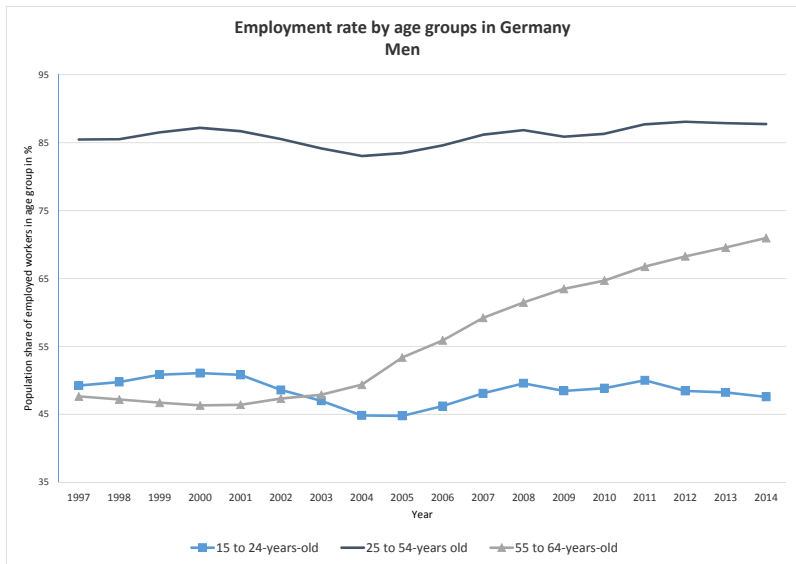
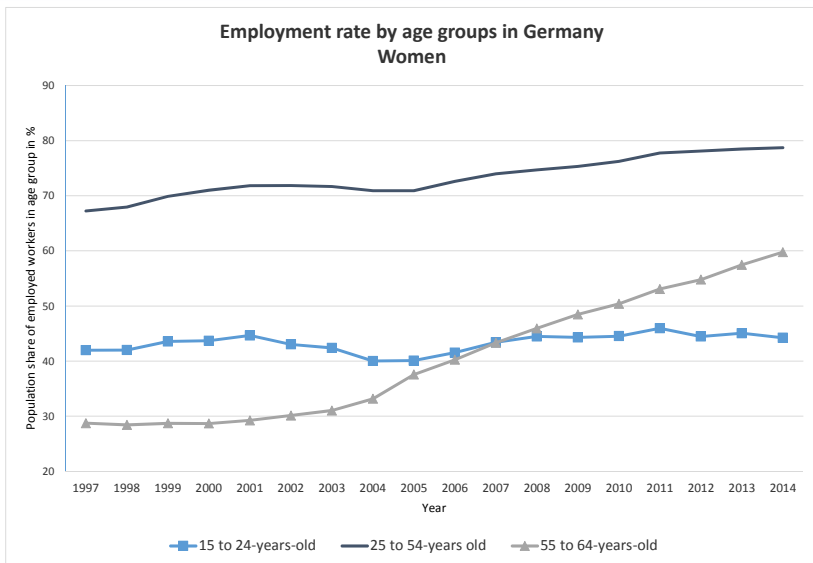


Institutional reforms and the incredible rise in old age employment

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Source: Mikrozensus data published by the German Federal Statistical Office.

Why should we care?

- Germany has to deal with the challenge of demographic ageing.
 - Working-age population is shrinking and ageing, life expectancy increases.
 - Burden on pay-as-you-go retirement system rises dramatically and financial sustainability is endangered.
- Labour market attachment of older workers of increasing relevance.
- Important to understand the driving factors behind the rise in employment.

What we care about

- Various labor market reforms aimed to encourage employment of older workers.
- Relevance of institutional changes remains disputed:
 - Hoffmann and Lemieux (2015): Labor market reforms don't explain sizable part of trend in (non)employment in Germany.
 - Also Banerjee and Blau (2016): Institutional incentives has only limited explanatory power for employment trends in the U.S. through 2010.
 - Dlugosz et al. (2014): Substantial effects of a German labor market reform on unemployment.

This paper

What Understanding the impact of institutions on (un)employment of older workers

How Exploiting the effect of an unemployment insurance reform in 2006

Contents

- 1 Literature & Contribution
- 2 Institutions
- 3 Data
- 4 Estimation strategy
- 5 Results
- 6 Conclusion

Literature

- 1 Studies of older workers' labor force participation (LFP)
 - Investigating role of various factors in explaining trends in older workers' LFP
 - Determinants like demographics, education, retirement incentives analyzed (Blau and Goodstein(2010), Perrachi and Welch(1994))
- 2 Analysis of effects of institutional reforms
 - Evaluating workers' responses to institutional incentives based on reforms of unemployment and retirement regulations.
 - Evidence for effects of unemployment benefit duration on unemployment duration. (Hunt(1995), Fitzenberger and Wilke (2007), Lalive et al. (2006))

Literature

- ③ Recent labor market developments in Germany
 - Investigating performance of the German labor market after the Great Recession.
 - Explanation with wage moderation, working time accounts, decentralized wage setting (Burda and Hunt (2011), Hoffmann and Lemieux (2015))

Unemployment insurance reform 2006

- Shortage of maximum length of unemployment benefits for workers aged 45 and above by up to 14 months.
- Affected those unemployed on or after February 1, 2006.
- Intention: Rise of older workers' employment.

Table 1: Maximum length of unemployment benefit receipt by age group

Age group	Pre-reform 2006 (until 1/2006)	Post-reform 2006 (2/2006-12/2007)	Change in months (2/2006-12/2007)
<45 years old	12	12	0
45-46 years old	18	12	-6
47-51 years old	22	12	-10
52-54 years old	26	12	-14
55-56 years old	26	18	-8
>56 years old	32	18	-14

Source: BGBL.I, 1997, p. 627; BGBL.I, 2003, p. 3004; BGBL.I, 2008, p. 681.

Unemployment insurance reform 2006

- Reform was already announced in December 2003 (law passed parliament).
- Anticipation behavior prior to the reform date very likely.
- Shift the beginning of the unemployment spell before February 1 2006.

Parallel institutional changes

- 1 Unemployment insurance reform 2008
 - Partial reversal of 2006 reform: Increasing payout durations for selected age groups.
 - Retroactively affected unemployment on January 1, 2008 and after.
- 2 End of 58 regulation (December 31, 2007)
 - Exemption for individuals aged 58 to search for work (usually a requirement for unemployment benefits).
 - Possible anticipation effects in terms of unemployment entry prior to January 1, 2008 for affected cohorts.

Relevant institutional changes

- ③ Retirement insurance regulations
 - German retirement system offers various pathways to early and full retirement with different requirements.
 - Due to various reforms, the minimum age of retirement entry differ by birth cohort.

Data

- German administrative data taken from the Sample of Integrated Labour Market Biographies (SIAB).
- SIAB: 2%-random sample of the Integrated Employment Biographies of the IAB (IEB).
- IEB: all individuals with at least one period in employment subject to social security, unemployment benefits receipt, or registered jobsearch since 1975.
- SIAB provides employment biographies on a day-to-day basis.

Sample

- East and West Germans aged between 40 and 64 years.
- Construction and mining workers excluded because of special unemployment and retirement benefits regulations.
- Observation period: March 2004 to December 2007.
- Sample restricted to workers who (would) have been eligible for the maximum duration of unemployment benefits under pre-reform regime → fully affected by the reform.

Definition of labor force status

- Employed(=E) for individuals in an employment relationship paying mandatory social security contributions.
- Unemployed(=U) for individuals receiving unemployment benefits.
- Out-of-the-labor-force(=O) for individuals leaving the labor market neither in E nor U
- Focusing on four types of labor market transitions: job stays E-E, job separations E-U, unemployment stays U-U, and job-findings U-E.
- Monthly transitions: $AB = 1$ if individual is in state A on day one of month t and in state B on day one of month $t + 1$

Estimation strategy

Difference-in-Differences design → Compare the pre- and post-reform monthly labor force transitions for age groups affected and not affected by the reform.

Groups and periods

Treatment groups

Age groups 45-46, 47-51, 52-54, 55-56, 57-59, 60-62, 62-64

Control group

Age group 40-44

Pre-reform period

March 2004 to January 2006 (resp. August 2005 for transitions from E)

Post-reform period

February 2006 to December 2007

Main estimation equation

$$E[AB_{i,m}] = \Lambda(\alpha post_{i,m} + \beta' age_{i,m} + \gamma'(post_{i,m} * age'_{i,m})' + \theta' X_{i,m} + \epsilon_{i,m})$$

$AB_{i,m}$ Binary variable for transitions from A to B for individual i in month m in A

Λ cumulative distribution function of logistic distribution

age Vector of indicators for age groups, i.e. treatment groups

$post$ Indicator for post-reform transitions

X Controls for general and socio-demographic characteristics and other relevant institutions and intervening mechanisms

Logit model

- Because outcome is binary and events are partially rare.
- Determine treatment effect resp. marginal effect (ME) of reform for each age group affected by the reform following Puhani (2012).
- Calculate the difference between potential outcomes with and without treatment between treatment and control group for those in the post-reform period and resp. age group:

$$\tau(\text{post} = 1, \text{age} = 1, X) = \Lambda(\alpha + \beta + \gamma + \theta'X) - \Lambda(\alpha + \beta + \theta'X)$$

- Calculate relative marginal effects (RME) as the marginal effect relative to the mean pre-reform transition rate in the relevant age group.

Common trends assumption

- Necessary to identify causal effects.
- Assumption=Parallel trends in development in labor market transitions for treatment and control groups without the reform.
- Test whether pre-reform time trends of treatment and control group differ significantly.

Common trends assumption

Logit model

$$E[AB_{i,m}] = \Lambda(\gamma_1' \text{age}_{i,m} + \gamma_2' t_{i,m} + \gamma_3' (t_{i,m} * \text{age}'_{i,m})' + \theta' X_{i,m} + \epsilon_{i,m})$$

$AB_{i,m}$ Binary variable for transitions from A to B for individual i in month m in A

Λ cumulative distribution function of logistic distribution

age Vector of indicators for age groups, i.e. treatment groups

t Variable from 1 to 23 for months 03/2004-1/2006

X Controls for general and socio-demographic characteristics and other relevant institutions and intervening mechanisms

Common trends assumption

- γ_2 measures time trends of control group
- γ_3 indicates if the time trend differs significantly for the treated age groups
- Apply linear, quadratic and cubic specifications of time trends and test for jointly significance of estimates of γ_3 for each age group.
- If coefficients are jointly significance, we don't observe causal effects.

Table 2: Logit estimates - p-values time trend

	EE	EU	UU	UE
Time x 45-46 years old	0.0819	0.1821	0.6764	0.5577
Time x 47-51 years old	0.3141	0.5647	0.0141	0.1007
Time x 52-54 years old	0.0934	0.1397	0.0005	0.2325
Time x 55-56 years old	0.1462	0.0540	0.0000	0.2935
Time x 57-59 years old	0.0050	0.8615	0.0000	0.4566
Time x 60-62 years old	0.6480	0.0564	0.0000	0.7032
Time x 63-64 years old	0.9892	0.2352	0.0013	0.8204

Note: Standard errors are clustered at the individual level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Time trend t is linear.

Source: SIAB 7510, own calculations.

→ UU transitions don't present causal effects; for other transitions no general indication of heterogeneous pre-reform outcome trends.

Expectations

Hypothesis 1

Increased propensity to stay employed EE.

Hypothesis 2

Decline in employment exits to unemployment EU.

Hypothesis 3

Reduced propensity to remain in unemployment UU.

Hypothesis 4

Increase in entry to employment from unemployment UE.

Table 3: ME and RME for job stays EE and job separations EU

	EE		EU	
	ME	RME	ME	RME
Post-reform x 52-54 years old	0.00028** (0.00010)	0.03%	-0.00026*** (0.00006)	-9.29%
Post-reform x 55-56 years old	0.00002 (0.00014)	0.00%	-0.00016 (0.00009)	-4.98%
Post-reform x 57-59 years old	0.00161*** (0.00015)	0.16%	-0.00103*** (0.00008)	-22.29%
Post-reform x 60-62 years old	0.00080* (0.00034)	0.08%	-0.00103*** (0.00013)	-18.39%
Post-reform x 63-64 years old	0.00318*** (0.00088)	0.34%	-0.00023 (0.00022)	-6.15%
N	8,020,998			

Note: Standard errors are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: SIAB 7510, own calculations.

Table 4: ME and RME for unemployment stays UU and job findings UE

	UU		UE	
	ME	RME	ME	RME
Post-reform x 52-54 years old	-0.05905*** (0.00339)	-6.37%	0.01264*** (0.00250)	46.88%
Post-reform x 55-56 years old	-0.03614*** (0.00317)	-3.85%	0.00641** (0.00220)	36.05%
Post-reform x 57-59 years old	-0.02232*** (0.00214)	-2.33%	0.00650*** (0.00131)	105.52%
Post-reform x 60-62 years old	-0.01581*** (0.00208)	-1.66%	0.00271** (0.00091)	130.92%
Post-reform x 63-64 years old	-0.01637*** (0.00369)	-1.77%	0.00003 (0.00096)	2.14%
N	430,301			

Note: Standard errors are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: SIAB 7510, own calculations.

Heterogeneity by gender and education

- Job exits EU: Stronger post-reform decline for males in most age groups.
- Job findings UE: Increases by more for females than for males for all age groups.
- job findings UE: Reform effects most significant for the middle educated individuals, but effects largest for high educated individuals.

Conclusion

- Reduction of unemployment benefit payments affected the transition rates of older workers in the expected ways.
- Compared to 40-44 year olds after the reform job exit rates declined, job finding rates increased, the propensity to stay in employment increased and the propensity to stay in unemployment declined for certain age groups.
- Largest behavioral adjustments among those affected most strongly by the reform.
- Result robust to different specifications of the estimation model, the sample selection mechanisms, and the estimators.
- Strong evidence that institutions matter and can have substantial effects on the employment behavior of older workers.

Thank you for your attention!

Appendix

Table 5: Robustnesstests for job stays EE

	(1)	(2)	(3)	(4)
Dep. Variable: EE	ME/RME	ME/RME	ME/RME	ME/RME
Post-reform x 52-54 years old	0.00028** 0.03%	0.00064*** 0.06%	0.00031** 0.03%	0.00031** 0.03%
Post-reform x 57-59 years old	0.00161*** 0.16%	0.00199*** 0.20%	0.00169*** 0.17%	0.00172*** 0.17%
Post-reform x 63-64 years old	0.00318*** 0.34%	0.00393*** 0.41%	0.00425*** 0.45%	0.00496*** 0.52%
Model	Logit	Sample 2	Probit	Cloglog
N	8,020,998	8,615,029	8,020,998	

Note: Standard errors are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: SIAB 7510, own calculations.

Table 6: Robustnesstests for job exits EU

Dep. Variable:EU	(1)	(2)	(3)	(4)
Post-reform x 52-54 years old	-0.00026** -9.29%	-0.00051*** -14.01%	-0.00025** -8.93%	-0.00024*** -8.57%
Post-reform x 57-59 years old	-0.00103*** -22.29%	-0.00118*** -25.54%	-0.00101*** -21.86%	-0.00101*** -21.86%
Post-reform x 60-62 years old	-0.00103*** -18.39%	-0.00091*** -17.30%	-0.00116*** -20.71%	-0.00115*** -20.54%
Model	Logit	Sample 2	Probit	Cloglog
N	8,020,998	8,615,029	8,020,998	

Note: Standard errors are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: SIAB 7510, own calculations.

Table 7: Robustnesstests for unemployment stays UU

Dep. Variable:UU	(1)	(2)	(3)	(4)
Post-reform x 52-54 years old	-0.05905*** -6.37%	-0.05194*** -5.65%	-0.05527** -5.96%	-0.04995*** -5.39%
Post-reform x 55-56 years old	-0.03614*** -3.85%	-0.03415*** -3.66%	-0.03430*** -3.65%	-0.03084*** -3.28%
Post-reform x 57-59 years old	-0.02232*** -2.33%	-0.02297*** -2.41%	-0.02261*** -2.36%	-0.02164*** -2.26%
Post-reform x 60-62 years old	-0.01581*** -1.66%	-0.01516*** -1.59%	-0.01530*** -1.60%	-0.01362*** -1.43%
Post-reform x 63-64 years old	-0.01637*** -1.77%	-0.01374*** -1.49%	-0.01171*** -1.27%	-0.00596*** -0.64%
Model	Logit	Sample 2	Probit	Cloglog
N	430,301	525,562	430,301	

Note: Standard errors are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: SIAB 7510, own calculations.

Table 8: Robustnesstests for job findings UE

Dep. Variable: UE	(1)	(2)	(3)	(4)
Post-reform x 52-54 years old	0.01264*** 46.88%	0.00997*** 30.03%	0.01135*** 42.10%	0.01225*** 45.44%
Post-reform x 55-56 years old	0.00641** 36.05%	0.00459* 20.69%	0.00508* 28.57%	0.00656** 36.90%
Post-reform x 57-59 years old	0.00650*** 105.52%	0.00849*** 100.59%	0.00538*** 87.34%	0.00647*** 105.03%
Post-reform x 60-62 years old	0.00271** 130.92%	0.00427*** 141.39%	0.00216* 104.35%	0.00271** 130.92%
Model	Logit	Sample 2	Probit	Cloglog
N	430,301	525,562	430,301	

Note: Standard errors are clustered at the individual level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: SIAB 7510, own calculations.