Unemployment Compensation and Wages: Evidence from the German Hartz Reforms

Stefan Arent and Wolfgang Nagl[*]
ifo Institute, Branch Dresden

Summary

Using the introduction of fixed unemployment assistance in Germany in 2005 as a unique natural experiment, we find strong evidence that decreased unemployment compensation has an adverse effect on wages. We use micro panel data to identify and estimate the effect of this structural break. In eastern and western Germany, the relative effect is higher for women. In western Germany, the relative effect increases with skill level. In eastern Germany, there is no clear skill-specific pattern.

1 Introduction

In this paper, we examine the effect of decreasing unemployment compensation (UC) payments on wages. Economic theory predicts that decreasing UC leads to decreased wages and higher rates of employment. This effect is the result of a decreased outside option in the context of wage bargaining and has been extensively modeled in the literature on search models (see Rogerson et al. 2005). Empirical findings support this prediction. There are two approaches that can be used to examine the effect of decreased UC on wages. The first approach is to measure the effect of UC on reservation wages by using survey data (see Feldstein/Poterba 1984 or Addison et al. 2009). The second approach is to measure the direct effect of UC on wages (see Topel 1984 or McCall/Chi 2008). To determine the effect of decreased UC on wages, we follow the second approach, using exogenous variation of the UC that is generated by a quasi-natural experiment resulting from an extensive reform of the German labor market: the Hartz reforms. As a result of the Hartz reforms, the decreased unemployment assistance (UA) for individuals who are unemployed in the long-term generates exogenous variation in the UC payments. The Hartz reforms were implemented between 2003 and 2006.

The main components of these reforms include increasing the flexibility of the labor market and decreasing the overall amount of UA (see Jacobi/Kluve 2007). Prior to 2005, UA was calculated as a fraction of the individual's earnings. Since 2005, however, the UA is means-tested and is not related to an individual's income. We use panel data from the Federal Employment Agency of Germany (2008) (BA-Employment Panel 1998-2007) to show the negative effect of this UA reduction on wages.

The remainder of this paper is organized as follows. Section 2 gives an overview of the German Hartz reforms. Section 3 describes our data. In Section 4, we explain our method and estimation strategy. In Section 5, we show empirical evidence for a decreasing wage effect. Section 6 concludes this study.

2   The German Hartz-reform

The Hartz reforms constitute the most comprehensive German labor market reform of the last decade. A good overview of legislative German labor market reforms since 1990 is provided by Ebbinghaus and Eichhorst (2006). The Hartz reforms consist of four parts. Hartz I and Hartz II increase the flexibility of the German labor market; these reforms were introduced at the beginning of 2003. The primary components of the reforms were designed to ease temporary work, to introduce a new start-up grant scheme and to liberalize the Mini-Jobs legislation.[1] Hartz III governs the reorganization of the German Federal Employment Agency. The Hartz-IV reform is the most important reform for the purposes of the quasi-natural experiment used in this paper. Hartz IV consists of two main components.[2]

The first and most important aspect of Hartz IV is that it introduced fixed and means-tested UA payments (ALG II) on the 1st of January, 2005. Prior to this date, the UA formula was determined by 53 % (or 57 % with a child) of the individual's former net wages. In 2005, the UA transitioned to a means-tested and non-income-related payment at a fixed level of 345 EUR plus means-tested housing costs.[3] Furthermore, after 2005, the law clearly stipulates that unemployed individuals must accept reasonable offers of employment. If an unemployed individual refuses a reasonable offer of employment, then his or her UA is reduced (Social Security Code; SGB II § 31 etseq).

The amount of income lost as a result of the Hartz-IV reform increases as the individual's former net wages increase. This result has two primary causes. First, the new lower amount of monthly support is independent from the individual's former income. Second, UA payments are now means-tested. If an individual has significant financial assets or if the individual's partner has a sufficiently high income, his or her UA payments could decrease to zero. Schulte (2004) shows that, the overwhelming majority of German households' financial assets do not exceed the maximum asset allowance of the UA. Unlike financial assets, however, the spouse's income plays a significant role in determining an unemployed individual's UA payments. The Hartz-IV reform decreases the amount of the UA for 59 % of households; 25 % of all households lose the entirety

---

[1] For Mini Jobs (earnings up to 400 EUR) the contribution rate to the social insurance is decreased in comparison to for regular employment subjected to social insurance contribution.

[2] In addition top-up benefits has been introduced to ease the re-employment of long-term unemployed via a wage subsidy.

[3] The ALG II replaced the two previous, parallel systems of non-means-tested unemployment assistance and means-tested social assistance.

of their UA claim. Couples without children are particularly affected by the Hartz-IV reform. Nearly every other couple without children (47 %) loses their UA claim completely. For 82 % of childless couples, the UA claim amount is decreased as a result of the reform. However, 72 % of single-parent households receive a higher UA claim amount after 2005. On average, for single-person households and couples with more than one child, the UA situation does not change substantially as a result of the Hartz-IV reform (Schulte 2004).[4]

The second important result of the Hartz-IV reform was that it shortened the maximum short-term period an individual was entitled to receive unemployment benefits (ALG I) to 18 months, effective on the 1st of February, 2006.[5] The length of benefits entitlement depends on the length of the individual's former employment and age. The minimum qualifying requirement to receive a short-term unemployment benefit (ALG I) for 6 months is a period of 12-month employment during the last 2 years that was subject to social insurance withholding. The ALG I is 60 % (or 67 % with a child) of individual's previous net wage. The ALG I is not means-tested and has a maximum payment level.[6]

Both components of the Hartz-IV reform reduce the expected value of financial support during unemployment. Because the entitlement length of ALG I benefits was also limited before the reform, one can theorize that introducing ALG II payments would have a greater effect on an individual's expected value of financial support during unemployment.

3   Data

We use the BA-Employment Panel 1998–2007, which consists of 2 percent of all employees that were subject to social insurance contribution and are unemployed in Germany.[7] This dataset is representative and contains quarterly information for individuals and firms from the first quarter of 1998 until the last quarter of 2007. We restrict our analysis to a balanced panel from the first quarter of 2000 to the fourth quarter of 2007. Prior to 2000, it was not possible to track individuals through periods of unemployment. Because we are interested in the effects of decreased UA payments on regular employees, we focus on full-time employees. Our sample contains all individuals who worked at least one quarter between the first quarter of 2000 and the fourth quarter of 2007 and were registered as unemployed while they were not working.

Our sample contains the following data on individuals: sex, age, wage, employment status, job tenure, education, type of employment and unemployment status. All information is collected at the end of each quarter. The wage is reported as the nominal gross salary per month. To avoid a time trend of the dependent variable, we calculate the real gross salary per month by using the German Harmonized Index of Consumer Prices (Federal Statistical Office of Germany 2011a). The real wages were stationary between

---

[4] Single person households with a net income of more than 1404 EUR are affected by the Hartz-IV-reform.

[5] The legislation was later changed so that the maximum period is now 24 months for older employees.

[6] The upper limit of ALG I depends on the (social security) contribution assessment ceiling.

[7] A detailed description of the data can be found in Schmucker and Seth (2009).

2000 and 2007.[8] The employment status is reported by the employer and is classified into four groups: unskilled blue-collar workers, skilled blue-collar workers, foremen and white-collar workers (the reference group). The job tenure is measured as an individual's duration (in quarters) of employment at a given firm. Education level is classified into three groups: low-skilled, medium-skilled and high-skilled. Workers without vocational training are classified as low-skilled, workers who have completed vocational training are classified as medium-skilled, and workers with academic degrees are classified as high-skilled employees.

For the empirical estimation, we use the following firm-specific information: firm size, industry and the age structure of the employees. The firm size is classified into three groups. A small firm has less than 50 employees and a large firm has more than 200 employees. We use medium size firms, classified as having between 50 and 200 employees, as a reference group. We distinguish the following industries: construction, manufacturing, wholesale and retail trade, real estate, rental and business activities, transport, storage and communication and financial intermediation.[9] The age structure of a firm is described by the share of older (>55 years of age) and younger (<20 years of age) employees. These variables are intended to absorb effects such as seniority wage effects. To account for the influence of business cycles, we include the industry-specific gross value added (real annual value, base year: 2000) (Federal Statistical Office of Germany 2010) and dummy variables for each quarter.

Because of structural differences in the labor markets, we divide the dataset into eastern and western Germany (see Kronthaler 2003 or Smolny 2009). This segmentation is based on job location. Very low and very high wages may distort the analysis for „regular" wages. Wages above the maximum level that must be reported for social insurance contributions are reported voluntarily. If the wage is not reported voluntarily, the maximum level that must be reported for social insurance contributions is reported as the individual's wage. To avoid biasing our analysis because of missing wage information, we truncate our data at the 5th percentile and at the 95th percentile. After these restrictions, our sample still contains 136, 949 men and 49, 240 women in western Germany and 25, 995 men and 17, 419 women in eastern Germany.

4   Methodology

The level of UA payments has a positive effect on wages. This positive effect can be shown using a wage bargaining model. The greater the UA, the greater the outside option that is available to employees; thus, higher UA payments result in higher wages. In search models with rational workers and profit-maximizing firms, this type of wage bargaining is used to derive an equilibrium wage (see Rogerson et al. 2005). Thus, the wage is a positive function of the UA. Therefore, decreasing the UA should decrease wages. The introduction of the means-tested, non-income related UA in 2005 is a quasi-natural experiment in which the UA decreases. The decrease of the UA weakens the worker's

---

[8] Since we observe a fixed number of time periods, we applied the Harris-Tzavalis test for stationarity (Harris/Tzavalis 1999). The non-stationarityhypothesisis only not discarded forlow-and high-skilled womenin eastern and western Germany in the Construction Industry. These two groups are too small to allow reliable test results. The use of alternative inflation data (BIP Deflator) does not change the results.

[9] The industries follow the European national accounting system (Federal Statistical Office of Germany 2007).

outside option and decreases the worker's bargaining power in individual or collective wage bargaining (e. g., bargaining through a union) (see Rowthorn 1999). This may induce moderate wage claim.

Our estimation strategy is consistent with the idea of a structural break in the German labor market in 2005. We identify this structural break using a Chow-test.[10] We do not detect a structural break for the shortening of short-term unemployment benefits entitlement periods in 2006. We estimate the effect of introducing means-tested, non-income related UA payments on the real wage in 2005. We use the following empirical model:[11]

$$\ln\left(w_{it}\right) = \beta_0 + \beta_1 lower\ UA_t + controls + a_i + u_{it}.$$

The logarithmic value of the real wage w of each employed individual i in period t is estimated with a constant β_0, a time dummy variable to measure the effect of the lower UA ($lower\ UA_t$), several control variables, a personal fixed effect a_i and an error term, u_{it}. The variable $lower\ UA$ is constant after 2005.

Because the decreased UA payments affect all socially insured employees, it is not possible to identify a treatment and a control group to isolate the pure effect of the lower UA. Nevertheless, we are confident that the parameter β_1 reveals the effect of the lower UA on wages. We are confident about this conclusion because we are able to isolate the effect of the *lower UA* dummy variable by using a wide set of control variables and sensitivity tests. Our model controls for age, age squared, professional status, firm size, the firm's age structure, individual job tenure, annual values of the industry-specific gross value added per worker and dummy variables for each quarter.[12] The industry-specific gross value added and the dummy variables for each quarter are included to account for time fixed effects.[13] In a balanced panel with a fixed effects model, the age variables account for a portion of the time trend effects. To ensure that the lower UA dummy does not simply mirror decreasing wage returns to age, we estimate our model as a sensitivity test without the age variables. Our results remain stable and are robust to this model specification.[14] As a further sensitivity test, we estimate placebo regressions with artificial reform variables. Instead of the variable lower UA, we introduced dummy variables for artificial reforms in every year except for 2005.[15] After 2004, the effect of the artificial reform dummy variable becomes negative. This effect is quite small when compared to the negative effects observed in 2005, 2006 and 2007. This result supports our assumption that the wage-dampening effect of the Hartz reforms begins to occur in 2005.

---

[10] To find additional support for the results of the Chow-test, we split our sample into two sub-samples: before (year 2003) and after the introduction (year 2007) of the means-tested UA payments. We exclude the period from 2004 to 2006 to avoid transition effects. The pooled regressions for both sub-samples show a significantly lower constant after the reform for everyone in the sample except for eastern German men. The remaining coefficients are quite similar (see Tables A1 and A2).

[11] Link tests (Pregibon 1980) support the dependent variable in logarithmic values. Furthermore, itallows an analysis of the relative effect of the reform, regardless of income level.

[12] We cover possible seasonal effects with dummy variables for each quarter other than the first quarter of the year.

[13] We use the industry-specific gross value added instead of the unemployment rate because there are no data on industry specific unemployment in Germany.

[14] The estimation results can be found in Table A3.

[15] Table A4 shows the coefficients of these artificial reform dummies.

Because we are interested in the variation in wages over time, we run individual fixed effect (FE) regressions. In a first step model, we estimate our empirical model separately for men and women in eastern and western Germany. This estimation gives a first impression of the effect of decreased UA payments on wages. In a second step model, we study skill-specific and industry-specific effects. Because of the information on skill, sex, industries and region for each worker does not vary over time, we estimate the model for men and women and the three skill levels for six different industries, according to the European national accounting system (see Federal Statistical Office of Germany 2007) for eastern and western Germany.[16] To preserve the resolution of our analysis while preserving the quality of the data, only industries with a share of more than 4 percent of all employees are considered.[17]

5   Results

In this section, we show evidence that the introduction of the decreased UA in 2005 leads to a decrease in wages. As mentioned in the previous section, in Table 1, we first present the empirical evidence for men and women in eastern and western Germany, irrespective of industry and skill level.

For men and women in eastern and western Germany, we find a highly significant, negative effect of the lower UA variable. The estimated coefficients presented in Table 1 are the marginal effects. In western Germany, the decreased UA variable shows a ceteris paribus 2.4 % decrease in wages for men and a 2.6 % decrease in wages for women after 2005. In eastern Germany, the relative effect is smaller for men (2.0 %), but higher for women (2.7 %). The negative coefficient of lower UA does not imply that wages decreased after 2005. The overall wage would only have decreased if all other variables would have remained constant in the absence of the Hartz reforms. However, we know empirically that this was not the case.

The relative effect is higher for women in both parts of Germany. This may reflect the fact that women have a weaker bargaining position. This weaker position may result from the fact that women typically work in less productive industries such as the service sector, health care or the public sector (Beblo et al. 2008). Because of the higher relative wage level, the absolute effect of the lower UA is stronger in western Germany.[18]

To allow a more detailed analysis, we now present the results for the skill-specific and industry-specific estimations. This study included 72 regressions in total. We estimate fixed effect regressions to identify the effect of the lower UA for men and women, six industries and three skill levels in eastern and western Germany. Tables 2 and 3 present the marginal effect of the lower UA dummy variable with respect to the industry, skill and gender of the worker.

In every industry, for nearly all skill levels and for both genders, we confirm the highly significant negative coefficients of the general estimations for western Germany (see Table 2). For the largest subsample of medium-skilled men in the manufacturing industry

---

[16] An aggregate estimation with dummy variable for each industry would be biased. By using a fixed effect estimation with dummy variables for the different industries, the coefficients of these dummy variables would be driven by the minority of inter-industrial mobile workers. Theory and empirics (Neal 1995) show that inter-industrial mobility is small.

[17] Overall, the chosen six industries contain more than 96 % of the working population in the private sector between 2000 and 2007 (Federal Statistical Office of Germany 2011b).

[18] In Table A5, we present the estimation results for the dependent variable of wage in absolute values.

Table 1 FE estimation results for men and women in eastern and western Germany

	western Germany		eastern Germany	
dependent variable: ln(wage)	men	women	men	women
constant	7.1851***	6.8753***	7.1069***	6.8522***
	(0.0093)	(0.0154)	(0.0233)	(0.0314)
lower UA	−0.0240***	−0.0259***	−0.0200***	−0.0271***
	(0.0002)	(0.0004)	(0.0006)	(0.0007)
age	0.0346***	0.0400***	0.0248***	0.0303***
	(0.0004)	(0.0006)	(0.0009)	(0.0013)
age^2	−0.0004***	−0.0004***	−0.0003***	−0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
unskilled blue collar worker	−0.0759***	−0.0538***	−0.0858***	−0.0644***
	(0.0026)	(0.0056)	(0.0065)	(0.0097)
skilled blue collar worker	−0.0590***	−0.0407***	−0.0713***	−0.0605***
	(0.0023)	(0.0060)	(0.0058)	(0.0089)
foreman	0.0036	0.0018	−0.0016	0.0289
	(0.0036)	(0.0167)	(0.0101)	(0.0206)
small firm	−0.0240***	−0.0233***	−0.0201***	−0.0215***
	(0.0009)	(0.0018)	(0.0021)	(0.0030)
large firm	0.0230***	0.0211***	0.0247***	0.0127***
	(0.0009)	(0.0016)	(0.0026)	(0.0027)
firm's share of young employees	−0.0129***	−0.0341***	0.0139	0.0203*
	(0.0042)	(0.0064)	(0.0093)	(0.0116)
firm's share of old employees	−0.0123***	−0.0284***	−0.0209***	−0.0134*
	(0.0030)	(0.0049)	(0.0063)	(0.0073)
industrial-specific gross value added	0.0005***	0.0002***	0.0005***	0.0005***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
job Tenure	0.0014***	0.0005***	0.0016***	0.0008***
	(0.0000)	(0.0000)	(0.0000)	(0.0001)
2nd quarter	−0.0043***	−0.0040***	−0.0043***	−0.0040***
	(0.0000)	(0.0000)	(0.0001)	(0.0001)
3rd quarter	−0.0088***	−0.0078***	−0.0092***	−0.0082***
	(0.0000)	(0.0001)	(0.0002)	(0.0002)
4th quarter	−0.0101***	−0.0089***	−0.0094***	−0.0084***
	(0.0000)	(0.0001)	(0.0002)	(0.0002)
R^2 (overall)	0.33	0.11	0.31	0.17
R^2 (within)	0.08	0.07	0.05	0.04
obs.	4 064 672	1 403 530	728 539	491 444

Industry-specific gross value added per worker is given annually.
Source: authors' calculation. Significance-level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parentheses.

in western Germany, the marginal effect of lower UA is −1.7 %, ceteris paribus. After controlling for the industry-specific effect, there is no clear evidence whether the effect of the lower UA is stronger for men or women. In many industries, for both men and women, the effect of the lower UA increases with the worker's skill level. The higher effect for high-skilled workers may be driven by a stronger relative decrease of the UA level. Recall that after 2005, the level of the UA is independent from the individual's wage. After 2005, the lower fixed levels of UA payments significantly weaken the fall-back position of highly qualified workers. The differences between industries are not

Table 2 Marginal effects of lower UA on the logarithmic wages with respect to industry, gender and skill level in western Germany

	Construction industry	Manu-facturing industry	Wholesale and retail trade	Real estate, renting and business activities	Transport, storage and communica-tion	Financial inter-mediation
			Men			
Low	−0.0195***	−0.0158***	−0.0196***	−0.0289***	−0.0225***	−0.0240***
	(0.0029)	(0.0009)	(0.0028)	(0.0044)	(0.0026)	(0.0071)
R^2 (within)	0.10	0.04	0.05	0.03	0.08	0.18
Obs.	30,828	226,234	41,384	15,388	33,231	4,476
Medium	−0.0223***	−0.0166***	−0.0266***	−0.0266***	−0.0205***	−0.0287***
	(0.0009)	(0.0004)	(0.0009)	(0.0013)	(0.0011)	(0.0012)
R^2 (within)	0.10	0.10	0.07	0.08	0.06	0.29
Obs.	292,236	1,254,838	475,837	192,017	213,330	122,192
High	−0.0243***	−0.0276***	−0.0600***	−0.0432***	−0.0282***	−0.0411***
	(0.0037)	(0.0007)	(0.0033)	(0.0015)	(0.0047)	(0.0021)
R^2 (within)	0.15	0.33	0.22	0.21	0.20	0.44
Obs.	13,532	194,734	36,564	104,933	8,915	28,022
			Women			
Low	−0.0174	−0.0169***	−0.0283***	−0.0315***	−0.0139**	−0.0130**
	(0.0108)	(0.0014)	(0.0042)	(0.0061)	(0.0065)	(0.0058)
R^2 (within)	0.14	0.04	0.05	0.11	0.09	0.11
Obs.	1,097	82,843	18,914	6,502	4,613	6,394
Medium	−0.0103**	−0.0150***	−0.0295***	−0.0283***	−0.0190***	−0.0247***
	(0.0044)	(0.0011)	(0.0015)	(0.0020)	(0.0028)	(0.0018)
R^2 (within)	0.04	0.09	0.06	0.07	0.08	0.18
Obs.	20,589	206,480	205,593	109,517	47,000	84,399
High	0.0283	−0.0215***	−0.0454***	−0.0443***	−0.0110	−0.0406***
	(0.0252)	(0.0043)	(0.0073)	(0.0058)	(0.0157)	(0.0072)
R^2 (within)	0.07	0.10	0.06	0.07	0.14	0.12
Obs.	1,594	20,417	11,030	21,302	2,836	8,252

Dependent variable: ln(wage)
Controls: age, age², professional status, firm-size, firḿs age structure, industry-specific gross value added per worker, job tenure, quarter dummies
Source: authors' calculation. Significance-level: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

systematic. For the construction and manufacturing industry, as well as for transport, storage and communications, the effect is smaller in contrast to the effect on the wholesale and retail trade industry, the real estate industry, the rental and business activities industry, as well as to the financial intermediation industry.

In eastern Germany, the lower UA has a significant negative effect, but the effect is smaller than in western Germany. For medium-skilled men in the manufacturing industry, the effect of the lower UA on wages is only 1.3 %. In contrast to western Germany, we do not observe any clear pattern in the effects of the lower UA with respect to gender, skill and industry. Accounting for an industry-specific effect, we find no systematic difference between the effects on men and women. Furthermore, the level of the effect is detached

Table 3 Marginal effects of lower UA on the logarithmic wages with respect to industry, gender and skill level for eastern Germany

	Construction industry	Manu-facturing industry	Wholesale and retail trade	Real estate, renting and business activities	Transport, storage and communica-tion	Financial inter-mediation
	Men					
Low	− 0.00656	− 0.0123*	− 0.00300	− 0.0143	− 0.0238***	− 0.0160
	(0.0125)	(0.0067)	(0.0075)	(0.0115)	(0.0060)	(0.0348)
R² (within)	0.122	0.064	0.120	0.085	0.155	0.484
Obs.	2,183	7,250	2,541	1,373	3,235	210
Medium	− 0.0139***	− 0.0125***	− 0.0128***	− 0.0197***	− 0.0232***	− 0.0232***
	(0.0017)	(0.0012)	(0.0017)	(0.0029)	(0.0018)	(0.0050)
R² (within)	0.051	0.094	0.060	0.047	0.047	0.358
Obs.	101,932	160,340	84,415	36,364	67,524	7,873
High	− 0.0326***	− 0.0099***	− 0.0132*	− 0.0136***	− 0.0126*	− 0.0120
	(0.0097)	(0.0031)	(0.0071)	(0.0050)	(0.0074)	(0.0086)
R² (within)	0.123	0.218	0.100	0.099	0.215	0.227
Obs.	4,660	21,132	4,906	15,551	2,734	2,688
	Women					
Low	0.0249	− 0.0152*	− 0.0183*	− 0.0268**	− 0.0446**	− 0.0159
	(0.0430)	(0.0083)	(0.0107)	(0.0133)	(0.0173)	(0.0133)
R² (within)	0.31	0.06	0.10	0.10	0.16	0.21
Obs.	199	4,325	1,533	896	838	398
Medium	− 0.00801	− 0.0139***	− 0.0133***	− 0.0222***	− 0.0230***	− 0.0120***
	(0.0070)	(0.0027)	(0.0022)	(0.0031)	(0.0027)	(0.0034)
R² (within)	0.05	0.05	0.05	0.03	0.11	0.11
Obs.	8,017	47,793	51,296	32,149	22,618	16,880
High	− 0.0503***	− 0.0142**	− 0.0135*	− 0.0069	− 0.0508***	− 0.0118
	(0.0185)	(0.0061)	(0.0080)	(0.0076)	(0.0181)	(0.0083)
R² (within)	0.05	0.16	0.08	0.02	0.12	0.17
Obs.	1,481	7,362	3,634	8,617	1,441	2,842

Dependent variable: ln(wage)
Controls: age, age², professional status, firm-size, firm's age structure, industry-specific gross value added per worker, job tenure, quarter dummies
Source: authors' calculation. Significance-level: *** p < 0.01, ** p < 0.05, * p < 0.1. Standard errors in parentheses.

from the skill level. In this regression, is also impossible to identify an industry-specific pattern (see Table 3).

6 Conclusions

Theory predicts that decreased amounts of UC should result in decreased wages. Using a 2 % sample of all socially insured, full time employees in Germany, we find strong evidence that decreasing the amount of the UA results in decreased wages in Germany. As a new approach, we use micro panel data to examine the structural break in the German labor market that occurred in 2005 as a result of the Hartz-IV reform. This legislative

reform of the labor market decreased the UA and was therefore a unique natural experiment. Prior to 2005, UA payments were calculated as a fraction of the individual's former wage. Beginning in 2005, the UA was distributed as a fixed, means-tested payment. Thus, the overall level of the UA decreased. Our findings show that the decrease in the UA has a negative effect on wages, ceteris paribus. In western Germany, the effect is –2.4 % for men and –2.6 % for women, and the effect is –2.0 % and –2.7 % for men and women in eastern Germany, respectively. Our results amend previous findings that show a wage restraint effect of the Hartz-IV reform (e. g., Refine/Kettner 2011). Furthermore, in western Germany, the marginal effect of the decreased UA is higher at higher skill levels; this finding holds for both men and women. The industry-specific effect is often higher for men. In eastern Germany, we do not detect a systematic, industry-specific difference between men and women, nor do we find a clear increase in the UA effect at increasing skill levels. However, our model confirms the negative effect of the lower UA on wages.

In addition to strong worldwide demand, the negative wage effect of the Hartz-IV reform may also be responsible for the favorable labor market situation in Germany (German Council of Economic Experts 2011). The decreased amount of UA available weakens the bargaining position of workers and collective bargaining units, thereby weakening their wage claim amounts. More moderate wage agreements may explain the German economy's increased competitiveness after 2005. In addition to bargaining models, our findings are also consistent with effects that would be predicted from a neo-classical labor market. A decreased UA decreases the implicit minimum wage, which leads to higher employment (decreased unemployment) that is accompanied by decreased wages. Although we find evidence for a ceteris paribus negative wage effect, other authors find descriptive evidence that the reform reduces the core of unemployed workers and increases employment in Germany (Sinn et al. 2009).

Current studies support the positive employment effect. These studies show that the reform has increased the labor market's matching efficiency (Klinger/Rothe 2012) and has reduced unemployment and the duration of individuals' unemployment periods (Krause/Uhlig 2011). Data from the German Federal Employment Agency (2012) show that the number of unemployed individuals and the unemployment rate decreased significantly after 2005. This finding also holds for long-term unemployed individuals, whose share of total unemployed individuals decreased from 46 % in 2007 to less than 35 % in 2010. At the same time, the rate of socially secured employment increased even during the 2008–2009 financial crisis. Moreover, current research (Koller 2011) suggests that the effect of an increasing low-wage labor market, which is often subject to criticism in the public sphere of debate, is small (western Germany) or nonexistent (eastern Germany).

To assess the welfare effects of the Hartz-IV reform, a joint analysis of the wage effect and the employment effect is needed. Future research should focus on both effects and their interaction effects to derive reliable political recommendations.

Appendix

Table A1 Pooled estimations before and after the reform in western Germany

	Men (before)	Men (after)	Woman (before)	Women (after)
Constant	**1,764***	**819.6***	**2,047***	**393.8***
	(31.94)	**(27.92)**	**(45.89)**	**(44.55)**
Age	92.98***	81.97***	114.1***	98.89***
	(1.01)	(1.14)	(1.48)	(1.80)
Age²	−0.94***	−0.82***	−1.25***	−1.04***
	(0.01)	(0.01)	(0.02)	(0.02)
Unskilled blue collar worker	−1,242***	−1,261***	−888.9***	−862.7***
	(2.41)	(2.43)	(3.52)	(4.01)
Skilled blue collar worker	−933.3***	−938.3***	−553.5***	−565.5***
	(2.39)	(2.47)	(6.65)	(6.92)
Foreman	−105.1***	−134.2***	−52.06	27.77
	(6.150)	(6.254)	(35.33)	(38.68)
Small firm	−197.5***	−185.3***	−258.2***	−264.1***
	(2.74)	(2.88)	(4.41)	(4.79)
Large firm	342.8***	332.7***	302.4***	307.6***
	(2.49)	(2.57)	(4.24)	(4.52)
Firm's share of young employees	−1,365***	−1,561***	−1,930***	−2,380***
	(19.13)	(21.75)	(29.79)	(36.71)
Firm's share of old employees	−208.7***	−336.4***	−345.0***	−458.9***
	(12.29)	(11.71)	(19.79)	(18.51)
Industrial-specific gross value added	−3.62***	6.89***	−16.05***	1.98***
	(0.24)	(0.093)	(0.36)	(0.20)
Job tenure	5.13***	3.55***	−5.90***	−2.85***
	(0.26)	(0.11)	(0.48)	(0.21)
2nd Quarter	3.52	−19.63***	11.18**	−17.49***
	(2.75)	(2.82)	(4.69)	(5.08)
3rd Quarter	2.19	−24.99***	22.61***	−12.31**
	(2.77)	(2.82)	(4.75)	(5.08)
4th Quarter	5.67**	−52.27***	37.24***	−29.00***
	(2.83)	(2.82)	(4.86)	(5.09)
R^2	0.46	0.46	0.29	0.25
Obs.	510,599	492,257	177,287	168,908

Source: authors' calculation. Significance-level: 0.01 (***), 0.05 (**) and 0.1 Standard errors are reported in parentheses.

Table A2 Pooled estimations before and after the reform in eastern Germany

	Men (before)	Men (after)	Woman (before)	Women (after)
Constant	1,118***	1,313***	372.7***	−32.22
	(43.91)	(52.92)	(58.85)	(69.75)
Age	55.41***	44.16***	85.26***	88.70***
	(1.80)	(2.31)	(2.39)	(3.05)
Age^2	−0.61***	−0.45***	−0.91***	−0.89***
	(0.02)	(0.03)	(0.02)	(0.03)
Unskilled blue collar worker	−787.2***	−992.6***	−696.5***	−771.3***
	(5.96)	(6.31)	(7.05)	(7.85)
Skilled blue collar worker	−727.2***	−898.3***	−590.8***	−627.6***
	(4.91)	(5.38)	(6.81)	(7.54)
Foreman	−161.9***	−260.2***	−123.2***	−148.1***
	(13.75)	(15.89)	(43.46)	(48.72)
Small firm	−196.1***	−167.6***	−294.4***	−311.8***
	(4.39)	(4.88)	(6.57)	(7.14)
Large firm	307.3***	333.3***	293.1***	240.8***
	(5.05)	(5.48)	(6.01)	(6.57)
Firm's share of young employees	−944.4***	−1,066***	−1,383***	−1,729***
	(31.20)	(42.06)	(37.75)	(46.35)
Firm's share of old employees	−125.1***	−142.3***	−14.05	10.52
	(20.61)	(19.95)	(25.23)	(24.87)
Industrial-specific gross value added	1.64***	2.52***	−0.13	2.11***
	(0.22)	(0.10)	(0.32)	(0.16)
Job tenure	13.70***	7.18***	1.13	0.028
	(0.44)	(0.20)	(0.69)	(0.28)
2nd Quarter	−7.92	−22.76***	2.58	−20.54***
	(5.14)	(5.77)	(6.71)	(7.54)
3rd Quarter	−19.65***	−29.99***	4.71	−22.08***
	(5.17)	(5.78)	(6.79)	(7.54)
4th Quarter	−19.39***	−51.11***	15.91**	−40.44***
	(5.32)	(5.81)	(6.98)	(7.55)
R^2	0.39	0.42	0.31	0.26
Obs.	89,265	89,297	61,444	59,867

Source: authors' calculation. Significance-level: 0.01 (***), 0.05 (**) and 0.1 (*). Standard errors are reported in parentheses.

Table A3 FE estimation results for men and women in eastern and western Germany without age variables

dependent variable: ln (wage)	western Germany		eastern Germany	
	men	women	men	women
constant	7.9260***	7.762***	7.599***	7.549***
	(0.0030)	(0.0057)	(0.0061)	(0.0072)
lower UA	**−0.0180*****	**−0.0121*****	**−0.0219*****	**−0.0189*****
	(0.0004)	**(0.0007)**	**(0.0010)**	**(0.0011)**
unskilled blue collar worker	−0.0840***	−0.0541***	−0.0916***	−0.0655***
	(0.00259)	(0.0057)	(0.0066)	(0.0097)
skilled blue collar worker	−0.0690***	−0.0447***	−0.0776***	−0.0611***
	(0.0024)	(0.0060)	(0.0059)	(0.0089)
foreman	0.0032	0.0035	−0.0012	0.0365*
	(0.0037)	(0.0166)	(0.0101)	(0.0212)
small firm	−0.0253***	−0.0247***	−0.0210***	−0.0217***
	(0.0010)	(0.0018)	(0.0021)	(0.0031)
large firm	0.0238***	0.0217***	0.0257***	0.0128***
	(0.0010)	(0.0017)	(0.0026)	(0.0027)
firm's share of young employees	−0.0371***	−0.0633***	0.0019	0.0065
	(0.0043)	(0.0065)	(0.0095)	(0.0117)
firm's share of old employees	−0.0317***	−0.0523***	−0.0396***	−0.0289***
	(0.0031)	(0.0050)	(0.0063)	(0.0073)
industrial-specific gross value added	0.0007***	0.0004***	0.0005***	0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
job Tenure	0.0017***	0.0015***	0.0015***	0.0014***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
2nd quarter	−0.0041***	−0.0037***	−0.0043***	−0.0039***
	(0.0000)	(0.0000)	(0.0001)	(0.0001)
3rd quarter	−0.0082***	−0.0072***	−0.0091***	−0.0079***
	(0.0000)	(0.0001)	(0.0002)	(0.0002)
4th quarter	−0.0091***	−0.00735***	−0.0094***	−0.0075***
	(0.0000)	(0.0002)	(0.0002)	(0.0003)
R^2(overall)	0.33	0.11	0.31	0.17
R^2(within)	0.04	0.07	0.03	0.02
obs.	4,064,672	1,403,530	728,539	491,444

The industry-specific gross value added is given annually. The result of this specification is equivalent to use of year dummy variables.
Source: authors' calculation. Significance-level: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors are reported in parentheses.

Table A4 Artificial reforms estimations

dependent variable: ln (wage)		2001 and later	2002 and later	2003 and later	2004 and later	2005 and later	2006 and later	2007 and later
western Germany	men	0.0168***	0.0213***	0.0266***	−0.0080***	−0.0240***	−0.0204***	−0.0153***
		(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
	women	0.0278***	0.0306***	0.0248***	−0.0087***	−0.0259***	−0.0280***	−0.0266***
		(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
eastern Germany	men	0.0141***	0.0170***	0.0132***	−0.0114***	−0.0200***	−0.0134***	−0.0074***
		(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0006)	(0.0004)	(0.0004)
	women	0.0283***	0.0321***	0.0241***	−0.0100***	−0.0271***	−0.0285***	−0.0226***
		(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0007)	(0.0004)	(0.0005)

Source: authors' calculation. Significance-level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are reported in parentheses.

Table A5 FE estimation results for men and women in eastern and western Germany

dependent variable:	western Germany		eastern Germany	
wage in euro	men	women	men	women
constant	524.7***	69.58*	898.1***	365.2***
	(25.64)	(39.79)	(47.94)	(62.94)
lower UA	**−74.18***	**−63.39***	**−40.81***	**−56.43***
	(0.72)	**(1.16)**	**(1.31)**	**(1.51)**
age	103.7***	104.2***	54.84***	67.35***
	(1.03)	(1.54)	(1.96)	(2.52)
age^2	−1.02***	−1.00***	−0.60***	−0.63***
	(0.01)	(0.02)	(0.02)	(0.03)
unskilled blue collar	−205.0***	−117.6***	−171.3***	−110.5***
worker	(6.73)	(11.90)	(12.68)	(15.94)
skilled blue collar	−166.2***	−86.08***	−148.4***	−107.0***
worker	(6.341)	(13.40)	(11.84)	(14.98)
foreman	15.65	0.17	−1.25	52.83
	(10.90)	(39.67)	(22.13)	(39.65)
small firm	−61.28***	−51.27***	−37.24***	−34.00***
	(2.56)	(4.48)	(4.13)	(6.07)
large firm	57.91***	48.82***	47.88***	22.13***
	(2.61)	(4.27)	(5.32)	(5.67)
firm's share of young	−21.55**	−66.53***	34.36*	46.45**
employees	(10.91)	(14.94)	(18.07)	(21.61)
firm's share of old	−61.69***	−80.16***	−47.99***	−35.11**
employees	(8.17)	(11.97)	(12.58)	(14.49)
industrial-specific	1.21***	0.41***	1.02***	1.19***
gross value added	(0.08)	(0.15)	(0.09)	(0.14)
job Tenure	3.31***	0.94***	3.09***	1.42***
	(0.11)	(0.19)	(0.19)	(0.25)
2nd quarter	−13.94***	−10.33***	−9.570***	−8.582***
	(0.13)	(0.20)	(0.23)	(0.27)
3rd quarter	−28.20***	−20.35***	−20.26***	−17.45***
	(0.19)	(0.30)	(0.35)	(0.41)
4th quarter	−33.58***	−23.47***	−20.20***	−17.43***
	(0.24)	(0.38)	(0.43)	(0.51)
R^2	0.09	0.07	0.06	0.05
obs.	4,064,672	1,403,530	728,539	491,444

The industry-specific gross value added is given annually. The result of this specification is equivalent to use of year dummy variables.
Source: authors' calculation. Significance-level: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors are reported in parentheses

References

Addisson, J. T., M. Centeno, P. Portugal (2009), Do Reservation Wages Really Decline? Some International Evidence on the Determinants of Reservation Wages. Journal of Labor Research 30: 1-8.

Beblo, M., A. Heinze, E. Wolf, (2008), Occupational Segregation of Men and Women between 1996 and 2005 – An Analysis at the Establishment Level. Journal for Labour Market Research 41(2-3): 181-198.

Ebbinghaus, B., W. Eichhorst (2006), Employment Regulation and Labor Market Policy in Germany 1991-2005. IZA Discussion Paper No. 2505: 1-60.

Federal Employment Office of Germany (2012), Number of Unemployed and the Unemployment rate. Available at: http://statistik.arbeitsagentur.de/Navigation/Statistik/Statistik-nach-Themen/Statistik-nach-Themen-Nav.html (last retrieved 15/06/2012).

Federal Statistical Office of Germany (2007), Volkswirtschaftliche Gesamtrechnungen Inlandsprodukt nach ESVG 1995 – Methoden und Grundlagen. Fachserie 18 Reihe S.22. Wiesbaden.

Federal Statistical Office of Germany (2010), Gross domestic product, gross value added in Germany by Bundesland and East-West-Regions 1991 to 2009. Reihe 1 Band 1. Wiesbaden.

Federal Statistical Office of Germany (2011a), German Harmonized Index of Consumer Prices. Available at: https://www-genesis.destatis.de (last retrieved 28/03/2011).

Federal Statistical Office of Germany (2011b), Compensation of employees, gross wages and salaries in Germany by Bundesland and East-West-Regions 1991 to 2010. Reihe 1 Band 2. Wiesbaden.

Feldstein, M., J. Poterba (1984), Unemployment Insurance and Reservation Wages. Journal of Public Economics 23: 141-167.

German Council of Economic Experts (2011), Assume responsibility for Europe – Annual Report 2011/12. Wiesbaden.

Harris, R. D. F., E. Tzavalis (1999), Inference for unit roots in dynamic panels where the time dimension is fixed. Journal of Econometrics 91: 201-226.

Jacobi, L., J. Kluve (2007), Before and After the Hartz Reforms: The Performance of Active Labour Market Policy in Germany. Journal of Labour Market Research 40(1): 45-64.

Klinger, S, T. Rothe (2012), The Impact of Labour Market Reforms and Economic Performance on the Matching of the Short-term and the Long-term Unemployed. Scottish Journal of Political Economy 59(1): 90-114.

Koller, L. (2011), Hartz IV und der Niedriglohnsektor – Bei vielen bleibt das Stück vom Kuchen gleich. IAB-Forum 1/2011: 34-39.

Krause, M. U., H. Uhlig (2011), Transitions in the German labor market: structure and crisis. Deutsche Bundesbank Discussion Paper No. 34/2011: 1-37.

Kronthaler, F. (2003), A Study of the Competitiveness of Regions based on a Cluster Analysis: The Example of East Germany. IWH-Discussion-Paper No. 179: 1-21.

McCall, B., W. Chi (2008), Unemployment insurance, unemployment durations and re-employment wages. Economics Letters 99: 115-118.

Neal, D. (1995), Industry-Specific Human Capital: Evidence from Displaced Workers. Journal of Labor Economics 13(4): 653-677.

Pregibon, D. (1980), Goodness of link tests for generalized linear models. Applied Statistics 29: 15-24.

Rebien, M., A. Kettner (2011), Die Konzessionsbereitschaft von Bewerbern und Beschäftigten nach den Hartz-Reformen. WSI Mitteilungen 5/2011: 218-225.

Rogerson, R., R. Shimer, R. Wright (2005), Search-Theoretic Models of the Labor Market: A survey. Journal of Economic Literature 18: 959-988.

Rowthorn, R. (1999), Unemployment, wage bargaining and capital-labour substitution. Cambridge Journal of Economics 23(4): 413-425.

Schmucker, A., S. Seth (2009), BA-Employment-Panel, 1998-2007 Codebook. FDZ Datenreport 1/2009: 1-123.

Sinn, H.-W., W. Geis, C. Holzner (2009), Die Agenda 2010 und die Armutsgefährdung. ifo Schnelldienst 17: 23-27.

Smolny, W. (2009), Wage Adjustment, Competitiveness and Unemployment – East Germany after Unification. Jahrbücher für Nationalökonomie und Statistik 229: 130-145.

Schulte, J. (2004), Arbeitslosengeld II und Arbeitslosenhilfe: Gewinner und Verlierer – Eine Schätzung der Nettoeinkommenseffekte von Hartz IV. Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaft der Freien Universität Berlin – Volkswirtschaftliche Reihe Nr. 2004/29: 1-18.

Topel, R.H. (1984), Equilibrium Earnings, Turnover, and Unemployment: New Evidence. Journal of Labor Economics 2(4): 500-522.

Data

Federal Employment Office of Germany (2008), BA-Employment Panel 1998-2007. Research Data Centre (FDZ) of the Federal Employment Agency of Germany (BA) at the Institute for Employment Research (IAB). Nuremberg.

Dipl.-Vw. Wolfgang Nagl, ifo Institute, Branch Dresden, Einsteinstraße 3, 01069 Dresden, Germany.
nagl@ifo.de

Dipl.-Vw. Stefan Arent, ifo Institute, Branch Dresden, Einsteinstraße 3, 01069 Dresden, Germany.
arent@ifo.de