Escaping Temporary Traps? Evidence from Age-Based Incentives to Permanent Employment*

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Abstract

This paper studies how reducing the cost differential between permanent and temporary contracts affects firms' use of each contract type. We analyze a 1997 Spanish reform that lowered non-wage labor costs for new open-ended (OE) contracts for workers under 30 and over 45, while leaving short-term (ST) contracts unaffected. Exploiting sectoral exposure and age-based discontinuities, we show that firms substitute strongly from ST to OE contracts for young workers but respond little for older workers. We find partial wage incidence of the subsidy on directly affected permanent jobs. The implied elasticity of substitution between ST and OE contracts is 6.5 for workers below age 30 and close to zero for workers above age 45. We also document that young workers' wages rise in unsubsidized ST jobs consistent with the expansion of OE employment strengthening their outside options. Overall, the results reveal sharp age asymmetries in contract substitution. They suggest that monetary incentives can facilitate transitions from temporary to permanent employment for young workers, but are less effective for workers above age 45.

JEL Classification codes: H25, H32, J08, J21, J38, J41.

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1 Introduction

The segmentation of workers between open-ended (OE) and short-term (ST) contracts, also known as duality, is a characteristic of many labor markets in Europe and developing countries (Eichhorst et al., 2018; ILO, 2015). OE contracts are considered to be "good" jobs as they pay relatively high wages, entitle workers to severance payments, and offer job stability and promotion opportunities. In contrast, ST contracts are often viewed as "bad" jobs offering lower wages, less severance payments, and limited career advancement prospects (García-Pérez et al., 2019; Daruich et al., 2023). A common argument is that duality arises due to the differences in employment protection costs between OE and ST contracts (Blanchard and Landier, 2002). Thus, reducing the cost gap between the two contract types is often proposed as a policy solution to decrease the prevalence of ST contracts. This paper empirically investigates the validity of this proposition.

Since 1980, at least 128 reforms in Europe have reduced the statutory labor costs of OE relative to ST contracts (Boeri, 2011). We study one such policy implemented in Spain in 1997, which reduced the non-wage labor costs of new OE contracts by 9–12% of gross wages, while leaving the costs of ST contracts unchanged. Approximately 80–85% of the reduction came from lower payroll taxes, with the remainder arising from reduced severance payments. The reform introduced two eligibility notches at ages 30 and 45 that reduced the labor cost of new OE hires for workers younger than 30 and for those older than 45.[1] These age thresholds constitute the main policy margins analyzed in this paper. The reform also included additional provisions affecting other groups, such as incentives for hiring the long-term unemployed and for converting existing ST contracts into OE contracts.[2]

This quasi-experiment offers an especially informative setting for studying dual labor markets for four reasons. First, the two age-based eligibility thresholds allow us to examine substitution between contract types for both young and older workers. Second, Spain exhibited the highest incidence of ST employment among OECD countries before the reform—33.6% in 1996, compared with an OECD average of 10.9%.[3] Third, the gap in employment protection between ST and OE contracts was among the largest in Europe (Bentolila et al., 2012), which we estimate at roughly 6.4–7% of an ST worker's labor costs.[4] Fourth, not all new OE hires younger than 30 and older than 45 were eligible for the reduced-cost contract, generating variation that allows us to study

[1] Although eligibility was defined based on worker characteristics, the statutory reduction in labor costs accrued to employers. The labor cost reduction for workers younger than 30 was 9% of gross wages, and for workers older than 45 was 12%.

[2] To be eligible for the payroll tax reductions, a long-term unemployed worker is defined as an individual registered as unemployed for at least one year.

[3] In 2022, the highest ST shares were observed in the Netherlands (27.7%), South Korea (27.3%), and Colombia (26.4%). The data is from OECD.

[4] Section 3 provides details. This estimate is a lower bound, as it excludes legal uncertainty and litigation costs.

wage incidence by comparing subsidized and unsubsidized permanent jobs.

Theoretically, lowering the relative cost of OE contracts should increase permanent hiring if OE and ST contracts are substitutes and wage pass-through is incomplete. However, substitution may be heterogeneous, depending on whether the function of the temporary contract is screening workers, covering short-term absences, managing seasonal demand, or containing labor costs (Garibaldi and Gomes, 2022; Del Bono and Weber, 2008; Houseman, 2001). When ST contracts are primarily used as screening devices, reductions in OE costs may encourage conversion into permanent positions. By contrast, when they reflect genuine short-term needs or are used to manage wage-setting frictions, financial incentives may have weaker effects. These functions are likely to differ by age. For workers under 30, who face greater screening uncertainty, lower OE costs may encourage firms to offer permanent contracts. For workers over 45, whose productivity is more predictable and for whom temporary contracts are less likely to serve a screening role, financial incentives may be less effective. Consistent with this reasoning, we find substantial substitution from ST to OE contracts among workers under 30, but not among workers over 45.

We begin our empirical analysis by examining the employment effects on young workers aged 18–30, exploiting cross-sector variation in pre-reform reliance on temporary employment among this age group. Sectors employing a larger share of 18–30-year-olds under ST contracts were more exposed to the reduction in OE labor costs. By comparing these more-exposed sectors with less-exposed ones, we assess how firms adjusted their employment composition for young workers in response to lower relative costs of permanent hiring.

The first set of results reveals a sharp reallocation across contract types. The reform increased transitions from ST to OE contracts, generating a sharp reallocation across contract types among young workers. Event-study estimates reveal an immediate divergence between high- and low-exposure sectors. By quarter 3 after implementation, OE employment in high-exposure sectors rises by 6.9 percentage points (pp) relative to low-exposure sectors, while ST employment declines by 8.9pp. These magnitudes point to substantial short-run substitution, consistent with firms converting existing temporary matches into permanent positions.

However, the dynamics evolve over time. The negative effect on ST employment attenuates and partially reverses. While conversions remain an important margin of adjustment, ST employment gradually recovers in later quarters. This dynamic pattern is consistent with search-and-matching models of dual labor markets (Blanchard and Landier, 2002; Boeri and Garibaldi, 2024; Booth et al., 2002). Lowering the relative cost of permanent contracts increases the option value for firms of converting temporary workers into OE positions. This encourages firms to convert temporary jobs into permanent ones while also increasing the attractiveness of temporary contracts as entry positions and stepping stones into stable employment. Consequently, substitution toward OE contracts operates alongside new ST hiring, moderating the longer-run decline in temporary

employment.

Beyond employment composition, the reform also affects wage-setting. The expansion of permanent employment induced by the reform is likely to strengthen workers' outside options, as OE jobs offer greater employment protection and stronger career prospects. If ST contracts depress wages by weakening bargaining power (Bassanini et al., 2024), firms may have incentives to maintain them even when the relative cost of OE contracts falls. Lowering OE labor costs therefore need not eliminate temporary employment if ST contracts help sustain monopsony power by limiting outside options. Consequently, when lower OE costs induce firms to convert temporary matches into permanent positions, workers in ST contracts may gain bargaining power—and potentially higher wages—even without a direct subsidy.

We test this mechanism directly by implementing a two-way fixed-effects design that compares workers just below and above the age-30 eligibility threshold, before and after policy implementation. We find that the reform increased wages in ST contracts by nearly 1.5% for workers just below the threshold relative to those just above it. These wage gains are consistent with improved outside options stemming from greater access to permanent employment. They also fit search-and-bargaining models of contractual dualism in which temporary workers are treated as 'outsiders' and temporary wages move with workers' outside options; policies that expand access to protected open-ended jobs can therefore spill over into higher wages even in short-term contracts (Boeri and Garibaldi, 2024; Daruich et al., 2023).

We next examine whether these adjustments generated spillovers across age groups. We apply the same sectoral exposure strategy used for 18–30-year-olds, and examine whether employment outcomes for older workers evolved differently in sectors that were more exposed to the reform through their pre-reform reliance on temporary young workers. We find no evidence of adverse effects on permanent employment among workers over 30. Instead, both OE and ST employment increase for this group in more exposed sectors.

Two mechanisms help explain the rise in permanent employment among older workers. First, firms in more exposed sectors may also have relied on other labor-cost reduction programs available for workers aged 30–45, including incentives targeting the long-term unemployed and for converting ST contracts that were already in place at the time of the reform into OE contracts. Second, some young workers who transition into OE contracts mechanically age into the 30+ group over time, raising permanent employment among older workers.

At the same time, the data reveal a parallel increase in temporary employment among older workers. A plausible explanation is compositional reallocation across age groups. As the reform raises wages and permanent employment prospects for young workers, temporary positions become relatively more expensive to fill with young employees. Firms that continue to rely on short-term arrangements may therefore substitute toward older workers in ST contracts.

To isolate the effects of the policy for workers above age 45, we adopt an alternative empirical strategy. The share of ST contracts among workers in this age range varies little across sectors, making sectoral exposure an uninformative measure. Instead, we exploit the sharp eligibility notch at age 45. The analysis proceeds in two steps.

First, we identify valid comparison groups. Near the notch, firms had incentives to delay converting temporary workers to permanent positions until eligibility, producing clear bunching in the age distribution of employment (Figure 4). The notch generates sizable distortions in contract timing: just below age 45, OE employment falls by 4.2% while ST employment rises by 8.5%, consistent with delayed ST-to-OE conversions. Using methods from the notch-design literature (Kleven and Waseem, 2013; Kopczuk and Munroe, 2015), we construct counterfactual employment distributions and isolate workers unaffected by this reallocation. This approach indicates that workers younger than 43 and older than 46 were not influenced by the bunching.[5]

Second, using these comparison groups, we estimate two-way fixed effects models comparing workers aged 40–41 and 47–48, on either side of the eligibility cutoff.[6] [7] Examining workers farther from the cutoff, we find little evidence of substitution from ST to OE contracts among workers over 45. Transitions from ST to OE do not increase, and total OE employment remains essentially unchanged. Although low-cost OE employment rises by roughly 2.2pp, high-cost OE employment declines by about 2pp, implying that the subsidized contracts primarily replaced existing permanent positions rather than creating new ones.[8] In contrast, the distortions observed near the notch show that firms respond sharply to the subsidy. However, these responses largely reflect intertemporal shifting rather than net contract reallocation: firms delay conversions until workers become eligible for the subsidy. The pronounced timing response therefore indicates that firms were attentive to the financial incentives created by the reform, even though it did not lead to substantial substitution between ST and OE contracts for older workers.

The absence of substitution for workers older than 45 naturally raises the question of whether labor-cost reductions were largely passed through into higher wages, thereby eliminating firms' incentives to expand permanent hiring. To interpret this possibility, we follow Lazear (1990) and Bozio et al. (2025), who show that reductions in severance payments should be passed through into

[5] Counterfactuals are based on employees aged 37–40, assuming that, absent the notch, this group would predict employment between ages 40 and 45. A placebo test using pre-reform data supports this assumption.

[6] Results are similar when using alternative groups aged 41–42 and 48–49.

[7] We provide two pieces of additional evidence that workers aged 40–41 constitute a valid comparison group. First, we compare their observed employment series with extrapolated pre-reform trends and find no meaningful deviations. Second, Appendix Section C.18 applies the same sectoral exposure strategy used for young workers, but using the baseline share of ST contracts among workers aged 40–42 as the exposure measure. The estimates show no systematic differences in OE employment across sectors.

[8] For expositional convenience, we refer throughout the paper to OE contracts eligible for the incentives introduced by the 1997 reform as *low-cost OE contracts*, since they entail lower labor costs for employers, and to ineligible OE contracts as *high-cost OE contracts*. Section 3.2 describes the institutional setting and eligibility criteria in detail.

higher wages, whereas payroll tax cuts that do not entail a corresponding reduction in workers' benefits should generate little or no wage response.[9]

Consistent with this hypothesis, we find substantial but incomplete pass-through of the policy into wages, with estimates of about 37.2% for workers below age 30 and 55.7% for workers above age 45. Importantly, this magnitude is substantially higher than what would be expected if wage adjustments reflected only the decline in severance payments. Although this pass-through reduces the magnitude of the effective labor-cost decline, the remaining cost reduction is still economically meaningful and large enough to generate substitution toward OE contracts. Yet, in practice, no such substitution occurs for above-45 workers.

To quantify this difference more formally, we combine these wage effects with employment changes to estimate substitution elasticities between OE and ST contracts. The resulting estimates are 6.5 for workers under 30 and 0.025 for workers over 45.[10] [11] These elasticities are estimated in the context of a reform that simultaneously altered firms' incentives for both under-30 and over-45 workers and should therefore be interpreted as equilibrium responses to a policy that reshaped labor demand across the age distribution.[12] Taken together, the large difference indicates that workers under 30 operate closer to the OE–ST margin, whereas for workers over 45 these contract types are much less substitutable—a pattern consistent with strong adverse selection among over-45 ST workers documented in the mechanisms section.

This paper makes three contributions. First, we provide new evidence on substitution between ST and OE contracts over the life cycle. Search-and-matching models of dual labor markets often assume perfect substitution between contract types, implying that the prevalence of temporary jobs is tightly linked to the employment protection cost gap (Blanchard and Landier, 2002; Cahuc and Postel-Vinay, 2002; Boeri and Garibaldi, 2024). Our estimates qualify this view. Substitution between ST and OE contracts is substantial for young workers but essentially zero for workers older than 45. These findings confirm that large disparities in employment protection can trap young workers in temporary employment (Blanchard and Landier, 2002; Boeri and Garibaldi, 2024), while highlighting the limits of monetary incentives for mid-career workers who are farther

[9] Throughout the paper, we use the terms *pass-through* and *wage incidence* to refer to the adjustment of wages in response to changes in firms' non-wage labor costs. This mechanism is conceptually distinct from wage increases driven by improved outside options, which operate through workers' bargaining position rather than through the direct sharing of cost savings.

[10] The elasticity estimated locally around the age-45 notch is 2.35, consistent with substantial responsiveness in the timing of contract conversions near the cutoff.

[11] Cappellari et al. (2012) estimates a substitution elasticity of around 1 using firm-size discontinuities in Italian data; other relevant studies include Centeno and Novo (2012) and Bratti et al. (2021).

[12] In particular, the small elasticity estimated for workers over 45 does not imply that the ST–OE margin for this group is mechanically unresponsive to policy. Rather, it reflects limited substitution in an environment where labor demand for OE contracts among under-30 workers increased broadly following the reform. While different counterfactual policies might generate stronger substitution for over-45 workers, the estimates are especially informative for reforms that apply across age groups and operate through general equilibrium adjustments in contract demand.

from the ST-OE margin.

Second, we provide evidence consistent with a monopsonistic mechanism that helps explain why labor market duality may persist even when the cost gap between OE and ST contracts narrows. The reform expands access to OE employment for workers under 30 and we find that wages increase in ST contracts and high-cost OE positions. Because these contracts were not eligible for payroll tax reductions, the wage gains cannot reflect direct cost pass-through. Instead, they are consistent with an outside-option channel: expanding access to stable employment improves workers' bargaining positions even when they remain in temporary jobs. In imperfectly competitive labor markets, ST contracts may weaken workers' outside options by limiting access to stable employment and credible alternative offers, thereby containing wage growth.[13] These findings suggest that the bargaining position of temporary workers is endogenous to the availability of permanent employment opportunities. This interpretation complements the evidence in Daruich et al. (2023), who show that temporary workers capture a smaller share of firm rents than permanent workers. Taken together, the results underscore the importance of incorporating life-cycle heterogeneity and monopsony power into models of dual labor markets.

Third, the results contribute to the literature on payroll tax incidence and non-standard forms of wage pass-through (Saez et al., 2012, 2019; Bozio et al., 2025). Prior work shows that payroll tax reductions may generate wage gains for both eligible and non-eligible workers (Saez et al., 2019), or exhibit limited pass-through when the payroll tax reduction is statutorily targeted to employers and not clearly linked to changes in workers' individual benefits (Bozio et al., 2025). In contrast, we document significant but incomplete wage pass-through for eligible workers. Unlike most existing studies, the reform we analyze targets specific demographic groups—individuals under 30 and over 45 who were not in OE employment—rather than broad segments of the workforce. The results suggest that when eligibility increases relative demand for a subset of workers, firms compete to hire them, generating at least partial wage incidence (Postel-Vinay and Robin, 2002; Cahuc et al., 2006; Altonji et al., 2013; Bagger et al., 2014).

The paper is organized as follows. Section 2 describes the data, and Section 3 outlines the institutional context and the 1997 reform. Section 4 presents the theoretical framework. Sections 5 and 6 report employment and wage effects, while Section 7 estimates substitution elasticities. Section 8 examines the mechanisms underlying our results, Section 9 provides additional results and robustness checks, and Section 10 concludes.

[13] Consistent with this view, temporary employment is positively associated with labor market concentration (Bassanini et al., 2024; Daruich et al., 2023).

2 Data

We use data from the *Muestra Continua de Vidas Laborales* (Continuous Sample of Work Lives, MCVL), an administrative dataset drawn from Spain's Social Security records, population register, and tax administration files. The MCVL provides longitudinal, spell-level information on labor market histories, including the exact start and end dates of employment and unemployment spells, monthly earnings (subject to statutory bottom- and top-coding), reasons for job separation, contract type (including whether the contract was eligible for a payroll tax credit), firm size, industry classification, part-time status, and workplace location.[14] The dataset also includes individual-level characteristics such as sex, educational attainment, date and province of birth, and citizenship, along with detailed information on household composition that reports the sex and date of birth of all household members.

The MCVL sample was first drawn in 2004, selecting 4% of all individuals who, in that year, were formally employed, receiving unemployment insurance (UI), unemployment assistance (UA), or collecting a contributory pension—amounting to over one million individuals. Sampling was random and unstratified. The dataset provides each individual's complete labor history from workforce entry, including all periods of employment, UI or UA receipt, and pension collection. New editions are released annually, retaining all individuals originally sampled in 2004 unless they permanently exit the Social Security (e.g., due to UI exhaustion, inactivity without benefits, or death). Exiting individuals are replaced by randomly selected Social Security affiliates with an active relationship in that year, whose complete retrospective labor histories are included into the dataset.

Our empirical analysis includes all individuals sampled in any edition of the MCVL between 2004 and 2012. Consequently, we use data from 2004–2012 to retrospectively analyze a policy implemented in 1997, which may raise concerns about sample representativeness. However, Figure A1 in the Online Appendix shows that the sample remains representative. Comparing the MCVL with the *Encuesta de Población Activa* (Spanish Labor Force Survey, SLFS), which provides a representative quarterly snapshot of the labor market, we find nearly identical employment trends for workers aged 25–30, 40–45, and 45–50. This close alignment indicates that both sources capture comparable labor market dynamics, validating the retrospective use of the MCVL for the

[14] For employment relationships in which a worker initially holds a fixed-term contract and subsequently transitions to another fixed-term or an OE contract, the MCVL records the final contract type as well as up to two preceding contracts within the same job relationship. The dataset also reports the exact start and end dates of each contract, which we incorporate into our analysis.

key age groups analyzed in this study.[15] [16]

The MCVL also offers several advantages over the SLFS. A key one for our purposes is that it records workers' exact ages, which—as we show in Section 5.3.1—is crucial for analyzing behavior around the policy's age cutoff at 45. By contrast, the SLFS reports age only in five-year intervals.[17]

3 Institutional Context

In 1996, Spain exhibited the highest incidence of ST employment among OECD countries, with 33.6% of workers holding ST contracts, compared with an OECD average of 10.9%. This high prevalence can be traced to the 1984 labor market reform, which substantially liberalized the use of ST contracts.[18] Before this reform, ST contracts were restricted to objectively temporary jobs, such as seasonal employment or ST replacements. The reform removed these restrictions, allowing ST contracts to be used broadly across sectors and occupations, which led to a rapid expansion in their use (Figure 1, Panel (b)). Because ST contracts involved no dismissal costs at expiration and limited firms' exposure to wrongful dismissal litigation, they became highly attractive to employers. As a consequence, Spain's labor market became strongly segmented, with a clear divide between OE employees and ST workers, the latter experiencing substantially higher job instability and weaker employment protection (Bentolila et al., 1994).

The remainder of this section describes the statutory labor cost gap between ST and OE contracts before the reform, outlines the policy changes that narrowed this gap, and explains the age-based discontinuities at 30 and 45 that support our empirical strategy.

3.1 The Difference in Severance Payments between OE and ST Contracts

Before the reform, OE and ST contracts were mainly distinguished by the higher severance payments owed to OE workers upon dismissal. Using pre-reform data, we estimate that this severance

[15] The MCVL's sampling design likely explains its consistency with the SLFS. Importantly, inclusion in the MCVL does not require active employment, individuals receiving UI, UA, or a contributory pension are also sampled. In our context, the UA program for workers aged 52 and older is particularly relevant, as it provides indefinite benefits until retirement. For example, a worker who was 45 when the policy was implemented would be 52 by 2004 and could therefore be sampled while collecting UA benefits. Section B.5 of the Online Appendix provides further details on this program.

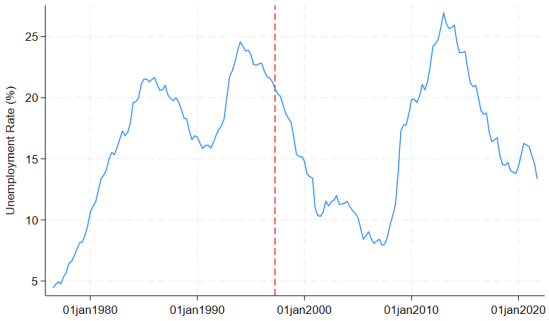
[16] Bonhomme and Hospido (2017) also exploit the retrospective structure of the MCVL and document that attrition is negligible over our study period and age range, primarily reflecting low mortality and emigration rates. Attrition is somewhat higher for women, however, largely due to career interruptions in their twenties and early thirties.

[17] Kugler et al. (2005) evaluate the same policy using the SLFS, comparing workers aged 45–64 with those aged 30–44. As we discuss in Section 5.3.1, finer age granularity is essential for accurately capturing behavioral responses around the notch.

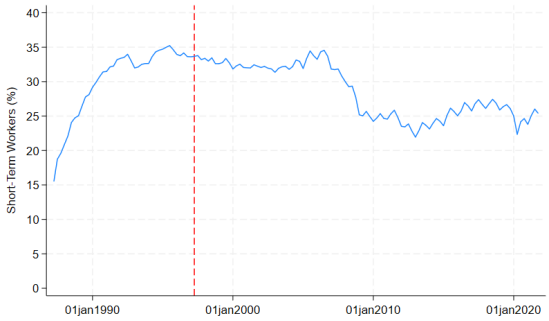
[18] Time-series evidence in Figure 1, Panel (a), suggests that the reform did not lead to a reduction in unemployment.

Figure 1: Unemployment and Short-Term Employment Rates

(a) Unemployment rate



(b) Share of worker in ST contracts



Notes: Unemployment rate and share of workers in temporary contracts over time. The dotted vertical line marks the enactment of the policy in May 1997. The figures are based on data from the Spanish Labor Force Survey. Panel (a) shows the evolution of the unemployment rate, while Panel (b) shows the share of workers employed under short-term contracts.

cost gap represented roughly 6.4%-7% of the total labor cost of an equivalent ST worker. The methodology underlying this calculation is described below.[19]

For OE contracts, severance payments varied depending on whether a dismissal was deemed wrongful or fair. In cases of wrongful dismissal, employers were liable for 45 days of wages per year of tenure, up to a maximum of 42 months. For fair dismissals, compensation was lower—20 days per year of tenure, capped at one year's salary. To qualify as fair, employers had to demonstrate either (i) the worker's inability to perform their duties or (ii) economic or technological grounds for the layoff. These cases could be challenged in court, and roughly 75% of disputes were resolved in favor of the employee (Bentolila, 1996). Regardless of the outcome, employers bore legal costs, and if a dismissal was judged unfair, they were also responsible for the worker's foregone wages during the trial. Given these high expected costs and the legal uncertainty, fair dismissals were rare. In our data, among workers younger than 30, 0.11% of separations were classified as fair, 71.17% as wrongful dismissals, and 28.72% as voluntary quits; among workers over 45, the corresponding shares were 0.34%, 78.09%, and 21.57%, respectively.

By contrast, ST contracts were strictly time-limited, with a maximum statutory duration of three years. At the time of the reform, these contracts entailed no severance payments upon expiration, and contract terminations at expiration were not subject to judicial review.[20] Given this institutional setting, and assuming that the observed dismissal rates of OE workers provide a reasonable approximation to the separation risk that ST workers would face if converted to OE

[19] The estimate uses data from January 1996 through April 1997, immediately preceding the reform.

[20] Severance payments for ST contracts were introduced later, in 2001.

contracts, we compute the pre-reform severance cost gap for young workers as follows:

$$\frac{\text{Pre-reform statutory severance gap}}{\text{Gross annual wage}} = \frac{(w \times 45 \times 71.17\% + w \times 20 \times 0.11\%) \times \text{Duration}}{((1+\tau)w \times 365) \times \text{Duration}} = 6.40\%,$$

where w denotes the daily wage, τ the payroll tax rate (37.2%), and *Duration* the years of job tenure. On average, this implies a severance cost gap of 6.40% for young workers.[21] Using the same approach and the observed separation risks for workers older than 45 yields a corresponding gap of: $\frac{(w\times45\times78.09\%+w\times20\times0.34\%)}{((1+\tau)w\times365)} = 7.03\%$.[22]

This estimate likely represents a lower bound of the true statutory labor cost differential, as it excludes additional expenses associated with fair dismissals that are litigated, such as legal fees, procedural delays, and uncertainty.[23]

3.2 The 1997 Policy Change

Concerns about the dual structure of the Spanish labor market—particularly its adverse effects on earnings, employment, and productivity (Wilhelmi, 2021)—prompted the government to introduce targeted subsidies for certain OE contracts.[24] These early measures, however, had limited scope. A major reform in 1997 substantially broadened access to these incentives, thereby reducing the cost of hiring eligible workers under OE contracts. Throughout the paper, we refer to OE contracts benefiting from these incentives as *low-cost OE contracts*, and to OE contracts that do not benefit from them as *high-cost OE contracts*. The reform led to a sharp increase in the use of low-cost OE contracts.

The 1997 reform simultaneously reduced both payroll taxes and severance payments for *new* OE hires within specific demographic groups. Payroll tax cuts were financed through the *Instituto Nacional de Empleo* (National Employment Institute) budget, ensuring that expenditures tied to

[21] Our calculation conditions on separation because we view this as a more informative measure of the labor cost gap between ST and OE contracts. An alternative would be to multiply the statutory severance payment by the observed probability of dismissal. However, dismissal probabilities are themselves endogenous to severance costs. Under a high-severance regime, firms may respond by dismissing fewer workers, retaining unproductive matches for longer, or relying more heavily on ST contracts. As a result, multiplying severance payments by the observed dismissal probability would mechanically produce a smaller expected severance cost precisely because severance costs are high. This would understate the labor cost wedge created by employment protection.

[22] As shown in Section B.1 of the Online Appendix, for workers older than 45 the gap fluctuates between 6% and 8% during the first five years of tenure, and 85.6% of OE contracts last no more than five years. Beyond this period, the gap stabilizes at around 6%. For workers younger than 30, the gap fluctuates between 4% and 7% during the first five years, and 92.5% of OE contracts last no more than five years. After this period, the gap fluctuates around 5%.

[23] Although difficult to quantify, these additional costs appear to be substantial. Most firms seem to avoid them by opting for wrongful dismissals instead, which is consistent with the fact that only 0.11% of separations among young workers and 0.34% among older workers were classified as fair, as well as with the discussion in Bentolila (1996).

[24] For instance, in 1992 subsidies were granted to firms hiring long-term unemployed workers younger than 25 or older than 45. Moreover, eligibility was limited to firms expanding their workforce, as summarized in Table B3.

social benefits remained unaffected. As is common in dual labor market reforms, the policy was marginal: it applied only to new OE contracts, leaving existing ones untouched (Boeri, 2011).

Importantly, the reform introduced two sharp age-based discontinuities in labor costs, benefiting workers under 30 and over 45.[25] Under the new rules, firms hiring OE workers younger than 30 received a 25.38% payroll tax reduction, while those hiring workers older than 45 obtained a 38.06% reduction. In both cases, severance payments for wrongful dismissals were reduced from 45 to 33 days per year of tenure—a 26.7% decrease. The implied relative reduction in expected labor costs for young workers is:

$$\frac{\text{Expected reduction in OE labor costs}}{\text{Labor costs under an ST contract}} = \frac{w\tau \times 25.38\% \times 365 + w[12 \times 71.17\%]}{w(1+\tau) \times 365} = 8.6\%.$$

Hence, the reform cut expected labor costs by 8.6% for workers under 30, and by 12.2% for older workers: $\frac{w\tau \times 38.06\% \times 365 + w[12 \times 78.09\%]}{w(1+\tau) \times 365} = 12.2\%$.[26] [27]

Notably, the reductions in statutory labor costs exceeded the pre-reform employment protection gap of 6.40% for young workers and 7.03% for older workers. For new hires, the reform more than offset the severance-related cost disadvantage of OE contracts relative to ST contracts. One might consequently expect ST contracts to disappear. In practice, however, several factors sustain their use. ST contracts can weaken workers' outside options—by limiting access to stable employment and credible outside offers—and thereby depress wages (see Section 5.2.2). In addition, terminating an OE contract continues to involve legal uncertainty and potentially substantial litigation costs, which are absent for ST contracts. As a result, firms may continue to rely on ST contracts despite the reduction in statutory labor costs for OE jobs, while facing stronger incentives to offer OE contracts to eligible workers.

The sharp discontinuities at ages 30 and 45 arise from differences in eligibility rules and the generosity of the incentives. Eligibility was more restrictive for workers aged 30–45. This group qualified only if they had been unemployed for at least one year or if they converted an ST contract that was already in place with the same employer at the time of the reform's approval. By contrast, eligibility was automatic for workers younger than 30 and for those older than 45.

In terms of magnitude, the implied reduction in expected labor costs was broadly similar for workers under 30 and for the long-term unemployed aged 30–45 (8.76%). The reduction was slightly larger—10.48%—for workers aged 30–45 who converted an existing ST contract with

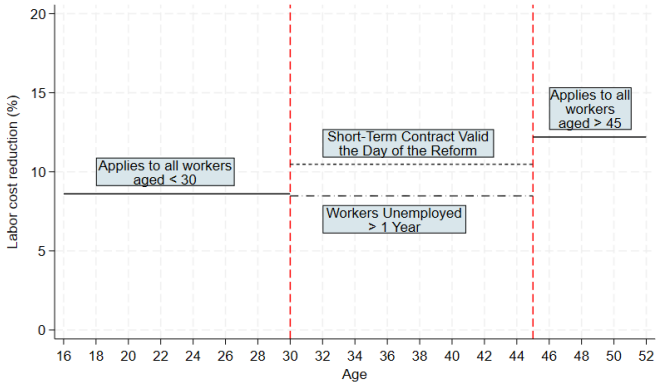
[25] Dolado and Jimeno (2004) note that the government initially intended to reduce statutory labor costs for all new OE hires. However, such a broad reduction risked being ruled unconstitutional by the Spanish Constitutional Court. To comply with legal constraints, policymakers instead targeted groups considered more vulnerable to unemployment and temporary employment traps—specifically, workers younger than 30 and older than 45.

[26] For young workers, 1.7% of the labor cost reduction is due to lower severance payments, and 6.91% from lower payroll taxes. For older workers, these numbers are 1.87% and 10.33%, respectively.

[27] Table B3 reports the evolution of labor cost reductions over time for each eligible group.

the same employer.[28] However, the largest effective reductions applied to workers over 45, since payroll tax cuts for this group extended for the entire duration of the contract. For workers younger than 45, in contrast, payroll tax reductions expired after two or three years. Figure 2 plots the percentage reduction in labor costs by age.[29] Although minor adjustments were made to payroll tax reductions over time, the eligibility discontinuities at ages 30 and 45 remained intact.[30]

Figure 2: Labor Cost Reductions by Age



Notes: The figure plots the expected percentage reduction in labor costs for new open-ended (OE) contracts relative to short-term (ST) contracts by worker age under the 1997 reform. Reductions combine payroll tax discounts and lower expected severance payments, computed using the formula described in the text. Eligibility was automatic for workers younger than 30 and older than 45, generating sharp discontinuities at these age thresholds. For workers aged 30–45, eligibility was conditional on long-term unemployment or conversion from an ST contract, in place at the time of the reform, with the same employer. Payroll tax reductions for workers over 45 applied for the entire duration of the contract, whereas for workers younger than 45 they expired after two or three years. See Table B3 for details on the evolution of these reductions over time.

A last key feature of the 1997 reform is that it was explicitly designed to target marginal OE jobs—that is, workers who, absent the policy, would have remained on ST contracts or out of employment. To ensure this targeting, the law imposed several restrictions on eligibility. First, it applied only to *new* OE hires. Second, workers with an OE contract in the preceding three months were excluded, preventing firms from poaching existing OE employees and rehiring them at a discount. Third, workers rehired by the same employer were ineligible if they had held a permanent contract within the past 24 months. In all such cases, firms were required to hire workers under the pre-reform statutory labor costs. In addition, employers had to be current on their tax obligations to claim the subsidy.[31] Fourth, a new restriction was added in 1999: firms that wrongfully dismissed

[28] We apply the same formula used for workers younger than 30 and older than 45. The implied reductions in expected labor costs are computed as $\frac{w\tau\times 31.72\%\times 365+w[12\times 78.57\%]}{w(1+\tau)\times 365} = 10.48\%$ for workers converting from an ST contract with the same employer, and $\frac{w\tau\times 25.38\%\times 365+w[12\times 78.57\%]}{w(1+\tau)\times 365} = 8.76\%$ for workers unemployed for at least one year.

[29] Using pre-reform data, we estimate that the average new OE hire aged 40–50 remained employed for 14 years. Restricting tax cuts to the first two years therefore substantially reduced their value.

[30] See Section B.3 in the Online Appendix for a description of these legislative changes. Importantly, all adjustments affected payroll tax discounts, while severance payment reductions remained unchanged.

[31] Further restrictions included: the subsidies could not be used to hire relatives of the owner or managers; they could not be applied to managers themselves, individuals in prison, professional athletes, artists, or dockers employed by public entities. Finally, when combined with other programs, tax credits could not exceed 60% of the annual wage.

a worker hired under the tax credit became ineligible for future discounts.[32]

4 Theoretical Framework

Search-and-matching models of dual labor markets characterize firms' hiring decisions as a choice between ST and OE contracts, which differ in regulatory constraints and dismissal costs (Blanchard and Landier, 2002; Boeri and Garibaldi, 2024). Because OE contracts entail higher firing costs, firms typically offer them only when the expected productivity of a match is sufficiently high to justify these costs, implying an implicit productivity threshold for permanent hiring. Matches below this threshold are instead hired under ST contracts, which provide greater adjustment flexibility for firms but weaker long-term employment prospects for workers. This institutional asymmetry gives rise to labor market segmentation between permanent and temporary employment.

Employment Effects. A central implication of these models is that reducing the relative cost of OE contracts increases the prevalence of permanent employment. By lowering the productivity threshold required for a permanent hire, policies such as the reform analyzed in this paper enable firms to offer OE contracts to workers who would otherwise be hired under ST contracts. In this framework, temporary employment can function as a stepping stone to stable jobs; accordingly, we expect the policy to expand OE employment.

The magnitude of this expansion is likely to vary across age groups. Among young workers, the effect may be stronger for several reasons. Firms frequently use ST contracts to screen inexperienced workers and learn about their productivity (Faccini, 2014), and narrowing the cost gap between contract types can accelerate conversion to OE contracts. In addition, dynamic complementarities in human capital may amplify these effects: training and learning-by-doing are more likely to occur within longer-term employment relationships, while firms have weaker incentives to invest in temporary workers. By increasing the likelihood of early conversion, the reform may strengthen firms' incentives to train young workers, thereby reinforcing transitions into permanent employment (Garcia-Louzao et al., 2023; Autor and Houseman, 2010; Booth et al., 2002; Cabrales et al., 2017). At the same time, if ST contracts work as stepping stones into OE employment, the reform may also increase the expected value of temporary jobs by raising the probability of future conversion. This channel can partially offset the mechanical substitution away from ST contracts, moderating the predicted decline in ST employment among young workers.

For workers older than 45, these mechanisms are likely weaker. Firms typically possess more precise information about older workers' productivity, so ST contracts might be used less often

[32]This restriction applied for one year or until the firm hired as many workers as it had dismissed unfairly. In our empirical analysis, we use data up to 2001. Additionally, in the Online Appendix, we verify that our results hold when using only pre-1999 data, before any legislative changes.

for screening and more frequently to accommodate structural needs such as seasonal demand, replacement positions, or project-based work (Del Bono and Weber, 2008; Berton and Garibaldi, 2012; Garibaldi and Gomes, 2022). Adult workers also face shorter expected job horizons and a greater likelihood of productivity shocks, which reduces the surplus associated with long-term employment relationships. Consequently, the same reduction in hiring costs that substantially increases permanent employment among young workers is likely to have more modest effects among workers over 45.

Outside Options and Wage Effects. By increasing the availability of OE jobs, the reform raises the value of workers' outside options. In search-and-matching and bargaining models, wages depend not only on the surplus generated within the current match but also on alternative employment opportunities (Boeri and Garibaldi, 2024). A higher probability of obtaining an OE job might increase the expected payoff from searching outside the current position. Accordingly, in age groups where the reform induces substitution from ST to OE contracts, we expect upward pressure on wages, even for workers who remain in temporary or otherwise unaffected positions.

Spillover Effects. Beyond its direct impact on eligible workers, the reform may also generate indirect effects across age groups.[33] An increase in OE employment among young workers could be accompanied by a reduction in OE employment among older workers if firms substitute younger for older employees in permanent positions. Similarly, a decline in ST employment among the young could coincide with an increase in ST employment among older workers if temporary positions are reallocated across age groups.

Crowd-Out. Distinct from cross-age-group spillovers, the reform could also generate crowding-out across contract types within a given age group. Firms may expand low-cost OE employment while reducing high-cost OE positions, mechanically substituting subsidized contracts for unsubsidized ones. In this case, the policy would primarily affect inframarginal workers—those who would have been hired on OE contracts even in the absence of the reform—resulting in relabeling rather than a net increase in permanent employment.

Wage Incidence. The reform can affect wages through two channels: reductions in payroll taxes and reductions in severance payments. In standard competitive frameworks, the incidence of payroll taxes depends on the relative elasticities of labor supply and demand. When labor supply is relatively inelastic compared to labor demand, a substantial share of employer payroll tax reductions is passed through to wages. Under these conditions, reductions in employer labor costs would be expected to translate into higher wages. However, recent evidence indicates that pass-through may be limited when tax changes are formally targeted to employers and only weakly linked to worker benefits (Bozio et al., 2025). This consideration suggests that direct wage effects

[33] Spillover effects have been documented in other evaluations of labor market policies (Crepon et al., 2013; Cahuc et al., 2022), underscoring their importance for a complete evaluation of the reform.

from payroll tax reductions in our setting are likely to be modest.

Severance payments operate differently because they are borne by firms but accrue to workers upon separation, effectively constituting deferred compensation. A reduction in mandated severance may therefore be partially offset by higher wages at the time of contracting, as firms and workers renegotiate the composition of total compensation (Lazear, 1990). Over time, however, this effect may attenuate. Workers employed under lower-cost OE contracts face weaker employment protection and potentially reduced bargaining power, which could translate into slower subsequent wage growth (Boeri and Garibaldi, 2024; Bentolila et al., 1994).

5 Employment Results

5.1 Empirical Strategies

In this section, we present descriptive evidence motivating the identification strategies used to estimate the reform's employment effects. We exploit two complementary sources of variation: sector-level ST incidence among young workers, and age-based discontinuities embedded in the policy design.

Sector-Level Variation. Although the reform applied nationally, its impact varied across sectors according to pre-reform reliance on ST contracts, particularly among young workers. Firms in sectors with higher reliance on ST employment were more likely to adjust hiring practices in response to the reform, making sectoral variation a useful lens for identifying its effect on the transition from temporary to permanent jobs. We capture this exposure using $\%ST_{s,96}$, defined as the number of workers in the relevant age group employed on ST contracts in sector s in 1996 divided by total employment in sector s (across all ages). This measure is constructed separately for workers aged 18–30 and for workers older than 45.[34]

The distribution of $\%ST_{s,96}$ reveals substantial heterogeneity across sectors for young workers. Among individuals aged 18–30, the average ST share is 16%, with a standard deviation of 9 percentage points, indicating meaningful differences in potential exposure to the reform. In contrast, ST employment among workers older than 45 is rare, averaging 1.9% with very limited cross-sector dispersion. Consequently, sectoral variation in temporary employment intensity provides informative identifying variation for younger workers but offers little leverage for older cohorts.[35]

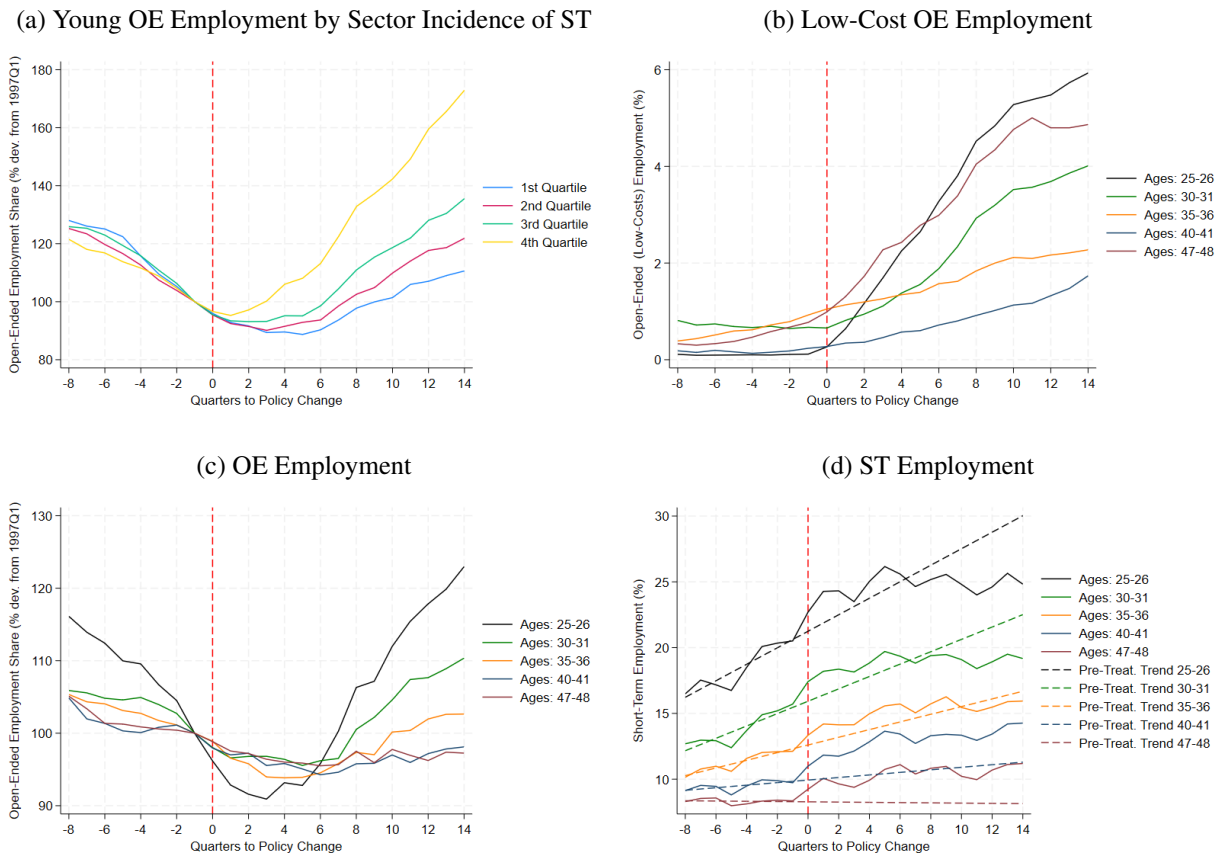
For our empirical strategy, we formalize the comparison using a binary treatment that contrasts sectors in the top quartile of exposure with those in the bottom quartile of the pre-reform

[34] Because the numerator is computed over age groups of different widths (18–30 and 45–65), while the denominator is total sectoral employment, the level of $\%ST_{s,96}$ is not directly comparable across age groups. Cross-age comparability is not required for our analysis, as the measure is used only for workers younger than 30.

[35] Figure C1 in the Online Appendix reports the distribution of $\%ST_{s,96}$.

temporary employment share, $\%ST_{s,96}$. In the bottom quartile, the average ST employment share among 18–30-year-olds is 5.5 percent in the pre-reform period. This relatively low incidence implies limited scope for policy-induced reallocation, although some response cannot be ruled out. By contrast, sectors in the top quartile exhibit an average ST share of 26.76 percent, indicating substantially greater reliance on temporary contracts and, therefore, a stronger margin along which firms may adjust following the reform.

Figure 3: Employment Time-Series



Notes: Panel (a) shows the raw time series for OE employment by quartile of sectoral exposure to the reform, measured by the 1996 share of workers aged 18–30 employed on ST contracts. Panels (b), (c), and (d) show low-cost OE employment, OE employment, and ST employment, respectively, for several age groups of workers. In Panels (a) and (c), the vertical axis reports employment indices normalized to 100 in the quarter preceding the policy's implementation, whereas Panels (b) and (d) report employment shares (in percent). In Panel (d), the dashed lines display the pre-treatment trends for each group. The vertical red-dashed line indicates the quarter in which eligibility for payroll tax cuts was expanded and severance payments were reduced.

Panel (a) of Figure 3 plots the sectoral evolution of OE employment for 18–30-year-old workers across the four exposure quartiles. Employment levels are normalized to 100 in the quarter immediately preceding the reform. The figure shows parallel pre-trends across exposure groups and a pronounced divergence after the reform. Fourteen quarters after implementation, OE employment in the top exposure quartile has increased by roughly 70 percent relative to its pre-reform level, whereas the bottom quartile exhibits an increase of about 10 percent. While the bottom quartile

also displays some post-reform growth, its response is markedly smaller, consistent with its limited initial reliance on temporary contracts.

Motivated by these time-series patterns, the empirical framework is closely related to a difference-in-differences design, as it compares the evolution of outcomes across sectors with differential pre-reform exposure to temporary employment. However, we avoid strict treated-versus-control terminology because we cannot fully rule out some exposure of low-ST sectors to the reform. Instead, the design exploits differential intensity of exposure and provides a structured way to assess whether post-reform dynamics align with the predictions presented in the theoretical framework. The details of the econometric specification are presented in Section 5.2.1.

In Appendix Section D.2, we complement this approach by using the continuous measure of pre-reform short-term incidence, $\%ST_{s,96}$, as the main regressor and exploiting the full cross-sectoral variation rather than focusing on the extremes. The resulting estimates are broadly consistent with the baseline specification.

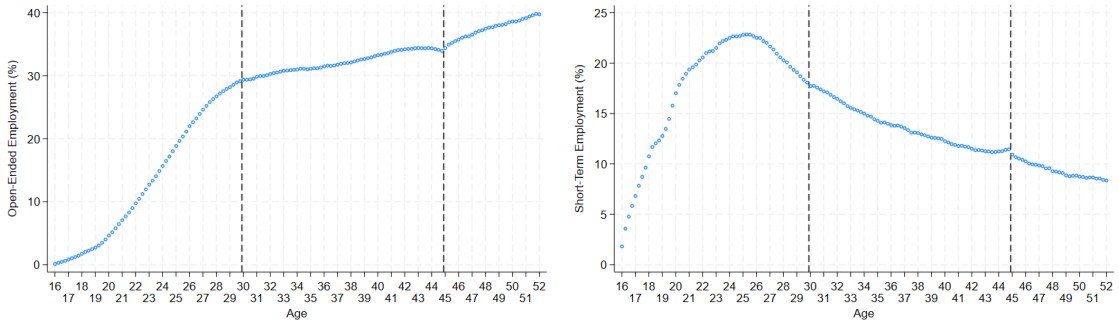
Variation Near the Notches: For adult workers, the reform created a sharp discontinuity at age 45. Employers hiring workers just below this threshold could lower labor costs by delaying conversion from a ST to an OE contract until the worker became eligible for the subsidy. This differential incentive led to a visible concentration of ST employment just below the cutoff (Figure 4), consistent with firms adjusting contract timing in response to eligibility rules. In Section 5.3.1, we exploit this bunching using standard methods from the notch-design literature to quantify how the reform affected the timing of ST-to-OE transitions (Kleven and Waseem, 2013; Kopczuk and Munroe, 2015). In contrast, no discontinuity arises at age 30, because workers cannot "age into" eligibility.[36]

[36] Around 8% of workers aged 47–55 are employed on ST contracts. This might appear at odds with the sectoral average of 1.9% (Figure C1), which corresponds to the average share workers 47–55 in a sector who are employed on ST contracts ($\%ST_{s,96}$). Since workers aged 47–55 account for roughly 14% of total sectoral employment, the implied joint share is small (approximately $0.14 \times 0.08 \approx 1\%$), consistent with the observed magnitude.

Figure 4: Open-Ended and Short-Term Employment Share by Age

(a) Open-Ended

(b) Short-Term



Notes: Employment shares by contract type and age. Panel (a) shows open-ended workers, and Panel (b) shows short-term workers. Vertical dashed lines indicate the labor cost notches.

Variation Far from the Notches: We next examine whether workers far from the notches can serve as a credible source of identification for the employment effects of the reform. Figure 3, Panels (b), (c) and (d) plot the evolution of employment by contract type for workers aged 25, 30, 35, 40, and 47. Panel (b) shows low-cost OE employment, Panel (c) shows total OE employment (normalized to each group's employment level one quarter before the reform), and Panel (d) shows ST employment. Three main patterns emerge from these time series.

First, workers aged 47 and 40 provide a credible comparison groups. Both groups are sufficiently distant from the 45-year-old notch and thus unaffected by the local employment distortions documented in Figure 4—a point we demonstrate further in Section 5.3.2. Following the reform, low-cost OE employment rises sharply for 47-year-olds, and more modestly for 40-year-olds. Also, total OE and ST employment exhibit parallel pre-reform trends (Panels (c) and (d)). These patterns support using these age groups to estimate the policy's effects on employment above the eligibility threshold at 45.

Second, there is no other age group that provides a valid control group for young workers. As shown in Panel (c), OE employment among younger cohorts diverges sharply from that of older groups before the reform.[37] This divergence likely reflects the higher cyclical sensitivity of youth employment (Oreopoulos and von Wachter, 2012), which violates the parallel-trends assumption and renders older workers an unsuitable counterfactual. Consequently, to identify the employment effects for this population, we rely instead on sector-level variation in exposure.

Third, Panel (d) points to possible spillover effects on older workers. The dashed lines are pre-treatment trends for each age group, and solid lines are the observed data. As we can observe, following the reform, ST employment declined among young workers relative to its pre-reform

[37]The time-series of the OE employment share in Panel (c), Figure 3, have been normalized to the OE employment share in the quarter preceding the reform.

trend but increased among older workers. This pattern is consistent with firms reallocating temporary positions from younger to older employees once conversion subsidies became available for the former. We formally investigate these spillover effects in Section 5.2.3.

Finally, we stress that the results for below-30 and above-45 workers are estimated in the context of a reform that simultaneously targeted both groups. While the estimates may not directly generalize to a setting in which only one group is treated in isolation, they are particularly informative for understanding reforms that operate across the broader age distribution of the workforce.

5.2 Effects of the Policy for Workers Younger than 30

5.2.1 Employment Effects

Methodology. Following the identification strategy described in Section 5.1, we estimate the policy's impact on young workers using cross-sector variation in the pre-reform incidence of ST contracts. Our baseline exposure measure, $HighST_{s,96}$, is an indicator equal to one for sectors whose pre-reform share of ST employment among workers aged 18–30 lies above the 75th percentile of the sectoral distribution, and zero for sectors below the 25th percentile. To quantify these effects, we estimate both dynamic and static two-way fixed-effects specifications. The empirical framework is closely related to a difference-in-differences design, although we avoid this terminology because we cannot fully rule out some exposure of the control group to the reform. Nevertheless, this approach provides a useful structure to assess whether the data evolve in line with the predictions of the theoretical framework and, more broadly, to improve our understanding of behavior in dual labor markets. The dynamic specification traces the evolution of the policy's effects over time and is estimated using the following model:

$$Y_{st} = \alpha + \delta_s + \delta_t + \sum_{j=-8,\neq -1}^{14} \beta_j \mathbb{1}[j=t] \times HighST_{s,96} + \sum_{j=-8}^{14} \gamma_j \mathbb{1}[j=t] \times X_s + \varepsilon_{st}, \qquad (1)$$

where Y_{st} denotes the employment or contract transition share for young workers in sector s at time t, normalized by the number of 18–30-year-olds employed in that sector in 1996.[38] Sector fixed effects (δ_s) control for time-invariant sectoral characteristics, while time fixed effects (δ_t) absorb aggregate shocks common to all sectors. The coefficients β_j measure the differential evolution of outcomes between high- and low-exposure sectors, relative to the quarter immediately preceding its implementation in May 1997 ($j = -1$).

[38] All employment outcomes are expressed as ratios: the number of 18-30-year-old workers employed in quarter $\times$ year (t) divided by the total number of 18-30-year-old workers in each sector under ST and OE contracts in 1996. Transition variables are defined analogously, as the number of transitions into a given contract type in quarter $\times$ year (t), normalized by the number of new hires under OE contracts in 1996 (for transitions into OE contracts) or under ST contracts in 1996 (for transitions into ST contracts).

To strengthen our empirical strategy, we interact time dummies with a rich set of sector-level baseline covariates, X_s, to account for potential confounders correlated with both baseline sectoral exposure and outcomes. These covariates include sectoral averages of wages, firm size, educational attainment, and job duration, as well as the incidence of part-time contracts, the share of managerial positions, and the proportion of male workers. We additionally control for labor market concentration, measured using a weighted Herfindahl–Hirschman Index across province–sector cells.

In addition to the dynamic specification, we estimate a static two-way fixed-effects model:

$$Y_{st} = \alpha + \delta_s + \delta_t + \beta_1 HighST_{s,96} + \beta_2 Post_t + \beta_3 (HighST_{s,96} \times Post_t) + \sum_{j=-8}^{14} \gamma_j \mathbb{1}[j = t] \times X_s + \varepsilon_{st}, \tag{2}$$

where β_3 captures the average post-reform differential effect across sectors with varying baseline exposure.

Results. We begin the empirical analysis by examining the impact of the reform on employment dynamics and job transitions. Panel (a) of Figure 5 shows that sectors in the top quartile of pre-reform ST employment among young workers experienced a larger post-reform increase in transitions from ST to OE contracts compared with sectors in the bottom quartile. Before the reform, the estimated coefficients fluctuate around zero and are not statistically different from zero, providing no evidence of differential pre-trends. These findings indicate that reductions in the cost of OE employment increase transitions from ST to OE contracts, thereby strengthening the role of ST as stepping stones into more stable employment, consistent with the predictions of search-and-matching models of dual labor markets (Blanchard and Landier, 2002; Boeri and Garibaldi, 2024).

Panels (c) and (e) present transitions into low-cost and high-cost OE contracts, respectively. In both cases, there is no evidence of differential pre-trends prior to the reform, supporting the validity of the identification strategy. Following the reform, the estimated coefficients for transitions into low-cost OE contracts (Panel c) increase steadily and become statistically significant, indicating a positive effect of the policy. By contrast, there is no evidence of displacement in transitions into high-cost OE contracts (Panel e).

The estimates reported in Table 1, Panel A, Columns (1)–(3), closely mirror the patterns documented in the event-study figures. The increase in transitions from ST to OE contracts is economically large, corresponding to an 77.85% rise relative to the baseline transition share in high ST-incidence sectors.[39] This magnitude is comparable to the large changes in conversion rates

[39] At baseline, the ST-to-OE transition share equals 3.6341. Figure C3 in the Appendix presents the raw time series of ST-to-OE transitions for high- and low-ST-incidence sectors, corroborating the large post-reform increase in transitions from ST to OE contracts.

documented by Daruich et al. (2023), who find that the liberalization of temporary contracts in a 2001 Italian reform reduced within-firm conversions from temporary to permanent employment for young workers by about 59% of the pre-reform rate. Column (2) shows that this effect is entirely driven by transitions into low-cost OE contracts. In contrast, Column (3) reports a small and statistically insignificant decline in transitions into high-cost OE contracts.

Next, we examine the impact of the reform on employment outcomes. Panel (a) of Figure 6 shows that sectors in the top quartile of pre-reform ST exposure experienced a substantially larger increase in OE employment among young workers than sectors in the bottom quartile. The magnitude is economically large: OE employment rises by 17 percentage points in high-exposure sectors relative to baseline levels, or a 35.2% increase relative to the pre-reform OE share (Table 1, Panel B, Column (3)).

The effect on ST employment is negative. Panel (e) of Figure 6 plots the dynamic effects and reveals a sharp divergence in the quarters immediately following the policy. By quarter 3 post-reform, OE employment in high-exposure sectors increases by 6.9 percentage points, while ST employment declines by 8.9 percentage points relative to low-exposure sectors. These magnitudes are consistent with a substantial reallocation across contract types in the short run.

After quarter 3, the decline in ST employment stabilizes, and from quarter 6 onward the coefficient gradually moves back toward zero. This pattern suggests that substitution from ST to OE contracts is the dominant adjustment margin in the first post-reform quarters. In later periods, ST employment partially recovers. This evolution is consistent with firms continuing to use temporary contracts as screening devices and as stepping stones into permanent employment, so that new ST hiring coexists with ongoing conversion into OE contracts.

These dynamics are consistent with the theoretical literature on dual labor markets, which predicts that a reduction in the relative cost of permanent contracts induces firms to convert temporary jobs into permanent positions (Blanchard and Landier, 2002; Boeri and Garibaldi, 2024; Booth et al., 2002). The fact that the decline in ST employment is smaller in magnitude than the increase in OE employment is also consistent with the theoretical framework, in which an increase in the option value of permanent employment raises the attractiveness of temporary contracts as entry positions, even as firms convert existing ST jobs into OE contracts. The substitution pattern becomes even more apparent when the outcome is expressed as the share of ST employment in total (ST+OE) employment in each period rather than relative to the baseline denominator. Panel (f) in Figure 6 shows a clear decline in the ST employment share, indicating a shift in the composition of employment toward permanent contracts.[40]

[40]Using pre-treatment data, we remove sector-specific linear trends from standardized ST employment and the ST employment share (Panels (e) and (f) of Figure 6), as these outcomes exhibit differential pre-treatment trends. The approach we follow is similar to that in Daruich et al. (2023) or Elias et al. (2025). Results without detrending are reported in Appendix Figure C4.

Approximately 55% of the increase in OE employment is driven by the expansion of low-cost OE jobs (Table 1, Column 1, Panel B), with the remainder explained by growth in high-cost OE employment (Table 1, Column 2, Panel B). Although the policy directly subsidized only low-cost contracts, the sizable contribution of high-cost OE jobs suggests indirect effects. We explore two potential mechanisms behind this pattern below.

Table 1: Effects of the Reform on Employment Outcomes and Transitions

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Short-Term Employment and Low-Cost Open-Ended transitions					
	Short-Term to Open-Ended	Short-Term to Low-Cost OE	Short-Term to High-Cost OE	Low- to High-Cost Open-Ended	Low- to High-Cost Open-Ended (Different Firm)	Low- to High-Cost Open-Ended (Same Firm)
Post $\times \%HighST_{s,96}$	2.829***	2.897***	-0.065	0.195**	0.064**	0.132**
	(0.742)	(0.673)	(0.289)	(0.076)	(0.029)	(0.060)
Observations	15,064	15,064	15,064	15,064	15,064	15,064
	Panel B: Employment Outcomes					
	Open-Ended Low-Cost	Open-Ended (High-Cost)	Open-Ended All	Ever Low-Cost Open-Ended	Short-Term	Short-Term Employment Share
Post $\times \%HighST_{s,96}$	0.093***	0.074	0.170***	0.111***	-0.034	-0.140***
	(0.027)	(0.045)	(0.052)	(0.030)	(0.095)	(0.036)
Observations	16,451	16,451	16,451	16,451	16,451	16,451
	Panel C: Employment Transitions from Non-Employment					
	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	Non-Employment to Any OE	Non-Employment to Short-Term		
Post $\times \%HighST_{s,96}$	0.083***	-0.113	-0.027	0.034		
	(0.029)	(0.084)	(0.090)	(0.035)		
Observations	15,064	15,064	15,064	15,064		

Notes: This table reports estimates from a two-way fixed-effects specification of the effects of reduced non-wage labor costs on labor market outcomes, using sector and time fixed effects (Equation 1). Panel A shows contract transitions, Panel B employment outcomes (with Columns 5–6 detrended to remove pre-reform trends), and Panel C further explore contract transitions. All regressions include interactions between quarter dummies and baseline sector-level controls—average earnings, market concentration, managerial share, education, total employment, job duration, part-time share, and male share—and are weighted by the baseline population of young workers. Robust standard errors clustered at the sector level are reported; significance: *10%, **5%, ***1%.

First, low-cost OE contracts may have acted as stepping-stones into high-cost OE contracts. To test this possibility, we check whether the overall rise in OE employment is mirrored by the fraction of workers who at some point held a low-cost OE contract. Figure 6, Panel (d), and Table 1, Panel B, Column (4) provide supporting evidence. By the end of the study period, the effect on ever holding a low-cost OE contract is 27pp, which is closely aligned with the overall increase in OE employment (a coefficient of 0.32 in quarter 14; Figure 6, Panel (a)). This suggests that most of the expansion in permanent jobs passed through the subsidized entry point.

Second, we examine transitions from low-cost to high-cost OE contracts. Panel (b) of Figure 5 shows that a substantial share of workers initially hired under subsidized OE contracts subsequently transition into high-cost OE positions, particularly when the subsidies begin to expire (around quarter 12). Consistent with this pattern, Table 1 indicates that sectors in the top quartile of pre-reform ST exposure experience a 19.5 percentage point increase in transitions from low-cost to high-cost OE contracts relative to sectors in the bottom quartile (Column 4).

Although most low- to high-cost OE transitions within the same firm occur after quarter 12 (Panel (f) of Figure 5), transitions that involve a change of employer are more evenly distributed

over time (Panel (d) of Figure 5). In total, 32% of all low- to high-cost OE transitions involve workers moving to a different firm (Column 5). Relative to baseline OE-to-OE transitions, this corresponds to an increase of approximately 14.9%. This pattern suggests that the observed transitions are not solely driven by the mechanical expiration of subsidies, but also reflect active reallocation of workers across firms.

Finally, Panel C of Table 1 examines transitions from non-employment. The reform increases transitions into low-cost OE contracts (Column 1), but this effect is offset by a corresponding, though statistically insignificant, decline in transitions into high-cost OE contracts (Column 2), resulting in no statistically significant effect on overall transitions into OE employment (Column 3). Nor is there any statistically significant effect on transitions from non-employment into ST employment (Column 4). These findings suggest that the increase in OE employment documented above is not primarily driven by transitions from non-employment. Instead, the evidence is consistent with the reform operating mainly through transitions among employed workers, particularly the conversion of ST contracts into OE contracts.

Overall, the evidence in this section indicates that reducing the statutory cost of OE contracts relative to ST contracts increases the likelihood that ST jobs transition into stable employment for young workers. As a consequence, the reform generates a sustained increase in OE employment. In addition, we document sizable increases in OE-to-OE transitions, consistent with an intensification of on-the-job search and an improvement in young workers' outside options, a mechanism we examine in greater detail in the next section.

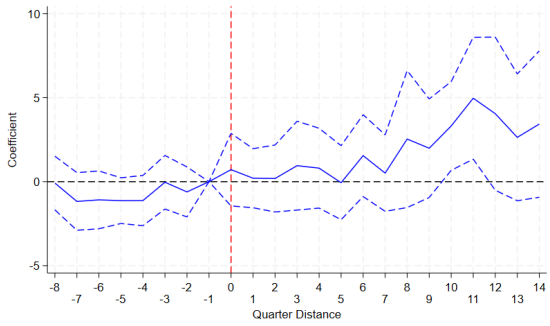
5.2.2 Outside Options and Wage Effects for Workers Younger than 30

The expansion of permanent jobs can influence wages by strengthening workers' outside options. Greater access to stable positions allows young workers to credibly threaten to search elsewhere, reducing firms' wage-setting power and exerting upward pressure on pay, even for those who remain in non-subsidized positions (Boeri and Garibaldi, 2024). This mechanism is particularly relevant in labor markets where temporary contracts serve purposes beyond flexibility (Bassanini et al., 2024; Daruich et al., 2023). By limiting access to stable employment, ST contracts might depress outside options and may therefore persist even when the labor costs of OE contracts fall. Expanding OE opportunities can thus raise wages broadly among young workers—not through statutory pass-through, but via enhanced bargaining positions.

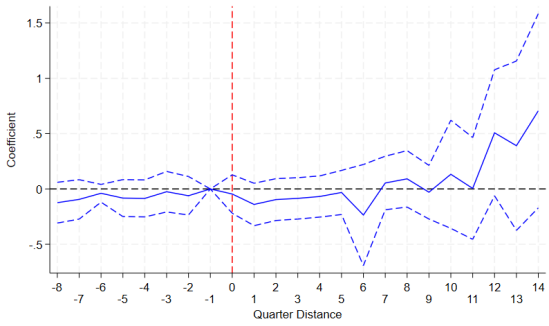
We test this channel by examining wage responses among groups not directly subsidized by the reform. ST workers do not benefit from payroll tax cuts or severance reductions, and high-cost OE workers are also unsubsidized, allowing us to isolate wage effects driven by improved outside options rather than lower labor costs. To identify these effects, we compare wage dynamics

Figure 5: Effects of the Reform on Employment Transitions

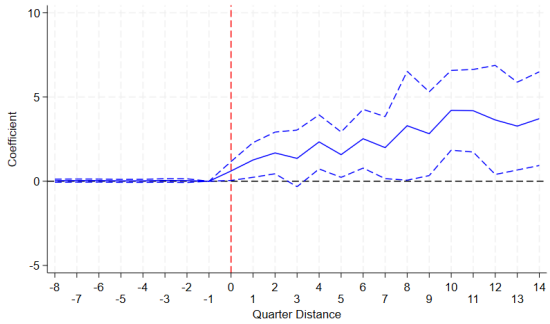
(a) Short-Term to Open-Ended



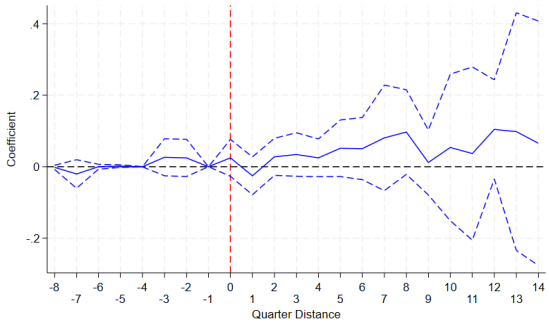
(b) Low- to High-Cost Open-Ended



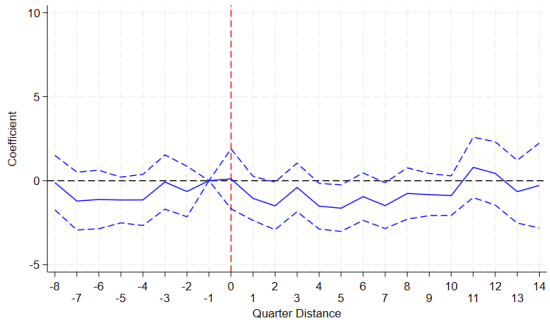
(c) Short-Term to Low-Cost Open-Ended



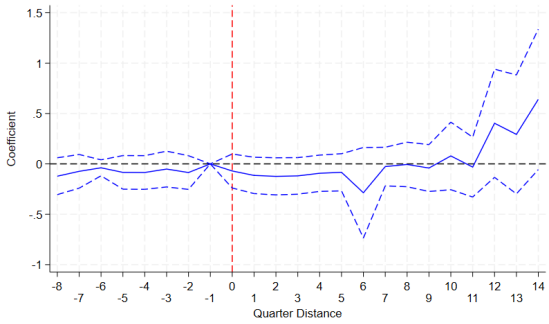
(d) Low- to High-Cost OE (Different Firm)



(e) Short-Term to High-Cost Open-Ended



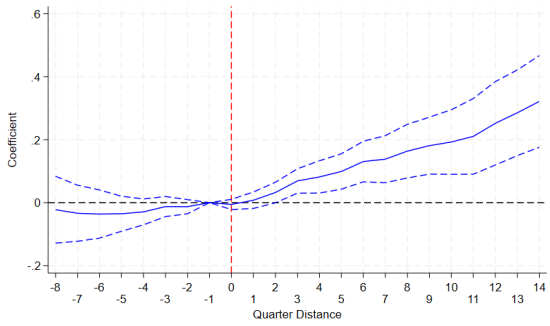
(f) Low- to High-Cost OE (Same Firm)



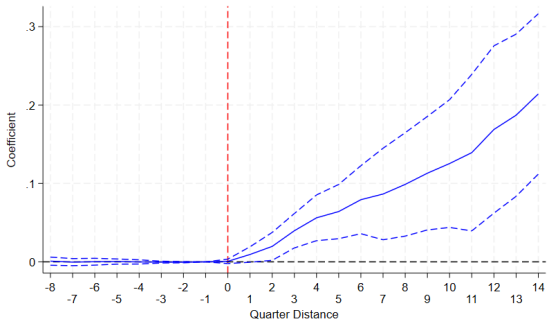
Notes: This figure presents event-study estimates of transition effects based on Equation 1, with coefficients (blue solid lines) and 95% confidence intervals shown in blue dashed lines. Panels (a), (c) and (e) report transitions from ST-to-OE towards any type of OE contract (a), a low-cost OE contract (c), and towards a high-cost OE contract (e). Panels (b), (d) and (f) report transitions from low-cost to high-cost open-ended contracts. Panel (b) is for transitions towards any firm, Panel (d) is for transitions towards a different firm, and Panel (f) is for transitions within the same firm. The vertical red dashed line marks the reform quarter. Regressions include interactions between quarter dummies and baseline sector-level controls—average wage, market concentration, managerial share, education, total employment, job duration, part-time share, and male share—and are weighted by the baseline population of young workers.

Figure 6: Effects of the Reform on Employment Outcomes

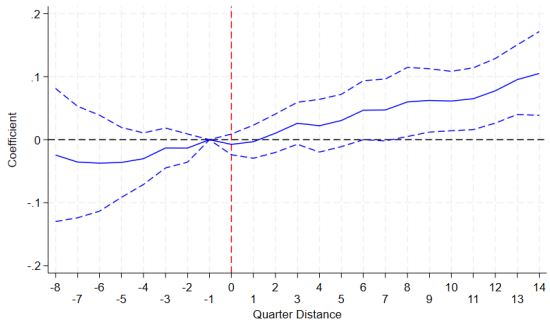
(a) All Open-Ended



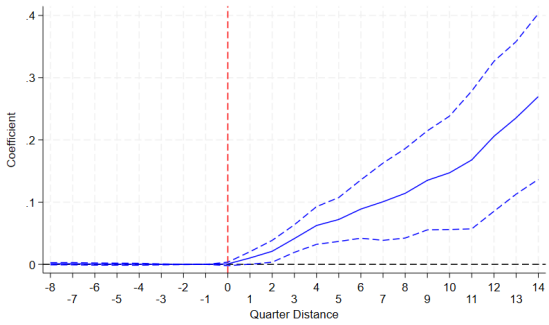
(b) Low-Cost Open-Ended



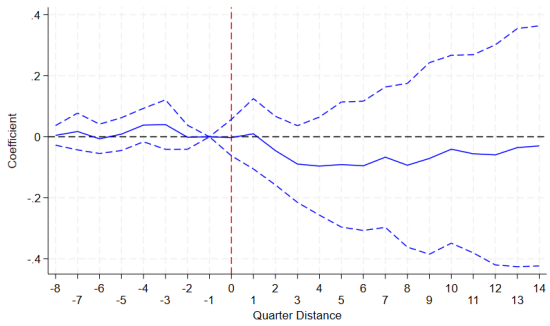
(c) High-Cost Open-Ended



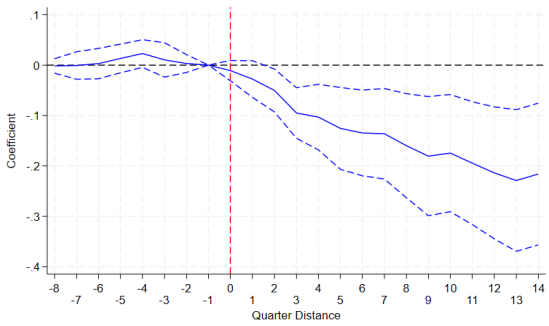
(d) Ever on Low-Cost Open-Ended



(e) Short-Term (Detrended)



(f) Short-Term Employment Share (Detrended)



Notes: The figure presents event-study estimates of the employment effects based on Equation 1. Blue solid lines show coefficient estimates with 95% confidence intervals in dashed blue. Panels (a)–(c) report results for total, low-cost, and high-cost open-ended employment, respectively; panel (d) for workers ever holding a low-cost contract; and panels (e)–(f) for short-term employment and the short-term employment share (both detrended using pre-treatment data). The vertical red dashed line marks the reform's implementation quarter. All regressions include interactions between quarter dummies and baseline sector-level controls—average wage, market concentration, managerial share, education, total employment, job duration, part-time share, and male share—and are weighted by the baseline population of young workers in each sector. Robust standard errors clustered at the sector level are reported in parentheses. Significant at the 10% level; ** 5% level; *** 1% level.

around the age-30 eligibility threshold, focusing on ST and high-cost OE workers aged 25–35.[41] Because the reform also affected employment composition, wage comparisons may nevertheless be influenced by changes in the characteristics of workers remaining in ST and high-cost OE jobs. To mitigate this concern, we control for a rich set of worker and firm characteristics, although selection on unobservables cannot be fully ruled out. We estimate the event-study specification:

$$Y_{it} = \alpha + \delta_s + \delta_p + \delta_t + \sum_{j=-8,\, j\neq -1}^{14} \beta_j \mathbf{1}[j = t]\text{Treatment}_i + \gamma X_{it} + \varepsilon_{it}, \tag{3}$$

where the dependent variable is the log daily wage expressed in full-time equivalent terms, and $Treatment_i$ equals 1 for workers younger than 30. The coefficients β_j trace differential wage dynamics relative to the quarter before the reform. The model includes sector, province, and quarter fixed effects; and controls for education, citizenship, disability, age-by-gender interactions, pre-reform ST and OE experience, firm size, and province-by-year effects. We also estimate a static two-way fixed-effects specification.

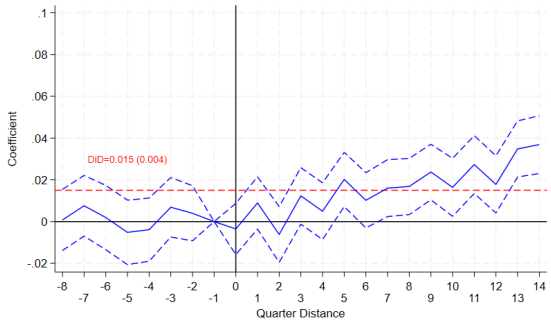
Figure 7 reports the event-study estimates (blue-solid line). Pre-reform wage trends for ST and high-cost OE workers are flat and statistically indistinguishable from zero. Following the reform, wage paths diverge. ST wages increase by nearly 4% fourteen quarters after the reform, while wages of high-cost OE workers rise by approximately 2%. The red-dashed horizontal line represents the static two-way fixed-effect estimate of the static version of Equation 3. On average, for the post-period, workers under 30 earn 1.5% higher wages in ST jobs and 1.6% higher wages in standard OE contracts.

These findings indicate that the reform raised wages for workers under 30 through improved outside options. More broadly, they suggest that expanding access to permanent employment can weaken firms' wage-setting power in segmented labor markets, generating spillover effects even among workers who remain in temporary or unsubsidized contracts. This interpretation complements the evidence in Daruich et al. (2023), who show that temporary workers receive a smaller share of firm rents than permanent workers. While their results highlight differences in rent sharing across contract types, our findings suggest that the bargaining position of temporary workers is itself endogenous to the availability of permanent employment opportunities: when access to OE jobs expands, wages rise even among workers who remain in ST contracts. By increasing the relative cost of employing under-30 workers on ST contracts, these wage effects may also influence firms' allocation of temporary jobs across age groups, which we examine in the next section.

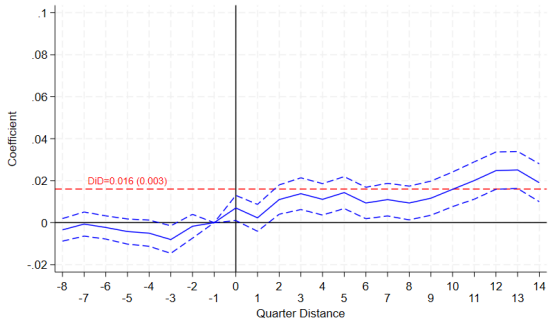
[41] Appendix Section C.5 presents robustness checks using a broader age window (20–40). The results remain consistent with an earnings increase in non-subsidized, high-cost, and ST contracts, reinforcing the interpretation that the reform improved outside options for young workers.

Figure 7: Evolution of ST and OE Wages Before and After the Reform (Notch at 30)

(a) Short-Term 25-30 Vs. 30-35



(b) High-Cost Open-Ended 25-30 Vs. 30-35



Notes: The figure reports event-study estimates of wage dynamics in ST and OE jobs. Coefficients are estimated from a two-way fixed-effects specification and shown in red; standard errors, reported in parentheses, correspond to Table C1 in the Appendix. Panel (a) compares wages in ST jobs on either side of the age-30 threshold, while Panel (b) presents the corresponding comparison for high-cost OE jobs. The treatment group consists of workers aged 25 to 30, and the control group consists of workers aged 30 to 35. Control variables include gender, educational attainment, citizenship status, disability status, cumulative months spent in ST employment between January 1990 and April 1997, and cumulative months spent in OE employment over the same period. The specification further includes age-by-gender interactions, as well as occupation, sector, and province-by-year effects.

5.2.3 Employment Effects for Workers Older than 30

We next examine the employment effects of the reform for workers older than 30. Analyzing outcomes for this group helps assess whether the increase in OE employment among younger workers was accompanied by changes in employment opportunities for older workers. In particular, we address two questions. First, did the rise in OE employment among young workers reflect a reallocation away from OE positions held by older workers? Second, consistent with the time-series evidence in Figure 3, Panel (d), did the decline in ST employment among young workers coincide with an increase in ST employment among older workers?

To address these questions, we re-estimate Equation 2 separately for three age aggregates: 18–65, 18–30, and 30–65. The dependent variable is first normalized by the pre-reform population aged 18–65 in each sector, so that the coefficients capture changes in employment relative to a fixed sectoral population benchmark. To facilitate interpretation in percentage terms, we then rescale each outcome by its own pre-reform mean for the corresponding age group. As a result, the estimated coefficients can be interpreted as proportional changes relative to baseline employment levels for each contract type. The regressions are weighted by the number of workers aged 18–65 in each sector in the baseline year.

The results, reported in Table 2, do not support displacement of older workers. Focusing on workers aged 30–65, OE employment increases by 14.3%, indicating that the expansion of OE employment was not confined to younger workers. These estimates reflect equilibrium employment responses for workers older than 30 following the reform rather than isolating only the direct effect of the policy applied to workers younger than 30. Consequently, they may also capture other

contemporaneous forces. The reform coincided with programs affecting older workers, including policies targeting the long-term unemployed and subsidies for converting ST contracts in place at the time of the reform into OE contracts, which may have supported OE employment for this group. In addition, workers cross the age-30 threshold over time. For example, increased ST-to-OE conversions among younger workers may also trigger conversions among older workers due to internal equity considerations. Taken together, these mechanisms help explain why we obtain a positive estimate rather than evidence of displacement among older workers.[42]

For completeness, the estimates for the 18–30 group replicate the main findings in Table 1: sectors in the top quartile of pre-reform ST exposure experienced a 37.1% increase in OE employment relative to sectors in the bottom quartile.

Table 2: Effects of the Reform on Older Workers' Employment Outcomes
(Relative to all workers in a sector)

	(1) Open-Ended Employment	(2) Short-Term Employment
	Panel A: Workers 18–65 Years Old	
Post $\times \%HighST_{s,96}$	0.179***	0.127
	(0.054)	(0.123)
	Panel B: Workers 18–30 Years Old	
Post $\times \%HighST_{s,96}$	0.371***	0.066
	(0.129)	(0.136)
	Panel C: Workers 30–65 Years Old)	
Post $\times \%HighST_{s,96}$	0.143***	0.241*
	(0.044)	(0.125)
Observations	24,489	24,489

Notes: This table presents two-way fixed-effects estimates of the effect of reductions in non-wage labor costs on labor market outcomes, using sector and time fixed effects (Equation 1). Panels A–C report results separately for workers aged 18–65, 18–30, and 30–65. All dependent variables are normalized by baseline sectoral employment (defined for workers aged 18–65). The specifications include interactions between quarter indicators and baseline sector-level characteristics: average earnings, market concentration, managerial share, educational composition, total employment, average job duration, part-time share, and male share. Regressions are weighted by baseline sectoral population. Short-term employment is detrended using pre-treatment observations. Robust standard errors, clustered at the sector level, are reported in parentheses. Statistical significance is denoted by * p<0.10, ** p<0.05, and *** p<0.01.

Turning to temporary employment, the evidence is consistent with positive spillovers. For

[42]The effects of programs potentially benefiting workers aged 30–45 are more difficult to isolate in our setting. First, several of these programs target the long-term unemployed, making it unclear which sectors are more likely to use them. Second, there is substantially less cross-sector variation in baseline ST exposure for workers aged 30–45. Third, these programs may interact with the incentives affecting workers younger than 30. Sectors that convert more ST contracts into OE contracts among younger workers may also use programs available for workers aged 30–45 more intensively as part of a broader shift toward OE employment. Because the share of ST employment among workers aged 18–30 does not perfectly correlate with that among workers aged 30–45, the latter measure may not fully capture the intensity with which these programs are used. For completeness, Appendix Table C12 reports estimates using the baseline share of ST employment among workers aged 30–42 as the exposure measure, restricting the age range to avoid the influence of the age-45 notch. The results do not suggest that sectors with higher ST exposure for this age group expanded OE employment.

workers aged 30–65, sectors in the top quartile of pre-reform ST exposure experienced a 24.1% increase in ST employment relative to sectors in the bottom quartile. This pattern implies that sectors more exposed to the reform partially offset the contraction in ST employment among young workers (see Table 1) through increased temporary hiring of older workers.[43]

This pattern is consistent with a shift in the age composition of temporary employment rather than a contraction in overall ST jobs. The reform induces substantial substitution from ST to OE among young workers, yet temporary employment might not vanish in more exposed sectors if it reflects structural short-term needs (Del Bono and Weber, 2008; Berton and Garibaldi, 2012; Garibaldi and Gomes, 2022). At the same time, the reform improves outside options for young workers and raises wages in ST jobs for that group, increasing the relative cost of employing young workers on temporary contracts. This suggests that not all ST positions are absorbed into permanent contracts and that firms continuing to rely on temporary employment may increasingly fill these positions with older workers, whose ST wages are not increasing.

If the remaining ST positions correspond to roles that are less easily incorporated into OE contracts, the increase in ST employment among older workers should be concentrated in contracts involving fewer hours. The strong expansion of OE employment among young workers suggests that some ST jobs previously held by 18–30-year-olds combined activities compatible with permanent contracts and activities that were genuinely temporary. As these workers transition into OE contracts, they are likely to concentrate on the more permanent components of their former positions. If so, the residual temporary employment filled by older workers would be less likely to take the form of full-time contracts. Consistent with this interpretation, Section C.7 of the Online Appendix documents part-time ST employment rises among workers older than 30 but not among workers aged 18–30.[44]

Figure C7 in the Appendix complements these results by presenting the event-study estimates for OE and ST employment across the 18–65, 18–30, and 30–65 age groups. The figures show clear evidence of parallel pre-trends, supporting the validity of the empirical strategy, and the post-reform dynamics align closely with the magnitudes reported in Table 2.

[43] In Table 2, the estimated effect on ST employment for the 18–30 group is positive and not significant, whereas it was negative and not significant in Table 1. These differences arise from changes in weighting and normalization. In the specification in Table 2, regressions are weighted by total 18–65 employment and outcomes are normalized by baseline 18–65 employment, while Table 1 weights and normalizes outcomes using 18–30 employment. Because the two approaches use different population benchmarks, estimates for ST employment among young workers may differ in sign and magnitude. We view the specification in Table 1 as more informative about the impact of the reform on the youth labor market, as it isolates changes relative to the size of the young workforce itself.

[44] Over the first ten quarters after the reform, the decline in ST jobs for young workers was largely offset by increases among older workers, consistent with a shift in the age composition of temporary employment, as shown in Appendix Figure C2. ST employment among workers aged 18–30 was rising prior to the reform, flattened at implementation, and declined thereafter, while ST employment increased for workers aged 30–40 and 40–50.

5.3 Employment Effects of the Policy for Workers Older than 45

This section assesses whether the reform led firms to substitute ST contracts with OE contracts among older workers. For individuals above age 45, eligibility for payroll tax reductions was automatic and did not depend on prior unemployment status or contract history. Moreover, unlike younger workers, payroll tax discounts applied for the entire duration of the contract. These features generate a sharp discontinuity in labor costs at age 45. As Figure 4 shows, this notch distorts observed employment rates around the threshold, so a simple comparison just below and above age 45 would not provide a valid measure of contract substitution.

To address this, we proceed in two steps. First, we examine employment patterns around the discontinuity to quantify distortions induced by the age-45 threshold and identify age ranges unaffected by them. Second, we focus the analysis on these unaffected groups to evaluate whether the reform systematically shifted workers from ST to OE contracts.

5.3.1 Employment Responses Near the Notch

Methodology. We analyze the policy's effect on workers near age 45, where the reform incentivizes firms to delay converting ST contracts into OE contracts until eligibility. For example, a 44-year-old ST worker who would have transitioned to an OE contract before 45 may now experience a postponed conversion, allowing the firm to benefit from lower payroll taxes and severance costs once the worker crosses the threshold.[45] We label this behavioral response as a transition delay (d), which raises ST employment just below the notch while correspondingly reducing OE employment.

The reform may also induce firms to favor workers just above age 45 over slightly younger candidates, generating across-notch substitution. We denote this effect by s_{oe} for OE contracts and s_{st} for ST contracts. Unlike transition delays, which raise ST employment below the threshold, across-notch substitution reduces both OE and ST employment in that range. We distinguish this mechanism from substitution across ST and OE contracts among workers already above the threshold, which we analyze separately in Section 5.3.2.

Our empirical goal is to quantify transition delays (d) and across-notch substitution (s_{oe}, s_{st}). Let $\hat{c}_{jk}$ denote the counterfactual employment distribution, where j indexes age using three-month bins from 40 to 47, and $k \in \{oe, oe_h, st\}$ denotes contract type: oe includes all OE contracts, oe_h refers to high-cost OE contracts, and st denotes ST contracts. Let c_{jk} represent observed

[45] Workers already employed under ST contracts when the 1997 reform was introduced could also be converted into subsidized OE contracts before age 45. For these workers, however, payroll tax reductions were available only during the first two years of the resulting OE contract, whereas workers who became eligible after turning 45 received labor cost reductions for the entire duration of the OE contract. Consequently, incentives to delay conversion existed in both cases but were substantially stronger for ST contracts initiated after the reform.

employment, and define deviations from the counterfactual as $\hat{m}_{jk} = (c_{jk} - \hat{c}_{jk})/\hat{c}_{jk}$. For workers just below the notch, at age 44.75, we expect:

$$\hat{m}_{44.75,oe} = -d - s_{oe} < 0, \tag{4}$$

indicating fewer OE workers than in the absence of the notch. The effect on ST employment is ambiguous, since transition delays and substitution operate in opposite directions:

$$\hat{m}_{44.75,st} = d - s_{st} \lesseqgtr 0. \tag{5}$$

Combining the two components isolate the across-notch substitution:

$$\hat{m}_{44.75} = \hat{m}_{44.75,oe} + \hat{m}_{44.75,st} = -s_{oe} - s_{st} < 0. \tag{6}$$

We estimate $\hat{m}_{j,oe}$, $\hat{m}_{j,st}$, and $\hat{m}_j$ for $j \in (40, 40.25, \ldots, 47]$. This quantifies the notch's impact on employment distributions and identifies the ages at which employment patterns diverge, identifying the population affected by transition delays and across-notch substitution and excluding these ages as valid comparison groups.

To do so, we construct counterfactual OE and ST employment distributions ($\hat{c}_{jk}$) using data from younger workers (below age a_L), who are unlikely to be affected by the notch. In our preferred specification, we fit a polynomial to the empirical age profile with $a_L = 40$, which excludes both transition delays—since ST contracts last at most three years—and the strongest across-notch substitution effects.[46] [47]

Identification relies on the assumption that, absent the notch, employment distributions would evolve smoothly around age 45.[48] Using historical data from a period without the notch, we find no systematic deviations at this threshold. We construct the counterfactual by regressing observed employment shares on age for workers below a_L, using a linear specification since pre-notch distributions are approximately linear (see Figure 4, Panels a–b):

$$c_{jk} = \beta_k a_j + \sum_{i \geq a_L} \gamma_{ik} \mathbb{1}[a_j = i] + v_{jk}, \tag{7}$$

where c_{jk} denotes the employment share of contract type k in age bin j. Counterfactual shares are obtained from the fitted values excluding the contribution of the age-bin indicators in the excluded

[46] As a robustness check, we report results using alternative values of a_L.

[47] More diffuse reallocation effects farther from the discontinuity cannot be entirely ruled out.

[48] The approach is also robust to spillovers from the incentives affecting workers younger than 30, as long as these vary smoothly with age. Such effects are absorbed by the estimated age profile and do not generate a discontinuity at age 45, allowing distortions from the notch to be identified.

range:

$$\hat{c}_{jk} = \hat{\beta}_k a_j \tag{8}$$

The displacement effect is measured as the difference between observed and counterfactual employment, reported both in absolute and relative terms:

$$\hat{M}_{jk} = c_{jk} - \hat{c}_{jk}, \qquad \hat{m}_{jk} = \frac{c_{jk} - \hat{c}_{jk}}{\hat{c}_{jk}}.$$

Standard errors are computed via bootstrap. Residuals from Equation 7 are resampled with replacement to generate simulated age–employment distributions, and the standard deviation of these estimates is used as the standard error.

Results. The empirical analysis yields four main findings. First, the reform delayed ST-to-OE transitions for workers near age 45, generating a local increase in ST employment and a corresponding decline in OE employment immediately below the notch. Second, substitution of older for slightly younger workers is small and statistically insignificant, indicating limited across-notch effects. Third, the policy crowded out high-cost OE contracts. Finally, workers younger than 43.5 and older than 45.5 appear unaffected by reallocation responses near the notch. We discuss each finding in detail below.

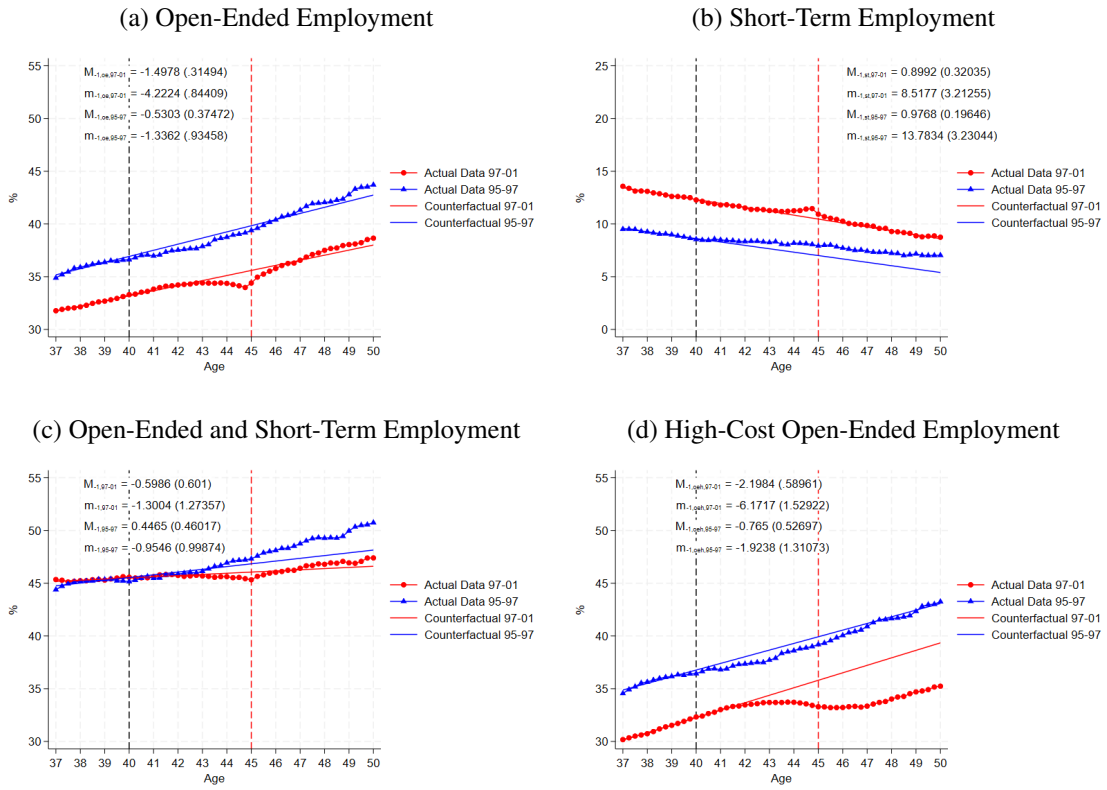
Figure 8 illustrates these patterns. Panels (a)–(d) plot observed and counterfactual employment rates by age for OE contracts, ST contracts, total employment, and high-cost OE contracts, respectively. The red series corresponds to the period May 1997–March 2001, when the labor cost notch was strongest. In this period, dotted lines denote observed outcomes and solid lines denote counterfactual values. The blue series corresponds to January 1995–April 1997, when the notch was weaker. In this period, triangles indicate observed data, while solid lines represent the counterfactual.

The estimates confirm that the notch reduces OE employment just below the threshold ($\hat{m}_{44.75,oe} < 0$). OE employment is 1.5 percentage points (pp), or 4.2%, lower than it would have been absent the notch. This effect is statistically significant at the 1% level and reflects both transition delays and substitution, as both mechanisms operate in the same direction. In contrast, pre-period data show no evidence of a "V"-shaped pattern around the threshold, and the estimated missing mass is statistically indistinguishable from zero.

For ST employment, the effect is positive and significant—0.90 pp, or 8.52%—indicating that transition delays dominate substitution ($d > |s_{st}|$). Pre-period estimates of similar magnitude appear, but the absence of the inverse "V" shape suggests these are spurious, likely reflecting nonlinearity in the data rather than a true discontinuity at age 45.[49]

[49] Inspection of pre-period data reveals a slope change around age 41, which the linear projection based on workers younger than 40 does not capture.

Figure 8: Empirical and Counterfactual Distributions



Notes: The figures show the empirical distribution of employment (red dots and blue triangles) and the respective counterfactual distribution (red and blue solid lines). The red data is for the policy period (May 1997 to March 2001), and the blue data is for the pre-policy period (January 1995 to April 1997). The counterfactual is estimated by fitting a linear polynomial to the empirical distribution in the ages between 37 and 40. Panel (a) depicts open-ended employment, Panel (b) short-term employment, Panel (c) joint open-ended and short-term employment, and Panel (d) high-cost open-ended employment. The figures also display the employment measures $M_{j,k,t}$ and $m_{j,k,t}$, where $j = -1$ is for workers at most one quarter away from the threshold at 45, t is either the pre-policy or the policy period, and k is each contract type, as explained in section 5.3.1. The black-dashed line shows the upper bound used to build the counterfactual. The red-dashed line represents the labor cost notch.

Panel (c) of Figure 8 combines OE and ST employment to measure across-notch substitution, $\hat{m}_{44.75} = \hat{m}_{44.75,oe} + \hat{m}_{44.75,st}$, and assess whether total employment declined just below the threshold. The estimate is negative but statistically insignificant (–0.60 pp, –1.3%), consistent with minimal across-notch substitution and small s_{oe} and s_{st}. Pre-period estimates are similarly insignificant.[50]

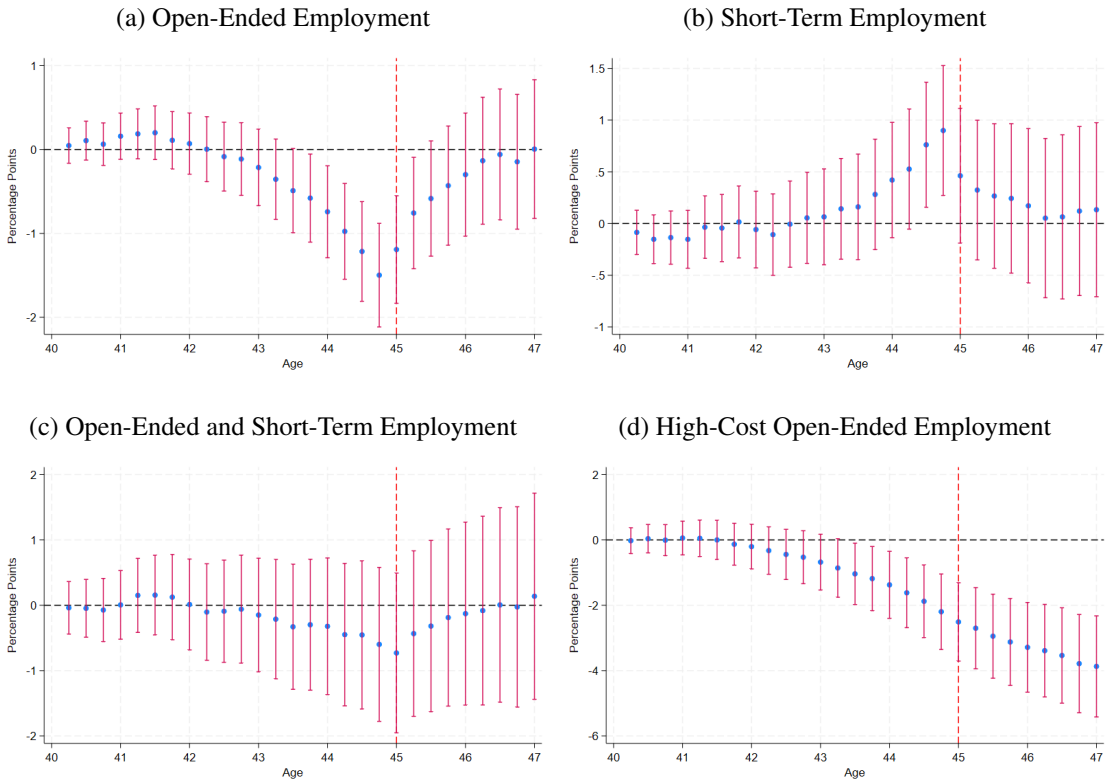
Finally, the introduction of the low-cost OE contract induced substitution away from high-cost OE positions ($\hat{m}_{44.75,oe_h} < 0$). Panel (d) of Figure 8 shows that employment in non-subsidized OE contracts fell by 2.20 pp (–6.2%) just below the notch, whereas pre-reform estimates are statistically insignificant, confirming a clear crowding-out effect.

Finally, Figure 9 plots the difference between observed and counterfactual employment for OE and ST contracts. These deviations become statistically significant around age 43.5 for OE

[50] Figure C9 in the Online Appendix (Section C) confirms that the primary effect near the notch is a delay in ST-to-OE transitions.

employment and 44.5 for ST employment, indicating that younger workers are largely unaffected by transition delays or across-notch substitution. Both responses dissipate within a few months after workers turn 45. Accordingly, in the next section, we focus on workers aged 40–41 and 47–48 to study the policy's impact far from the threshold, specifically whether it increased the incidence of marginal OE jobs and overall OE employment.

Figure 9: Age Effects Relative to Counterfactual



Notes: The blue dots in the figures show the difference between the empirical distribution of employment and the counterfactual distribution. The red-capped lines are the confidence intervals. Panel (a) depicts open-ended employment, panel (b) short-term employment, panel (c) joint open-ended and short-term employment, and panel (d) high-cost open-ended employment. The vertical red-dashed line represents the labor costs notch.

5.3.2 Employment Responses Far from the Notch

Building on the previous section, we turn to workers far from the notch to assess whether the reform induced firms to substitute OE contracts for ST contracts among older workers.

Methodology. We estimate the following specification:

$$y_{ijt} = \alpha + \eta Above45_i + \delta post_t + \beta Above45_i \times post_t + \gamma X_{it} + \rho_t + \varepsilon_{it}, \tag{9}$$

where y_{ijt} denotes two outcomes: an indicator for whether worker i transitions from ST employment or non-employment into an OE contract in period t, and an indicator for whether worker i is

employed under contract type j in period t ($j \in \{\text{OE}, \text{low-cost OE}, \text{high-cost OE}, \text{ST}\}$). $Above45_i$ equals one for workers aged 47–48 and zero for those aged 40–41.[51]

$post_t$ is an indicator equal to one for periods after May 1997, when the policy was implemented. X_{it} includes controls for sector, educational attainment, citizenship, sex, disability status, and part-time employment. ρ_t denotes month fixed effects, and ε_{it} is the error term, with standard errors clustered by age. The sample includes eight pre-treatment quarters and fourteen post-treatment quarters.[52]

An important feature of this analysis is that workers aged 40 and 47 are unlikely to be affected by transition delays or across-notch substitution near the discontinuity. This setup allows us to test whether the policy induced ST-to-OE substitution through three channels: (i) higher ST-to-OE transitions, (ii) higher non-employment-to-OE transitions, and (iii) increases in overall OE employment. The empirical approach is analogous to a difference-in-differences design comparing workers aged 47–48 and 40–41 before and after the reform. However, we avoid using that terminology because other labor-cost reduction programs introduced by the reform could have affected employment on both sides of the notch.

Nevertheless, the age-45 notch generates a sharp change in relative labor costs—evidenced by the distortions in contract timing documented in Section 5.3.1—and eligibility for the subsidy expands substantially beyond that threshold. For this reason, whether we detect differential responses between workers aged 47–48 and 40–41 remains informative about substitution between ST and OE contracts.

To assess whether parallel trends hold in the pre-treatment period, we estimate an event-study specification:

$$y_{ijt} = \alpha + \delta post_t + \rho_t + \sum_{t=-8, t\neq -1}^{14} \beta_{jt} Above45_i + \gamma X_{it} + \varepsilon_{it}. \tag{10}$$

Results. We begin by assessing whether the policy increased transitions into OE jobs. Figure 10 presents event-study estimates for transitions from ST to OE contracts with the same employer (left column) and from non-employment to OE contracts (right column).

The top, middle, and bottom panels present transitions to low-cost OE contracts, all OE contracts, and high-cost OE contracts, respectively. Pre-treatment coefficients are statistically indistinguishable from zero and display no differential trends across both groups. The policy increased transitions from ST to low-cost OE contracts but reduced transitions to high-cost OE contracts, keeping transitions to all OE contracts unchanged. Table 3, Panels A and B, confirms these pat-

[51] Throughout this section, references to ages 47 and 40 correspond to age ranges 47–48 and 40–41, respectively.

[52] Online Appendix Table E1 shows that restricting the post-treatment window to six quarters yields similar results. Details on subsequent policy changes are provided in Section B.3 and Table B2 of the Online Appendix.

terns for both within-firm and overall ST-to-OE transitions. As a result, the reform did not increase the overall likelihood that ST workers move into OE contracts, in contrast to the predictions of Blanchard and Landier (2002) and the evidence for workers under 30.[53]

The reform also increased transitions from non-employment into OE contracts for older workers, driven primarily by a rise in low-cost OE hires (Figure 10, top-right panel). Simultaneously, transitions into high-cost OE contracts declined slightly (bottom-right panel), indicating partial crowding-out across contract types. As a result, overall transitions into OE contracts show only very modest net effects (middle-right panel; Table 3, Panel C).

Consistent with this reallocation, overall OE employment among older workers did not rise permanently (Figure 11, Panel a; Table 3, Panel D, Column 1: 0.129 pp, not significant). Low-cost OE employment increased by 2 pp six quarters after the reform (Figure 11, Panel b), but this was fully offset by declines in high-cost OE contracts (Figure 11, Panel c; Table 3, Panel D, Columns 2–3), leaving total OE employment essentially unchanged.

Temporary spikes in OE employment observed in quarters 3 and 10 were short-lived. Although low-cost OE hires increased (Table C4 in the Appendix), these gains were offset by declines in high-cost OE hires. Further adjustment occurred through higher separations of high-cost OE workers. This pattern aligns with the "honeymoon effect" (Boeri and Garibaldi, 2007), whereby lower-cost contracts generate only temporary employment gains before natural turnover dissipates them.

A potential concern is that other labor-cost reductions introduced by the reform may have increased OE employment among workers aged 40, which would bias our estimates downward. To assess this possibility, Panel (e) in Figure 11 plots the time series of OE employment for workers aged 40 and 47. The solid lines show the observed data, while the dashed lines depict trends estimated using pre-reform data, allowing us to evaluate deviations from the pre-treatment trend. For both groups, these deviations remain small during the first six post-reform quarters, when the pre-reform trend is most likely to approximate the counterfactual path absent the policy. In particular, comparing observed outcomes with the extrapolated pre-reform trend for workers aged 40 provides no evidence that OE employment rose due to spillovers from the policy affecting workers under 30 or from other programs introduced by the reform. We therefore do not expect our estimates to be biased by such effects.

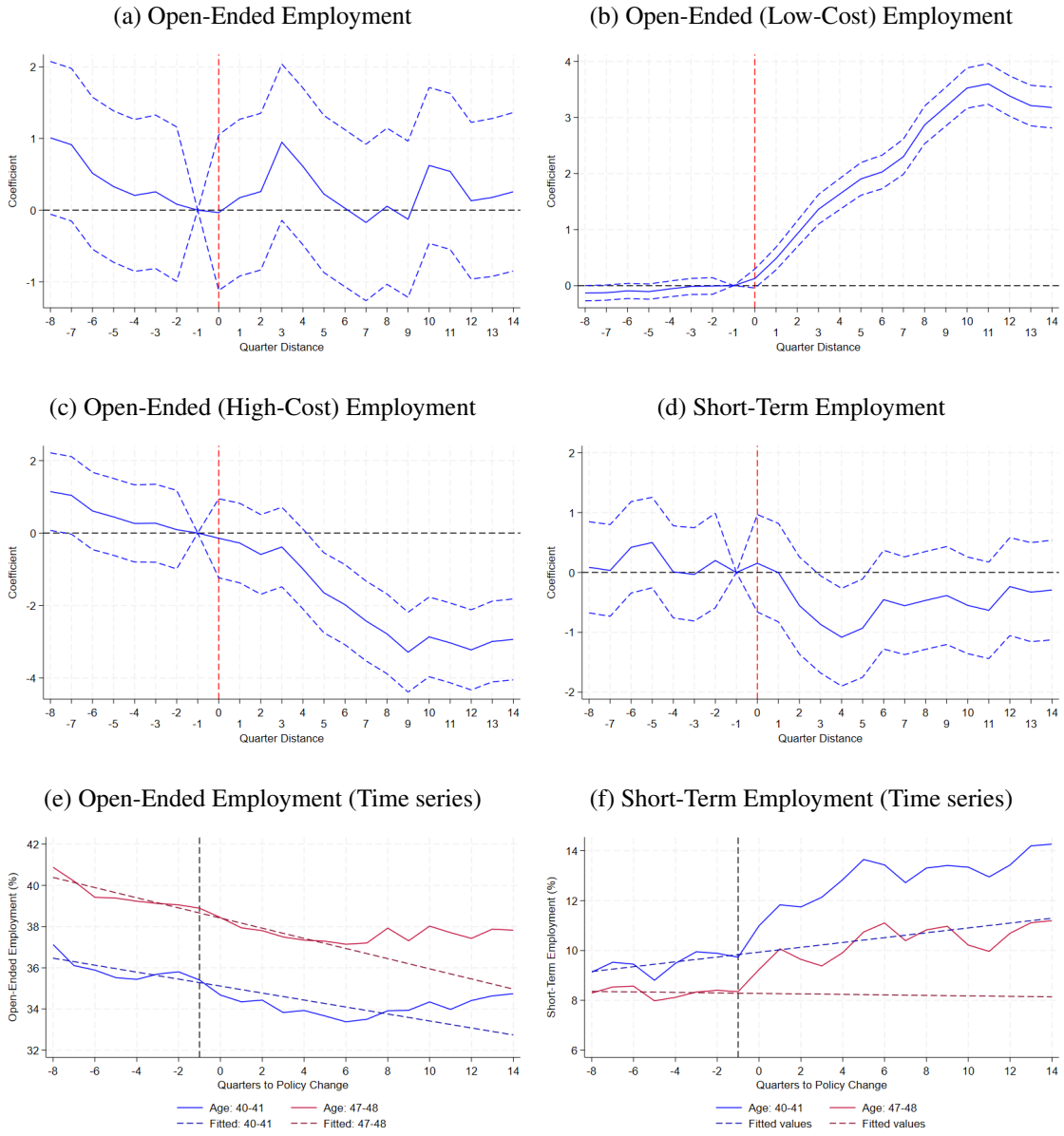
We draw two main conclusions from the evidence on OE flows and employment. First, the policy primarily benefited inframarginal workers, those who would have obtained OE contracts even in the absence of the notch at 45, but were instead hired at lower cost to firms. Second, the higher labor cost reductions for workers older than 45 failed to stimulate ST-to-OE transitions for

[53] Figure C12 in the Appendix shows ST-to-OE transitions that involve a change of employer; the results are very similar.

Figure 10: Effects of the Reform on Employment Transitions

Notes: The figure shows the event-studies that analyze the effect on marginal open-ended jobs. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panels (a), (c), and (e) display short-term conversions with the same employer: towards a low-cost open-ended contract (a), towards any type of open-ended contract (c), and towards high-cost open-ended contracts (e). Panels (b), (d), and (f) depict transitions from non-employment to low-cost open-ended contracts (b), towards any type of open-ended contract (d), and towards high-cost open-ended contracts (f). The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure 11: Effects of the Reform on Employment Outcomes



Notes: The figure shows the event-studies that analyze the employment effects. The specification is Equation 10. In Panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for open-ended employment, Panel (b) for open-ended employment in low-cost contracts, Panel (c) for open-ended employment in high-cost contracts, and Panel (d) for short-term employment. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45. Panels (e) and (f) plot the employment shares of workers aged 40–41 and 47–48 in open-ended and short-term contracts, respectively. In Panels (e) and (f) the dashed lines display the pre-treatment trends for each group.

these workers. Consequently, overall OE employment did not increase. The absence of an increase in OE employment for workers over 45 should be interpreted in light of the fact that incentives for different age groups were introduced at the same time. Because the reform simultaneously altered firms' hiring incentives for both younger and older workers, the estimated responses reflect equilibrium adjustments to this joint policy environment rather than the effect of a stand-alone policy targeting older workers. In a counterfactual setting without the policy for young workers, firms might have expanded OE employment among older workers to a greater extent.

Table 3: Effects on Transitions and Employment. Workers 47-48 and 40-41 years old.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment × Post	-0.014	0.129***	-0.143***	
	(0.023)	(0.010)	(0.021)	
Observations	744,812	744,812	744,812	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment × Post	0.001	0.180***	-0.178***	
	(0.032)	(0.009)	(0.028)	
Observations	744,812	744,812	744,812	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment × Post	0.139**	0.167***	-0.028	
	(0.046)	(0.012)	(0.038)	
Observations	744,812	744,812	744,812	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment × Post	0.129	2.203***	-2.041***	-0.596**
	(0.214)	(0.038)	(0.209)	(0.205)
Observations	744,800	744,800	744,800	744,800

Notes: The table shows the effects of lower non-wage labor costs on several labor market variables. *Above*45 equals 1 for workers aged 47-48, and 0 for workers aged 40-41. The estimation period includes 8 quarters before treatment and 14 after it. Estimates are multiplied by 100 and interpreted as percentage points. Panel A focuses on transitions from ST to OE with the same employer; Panel B shows transitions from ST to OE for any employer; Panel C shows transitions from non-employment; Panel D reports employment on OE and ST contracts. Standard errors clustered at the worker's age level are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Next, we turn to the effects on ST employment among older workers. The point estimate indicates a decline of 0.596 pp (Table 3, Panel D, Column 4; Figure 11, Panel D). This coefficient should be interpreted with caution, as Section 5.2.3 documents positive spillovers on ST employment in sectors more exposed to the reform. Moreover, these spillovers are clearly visible in the time series for both 40- and 47-year-olds: as shown in Figure 11, Panel (f), ST employment increased for both groups after the reform. Consistent with this pattern, Appendix Section C.2 shows that these spillovers extend across a broad age range. The negative estimate therefore reflects differential spillovers by age: ST employment rose for both groups, but slightly more for workers around age 40 than for those at 47.

Examining employment of workers older than 45 provides a key insight: the higher reduction in labor costs that targeted them did not induce substitution of OE for ST contracts among workers over 45.[54] This raises an important question: Were reductions in statutory labor costs offset by wage increases?

6 Wage Incidence

Based on Section 4, reductions in severance payments are expected to be passed through to wages, whereas payroll tax cuts—weakly linked to individual benefits—should generate smaller wage responses. Thus, wages should increase roughly in line with the decline in employment protection: about 1.7% for below-30 workers and 1.87% for above-45 workers. If wage incidence for workers older than 45 exceeds this benchmark, the effective labor-cost reduction would be smaller than intended, potentially explaining the lack of ST-to-OE substitution in this group. The remainder of this section examines these predictions empirically.

We construct a panel of workers aged 18–30 and 45–55 who transitioned from ST to OE contracts between May 1997 and March 2001. We analyze two samples: (i) workers who changed employers during the observation window, and (ii) workers continuously employed by the same firm across all 24 quarters.[55] Wage trajectories are followed from eight quarters before to six quarters after the transition for young workers, and up to fourteen quarters after for older workers, reflecting the shorter duration of subsidies for young workers compared with above-45 workers, for whom the subsidies applied throughout the entire employment spell.[56]

The presence of both transition types reflects restrictions on low-cost OE contracts, as detailed in Section 3. Firms that wrongfully dismissed a worker hired under a low-cost OE contract were prohibited from using the subsidized contract again. Similarly, employers who were behind on tax payments or had employed the same worker under an OE contract within the preceding three months were ineligible. Additionally, firms could not rehire a worker under a low-cost OE contract if the employee had held an OE position with the same firm within the past 24 months.

[54] This result does not imply that ST and OE contracts constitute separate labor markets for older workers. The evidence suggests that the policy primarily affected inframarginal OE employment—workers who would have been hired under OE contracts even in the absence of the reform. Some of these hires originate from ST contracts, indicating that the two contract types remain connected for adult workers. However, both the evidence far from the notch and the behavior observed near the age-45 cutoff suggest that the reform altered this margin only inframarginally, without inducing additional substitution from ST to OE employment.

[55] Among younger workers, the first sample includes 7,930 transitions to low-cost OE contracts and 4,561 to high-cost OE contracts, versus 2,991 and 1,213 in the continuous-employment sample. For older workers, the corresponding figures are 1,839 and 1,177, and 835 and 419, respectively.

[56] We also do a wage incidence analysis based on transitions from non-employment to OE jobs. The results are very similar; see Appendix Section C.10 for the details.

The empirical strategy is a two-way fixed effects regression. The dynamic specification is:

$$Y_{it} = \alpha + \delta_i + \delta_t + \delta_a + \sum_{j=-8,\neq -1}^{14} \beta_j \mathbb{1}[j = t] Treatment_i + \sum_{j=-8}^{14} \gamma_j \mathbb{1}[j = t] X_i + \rho X_{it} + \varepsilon_{it} \quad (11)$$

where δ_i, δ_t, and δ_a represent individual, time, and age fixed effects, respectively. The time effects are measured relative to the quarter in which the transition occurs. $Treatment_i$ is a dummy that equals 1 for workers who transition to low-cost OE contracts, and 0 for those who transition to high-cost contracts. The β_j are the coefficients of interest, capturing the effect of treatment each quarter. Y_{it} is the logarithm of the daily wage expressed in full-time equivalent terms.[57]

A key concern is the potential endogeneity of worker selection into low-cost OE contracts, since worker and firm characteristics may jointly influence both the type of transition and subsequent wage dynamics. Although individual fixed effects absorb time-invariant differences, challenges remain if these characteristics shape wage growth differentially after conversion. For instance, high-productivity firms may share more rents with workers. If such firms are also more likely to adopt low-cost contracts, our incidence estimates may confound contract effects with underlying firm wage-setting policies.

To mitigate this concern, we interact baseline worker and firm characteristics with quarter dummies, capturing heterogeneous wage dynamics across workers and firms. Individual controls include gender, education, citizenship, disability status, and pre-1997 employment history. Firm controls allow for flexible wage trends by sector, firm size, age, and legal structure. We also include age dummies and the provincial unemployment rate. As a benchmark, we estimate a static two-way fixed effects specification:

$$Y_{it} = \alpha + \delta_i + \delta_t + \delta_a + \kappa Treatment_i \times Post_t + \sum_{j=-8}^{14} \gamma_j \mathbb{1}[j = t] X_i + \rho X_{it} + \varepsilon_{it} \quad (12)$$

where $Post_t$ equals one for quarters following the transition.

We present the event studies in Figure 12, with the interaction term coefficient κ from Equation 12 shown in Table 4. The top panels of Figure 12 are 18-30-year-old workers, and the bottom ones for 45-55-year-old workers. Panels (a) and (c) are for the full sample of workers in each age group, and Panels (b) and (d) are for the samples of workers who stay in the same job after the reform.

In all figures, wages for workers entering a low-cost OE contract increase sharply at the start of the contract. In addition, wage effects shrink after contract conversion. This decline is consistent with treated workers experiencing slower wage growth than control workers after the transition, reflecting a weaker outside option in wage bargaining. This pattern aligns with wage-bargaining

[57] The wage includes paid holidays.

models Boeri and Garibaldi (2024), and insider–outsider theories of the labor market Bentolila et al. (1994).

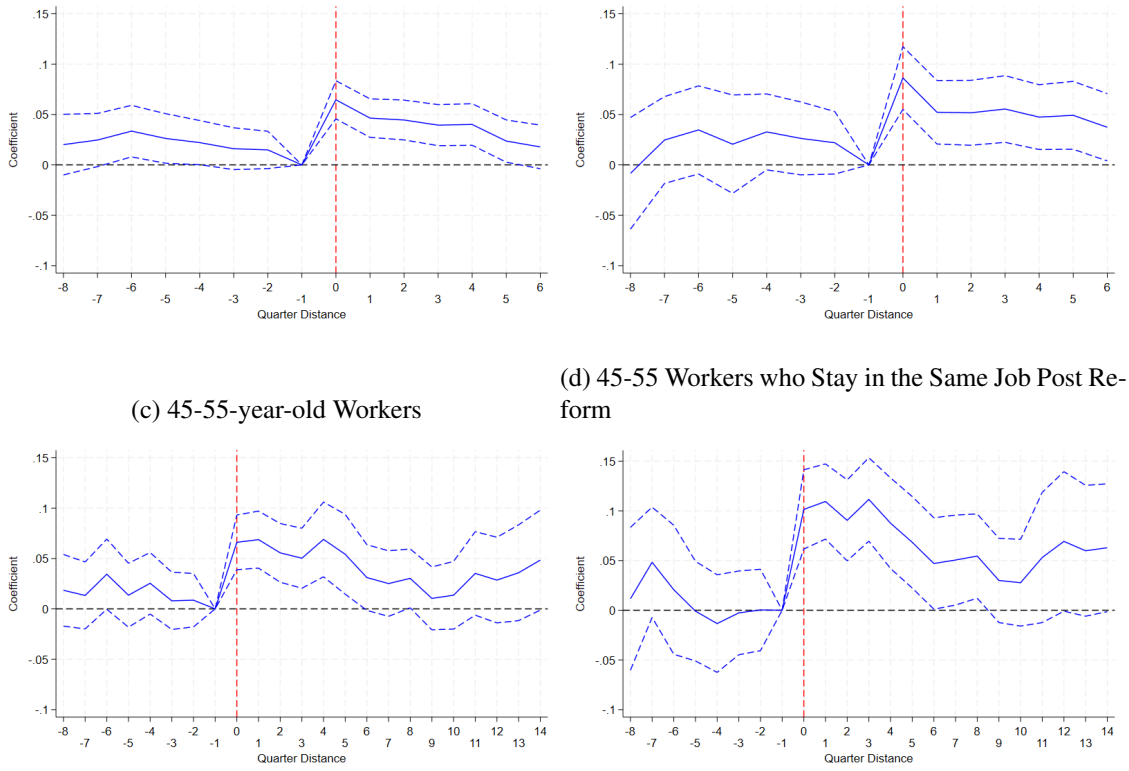
Figure 12: Wage Dynamics After Contract Transition: Low-Cost vs. High-Cost OE Employees

(a) 18-30-year-old Workers

(b) 18-30 Workers who Stay in the Same Job Post Reform

(c) 45-55-year-old Workers

(d) 45-55 Workers who Stay in the Same Job Post Reform



Notes: This figure presents event-study estimates analyzing the wage incidence of the reform. The specification follows a difference-in-differences approach with individual and time-fixed effects, as described in Equation 11. The solid blue lines represent the coefficient estimates, while the dashed blue lines indicate the 95% confidence intervals calculated using clustered standard errors at the individual level. The top panels are for 18-30-year-old workers. The bottom panels are for 45-55-year-old workers. Panels (a) and (c) include all workers of each age group, regardless of whether they lose or change jobs in the post-reform period. Panels (b) and (d) restrict the sample to workers of each age group who remain continuously employed with the same employer after transitioning to an OE contract. The model includes interactions of quarter dummies with a set of controls: sector, firm size, company age, firm's legal status, gender, education, disability status, citizenship status, part-time work, the number of employees in the company, the number of months worked in ST contracts over the seven years before the reform, and the number of months worked in OE contracts over the same period. Additionally, we control for age dummies and the province-level unemployment rate.

Table 4 reports the wage estimates. Panels A and B focus on workers aged 18–30, while Panels C and D consider workers aged 45–55. Column 1 reports the baseline two-way fixed effects specification without interacting baseline worker and firm characteristics with quarter dummies. The estimated effects are close to zero in all four panels. Columns 2–5 progressively introduce these interactions together with additional worker and firm controls. The contrast between the null estimates in Column 1 and the positive, stable estimates in Columns 2–5 highlights the empirical importance of allowing for differential wage dynamics associated with observable worker and firm characteristics. Our preferred specification is Column 5, which includes the full set of controls and

interactions and therefore represents our baseline approach to accounting for potential endogenous selection into low-cost OE contracts. Estimated wage effects range from 2.8–3.2% for below-30 workers and from 4.3–6.8% for above-45 workers.

Table 4: Wage Incidence

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
Panel A: Transition from ST to OE and Stay at Same Firm (30 years old)					
Treatment x Post	0.006	0.040***	0.039***	0.032***	0.032***
	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)
Observations	56,913	56,913	56,913	56,913	56,913
Panel B: All Transitions from ST to OE (30 years old)					
Treatment x Post	0.000	0.034***	0.033***	0.029***	0.028***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	128,153	128,153	128,153	128,153	128,153
Panel C: Transition from ST to OE and Stay at Same Firm (45 years old)					
Treatment x Post	0.017	0.080***	0.079***	0.079***	0.068***
	(0.018)	(0.018)	(0.018)	(0.019)	(0.016)
Observations	37,565	37,565	37,565	37,565	37,565
Panel D: All Transitions from ST to OE (45 years old)					
Treatment x Post	-0.003	0.047***	0.047***	0.047***	0.043***
	(0.012)	(0.011)	(0.011)	(0.012)	(0.011)
Observations	72,623	72,623	72,623	72,623	72,623
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Province Unemployment	No	Yes	Yes	Yes	Yes
Sector Controls	No	No	Yes	Yes	Yes
Firm Size	No	No	No	Yes	Yes
Other Firm Controls	No	No	No	No	Yes

Notes: The table shows the wage incidence effects of the reform. The specification is Equation 12. We focus on workers who transition from an ST contract to an OE contract, either low- or high-cost. We analyze 18-to 30-year-old workers (Panels A and B) and 45-to 55-year-old workers (Panels C and D). Panels A and C are for a sample of people continuously employed with the same employer after the transition. Panels B and D are for all workers, regardless of whether they lose or change jobs in the post period. Columns 2 to 5 include interactions of quarter dummies with controls for the sector, firm's size, company's age, firm's legal status, gender, education, disability status, citizenship status, part-time work, dummies for the worker's age, the number of months worked in ST contracts the 7 years before the reform, the number of months worked in OE contracts the 7 years before the reform, and the unemployment rate at the province level. Each column controls for a different subset of these variables, as specified at the bottom of the table. Robust standard errors clustered at the individual level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

The estimated wage effects also exceed the mechanical reduction in severance payments (1.7% for below-30 workers and 1.87% for above-45 workers). This implies that the estimated incidence cannot be explained exclusively by reductions in benefits accruing to workers (Lazear, 1990;

Bozio et al., 2025). Instead, the results are consistent with standard models in which tax incidence depends on labor market conditions that shape wage determination. When firms compete more intensely to hire workers eligible for contribution discounts, the perceived value of employment rises, and workers' outside options strengthen, exerting upward pressure on wages (Postel-Vinay and Robin, 2002; Cahuc et al., 2006; Altonji et al., 2013; Bagger et al., 2014).

The implied pass-through rates are substantial, ranging from 32.5–37.2% for workers aged 18–30 and from 35.2–55.7% for those aged 45–55.[58] Despite their magnitude, these rates fall short of full pass-through. Consequently, the absence of employment growth in OE contracts among above-45 workers cannot be attributed solely to wage incidence. Moreover, for workers older than 45, the policy primarily affected inframarginal OE workers, which implies that labor cost reductions accrued mainly to individuals who would have been employed even in the absence of the subsidy.

7 Elasticity Estimation

The policy we analyze provides a unique opportunity to estimate the elasticity of substitution between ST and OE employment.[59] Specifically, we estimate:

$$\sigma = -\left[\Delta \ln\left(\frac{L_{OE}}{L_{ST}}\right)\right] / \left[\Delta \ln\left(\frac{W_{OE}}{W_{ST}}\right)\right]. \tag{13}$$

where σ denotes the elasticity of substitution between OE and ST labor. L_{OE} and L_{ST} are the quantities of labor under each contract type, and W_{OE} and W_{ST} are their corresponding labor costs.

To compute the numerator, we use the estimated changes in OE and ST employment reported in Sections 5.2.1 and 5.3. For young workers, the estimated effects are not directly expressed in terms of relative employment; therefore, we recover $\Delta \ln(L_{OE}/L_{ST})$ by combining the regression coefficients with the baseline employment shares. This procedure yields an average estimated change of 0.3699 log points.[60] For workers older than 45, we use the estimated effect on OE

[58] The pass-through rates use the wage estimates from Column (5) of Table 4. For workers aged 18–30, dividing the estimated wage effects for all ST-to-OE transitions and same-employer transitions, 0.028 and 0.032, by the corresponding 8.6% reduction in OE labor costs yields pass-through rates of 32.5% and 37.2%, respectively. For workers aged 45–55, dividing the corresponding estimates, 0.043 and 0.068, by the 12.2% reduction in OE labor costs yields rates of 35.2% and 55.7%. Section 7 uses the estimates based on same-employer transitions, 37.2% and 55.7%, because, by focusing on workers who remain with the same employer, they isolate wage changes within the existing worker–firm match and are therefore less likely to be confounded by differences in firms' wage-setting policies.

[59] Section C.11 provides a detailed, step-by-step derivation of the calculations, along with sensitivity analyses to the key assumptions, for both the young and older worker elasticity estimates.

[60] In Table 1, Panel B, the dependent variables are expressed relative to both baseline OE and ST employment levels. Using the average baseline share of OE contracts across sectors, $s_{OE} = \frac{L^0_{OE}}{L^0_{OE}+L^0_{ST}} = 0.4823$, we obtain $\Delta \ln\left(\frac{L_{OE}}{L_{ST}}\right) \approx 0.3699$.

employment from Table 3. The resulting change in relative employment is approximately 0.0013 log points.[61]

The denominator of equation (13) captures the change in relative labor costs and requires computing the ratios of labor costs for OE and ST employment before and after the reform. We begin by computing the change in labor costs for OE employment. The percentage change in OE labor costs is given by $\left(1-\frac{W^1_{OE}}{W^0_{OE}}\right)(1-\omega)$, where the first term captures the reform's direct effect on expected labor costs per worker, and ω denotes the wage pass-through rate, which attenuates the overall reduction in labor costs borne by firms. We calculate $\left(1-\frac{W^1_{OE}}{W^0_{OE}}\right)$ using the expected annual labor cost:

$$\frac{W^1_{OE}}{W^0_{OE}} = \frac{w^1_{OE}[1+\tau(1-r)] + \frac{33}{365}w^1_{OE}\cdot p + \frac{20}{365}w^1_{OE}\cdot q}{w^0_{OE}(1+\tau) + \frac{45}{365}w^0_{OE}\cdot p + \frac{20}{365}w^0_{OE}\cdot q}.$$

Expected OE labor costs depend on the average wage (w^t_{OE}), the payroll tax rate (τ), the payroll tax reduction (r), severance costs in the event of wrongful termination (from $\frac{45}{365}$ to $\frac{33}{365}$ of annual wages), the probability of lawful dismissal (q), and the probability of wrongful dismissal (p). Given the improvement in outside options for young workers (see Section 5.2.2), we incorporate the 1.6% increase in wages for high-cost OE young workers ($w^1_{OE} = 1.016 w^0_{OE}$). For workers older than 45, we don't detect an increase and for them $w^1_{OE} = w^0_{OE}$ (see results in Sections C.5 and C.15). Parameter values are $\tau = 37.2\%$; $r = 25.38\%$ for young workers and 38.06% for workers older than 45; $q = 0.11\%$ for young workers and 0.34% for adult workers, $p = 71.17\%$ for young workers, and 78.09% for workers older than 45. Substituting these values yields $\frac{W^1_{OE}}{W^0_{OE}} = 0.9340$ for young workers and 0.8861 for workers older than 45.[62]

Accounting for wage pass-through, with $\omega = 0.372$ for young workers and $\omega = 0.557$ for workers older than 45, the effective reduction in OE labor costs equals 4.14% and 5.05%, respectively.

We then turn to labor costs for ST employment. For young workers, ST wages increase modestly by about 1.5% (Section 5.2.2). For workers older than 45, changes in ST labor costs are negligible, implying $\frac{W^1_{ST}}{W^0_{ST}} \approx 1$. Combining the changes in OE and ST labor costs yields changes in relative labor costs of 0.0572 log points for young workers and 0.0518 log points for workers older than 45.

Elasticity of substitution for workers under 30 and over 45. Using these inputs, we estimate

[61] As discussed in Section 5.2.3 and Appendix Section C.2, the changes in ST employment observed around the age-45 threshold are not driven by the variation in labor costs induced by the reform for workers above age 45, but instead reflect spillover effects from firms' adjustments to the policy for younger cohorts. Because these ST employment changes are unrelated to the relative cost variation relevant for above-45 workers, we treat ST employment as constant over time when constructing the elasticity numerator for this age group. Section C.11 provides sensitivity analyses to this assumption, showing that the conclusions in this section are largely unaffected.

[62] Assuming no OE wage response for young workers ($w^1_{OE} = w^0_{OE}$) yields a lower-bound estimate of 0.9193.

$\sigma = 6.5$ for young workers and $\sigma = 0.0249$ for workers older than 45.[63] The results indicate that ST and OE contracts are close substitutes for younger workers. In contrast, the near-zero elasticity for workers older than 45 suggests either that ST jobs reflect seasonal or replacement demand (Garibaldi and Gomes, 2022; Del Bono and Weber, 2008), or that the two contract types serve older workers with distinct skill profiles.[64]

Table C6 in the Appendix shows that the estimated elasticity of substitution between OE and ST contracts is robust to alternative specifications and assumptions. Estimates remain large when using a continuous treatment measure, restricting the post-treatment horizon to the first three quarters to capture the initial substitution response, or varying assumptions about wage incidence and outside-option effects. The resulting elasticity estimates range between 4 and 8.7. Additional exercises for older workers have only modest effects on the estimates, with the elasticity ranging from 0.01 to 0.08, consistent with limited substitution for this group. Overall, the evidence points to substantial substitutability between contract types in response to relative labor cost changes among young workers, and much weaker substitution among workers older than 45.

Near-notch elasticity of substitution. Exploiting the age-45 eligibility threshold analyzed in Section 5.3.1, the reform generated discontinuous incentives for OE contracts, delaying ST-to-OE conversions below the notch and favoring hires just above age 45. This allows estimation of a near-notch elasticity, capturing two adjustment margins: an intertemporal margin, as firms shift the timing of conversions, and a cross-sectional margin, as firms favor immediately eligible hires.

Based on the estimates, OE employment fell 4.396% and ST employment rose 8.68% relative to the counterfactual. Using Equation (13), the numerator is 0.1282. The denominator, the expected relative cost change accounting for wage incidence, is 0.0549. Combining these terms yields a near-notch elasticity of $\sigma = 2.35$, indicating firms can and do postpone contract conversions in response to policy-induced labor cost changes.[65]

8 Mechanisms: Adverse Selection and Short-Term Wage Penalty

This section examines the mechanisms underlying the sharp age heterogeneity in the substitution between ST and OE contracts and the continued use of ST contracts after the reform.

First, adverse selection helps explain why the elasticity of substitution differs markedly be-

[63] The 95% confidence interval for young workers is [-2.18, 17.31] and [-0.06, 0.1087] for the older group of workers.

[64] For young workers, part of the OE expansion occurs in high-cost contracts, attenuating the effective price change. For workers above age 45, while there is no net OE expansion, the use of low-cost OE contracts increases, magnifying the effective labor cost reduction per OE job. In Section C.12, we estimate the elasticity explicitly accounting for these compositional differences in the price and quantity responses across age groups. The resulting elasticity remains large for young workers (12) and close to zero for older workers (0.003).

[65] The 95% confidence interval is [2.323, 2.389].

tween workers under 30 and those over 45. Policy-eligible older workers employed on ST contracts are substantially more negatively selected than their younger counterparts, making them unlikely candidates for conversion into OE positions.

Second, the increase in wages in ST and high-cost OE contracts for young workers—consistent with an improvement in outside options following the expansion of OE employment—suggests that ST contracts are also used as a cost-containment device (Section 5.2.2), serving a role beyond flexibility. If so, we should observe wage penalties for ST workers relative to comparable OE jobs. Such a wage gap implies that ST employment provides firms with a cost advantage beyond differences in employment protection. As a result, even when statutory cost gaps narrow, ST contracts can remain attractive.

Adverse selection. A defining feature of the Spanish labor market is that transitions from ST-to-OE are concentrated early in a worker's career. Most young employees begin in ST contracts and move into OE positions within their first years of labor-market experience. For adult workers, the pattern differs sharply: the modal contract is OE, and relatively few new OE jobs originate from ST positions (Figure 4). This suggests that ST contracts function as stepping stones into permanent employment for young workers, but not as much for older workers.[66]

A natural explanation is adverse selection. Because most workers obtain their first OE contract before age 30, employers can infer that individuals who remain on ST contracts later in life are negatively selected. This signal intensifies with age (Greenwald, 1986). Consequently, adult ST workers are disproportionately drawn from the lower tail of the productivity distribution and are seldom offered OE positions. For young workers, by contrast, firms recognize that stable employment is difficult to obtain early in the career (Ryan, 2001). Although young workers are perceived as riskier due to limited work histories, their expected productivity may nonetheless exceed that of adversely selected middle-aged ST workers. This asymmetry helps account for why transitions from ST to OE contracts are common among young workers but less prevalent among older workers.

To assess whether adverse selection intensifies with age, we compare the extent of negative selection on observables between above-45 and below-30 ST workers. We estimate the following specification on the population of new hires, where the dependent variable is an indicator for being hired on an ST rather than an OE contract:

$$y_{it} = \alpha + \delta_t + \delta_s + \delta_p + \delta_a + \beta X_{it} + \phi 45_{it} + \kappa X_{it} 45_{it} + \varepsilon_{it}, \tag{14}$$

where y_{it} equals 1 when the individual is hired in a ST contract, and 0 when hired in an OE contract. δ_t, δ_s, δ_p and δ_a are quarter, sector, province and age fixed effects. X_{it} is a vector of worker and

[66] Appendix Section C.13 presents complementary evidence based on hiring flows.

job characteristics: wage, education, experience, firm size, managerial job, gender, citizenship, part-time, and disability status. 45_{it} is an indicator equal to one if the worker is aged 45 or older. The sample is restricted to workers aged 18–30 and 45–55.

Table 5: Sorting into Short-Term and Low-Cost Open-Ended Contracts

	(1)	(2)	(3)	(4)	(5)	(6)
	ST			Bonified		
	Below 30	Above 45	Both	Below 30	Above 45	Both
Log Wage	-0.301***	-5.976***	-0.352***	-5.425***	-12.544***	-5.658***
	(0.078)	(0.305)	(0.078)	(0.344)	(0.594)	(0.341)
Experience in OE	-0.293***	-0.613***	-0.289***	-0.315***	-0.450***	-0.337***
	(0.005)	(0.006)	(0.005)	(0.012)	(0.012)	(0.012)
Experience in ST	-0.202***	-0.275***	-0.202***	-0.270***	-0.472***	-0.300***
	(0.005)	(0.010)	(0.005)	(0.016)	(0.022)	(0.016)
High-Rank Occupation	-6.518***	-16.269***	-7.588***	-3.089***	-8.433***	-3.176***
	(0.368)	(1.242)	(0.361)	(1.081)	(1.584)	(1.067)
University Degree	-2.311***	-3.099***	-2.396***	-5.488***	1.784	-5.557***
	(0.180)	(1.118)	(0.180)	(0.708)	(1.502)	(0.699)
Firm Size	-0.354***	-1.676***	-0.341***	-0.319***	-1.318***	-0.246***
	(0.022)	(0.060)	(0.022)	(0.080)	(0.077)	(0.078)
Log Wage x 45			-6.056***			-7.980***
			(0.314)			(0.664)
Experience in OE x 45			-0.367***			-0.131***
			(0.008)			(0.017)
Experience in ST x 45			-0.062***			-0.158***
			(0.011)			(0.027)
High-Rank Occupation x 45			-7.861***			-4.874**
			(1.290)			(1.899)
University Degree x 45			-0.584			7.220***
			(1.122)			(1.650)
Firm Size x 45			-1.370***			-1.267***
			(0.062)			(0.106)
Observations	319,355	81,575	400,930	54,731	29,627	84,358

Notes: The table displays the characteristics of short-term workers, relative to high-cost open-ended contracts for below-30 workers (Column 1), above-45 workers (Column 2), and both (Column 3). Columns 4, 5 and 6 show the characteristics of low-cost open-ended workers, relative to high-cost open-ended contracts for below-30 workers, above-45 workers, and both, respectively. Specification is Equation 14. Additional controls are province, sector, quarter and age fixed effects. We also include variables for citizenship, disability, gender and part-time contracts. Standard errors clustered at the worker's age level are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

The results, reported in Table 5, reveal three main patterns. First, among both young (18–30) and adult (45–55) workers, those hired under ST contracts differ systematically from those hired directly into OE contracts: they earn lower wages, have less prior OE experience, are less likely to hold managerial positions, are less educated, and are employed in smaller firms. Second, the interaction terms indicate that negative selection into ST contracts is substantially stronger for above-45

than for below-30 workers. Conditional on age, above-45 ST workers earn lower wages, accumulate less experience, and are less likely to occupy higher-rank positions relative to their OE-hired counterparts, with larger gaps than those observed for young workers. Third, Columns (4)–(6), which replicate the analysis distinguishing between low-cost and high-cost OE hires, confirm the same pattern: workers older than 45 entering low-cost OE jobs are also more negatively selected than comparable young workers.

Taken together, the results indicate that adverse selection intensifies with age. This provides a natural explanation for why above-45 ST workers remain far below the productivity threshold required for OE conversion, consistent with the near-zero substitution elasticity we estimate for this group.

Short-Term Wage Penalty. The low ST-to-OE substitution elasticity for workers older than 45 points to a complementary mechanism: ST and OE contracts may serve distinct functions within firms. As discussed in Section 5.2.2, ST contracts can weaken workers' outside options and thereby increase firms' wage-setting power. One way this mechanism operates is by allowing employers to pay systematically lower wages under temporary contracts. If ST jobs exert downward pressure on wages, we should observe a wage penalty for temporary employment, even conditional on worker and firm characteristics.

This interpretation is consistent with institutional features of the Spanish labor market, where ST workers are underrepresented in unions and firm-level wage agreements (Bentolila et al., 1994; Wilhelmi, 2021), and with evidence from Italy documenting weaker rent-sharing for temporary employees (Daruich et al., 2023). In such an environment, reductions in OE hiring costs may not be sufficient to induce substitution if firms value ST contracts as a means of maintaining lower wage bills—especially for older workers who may be negatively selected into temporary jobs.

We test this implication empirically. We document a sizable ST wage penalty using two approaches (see Section C.14 in the Appendix for details). First, cross-sectional wage regressions controlling for rich worker and firm characteristics show that ST workers earn 12.2% less than comparable OE workers. Second, exploiting within-worker changes around ST-to-OE transitions, we estimate a wage gain of 11.1% upon conversion.

Both estimates indicate a substantial wage penalty for ST jobs. This evidence supports the view that ST contracts compress wages and weaken outside options, helping explain why ST employment remains central for older workers despite the reform.

9 Robustness

Employment Effects on Young Workers: We perform a series of robustness checks to assess the validity of our identification strategy for the employment effects on young workers. First, we

implement a placebo test that shifts the reform date to the first quarter of 2003. We use the sectoral exposure to ST contracts among young workers in 2002, but recompute all outcomes and control variables as if the policy had occurred in the first quarter of 2003. The results show no systematic relationship between the initial share of ST contracts and subsequent employment outcomes under the placebo timing. The two-way fixed-effects estimates reported in Table D1 are statistically indistinguishable from zero.

We further assess robustness through subgroup analyses and sample restrictions. First, we redefine exposure using the share of ST contracts among workers aged 25–30—a cohort just below the policy threshold. We also re-estimate the model on a male-only sample to account for the slightly different policy conditions affecting women. The resulting estimates are similar (Table D3). Finally, restricting the period to the pre-1999 years (Table D4) addresses potential confounding from later policy extensions. Although the coefficients are somewhat attenuated, the effects on both low- and high-cost open-ended employment remain positive and statistically significant, confirming the robustness of our conclusions.

Employment Effects on Workers Older than 45: To assess the validity of the employment results near the notch, we show they are robust to changes in the upper and lower age bounds used to construct the counterfactuals. Specifically, we analyze workers aged 37–39.5, 37–40.5, 36.5–40, and 37.5–40. The results, reported in Section E.1, are quantitatively very similar across specifications.

To further validate the results away from the notch, we restrict the sample to the period before January 1999, when a legal change excluded firms that had wrongfully dismissed workers from eligibility for labor cost reductions. The estimates, reported in Table E1, remain consistent with our baseline findings. Similar robustness emerges when analyzing men and women separately (Tables E2 and E3). In addition, the results are stable across alternative worker age groups, as shown in Tables E4–E6 and Figures E5–E16. Finally, Table C11 shows no systematic evidence that the reform affected transitions from self-employment to either OE or ST contracts.

Outside Options for Workers Older than 45: We find no evidence of wage effects for workers not directly targeted by the policy. Specifically, Sections C.5 and C.15 of the Online Appendix examine potential impacts on ST wages and detects no statistically significant changes.

Credible Parallel Trends: In Section C.16, we test the robustness of our results to alternative assumptions regarding the linearity of pre-treatment trends, following the methodology of Rambachan and Roth (2023). The necessary deviations from linearity to overturn our findings would be implausibly large, reinforcing the credibility of our conclusions.

Wage Incidence: The results on wage incidence remain robust across different time frames. We split the sample into two periods: before and after the government modified ST-to-OE conversion conditions. Table F1 presents results for May 1997–December 1998, while Table F2 covers

January 1999–March 2001. The findings are also consistent when analyzing wage effects by gender (Tables F3 and F4) and age (Figure F1).

10 Conclusions

This paper provides new evidence on how firms adjust contract choices and wages in response to changes in the relative cost of permanent employment. Exploiting two age-based notches created by the 1997 Spanish reform, we show that lowering the cost of OE contracts generates substantial substitution away from ST jobs for workers younger than 30, who are closer to the margin between temporary and permanent employment. For workers older than 45, however, contract substitution is nearly absent despite larger labor-cost reductions. These findings challenge the common modeling assumption of homogeneous substitution across worker types and highlight the importance of life-cycle heterogeneity in dual labor markets.

We also document substantial but incomplete wage incidence: roughly half of the reduction in labor costs is passed through to wages. This reflects the sharing of cost savings between firms and workers. In addition, we find evidence of improved outside options for young workers, as wage increases extend beyond subsidized contracts and affect temporary and unsubsidized permanent jobs as well. Importantly, the expansion of OE employment among workers under 30 does not come at the expense of older workers: we find no evidence of displacement in OE jobs for those aged 30–65. Overall, the findings suggest that monetary incentives aimed at reducing duality are most effective for younger workers.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the author(s) used OpenAI's ChatGPT in order to check the paper for consistency and clarity. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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A Online Appendix (Not for Publication)

Contents

A A Comparison of Survey and Administrative Data

The first wave of the MCVL was drawn in 2004 and contains the complete employment histories of sampled individuals. Because the policy of interest was implemented in 1997, our analysis relies on the retrospective information in the 2004–2012 MCVL editions. A potential concern is that these data may not accurately capture labor market dynamics in the years immediately preceding the policy.

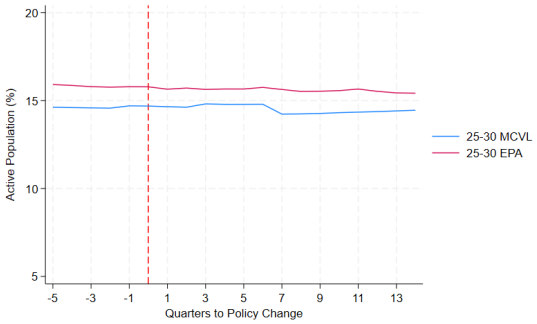
To assess this issue, we compare the MCVL to the Spanish Labour Force Survey (SLFS) and show that the two sources exhibit very similar labor market patterns over time. Specifically, we examine the evolution, before and after the policy, of two population aggregates for workers aged 25–30, 40–45, and 45–50. The first is the share of each age group in the active population, computed using the SLFS. The second is the share of individuals in each age group who appear in the 2004–2012 MCVL samples.

Figure A1 reports the results: panel (a) corresponds to workers aged 25–30, panel (b) to those aged 40–45, and panel (c) to those aged 45–50. In all cases, the MCVL and SLFS series evolve closely in parallel over the period of analysis, indicating that both datasets capture similar labor market dynamics.

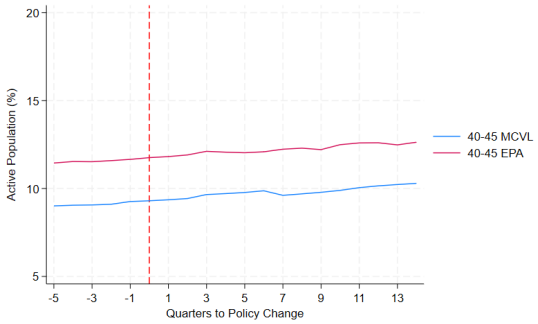
Levels differ across the two sources, with the SLFS exhibiting higher shares throughout. This difference is expected, as the underlying populations are not identical. The SLFS includes unemployed individuals actively searching for work as well as informal workers, whereas the MCVL is unlikely to capture all job seekers and excludes informal employment (Elias et al., 2025). Crucially, however, our analysis requires that the two datasets display similar dynamics rather than identical levels, a condition that is clearly satisfied in the data.

Figure A1: Comparing Survey (EPA) and Administrative Data (MCVL)

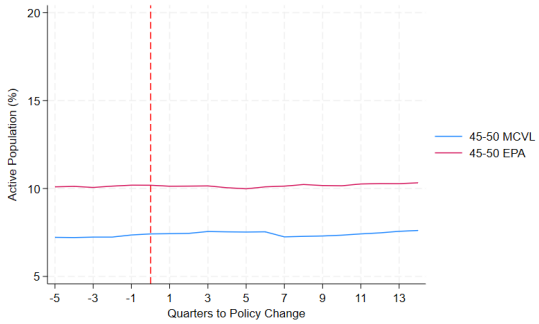
(a) Aged 25-30



(b) Aged 40-45



(c) Aged 45-50



Notes: The figure presents the evolution of two population aggregates: the active population measured in the SLFS (red line) and the population of workers sampled in the 2004–2012 MCVL editions (blue line). The top panel corresponds to workers aged 25–30, the middle panel to those aged 40–45, and the bottom panel to those aged 45–50. The vertical red dashed line indicates the quarter in which the policy was implemented.

B Additional Institutional Details

B.1 Heterogeneity of the severance payment gap

The expected gap in severance payments may vary with job tenure if the incidence of wrongful dismissals, fair dismissals, and quits differs systematically over the length of the employment spell. To assess the extent of this heterogeneity, we examine how separation types and the severance-related labor cost gap evolve with job duration. Figure B1 summarizes the evidence.

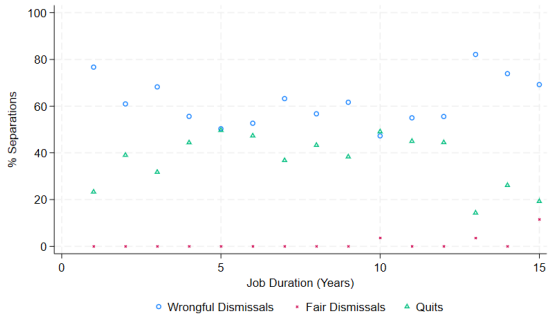
Panel (a) reports the distribution of separations by wrongful dismissals, fair dismissals, and quits. These proportions are remarkably stable across tenure. Among young workers, wrongful dismissals account for 71.17% of separations on average, while fair dismissals and quits represent 0.11% and 28.72%, respectively. For above-45 workers, the corresponding shares are 78.09%, 0.34%, and 21.57%. Given these distributions, the implied expected gap in employment protection is 6.40% for young workers and 7.03% for workers older than 45, consistent with the values reported in the main text.

Panel (c) displays the distribution of separations by tenure. Most separations occur early in the employment relationship: 87.46% take place within the first three years, and 92.52% of OE contracts last no more than five years. For above-45 workers, the corresponding shares are 77.07% and 85.55%, respectively. Restricting the sample to contracts with tenure of at most three years yields separation compositions that are very similar to the overall averages. Among young workers, the share of wrongful dismissals increases slightly to 73.19%, while quits account for 26.81%. For above-45 workers, wrongful dismissals represent 81.25%, fair dismissals remain negligible, and quits account for 18.74%. The corresponding figures for workers older than 45 in Panels (b) and (d) follow a similar pattern.

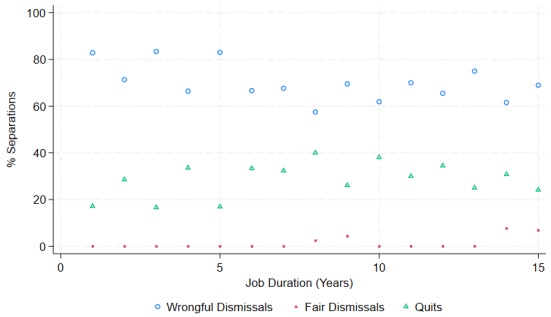
Panels (e) and (f) plots the severance-induced labor cost gap between ST and OE contracts, expressed as a percentage of wages. The gap is stable over tenure, fluctuating around 5% and 6% for young workers and workers older than 45, respectively. The absence of a monotonic increase with tenure may appear counterintuitive, but it reflects the fact that the gap is defined relative to total earnings over the contract duration (see Equation 3.1).

Figure B1: Separations and Expected Gap in Severance Payments

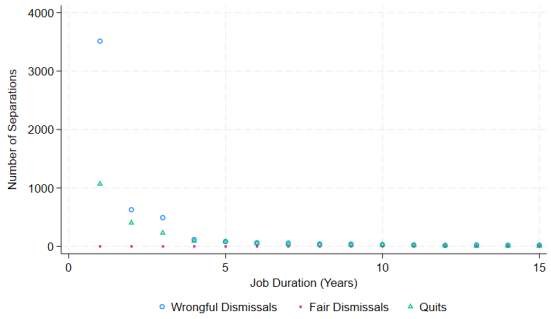
(a) Separations (%) 30



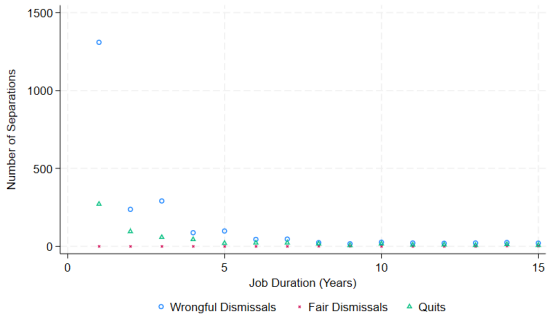
(b) Separations (%) 45



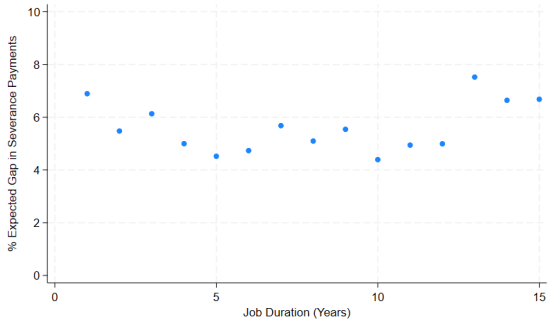
(c) Number of separations 30



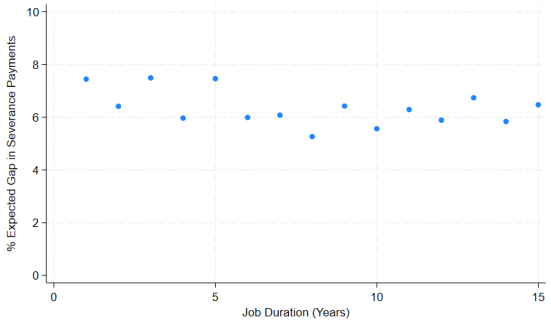
(d) Number of separations 45



(e) Expected gap in severance payments 30



(f) Expected gap in severance payments 45



Notes: Panels (a)–(d) show heterogeneity in job separations by tenure, with the left column corresponding to below-30 workers and the right column to above-45 workers. The sample includes all workers who start an OE job during the year prior to the policy. Panels (a) and (b) report the share of wrongful dismissals, fair dismissals, and quits by job tenure, while Panels (c) and (d) present the corresponding counts of each type of separation. Panels (e) and (f) display the expected gap in severance payments by tenure.

B.2 Calculation of the Reduction in Labor Costs

The overall payroll tax rate is 37.2%. The policy applies a reduction to a specific component of this rate—23.6 percentage points—corresponding to *contingencias comunes*, which are statutorily paid by the employer and finance health insurance and pension benefits.[67][68] The tax base is the worker's wage, subject to statutory minimum and maximum contribution bases that vary by occupational category, as reported in Table B1.

Table B2 summarizes the payroll tax rate discounts associated with the policy. This table differs from Table B3 in that it reports only the statutory reductions in payroll tax rates specified in the legislation, rather than the implied overall reductions in labor costs. In its original design, the payroll tax rate was reduced by 60% for workers hired after their 45th birthday, by 40% for workers younger than 30, by 40% for previously unemployed workers, and by 50% for conversions of ST contracts into OE contracts. Importantly, the more generous treatment of workers hired at age 45 or older remained a stable feature of the policy throughout the period we analyze.

To obtain the actual reduction in labor costs summarized in Table B3, we can apply the following formula:

$$\frac{\text{Expected reduction in statutory labor costs}}{\text{Labor costs in ST contract}} = \frac{w\tau \times \frac{23.6\% \times discount}{\tau} \times 365 + w(45-33) \times p}{w(1+\tau) \times 365},$$

where p is the wrongful dismissal rate (78.09% for workers older than 45 and 71.17% for young workers).

For example, for male workers unemployed for more than one year, the contribution discount amounts to 40%. Under this scenario, the implied reduction in total labor costs ranges between 8.6 and 8.8%, assuming the wrongful dismissal rates observed for young and above-45 workers, respectively. Applying the parameters reported in Table B2 together with the formula above yields the labor cost reductions presented in Table B3.

Table B1: Payroll Tax Bases for 1998

Worker Group	Minimum Base (monthly)	Maximum Base (monthly)
Engineers and university graduates	697.23	2311.67
Technical engineers	578.23	2311.67
Chief administrative	502.69	2311.67
Non-graduated assistants	467.17	2311.67
Administrative officials, subordinate employees and administrative assistants	467.17	1722.8
First-, second- and third-order officials. Employer under 18 years (1)	15.57	57.43

Notes: Source: Ministerio de Trabajo e Inmigración (2011). Column (1) reports the daily contribution base. Worker group denotes the contribution categories defined under Spanish Social Security legislation.

[67] At the time, the statutory payroll tax rate was split between a 30.8% employer contribution and a 6.4% employee contribution.

[68] The resulting reduction in payroll tax revenues was financed through a dedicated budgetary allocation of the Spanish employment agency.

Table B2: Payroll Tax Cuts Programs

Group of workers	8/5/1992-5/16/1997	05/17/1997-12/31/1998	01/01/1999-04/10/1999	04/11/1999-12/31/1999	1/1/2000-03/02/2001
45 years or older	Only workers registered as unemployed for at least one year. Subsidy of 3000 euros. 50% all contract.	60%, first 2 years, 50% after.	45% first year, 40% after (+5% women).	45% first year, 40% after (+5% women).	50% first year, 45% after.
More than a year unemployed		40%, first two years (60% for women).	40% first year, 30% second year (+5% women).	40% first year, 30% second year (+5% women).	50%, first year, 45% second year.
Conversion of short-term contracts into open-ended		50%, first two years (60% if the worker is 45 or older, first two years. 50% after). The short-term contract had to be valid on May 17th, 1997.	25%, first two years. Only for workers hired on a short-term contract when they were younger than 30, older than 45, or had spent at least one year unemployed. The short-term contract had to be valid on January 1st, 1999.	25%, first two years (25% for the whole duration of the contract if the worker is older than 45). The short-term contract had to be valid on January 1st, 1999.	20%, first two years. Only for apprenticeship and replacement short-term contracts.
Younger than 30 years old	<25 y, and 1 year registered as unemployed; or 25-29 years old if they had not worked for more than 3 months. 2400 euros in subsidy.	40%, 24 months.	35% first year, 25% second year (+5% women).	35% first year, 25% second year (+5% women).	20%, 24 months.

Notes: The table is a summary of the main payroll tax credits available in each year. The sources are the laws enumerated in section B.4.

Table B3: Reductions in Statutory Labor Costs

Group of workers	8/5/1992-5/16/1997	05/17/1997-12/31/1998	01/01/1999-04/10/1999	04/11/1999-12/31/1999	1/1/2000-03/02/2001
45 years or older	Only workers registered as unemployed for at least one year. Subsidy of 3000 euros. 10.5% all contract.	12.2%, first 2 years, 10.5% after.	9.6% first year, 8.8% after (+0.87% women).	9.6% first year, 8.8% after (+0.87% women).	10.5% first year, 9.6% after.
More than a year unemployed		8.8%, first two years (12.2% for women).	8.8% first year, 7% second year (+0.87% women).	8.8% first year, 7% second year (+0.87% women).	10.5%, first year, 9.6% second year.
Conversion of short-term contracts into open-ended		10.5%, first two years (12.2% if the worker is 45 or older, first two years. 10.5% after). The short-term contract had to be valid on May 17th, 1997.	6.2%, first two years. Only for workers hired on a short-term contract when they were younger than 30, older than 45, or had spent at least one year unemployed. The short-term contract had to be valid on January 1st, 1999.	6.2%, first two years (6.2% for the whole duration of the contract if the worker is older than 45). The short-term contract had to be valid on January 1st, 1999.	5.3%, first two years. Only for apprenticeship and replacement short-term contracts.
Younger than 30 years	<25 y, and 1 year registered as unemployed; or 25-29 years old if they had not worked for more than 3 months. 2400 euros in subsidy.	8.6%, 24 months.	7.7% first year, 6% second year (+0.87% women).	7.7% first year, 6% second year (+0.87% women).	5.1%, 24 months.

Notes: The table summarizes the statutory reductions in labor costs available in each year. Sources are the laws listed in Section B.4. Labor cost reductions for workers aged 45 or older, workers unemployed for more than one year, and contract conversions are computed using the dismissal rates of workers aged 45 or older, as described in Section 3. For workers younger than 30, the calculations are based on dismissal rates for workers aged 18–30.

B.3 Changes in the Payroll Tax Cut Program

Some of the most consequential policy changes concerned conversions from ST to OE contracts. Beginning on January 1, 1999, ST contracts in force on that date could be converted into OE contracts with reduced labor costs only if the worker was younger than 30 or older than 45. This represented a departure from the May 1997 reform, under which any ST-to-OE conversion qualified for a payroll tax reduction, provided that the ST contract was in force at the time the reform was enacted.[69]

In addition, for workers older than 45, payroll tax discounts following a conversion were initially limited to two years rather than applying for the full duration of the contract. This restriction was reversed in April 1999, when the legislation was amended again to extend eligibility to all ST contracts in force on January 1, 1999, regardless of the worker's age, and to grant older workers payroll tax reductions for the entire duration of the OE contract.

Further changes followed in January 2000, when eligibility for payroll tax reductions upon conversion was narrowed to two specific types of ST contracts: apprenticeship contracts and worker replacement contracts. In practice, however, this restriction was easily circumvented for workers older than 45, who could simply wait for their temporary contract to expire and then be hired directly into an OE contract to qualify for the age-based tax break.

In the empirical analysis, we report results using data from both before and after January 1999 to demonstrate that our findings are robust to the sequence of legislative changes affecting payroll tax discounts for contract conversions.

B.4 Payroll Tax Legislation

The following is a list of Spain's legislation concerning payroll taxes, and summarized in Table B2:

- Ley 22/1992 de 30 de julio.
- Real-Decreto Ley 9/1997 de 16 de mayo.
- Ley 64/1997 de 26 de diciembre.
- Ley 50/1998
- Ley 55/1999 de 29 de diciembre.
- Ley 14/2000.

[69] That is, eligibility under the 1997 reform required the ST contract to be active when the law was passed.

B.5 Unemployment Assistance for Workers Older than 52

The unemployment assistance (UA) program for workers aged 52 or older is regulated by Social Security Law 1/1994 and provides eligible individuals with benefits of unlimited duration until they reach the statutory retirement age.[70] Workers are eligible if the following conditions are met:

- Have contributed to the UI fund for at least six years during their labor life.
- At the moment they request UA they fulfill all requisites for a contributory retirement pension, except the age.
- They do not have non-work rents higher than 75% of the minimum wage.

This UA program provides workers with a monthly stipend equivalent to:

- 75% of the minimum wage when the individual takes care of one or no relatives.
- 100% of the minimum wage when the individual takes care of at least two relatives.
- 125% of the minimum wage when the individual takes care of three or more relatives.

Moreover, it provides workers with state-sponsored contributions.

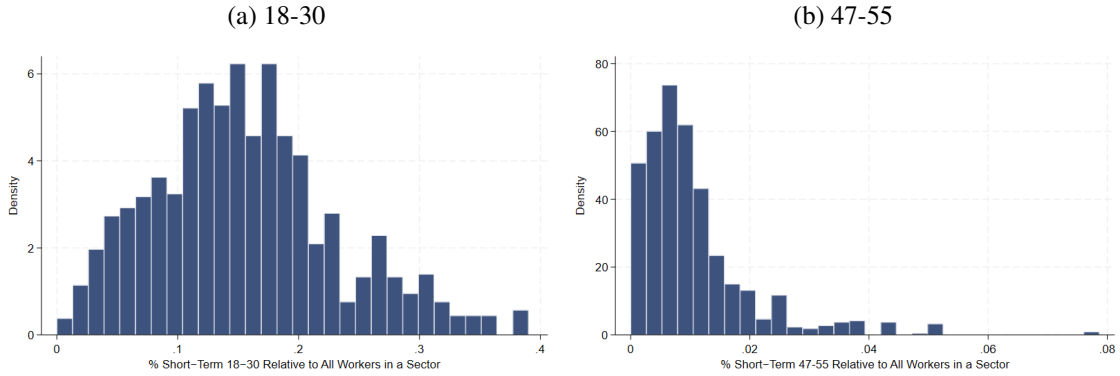
[70] The minimum age requirement was increased to 55 in 2012 and subsequently reduced to 52 in 2019, along with other program modifications.

C Additional Evidence

C.1 Proportion of Short-Term Workers by Age Group

Figure C1 shows the distribution of the variable $\%ST_{s,96}$, the 1996 share of workers aged 18–30, or 47-55, employed on ST contracts within each sector.[71] Panel (a) for workers aged 18–30 and Panel (b) for those aged 47–55. Among young workers, the average ST share is 16% with a standard deviation of 9 percentage points, indicating substantial cross-sectoral variation. By contrast, among middle-aged workers, ST employment is rare (average 1.9%) with minimal dispersion, making sectoral variation uninformative for this group.

Figure C1: Proportion of ST workers aged 18–30 and 47-55 in each sector relative to the total sector workforce in 1996 ($\%ST_{s,96}$)



Notes: Histogram presenting the distribution of the shock variable. The percentage of short-term workers aged 18-30 and 47-55 across sectors in 1996.

C.2 ST employment by age

Figure C2 presents additional descriptive evidence on the evolution of ST employment by age group around the 1997 reform. The denominator in these time-series is the number of workers in each age group in each quarter. Panel (a) shows that ST employment among workers aged 18–30 followed a clear upward trend before the reform. Following the implementation of the reform, this trend breaks: ST employment for younger workers levels off and subsequently declines. By contrast, ST employment among workers aged 30–40 and 40–50 increases in the post-reform period.

Panel (b) provides further insight by removing age-group–specific pre-reform trends and plotting deviations from projected counterfactual paths. The detrended series shows that ST employment rises for workers aged 30–40 and 40–50 relative to their projected pre-reform trends. Moreover, the figure also reports a line for all age groups combined, which allows us to assess whether

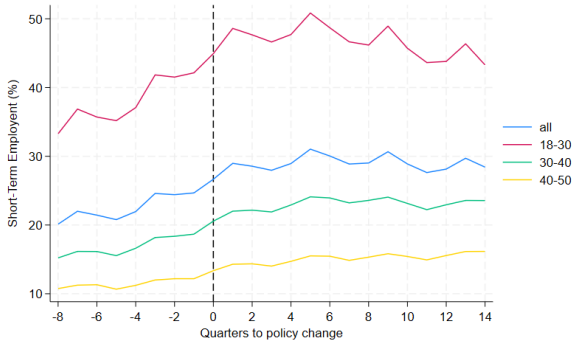
[71] We calculate $\%ST_{s,96}$ for the 47–55 age group, rather than 45–55, to measure ST exposure among workers sufficiently far from the age-45 notch.

the decline in ST employment among workers aged 18–30 is offset by increases among older workers. For approximately the first ten quarters following the reform, the aggregate series remains close to its projected path, indicating that reductions in ST employment among younger workers are largely mirrored by increases among workers older than 30.

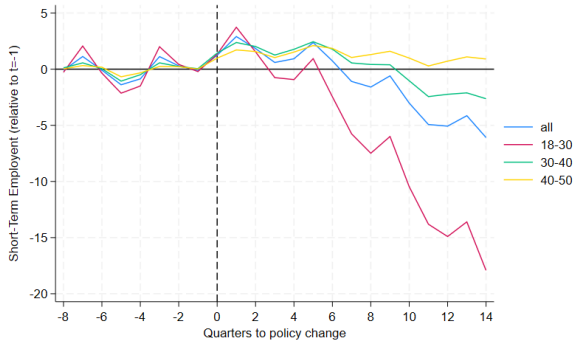
Interpretation of Panel (b) should remain cautious, particularly at longer horizons, as extrapolating pre-reform trends may overstate post-reform declines in ST employment for younger workers. Nonetheless, during the initial post-reform period the patterns are consistent with a reallocation of ST jobs from younger to older workers rather than a proportional contraction in overall ST employment.

Figure C2: Short-term employment by age

(a) Time Series ST Employment



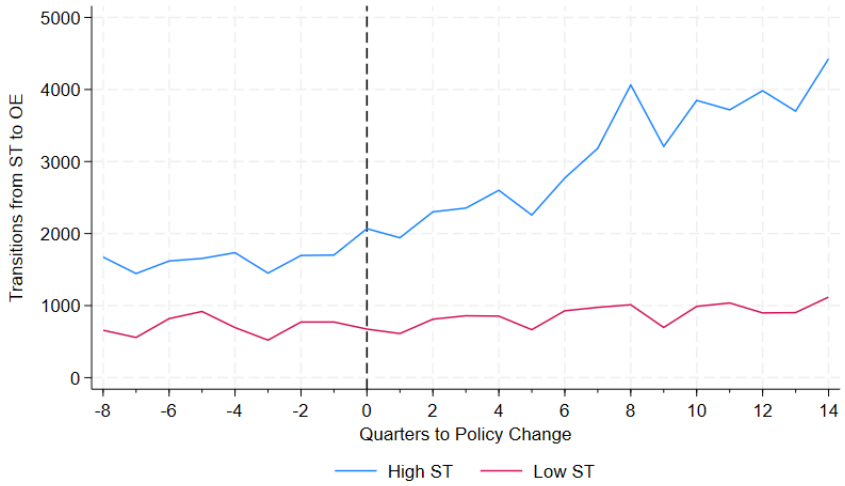
(b) ST Employment (Deviation from Pre-Trend



Notes: Panel (a) shows the time-series for ST employment for all workers 18-50, 18-30, 30-40, and 40-50 years old. Panel (b) plots the deviations from pre-treatment trends for each age group.

C.3 Transitions from ST to OE for Below-30 Workers

Figure C3: Transitions from ST to OE

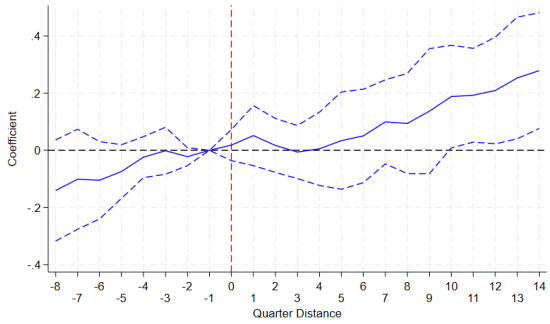


Notes: Total quarterly transitions from ST to OE contracts. The red vertical line denotes the quarter of policy enactment. The series are shown separately for sectors in the first and fourth quartiles of baseline (1996) ST incidence.

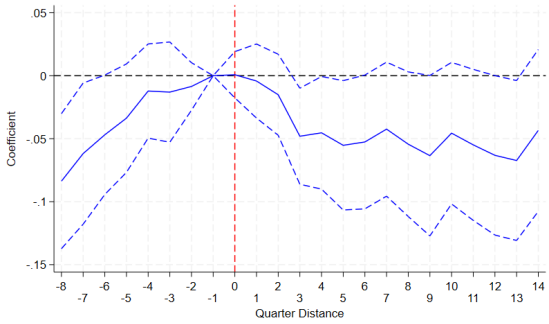
C.4 Non-detrended employment results

Figure C4: Employment results (non-detreded). 30-age-notch

(a) Short-Term



(b) Short-Term Employment Share



Notes: The figure presents event-study estimates of the employment effects based on Equation 1. Blue solid lines show coefficient estimates with 95% confidence intervals in dashed blue. Panel (a) presents results for short-term employment, and Panel (b) reports the share of short-term employment relative to the period-specific total of short-term and open-ended employment. The vertical red dashed line marks the reform's implementation quarter. All regressions include interactions between quarter dummies and baseline sector-level controls—average wage, market concentration, managerial share, education, total employment, job duration, part-time share, and male share—and are weighted by the baseline population of young workers in each sector.

C.5 Outside Options

Below-30 Workers. Table C1 reports the results from Equation 3, which are also shown in Figure 7. Recall that the numbers are estimates from a static two-way fixed-effects specification that examines wage dynamics in non-subsidized contracts (ST and high-cost OE), comparing workers aged 25–30 to those aged 30–35 before and after the reform.

In addition, we assess the robustness of the outside-option results presented in Section 5.2.2 by expanding the comparison group to include workers aged 20–40, rather than restricting attention to those aged 25–35. The corresponding estimates, shown in Table C2 and Figure C5, are fully consistent with the main findings.

Comparing the estimates in Table C2 with those from the baseline specification reported in Table C1, we obtain qualitatively similar results: wages increase following the policy enactment, consistent with an improvement in outside options for younger workers relative to slightly older cohorts. The somewhat larger coefficients for the broader age range likely reflect the more pronounced contrast between very young workers and more established workers. Younger workers face greater scope for improvements in job opportunities—both in terms of initial earnings and subsequent wage trajectories—while the comparison group includes individuals with higher baseline wages and more stable labor market attachment. This compositional difference may mechanically amplify the estimated effects.

Table C1: Evolution of ST and OE Wages, Young Workers

	(1)	(2)
	Log Daily Wage	
	ST	OE
Treatment x Post	0.015***	0.016***
	(0.004)	(0.003)
Observations	829,354	1,263,119

Notes: The table reports wage differences in ST and OE jobs before and after the reform. Treatment equals one for workers younger than 30. Column (1) compares ST wages for ages 25–35. Column (2) examines OE wages for non-subsidized OE workers using the 25–35 comparisons. All regressions control for gender, education, citizenship, disability status, months spent in ST and OE jobs between 1990 and 1997, and include age-by-gender, occupation, sector, and province-by-year fixed effects. Standard errors are clustered at the individual level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Above-45 Workers. We also examine whether the reform affected wage-setting in ST contracts. To construct a credible counterfactual, we exclude observations close to the 45-year notch, where the reform incentives are strongest and may contaminate wage comparisons.

We compare ST workers aged 40–41 with those aged 47–48 and estimate the same specification as in Section 5.2.2. The event-study estimates are reported in Figure C6, which shows no meaningful wage differences across the 45-year threshold, consistent with limited wage adjustment for

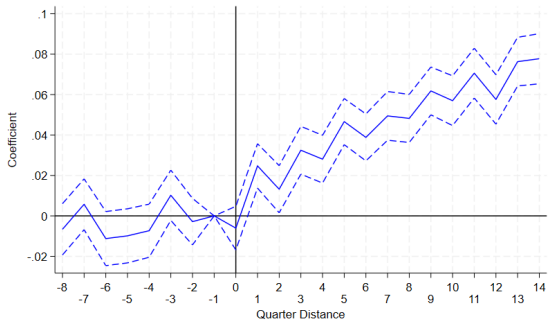
Table C2: Evolution of ST and OE Wages, Young Workers, 20-40

	(1)	(2)
	Log Daily Wage	
	ST	OE
Treatment x Post	0.047***	0.021***
	(0.003)	(0.003)
Observations	1,223,189	1,437,009

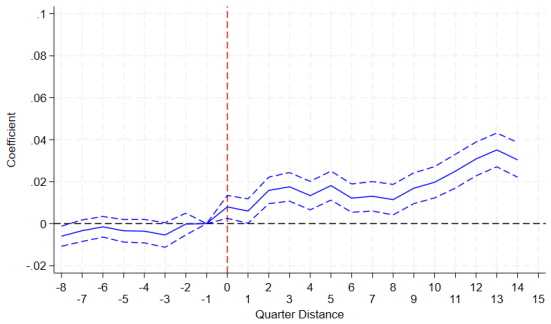
Notes: The table reports wage differences in ST and OE jobs before and after the reform. Treatment equals one for workers younger than 30. Column (1) compares ST wages for ages 20–40. Column (2) examines OE wages for non-subsidized OE workers using the 20–40 comparisons. All regressions control for gender, education, citizenship, disability status, months spent in ST and OE jobs between 1990 and 1997, and include age-by-gender, occupation, sector, and province-by-year fixed effects. Standard errors are clustered at the individual level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure C5: Evolution of ST and OE Wages Before and After the Reform (Notch at 30)

(a) Short-Term 20-40



(b) Open-Ended 20-40



Notes: The figure presents event-study estimates of wage dynamics in ST and OE jobs. Panel (a) compares ST wages on either side of the age-30 notch. Panel (b) compares high-cost OE wages on either side of the age-30 notch. The treatment group are workers 20 to 30 years old. The control group are workers 30 to 40 years old. Control variables include gender, education, citizenship status, disability status, months spent in ST employment between January 1990 and April 1997, and months spent in OE employment over the same period. The specification also includes age-by-gender fixed effects, as well as occupation, sector, and province-by-year fixed effects.

older workers. Table C3 presents the corresponding two-way fixed-effects estimates. The results show that workers aged 45 or older experience no statistically significant wage changes relative to slightly younger workers.

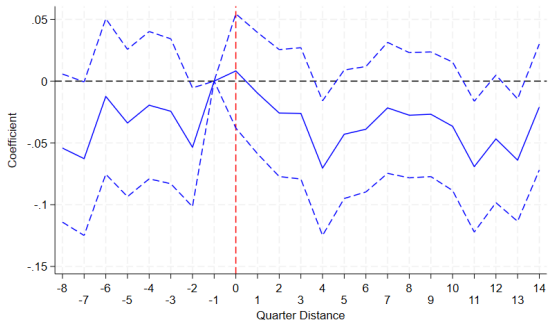
Table C3: Evolution of ST and OE Wages Before and After the Reform (45 notch)

	(1)	(2)
	Log Daily Wage	
	ST	OE
Treatment x Post	-0.004	-0.002
	(0.013)	(0.005)
Observations	76,093	269,305

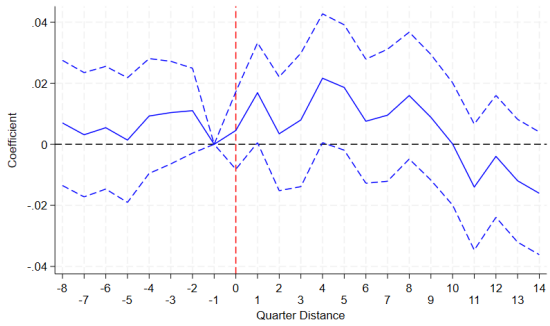
Notes: The table reports wage differences in ST and OE jobs before and after the reform. The treatment indicator equals one for workers aged 45 or older. Column (1) compares ST wages for workers aged 40 versus 47. Column (2) examines OE wages among non-subsidized OE workers using the 40 versus 47 comparison. All regressions control for gender, education, citizenship, disability status, and months spent in ST and OE jobs between 1990 and 1997, and include age-by-gender, occupation, sector, and province-by-year fixed effects. Standard errors are clustered at the individual level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure C6: Evolution of ST and OE Wages Before and After the Reform (45 notch)

(a) Short-Term 40/47



(b) Open-Ended 40/47



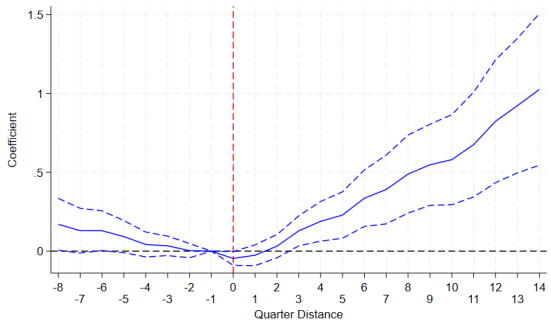
Notes: The figure presents event-study estimates of wage dynamics in ST and OE jobs. Panels (a) compare ST wages on either side of the age-45 notch. Panel (b) examine OE wages for workers in standard (non-subsidized) OE positions. Control variables include gender, education, citizenship status, disability status, months spent in ST employment between January 1990 and April 1997, and months spent in OE employment over the same period. The specification also includes age-by-gender interactions, as well as occupation, sector, and province-by-year fixed effects.

C.6 Spillovers Event-study

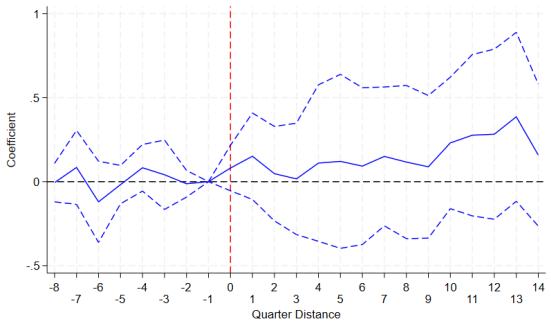
In this section, we plot the event-study coefficients corresponding to Table 2 in Section 5.2.3. These figures provide a visual representation of the dynamic effects underlying the spillover estimates reported in the main text and allow us to assess pre-trends and the timing of the responses.

Figure C7: Spillover Effects on Open-Ended and Short-Term Employment

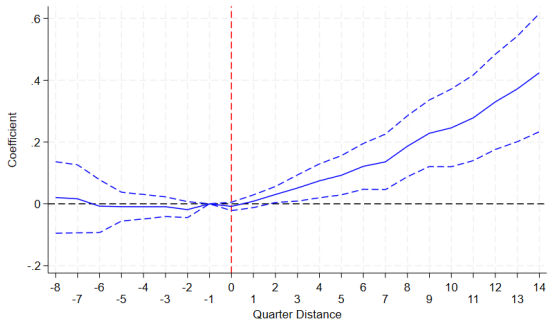
(a) Open-Ended 18-30



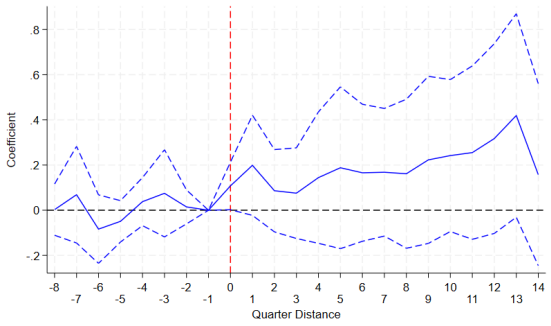
(b) Short-Term 18-30



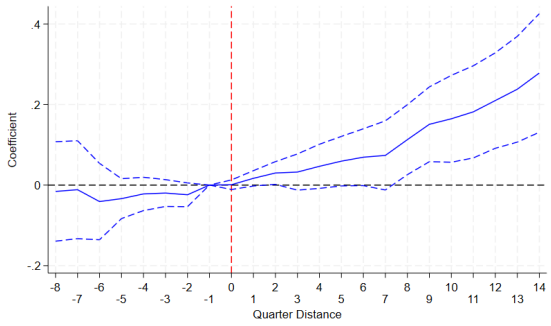
(c) Open-Ended 18-65



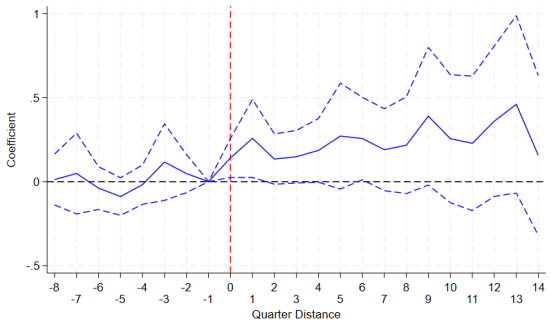
(d) Short-Term 18-65



(e) Open-Ended 30-65



(f) Short-Term 30-65



Notes: The figure shows the event-studies that analyze the employment effects on workers 18 to 30 years old (top panels), 18 to 65 (middle panels) or 30 to 65 (bottom panels). The specification is Equation 1. The ST employment outcomes have been detrended using pre-treatment data. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The vertical red-dashed line represents the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered. The regressions include interactions between quarter dummies and baseline sector-level controls. The controls are average wage, labor market concentration, the share of managerial positions, the proportion of workers with a college degree, average number of workers per firm, average job duration, the proportion of part-time contracts, and the share of male workers. The regressions are weighted by the population in each sector at baseline.

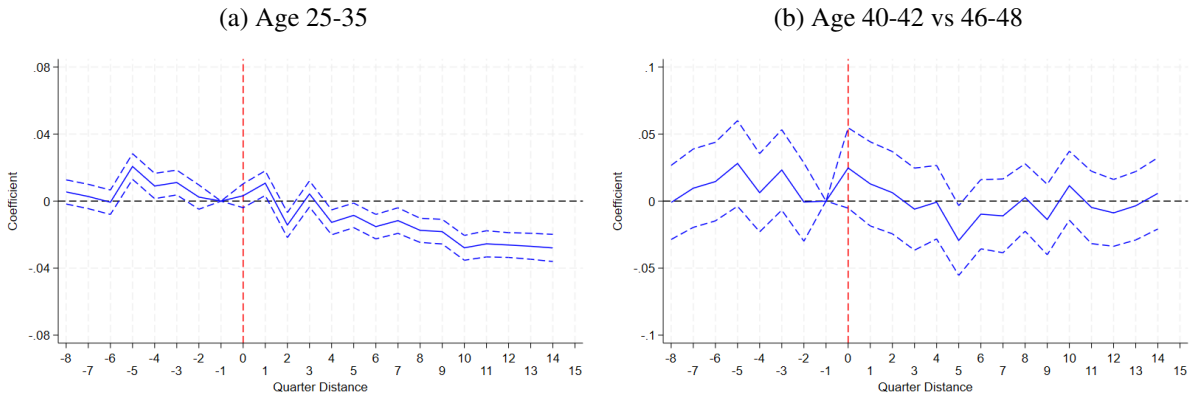
C.7 Effect on Part-Time Contracts

In Section 5.2.3, we show that sectors with higher pre-reform exposure to ST contracts among workers aged 18–30 experience increases in ST employment among workers aged 30–65 after the reform. This reallocation raises the question of what type of ST jobs older workers are filling. If the remaining ST positions correspond to tasks that are less easily incorporated into OE contracts, the increase in ST employment among older workers should be concentrated in contracts involving fewer hours. The strong expansion of OE employment among young workers suggests that some ST jobs previously held by 18–30-year-olds combined permanent and genuinely temporary activities. As these workers transition into OE contracts, they are likely to retain the more permanent components of those roles. If so, the residual ST employment filled by older workers should be less likely to take the form of full-time contracts. In this section, we test this implication by examining whether the post-reform increase in ST employment among older workers is disproportionately driven by part-time positions.

In order to know this, we compare the probability of being employed in a part-time job. We follow the same approach as Section 5.2.2, and use as a treatment variable whether the worker is 30 years or younger. Comparing 30-35 workers to 25-30 in the young population, and comparing 40-42 vs 46-48 for older workers. The model includes sector, province, and quarter fixed effects; age-by-gender fixed effects; and controls for education, citizenship, disability status, months of prior ST and OE experience (1990–1997), firm size, and province-by-year fixed effects. We also estimate a complementary static specification with treatment, post-reform, and interaction terms.

The event-study results are presented in Figure C8. Panel (a) shows that workers younger than 30 are less likely to hold part-time positions than comparable workers just above the 30-year threshold. Fourteen quarters after the reform, workers below age 30 are about 3 percentage points less likely to be in part-time employment relative to their slightly older counterparts. In contrast, Panel (b) shows no comparable discontinuity around the age-45 notch, indicating no differential change in part-time employment for workers on either side of that threshold.

Figure C8: Impact of the Reform on Part-Time Employment



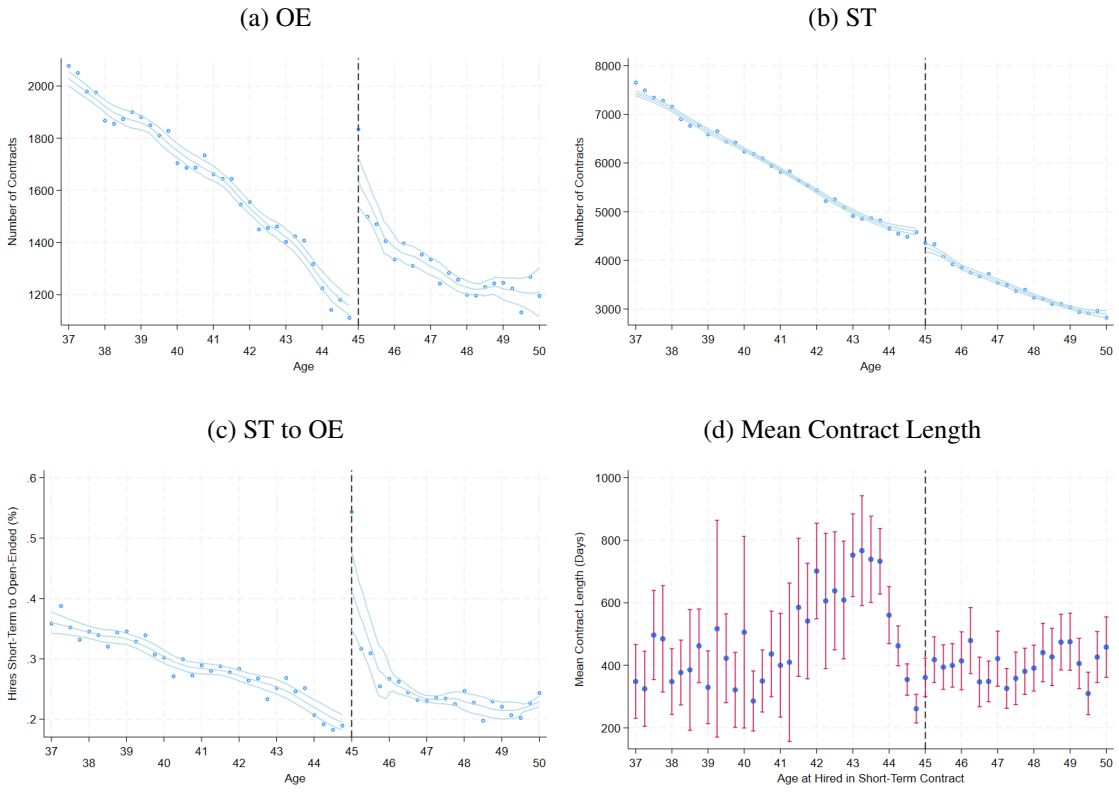
Notes: The figure presents event-study estimates of the probability of part-time employment. Panel (a) compares workers just below and above the age-30 threshold, while Panel (b) compares those on either side of the age-45 notch. The specification controls for gender, education, citizenship, disability status, months spent in ST employment between January 1990 and April 1997, and months spent in OE employment over the same period. It also includes age-by-gender fixed effects, as well as occupation, sector, and province-by-year fixed effects. Standard errors are clustered at the individual level.

C.8 Transitions and Contract Length Around Notch at 45

Figure C9 presents descriptive evidence supporting the interpretation that the primary effect of the policy at the 45-notch is to delay the timing at which some ST workers transition into OE contracts. Panel (a) shows a sharp increase in entries into OE contracts immediately above the age threshold. Such a discontinuity is difficult to reconcile with pure substitution effects, which would not predict a pronounced jump precisely at age 45.

Consistent with this interpretation, transitions from ST to OE contracts also increase discontinuously at the threshold (Panel (c)). Moreover, Panel (d) shows that ST contracts subsequently converted into OE contracts have unusually long durations for workers just below the threshold, indicating that some conversions are postponed until eligibility for the age-based incentive is reached.

Figure C9: Transitions and Contract Length



Notes: Figures (a) and (b) show the entries into open-ended and short-term contracts around the notch at the age of 45. Figure (c) displays transitions from short-term contracts into open-ended contracts. Figure (d) shows the mean contract length and the 95% confidence interval (red-capped lines) for short-term contracts that transition to an open-ended contract with low labor costs with the same employer. The blue dots in each figure depict the raw data. The vertical black-dashed line represents the labor cost notch. In Panels (a), (b), and (c), the blue solid lines are local polynomials estimated with pre- and post-notch data. The grey lines are the confidence intervals of the local polynomials.

C.9 Additional Employment Results (45-notch)

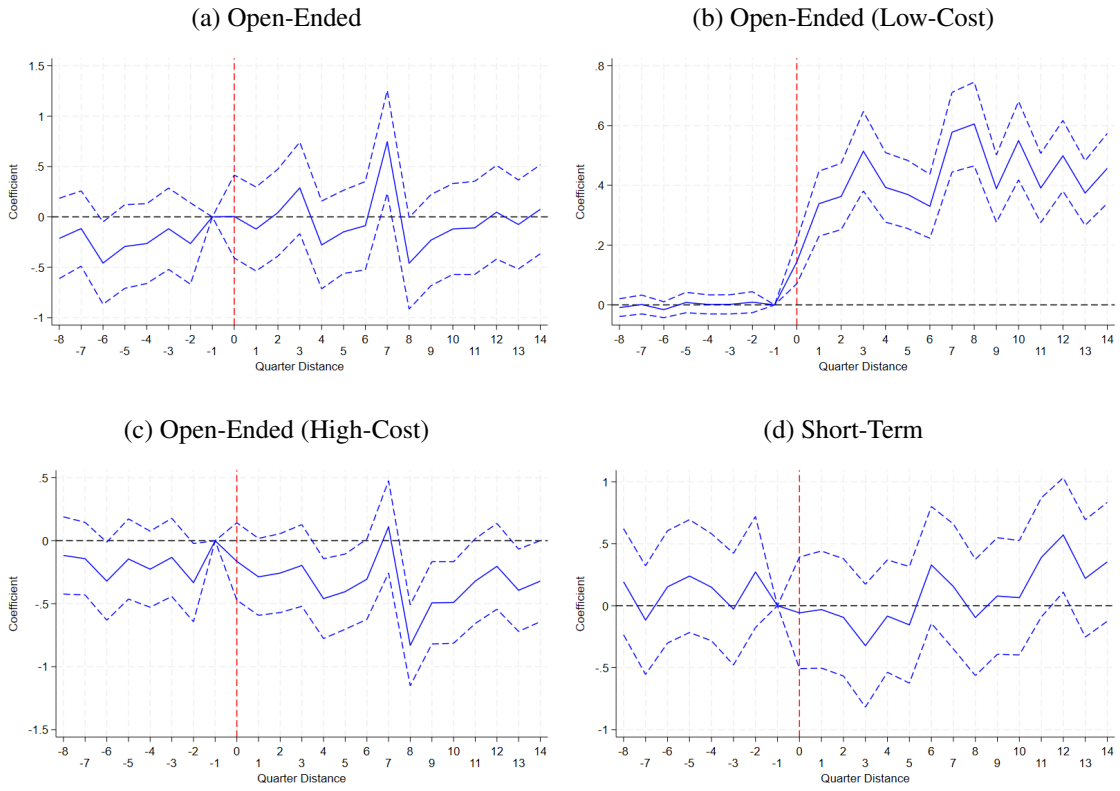
In this section, we complement the analysis in Section 5.3.2 by examining employment flows. Specifically, we focus on hires and separations for workers aged 47–48 relative to 40–41, in order to assess whether the reform affected transitions into and out of OE and ST contracts among workers sufficiently distant from the age-45 threshold.

Table C4: Effects on Contract Hires and Separations

	(1)	(2)	(3)	(4)
	Panel A: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Above45 x Post	0.269**	0.422***	-0.154*	-0.070
	(0.082)	(0.012)	(0.075)	(0.049)
Observations	744,812	744,812	744,812	744,812
	Panel B: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Above45 x Post	0.386***	0.183***	0.207**	-0.062
	(0.074)	(0.007)	(0.069)	(0.073)
Observations	744,812	744,812	744,812	744,812

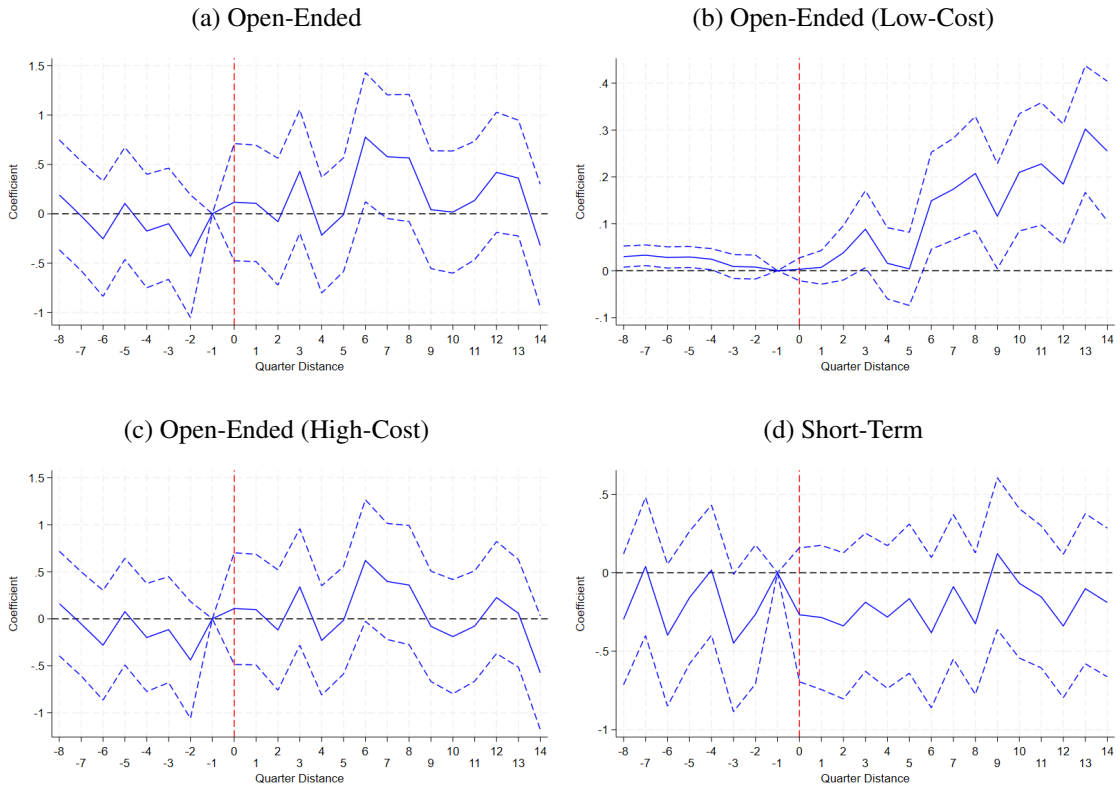
Notes: This table reports the effects of the reduction in non-wage labor costs on selected labor market outcomes. The treatment group consists of workers aged 47–48, while the control group consists of workers aged 40–41. The estimation window spans four quarters before treatment and twelve quarters thereafter. All coefficients are multiplied by 100 and can therefore be interpreted as percentage-point effects. Panel A presents hires into each contract, Panel B on job separations. Standard errors, clustered at the age level, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure C10: Effects of the Reform on Hiring



Notes: The figure shows the event-studies that analyze the effects on hires. The specification is Equation 10. In Panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for entries into open-ended contracts, Panel (b) for entries into open-ended low-cost contracts, Panel (c) for entries into open-ended high-cost contracts, and Panel (d) for entries into short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

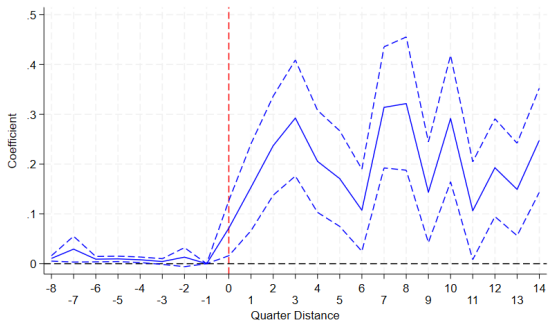
Figure C11: Effects of the Reform on Separations



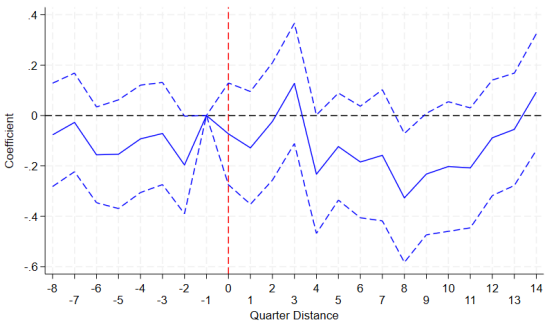
Notes: The figure shows the event-studies that analyze the effects on separations. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for exits from open-ended contracts, Panel (b) for exits from open-ended low-cost contracts, Panel (c) for exits from open-ended high-cost contracts, and Panel (d) for exits from short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure C12: Transitions from Short-Term to Open-Ended (Any Employer)

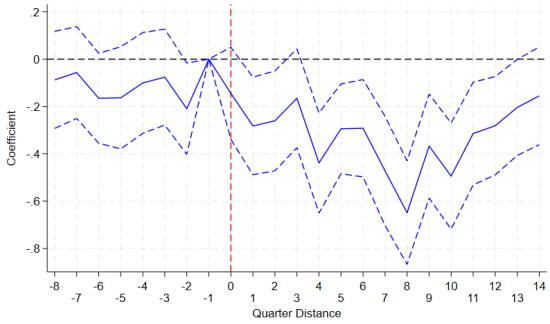
(a) Short-Term to Open-Ended (Low-Cost) Any Employer



(b) Short-term to Open-Ended Any Employer



(c) Short-Term to Open-Ended (High-Cost) Any Employer



Notes: The figure presents event-study estimates of the effects on marginal open-ended employment. The specification corresponds to Equation 10. Blue solid lines denote coefficient estimates, and blue dashed lines represent 95% confidence intervals. Estimates are multiplied by 100 and can therefore be interpreted in percentage points. Panels (a), (b), and (c) focus on short-term contract conversions with the same employer: into a low-cost open-ended contract (a), into any open-ended contract (b), and into a high-cost open-ended contract (c). The vertical red dashed line indicates the quarter in which eligibility for payroll tax cuts was expanded and severance payments were reduced, particularly for workers aged 45 and older.

C.10 Wage Incidence: Transitions from Non-Employment to OE Jobs

In this section, we expand the analysis in Section 6 by considering a different entry margin into permanent employment. Specifically, we examine workers who transition from non-employment into either low-cost or high-cost OE contracts. This extension allows us to assess whether the wage-incidence patterns documented in the main text also arise when permanent employment is reached from non-employment.

Transitions from non-employment into OE contracts constitute an important entry margin into permanent employment. Analyzing wage incidence along this margin is, however, less straightforward than in the ST-to-OE setting. For workers converting from ST to OE contracts, wages are observed both before and after the transition, allowing a direct comparison of wage dynamics around the conversion date. By contrast, individuals entering OE employment from non-employment have no earnings before the transition, which precludes the use of standard event-time measures based on continuous wage histories.

To address this limitation, we restrict attention to quarters in which workers record positive earnings, following the approach outlined in Section 6. Event time is therefore defined over periods with observed earnings rather than calendar quarters. This redefinition allows us to compare wage outcomes immediately before and after the start of the OE job without relying on mechanically zero wages during non-employment spells. We conduct the analysis separately for workers aged 18–30 and 45–55, and we distinguish between transitions into low-cost and high-cost OE contracts.

The resulting samples are substantially smaller than those used in the ST-to-OE analysis. Among younger workers, the administrative data record 14,172 transitions from non-employment into OE employment. Requiring at least 24 non-consecutive months of non-zero earnings in the pre-period, as well as positive earnings in the quarters immediately after the transition, reduces the estimation sample to 528 transitions into low-cost OE contracts and 381 transitions into high-cost OE contracts.[72]

For older workers, the data include 7,832 such transitions. Imposing the same restriction yields final samples of 594 transitions into low-cost OE contracts and 703 transitions into high-cost OE contracts.

The empirical strategy mirrors that used in the main wage-incidence analysis. We estimate a difference-in-differences specification with individual, time, and age fixed effects, as well as an event-study version that traces wage dynamics relative to the quarter in which the OE job begins (Equations 11 and 12). The treatment indicator distinguishes low-cost from high-cost OE contracts, and the specification includes the same set of worker and firm covariates interacted with quarter dummies to flexibly control for heterogeneous wage trends. The dynamic estimates are reported in

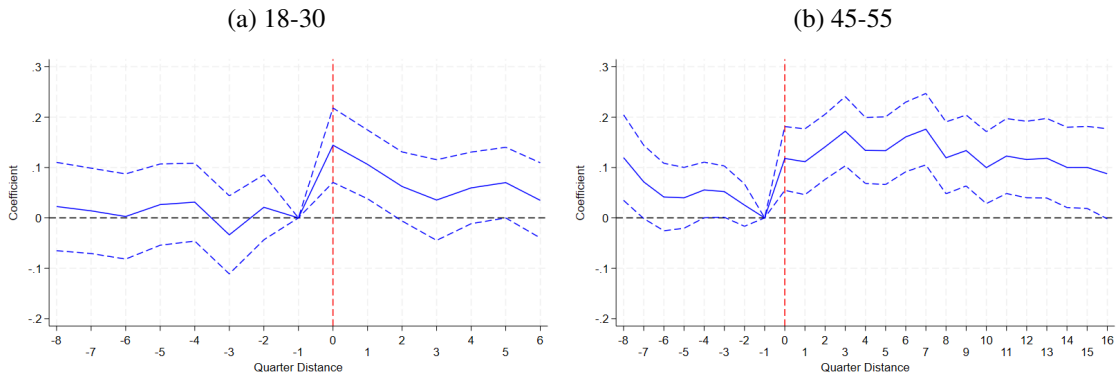
[72] Recall that the event time is zero when a worker enters a low-cost OE contract, which can happen any time between May 1997 and March 2001. Hence, the quarters in the pre-period change depending on the time of transition.

Figure C13, while the corresponding static estimates—analogous to Table 4 in the main text—are presented in Table C5.

The results broadly mirror those obtained for ST-to-OE transitions. For both age groups, wages increase sharply at the onset of the OE job for workers entering low-cost contracts relative to those entering high-cost contracts, consistent with substantial pass-through of the labor cost reduction.

Under our preferred specification (Table C5, Column 5), the implied pass-through rates are 108% for young workers and 79.5% for older workers. These estimates should be interpreted cautiously, given the smaller sample sizes and the positive selection inherent in restricting attention to individuals with sufficiently long post-transition earnings histories. Importantly, however, the estimates most relevant for interpreting the employment results deliver the same qualitative message as in the main specification: pass-through for workers above age 45 is substantial but incomplete. This implies that firms retained part of the labor-cost reduction, so that the effective cost of OE contracts declined. In principle, this should have generated increases in OE employment for older workers. The absence of such an increase in the data therefore reinforces our conclusion that substitution toward OE contracts is limited for this group.

Figure C13: Wage Dynamics Non-Employment to Open-Ended Transition: Low-Cost vs. High-Cost OE Employees



Notes: Figure 12 presents event-study estimates of the wage incidence of the reform. The specification follows a difference-in-differences with individual and time fixed effects, as described in Equation 11. The blue solid lines represent the estimated coefficients, and the dashed lines indicate the 95% confidence intervals based on robust standard errors clustered at the individual level. Panel (a) reports estimates for workers aged 18–30, and Panel (b) for those aged 45–55. The model includes interactions between quarter dummies and controls for sector, gender, education, disability status, citizenship, part-time status, firm size (number of employees), the number of months worked under ST and OE contracts in the seven years prior to the reform, as well as firm age and legal status. We also control for age dummies and the provincial unemployment rate.

Table C5: Wage Incidence

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
Panel A: Transition from NE to OE (30 years old)					
Treatment x Post	0.140***	0.104***	0.106***	0.104***	0.093***
	(0.034)	(0.034)	(0.035)	(0.035)	(0.035)
Observations	13,495	13,353	12,841	12,841	12,342
Panel B: Transition from NE to OE (45 years old)					
Treatment x Post	0.101***	0.084***	0.079***	0.078***	0.080***
	(0.023)	(0.024)	(0.026)	(0.025)	(0.029)
Observations	30,188	29,201	28,156	28,156	27,888
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Province Unemployment	No	Yes	Yes	Yes	Yes
Sector Controls	No	No	Yes	Yes	Yes
Firm Size	No	No	No	Yes	Yes
Other Firm Controls	No	No	No	No	Yes

Notes: Notes: The table reports the wage effects of the reform estimated using a two-way fixed-effects specification, as in Equation 12. Panel A corresponds to workers younger than 30 and Panel B to workers older than 45. Columns 2 to 5 progressively incorporate interactions between quarter dummies and worker and job characteristics, including sector, firm size, firm age, legal status, gender, education, disability status, citizenship, part-time status, age dummies, months worked in ST contracts during the seven years prior to the reform, months worked in OE contracts during the same period, and the provincial unemployment rate. Each column includes a different subset of these controls, as detailed at the bottom of the table. Robust standard errors clustered at the individual level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

C.11 Elasticity Estimation

To assess the sensitivity of the elasticity estimates to alternative assumptions, we first define its components and describe the required calculations. By definition, the elasticity of substitution is given by:

$$\sigma = -\frac{\Delta \ln\left(\frac{L_{OE}}{L_{ST}}\right)}{\Delta \ln\left(\frac{W_{OE}}{W_{ST}}\right)},$$

where L_{OE} and L_{ST} denote employment in OE and ST contracts, respectively, and W_{OE} and W_{ST} represent the corresponding labor costs. The numerator captures the change in relative employment across contract types, while the denominator measures the corresponding change in relative labor costs, so that σ summarizes the responsiveness of contract composition to cost differentials.

Numerator: We begin by estimating the numerator separately for young and older workers. This term can be written as

$$\begin{aligned}\Delta \ln\left(\frac{L_{OE}}{L_{ST}}\right) &= \ln\left(\frac{L^1_{OE}}{L^1_{ST}}\right) - \ln\left(\frac{L^0_{OE}}{L^0_{ST}}\right) \\ &= \ln\left(\frac{L^1_{OE}}{L^0_{OE}}\right) - \ln\left(\frac{L^1_{ST}}{L^0_{ST}}\right),\end{aligned}$$

which corresponds to the relative change in employment for OE contracts minus the relative change for ST contracts. In the following, we detail the procedure used to calculate these terms.

Below-30 workers: For young workers, we rely on the estimates reported in Table 1. Using these estimates, we recover how changes in OE and ST employment relate to initial employment levels and the baseline sectoral share of ST employment. Specifically:

$$\frac{L^1_{OE}}{L^0_{OE}+L^0_{ST}} = \frac{L^0_{OE}}{L^0_{OE}+L^0_{ST}} + HighST_{s,96} \times \beta_{OE}, \qquad \frac{L^1_{ST}}{L^0_{OE}+L^0_{ST}} = \frac{L^0_{ST}}{L^0_{OE}+L^0_{ST}} + HighST_{s,96} \times \beta_{ST}.$$

We use the baseline share of OE employment, $\frac{L^0_{OE}}{L^0_{OE}+L^0_{ST}} = 0.4823$. Combining these values with the estimated effects of the reform on OE and ST employment (0.170 for OE and -0.034 for ST), we obtain average employment ratios of $\frac{L^1_{OE}}{L^0_{OE}} \approx 1.3525$ for OE workers and $\frac{L^1_{ST}}{L^0_{ST}} \approx 0.9343$ for ST workers. Consequently, the numerator of the elasticity expression, $\Delta \ln\left(\frac{L_{OE}}{L_{ST}}\right)$, is estimated to be 0.3699 log points.

Above-45 workers: For older workers, we use the estimated effect on OE employment reported in Table 3. Consistent with the discussion in Section 5.2.3 and the evidence presented in Appendix Section C.2, we assume that the estimated decline in ST contracts is primarily driven by spillover effects. At the end of this section, however, we examine the sensitivity of this as-

sumption by considering alternative scenarios in which 25% or 50% of the observed decline in ST employment is not attributable to spillovers.

The estimated coefficients are 0.129 for OE employment and -0.596 for ST employment. Under the baseline assumption that the decline in ST employment fully reflects spillovers, we set $L^1_{OE} = L^0_{OE}(1+0.00129)$ and $L^1_{ST} = L^0_{ST}$. This yields a change in the employment ratio for above-45 workers of $\Delta \ln\left(\frac{L_{OE}}{L_{ST}}\right) \approx 0.0013$ log points.

Denominator: For the denominator, we expand the expression, such that it represents the change in labor costs as a function of past and future OE and ST labor costs, specifically:

$$\begin{aligned}\Delta \ln\left(\frac{W_{OE}}{W_{ST}}\right) &= \ln\left(\frac{W^1_{OE}}{W^1_{ST}}\right) - \ln\left(\frac{W^0_{OE}}{W^0_{ST}}\right) \\ &= \ln\left(\frac{W^1_{OE}}{W^0_{OE}}\right) - \ln\left(\frac{W^1_{ST}}{W^0_{ST}}\right),\end{aligned}$$

Thus, we only need to compute the ratios of labor costs for OE and ST employment. For ST workers, we rely on the estimated wage change reported in Section C.5, which indicates a 1.5 percent increase around the policy reform. Hence,

$$\frac{W^1_{ST}}{W^0_{ST}} = 1.015.$$

For OE workers, we first compute the percentage change in labor costs based on expected OE labor costs, using the following expression:

$$\begin{aligned}\frac{W^1_{OE}}{W^0_{OE}} &= \frac{w^1_{OE}[1+\tau(1-r)] + \frac{33}{365} * w^1_{OE} * p + \frac{20}{365} * w^1_{OE} * q}{w^0_{OE}(1+\tau) + \frac{45}{365} * w^0_{OE} * p + \frac{20}{365} * w^0_{OE} * q} \\ &= \frac{w^1_{OE}}{w^0_{OE}} \frac{[1+\tau(1-r)] + \frac{33}{365} * p + \frac{20}{365} * q}{(1+\tau) + \frac{45}{365} * p + \frac{20}{365} * q}.\end{aligned}$$

The expected annual labor cost of an OE contract depends on the wage (w^t_{OE}), the payroll tax rate (τ), the payroll tax reduction (r), the severance cost per year in the event of wrongful termination (equal to $\frac{45}{365}$ before the reform and $\frac{33}{365}$ after), the probability of lawful dismissal (q), and the probability of wrongful dismissal (p). We incorporate the estimated 1.6% increase in OE wages for young workers (see Section C.5 in the Appendix), while wages for older workers remain unchanged. The parameters take the following values: $\tau = 37.2\%$, $r = 25.38\%$ for young workers and 38.06% for older workers, $q = 0.11\%$ for young workers and 0.34% for adult workers, $p = 71.17\%$ for young workers, and 78.09% for older workers. Substituting these values into the previous expression, we get that the percentage change in labor costs Δ is equal to 6.60% for young

workers and 11.39% for workers older than 45.

We next allow total labor costs to adjust through the pass-through of the statutory cost reduction. Based on our wage-incidence estimates, we set $\omega = 0.372$ for young workers and $\omega = 0.557$ for older workers. These values imply an effective reduction in OE labor costs of

$$\left(1 - \frac{W_{OE}^{1}}{W_{OE}^{0}}\right)(1-\omega),$$

where $\omega \in [0,1]$ denotes the share of the statutory cost change passed through to workers. A value of $\omega = 0$ implies that firms bear the full incidence of the reform, whereas $\omega = 1$ corresponds to complete pass-through to workers. Varying ω therefore changes the implied cost differential, $\Delta \ln(W_{OE}/W_{ST})$, and, in turn, the elasticity parameter σ. In our preferred specification, the estimated pass-through parameters are $\omega_{\text{young}} = 0.372$ and $\omega_{\text{old}} = 0.557$.

The result of this calculation corresponds to a 4.14% decline for young workers and a 5.05% decline for older workers. Combining these reductions with the change in ST labor costs—an increase of 1.5% for young workers and no change for older workers—yields changes in relative labor costs (as defined in equation 13) of 0.0572 log points for young workers and 0.05178 log points for older workers.

Elasticity of substitution: Using numerator values of 0.3699 log points for young workers and 0.0013 log points for older workers, together with the corresponding denominators of 0.0572 and 0.05178 log points, we obtain estimated elasticities of substitution of approximately 6.5 for young workers and 0.025 for older workers. Table C6 then reports how these elasticity estimates vary under the alternative assumptions described above. Although the point estimates exhibit some sensitivity to specific assumptions, the central qualitative result is robust: elasticity of substitution is very large for young workers, while it is close to zero for above-45 workers.

Sensitivity analysis: In Table C6 we report several sensitivity exercises for the elasticity of substitution estimates. In particular, we consider alternative estimates to the employment responses used to derive the elasticity, as well as sensitivity to key assumptions underlying the mapping from labor cost changes to relative employment effects.

First, we use the continuous treatment specification (Table D2) instead of the baseline discrete comparison between high- and low-exposure sectors. Consistent with the baseline results, we find an increase in OE employment together with a modest decline in ST employment. Using the estimated average increase in OE employment across sectors, 0.1189 (0.743×0.16), and the corresponding decline in ST employment, 0.0536 (-0.335×0.16)[73], we obtain an implied elasticity of substitution of 5.8. This estimate is slightly below the baseline elasticity, providing an important

[73] Here we use the average baseline incidence of ST contracts among young workers across sectors, as reported in Figure C1.

robustness check of our main elasticity estimate.

Second, we assess sensitivity to the post-treatment horizon used to measure employment effects. Rather than relying on estimates up to 14 quarters after the reform, we focus on the third quarter following implementation. This restriction mitigates the concern that longer horizons may incorporate general equilibrium adjustments or dynamic labor demand responses that extend beyond the immediate substitution between contract types induced by the policy. Under this shorter horizon, we estimate an increase in OE employment of 0.069 and a decline in ST employment of 0.089, which implies an elasticity of substitution of 5.6, very close to our baseline estimate.

Next, we examine how alternative assumptions entering the calculation of relative labor cost changes affect the estimated elasticity. In particular, we consider three scenarios: (i) no change in ST wages, (ii) no change in OE wages, and (iii) no wage incidence of the policy on workers. These assumptions modify the magnitude of the implied change in relative labor costs used to recover the elasticity.

In particular, the no–wage-incidence assumption yields an estimated elasticity of approximately 4.4. Under this scenario, the full reduction in non-wage labor costs is treated as a decline in firms' labor costs, implying a larger effective cost shock and therefore a smaller elasticity for a given employment response. Importantly, even under this conservative specification, the estimated elasticity remains sizable, reinforcing the conclusion that firms display substantial substitutability between ST and OE contracts.

Panel B presents sensitivity exercises for the elasticity of substitution among older workers. Because the policy also targeted young workers, the estimated increase in ST employment among older workers may partly reflect spillover effects operating through within-firm adjustment margins. Our baseline calculation assumes that the entire increase is attributable to spillovers from the policy. To assess robustness, we consider two alternative scenarios in which only 75% or 50% of the observed increase is attributed to spillovers. The results indicate that the elasticity estimates are only modestly affected by these assumptions, reflecting the limited substitution between OE and ST contracts observed for this demographic group overall.

C.12 Elasticity of Substitution Using the Relative Increase in Low-Cost OE Contracts

The employment results indicate that the increase in OE employment among young workers occurred partially through high-cost contracts, particularly after the expiration of the subsidies (see Figure 5, Panels (b), (d), and (f)). By contrast, for older workers the policy largely subsidized OE jobs that would have existed even in the absence of the reform—that is, inframarginal OE employment (see Figure 11, Panels (b) and (c)). To account for this heterogeneity, we adjust the

Table C6: Sensitivity Analysis of Elasticity Estimates

Sensitivity	σ
Panel A: Young workers	
Continuous Treatment (Average)	5.8
Employment effects first 3 quarters	5.6
No change in ST labor costs ($W^1_{ST} = W^0_{ST}$)	8.7
No change in standard OE wages ($w^1_{OE} = w^0_{OE}$)	5.5
No wage incidence ($\omega = 0$)	4.4
Panel B: Older workers	
Percent of ST due to spillover 75%	0.0537
Percent of ST due to spillover 50%	0.0825
No wage incidence ($\omega = 0$)	0.0107

percentage change in labor costs, as described in Section 7, as follows:

$$\left(1 - \frac{W^1_{OE}}{W^0_{OE}}\right)(1-\omega)\frac{\Delta\text{Low-Cost OE}}{\Delta\text{OE}}, \tag{15}$$

where the final term scales the effective cost change by the share of the overall increase in OE employment accounted for by low-cost OE contracts.

For young workers, this share equals $0.093/0.170 = 0.5470$ (see Table 1, Panel B, Columns 1 and 3). This implies that only a fraction of the observed increase in OE employment operates through low-cost contracts, attenuating the effective monetary incentive. For above-45 workers, the corresponding ratio is $2.203/0.129 = 17.08$ (see Table 3, Panel D, Columns 1–2), indicating that for each marginal increase in OE employment there are 17 inframarginal OE workers. As a result, the reduction in labor costs associated with low-cost OE contracts is substantially larger for workers older than 45.

Incorporating the factor $\frac{\Delta\text{Low-Cost OE}}{\Delta\text{OE}}$ yields an implied reduction in labor costs of 2.3% for young workers and 86% for above-45 workers. The corresponding elasticities of substitution are 9.78 for young workers and 0.003 for workers older than 45, underscoring that ST-to-OE substitution is quantitatively much more important in the market for young workers than for above-45 workers.

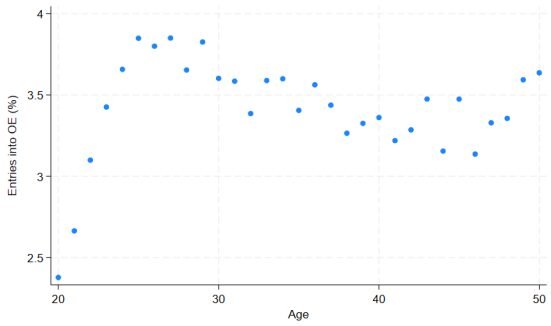
C.13 Entries into OE Contracts

The graphical evidence in this section indicates that ST contracts primarily serve as stepping stones for younger workers, consistent with ST-to-OE substitution being quantitatively more important at younger ages. Figure C14, Panel (a), plots the share of ST contracts that transition into OE contracts by age. This share is low overall—around 3.5% for workers older than 25. Although this transition rate is somewhat higher when expressed relative to all OE entries (Panel (b)), it remains modest. For example, among 45-year-olds, only 25% of OE entries originate from ST contracts, compared with approximately 40% for 25-year-olds.

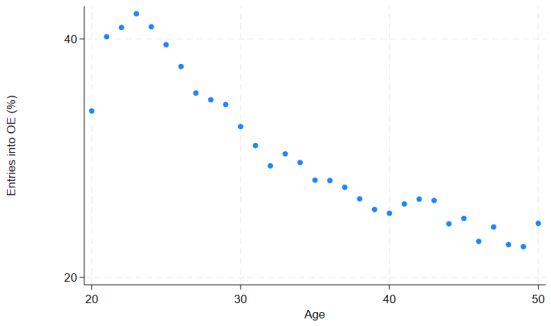
Panels (c) and (d) further show that, for 45-year-olds, the main entry routes into OE employment are non-employment (about 40%) and direct transitions from other OE jobs (around 30%). This pattern suggests that screening into OE positions for older workers occurs largely through alternative channels rather than via ST contracts. Given their longer employment histories, firms can assess older workers based on past job trajectories. Moreover, employers may interpret extended experience in ST contracts as indicative of lower accumulated human capital. Consistent with this interpretation, Garcia-Louzao et al. (2023) document that returns to experience accrued under ST contracts are substantially lower than those associated with other employment spells.

Figure C14: Entries into Open-Ended Contracts

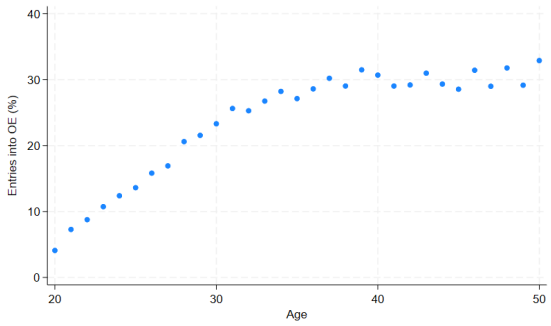
(a) From ST relative to ST



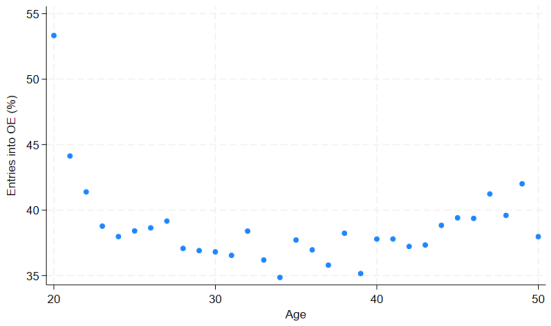
(b) From ST relative to OE



(c) From OE relative to OE



(d) From Non-Employment relative to OE



Notes: The Figure shows a breakdown of the entries into OE contracts taking into account the situation of the worker the month before he is hired into an OE contract. Panel (a) shows the percentage of entries from a ST contract, relative to the number of ST workers of that age. The other graphs display the percentage of OE hires that happen from a ST contract (Panel (b)), from another OE contract (Panel (c)), and from out of employment (Panel (d)). To construct the figures we used data from the pre-policy period between January 1995 to April 1997.

C.14 Wage penalty

Section 5.2.2 suggests that ST contracts may persist after the reform because they help exert downward pressure on wages by weakening workers' outside options. This hypothesis rests on an important institutional characteristic: ST workers are largely underrepresented in both unions and firm-level wage agreements (Bentolila et al., 1994; Wilhelmi, 2021). Furthermore, Daruich et al. (2023) document differential rent-sharing between ST and OE contracts in Italy.

A direct implication of this mechanism is that ST wages should be lower than OE wages for comparable workers and jobs. In this appendix section, we test this prediction by estimating the wage differential between ST and OE contracts, controlling for rich worker and firm characteristics. The results provide direct evidence on the magnitude of the ST wage penalty and help quantify the extent to which temporary contracts confer a wage-setting advantage to firms.

We take this idea to the data. We expect ST workers to earn significantly lower wages than comparable OE employees. We test this prediction in two complementary ways. First, conditional on observable characteristics, we assess whether ST workers face a wage penalty relative to OE workers. Second, we examine whether workers transitioning from ST to OE contracts experience a significant wage premium.

ST Wage Penalty in a Mincerian Regression. To measure the wage penalty, we focus on individuals aged 18–55 during the 1996–1998 period. Our preferred specification is:

$$y_{it} = \alpha + \beta ST_{it} + \gamma X_{it} + \rho_p + \theta_t + \varepsilon_{it} \tag{16}$$

where y_{it} denotes the logarithm of the wage of worker i in period t. ST_{it} is a dummy equal to one if the worker holds an ST contract and zero otherwise. The coefficient β is the parameter of interest. X_{it} includes individual controls such as education, experience, age, sector, gender, disability status, firm size, the provincial unemployment rate, and several social security variables capturing the worker's rank and firm activity. ρ_p, θ_t, δ_m, and κ_a denote province, and time fixed effects, respectively.

Table C7 reports five specifications. Column (1) includes province and year fixed-effects, Column (2) adds interactions of age categories with education attainment and gender, Column (3) corresponds to our preferred specification. Columns (4) and (5) restrict to workers aged 18-30 and 45-55, respectively. In all cases, we find a significant and negative wage penalty. When including all controls, the estimated penalty equals –12.2%. This estimate is comparable to the temporary wage gap of 12–13% found using Italian data (Picchio, 2006). Hence, monetary incentives to increase OE employment may be ineffective if they do not compensate for the large wage gap across contracts.

Wage Premium after Transition to an OE Contract. To quantify the wage premium asso-

Table C7: Wage Penalty for Short-Term Contracts

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
ST	-0.196***	-0.191***	-0.122***	-0.100***	-0.157***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.007)
Observations	533,422	533,422	533,422	306,237	47,685

Notes: The table reports the estimated wage penalty faced by short-term (ST) workers relative to open-ended (OE) workers. The sample includes individuals aged 18–55 observed from four quarters before to six quarters after the policy change. Column (1) includes province and year fixed-effects; Column (2) adds interactions of age categories with education attainment and gender; and Column (3) presents the preferred specification with the full set of controls. Columns (4) and (5) restrict the sample to workers aged 18–30 and 45–55, respectively. Robust standard errors are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

ciated with becoming an OE worker, we focus on employees who transition from an ST to an OE contract with the same firm between January 1996 and April 1997, prior to the policy implementation. We compare their daily wages in the months immediately before and after the transition. For each individual, we retain observations corresponding to the month preceding the transition and the month immediately after. We follow the next equation:

$$Y_{it} = \alpha + \beta Transition_{it} + \eta_i + \zeta_t + \gamma Unemp_{pt} + \varepsilon_{it}, \tag{17}$$

where $Transition_{it}$ is a dummy equal to one if worker i transitions to an OE contract in period t. The regression includes individual fixed effects η_i and quarter fixed effects ζ_t. Because the transition occurs within the same firm, constant firm characteristics are absorbed by η_i. We also control for the provincial unemployment rate $Unemp_{pt}$. Identification relies on within-individual variation before and after the transition.

Table C8 presents the results. We find a wage premium of approximately 11% following a transition to an OE contract, a result consistent across specifications and in line with Italian evidence showing a 6–8% premium (Daruich et al., 2023).

Table C8: Wage after Transition to Open-Ended

	(1)	(2)	(3)	(4)	(5)
	log wage				
transitionSTtoOE	0.125***	0.117***	0.111***	0.135***	0.075**
	(0.008)	(0.007)	(0.009)	(0.012)	(0.035)
Observations	24,056	24,056	13,576	7,531	1,221

Notes: The table reports the wage change associated with a transition from a short-term (ST) contract to an open-ended (OE) contract. The sample includes individuals aged 18–55 who transition from ST to OE between the first quarter of 1997 and the first quarter of 2001, inclusive. Column (1) presents estimates with province and time fixed effects only; Column (2) additionally includes interactions between age indicators, education attainment, and gender; and Column (3) reports the preferred specification with the full set of controls. Columns (4) and (5) further restrict the sample to workers aged 18–30 and 45–55, respectively. Robust standard errors are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

C.15 The Evolution of Short-term Wages for Above-45 Workers

In Section C.5, we examine whether the reform improved outside options for above-45 workers by comparing wage dynamics for ST workers across age groups around the 45-year threshold. Specifically, we compare ST workers just below and just above the notch, excluding observations close to the cutoff. We find no evidence of such wage adjustments.

In this section, we explore further this result by using alternative comparison groups. For that, we compare the evolution of wages in ST and OE jobs for workers 40-42 years old. The logic behind this comparison is that these groups of workers are not directly affected by the labor cost discounts offered to workers older than 45. However, ST employment increases for them. Hence, if the wages of ST workers increase because of the higher demand for them, we should be able to detect it, regardless of the wage incidence effects of the discounts for workers older than 45.

To compare the wage evolution of ST and OE workers 40-42 years old, we run the following specification:

$$Y_{it} = \alpha + \delta_s + \delta_p + \delta_t + \rho ST_{it} + \psi Post_t + \sum_{j=-8,\neq -1}^{14} \beta_j \mathbb{1}[j = t] ST_{it} + \gamma X_{it} + \varepsilon_{it} \tag{18}$$

where Y_{it} is the log of the average wage for individual i in quarter t. δ_s and δ_p are sector and province fixed effects. δ_t are quarter fixed effects. $Post_t$ is a dummy capturing quarters after the reform. ST_{it} is a dummy equal to one when the worker holds a ST contract. β_j are the coefficients of interest. They capture any differential evolution over time of the ST and OE wage gap, relative to its value a quarter before the reform. X_{it} is a vector of controls, such as the worker's gender, education level, citizenship status, disability status, months in ST employment between January 1990 and April 1997, and months in OE employment between January 1990 and April 1997, the firm's number of employees and the provincial unemployment rate. The static version of Specification 18 is:

$$Y_{it} = \alpha + \delta_s + \delta_p + \delta_t + \beta_1 ST_{it} + \beta_2 Post_t + \beta_3 Post_t \times ST_{it} + \gamma X_{it} + \varepsilon_{it} \tag{19}$$

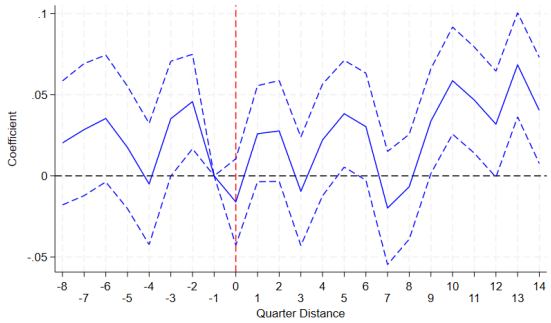
The event-studies are shown in Panels (a) and (b) in Figure C15. The left panel is for 40- to 41-year-old workers. The right one for 41- to 42-year-old employees. As can be seen, there is no clear evidence of the wages of ST workers being affected by the policy. In Table C9 we report the estimates for the interaction term in Equation 19. When we include controls (Columns 2 and 4), the coefficients are small and not statistically significant, consistent with the figures.

To conclude, we have compared the wage evolution of ST and OE workers younger than 45, and therefore not directly affected by the labor cost reductions above 45. The evidence does not

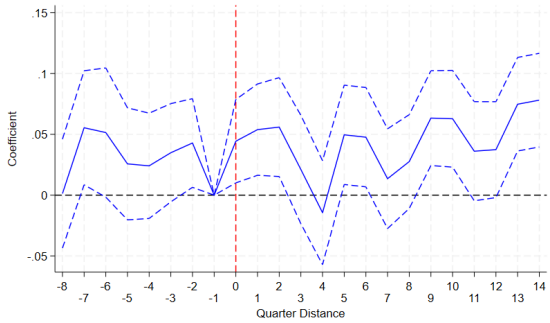
suggest that the wages of ST workers were impacted by the policy.

Figure C15: Short-term Wage Evolution (Relative to OE, 45-notch)

(a) 40-41 years, Relative to OE Jobs



(b) 41-42 years, Relative to OE Jobs



Notes: The figure shows the event-studies that analyze the evolution of wages in ST jobs relative to OE. We compare workers of the same age in ST and OE jobs. The specification is Equation 18. We include as control variables the worker's gender, education level, citizenship status, disability status, months in ST employment between January 1990 and April 1997, and months in OE employment between January 1990 and April 1997. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Table C9: Effects on the Wage of Short-Term Contracts (Relative to OE, 45-notch)

	(1)	(2)
	Log Daily Wage	
Treatment x Post	0.004	0.015
	(0.009)	(0.009)
Observations	207,275	168,134

Notes: The columns shows estimates of the post-reform wage evolution of ST workers relative to OE ones. Column 1 for 40- to 41-year-old workers. Column 2 for 41- to 42-year-old workers. The specification is Equation 18. We include as control variables the worker's gender, education level, citizenship status, disability status, months in ST employment between January 1990 and April 1997, and months in OE employment between January 1990 and April 1997, and interactions of quarter and province fixed-effects. Robust standard errors clustered at the individual level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

C.16 Assessing the Parallel Trends Assumptions

We assess the sensitivity of our two-way fixed-effects estimates to potential violations of the parallel trends assumption using the "credible" approach proposed by Rambachan and Roth (2023). Rather than assuming exact parallel trends, this framework allows for smooth deviations in untreated potential outcomes and quantifies how large such deviations would need to be to overturn our conclusions. In particular, we focus on the magnitude of changes in the slope of the differential trend between treated and control groups across consecutive periods that would render the estimated effect statistically indistinguishable from zero.

Table C10 presents the results from the Honest DiD analysis. We focus on the average post-treatment effect. Following Rambachan and Roth (2023), we report the minimum violation of

parallel trends required to invalidate the estimate (M), normalized by the slope of the pre-treatment trend (Slope).

We report Honest DiD sensitivity analyses for the outcomes that are precisely estimated in Tables 1 and 6 for the age-30 notch. Across specifications, the threshold values imply that implausibly large deviations from parallel trends would be required to overturn the baseline conclusions. The estimates are therefore robust to substantial violations of the identifying assumption, in the sense that only pronounced changes in the slope of the untreated counterfactual would eliminate the estimated effects.

For the outcome ever in a low-cost OE contract, we adopt a Relative Magnitude (RM) restriction rather than the smoothness (delta) restriction used elsewhere. The pre-period exhibits very limited curvature, making smoothness bounds uninformative. Under RM, the identifying assumption constrains the level of post-treatment violations relative to the largest pre-period deviation. The corresponding breakdown value indicates that the post-treatment violation would need to be approximately 5.3 times larger than the maximum pre-treatment discrepancy to overturn the result, again pointing to substantial robustness.

Similarly, for the 45-year notch, we estimate very high deviations from the linear trend for a violation of the parallel trends, as shown in Panel B, with the exception of those variables for which we still estimate an imprecise coefficient.

C.17 SE transitions

We also examine whether the reform affected transitions from self-employment into wage employment. This margin could plausibly respond to the policy if some self-employed individuals effectively work for a single firm that is unwilling to offer a formal employment contract. By lowering labor costs, the reform may have increased firms' incentives to convert these relationships into OE contracts.

We estimate these effects using Equation 9, focusing on transitions from self-employment to both OE and ST contracts. In the analysis for age 30, the treatment indicator compares workers aged 30 or younger to those just above the threshold. For age 45, we compare workers aged 47 to those aged 40. The set of control variables is identical to that used in Section 5.3.2.

Table C10: Assessing Parallel Trends

	Slope	M	%
	Panel A: 30-age-notch		
Employment			
OE low-cost	0.000	0.001	667.2
OE all	0.001	0.001	264.3
Ever OE low-cost	0.000	5.3	–
ST share	0.0002	0.0007	316
Transitions			
ST to Low-Cost OE	0.001	0.013	1077.0
ST to OE	0.084	0.038	45.0
Low-Cost OE to High-Cost	0.007	0.005	67.9
Wage Incidence			
Wage	0.000	0.001	131.4
	Panel B: 45-age-notch		
Transitions			
ST to low-cost OE (same employer)	0.002	0.002	100.0
ST to high-cost OE (same employer)	0.017	0.003	17.6
ST to low-cost OE	0.002	0.004	200.0
ST to high-cost OE	0.004	0.002	50.0
Employment			
OE low-cost	0.019	0.032	168.4
OE high-cost	0.163	0.000	0.0
ST	0.132	0.020	15.1
Wages			
Wage (workers stay same job)	0.000	0.0020	13888.0
Wage (all workers)	0.004	0.0020	54.8

Notes: The table reports the estimated linear pre-trend slope from the event-study coefficients over periods 8 to 1, together with the calibrated M. The calibrated M corresponds to the minimum bound on post-treatment deviations from parallel trends required for the estimated effect to lose statistical significance under the Honest DiD sensitivity analysis. Column (3) expresses this bound as a percentage of the estimated pre-treatment slope. Each panel corresponds to the outcome variables analyzed in Tables 1, 3, and 12. For presentation purposes, coefficients are rounded to three decimal places.

Table C11: Transitions from Self-Employment to Wage-Employment

	(1) Transition to OE	(2) Transition to ST
	Panel A: 30-age-notch	
Treatment × Post	0.004	0.001
	(0.004)	(0.005)
Observations	8,852,257	8,852,257
	Panel B: 45-age-notch	
Treatment × Post	-0.003	-0.018**
	(0.011)	(0.007)
Observations	744,975	744,975

Notes: The table present DiD estimates of transitions from self-employment to wage employment. All estimates are multiplied by 100 and can therefore be interpreted in percentage points. Panel A considers workers aged 18-35 and Column (1) presents transitions from self-employment to OE contracts, and Column (2) transitions from self-employment to ST contracts. Panel B repeats the same exercise but compares workers aged 40 and 47. * significant at the 10% level; ** at the 5% level; *** at the 1% level.

C.18 Permanent contracts 45-age-notch

As a complementary exercise, we estimate a specification that exploits cross-sector variation in the incidence of ST contracts across age groups, in the spirit of the baseline design in Section 5.2.1. Specifically, we estimate the effect of the reform on permanent employment separately for workers aged, 30-42, 40-42 and 47-50.

For each age group g, we construct a sectoral exposure measure $HighST^{g}_{s,96}$ defined analogously to our baseline measure, but using the pre-reform share of ST employment for workers in age group g in 1996. In particular, $HighST^{g}_{s,96}$ is an indicator equal to one for sectors whose ST share among workers in group g lies above the 75th percentile of the sectoral distribution and zero for sectors below the 25th percentile.[74]

We then estimate dynamic two-way fixed-effects specifications separately for each age group and outcome. The estimating equation is given by

$$Y^{g}_{st} = \alpha + \delta_s + \delta_t + \sum_{j=-8, j\neq -1}^{14} \beta^{g}_{j} \left(\mathbb{1}[t=j] \times HighST^{g}_{s,96} \right) + \sum_{j=-8}^{14} \gamma^{g}_{j} \left(\mathbb{1}[t=j] \times X_s \right) + \varepsilon^{g}_{st}. \quad (20)$$

Here, Y^{g}_{st} denotes the share of workers in sector s at time t who belong to age group g and hold permanent contracts. Outcomes are normalized by baseline employment in each sector. For the broader group of workers aged 30–42, outcomes are normalized by total employment of workers aged 30–42 in sector s in 1996, including both ST and OE contracts. For the narrower groups aged 40–42 and 47–50, outcomes are instead normalized by total employment of workers aged 40–50 in sector s in 1996, ensuring that estimates on either side of the age-45 notch are directly comparable. Sector fixed effects (δ_s) control for time-invariant sector characteristics, while time fixed effects (δ_t) absorb aggregate shocks common to all sectors. The coefficients β^{g}_{j} trace the differential evolution of outcomes between high- and low-exposure sectors for each age group g, relative to the quarter immediately preceding the reform ($j=-1$).

Results are reported in Table C12. Column (1) reports estimates for OE employment, while Column (2) reports estimates for ST employment. The estimates for OE employment are small and statistically indistinguishable from zero. Column (1) indicates that sectors with a higher initial incidence of ST contracts exhibit a modest increase in OE employment relative to the pre-policy period. However, the magnitude of the estimate is small—about one-third or less of the standard

[74] We construct each incidence indicator analogously to our main specification for young workers, although the cross-sector variation differs markedly from that observed for workers aged 18–30. For workers aged 30–42, sectors above the 75th percentile exhibit, on average 15.05% of workers in ST contracts, compared with 2.43% in sectors below the 25th percentile. In contrast, variation is substantially smaller for the older age groups. For workers aged 40–42, sectors above the 75th percentile have, on average 1.87% of workers in ST contracts, compared with 0.08% in sectors below the 25th percentile. Similarly, for workers aged 47–50, the corresponding values are 2.23% and 0.08%, respectively.

deviation of the outcome—suggesting that the effect is economically negligible.

This pattern contrasts with the results in Section 5.2.3, where we document increases in OE employment for the broader group of workers aged 30–65. A likely explanation is that policies affecting workers aged 30–42 are more difficult to capture with our sectoral exposure measure. Several of these programs targeted the long-term unemployed, making their take-up less clearly related to sectoral characteristics. In addition, baseline ST exposure varies substantially less across sectors for workers aged 30–42 than for younger workers. Finally, the programs available to workers aged 30–45 may interact with the incentives affecting younger workers. Sectors that convert more ST contracts into OE contracts among workers under 30 may also use programs for older workers more intensively as part of a broader shift toward OE employment. Because the sectoral share of ST employment among workers aged 18–30 is only imperfectly correlated with that among workers aged 30–45, the latter may not fully capture the take-up of these programs.[75]

Turning to workers aged 40–42, the estimates do not point to systematic differences in permanent employment across sectors. This absence of detectable effects reinforces the validity of using this group to evaluate labor market responses around the age-45 notch. In contrast to the patterns observed for younger workers in Section 5.2.1, we do not observe systematic sectoral differences in permanent employment for this age group.

The negative coefficients for ST employment (Column 2) should be interpreted with caution. The time-series evidence shows that ST employment increases for these age groups after the reform (Figure 3, Panel (d)). The negative estimates, therefore, do not reflect an absolute decline in ST employment. Instead, they indicate that sectors with a higher pre-reform incidence of ST contracts among these workers did not experience larger increases in ST employment relative to other sectors. In other words, sectors that relied more heavily on ST contracts prior to the reform were not the ones expanding their use of ST contracts the most during this period.

D Robustness for Young Workers

D.1 Placebo

We implement a placebo exercise by artificially shifting the reform date to the first quarter of 2003 (Table D1) and constructing the shock variable using the sectoral exposure of young workers to ST contracts measured in 2002. Under this specification, the baseline share of ST contracts is not statistically associated with subsequent employment outcomes. The estimated employment effects are generally small and imprecise, and their magnitudes represent only a minor fraction of the corresponding baseline estimates.

[75] In the baseline data, the Pearson correlation between the share of ST contracts among workers aged 18–30 and the share of ST contracts among workers aged 30–35, 35–40, 40–45, and 45–50 is 0.60, 0.50, 0.37, and 0.20, respectively.

Table C12: Sectoral Exposure and Employment Outcomes for Older Workers

	(1) Open-Ended Employment	(2) Short-Term Employment
	Panel A: Workers Aged 30–42	
$Post \times HighST_{s,96}^{30-42}$	-0.015	-0.089**
	(0.070)	(0.037)
Observations	14,559	14,559
	Panel B: Workers Aged 40–42	
$Post \times HighST_{s,96}^{40-42}$	0.010	-0.075***
	(0.028)	(0.020)
Observations	12,655	12,655
	Panel C: Workers Aged 47–50	
$Post \times HighST_{s,96}^{47-50}$	-0.001	-0.096***
	(0.019)	(0.016)
Observations	13,043	13,043

Notes: This table reports estimates from a two-way fixed-effects specification of the effects of reduced non-wage labor costs on employment outcomes, using sector and time fixed effects (Equation 1). Each panel examines the effect of baseline ST incidence for different age groups: 30–42, 40–42, and 47–50. Panel A reports results for workers aged 30–42, with outcome variables normalized by the baseline number of workers aged 30–42 in each sector. Panels B and C report results for workers aged 40–42 and 47–50, respectively, with outcomes normalized by the baseline number of workers aged 40–50 in each sector. All regressions include interactions between quarter dummies and baseline sector-level controls—average earnings, market concentration, managerial share, education, total employment, job duration, part-time share, and male share. Regressions are weighted by the number of workers in the corresponding age group and sector in the baseline year. Robust standard errors clustered at the sector level are reported; significance levels: *10%, **5%, ***1%.

A similar pattern emerges for transition outcomes. The estimated increase in transitions from ST to OE is approximately 3.7% of the magnitude observed in the main results, and the estimate for transitions to low-cost OE is likewise substantially smaller. Together, these placebo estimates suggest that the baseline results are unlikely to be driven by spurious correlations or noise in the data.

Table D1: Effects of Reform on Employment Outcomes (Placebo)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Employment Transitions					
	Short-Term to Open-Ended	Short-Term to Low-Cost OE	Short-Term to High-Cost OE	Low- to High-Cost Open-Ended	Low- to High-Cost Open-Ended (Different Firm)	Low- to High-Cost Open-Ended (Same Firm)
$Post \times \%HighST_{s,03}$	0.104	0.997	-0.852	0.480	-0.008	0.489
	(1.029)	(0.672)	(0.991)	(0.867)	(0.107)	(0.832)
Observations	13,363	13,363	13,363	13,363	13,363	13,363
	Panel B: Employment Outcomes					
	Open-Ended Low-Cost	Open-Ended High-Cost	Open-Ended (All))	Ever Low-Cost Open-Ended	Short-Term	Short-Term Employment Share
$Post \times \%HighST_{s,03}$	-0.019	-0.013	-0.035	0.015	-0.085	0.000
	(0.026)	(0.027)	(0.034)	(0.028)	(0.056)	(0.002)
Observations	14,619	14,619	14,619	14,619	14,619	14,619

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table reports placebo estimates of the policy's impact on sector-level labor market outcomes under the counterfactual assumption that the reform was implemented in the first quarter of 2003. The empirical specification follows the two-way fixed-effects model in Equation 1, including the full set of controls as well as sector and time fixed effects. All variables are constructed relative to their baseline values in 2002. Panel A uses the sectoral share of ST contracts in 2002 to examine employment outcomes, while Panel B reports results for employment transitions. All outcome variables are de-trended using the pre-shock period to remove pre-existing trends prior to the counterfactual policy date. Standard errors are clustered at the sector level. * significant at the 10% level; ** at the 5% level; *** at the 1% level.

D.2 Continuous treatment

We also explore alternative continuous treatment definitions based on the baseline distribution of ST contracts. Using the continuous treatment yields qualitatively similar results, albeit with lower precision. The specification is:

$$Y_{st} = \alpha + \delta_s + \delta_t + \beta_1 ST_{s,96} + \beta_2 Post_t + \beta_3 (ST_{s,96} \times Post_t) + \sum_{j=-8}^{14} \gamma_j \mathbb{1}[j = t] \times X_s + \varepsilon_{st}, \qquad (21)$$

where $ST_{s,96}$ is the 1996 share of 18-30-year-old workers employed on ST contracts within sector s.

Table D2: Effects of the Reform on Employment Outcomes and Transitions (Continuous shock)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Short-Term Employment and Low-Cost Open-Ended transitions					
	Short-Term to Open-Ended	Short-Term to Low-Cost OE	Short-Term to High-Cost OE	Low- to High-Cost Open-Ended	Low- to High-Cost Open-Ended (Different Firm)	Low- to High-Cost Open-Ended (Same Firm)
Post $\times \%ST_{s,96}$	10.918***	9.932***	0.985	0.695*	0.334	0.361
	(3.908)	(3.388)	(1.511)	(0.395)	(0.250)	(0.248)
Observations	31,304	31,304	31,304	31,304	31,304	31,304
	Panel B: Employment Outcomes					
	Open-Ended Low-Cost	Open-Ended (High-Cost)	Open-Ended All	Ever Low-Cost Open-Ended	Short-Term	Short-Term Employment Share
Post $\times \%ST_{s,96}$	0.322*	0.415**	0.743**	0.351*	-0.335	-0.624**
	(0.172)	(0.193)	(0.307)	(0.191)	(0.399)	(0.241)
Observations	33,839	33,839	33,839	33,839	33,839	33,839
	Panel C: Employment Transitions from Non-Employment					
	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	Non-Employment to Any OE	Non-Employment to Short-Term		
Post $\times \%ST_{s,96}$	0.213	-0.152	0.073	0.003		
	(0.158)	(0.357)	(0.330)	(0.118)		
Observations	31,304	31,304	31,304	33,451		

Notes: This table reports the effects of reduced non-wage labor costs on labor market outcomes, using sector and time fixed effects, and $ST_{s,96}$ as the main regressor. (Equation 21). Panel A shows contract transitions, Panel B employment outcomes (with Columns 5–6 detrended to remove pre-reform trends), and Panel C further explore contract transitions. All regressions include interactions between quarter dummies and baseline sector-level controls—average earnings, market concentration, managerial share, education, total employment, job duration, part-time share, and male share—and are weighted by the baseline population of young workers. Robust standard errors clustered at the sector level are reported; significance: *10%, **5%, ***1%.

D.3 Subgroups

We conduct additional robustness checks by exploiting alternative definitions of exposure and applying sample restrictions. Exposure is first redefined as the share of ST contracts among workers aged 25–30, i.e. individuals just below the eligibility cutoff. Estimates based on this measure are larger in magnitude and more precisely estimated (Table D3). We further restrict the sample to male workers to abstract from gender-specific policy provisions.

Table D3: Effects of Reform on Employment Outcomes (Robustness)

	(1) Short-Term to Open-Ended	(2) Short-Term to Low-Cost OE	(3) Short-Term to High-Cost OE	(4) Low- to High-Cost Open-Ended	(5) Low- to High-Cost Open-Ended (Different Firm)	(6) Low- to High-Cost Open-Ended (Same Firm)
				Panel A: Shock Variable 25-30		
$Post \times \%HighST_{s,96}$	1.686***	1.389***	0.298	0.150**	0.058**	0.092*
	(0.538)	(0.506)	(0.220)	(0.065)	(0.023)	(0.050)
Observations	15,174	15,174	15,174	15,174	15,174	15,174
				Panel B: Sample of Males		
$Post \times \%HighST_{s,96}$	0.510	1.169*	-0.659	0.483*	0.577***	-0.094
	(0.932)	(0.678)	(1.059)	(0.273)	(0.188)	(0.124)
Observations	15,172	15,172	15,172	15,172	15,172	15,172
	Open-Ended Low-Cost	Open-Ended High-Cost	Open-Ended (All))	Ever Low-Cost Open-Ended	Short-Term	Short-term Employment Share
				Panel C: Shock Variable 25-30		
$Post \times \%HighST_{s,96}$	0.071***	0.078**	0.150***	0.085***	-0.014	-0.167***
	(0.019)	(0.030)	(0.036)	(0.021)	(0.042)	(0.050)
Observations	16,565	16,565	16,565	16,565	16,565	16,565
				Panel D: Sample of Males		
$Post \times \%HighST_{s,96}$	0.037*	0.090**	0.128***	0.043*	-0.034	-0.115***
	(0.019)	(0.035)	(0.037)	(0.022)	(0.057)	(0.039)
Observations	16,579	16,579	16,579	16,579	16,579	16,579

Notes: This table reports the estimated effects of reduced non-wage labor costs on sector-level employment outcomes. The estimates are obtained from the two-way fixed-effects specification in Equation 1, which includes sector and time fixed effects. Panels A and C focus on workers aged 25–30, while Panels B and D restrict the sample to male workers. * denotes significance at the 10% level; ** at the 5% level; and *** at the 1% level.

D.4 Pre-1999 period

As an additional check, we re-estimate the model using only observations from before 1999 (Table D4) to eliminate potential confounding from subsequent policy expansions. While the estimated coefficients are smaller in magnitude, they remain positive and statistically significant for both low- and high-cost open-ended employment, providing further support for the stability of the main results.

Table D4: Effects of Reform on Employment Outcomes (Robustness pre 1999)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Employment Transitions					
	Short-Term to Open-Ended	Short-Term to Low-Cost OE	Short-Term to High-Cost OE	Low- to High-Cost Open-Ended	Low- to High-Cost Open-Ended (Different Firm)	Low- to High-Cost Open-Ended (Same Firm)
$Post \times \%ST_{s,96}$	1.433**	1.524**	-0.091	-0.019	0.005	-0.024
	(0.682)	(0.654)	(0.357)	(0.030)	(0.011)	(0.027)
Observations	10,720	10,720	10,720	10,720	10,720	10,720
	Panel B: Employment Outcomes					
	Open-Ended Low-Cost	Open-Ended High-Cost	Open-Ended (All))	Ever Low-Cost Open-Ended	Short-Term	Open-Ended and Short-Term
$Post \times \%ST_{s,96}$	0.038***	0.047	0.086*	0.042***	-0.048	0.017
	(0.011)	(0.045)	(0.046)	(0.011)	(0.061)	(0.101)
Observations	11,755	11,755	11,755	11,755	11,755	11,755

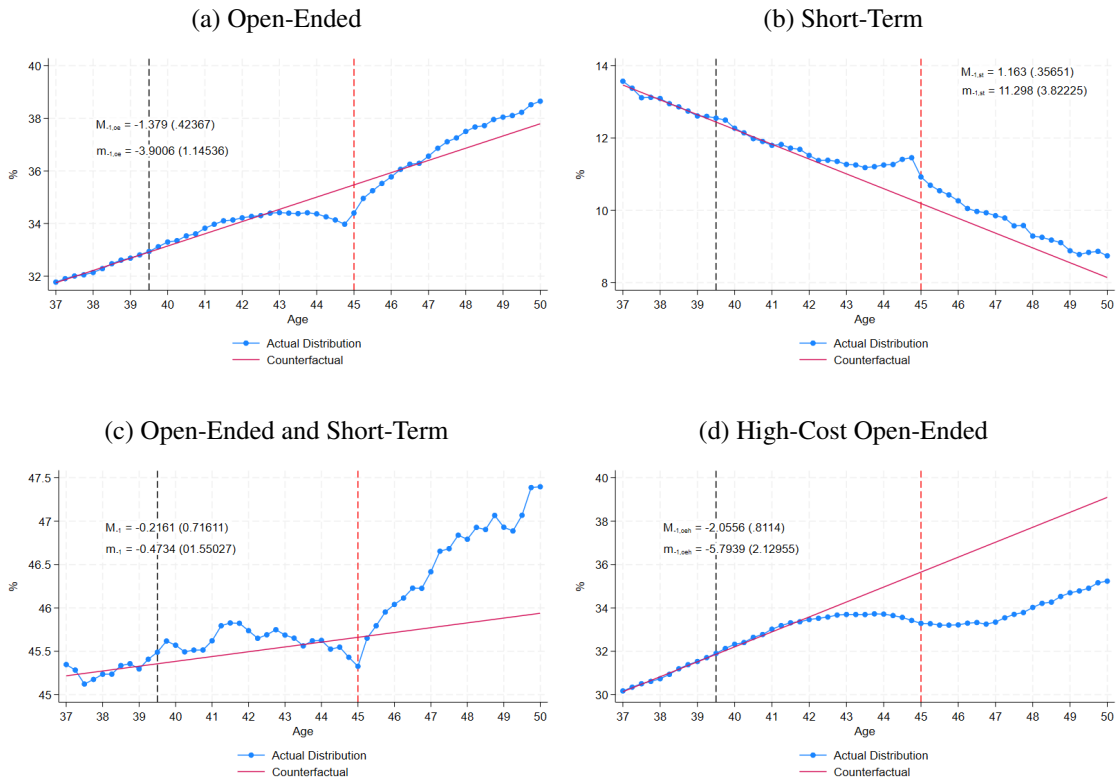
Notes: This table presents the estimated effects of reduced non-wage labor costs on sector-level labor market outcomes. Estimates are obtained using the difference-in-differences specification in Equation 1, which includes sector and time fixed effects. The sample is limited to the pre-1999 period to exclude later policy extensions. Panel A presents results on employment transitions and Panel B employment outcomes. * significant at 10%; ** significant at 5%; *** significant at 1%.

E Robustness for Above-45 Workers

E.1 Changing counterfactual bounds

This section presents robustness analyses for the results near the notch reported in Section 5.3.1. Specifically, we consider alternative choices of bounds when constructing the counterfactual distribution, as described below. The results remain robust across these alternative specifications.

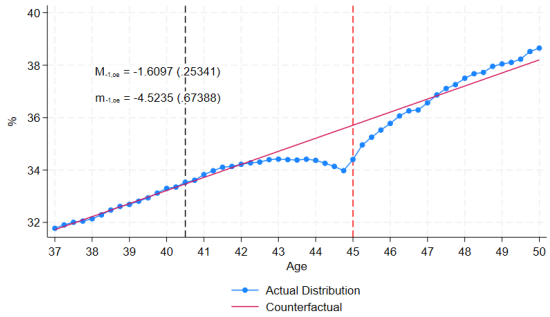
Figure E1: Empirical and Counterfactual Distributions (Based on Ages 37-39.5)



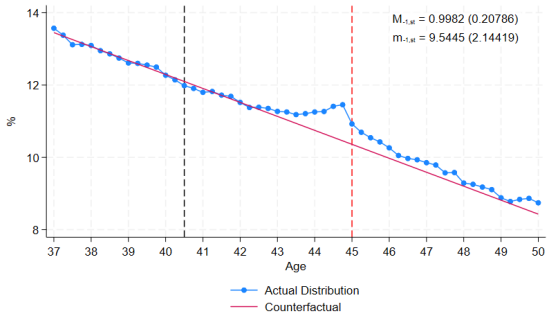
Notes: The figures show the empirical distribution of employment (blue dots) and the respective counterfactual distribution (red solid line). The counterfactual is estimated by fitting a linear polynomial to the empirical distribution in the ages between 37 and 39.5. Panel (a) depicts open-ended employment, panel (b) short-term employment, panel (c) joint open-ended and short-term employment, and panel (d) high-cost open-ended employment. The figures also display the employment measures $M_{j,k}$ and $m_{j,k}$, where $j = -1$ is for workers at most one quarter away from the threshold at 45 and k is each contract type, as explained in section 5.3.1. The black-dashed line shows the last age bin used to build the counterfactual. The red-dashed line represents the labor cost notch.

Figure E2: Empirical and Counterfactual Distributions (Based on Ages 37-40.5)

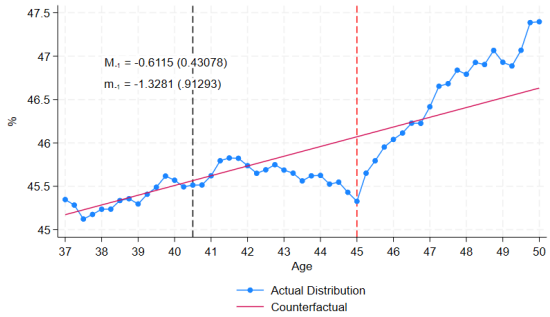
(a) Open-Ended



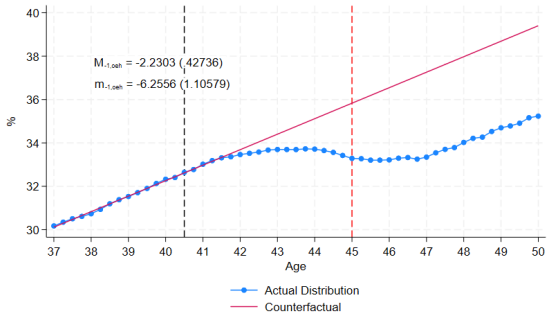
(b) Short-Term



(c) Open-Ended and Short-Term



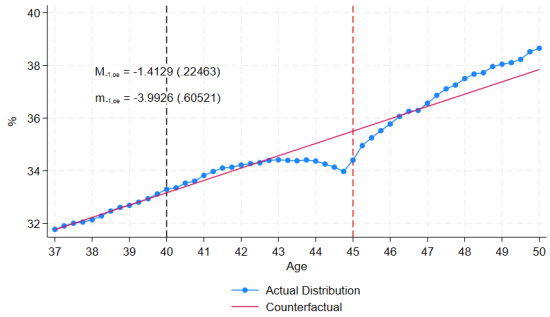
(d) High-Cost Open-Ended



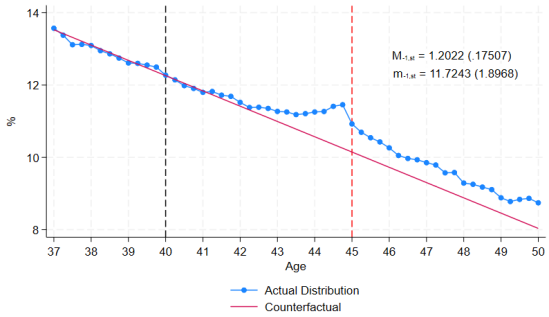
Notes: The figures show the empirical distribution of employment (blue dots) and the respective counterfactual distribution (red solid line). The counterfactual is estimated by fitting a linear polynomial to the empirical distribution in the ages between 37 and 40.5. Panel (a) depicts open-ended employment, panel (b) short-term employment, panel (c) joint open-ended and short-term employment, and panel (d) high-cost open-ended employment. The figures also display the employment measures $M_{j,k}$ and $m_{j,k}$, where $j = -1$ is for workers at most one quarter away from the threshold at 45 and k is each contract type, as explained in section 5.3.1. The black-dashed line shows the last age bin used to build the counterfactual. The red-dashed line represents the labor cost notch.

Figure E3: Empirical and Counterfactual Distributions (Based on Ages 36.5-40)

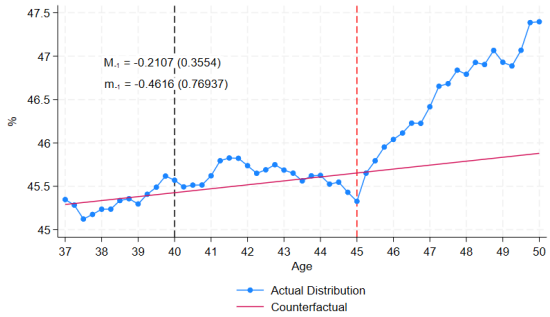
(a) Open-Ended



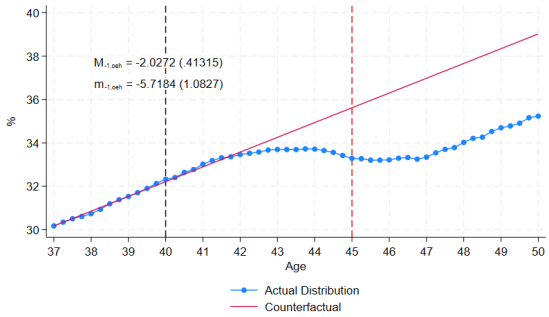
(b) Short-Term



(c) Open-Ended and Short-Term



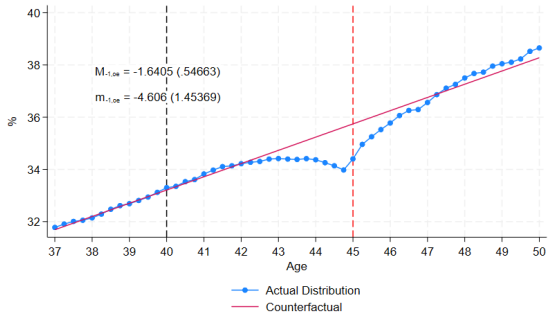
(d) High-Cost Open-Ended



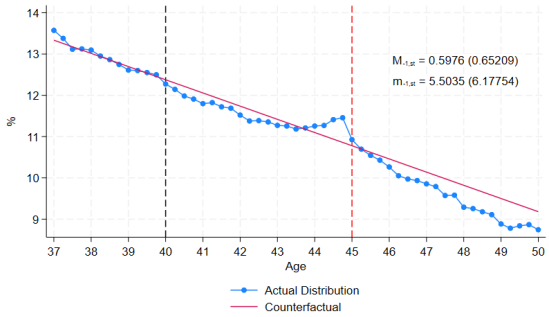
Notes: The figures show the empirical distribution of employment (blue dots) and the respective counterfactual distribution (red solid line). The counterfactual is estimated by fitting a linear polynomial to the empirical distribution in the ages between 36.5 and 40. Panel (a) depicts open-ended employment, panel (b) short-term employment, panel (c) joint open-ended and short-term employment, and panel (d) high-cost open-ended employment. The figures also display the employment measures $M_{j,k}$ and $m_{j,k}$, where $j = -1$ is for workers at most one quarter away from the threshold at 45 and k is each contract type, as explained in section 5.3.1. The black-dashed line shows the last age bin used to build the counterfactual. The red-dashed line represents the labor cost notch.

Figure E4: Empirical and Counterfactual Distributions (Based on Ages 37.5-40)

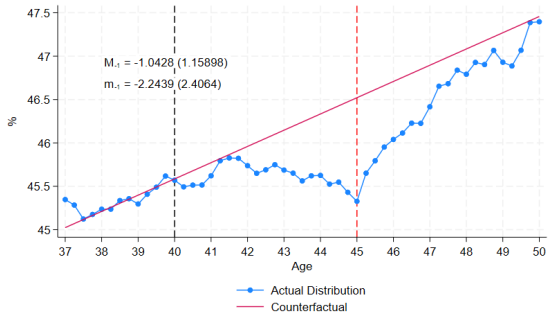
(a) Open-Ended



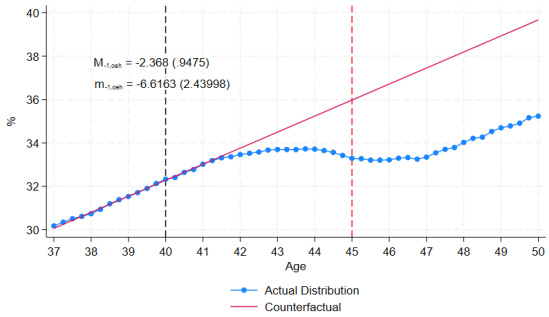
(b) Short-Term



(c) Open-Ended and Short-Term



(d) High-Cost Open-Ended



Notes: The figures show the empirical distribution of employment (blue dots) and the respective counterfactual distribution (red solid line). The counterfactual is estimated by fitting a linear polynomial to the empirical distribution in the ages between 37.5 and 40. Panel (a) depicts open-ended employment, panel (b) short-term employment, panel (c) joint open-ended and short-term employment, and panel (d) high-cost open-ended employment. The figures also display the employment measures $M_{j,k}$ and $m_{j,k}$, where $j = -1$ is for workers at most one quarter away from the threshold at 45 and k is each contract type, as explained in section 5.3.1. The black-dashed line shows the last age bin used to build the counterfactual. The red-dashed line represents the labor cost notch.

E.2 Employment Effects Far from Notch: Different Age Groups, Men and Women, and Before 1999

This section presents robustness analyses for the main results on above-45 workers reported in Table 3, using alternative comparison groups and sample restrictions. Table E1 compares workers aged 47–48 to those aged 40–41 while restricting the post-policy window to six quarters. The estimates remain closely aligned with the baseline specification, continuing to indicate a substitution of low-cost OE contracts for high-cost OE contracts following the policy implementation.

Similarly, Tables E2 and E3 report results estimated separately for male and female workers. The patterns are consistent across genders, although the effects are somewhat stronger for men.

Finally, Tables E4, E5, and E6 vary the comparison age groups. The results remain largely unaffected, confirming that the findings are not sensitive to the specific age thresholds used in the baseline design.

Table E1: Effects on Transitions and Employment, Short Post Period. Workers 47-48 and 40-41 years old.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment x Post	-0.009	0.111***	-0.120***	
	(0.027)	(0.007)	(0.025)	
Observations	461,286	461,286	461,286	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment x Post	0.016	0.146***	-0.130***	
	(0.036)	(0.006)	(0.034)	
Observations	461,286	461,286	461,286	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment x Post	0.158**	0.140***	0.018	
	(0.050)	(0.021)	(0.043)	
Observations	461,286	461,286	461,286	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.195	1.237***	-1.008***	-0.677**
	(0.247)	(0.026)	(0.234)	(0.266)
Observations	461,286	461,286	461,286	461,286
	Panel E: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.225**	0.347***	-0.122	-0.134
	(0.086)	(0.024)	(0.076)	(0.075)
Observations	461,286	461,286	461,286	461,286
	Panel F: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.321***	0.089***	0.234**	-0.081
	(0.082)	(0.005)	(0.076)	(0.090)
Observations	461,286	461,286	461,286	461,286

Notes: The table shows the effects of the lower non-wage labor costs on several labor market variables. *Above*45 is equal to 1 for workers aged 47-48, and 0 for workers aged 40-41. The estimation period includes data from 4 quarters before treatment and 6 after it. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel A focuses on transitions from a short-term contract to an open-ended with the same employer, whereas panel B shows it for any employer. Panel C shows the effects on transitions from non-employment. Panel D reports the results for employment on open-ended and short-term contracts. Panels E and F display the results for transitions in and out of open-ended and short-term contracts, respectively. Standard errors clustered at the worker's age level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table E2: Effects on Transitions and Employment. Workers 47-48 and 40-41 years old. Men.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment x Post	-0.048	0.146***	-0.193***	
	(0.036)	(0.021)	(0.033)	
Observations	421,493	421,493	421,493	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment x Post	-0.048	0.212***	-0.260***	
	(0.052)	(0.021)	(0.045)	
Observations	421,493	421,493	421,493	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment x Post	0.143**	0.182***	-0.040	
	(0.051)	(0.016)	(0.047)	
Observations	421,493	421,493	421,493	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.344	2.651***	-2.261***	-1.061***
	(0.258)	(0.033)	(0.246)	(0.204)
Observations	421,493	421,493	421,493	421,493
	Panel E: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.244*	0.497***	-0.253*	-0.097
	(0.124)	(0.019)	(0.117)	(0.073)
Observations	421,493	421,493	421,493	421,493
	Panel F: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.272*	0.240***	0.036	-0.101
	(0.146)	(0.007)	(0.139)	(0.097)
Observations	421,493	421,493	421,493	421,493

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table shows the effects of the lower non-wage labor costs on several labor market variables for men. *Above*45 is equal to 1 for workers aged 47-48, and 0 for workers aged 40-41. The estimation period includes data from 4 quarters before treatment and 12 after it. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel A focuses on transitions from a short-term contract to an open-ended with the same employer, whereas panel B shows it for any employer. Panel C shows the effects on transitions from non-employment. Panel D reports the results for employment on open-ended and short-term contracts. Panels E and F display the results for transitions in and out of open-ended and short-term contracts, respectively. Standard errors clustered at the worker's age level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table E3: Effects on Transitions and Employment. Workers 47-48 and 40-41 years old. Women.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment x Post	0.020	0.104***	-0.084**	
	(0.022)	(0.017)	(0.026)	
Observations	323,319	323,319	323,319	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment x Post	0.051	0.133***	-0.081*	
	(0.044)	(0.011)	(0.043)	
Observations	323,319	323,319	323,319	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment x Post	0.124	0.144***	-0.020	
	(0.081)	(0.009)	(0.075)	
Observations	323,319	323,319	323,319	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.287	1.519***	-1.214***	-0.413
	(0.193)	(0.054)	(0.208)	(0.227)
Observations	323,319	323,319	323,319	323,319
	Panel E: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.265***	0.310***	-0.045	-0.043
	(0.072)	(0.012)	(0.063)	(0.072)
Observations	323,319	323,319	323,319	323,319
	Panel F: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.562***	0.101***	0.467***	-0.035
	(0.111)	(0.009)	(0.111)	(0.068)
Observations	323,319	323,319	323,319	323,319

Notes: The table shows the effects of the lower non-wage labor costs on several labor market variables for women. *Above*45 is equal to 1 for workers aged 47-48, and 0 for workers aged 40-41. The estimation period includes data from 4 quarters before treatment and 12 after it. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel A focuses on transitions from a short-term contract to an open-ended with the same employer, whereas panel B shows it for any employer. Panel C shows the effects on transitions from non-employment. Panel D reports the results for employment on open-ended and short-term contracts. Panels E and F display the results for transitions in and out of open-ended and short-term contracts, respectively. Standard errors clustered at the worker's age level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table E4: Effects on Transitions and Employment. Workers 48-49 and 40-41 years old.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment x Post	-0.011	0.124***	-0.136***	
	(0.021)	(0.008)	(0.017)	
Observations	739,216	739,216	739,216	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment x Post	0.024	0.175***	-0.152***	
	(0.024)	(0.007)	(0.022)	
Observations	739,216	739,216	739,216	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment x Post	0.094*	0.151***	-0.057	
	(0.048)	(0.008)	(0.042)	
Observations	739,216	739,216	739,216	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.327	2.167***	-1.801***	-1.340***
	(0.215)	(0.021)	(0.219)	(0.107)
Observations	739,216	739,216	739,216	739,216
	Panel E: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.189**	0.394***	-0.205***	-0.109***
	(0.068)	(0.013)	(0.060)	(0.014)
Observations	739,216	739,216	739,216	739,216
	Panel F: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.283***	0.190***	0.096	-0.263***
	(0.073)	(0.013)	(0.067)	(0.061)
Observations	739,216	739,216	739,216	739,216

Notes: The table shows the effects of the lower non-wage labor costs on several labor market variables. *Above*45 is equal to 1 for workers aged 48-49, and 0 for workers aged 40-41. The estimation period includes data from 4 quarters before treatment and 12 after it. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel A focuses on transitions from a short-term contract to an open-ended with the same employer, whereas panel B shows it for any employer. Panel C shows the effects on transitions from non-employment. Panel D reports the results for employment on open-ended and short-term contracts. Panels E and F display the results for transitions in and out of open-ended and short-term contracts, respectively. Standard errors clustered at the worker's age level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table E5: Effects on Transitions and Employment. Workers 48-49 and 41-42 years old.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment x Post	-0.058**	0.116***	-0.173***	
	(0.022)	(0.008)	(0.020)	
Observations	579,321	579,321	579,321	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment x Post	-0.044	0.167***	-0.212***	
	(0.024)	(0.007)	(0.022)	
Observations	579,321	579,321	579,321	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment x Post	0.054	0.146***	-0.092*	
	(0.046)	(0.008)	(0.040)	
Observations	579,321	579,321	579,321	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	-0.102	2.213***	-2.283***	-1.151***
	(0.153)	(0.023)	(0.140)	(0.066)
Observations	579,321	579,321	579,321	579,321
	Panel E: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.082	0.378***	-0.296***	-0.006
	(0.059)	(0.013)	(0.052)	(0.040)
Observations	579,321	579,321	579,321	579,321
	Panel F: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.205	0.181***	0.028	-0.067
	(0.120)	(0.012)	(0.118)	(0.048)
Observations	579,321	579,321	579,321	579,321

Notes: The table shows the effects of the lower non-wage labor costs on several labor market variables. *Above*45 is equal to 1 for workers aged 48-49, and 0 for workers aged 41-42. The estimation period includes data from 4 quarters before treatment and 12 after it. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel A focuses on transitions from a short-term contract to an open-ended with the same employer, whereas panel B shows it for any employer. Panel C shows the effects on transitions from non-employment. Panel D reports the results for employment on open-ended and short-term contracts. Panels E and F display the results for transitions in and out of open-ended and short-term contracts, respectively. Standard errors clustered at the worker's age level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

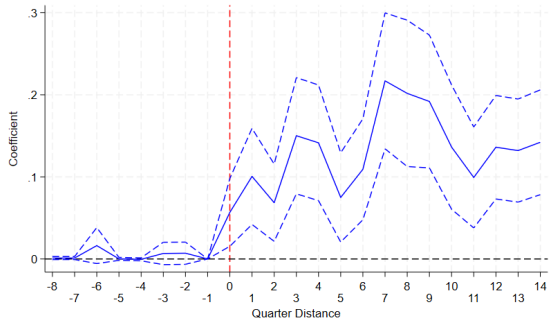
Table E6: Effects on Transitions and Employment. Workers 47-48 and 41-42 years old.

	(1)	(2)	(3)	(4)
	Panel A: Transitions to Open-Ended			
	Short-term to Open-Ended (Same Employer)	Short-term to Low-Cost OE (Same Employer)	Short-term to High-Cost OE (Same Employer)	
Treatment x Post	-0.060**	0.120***	-0.180***	
	(0.024)	(0.011)	(0.024)	
Observations	584,039	584,039	584,039	
	Panel B: Transitions to Open-Ended			
	Short-term to Open-Ended (Any Employer)	Short-term to Low-Cost OE (Any Employer)	Short-term to High-Cost OE (Any Employer)	
Treatment x Post	-0.067*	0.172***	-0.238***	
	(0.031)	(0.009)	(0.028)	
Observations	584,039	584,039	584,039	
	Panel C: Employment Transitions from Non-Employment			
	Non-Employment to Open-Ended	Non-Employment to Low-Cost OE	Non-Employment to High-Cost OE	
Treatment x Post	0.097*	0.162***	-0.065	
	(0.045)	(0.012)	(0.036)	
Observations	584,039	584,039	584,039	
	Panel D: Employment Variables			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	-0.278	2.229***	-2.481***	-0.434*
	(0.161)	(0.040)	(0.143)	(0.192)
Observations	584,039	584,039	584,039	584,039
	Panel E: Hires			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.159*	0.406***	-0.247***	0.028
	(0.077)	(0.012)	(0.069)	(0.062)
Observations	584,039	584,039	584,039	584,039
	Panel F: Separations			
	Open-Ended All	Open-Ended Low-Cost	Open-Ended High-Cost	Short-Term
Treatment x Post	0.299**	0.173***	0.131	0.133*
	(0.121)	(0.004)	(0.119)	(0.064)
Observations	584,039	584,039	584,039	584,039

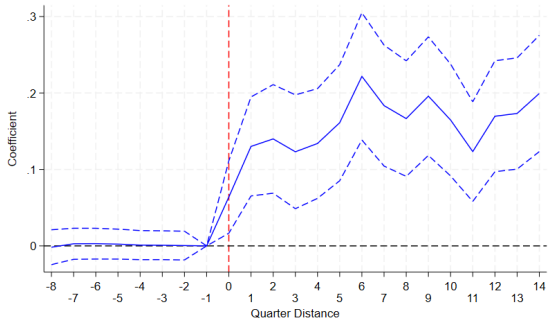
Notes: The table shows the effects of the lower non-wage labor costs on several labor market variables. *Above*45 is equal to 1 for workers aged 47-48, and 0 for workers aged 41-42. The estimation period includes data from 4 quarters before treatment and 12 after it. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel A focuses on transitions from a short-term contract to an open-ended with the same employer, whereas panel B shows it for any employer. Panel C shows the effects on transitions from non-employment. Panel D reports the results for employment on open-ended and short-term contracts. Panels E and F display the results for transitions in and out of open-ended and short-term contracts, respectively. Standard errors clustered at the worker's age level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Figure E5: Effects of the Reform on Employment Transitions, 40-41 and 48-49

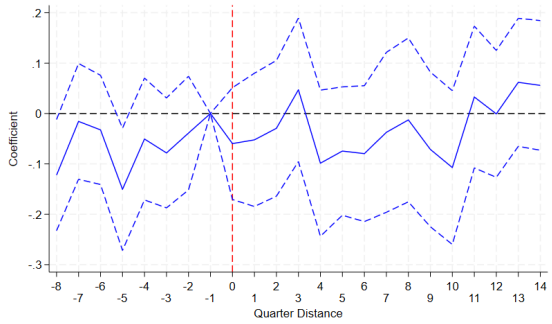
(a) Short-Term to Open-Ended (Low-Cost) (Same Employer)



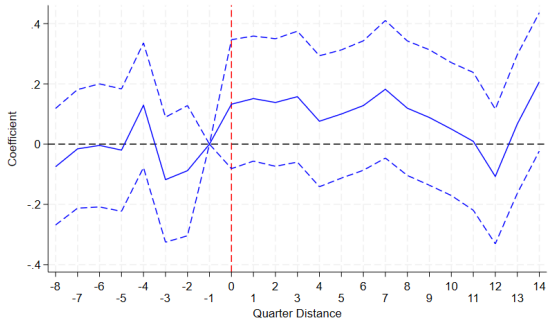
(b) Non-Employment to Open-Ended (Low-Cost)



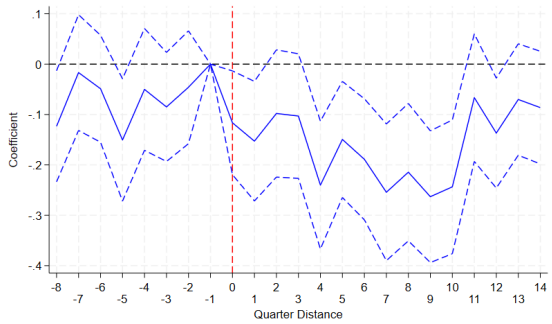
(c) Short-Term to Open-Ended (Same Employer)



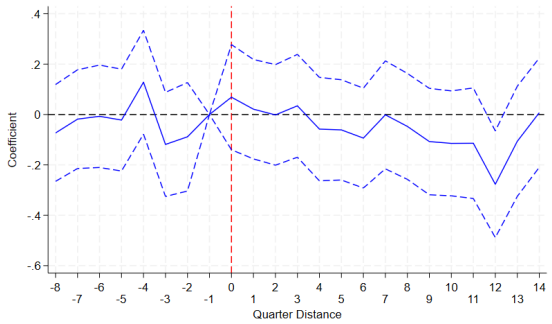
(d) Non-Employment to Open-Ended



(e) Short-Term to Open-Ended (High-Cost) (Same Employer)



(f) Non-Employment to Open-Ended (High-Cost)

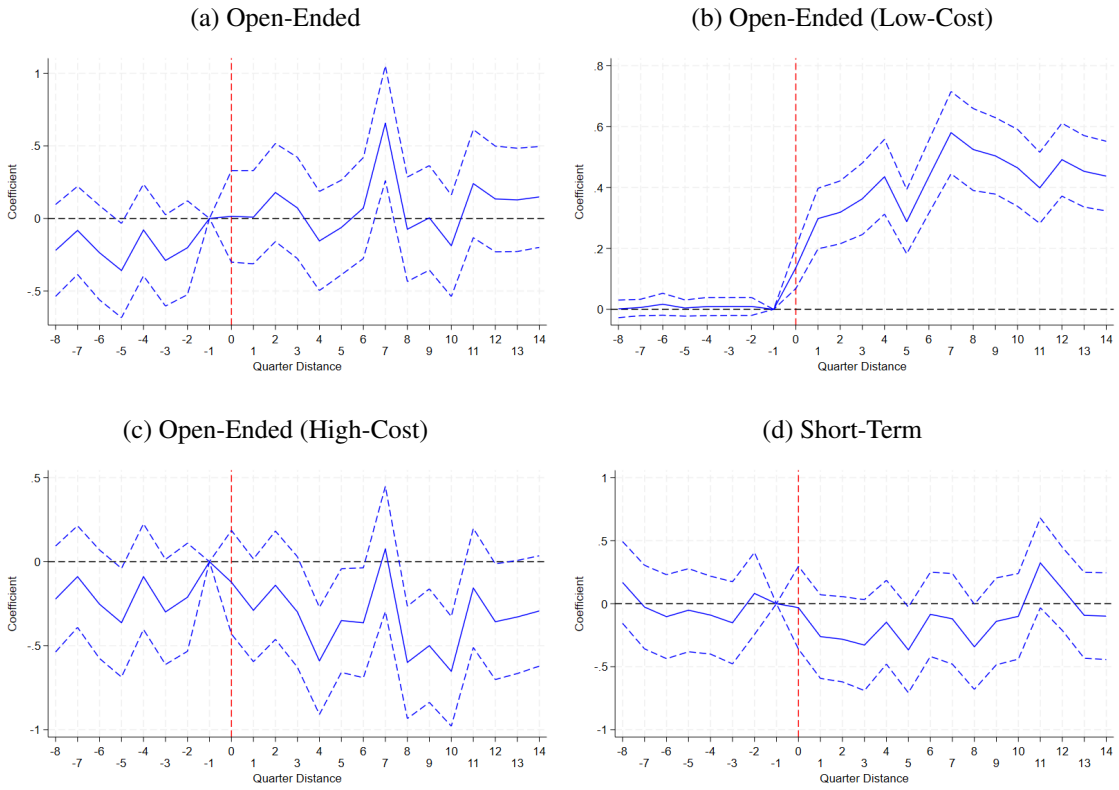


Notes: The figure shows the event-studies that analyze the effect on marginal open-ended jobs. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panels (a), (c) and (e) display short-term conversions with the same employer: towards a low-cost open-ended contract (a), towards any type of open-ended contract (c), and towards high-cost open-ended contracts (e). Panels (b), (d) and (f) depict transitions from non-employment to low-cost open-ended contracts (b), towards any type of open-ended contract (d), and towards high-cost open-ended contracts (f). The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E6: Effects of the Reform on Employment Outcomes, 40-41 and 48-49

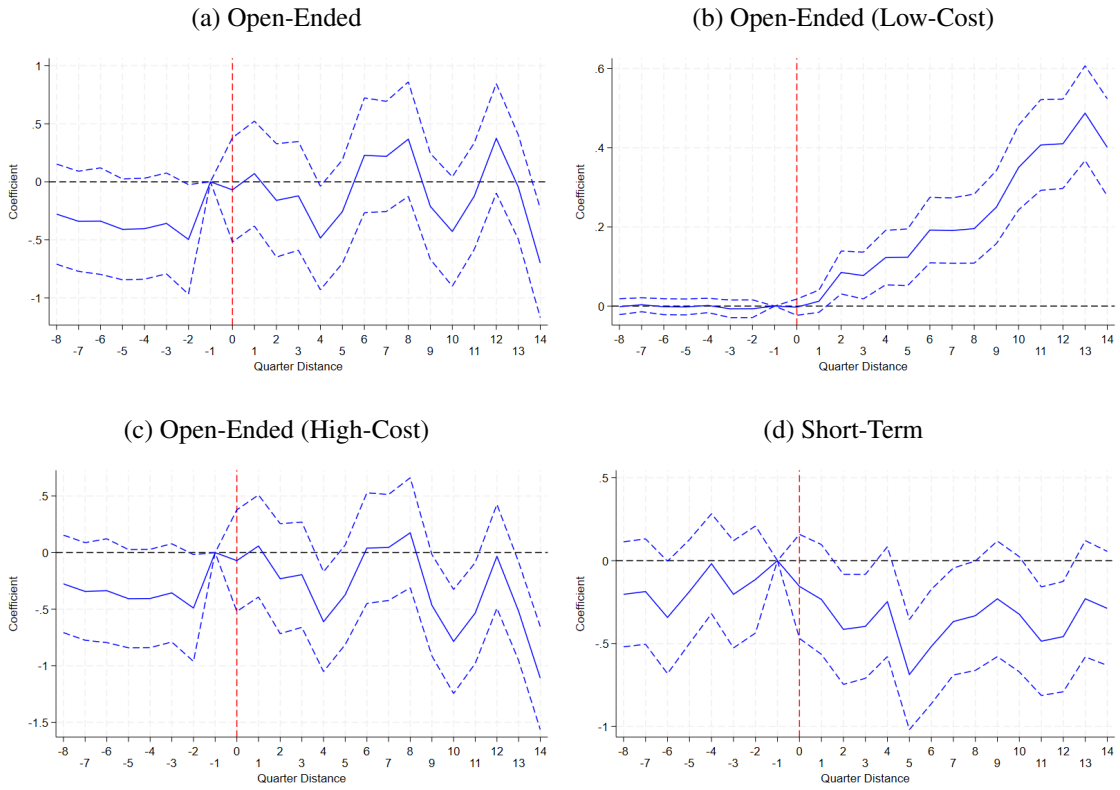
Notes: The figure shows the event-studies that analyze the employment effects. The specification is Equation 10. In panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for open-ended employment, panel (b) for open-ended employment in low-cost contracts, panel (c) for open-ended employment in high-cost contracts, and panel (d) for short-term employment. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E7: Effects of the Reform on Hiring, 40-41 and 48-49



Notes: The figure shows the event-studies that analyze the effects on hires. The specification is Equation 10. In panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for entries into open-ended contracts, panel (b) for entries into open-ended low-cost contracts, panel (c) for entries into open-ended high-cost contracts, and panel (d) for entries into short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

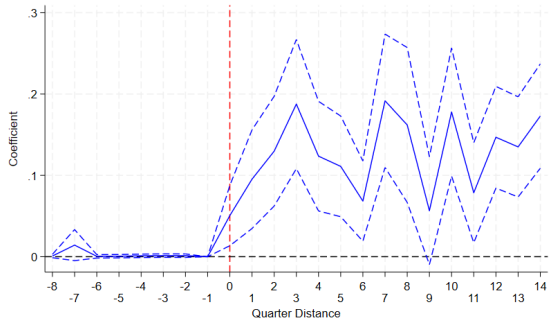
Figure E8: Effects of the Reform on Separations, 40-41 and 48-49



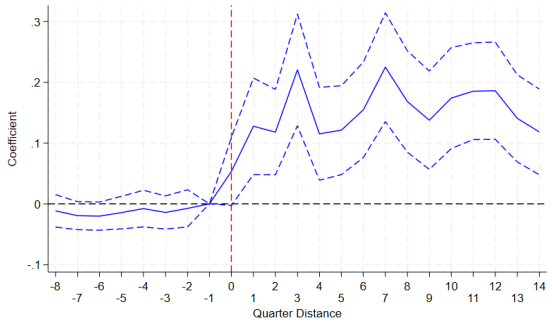
Notes: The figure shows the event-studies that analyze the effects on separations. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for exits from open-ended contracts, panel (b) for exits from open-ended low-cost contracts, panel (c) for exits from open-ended high-cost contracts, and panel (d) for exits from short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E9: Effects of the Reform on Employment Transitions, 41-42 and 47-48

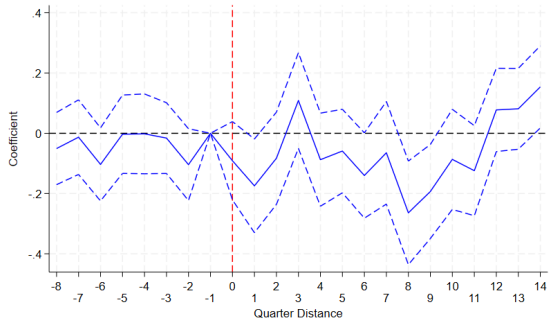
(a) Short-Term to Open-Ended (Low-Cost) (Same Employer)



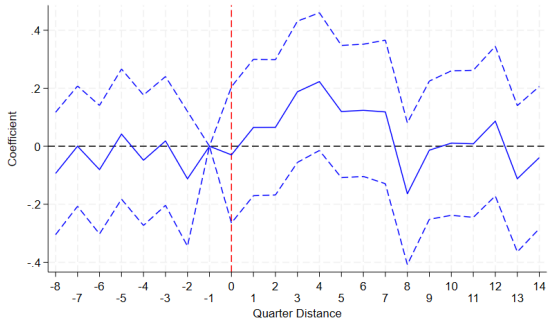
(b) Non-Employment to Open-Ended (Low-Cost)



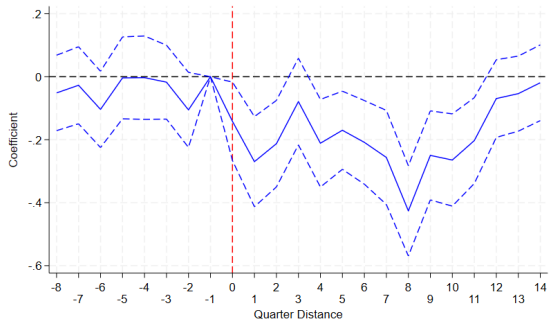
(c) Short-Term to Open-Ended (Same Employer)



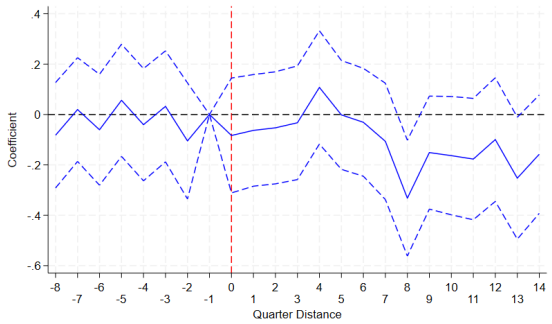
(d) Non-Employment to Open-Ended



(e) Short-Term to Open-Ended (High-Cost) (Same Employer)



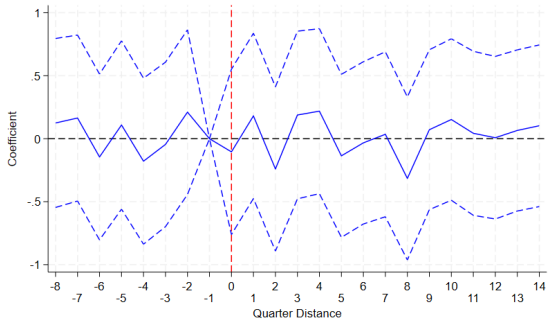
(f) Non-Employment to Open-Ended (High-Cost)



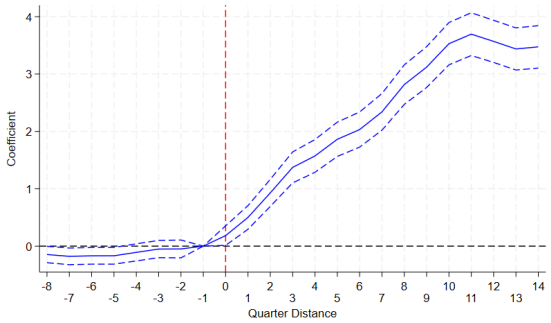
Notes: The figure shows the event-studies that analyze the effect on marginal open-ended jobs. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panels (a), (c) and (e) display short-term conversions with the same employer: towards a low-cost open-ended contract (a), towards any type of open-ended contract (c), and towards high-cost open-ended contracts (e). Panels (b), (d) and (f) depict transitions from non-employment to low-cost open-ended contracts (b), towards any type of open-ended contract (d), and towards high-cost open-ended contracts (f). The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E10: Effects of the Reform on Employment Outcomes, 41-42 and 47-48

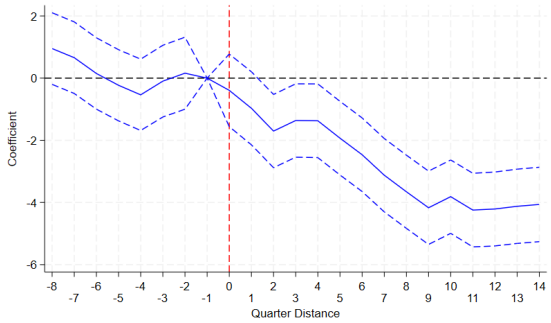
(a) Open-Ended Employment



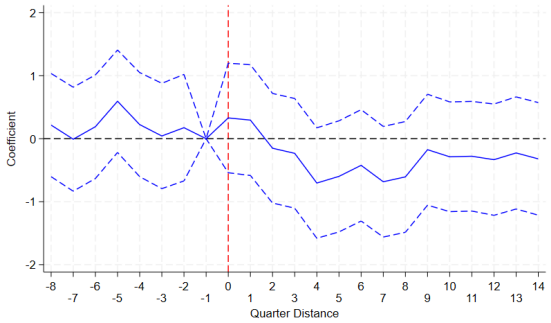
(b) Open-Ended (Low-Cost) Employment



(c) Open-Ended (High-Cost) Employment

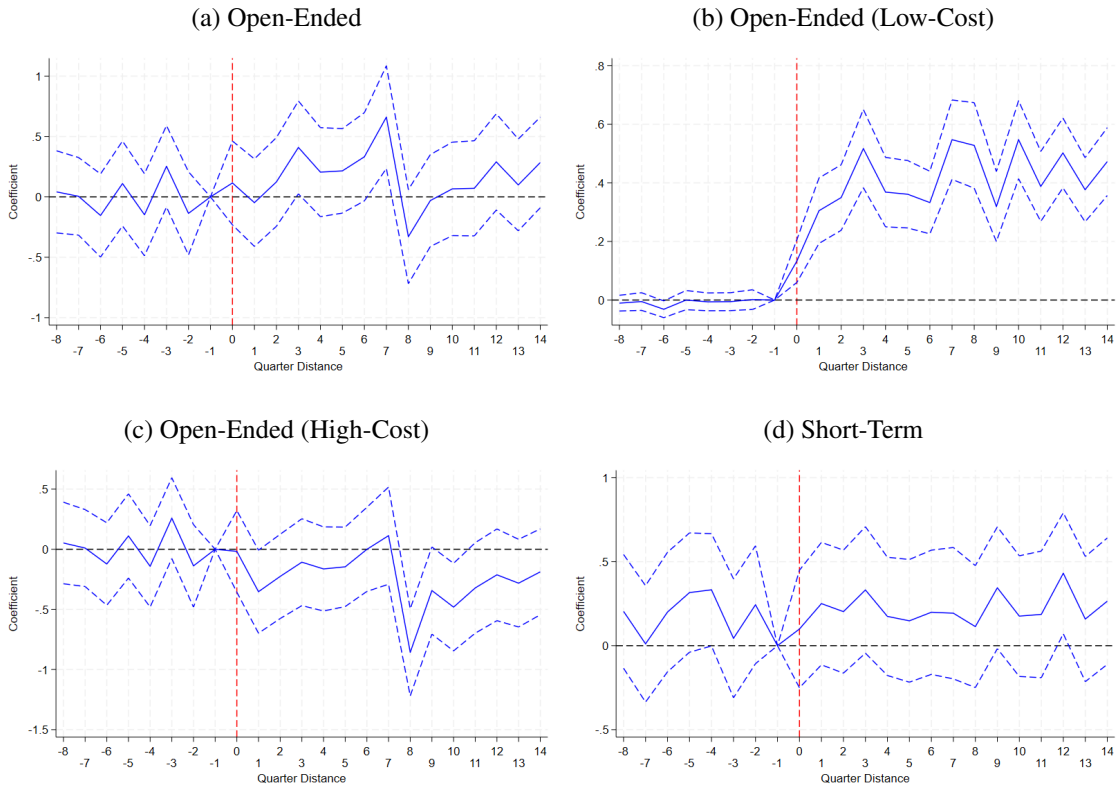


(d) Short-Term Employment



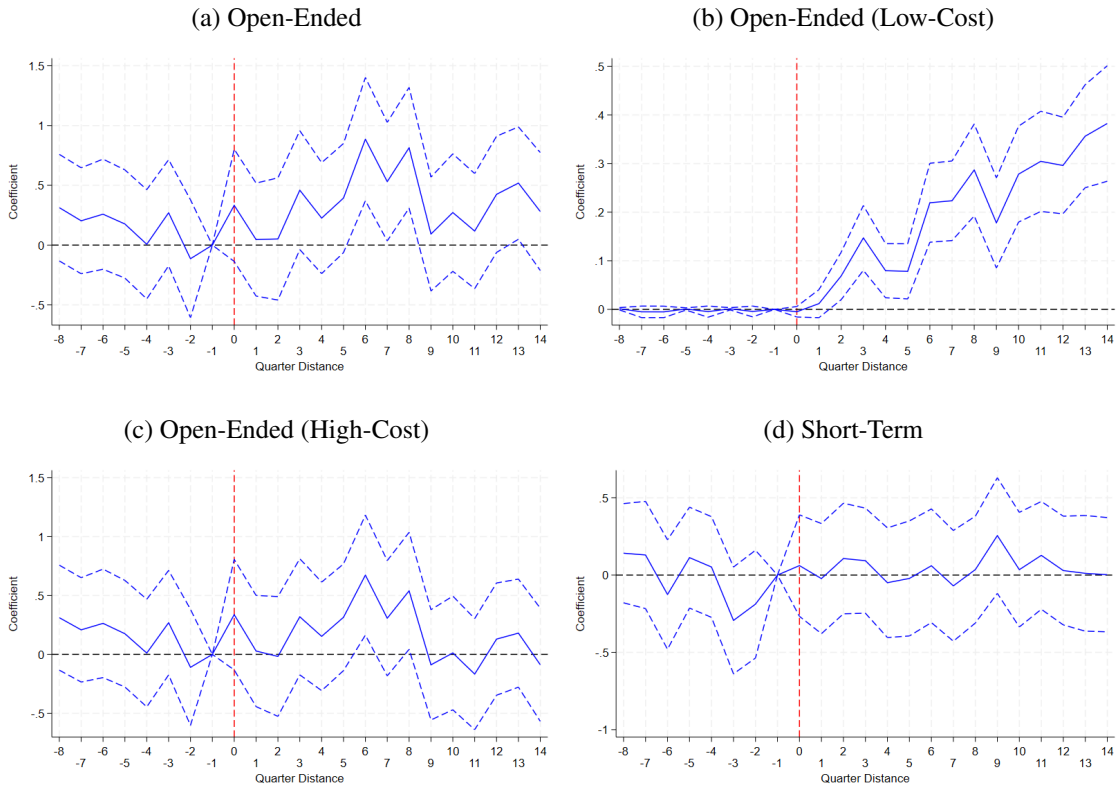
Notes: The figure shows the event-studies that analyze the employment effects. The specification is Equation 10. In panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for open-ended employment, panel (b) for open-ended employment in low-cost contracts, panel (c) for open-ended employment in high-cost contracts, and panel (d) for short-term employment. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E11: Effects of the Reform on Hiring, 41-42 and 47-48



Notes: The figure shows the event-studies that analyze the effects on hires. The specification is Equation 10. In panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for entries into open-ended contracts, panel (b) for entries into open-ended low-cost contracts, panel (c) for entries into open-ended high-cost contracts, and panel (d) for entries into short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

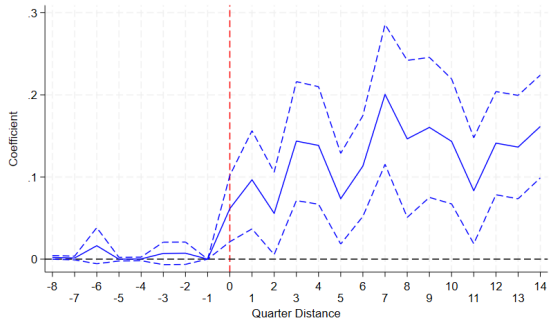
Figure E12: Effects of the Reform on Separations, 41-42 and 47-48



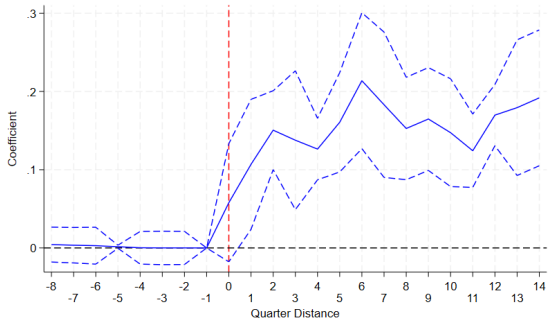
Notes: The figure shows the event-studies that analyze the effects on separations. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for exits from open-ended contracts, panel (b) for exits from open-ended low-cost contracts, panel (c) for exits from open-ended high-cost contracts, and panel (d) for exits from short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E13: Effects of the Reform on Employment Transitions, 41-42 and 48-49

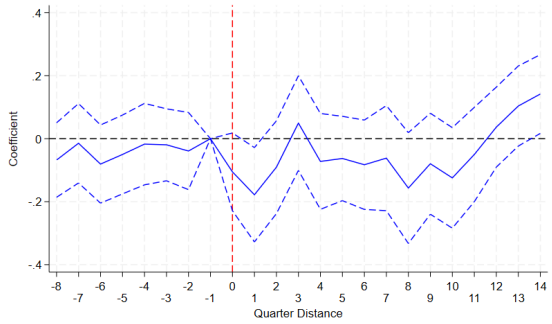
(a) Short-Term to Open-Ended (Low-Cost) (Same Employer)



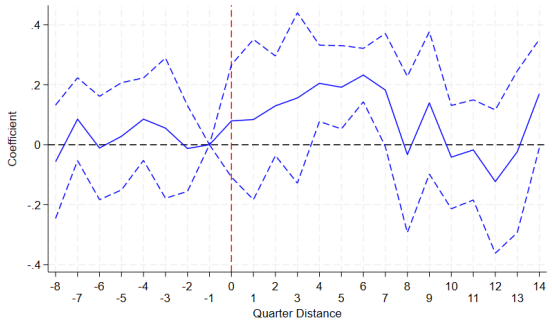
(b) Non-Employment to Open-Ended (Low-Cost)



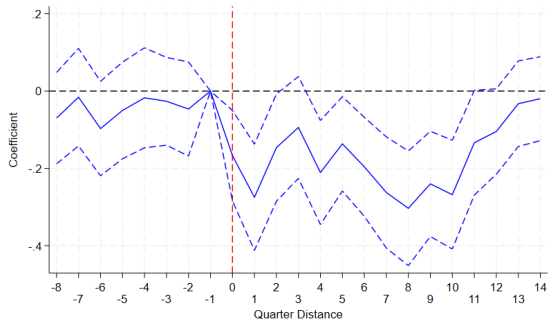
(c) Short-Term to Open-Ended (Same Employer)



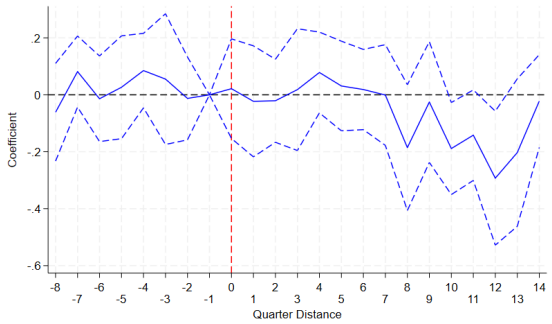
(d) Non-Employment to Open-Ended



(e) Short-Term to Open-Ended (High-Cost) (Same Employer)

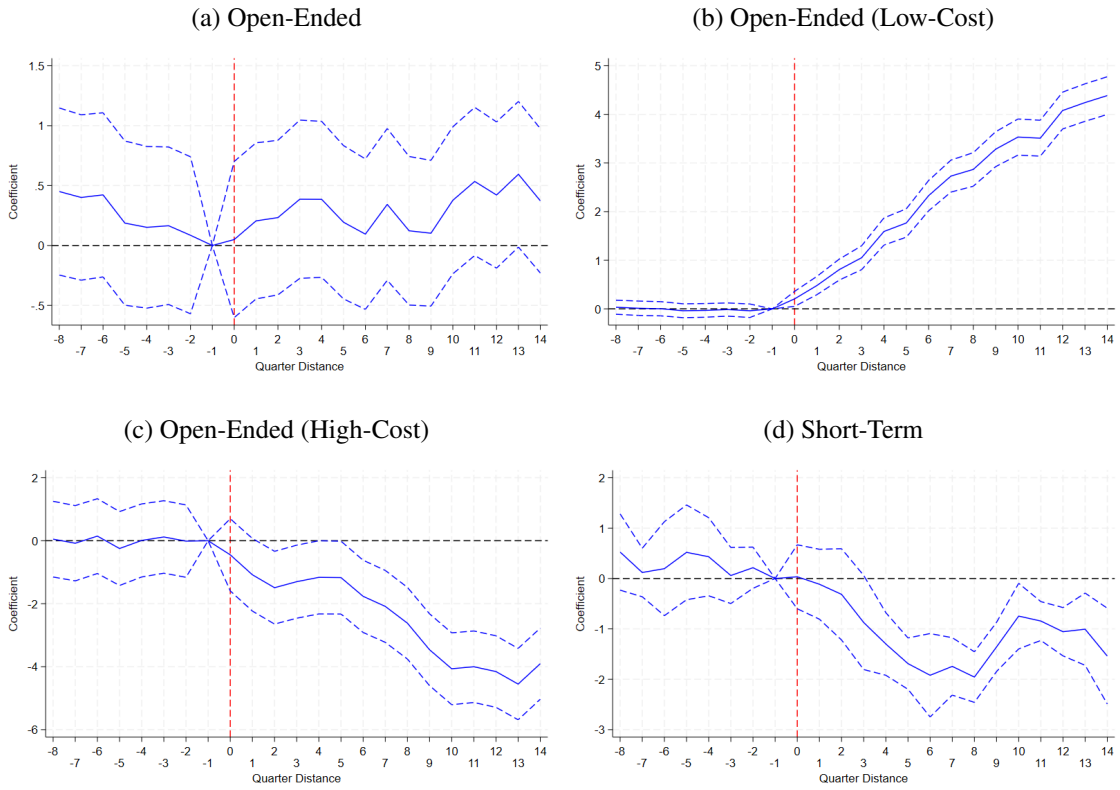


(f) Non-Employment to Open-Ended (High-Cost)



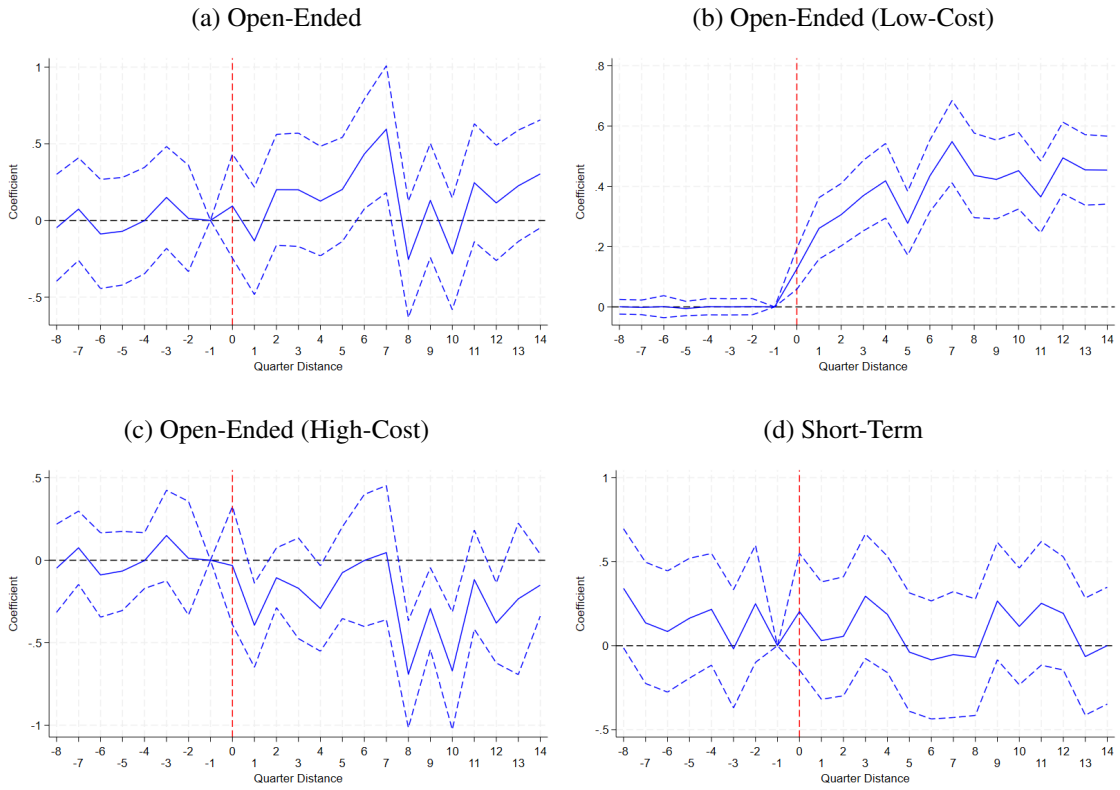
Notes: The figure shows the event-studies that analyze the effect on marginal open-ended jobs. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panels (a), (c) and (e) display short-term conversions with the same employer: towards a low-cost open-ended contract (a), towards any type of open-ended contract (c), and towards high-cost open-ended contracts (e). Panels (b), (d) and (f) depict transitions from non-employment to low-cost open-ended contracts (b), towards any type of open-ended contract (d), and towards high-cost open-ended contracts (f). The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E14: Effects of the Reform on Employment Outcomes, 41-42 and 48-49



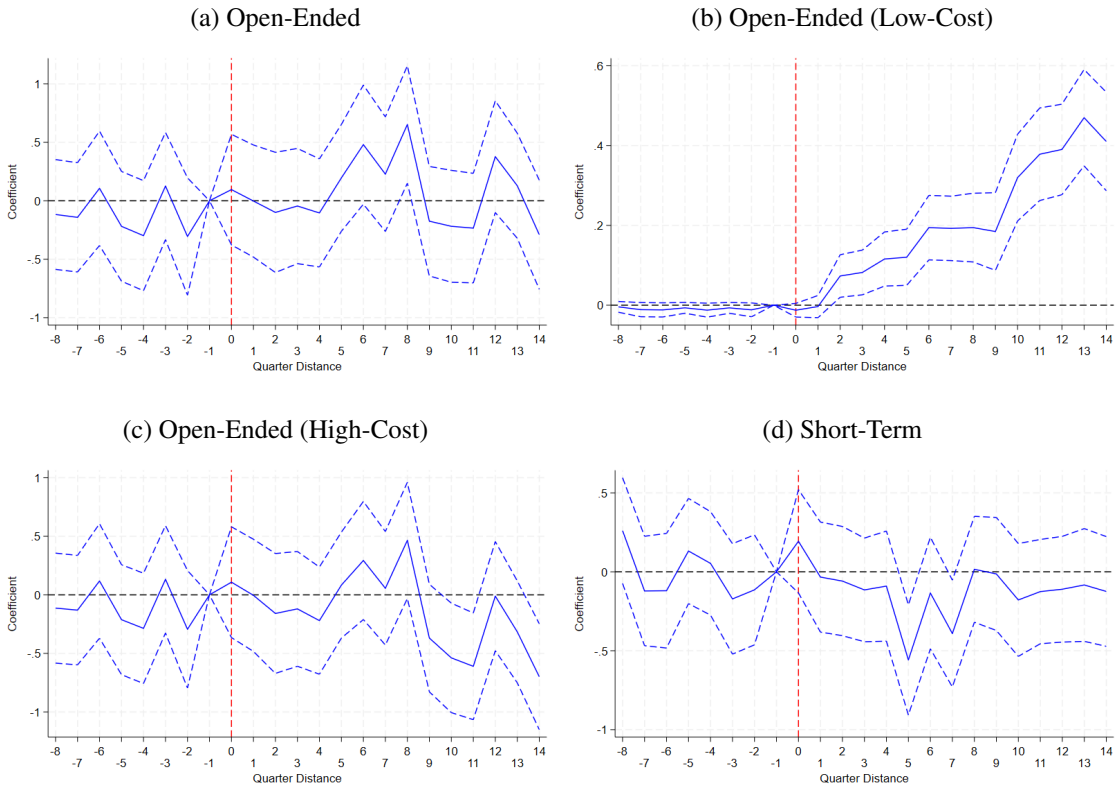
Notes: The figure shows the event-studies that analyze the employment effects. The specification is Equation 10. In panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for open-ended employment, panel (b) for open-ended employment in low-cost contracts, panel (c) for open-ended employment in high-cost contracts, and panel (d) for short-term employment. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E15: Effects of the Reform on Hiring, 41-42 and 48-49



Notes: The figure shows the event-studies that analyze the effects on hires. The specification is Equation 10. In panels (a)-(d), the blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for entries into open-ended contracts, panel (b) for entries into open-ended low-cost contracts, panel (c) for entries into open-ended high-cost contracts, and panel (d) for entries into short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

Figure E16: Effects of the Reform on Separations, 41-42 and 48-49



Notes: The figure shows the event-studies that analyze the effects on separations. The specification is Equation 10. The blue solid lines are the coefficient estimates and the blue-dashed lines 95% confidence intervals. The estimates have been multiplied by 100 so that they can be interpreted as percentage points. Panel (a) depicts the results for exits from open-ended contracts, panel (b) for exits from open-ended low-cost contracts, panel (c) for exits from open-ended high-cost contracts, and panel (d) for exits from short-term contracts. The vertical red-dashed line depicts the quarter when eligibility for payroll tax cuts was expanded and severance payments lowered, in particular for workers older than 45.

F Robustness for Wage Incidence

In this section, we examine alternative subsamples in the calculation of the wage incidence estimates presented in Section 6. Specifically, Tables F1 and F2 report estimates separately for two periods: May 1997 to 1998, when the effect of the notch is expected to be stronger, and January 1999 to March 2001, when it may be attenuated. In addition, Tables F4 and F3 present results separately for female and male workers, accounting for the somewhat different labor market conditions faced by women. The estimates are highly consistent across gender groups.

Table F1: Wage Incidence (May 1997-December 1998)

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
Panel A: Transition from ST to OE and Stay at Same Firm (30 years old)					
Treatment x Post	-0.011	0.039**	0.039**	0.033**	0.032**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Observations	28,755	28,755	28,755	28,755	28,755
Panel B: All Transitions from ST to OE (30 years old)					
Treatment x Post	-0.011	0.033***	0.032***	0.030***	0.028***
	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	57,682	57,682	57,682	57,682	57,682
Panel C: Transition from ST to OE and Stay at Same Firm (45 years old)					
Treatment x Post	0.024	0.060***	0.060***	0.058***	0.046**
	(0.024)	(0.021)	(0.021)	(0.021)	(0.021)
Observations	17,902	17,902	17,902	17,902	17,902
Panel D: All Transitions from ST to OE (45 years old)					
Treatment x Post	0.011	0.051***	0.049***	0.049***	0.046***
	(0.017)	(0.015)	(0.015)	(0.015)	(0.015)
Observations	32,865	32,865	32,865	32,865	32,865
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Province Unemployment	No	Yes	Yes	Yes	Yes
Sector Controls	No	No	Yes	Yes	Yes
Firm Size	No	No	No	Yes	Yes
Other Firm Controls	No	No	No	No	Yes

Notes: The table shows the wage effects of the reform. The specification is a difference-in-differences, as in Equation 12. We focus on workers who transition from an ST contract to an OE contract, either low- or high-cost. We analyze 18-to 30-year-old workers (Panels A and B) and 45-to 55-year-old workers (Panels C and D). Panels A and C are for a sample of people continuously employed with the same employer after the transition. Panels B and D are for all workers, regardless of whether they lose or change jobs in the post period. Columns 2 to 5 include interactions of quarter dummies with controls for the sector, firm's size, company's age, firm's legal status, gender, education, disability status, citizenship status, part-time work, dummies for the worker's age, the number of months worked in ST contracts the 7 years before the reform, the number of months worked in OE contracts the 7 years before the reform, and the unemployment rate at the province level. Each column controls for a different subset of these variables, as specified at the bottom of the table. Robust standard errors clustered at the individual level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table F2: Wage Incidence (January 1999-March 2001)

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
Panel A: Transition from ST to OE and Stay at Same Firm (30 years old)					
Treatment x Post	0.024	0.037**	0.036**	0.026	0.026
	(0.019)	(0.017)	(0.017)	(0.017)	(0.017)
Observations	28,158	28,158	28,158	28,158	28,158
Panel B: All Transitions from ST to OE (30 years old)					
Treatment x Post	0.008	0.027***	0.025**	0.019*	0.018*
	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	70,471	70,471	70,471	70,471	70,471
Panel C: Transition from ST to OE and Stay at Same Firm (45 years old)					
Treatment x Post	0.010	0.082***	0.083***	0.083**	0.071***
	(0.026)	(0.030)	(0.031)	(0.033)	(0.026)
Observations	19,663	19,663	19,663	19,663	19,663
Panel D: All Transitions from ST to OE (45 years old)					
Treatment x Post	-0.014	0.040**	0.040**	0.041**	0.035**
	(0.017)	(0.018)	(0.018)	(0.018)	(0.016)
Observations	39,758	39,758	39,758	39,758	39,758
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Province Unemployment	No	Yes	Yes	Yes	Yes
Sector Controls	No	No	Yes	Yes	Yes
Firm Size	No	No	No	Yes	Yes
Other Firm Controls	No	No	No	No	Yes

Notes: The table shows the wage effects of the reform. The specification is a difference-in-differences, as in Equation 12. We focus on workers who transition from an ST contract to an OE contract, either low- or high-cost. We analyze 18-to 30-year-old workers (Panels A and B) and 45-to 55-year-old workers (Panels C and D). Panels A and C are for a sample of people continuously employed with the same employer after the transition. Panels B and D are for all workers, regardless of whether they lose or change jobs in the post period. Columns 2 to 5 include interactions of quarter dummies with controls for the sector, firm's size, company's age, firm's legal status, gender, education, disability status, citizenship status, part-time work, dummies for the worker's age, the number of months worked in ST contracts the 7 years before the reform, the number of months worked in OE contracts the 7 years before the reform, and the unemployment rate at the province level. Each column controls for a different subset of these variables, as specified at the bottom of the table. Robust standard errors clustered at the individual level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table F3: Wage Incidence (Male)

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
Panel A: Transition from ST to OE and Stay at Same Firm (30 years old)					
Treatment x Post	-0.005	0.040***	0.040***	0.034***	0.033***
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)
Observations	46,771	46,771	46,771	46,771	46,771
Panel B: All Transitions from ST to OE (30 years old)					
Treatment x Post	-0.002	0.040***	0.038***	0.035***	0.034***
	(0.010)	(0.009)	(0.008)	(0.008)	(0.008)
Observations	79,985	79,985	79,985	79,985	79,985
Panel C: Transition from ST to OE and Stay at Same Firm (45 years old)					
Treatment x Post	0.045**	0.067***	0.067***	0.069***	0.056***
	(0.022)	(0.020)	(0.020)	(0.021)	(0.017)
Observations	31,611	31,611	31,611	31,611	31,611
Panel D: All Transitions from ST to OE (45 years old)					
Treatment x Post	0.022	0.050***	0.049***	0.050***	0.045***
	(0.016)	(0.014)	(0.014)	(0.014)	(0.013)
Observations	50,348	50,348	50,348	50,348	50,348
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Province Unemployment	No	Yes	Yes	Yes	Yes
Sector Controls	No	No	Yes	Yes	Yes
Firm Size	No	No	No	Yes	Yes
Other Firm Controls	No	No	No	No	Yes

Notes: The table shows the wage effects of the reform. The specification is a difference-in-differences, as in Equation 12. We focus on workers who transition from an ST contract to an OE contract, either low- or high-cost. We analyze 18-to 30-year-old workers (Panels A and B) and 45-to 55-year-old workers (Panels C and D). Panels A and C are for a sample of people continuously employed with the same employer after the transition. Panels B and D are for all workers, regardless of whether they lose or change jobs in the post period. Columns 2 to 5 include interactions of quarter dummies with controls for the sector, firm's size, company's age, firm's legal status, gender, education, disability status, citizenship status, part-time work, dummies for the worker's age, the number of months worked in ST contracts the 7 years before the reform, the number of months worked in OE contracts the 7 years before the reform, and the unemployment rate at the province level. Each column controls for a different subset of these variables, as specified at the bottom of the table. Robust standard errors clustered at the individual level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table F4: Wage Incidence (Female)

	(1)	(2)	(3)	(4)	(5)
	Log Daily Wage				
Panel A: Transition from ST to OE and Stay at Same Firm (30 years old)					
Treatment x Post	0.017	0.031*	0.030*	0.021	0.020
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Observations	24,731	24,731	24,731	24,731	24,731
Panel B: All Transitions from ST to OE (30 years old)					
Treatment x Post	-0.001	0.023*	0.022*	0.016	0.013
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Observations	50,050	50,050	50,050	50,050	50,050
Panel C: Transition from ST to OE and Stay at Same Firm (45 years old)					
Treatment x Post	-0.016	0.055**	0.054**	0.056**	0.053**
	(0.026)	(0.025)	(0.025)	(0.025)	(0.026)
Observations	12,511	12,511	12,511	12,511	12,511
Panel D: All Transitions from ST to OE (45 years old)					
Treatment x Post	-0.010	0.033*	0.033*	0.034*	0.034*
	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
Observations	24,400	24,400	24,400	24,400	24,400
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Province Unemployment	No	Yes	Yes	Yes	Yes
Sector Controls	No	No	Yes	Yes	Yes
Firm Size	No	No	No	Yes	Yes
Other Firm Controls	No	No	No	No	Yes

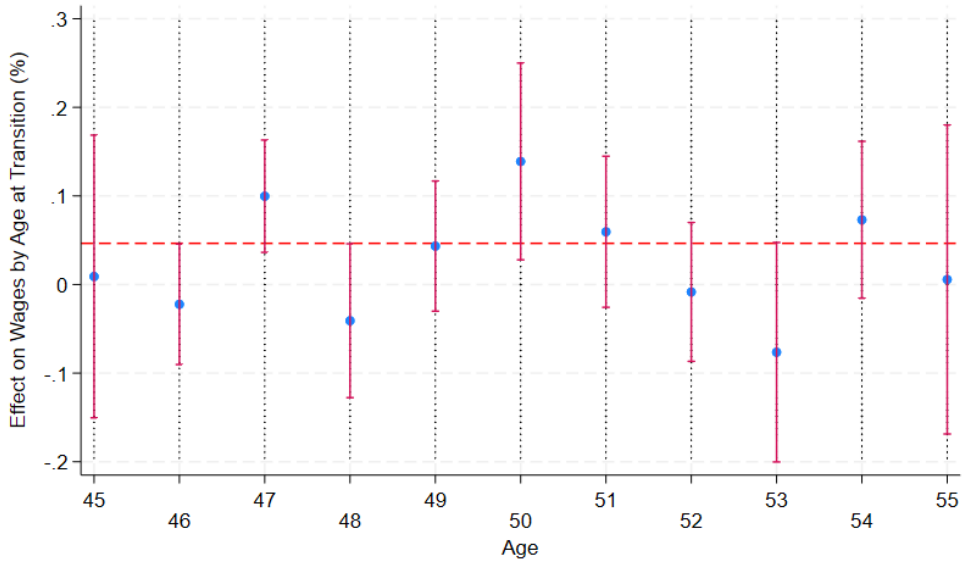
Notes: The table shows the wage effects of the reform. The specification is a difference-in-differences, as in Equation 12. We focus on workers who transition from an ST contract to an OE contract, either low- or high-cost. We analyze 18-to 30-year-old workers (Panels A and B) and 45-to 55-year-old workers (Panels C and D). Panels A and C are for a sample of people continuously employed with the same employer after the transition. Panels B and D are for all workers, regardless of whether they lose or change jobs in the post period. Columns 2 to 5 include interactions of quarter dummies with controls for the sector, firm's size, company's age, firm's legal status, gender, education, disability status, citizenship status, part-time work, dummies for the worker's age, the number of months worked in ST contracts the 7 years before the reform, the number of months worked in OE contracts the 7 years before the reform, and the unemployment rate at the province level. Each column controls for a different subset of these variables, as specified at the bottom of the table. Robust standard errors clustered at the individual level are shown in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

F.1 Wage Incidence Results by Age After the Notch at 45

We repeat the wage analysis based on Equation 12 for several age groups. In particular, workers who transition to an OE contract just a quarter after their 45th birthday. The other groups of workers are comprised of individuals who are at most one year apart from each other. An example will clarify the procedure: the group of 46 contains workers older than 45.25 and up to 46.25 (not included). The objective is to understand if the wage incidence results for above-45 workers are driven by the transition delays triggered by the notch at 45.

The results are displayed in figure F1. The wage effects are very stable across age groups. The horizontal red-dashed line indicates the estimate for the entire group reported in Table 4, column (3). The coefficients are very stable and not significantly different from each other. Therefore, it does not seem that workers transitioning after crossing the threshold were able to capture higher rents because they waited for longer in ST contracts.

Figure F1: Effect on Wages by Age at Transition



Notes: The figure displays the coefficients (blue dots) and 95% confidence intervals (red-capped line) obtained from running Equation 12 for workers of different ages. The horizontal red-dashed line indicates the estimate for the entire group reported in Table 4, Column (3).