls for all time-invariant region-specific factors through region fixed effects and for all aggregate time-varying factors through year fixed effects. The approach thus precisely isolates the relative wage adjustments that we are interested in. The approach easily lends itself to studying variations in flexibility between different groups of workers. This is particularly important since the de facto risk of unemployment may vary substantially between different groups of workers (see e.g. Morchio, 2016). In order to isolate the wage responses to demand-side changes (thus handling the threat of reverse causality from wages to unemployment) we use an instrumental variable approach drawing on the logic of shift-share instruments as in Bartik (1991, 2002).

Our findings show that there is indeed non-trivial actual flexibility within the IA model. Despite the institutional rigidities generated by the IA benchmark, regional wages do in fact respond to changes in regional unemployment. Our preferred specification shows a long-run elasticity of −0.075, thus not far from the consensus estimate of the earlier literature. Using more conventional methods (i.e. ignoring the endogeneity of wages) gives a slightly lower, but still economically and statistically significant elasticity of −0.035. We also show that adjusting for endogenous worker composition is important (but there is no evidence of compositional biases on the firm side). Overall, our results point to non-trivial wage flexibility in Sweden, albeit somewhat below the (old) international consensus rate. However, these aggregate numbers hide some crucial heterogeneity. We show that workers with a higher-than-average risk of job-loss into unemployment only have a marginally higher response to changes in regional unemployment than low-risk workers. An important contributing factor is that actual wages within sectors where *formal* agreements contain very little local autonomy also *de facto* remain largely irresponsive to regional unemployment rates, *and* workers with a high risk of unemployment are heavily overrepresented within these sectors. In sectors with more local autonomy, wages appear much more responsive for workers with a higher risk of unemployment, as expected. These results thus suggest that institutional rigidities prevent wages of vulnerable groups from adjusting to changes in relative labor demand.

Overall, our results suggest that the Swedish-style pattern bargaining model can be combined with relative wage adjustments as long as contracts include sufficient possibilities for local negotiations. Since most agreements do contain some local autonomy, the results do not support the view that the IA structure is a major reason for why nominal wages have increased less than expected in sectors with reported labor shortages in the current economic boom. At the same time, the design of the contracts within the IA-model clearly matters for the degree of actual flexibility. Since the labor market for workers most prone to job-loss into unemployment remains more rigid

than average, unemployment for some of the most vulnerable workers may remain persistently high if labor market conditions are deteriorating within the rigid sectors.

The paper is structured as follows: Section 2 outlines the key features of Swedish wage setting institutions and other relevant institutional aspects. Section 3 presents the data and descriptive statistics. Section 4 presents the empirical methods. Section 5 contains our results and Section 6 concludes.

2 Institutions

In this section, we provide an overview of wage setting institutions in Sweden. The exposition is by necessity somewhat stylized and we try to emphasize the aspects of the institutions that we believe are relevant for the empirical analysis.[7]

2.1 Industry-level agreements

Wage setting in Sweden is entirely left to the social partners. There are, for instance, no legislated minimum wages. Instead, the wage setting system relies on high collective agreement coverage. This is achieved through rules stipulating that agreements cover all employees (also non-members) at workplaces with signed collective agreements. As a consequence, around 85 percent of Swedish private sector employees were estimated to be covered by collective agreements in 2015, although the membership rates were around 64 percent (Kjellberg, 2017).[8] The share of the private sector employees covered by collective agreements has been remarkably stable during the past 15 years.

Collective wage agreements are, since the demise of central wage negotiations in the 1980s, signed at the industry level.[9] White- and blue-collar workers within each industry have separate agreements. Since 1997, the wages are set according to a "pattern bargaining" structure embedded in a model usually referred to as the "Industrial Agreement" (IA).[10] Unions and employers within manufacturing and mining industries, i.e. the industries that are perceived as most heavily exposed to international competition, negotiate first and sign a set of coordinated agreements. These agreements define a percentage wage increase referred to as "the benchmark" (*märket*). Other sectors follow and sign agreements at, or around, this benchmark. The National Mediation Office, which oversees negotiations, is instructed to assist in centering the agreements towards the industrial benchmark. Different agreements have very different means to reach the benchmark. Elements that can vary include the contract duration (between 1 and 3 years), the time path of wage increases, and the allocation of

[7] The presentation draws on Forslund et al (2012) and Forslund et al (2014).

[8] In contrast to other Nordic countries, collective agreements in Sweden are never turned into laws that non-covered firms have to adher to. Instead unions are able to coerce establishments into signing agreements by preventing members in covered firms from dealing with uncovered firms (e.g. not collecting garbage, not deliver goods and so forth). Such "embargos" are possible even toward firms without union members.

[9] There are some exceptions where agreements instead are occupation specific, such as for electricians.

[10] The IA was introduced on the surprise initiative of the blue collar unions after a turbullent round of industry-level wage negotiations in the aftermath of the deep Swedish recession in the early 1990s.

wage increases across the worker collective (e.g. across different groups, through minimum wages, or wage increases in percent, or fixed amounts).

2.2 Local negotiations

Industry-level negotiations are in most cases followed by some form of individual or collective local wage negotiations. These local negotiations follow a set of rules and protocols determined within each industry-level agreement. There are large variations in these rules and protocols, which implies that the means through which the industry-level agreements (are intended to) affect actual wages also vary substantially between agreement areas. Some agreements are intended to have a very direct impact on actual wages, others are more indirect. During industry level negotiations, industrial conflicts (i.e. strikes and lockouts) are allowed and do occasionally take place. However, such measures are not allowed during local negotiations.

Local procedures vary across the widest possible range. Some industries have centrally determined "tariff wages" (mostly transportation agreements) stipulating detailed wage levels depending on the exact type of performed tasks. Other sectors (such as hotels and restaurants, retail, call centers) have less complex industry-level agreements, but instead have (negotiated) minimum wages with substantial bite. The majority of agreements, however, have minimum wages with a low actual bite and formal procedures with scope for local negotiations. These local negotiations can be constrained by guaranteed wage increases at the individual or group level, and/or fallback outcomes in the case of failed local negotiations. The most decentralized agreements (mostly white-collar public sector, and managerial) are purely procedural, i.e. they do not stipulate any guaranteed wage increases or minimum wages. Instead, wages are entirely set during local negotiations according to procedures specified in the industrial agreements.

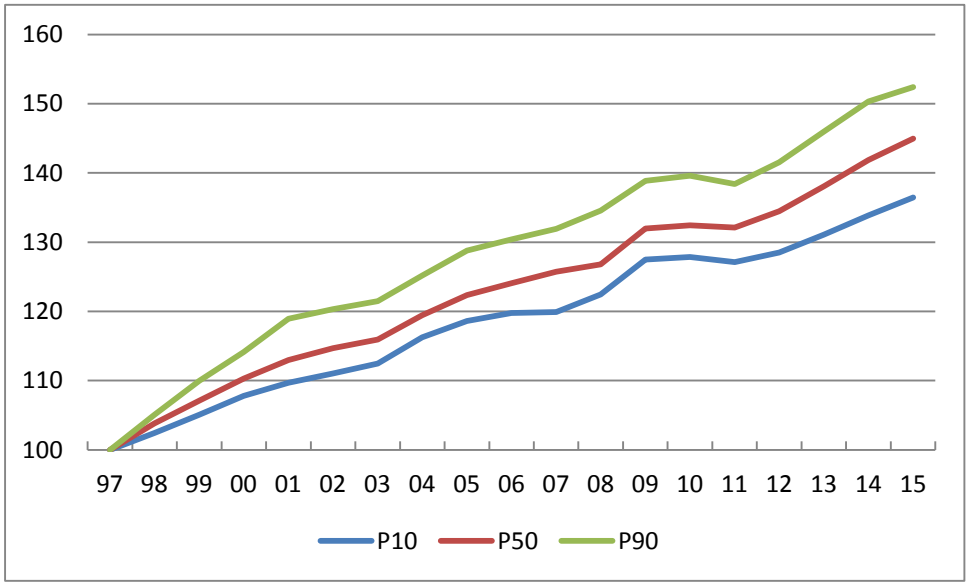
To get a sense of the relative magnitudes, the National Mediation Office (2016) estimates that 10 percent of all employees in the private sector were covered by agreements that leave wage setting entirely up to local negotiations and 15 percent by agreements that have a centrally agreed increase with no local variations. This means that for the majority of the private sector employees the wages are set in a combination of industry and local negotiations. This is often done through a centrally agreed increase on the total pay bill, with local negotiations on its distribution, sometimes with individual supplements linked to performance.

2.3 The evolution of real wages and wage dispersion

Since the introduction of the IA in 1997, aggregate real wages have grown dramatically across the distribution, as shown in Figure 1. The first few years saw a continuation of the growth in wage dispersion that had begun in the early 1980s (see e.g. Skans et al, 2009). However, since 2000, wage dispersion has remained almost constant and real wages have grown at a similar pace in all parts of the wage distribution.

Taken at face value, Figure 1 can be interpreted in two very different ways. Ideally, relative wages have been able to adapt to changing economic conditions within the aggregate distribution. In the worst case, however, the aggregate stability may be the results of real-wage rigidities. In the extreme, if all wages have grown according to the IA benchmark, we could see a wage structure in the end of the period that has conserved the economic logic of 1997. In this case, current wage differences may be distorting the allocation of workers across different segments of the labor market.

Figure 1 Real wage evolution for different parts of the distribution, 1997–2015
Index 1997=100



Note: Wage distribution is based on the full-time equivalent wage. The wage data include 18–64-year-olds for the years 1997–2013 and 18–66-year-olds for the years 2014–2015. The nominal wages have been deflated with the consumer price index. The lines are for the 10th, median (P50) and 90th percentile in the wage distribution each year.

Source: Statistics Sweden

2.4 Other institutions and the economic environment

Although our empirical analysis will focus on documenting the degree of relative wage adjustments to local shocks, we wish to highlight some other major changes in the economic environment during the period under study (1998–2013). During this period, several other aspects of the economic environment have changed quite substantially. The *de facto* replacement rate in the unemployment insurance (UI) system has dropped dramatically, primarily since the maximum remuneration has remained constant in nominal terms for a long period[11] and through an extensive in-work tax credit. The economic incentives to work and (as a flip side) economic inequality in the lower end of the earnings distribution have increased dramatically, despite of the stable wage distribution.

[11] This is true both for the UI system and other support systems.

During the period analyzed, the economic environment in Sweden as elsewhere has seen dramatic changes due to technology and trade.[12] However, the impact of the financial crisis outside of manufacturing industries was muted in Sweden compared to most other countries (there was, e.g., much less need for fiscal consolidation). Instead, the country has seen a more dramatic growth in the number of refugees than most other comparable countries, generating a gradual increase in the share of low-skilled workers among the unemployed.

3 Data

The two main data sources used in this study are Statistics Sweden's LISA database and the Swedish Wage Structure database. Both data sources are used for the years 1998−2013. LISA is an individual level panel database which includes the whole Swedish population aged 16 years or more. In this study, we focus on workers aged 20−64 years. LISA includes rich information on individuals' characteristics (e.g. gender, age, region of origin, level and type of education, marital status, number and ages of children, family type, county of residence). The database also includes information on whether the individual was registered as unemployed at the Public Employment Services (PES) in November and the number of unemployment days each year as well as register-based information on the employment status in November. In addition, there is information on employer characteristics (e.g. number of employees and industry) for the employed individuals. Our data do not contain any indicators of the type of collective agreement for the simple reason that this information is lacking in all publicly available Swedish registers.

LISA includes information on the annual income as reported to the tax authorities by the employers. However, these data do not record working hours, or hourly/monthly wages. Annual labor earnings largely depend on the number of hours worked during the year, which is highly correlated with economic conditions. In order to study effects of economic conditions on actual wages, we thus need a wage measure that accounts for hours worked. For this reason, we use data on wages from the Swedish Wage Structure database and merge these with the individual background information from LISA. The wage measure we use covers the "full-time equivalent" monthly wage (hourly wages times monthly full-time working hours). The measure includes basic monthly wages as well as some stable supplementary payments such as compensation for inconvenient working hours (night shifts) and compensations for managerial duties. However, the measure does not include overtime supplements.

The wage data should be very accurate since they are reported directly by the employers (who are legally required to report). A drawback is that coverage is incomplete for parts of the private sector. For the private sector, wages are collected each year in September from all employers with at least 500 employees and from a stratified sample of smaller employers.[13] In total, the wage data cover roughly 50 percent of all the

[12] See Adermon and Gustavsson (2015) or Goos et al (2014) for evidence on the shifting occupational structure (polarization).

[13] The strata are based on industry and employer size. In 2013, about 8 000 employers were included in the private sector wage sample.

private sector employees each year. Thus, there is a large panel element in the wage data.

The data on the private sector employees consist of between 800,000 and 1 million individuals each year, adding up to 14 million observations 1998−2013.[14] However, we perform our empirical analysis at the regional level (21 counties) and therefore construct regional wage measures by aggregating the wage measures after purging them of compositional changes (see below).

All other regional variables are constructed from the LISA database.[15] The regional unemployment rate is the number of workers registered as unemployed in November at the PES as a percent of the regional labor force (registered unemployed + employed according to tax registers).[16] Other regional variables include the population shares of women, foreign-born, and for each level of education. Each industry's fraction of the total employment in the county is calculated based on the two-digit industry classification (SNI2007) of the employees' main employer.

3.1 Subsample categories

In order to provide some deeper insights into the origin of the wage flexibility we use our micro data to specify sub-categories of workers. One key feature is the distinction between stayers and movers. Are wages flexible within ongoing employment relationships, or does wage flexibility occur for workers who change employer? We define stayers as workers who remain in the same job as they had in the year before. Job-to-job movers are employees who changed jobs without an intervening unemployment spell. The final group consists of hires from unemployment or inactivity. We define these categories by using the universal tax records, which implies that we can identify the variables correctly also in cases where the firm was out of the wage sample in the previous year.

In the case of stayers, we are interested in the extent to which wages adjust differently for workers with a high vs. a low risk of unemployment. To this end, we estimate a linear probability model on the population of employed workers where the outcome is the probability that they experience at least one day of registered unemployment in the coming year. The model controls for gender, marriage status, immigration status, industry and sector as well as the interaction of age-groups (<25, 25−49, 50−64), level of education (2-digit ISCED) and field of education (2-digit ISCED). The model also includes fixed effects for the interaction between year and region. We predict the un-

[14] To ensure that the results are not driven by outliers we have exkluded individuals with very high (>99th percentile) or very low (<1th percentile) wages from the first stage composition correction of the regional wages. This restriction does not change the results.

[15] Thus, unemployment and employment measures are register based. The reason for not using Labor Force Survey (LFS) measures for unemployment and employment is that we do not have access to consistent regional LFS series before a major data revision in 2005.

[16] Register based employment as defined in LISA database. For details, see http://www.scb.se/Statistik/_publikationer/AM9901_1990I09_BR_AM76BR1104.pdf

employment risk based on all these variables except the region-year fixed effects and split the data by the median predicted risk into high-risk and low-risk workers.[17]

Finally, we are interested in the relationship between formal and actual wage flexibility. We therefore separate-out industries where the agreements have relatively little *formal* local flexibility according to the design of the wage contracts (see Section 2). These agreements are either of the "tariff" form with no or very little formalized scope for local wage adjustments, or have chosen to implement very high minimum wages (again with little room for local flexibility) that cover a substantial part of the workforce. We refer to such contracts as "low-flex". Following the National Mediation Office (2016), we define the transportation sector, hotels and restaurants, some business services, and the retail sector as being included in the low-flex category.[18]

3.2 Descriptive statistics

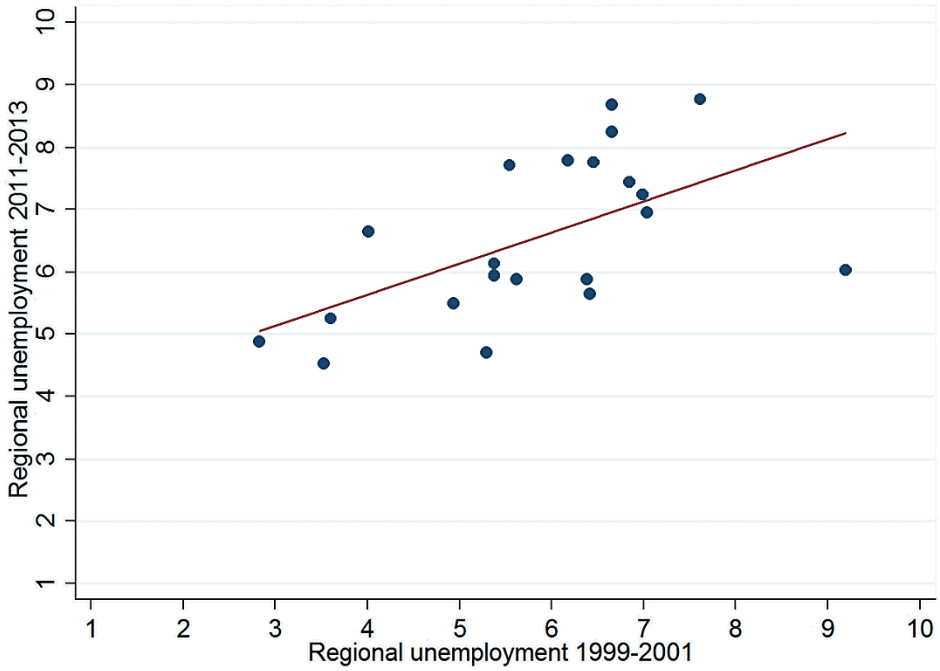
The regional unemployment rates are displayed in Figure 2 and Figure 3. Figure 2 shows the relationship between the regional mean unemployment in 1999−2001 and the corresponding rate in 2011−2013. The ranking of the regions is clearly correlated over time, but there are also substantial idiosyncratic movements across time. A substantial part of this variation is due to differing industrial compositions. As an example, the county with the highest unemployment rate in the initial period (*Norrbotten)* is below the median in the second period, mostly because of an enormous increase in mining-related labor demand. In 1999−2013 the regional unemployment varied between 2.2 and 10.5 percent, with a mean of 5.6 percent and a standard deviation of 1.6. Our empirical analysis will explore the evolution of unemployment after removing year and county fixed effects and Figure 3 therefore depicts this variation. As is evident, there are substantial movements in the relative unemployment rates of the different counties. More detailed descriptive statistics can be found in the Appendix.

[17] The predicted unemployment risk, and hence even the estimated wage flexibility, is about the same whether or not the industry controls are included in the linear unemployment probability model.

[18] The business services include e.g. office cleaning, janitor services and call centers. The National Mediation Office also adds the construction industry to the low-flex chategory since the wages are set according to piece rates, but for our purposes this is not a reasonable justification and we have hence not included the construction industry in the low-flex category.

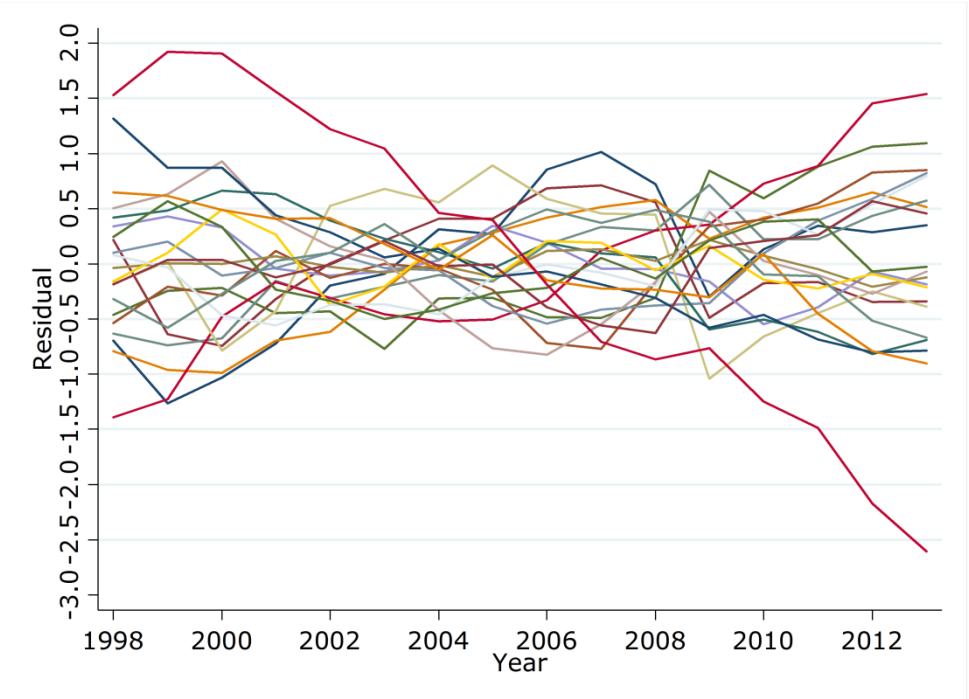
Figure 2 Regional persistence of unemployment

Percent



Note. Register-based unemployment.

Figure 3 Development of regional unemployment after removing year and county fixed effects



Note. The figure shows residual unemployment rates from regressions on year and county fixed effects.

4 Empirical methods

4.1 Overview

First, we correct wages for changes in the composition of workers. We then aggregate these corrected wages to the county-year level and estimate models with county and year fixed effects. In order to ensure that the results we find arise from demand-side changes, we employ a Bartik (1991, 2002)-style IV-model. Each of these three parts is described below.

4.2 Composition-correction

It is well-known that systematic changes in the composition of employees across the business cycle can have a substantial impact on the measured variability of wages across the cycle as already noted by e.g. Bils (1985) and Solon et al (1994). To handle this issue, we adjust our regional wage data for individual composition effects as suggested by, e.g., Card (1995) and Bell et al (2002).[19] Our empirical work is therefore executed in two stages. In the first stage, we remove any time constant individual heterogeneity by estimating the following model:

$$w_{ijt} = \alpha_i + \alpha_{jt} + \sum_k^K X_{ijtk}\beta_{jk} + \varepsilon_{ijt} \qquad (1)$$

where w_{ijt} is the natural logarithm of the monthly wage for individual *i* observed in region *j* year *t*, α_i is an individual fixed effect, α_{jt} is a region specific year effect (year dummy * region dummy), X is a set of *k=1, …, K* time-varying individual characteristics (age, age^2, dummy variables indicating marital status, presence of children aged 0−6 years, 3 levels of education and 16 industries). The composition parameters, β_{jk}, differ across the regions but remain constant over time.

Equation (1) is estimated using individual data for years 1998−2013 for the entire private sector. The estimated region-specific year effects, $\hat{\alpha}_{jt}$, are then used as the composition corrected wages.

4.3 The regional-level model

In the second stage, the unit of observation is region/year cells in the spirit of Blanchflower and Oswald (1994), Bell et al (2002) and Gregg et al (2014). Using the regional panel, we estimate a model of the following form:

$$\hat{\alpha}_{jt} = \omega_j + \omega_t + \gamma\hat{\alpha}_{jt-1} + \delta u_{jt} + \sum_k^K Z_{kjt}\,\varphi_k + \nu_{jt} \qquad (2)$$

[19] In the empirical section we show results from alternative adjustment procedures.

where ω_j is the region fixed effect, ω_t is the year fixed effect, u_{jt} is the natural logarithm of the regional unemployment rate in percent, and Z_{kjt} are time-varying regional variables (share of population with 3 different levels of education, share of women and foreign-born in the population). The year effects, ω_t, take care of all aggregate shocks (e.g. policy changes, price changes and economic growth). The parameter δ gives the short-run elasticity of wages with respect to unemployment, which is the main parameter of interest. As standard in the literature, the model includes the lagged dependent variable in order to assess how much the wages adjust to the regional unemployment in the long-run. The long-run elasticity of wages is given by $\frac{\delta}{1-\gamma}$ where γ is the coefficient of the lagged dependent variable.

It should be noted that when dynamic models are estimated with fixed effects the coefficient of the lagged dependent variable is subject to Nickell (1981) bias of order 1/T. In this case T=15 and the potential bias is thus relatively minor. However, we also estimate models excluding the dynamic component from the equation (2) and the overall wage flexibility estimate remains fairly robust. When exploring differences across mobility groups, we focus on the model without dynamics for easy exposition but report the full set of dynamic results in the Appendix.

To account for the possibility that unobserved labor quality or autonomous wage pressure, for instance arising from variations in rent capture and the extent of product market competition, have different time trends in different regions, we have also estimated equation (2) with regional trends $\sum_{j=2}^{J}(\mu_j' D_j)t$. However, including these regional trends does not alter the results.

For all reported results, standard errors in equation (2) are corrected for clustering on the 21 regions. We acknowledge that this number is somewhat lower than ideal. In practice, however, clustered standard errors are very similar in size (slightly larger) to robust standard errors without clusters.

4.4 Instrumenting regional unemployment

There is an obvious simultaneity problem when estimating the effect of unemployment on wage levels since high wage levels in a region, all else equal, are likely to contribute to a higher regional unemployment rate. To handle this issue, we use an instrumental variable approach, drawing on Bartik (1992, 2002). The strategy implies using the predicted regional employment growth as a source of exogenous variation in regional labor demand. The predicted regional employment growth is derived from interactions between the region's initial industry mix and the national employment growth of each industry. The idea is that the national employment growth in an industry is dependent on the aggregate demand of the industry's products, and therefore not directly affected by regional wages. The employment level for each region as of year *t* is predicted by allocating each two-digit industry's growth (the national average from 1998 to *t*) according to each region's initial exposure to the industries. Thus, we generate the instrument as:

$$instrument_{jt} = \sum_b \left(\frac{E_{bj98}}{E_{j98}}\right) * E_{bt}^{tot} \quad (3)$$

where E_{bj98} is the number of employees in industry *b* within region *j* in year 1998, E_{j98} is the total number of employees in region *j* in year 1998, E_{bt}^{tot} is the number of employees at the national level in industry *b* in year *t*.[20]

The instrument ensures that the variation in regional unemployment arise from the labor demand side. However, the IV-strategy cannot ensure that this demand shift only affect the labor market through the regional unemployment per se and not by other factors that are correlated with the labor demand that drive wage moderation, for example vacancies or firms' profits. But under the assumption that such demand shifts primarily affect the labor market directly (i.e. not through wages), we interpret the IV estimates as estimates of demand-induced changes in local labor-market conditions scaled according to the shocks' impact on the regional unemployment rate.

5 Results

The results from estimating equation (2) are presented in this section. To recap, the dependent variable is the composition-corrected monthly wage at the regional level in log form. The coefficient of the regional unemployment rate measures the short-run wage flexibility (elasticity). We also report estimates of the long-run elasticity of wages with respect to the regional unemployment, which is calculated using the estimated coefficients for the short-run elasticity and the estimate for the lagged dependent variable.

5.1 Main results

The results, presented in Table 1, show that the regional unemployment rate affects the private sector wage level. When the regional unemployment rate is treated as exogenous, the short-run elasticity of wages in the private sector varies in the range of -0.012 and -0.016, depending on whether or not the regional trends are included in the models (see columns 1 and 2 in Table 1). The results from the OLS-models indicate that the long-run elasticity of wages is around -0.035.

If we instead treat the regional unemployment as endogenous and instrument it with local labor market shocks, we get a higher estimated wage elasticity. This is as expected since the IV approach removes the counteracting process wherein high regional wage levels may lead to high unemployment. The short-run elasticity in the IV-model is -0.025 (see column 3 in Table 1).[21] Thus, doubling the regional unemployment rate (e.g. from 4 to 8 percent), would lead to 2.5 percent lower regional wage levels in the short-run. In the long-run, the regional wage level would instead be 7.5

[20] We only use private sector employees when constructing the instrument. The private sector is defined from the employers' sector code in the LISA database which differs somewhat from the definition of the private sector in the wage data.

[21] The first stage estimates are presented in column 3 in Table 12 in the Appendix.

percent lower. It should be stressed that, as noted above, the regional unemployment is an indicator for the regional business cycle conditions and it is not possible to distinguish whether it is the regional unemployment per se or some other factors that are correlated with the labor demand that drive the wage moderation, for example vacancies or firms' profits. However, the instrument ensures that the variation in regional unemployment arises from the labor demand side and not from variations in labor supply.

Table 1 Elasticity of wages in the private sector

Dependent variable: Ln(composition corrected monthly wage in the county)

	1	2	3
	OLS	OLS	IV
Ln(regional unemployment rate)	-0.012**	-0.016**	-0.025**
	(0.004)	(0.004)	(0.008)
Ln(regional wage $t-1$)	0.652**	0.475**	0.666**
	(0.037)	(0.086)	(0.040)
Long-run elasticity	-0.035**	-0.030**	-0.075**
Regional trends	No	Yes	No
Number of observations	315	315	315
Number of regions (cluster)	21	21	21

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the regional wages. ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. In the IV-model the regional unemployment is instrumented with local labor demand shocks.

5.2 The role of compositional adjustments

Our baseline model (used throughout, if not otherwise noted) accounts for selection on individual characteristics through the individual fixed effects in equation (1). To highlight the importance of this correction, and explore the role of demand side (i.e. firms) selection, we have re-estimated the first stage model without individual fixed effects and with different sets of alternative fixed effects. In Table 2, we show that accounting for the composition of the employees is indeed crucial for the estimated elasticity of wages. Without individual effects, the estimated elasticity becomes smaller and statistically insignificant. This result suggests that low-wage workers are more likely to be employed when unemployment is relatively low. Accounting for firm effects (column 2) does not change this picture. However, once individual fixed effects are included (column 3), it does not matter if these instead are specified by each individual-firm combination (the "match effects" of column 4).[22] Thus, the data suggest that selection on the supply side (workers) is important for our conclusions, but that our results are unaffected by the fact that our main model leaves selection on the demand side (firms) out of the model.

[22] Data in Table 2 is restricted to only include individuals with at least two wage observations in order to get comparable samples in different columns. Thus, the estimated coefficient for the lagged dependent variable and the calculated long-run elasticity in column 3 differ marginally from the results presented in column 3 in Table 1.

Table 2 Elasticity of wages with different fixed effects in the first stage composition correction of the regional wages, private sector

Dependent variable: Ln(composition corrected monthly wage in the county)

	1	2	3	4
	IV	IV	IV	IV
Ln(regional unemployment)	-0.004	-0.003	-0.025**	-0.023**
	(0.008)	(0.007)	(0.008)	(0.008)
Ln(regional wage $t-1$)	0.544**	0.551**	0.659**	0.681**
	(0.071)	(0.065)	(0.040)	(0.035)
Long-run elasticity	-0.008	-0.006	-0.073**	-0.073**
1st stage fixed effects:	None	Firm	Employee	Match
Number of observations	315	315	315	315
Number of regions (cluster)	21	21	21	21

Note: ** p<0.01, * p<0.05, + p<0.1. Individuals with only one wage observation and individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the regional wages in order to get comparable samples. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

5.3 Heterogeneity

5.3.1 BASIC DEMOGRAPHICS

There are small differences in wage flexibility between individuals with different levels of education (see Table 3) as well as between native-born and foreign-born individuals (see Table 4). The results also show that in the private sector the wages of men are more flexible than the wages of women (see Table 4). This probably reflects the fact that women in the private sector to a larger extent than men have jobs that are similar to public sector jobs, for instance jobs in privately provided health care and education. Wages in these sectors can plausibly be assumed to be anchored by local public sector wages in the same sectors, and these local public sector wages are more likely to be determined by non-market factors such as local budget constraints.[23]

[23] Estimating the model for public sector wages provide much smaller estimates, as expected. See Table 13 in the Appendix.

Table 3 Elasticity of wages for individuals with different education level

Dependent variable: Ln(composition corrected monthly wage for the group in the county)

	(1)	(2)	(3)
	IV	IV	IV
	Compulsory education	Secondary education	Post-secondary education
Ln(regional unemployment rate)	-0.020*	-0.025**	-0.019
	(0.008)	(0.008)	(0.012)
Ln(regional wage t−1)	0.540**	0.621**	0.730**
	(0.072)	(0.044)	(0.043)
Long-run elasticity	-0.043*	-0.065**	-0.070
Number of observations	315	315	315
Number of regions (cluster)	21	21	21

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the regional wages. ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

Table 4 Elasticity of wages for women, men, native-born and foreign-born

Dependent variable: Ln(composition corrected monthly wage for the group in the county)

	(1)	(2)	(3)	(4)
	IV	IV	IV	IV
	Women	Men	Native-born	Foreign-born
Ln(regional unemployment rate)	-0.017*	-0.031**	-0.027**	-0.031*
	(0.008)	(0.009)	(0.008)	(0.015)
Ln(regional wage t−1)	0.669**	0.625**	0.670**	0.580**
	(0.064)	(0.043)	(0.040)	(0.082)
Long-run elasticity	-0.051*	-0.083**	-0.081**	-0.074*
Number of observations	315	315	315	315
Number of regions (cluster)	21	21	21	21

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the regional wages. ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

5.3.2 LAGGED EMPLOYMENT STATUS AND UNEMPLOYMENT RISK

As described in Section 3, we separate between workers depending on their previous status (job-to-job movers, hires from unemployment, workers who stay within a match). Furthermore, we predict the unemployment risk of workers in order to find workers who remain in continued employment but who are more likely to be directly affected by unemployment. It should be kept in mind that the incidence of mobility changes with the regional cycle; in Table 14 in the Appendix we show that the incidence of job-to-job mobility is, as expected, pro-cyclical.

Since the dynamic model makes little sense for the sample of movers (the lag will be defined by previous movers), we focus on models without the lagged dependent variable in the main text. For completeness, we present the corresponding dynamic tables

in the Appendix.[24] As shown in Table 5, the wage flexibility appears to be lower (statistically insignificant) among job-to-job movers than among remaining workers. The effect is largest for workers entering from unemployment. Among stayers (workers remaining in their current employment), the impact appear to be somewhat higher for workers with higher-than-average estimated unemployment risk. Overall, it is surprising that job-to-job movers appear unaffected and that the impact of the predicted unemployment risk is so limited. We return to the issue below.

Table 5 Wage flexibility by unemployment risk and for transitions, private sector

Dependent variable: Ln(composition corrected monthly group wage in the county)

	1	2	3	4
	IV	IV	IV	IV
	Within match low u risk	Within match high u risk	Job-to-job	Unemployment to job
Ln(regional unemployment)	-0.034^{+}	-0.049**	-0.022	-0.065**
	(0.019)	(0.017)	(0.023)	(0.029)
Number of observations	294	294	294	294
Number of regions (cluster)	21	21	21	21
Share of 1st stage observations	42 %	41 %	11 %	6 %

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the group's regional wage. ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

5.3.2 LOW-FLEX AGREEMENTS

Next, we analyze the data depending on the degree of formalized local flexibility, as we believe that industries with more centralized wage setting practices should absorb less of the local shocks in wages. This hypothesis is confirmed by the results presented in Table 6. The low-flex industries have a non-existent wage response to changes in the local unemployment rate, whereas the rest of the private sector has a wage elasticity of 3 percent in the short-run and almost 9 percent in the long-run.

[24] See Table 15, Table 16 and Table 17 in the Appendix.

Table 6 Elasticity of wages with different degree of flexibility in wage agreements, private sector

Dependent variable: Ln(composition corrected monthly wage in the county)

	1	2	3	4
	Low-flex industries		Private sector excl. low-flex industries	
	IV	IV	IV	IV
Ln(regional unemployment)	-0.029	-0.017	-0.056*	-0.030**
	(0.040)	(0.011)	(0.022)	(0.008)
Ln(group wage $t-1$)		0.750**		0.661**
		(0.059)		(0.041)
Long-run elasticity		-0.068		-0.087**
Number of observations	336	315	336	315
Number of regions (cluster)	21	21	21	21

Note: ** p<0.01, * p<0.05, $^{+}$ p<0.1. Individuals with only one observation and individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the regional wages. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks. The first stage IV-estimates are presented in Table 12 in the Appendix.

Furthermore, Table 7 shows that actual wages in low-flex industries do not even have significant adjustments in response to changes in the county-level unemployment rate in the case of workers with high unemployment risk or among entrants from unemployment although the lack of statistical precision is an issue in this case.

In contrast, in Table 8 that excludes the low-flex industries, we find much larger point estimates suggesting that wages respond much more in these industries. The difference between the samples appears most pronounced for the more marginal workers. When excluding low-flex industries, wages of employees with high unemployment risk respond twice as much as workers with low unemployment risk. The response for workers entering from unemployment is twice as large as in the low-flex agreements.

The last set of results highlights an important association between contractual flexibility and employment stability. As shown in Figure 4, low-flex agreements cater to the high risk workers to a disproportional extent. The share of workers with more than 10 percent risk of job-loss into unemployment is twice as high in low-flex industries as in other areas (39 vs. 19 percent of workers).

Table 7 Wage flexibility by unemployment risk and for transitions, low-flex industries

Dependent variable: Ln(composition corrected monthly group wage in the county)

	1	2	3	4
	IV	IV	IV	IV
	Within match low u risk	Within match high u risk	Job-to-job	Unemployment to job
Ln(regional unemployment)	-0.028	-0.038	-0.0003	-0.046
	(0.027)	(0.040)	(0.029)	(0.037)
Number of observations	294	294	294	294
Number of regions (cluster)	21	21	21	21
Share of 1st stage observations	26 %	51 %	12 %	11 %

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the group's regional wage. ** p<0.01, * p<0.05, + p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

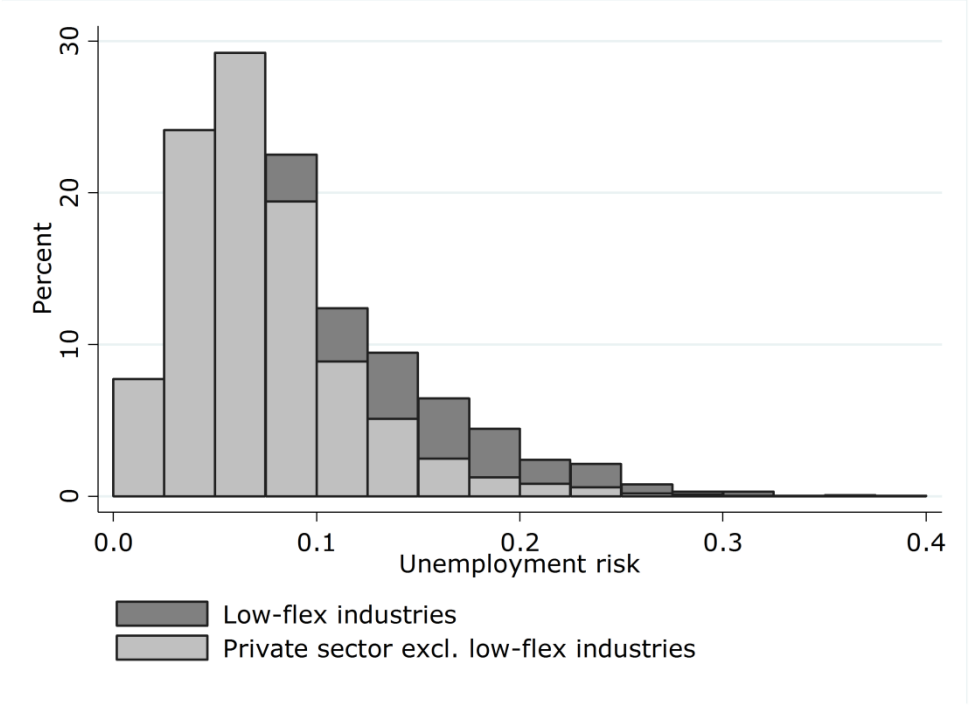
Table 8 Wage flexibility by unemployment risk and for transitions, private sector excluding low-flex industries

Dependent variable: Ln(composition corrected monthly group wage in the county)

	1	2	3	4
	IV	IV	IV	IV
	Within match low u risk	Within match high u risk	Job-to-job	Unemployment to job
Ln(regional unemployment)	-0.035+	-0.061**	-0.034	-0.084**
	(0.019)	(0.021)	(0.022)	(0.031)
Number of observations	294	294	294	294
Number of regions (cluster)	21	21	21	21
Share of 1st stage observations	45 %	39 %	11 %	6 %

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the group's regional wage. ** p<0.01, * p<0.05, + p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

Figure 4 Distribution of unemployment risk



Note. Register-based unemployment. A small amount of observations have a predicted unemployment risk which is smaller than zero or higher than 40 percent. These are not shown in the figure.

6 Conclusions

In this paper, we have analyzed the impact of regional unemployment rates on actual wages on the Swedish labor market. The setting is one where the aggregate wage distribution has remained remarkably stable across almost 20 years, with steadily growing real wages in all parts of the distribution. The stability is consistent with the institutional environment with the Swedish pattern bargaining system where all sectors are expected to follow the industrial agreement benchmark. Despite these institutional rigidities and the aggregate stability, we find evidence of substantial local wage flexibility. Our preferred estimates which account for differential selection of workers and which isolates demand induced movements in unemployment suggest a wage-unemployment elasticity of −0.025 in the short run and −0.075 in the long run. These numbers are well in line with the international evidence. Using models that are more in line with the previous international models provide responses of about half this magnitude, which we still interpret as non-trivial local flexibility. Thus, our results suggest that it is possible to combine stable wage dispersion with local flexibility. However, further results suggest that the degree of flexibility varies depending on the content of collective agreements. Contracts with less formal flexibility have less actual local flexibility. Furthermore, workers with a very high unemployment risks are disproportionally often found in precisely these less flexible agreements.

Overall, our results suggest that the Swedish-style pattern bargaining model can be combined with substantial relative wage adjustments. The results do not support the

view that the structure is rigid enough to prevent local labor markets adjusting wages when local labor demand shifts. Thus, the institutions do not appear to be a major reason as to why there have been relatively small nominal wage increases despite of labor shortages in many sectors during the recent economic boom. At the same time, the design of the industry-level contracts appears to matter for the degree of actual flexibility. The workers most prone to job-loss into unemployment disproportionally often work in the industries with the least wage flexibility, suggesting that unemployment for vulnerable workers may remain persistently high if there are adverse shocks within these labor market segments.

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Appendix

Table 9 Descriptive statistics on the regional panel data

	N	Mean	SD	Min	Max
County employment rate	336	76.29	2.58	69.47	83.20
Share of women in the county	336	0.49	0.01	0.48	0.50
Share of foreign born in the county	336	0.12	0.05	0.04	0.29
Share with basic education in the county	336	0.18	0.04	0.09	0.29
Share with secondary education in the county	336	0.52	0.04	0.40	0.57
Share with post-secondary education in the county	336	0.31	0.06	0.20	0.48
County unemployment rate	336	5.70	1.66	2.16	10.54
Instrument	336	76716.59	4880.67	63705.81	87107.11
CPI inflation (annual)	336	1.26	1.07	-0.30	3.40
Ln wage for all private sector employees	336	10.23	0.25	9.79	10.70
Ln wage for low-flex industries	336	9.76	0.20	9.41	10.11
Ln wage for all other industries in the private sector	336	10.69	0.30	10.17	11.26

Table 10 Descriptive statistics, employees in low-flex industries

Individual level data

	N	Mean	SD	Min	Max
Monthly wage	2622117	22622.77	7243.08	11916.00	90783.00
Ln monthly wage	2622117	9.99	0.27	9.39	11.42
Age	2622117	40.26	12.62	20.00	64.00
Woman	2622117	0.54	0.50	0.00	1.00
Foreign born	2621837	0.18	0.38	0.00	1.00
Basic education	2610077	0.21	0.41	0.00	1.00
Secondary education	2610077	0.59	0.49	0.00	1.00
Post-secondary education	2610077	0.20	0.40	0.00	1.00
Married	2622116	0.37	0.48	0.00	1.00
Children aged 0−6	2622117	0.17	0.37	0.00	1.00

Table 11 Descriptive statistics, private sector employees excluding low-flex industries

Individual level data

	N	Mean	SD	Min	Max
Monthly wage	14100056	27134.91	10346.32	11916.00	90798.00
Ln monthly wage	14100056	10.15	0.33	9.39	11.42
Age	14100056	42.16	11.40	20.00	64.00
Woman	14100056	0.35	0.48	0.00	1.00
Foreign born	14099540	0.11	0.31	0.00	1.00
Basic education	14060125	0.14	0.35	0.00	1.00
Secondary education	14060125	0.52	0.50	0.00	1.00
Post-secondary education	14060125	0.33	0.47	0.00	1.00
Married	14100056	0.46	0.50	0.00	1.00
Children aged 0−6	14100056	0.20	0.40	0.00	1.00

Table 12 First-stage IV-estimation results

Dependent variable: Ln(regional unemployment)

	(1) Low-flex industries	(2) Private sector excl. low-flex industries	(3) Private sector
Instrument	-0.00008** (0.00002)	-0.00008** (0.00002)	-0.00009** (0.00002)
Ln(regional wage *t*−1)	0.336 (1.403)	2.059+ (1.019)	2.156+ (1.091)
Year dummies:			
2000	0.181 (0.110)	0.052 (0.147)	0.063 (0.145)
2001	0.175 (0.155)	-0.080 (0.226)	-0.054 (0.215)
2002	0.231 (0.214)	-0.146 (0.298)	-0.106 (0.280)
2003	0.318 (0.255)	-0.179 (0.362)	-0.120 (0.333)
2004	0.575+ (0.324)	-0.020 (0.442)	0.050 (0.409)
2005	0.580 (0.381)	-0.120 (0.506)	-0.036 (0.466)
2006	0.503 (0.432)	-0.310 (0.584)	-0.206 (0.537)
2007	0.405 (0.505)	-0.514 (0.667)	-0.397 (0.614)
2008	0.572 (0.566)	-0.475 (0.747)	-0.339 (0.687)
2009	0.904 (0.609)	-0.308 (0.802)	-0.148 (0.726)
2010	1.068 (0.669)	-0.234 (0.879)	-0.058 (0.798)
2011	1.120 (0.731)	-0.261 (0.949)	-0.073 (0.864)
2012	1.223 (0.790)	-0.276 (1.019)	-0.070 (0.926)
2013	1.235 (0.858)	-0.380 (1.086)	-0.158 (0.986)
County population shares of			
–Women	5.707 (9.748)	1.172 (10.398)	1.965 (10.147)
–Individuals with compulsory eduction	8.321** (2.701)	6.762* (2.482)	6.749* (2.542)
–Individuals with post-secondary education	-0.408 (3.715)	-1.937 (3.343)	-1.861 (3.511)
–Foreign-born	7.285* (3.380)	7.206* (3.365)	7.104+ (3.456)
Number of observations	315	315	315
Number of regions (cluster)	21	21	21
R-squared	0.895	0.899	0.898

Note: ** p<0.01, * p<0.05, + p<0.1. Standard errors in parentheses are corrected for clustering on region.

Source: NIER.

Table 13 Elasticity of wages in the public sector

Dependent variable: Ln(composition corrected monthly wage in the county)

	1	2	3
	OLS	OLS	IV
Ln(regional unemployment rate)	-0,002	-0,004+	-0,015**
	(0,002)	(0,002)	(0,005)
Ln(regional wage *t*−1)	0,667**	0,361**	0,730**
	(0,049)	(0,086)	(0,074)
Long-run elasticity	-0,006	-0,006+	-0,057**
Regional trends	No	Yes	No
Number of observations	315	315	315
Number of regions (cluster)	21	21	21

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the regional wages. ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. In the IV-model the regional unemployment is instrumented with local labor demand shocks.

Table 14 Probability to change job without unemployment

Dependent variable: Changed employer since the previous year

	Low-flex industries	Private sector excl. low-flex industries	All private sector employed
Ln(regional unemployment)	−0.006** (0.0006)	−0.009** (0.0002)	−0.009** (0.0002)
Number of observations	2,214,418	11,742,193	13,956,611
Number of employed	570,447	2,203,978	2,605,926

Note: ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. The estimated models are linear probability predictions with individual and year fixed effects controlling for age, age^{2}, dummy variables för married, children aged 0−6 years and industry.

Table 15 Wage flexibility by unemployment risk and for transitions, private sector

Dependent variable: Ln(composition corrected monthly group wage in the county)

	1	2	3	4
	IV	IV	IV	IV
	Within match low u risk	Within match high u risk	Job-to-job	Unemployment to job
Ln(regional unemployment)	-0.030**	-0.031**	-0.013	-0.043+
	(0.009)	(0.008)	(0.012)	(0.024)
Ln(group wage *t*−1)	0.541**	0.561**	0.314**	0.219**
	(0.037)	(0.056)	(0.061)	(0.076)
Long-run elasticity	-0.065**	-0.070**	-0.019	-0.054+
Number of observations	273	273	273	273
Number of regions (cluster)	21	21	21	21
Share of 1st stage observations	42 %	41 %	11 %	6 %

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the group's regional wage. ** p<0.01, * p<0.05, $^{+}$ p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

Table 16 Wage flexibility by unemployment risk and for transitions, low-flex industries

Dependent variable: Ln(composition corrected monthly group wage in the county)

	1	2	3	4
	IV	IV	IV	IV
	Within match low u risk	Within match high u risk	Job-to-job	Unemployment to job
Ln(regional unemployment)	-0.015	-0.019	0.001	-0.039
	(0.012)	(0.014)	(0.022)	(0.030)
Ln(group wage $t-1$)	0.551**	0.666**	0.190*	0.179*
	(0.087)	(0.055)	(0.090)	(0.079)
Long-run elasticity	-0.034	-0.057	0.001	-0.048
Number of observations	273	273	273	273
Number of regions (cluster)	21	21	21	21
Share of 1st stage observations	26 %	51 %	12 %	11 %

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the group's regional wage. ** p<0.01, * p<0.05, + p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

Table 17 Wage flexibility by unemployment risk and for transitions, private sector excluding low-flex industries

Dependent variable: Ln(composition corrected monthly group wage in the county)

	1	2	3	4
	IV	IV	IV	IV
	Within match low u risk	Within match high u risk	Job-to-job	Unemployment to job
Ln(regional unemployment)	-0.032**	-0.036**	-0.019+	-0.063**
	(0.009)	(0.009)	(0.011)	(0.022)
Ln(group wage $t-1$)	0.538**	0.593**	0.324**	0.191**
	(0.037)	(0.048)	(0.065)	(0.066)
Long-run elasticity	-0.069**	-0.089**	-0.028+	-0.078**
Number of observations	273	273	273	273
Number of regions (cluster)	21	21	21	21
Share of 1st stage observations	45 %	39 %	11 %	6 %

Note: Individuals with very high (>99th percentile) or very low (<1th percentile) wages are excluded from the first stage composition correction of the group's regional wage. ** p<0.01, * p<0.05, + p<0.1. Standard errors in parentheses are corrected for clustering on region. All models incude time-varying regional controls, regional fixed effects and year fixed effects. The time-varying regional controls are the proportion with compulsory and post-secondary education, female and foreign-born in the population. The regional unemployment is instrumented with local labor demand shocks.

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