Peer Effects and Retirement Decisions: Evidence from Pension Reform in Germany

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Extended Abstract

Introduction

The majority of developed countries are facing a demographic transition that threatens the solvency of their social security programs (Gruber and Wise 2008). Private pension plans are under similar pressure as employers manage an aging workforce and combat legacy costs. As policymakers and employers consider options to address these issues, it is important to understand how individuals make retirement decisions. The literature has focused primarily on examining the impact of changes in own pension incentives on retirement behavior (Lumsdaine and Mitchell 1999; Leonesio 1996; Mastrobuoni 2009). Much less is known about the impact of peer retirements on individual retirement behavior. If peer effects are present in the context of retirement, changes in individual retirement incentives may spillover and alter the retirement behavior of colleagues, even those unaffected by the reform. The existence of a social multiplier would amplify the magnitude of individual responses to changes in their private retirement incentives.

In this study, we use employee-employer matched administrative data to make three noteworthy contributions to the retirement literature. First, we produce the first estimates of peer effects generalizable to a wide range of industries and occupations by using data from about half of the German workforce. Previous researchers have studied specific occupations or types of workers, including school teachers in the Los Angeles School District (Brown and Laschever 2012; BL henceforth) and non-federal public-sector workers in Oregon (Chalmers, Johnson and Reuter 2008; CJR henceforth). Both studies find that individual-retirement decisions are positively affected by peer retirements, but it is impossible to know whether these findings extrapolate to the broader economy or the private sector. Our estimates are based on workers employed in different types of establishments, occupations and industries. Second, we are able to examine more narrowly defined peer groups than those from prior work, which have measured peer effects at the school level (BL) and establishment level (CJR). Our peer group is defined as workers aged 50 and older employed in the same occupation within the same establishment, which allows us to examine the vast majority of the retirement distribution. Third, we introduce as instruments stepwise changes in pensionable ages that vary across different pension streams (e.g., unemployment, disability). The policy changes did not affect workers born before 1937 but affected workers born between 1937 and 1952 differentially based on birth cohort and gender. Thus, the reform provides a source of exogenous variation we use to identify the impact of peer retirements on individual retirement timing. Importantly, the use of changes in pensionable ages varying by birth cohort and gender circumvent the potential endogeneity problems associated with using changes in benefits, which

are a function of past earnings and, as a result, could affect old-age labor-supply decisions through past earnings (See Mastrobuoni 2009).

We find one additional peer retirement is associated with a 0.5 percentage point increase in the individual retirement hazard rate among men age 50 to 65. When we restrict our analysis to 60 to 65 year olds, the peer effect estimate rises to 2 percentage points. Estimates are slightly larger among women and largest in the smallest peer groups.

Data

Our data are drawn from establishment- and employee-level administrative records of the German pension system. We create a custom extract from the Establishment History Panel (BHP) matched to Integrated Employment Biographies (IAB) for all workers within each establishment. Our data include employment histories for all workers within an establishment, necessary information to determine the pensionable age for each individual, and important covariates that relate to retirement decision (e.g., detailed work histories, earnings, work hours, educational attainment, occupation and industry). Having data for all workers within an establishment is crucial for studying peer effects, which has resulted in previous studies using smaller samples that must rely on ad-hoc peer-group definitions (Halliday and Kwak 2012).

From the BHP population, we first select all establishments that are recorded at least once between 1990 and 2010. Within the outlined observation period, we only include establishments that employ at least 100 workers at any point in time. In addition, we restrict the sample to establishments that are located in West Germany over the observation period. After these restrictions are imposed, our data set includes between 11,342 and 12,525 establishments per year. The majority of observed establishments belong to the mining and manufacturing sectors, followed by trade and food services, finance and real estate.

We then select every individual born between 1925 and 1950 who has worked in the sampled establishments in a job liable to social security at least one day in between 1990 and 2010. Our sample is composed of 4,186,978 workers and 60,072,136 employment-spell observations. The data are organized at the person-year level.

Lastly, we sample the daily employment histories of the outlined workers from 1975 to 2011. These are obtained from the notification process of the social security system and the internal procedures of the Federal Employment Agency. The individual data contain exact information on the daily employment and unemployment history of the individuals. In addition, the data contain a rich set of variables describing employment or benefit receipt in more detail. For example, the data include precise information on daily wages and income from benefits, such as unemployment. Moreover, spatial information and a rich set of demographic variables are available. We use these employment histories to determine workforce exit for each worker in the sample.

Econometric Methodology

The identification of peer effects has three main challenges: simultaneity, correlated unobservables, and endogenous group membership. To convincingly address these issues in an observational study, an instrument that is strongly correlated with endogenous group outcome and uncorrelated with unobservable determinants of retirement decisions is required. However, more is needed to identify the causal effect of peer behavior on individual outcomes: the instrument

must also differentially affect members of the peer group (Brock and Durlauf 2001). In the peer-effects literature, such instruments are referred to as Partial Population Interventions (PPI), meaning an exogenous intervention that affects some individuals in the peer group and not others (Moffitt 2001). Brown and Laschever (2012) extend the PPI-approach by examining a policy intervention that affects members of peer groups differently, which they refer to as a Differential Population Intervention (DPI).

We rely on stepwise changes in pensionable ages across old age, disability, long service, and unemployment pension streams as a source of exogenous variation with which to identify the impact of peer retirements. The policy instruments have features of both the PPI and DPI approaches, as the reforms did not affect workers born before 1937 but affected workers born between 1937 and 1952 differentially based on birth cohort and gender. Our identification strategy assumes that it is valid to exclude the policy instruments from the structural model, which is justifiable on the grounds that the impact of the pension reforms should operate through peer behavior after holding constant the age and gender composition of the peer group.

To estimate peer effects, we must jointly model individual and peer behavior. The equation that models individual-retirement behavior is

$$y_{i,g,t} = \beta_0 + \beta_1 \vec{y}_{-i,g,t} + X'_{i,t}\beta_2 + Z'_{g,t}\beta_3 + \phi_g + \phi_t + \epsilon_{i,g,t}, \quad (1)$$

while the equation that represents group-retirement behavior is

$$\vec{y}_{i,g,t} = \delta_0 + \delta_1 P_{g,t} + X'_{i,t}\delta_2 + Z'_{g,t}\delta_3 + \lambda_g + \lambda_t + \eta_{i,g,t} \quad (2)$$

The subscripts i, g and t index individuals, peer groups, and years, respectively. The dependent variable, $y_{i,g,t}$, in equation (1) is a binary variable that equals zero when individual i belonging to peer group g in year t is working, one when the individual retires, and missing thereafter. Such a specification is known in the retirement literature as a "discrete time hazard model", and the coefficient estimates can be interpreted as changes in the retirement hazard rate. Peer behavior enters equation (1) through the variable $\vec{y}_{-i,g,t}$, which is a contemporaneous count of retirements in the individual's peer group g at year t (excluding individual i). Ultimately, the parameter of interest is β_1, and it can be interpreted as the estimated change in the retirement hazard rate when one additional peer retires. The remaining variables in equation (1) account for individual characteristics $(X_{i,t})$, the characteristics of the peer group $(Z_{g,t}$ and $\phi_g)$, and year-specific effects (ϕ_t). The variables included in $Z_{g,t}$ include establishment-level characteristics as well.

The dependent variable, $\vec{y}_{i,g,t}$, in equation (2) is the same count-of-peer-retirements variable that appears in Equation (1). Our PPI/DPI is $P_{g,t}$, which is the peer group average increase in the age of eligibility for full pension benefits via any stream in year t. All other variables included in equation (2) are also included in equation (1).

The method used to estimate the system of equations depicted in equations (1) and (2) is two stage least squares (2SLS). As explained above, our empirical strategies requires a valid PPI/DPI to obtain an unbiased estimate for the effect of peer-retirement behavior on individual-retirement timing, which is β_1 from equation (1). If the assumptions are met, the exclusion restriction assumption required for 2SLS is also satisfied. Specifically, we must assume the only way in which

our DPI, $P_{g,t}$, influences individual-retirement decisions is through its effect on peer behavior. But there are two additional assumptions required for our 2SLS estimation strategy to produce an unbiased estimate of β_1. First, $P_{g,t}$ must be correlated with peer retirement decisions, $\vec{y}_{i,g,t}$. If this correlation is weak, our estimate of β_1 will be biased (Bound, Jaeger and Baker 1995). Second, $P_{g,t}$ must have differential effects within and between peer groups; that is, $P_{g,t}$ must affect peer-group members differently.

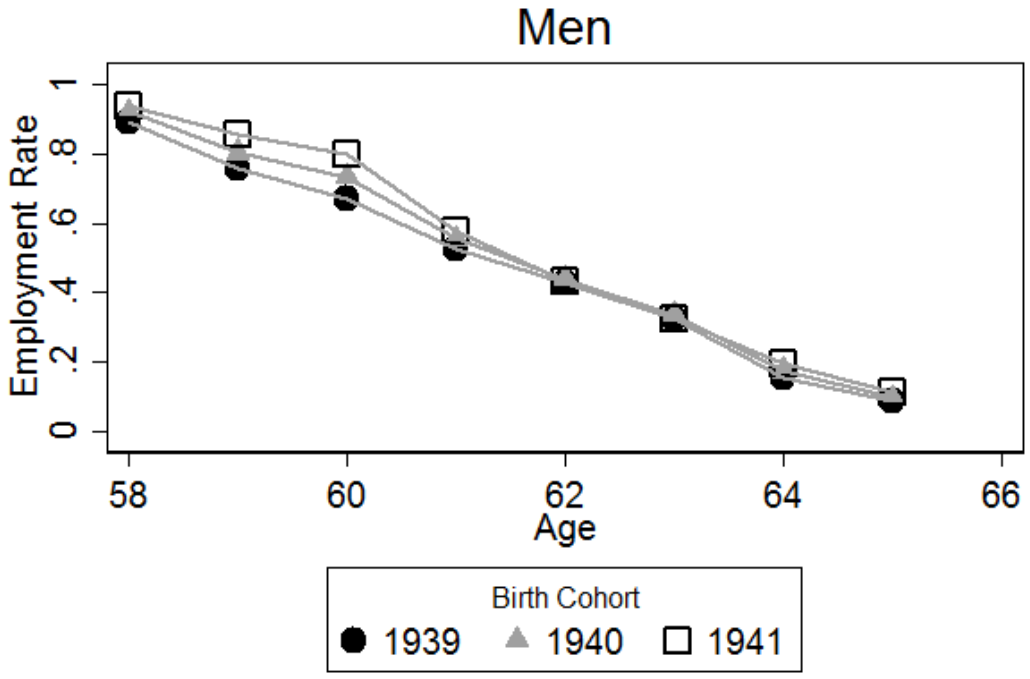
Results

In Figure 1 we plot unadjusted employment rates by age and gender for the first three cohorts affected by the reform to show the differential impact of their pension eligibility rules by birth year and gender. First access to full retirement for reason of unemployment (the most popular pathway to retirement before the reform) changed from age 60 to age 63.5 across these cohorts. Also, the 1941 cohort experienced a change in pensionable age for women of 6 months (from 60 to 60.5).

Tables 1 and 2 contain the first stage regression estimates for men and for women using the entire sample (ages 50 to 65) and using only workers 60 to 65. In these tables we report both the estimated coefficient on the instrument, which is the average change peer's full retirement age measured in months, and the estimated coefficient on the individual's change in retirement age. All estimated coefficients on the instrument have the expected sign (negative), are strongly statistically significant, and range in magnitude from -0.5 to -0.2. These estimates imply a one month increase in the average change in full retirement age within the peer group is associated with 0.2 to 0.5 fewer peer retirements. For reference, the mean change in full retirement age in our 50 to 65 sample was 28 months in men's peer groups and 29 months in women's while the average numbers of peer retirements in each year were 15 and 9. In each regression, the individual's change in full retirement age is not significantly related to the number of peer retirements and point estimates are near zero in all specifications.

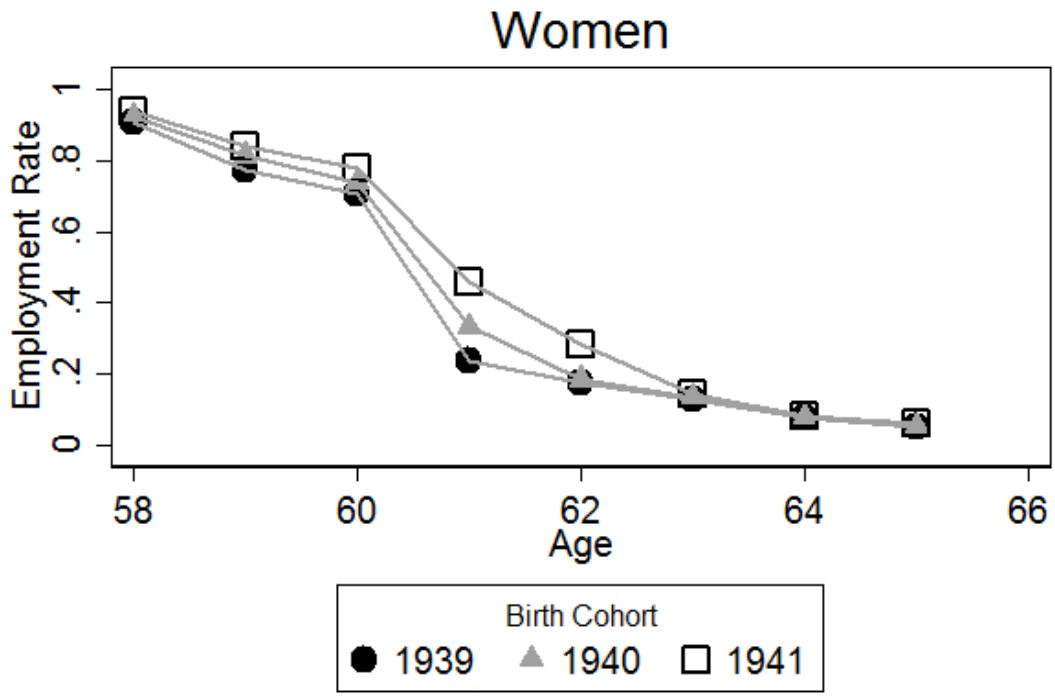
Tables 3 and 4 report the second stage IV estimates alongside OLS estimates, again using the full sample and in restricted samples of men and women ages 50 to 65. For both men and women and in both samples we find evidence of positive peer effects. The estimate for men in Table 3 can be interpreted as a 0.5 percentage point increase in the retirement hazard rate in response to a peer's retirement. For comparison, our estimates of the response to changes in own pensionable age indicate a full year increase would result in about a 1 percentage point decrease in the retirement hazard rate for men age 50 to 65, and an 8 percentage point decrease among women ages 60 to 65. Taking these estimates literally, two additional peer retirements would negate the effect of a one-year increase in own full retirement age among persons 50 to 65, and at ages 60 to 65 one peer retirement has a larger effect on retirement behavior than a one year increase in own full retirement age.

Figure 1A Employment Rates for Selected Cohorts, Men



Employment rate conditional upon working at age 57

Figure 1B Employment Rates for Selected Cohorts, Women



Employment rate conditional upon working at age 57

Table 1 First Stage Estimates for Peer (Instrument) and Individual Changes in Pensionable Age, Ages 50 to 65

	Men			Women		
	coef		std. err.	coef		std. err.
Ave Change Peers	-0.503	**	0.008	-0.282	***	0.038
Change Individual	0.028		0.212	-0.002		0.002
N	10,075,899			4,932,495		

* p<.1; ** p<.05; *** p<.01

1. Additional covariates include individual controls (age, experience, wage, nationality, education), group controls (share of females, share of high- and low qualified, share of foreigners, median in and interquartile age, mean wage paid in occupation), establishment controls (share of females, share of high- and low qualified, share of foreigners, share of different occupations), year fixed effects and peer group fixed effects.

2. Standard errors are clustered on the establishment level

Table 2 First Stage Estimates for Peer (Instrument) and Individual Changes in Pensionable Age, Ages 60 to 65

	Men			Women		
Men	coef		std. err.	coef		std. err.
Ave Change Peers	-0.217	***	0.051	-0.161	***	0.023
Change Individual	-0.003		0.016	0.003		0.005
N	2,620,965			1,029,011		

* p<.1; ** p<.05; *** p<.01

1. Additional covariates include individual controls (age, experience, wage, nationality, education), group controls (share of females, share of high- and low qualified, share of foreigners, median in and interquartile age, mean wage paid in occupation), establishment controls (share of females, share of high- and low qualified, share of foreigners, share of different occupations), year fixed effects and peer group fixed effects.

2. Standard errors are clustered on the establishment level

Table 3 Second Stage and OLS Estimates for Change in Retirement Hazard, Ages 50 to 65

	2SLS			OLS		
Men	coef		std. err.	coef		std. err.
Peer Effect	0.005	***	0.002	0.0006	***	0.000
Own Effect	-0.001	***	0.000	-0.0009	***	0.000
N	10,075,899			10,075,899		

	2SLS			OLS		
Women	coef		std. err.	coef		std. err.
Peer Effect	0.007	***	0.001	0.0008	***	0.000
Own Effect	-0.001	***	0.000	-0.0011	***	0.000
N	4,932,495			4,932,495		

* p<.1; ** p<.05; *** p<.01

1. Additional covariates include individual controls (age, experience, wage, nationality, education), group controls (share of females, share of high- and low qualified, share of foreigners, median in and interquartile age, mean wage paid in occupation), establishment controls (share of females, share of high- and low qualified, share of foreigners, share of different occupations), year fixed effects and peer group fixed effects.

2. Standard errors are clustered on the establishment level

Table 4 Second Stage and OLS Estimates for Change in Retirement Hazard, Ages 60 to 65

	2SLS			OLS		
Men	coef		std. err.	coef		std. err.
Peer Effect	0.023	***	0.005	0.0015	**	0.000
Own Effect	-0.001	*	0.000	-0.0007	***	0.000
N	2,620,965			2,620,965		

	2SLS			OLS		
Women	coef		std. err.	coef		std. err.
Peer Effect	0.034	***	0.005	0.0013	**	0.000
Own Effect	-0.007	***	0.000	-0.0070	***	0.000
N	1,029,011			1,029,011		

* p<.1; ** p<.05; *** p<.01

1. Additional covariates include individual controls (age, experience, wage, nationality, education), group controls (share of females, share of high- and low qualified, share of foreigners, median in and interquartile age, mean wage paid in occupation), establishment controls (share of females, share of high- and low qualified, share of foreigners, share of different occupations), year fixed effects and peer group fixed effects.

2. Standard errors are clustered on the establishment level

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