Lump of Labor? Employment Effects of Pension Reforms in Firms and Labor Markets*

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Abstract

We study how pension reforms affect overall employment in firms and local labor markets. We leverage rich administrative data on all German workers and firms along with cohort-based pension reforms generating quasi-experimental variation in the employment of older workers. At the firm level, we find significant negative spillovers: as old workers stay in their jobs longer, employment of younger workers declines. However, these effects reverse at the local labor market level, where we find positive spillovers on young workers' employment and strongly positive overall employment effects of pension reforms. Our findings highlight the importance of accounting for equilibrium adjustments when evaluating the labor market impacts of workforce aging and retirement policy.

Keywords: pension reform, workforce aging, retirement, employment effects, spillovers, labor demand.
JEL codes: H55, J21, J26.

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Extended Abstract

Many countries are reforming their public pension systems in order to ensure fiscal sustainability. A common objective of these reforms is to encourage older individuals to retire later. A sizable literature has studied how such reforms affect the employment of older workers (e.g. Manoli and Weber, 2016; Seibold, 2021; Lalive et al., 2023; Rabaté et al., 2024).

However, a key concern in policy debates around pension reforms is that rising employment of older workers may hamper labor market opportunities of the young. Such effects would not only create intergenerational tensions, but may also un-do the fiscal gains from pension reform – counteracting their primary policy objective. Debates around these concerns have been contentious, with some economists dismissing them as a "lump of labor" fallacy that incorrectly assumes that the total number of jobs in an economy is fixed (see e.g. Gruber et al., 2010).

Up to date, causal evidence on the impact of pension reform on overall employment is surprisingly limited. A few recent studies provide firm-level analyses of pension reforms (e.g. Bianchi et al., 2023; Hut, 2024; Badalyan, 2025), suggesting negative within-firm spillovers on the careers of younger workers. Yet, by construction, these analyses cannot capture any general equilibrium adjustments operating beyond firms, which lie at the heart of the lump-of-labor debate. Even if a delayed retirement crowds out a younger worker within a specific firm, this worker may find employment elsewhere. However, evidence on spillover effects of pension reforms beyond firms remains very limited.[1]

In this project, we study the impact of pension reforms on overall employment in firms and local labor markets. To do so, we leverage rich administrative data on the universe of German workers and firms, and we exploit large-scale, cohort-based pension reforms that create quasi-experimental variation in the employment of older workers. Our main empirical strategy is a difference-in-difference approach across differentially exposed firms or local labor markets. Our main findings are the following: At the firm level, we find significant negative spillovers on young workers' employment as old workers remain in their jobs longer. However, these effects reverse the labor market level, where we find positive spillovers on young workers and positive overall employment effects of pension reforms.

Institutional Background. Germany has a pay-as-you-go pension system sharing many of its key characteristics with public pension systems in other developed countries. The vast majority of German workers are covered by public pensions, as enrollment is mandatory for most employees. Pension contributions are levied as a payroll tax on gross earnings. Benefits are defined according to a pension formula based on a worker's lifetime contribution history. Pension benefits are roughly proportional to lifetime income and there is relatively little redistribution. The average net replacement rate is 53% OECD (2021), and public pensions are the main source of income for most recipients.

A key institutional feature for our purposes is given by statutory retirement ages. These are saliently presented age thresholds that define when workers can claim a pension. There are two main types of statutory ages: (i) the Early Retirement Age (ERA), which is the earliest possible claiming age, and (ii) the Full Retirement Age (FRA), from which workers can get a full pension without actuarial penalties. In Germany, both the ERA and the FRA vary across workers, depending on their gender and contribution histories.

In this project, we exploit two large-scale, cohort-based pension reforms entailing discontinuous changes

[1] To our knowledge, the only exception is Bertoni and Brunello (2021) who use survey data to investigate the province-level effects of an Italian pension reform. Mohnen (2025) examines a related question, namely how retirement trends among older workers affect youth labor market outcomes across U.S. commuting zones.

in statutory retirement ages. The first reform abolished the so-called "pension for women" for birth cohorts January 1952 and younger. This retirement pathway had previously allowed women to retire earlier than men, and its removal effectively increased the ERA from 60 to 63 or 65 (depending on the individual's contribution history) at the cohort cutoff. Henceforth, we refer to this reform as the *Women's Reform*. The second reform featured a discontinuous increase in the FRA for workers with very long contribution periods (at least 45 years). This group had been exempted from a prior FRA increase, but the exemption applied only to workers born before January 1942. At the cohort cutoff, the FRA thus discontinuously increased from 60 or 63 to 65 (depending on the individual's contribution history). Since women are still eligible for their generous special pathway at the time, the second reform effectively only applied to men. We will refer to this reform as the *Men's Reform*.

Data. We use rich administrative labor market data provided by the Institute for Employment Research (IAB). Our main data source is given by the Integrated Employment Biographies (IEB). This dataset combines employer-employee matched data with registry information on unemployment spells for the universe of workers covered by the German social security system since 1975. The data contains information on the full labor market histories of workers, including days worked, wages and unemployment benefits. The data also include some further sociodemographic characteristics, such as date of birth, education, gender, occupation, and job location. For each reform, we construct a *firm sample* aggregating outcomes at the establishment level[2] and a *labor market sample* at the level of commuting zones. For the women's reform, the firm sample contains 11,162,572 workers in 121,504 establishments and the labor market sample contains 25,858,937 workers in 223 commuting zones, spanning the years 2008 to 2016. For the men's reform, the firm sample contains 7,437,813 workers in 52,672 establishments and the labor market sample contains 26,055,291 workers in 223 commuting zones, spanning the years 1998 to 2006.

Empirical Strategy. Our empirical approach is to exploit the quasi-random variation in older workers' retirement due to the two pension reforms. Specifically, we employ a difference-in-difference strategy comparing units (i.e. firm or labor markets) with differential exposure to these reforms over time. Figure 1 illustrates how we define reform exposure for the case of the women's reform. We consider focal workers born in a bandwidth of +/- 1 year around the cutoff as potentially treated individuals. Reform exposure is then defined as the share of treated workers born above the cutoff within a unit, conditional on the share of focal workers. This enables us to compare units with similar overall age structure, across which reform exposure varies only due to local differences in age composition around the cutoff.

We employ the following difference-in-difference specification:

$$Y_{it} = \beta(treat_i \cdot post_t) + \gamma(focal_i \cdot post_t) + \sum_j \delta_j(X_i^j \cdot post_t) + \alpha_i + \phi_t + \epsilon_{it} \tag{1}$$

where Y_{it} is an outcome of unit (firm or labor market) i in year t, $treat_i$ is the share of treated workers in i (our reform exposure measure), $focal_i$ is the share of focal workers in i, and $post_t$ is an indicator for the post-reform period, which corresponds to 2011 and later for the women's reform and 2001 and later for the men's reform.[3] We measure $treat_i$ at baseline, that is, in 2010 for the women's reform and in 2000 for the

[2] In our data, workplaces are defined through establishment IDs assigned by the social security system. About 84% of establishments correspond to a single-establishment firm. In keeping with convention, we use the terms establishment and firm interchangeably (cf. Card et al., 2013).

[3] For the women's reform, differential retirement rules across treated and untreated focal workers begin to apply in 2011, when untreated workers reach their ERA of 60 but treated workers cannot retire yet. For the men's reform, untreated focal workers similarly

men's reform. In addition, our specification accounts for controls X_i, including baseline gender and age composition, as well as unit α_i and year fixed effects ϕ_t.[4] The coefficient β captures the main difference-in-difference effect of interest.

Moreover, we use an analogous dynamic difference-in-difference specification:

$$Y_{it} = \sum_k \beta^k (treat_i \cdot \mathbb{1}(t = k)) + \sum_k \gamma^k (focal_i \cdot \mathbb{1}(t = k)) + \sum_k \sum_j \delta_j^k (X_i^j \cdot \mathbb{1}(t = k)) + \alpha_i + \phi_t + \epsilon_{it} \quad (2)$$

where β_t captures the dynamic impact of reform exposure $treat_i$.

Firm-Level Results. Figure 2 shows firm-level results for the women's reform. Panel (a) illustrates our "first stage" by showing that focal workers' employment strongly increases in firms with higher exposure to the reform. While pre-trends are flat, focal workers' employment starts increasing precisely when the reform begins to bite in 2011 and remains significantly higher in more exposed firms throughout the entire post-reform period. Panel (b) shows that this first stage translates into a strong increase in the employment of old workers (aged 55 and above) more generally. On average, old workers' employment increases by around 16% in more exposed firms, with the dynamic patterns closely following the first-stage variation. In Panel (c), we find negative spillovers of the reform on young and middle-aged workers (aged 54 and younger). On average, their employment declines by around 5%. Dynamically, these negative effects increase initially but seem to dissipate by 2016. Panel (d) displays impacts on total firm-level employment. We find positive total employment effects of around 8% on average. This suggests that, while negative spillovers on younger workers dampen overall effects of the reform, total employment still increases substantially when older workers retire later. Finally, Panels (e) and (f) of the figure show that the employment effects of the reform are concentrated among women, while men's employment does not change significantly.

Figure 3 displays analogous firm-level results for the men's reform. In Panel (a), focal workers' employment strongly increases in more exposed firms from 2001 onward, whereas trends are parallel in the pre-reform years. Panel (b) shows that the reform causes a substantial increase in old workers' employment in firms, with an average effect of around 25%. Again, we find significant negative spillovers on young and middle-aged workers in Panel (c), whose employment declines by around 11%. However, contrary to the women's reform, younger workers' employment does not seem to recover until the end of the analysis period. The impact on total firm-level employment in Panel (d) is positive but more modest at around 4%, with significant dynamic estimates only in the short-run. Finally, Panels (e) and (f) show effects by gender, suggesting that employment impacts are concentrated among men.

Labor-Market Level Results. A key question is how to define labor markets in order to capture spillovers beyond firms. Since there is no clear a priori answer to this (cf. Nimczik, 2023), we draw on several alternative definitions. Our main results are based on commuting zones, constructed by the Federal Office for Regional Planning on the basis of observed commuting flows. We also present results for smaller geographic units, namely municipalities, and for labor markets defined by commuting zone-industry cells.

Figure 4 displays our main results based at the commuting-zone level for the women's reform. Panel (a) shows that focal workers' employment increases by 3% on average in more exposed commuting zones. Dynamically, these first-stage effects are highly significant in the short-run but somewhat noisy towards the end of the analysis period. This translates into a significant increase in the employment of old workers

reach their FRA from 2001.

[4] In the firm-level regressions, we additionally include year-county and year-industry fixed effects.

in Panel (b), with an average effect size of around 1%. Panel (c) shows spillover effects of the reform on young and middle-aged workers. Strikingly, patterns are reversed compared to our firm-level results. We find *positive* spillover effects on younger workers, which are significant in the short-run and, in line the first stage, become noisier in the medium-run. The average difference-in-difference estimate suggests an effect size of 0.7%. As expected, Panel (d) shows that total employment increases in more exposed commuting zones, with an average effect of 0.7% and dynamic patterns in line with the subgroup effects. Interestingly, in Panels (e) and (f), employment of both women and men increase by similar magnitudes.

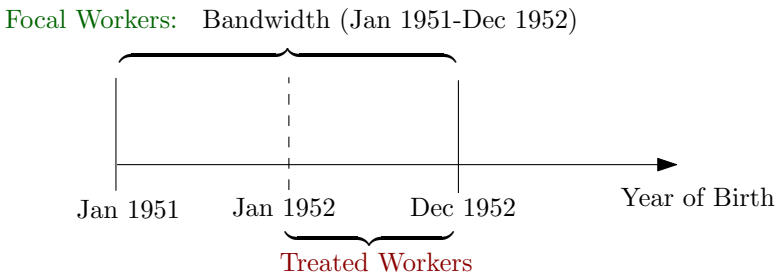
Figure 5 shows a range of results across different labor market definitions, namely for commuting zones, commuting zone-industry cells, and municipalities. Firm-level effects are also included for reference. Panel (b) displays estimates for the women's reform, and Panel (b) for the men's reform.[5] Three main results emerge. First, old workers' employment increases as a result of the two reforms across all labor market definitions. Second, while young workers' employment decreases within firms, we do not find any evidence of negative spillovers on young workers at the labor-market level. If anything, employment of young workers increases, except at the municipality level where the point estimate is negative and insignificant. Third, total employment increases in all specifications, including in firms and across all labor market definitions.

Conclusion. In this project, we investigate the impact of pension reforms in firms and local labor markets. While a well-established literature suggests large individual-level employment responses to pension reforms, their overall employment effects are less well-known so far. In particular, concerns are often voiced about potential adverse effects on younger workers, who may be crowded out by older workers staying in their jobs. We leverage rich employer-employee matched labor market data and quasi-experimental variation from a German pension reform to explore these questions. Our results suggest that there are indeed negative spillover effects on young workers within firms, but these dissipate at the labor-market level where we find positive impacts on the employment of both old and young workers.

[5] We are currently working on commuting-zone level results for the men's reform. These are not included yet.

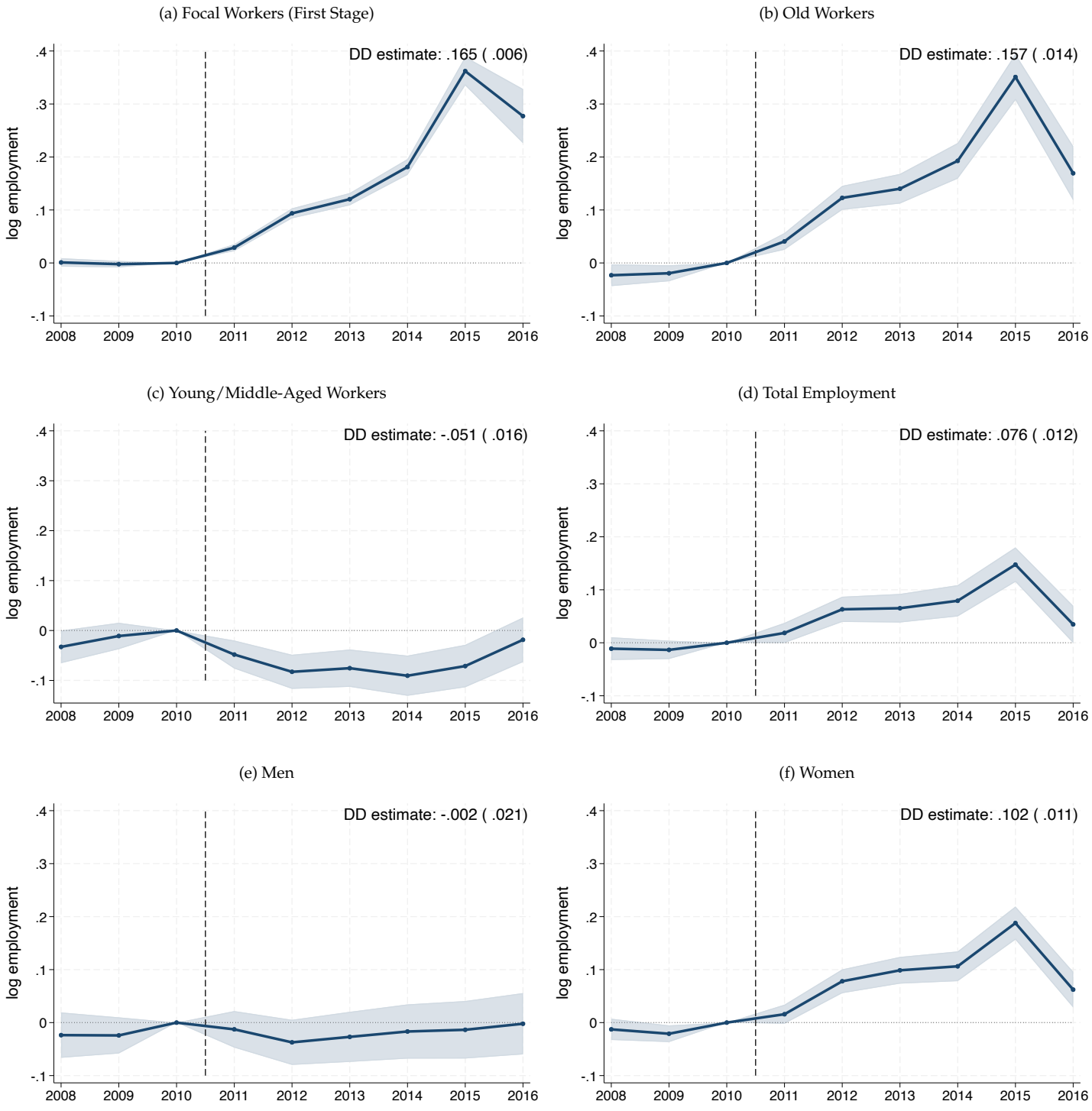
Figures and Tables

FIGURE 1: EMPIRICAL STRATEGY – ILLUSTRATION



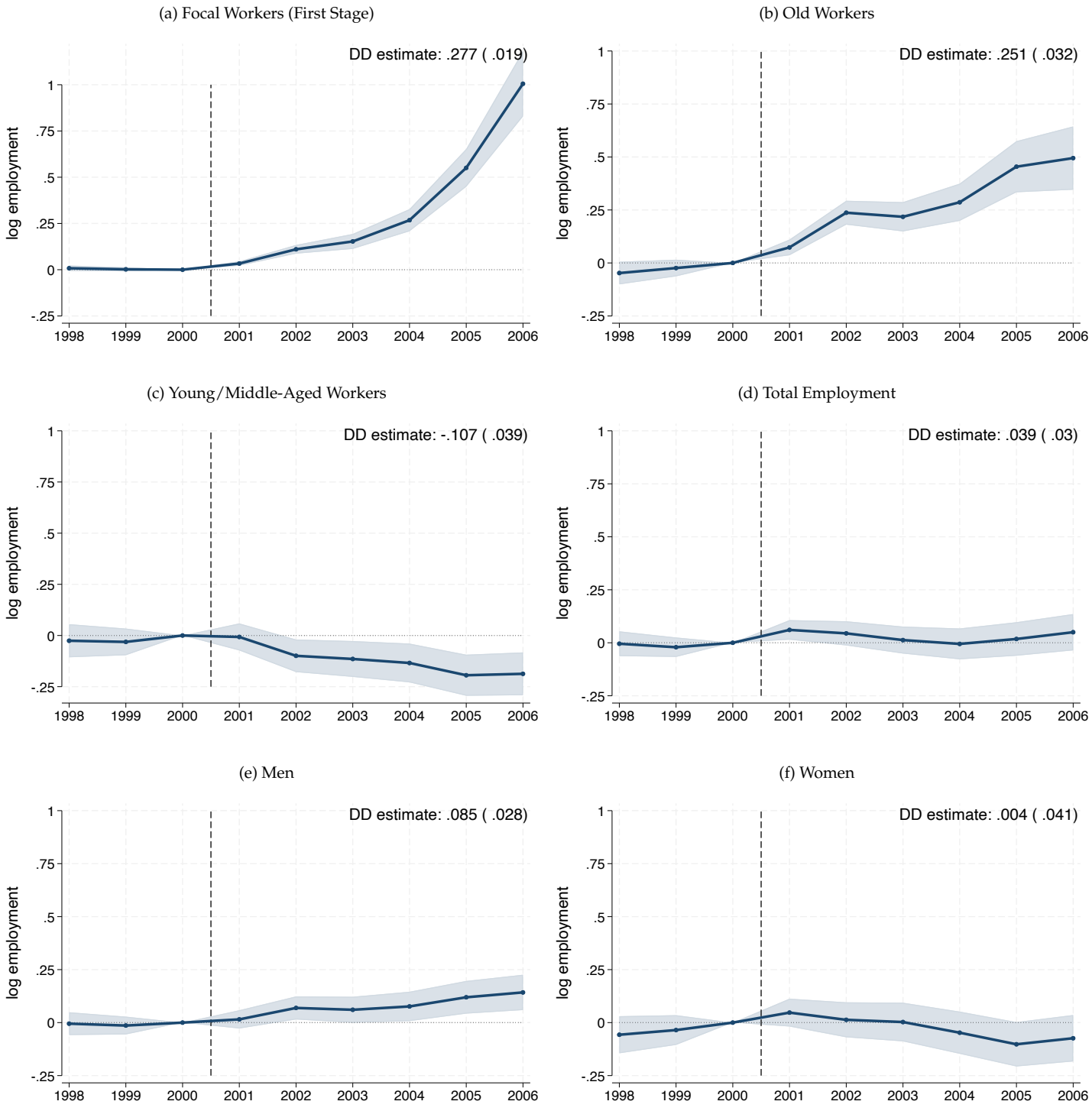
Notes: The figure illustrates our empirical strategy for the case of the women's reform. "Focal workers" are potentially exposed workers born within a bandwidth of +/-1 year around the cohort cutoff of the reform. "Treated workers" are those among focal workers who are born above the cutoff and thus exposed to the reform. We define reform exposure as the share of treated workers, conditional on the share of focal workers, within a firm or a labor market.

FIGURE 2: FIRM-LEVEL RESULTS – WOMEN'S REFORM



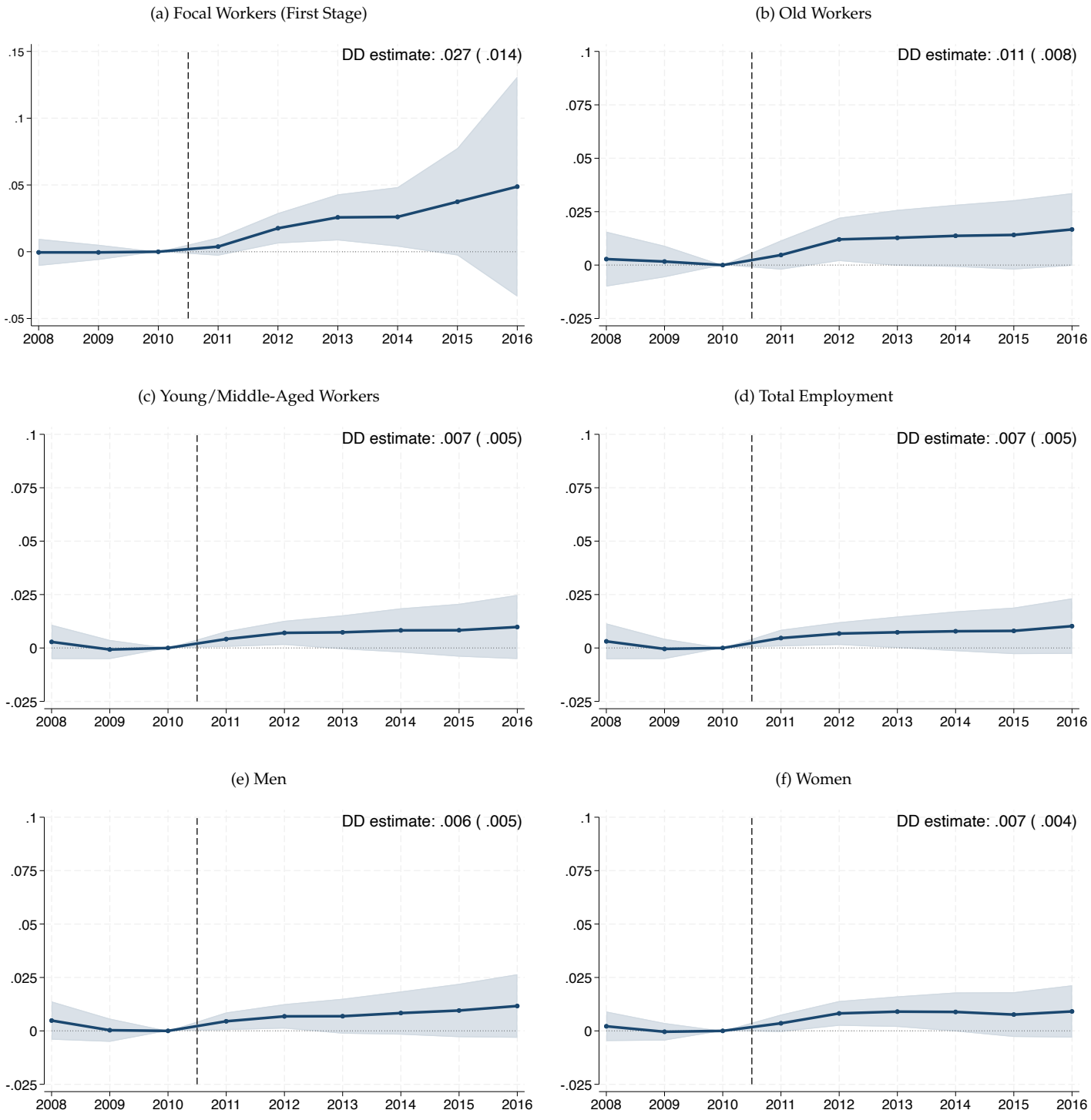
Notes: The figure shows firm-level results for the women's reform. Each panel displays dynamic difference-in-difference effects on log employment of the group indicated by the respective panel title. Focal workers are those born in 1951 and 1952, old workers are individuals aged 55 and older, and young/middle-aged workers are those aged 54 and younger. While the dynamic effects are estimated according to equation (2) and shown with 95% confidence bands, each panel also includes an average difference-in-difference effect estimated according to equation (1) with its standard error in parentheses. The vertical dashed lines demarcate the time from which the women's reform entails differential ERAs for treated vs. untreated workers.

FIGURE 3: FIRM-LEVEL RESULTS – MEN'S REFORM



Notes: The figure shows firm-level results for the men's reform. Each panel displays dynamic difference-in-difference effects on log employment of the group indicated by the respective panel title. Focal workers are those born in 1941 and 1942, old workers are individuals aged 55 and older, and young/middle-aged workers are those aged 54 and younger. While the dynamic effects are estimated according to equation (2) and shown with 95% confidence bands, each panel also includes an average difference-in-difference effect estimated according to equation (1) with its standard error in parentheses. The vertical dashed lines demarcate the time from which the women's reform entails differential FRAs for treated vs. untreated workers.

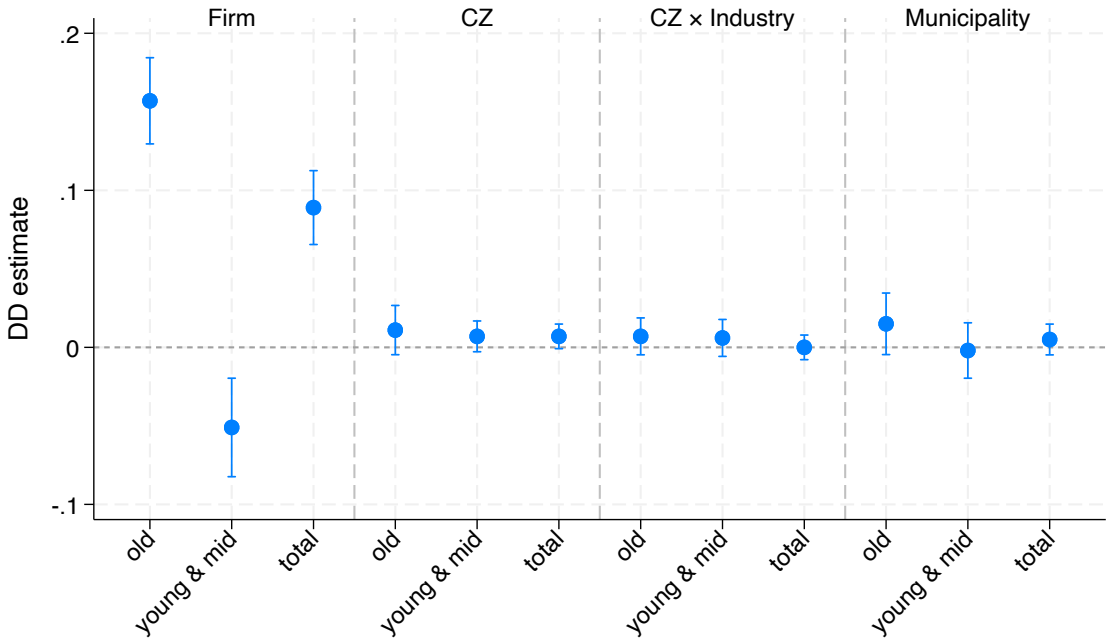
FIGURE 4: COMMUTING-ZONE LEVEL RESULTS – WOMEN'S REFORM



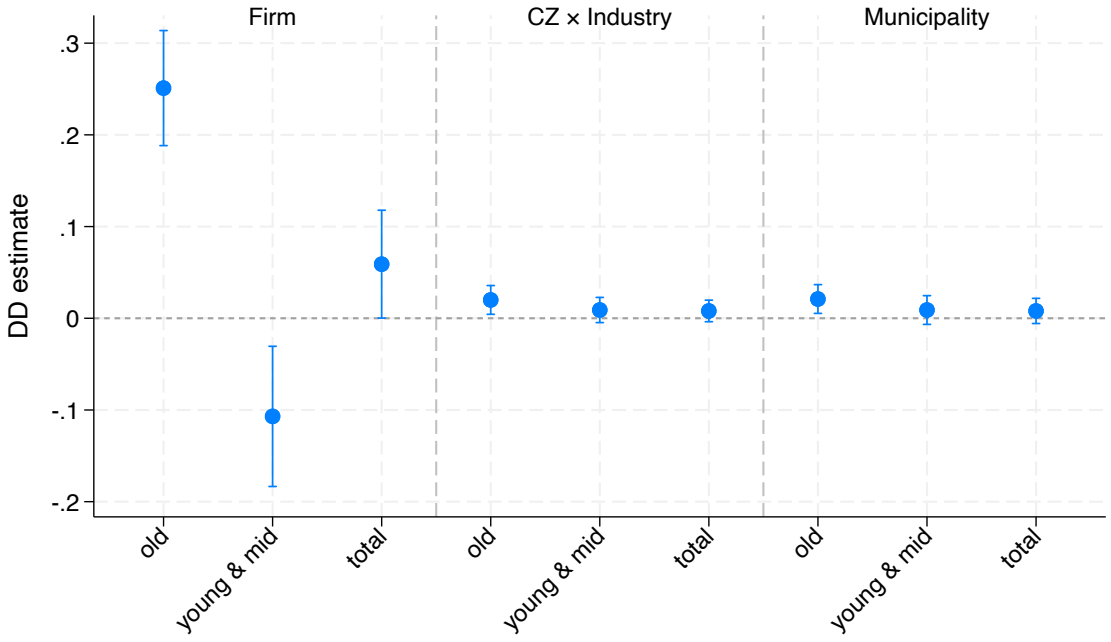
Notes: The figure shows commuting-zone level results for the women's reform. Each panel displays dynamic difference-in-difference effects on log employment of the group indicated by the respective panel title. Focal workers are those born in 1951 and 1952, old workers are individuals aged 55 and older, and young/middle-aged workers are those aged 54 and younger. While the dynamic effects are estimated according to equation (2) and shown with 95% confidence bands, each panel also includes an average difference-in-difference effect estimated according to equation (1) with its standard error in parentheses. The vertical dashed lines demarcate the time from which the women's reform entails differential ERAs for treated vs. untreated workers.

FIGURE 5: RESULTS ACROSS LABOR MARKET DEFINITIONS

(a) Women's Reform



(b) Men's Reform



Notes: The figure summarizes estimated employment effects across firms and labor markets. Each dot corresponds to a difference-in-difference coefficient estimated according to (1) with its 95% confidence interval. Panel titles indicate the level of analysis and x-axis labels indicate the respective group of workers, for whom the estimated impact on log employment is displayed.

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