ERF Working Papers Series

Do Employment Subsidies Affect Skill Intensity and Capital Formation? Evidence from Turkish Manufacturing

Günes Asık and Çaglar Yüncüler

ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية

Working Paper No. 1808
December 2025

DO EMPLOYMENT SUBSIDIES AFFECT SKILL INTENSITY AND CAPITAL FORMATION? EVIDENCE FROM TURKISH MANUFACTURING

Güneş Aşık[1] and Çağlar Yüncüler[2]

Working Paper No. 1808

December 2025

This paper was originally presented during the ERF 31st Annual Conference on "Youth, Demographic Dividend and Migration in MENA: Challenges and Opportunities in Uncertain Times", April 27-29, 2025.

Send correspondence to:
Güneş Aşık
Middle East Technical University
gunesa@metu.edu.tr

[1] Middle East Technical University. gunesa@metu.edu.tr
[2] TOBB University of Economics and Technology. caglaryunculer@gmail.com

First published in 2025 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This study investigates the impact of employment subsidies on the dynamics of labor markets and production technologies in Turkey's manufacturing sector, with a focus on a 2016 subsidy reform that extended a 6-percentage-point reduction in employer-side social security contributions to previously ineligible micro firms. Leveraging a difference-in-differences approach, we examine the effects of the policy on employment, capital investment, capital intensity and skill upgrading across firms of varying sizes. Our findings reveal that micro firms responded with significant employment gains, while small firms increased capital investment and capital–labor intensity in the form of tangible assets. However, the policy had no measurable effect on skill upgrading, highlighting its limits in fostering structural labor market transformation. By extending the evaluation of employment subsidies beyond job creation, this study contributes to the broader discourse on active labor market policies and their role in promoting sustainable growth and technological development in emerging economies.

Keywords: Employment subsidy, capital intensity, firm-level analysis, difference-in-differences
JEL Classifications: J23, J38, R58

ملخص

تدرس هذه الدراسة تأثير إعانات التوظيف على ديناميكيات أسواق العمل وتقنيات الإنتاج في قطاع التصنيع في تركيا، مع التركيز على إصلاح الدعم في عام 2016 والذي أدى إلى خفض مساهمات الضمان الاجتماعي من جانب صاحب العمل بنسبة 6 نقاط مئوية للشركات الصغيرة غير المؤهلة سابقًا. ومن خلال الاستفادة من نهج الاختلاف في الاختلافات، نقوم بدراسة آثار السياسة على التوظيف واستثمار رأس المال وكثافة رأس المال ورفع مستوى المهارات عبر الشركات ذات الأحجام المختلفة. تكشف نتائجنا أن الشركات الصغيرة استجابت بمكاسب كبيرة في التوظيف، في حين زادت الشركات الصغيرة من الاستثمار الرأسمالي وكثافة رأس المال – العمالة في شكل أصول ملموسة. ومع ذلك، لم يكن لهذه السياسة أي تأثير ملموس على رفع مستوى المهارات، مما يسلط الضوء على حدودها في تعزيز التحول الهيكلي لسوق العمل. ومن خلال توسيع نطاق تقييم إعانات التوظيف إلى ما هو أبعد من خلق فرص العمل، تساهم هذه الدراسة في الخطاب الأوسع حول سياسات سوق العمل النشطة ودورها في تعزيز النمو المستدام والتنمية التكنولوجية في الاقتصادات الناشئة.

1. Introduction

Active labor market policies (ALMPs) are designed to address structural labor market challenges such as rising inequality, technological disruption, and the changing nature of work. These policies include job guarantees, universal basic income, work-sharing arrangements, retraining and reskilling programs, employment subsidies, and cooperative business models. The overarching goal is to either complement or serve as alternatives to traditional mechanisms such as minimum wage laws, collective bargaining, and unemployment insurance. By promoting both labor market flexibility and security, ALMPs seek to enhance economic resilience, reduce inequality, and foster more inclusive labor markets that better serve the needs of both workers and employers.

Among the most widely adopted ALMPs are employment (or wage) subsidies, which provide financial incentives to employers with the goal of increasing employment, particularly among disadvantaged groups such as long-term unemployed individuals, youth, low-skilled workers, and marginalized populations. These subsidies can take various forms, including direct wage payments, tax credits, or reductions in employer-side social security contributions. They are often implemented during periods of economic downturn or recession, when labor demand weakens and unemployment risks intensify.

The core rationale behind employment subsidies is to offset perceived or actual hiring risks—such as lower productivity or high training costs—by lowering the cost of employment. In doing so, these programs aim to reduce unemployment by encouraging firms to expand their workforce, promote labor market inclusion by supporting the employment of vulnerable populations, stimulate economic growth through increased household income and consumption, alleviate poverty and income inequality particularly for low-wage and low-productivity workers and encourage formalization, especially in countries with high levels of informal employment.

However, employment subsidies also face several limitations. A central concern is deadweight loss: many subsidized jobs may have been created even without the subsidy, thereby reducing the cost-effectiveness of the intervention. Additionally, substitution effects may arise if firms replace unsubsidized workers with subsidized ones, particularly when the subsidy is temporary. There is also the risk of dependency, whereby firms refrain from hiring unsubsidized workers once the incentive is withdrawn, potentially undermining the sustainability of job creation. Finally, employment subsidies often entail substantial fiscal costs, which can be especially burdensome if the policy is broad-based or extended over long durations.

Employment subsidies have long been a component of Turkey's ALMP toolkit, implemented in various forms. These programs have targeted a wide range of objectives, including first-time employment, specific economic sectors, population subgroups such as women or youth, particular firm characteristics (e.g., small businesses or exporters), or specific geographic regions such as provinces or counties. Regardless of the specific target group, the primary

design of these policies has consistently emphasized reducing the labor cost burden for employers, rather than providing direct income support to employees (Aşık et al., 2022).

This emphasis on cost reduction is particularly relevant in Turkey, where the combined burden of taxes and social security contributions on labor is 39% of gross labor cost, above the OECD average of 35% (OECD, 2025). Consequently, from the perspective of firms, any meaningful reduction in labor costs through subsidies can affect a wide array of operational and strategic decisions, including hiring behavior, by increasing the demand for labor through lower marginal cost; production capacity, as increased hiring may support output expansion; pricing strategies, since labor cost reductions may translate into lower marginal costs; market access, particularly where enhanced competitiveness enables firms to expand into new domestic or export markets; human capital choices, affecting the skill composition of the workforce; capital accumulation and technological upgrading, through shifts in factor substitution or investment incentives.

The expected outcomes for human capital formation and capital investment are less clear-cut and may even be interrelated, both with important implications for firm-level productivity. On the human capital side, evidence suggests that employment subsidies, particularly those targeting low-skilled labor, may increase the share of low-skilled employment and potentially dampen incentives for skill acquisition (Oskamp and Snower, 2006). However, from a theoretical standpoint, it is equally plausible that firms could leverage the cost advantage created by the subsidy to hire higher-skilled workers at a reduced effective wage, thereby upgrading the skill composition of their workforce. As such, the impact of employment subsidies on workforce skills is ambiguous and may vary across sectors, firm types, and policy designs.

On the capital side, the effects of lower labor costs are similarly dual. Firms may respond by expanding their workforce as a substitute for capital, especially if labor becomes relatively cheaper in production. Alternatively, some firms might increase capital investment, either to complement a growing workforce and maintain the marginal productivity of labor, or by reinvesting the cost savings derived from the subsidy into technological upgrading or capacity expansion. Classical and neoclassical frameworks generally support the complementarity of production factors, predicting that labor subsidies could stimulate capital accumulation (Judd, 1987; Shi and Wen, 1999; Fuest and Huber, 2000; Daveri and Tabellini, 2000). In contrast, substitution effects are also possible. Petrucci and Phelps (2005), for example, argue that subsidies tend to disproportionately benefit the targeted factor, potentially crowding out investment in the untargeted one—suggesting a trade-off rather than complementarity in some settings.

In the existing literature, studies evaluating the effectiveness of employment subsidies have primarily focused on their impact on the level of employment, with the bulk of this research concentrated in developed countries (Blundell et al., 2004; Deidda et al., 2015; Goos and Konings, 2007; Huttunen et al., 2013). The findings are mixed. Some studies report no statistically significant effects, while others find positive employment impacts for specific

groups, such as older women and youth, or observe gains that are transitory in nature. Evidence from developing countries is relatively more limited but similarly heterogeneous: some studies report negligible or null effects overall, while others identify positive impacts on formal employment, particularly in high-informality contexts (Gruber, 1997; Kugler and Kugler, 2009; Cruces et al., 2010).[3]

Turkey has also been the subject of several empirical evaluations of employment subsidy programs. For example, Betcherman et al. (2010) document a positive effect on formal employment from two regional subsidy programs launched in 2004 and 2005, which targeted new hires in firms with more than 10 employees. The 2011 employment subsidy—targeted at young people and women—has been evaluated using the Household Labor Force Survey in studies by Ayhan (2013), Uysal (2013), and Balkan et al. (2016). While Balkan et al. (2016) find no measurable effect, the other two report positive outcomes, especially for women, though concerns remain about the duration and sustainability of these effects. More recently, Basbuga et al. (2022) assess the impacts of multiple subsidy schemes and find positive employment outcomes. The most comprehensive analysis to date is by Aşık et al. (2022), who evaluate a geographically targeted 2016 subsidy that reduced employer social security contributions in underdeveloped regions. Using firm-level administrative data from the Social Security Institution, they find a significant and persistent increase in registered employment, particularly in small firms. However, they argue that the effect primarily reflects formalization of pre-existing informal jobs, rather than expansion at the extensive margin.

While these studies provide valuable evidence on employment outcomes, limiting policy evaluation solely to employment levels risks overlooking broader firm responses. In particular, the impact of employment subsidies on workforce skill composition and firm investment behavior has critical implications for productivity growth and long-term competitiveness. These dimensions are especially important in middle-income economies like Turkey, where productivity stagnation and low investment rates constrain inclusive development.

Against this background, we extend prior analyses by examining the broader firm-level effects of employment subsidies. Specifically, we investigate the causal impact of the 2016 regional subsidy expansion on capital accumulation and skill composition in the manufacturing sector, using high-quality matched employer–employee administrative data. In doing so, we provide a deeper understanding of how wage subsidies affect both labor and capital dynamics in developing economies. We restrict our analysis to manufacturing industry only as technological level is only defined for manufacturing industry.

To this end, we examine the effects of a geographically targeted employment subsidy introduced under Law No. 6846, which provided an additional 6-percentage-point reduction in employer-side social security contributions.[4] This subsidy was applied on top of the existing,

[3] See Almeida et al. (2014) for a review for developing economies.
[4] This is the same subsidy program Aşık et. al (2022) investigates

nationwide 5-percentage-point reduction under Law No. 5510 and was specifically designed to encourage registered employment in underdeveloped regions[5] of Turkey.

The additional 6-percentage-point reduction in employer social security contributions was first introduced in 2013 under Law No. 6486, as an added incentive to support firms operating in underdeveloped areas. A key institutional feature of the 2013 subsidy, which is central to this study's identification strategy, was its eligibility restriction: Initially, the subsidy applied only to firms with 10 or more employees, and even then, only to new hires beyond a firm's existing workforce. This changed markedly in 2016, when the subsidy's scope was significantly broadened. From that year onward, all firms operating in underdeveloped regions became eligible, regardless of their employment size, and the subsidy was extended to all employees, not just additional hires. This reform marked a turning point for micro firms—those with fewer than 10 employees—which had previously been excluded from the program and now became eligible for the first time.

A second major reform occurred in August 2020, when the spatial unit used to define subsidy eligibility shifted from the province level to the county level. Under this new classification, several counties—previously assigned to Regions 1, 2, or 3 due to their provincial affiliation—were reclassified into Region 4 based on their own local development indicators. This change not only expanded the program's reach but also created a natural comparison group for empirical analysis, as these counties remained untreated during the earlier subsidy expansion analyzed in this study.

We leverage this second legislative change—the 2020 reclassification of subsidy eligibility based on counties rather than provinces—to construct a refined control group for identifying the causal effects of employment subsidies on firms in treated areas. We implement a difference-in-differences (DiD) framework to estimate the causal impact of the 2016 subsidy expansion, exploiting variation in eligibility criteria over time. Similar to Aşık et al. (2022), we treat the 2016 reform as the policy intervention and identify the treatment group as firms located in Region 4 counties, which became newly eligible for the subsidy regardless of firm size or employment growth.

To construct a valid control group, we draw on the reclassified counties as subsidy-eligible only after 2020—despite having socioeconomic development levels comparable to Region 4—but were not treated during the sample period of 2006 to 2019 due to their provincial affiliation with more developed regions (Regions 1–3). This change in policy design—shifting the eligibility unit from provinces to counties in 2020—created a quasi-natural experiment, enabling us to compare treated firms with otherwise similar untreated firms that remained outside the program until after the study period. By restricting our analysis to 2006–2019, we ensure that control units are not contaminated by later eligibility.

[5] Turkey's regional development framework classifies provinces into six development regions based on socioeconomic indicators. Region 1 represents the most developed areas, while Region 6 includes the least developed. Regions 4, 5, and 6 are officially designated as underdeveloped and are thus eligible for targeted policy intervention.

We contribute to the literature in several important ways. First, we add to the relatively limited body of research on the effects of employment subsidies in Turkey and other developing economies, where program evaluations remain scarce despite widespread policy use. Second, it is among the few studies to examine the relationship between employment subsidies, capital formation and the skill composition of employment. Third, whereas most existing research on capital accumulation focuses on the effects of capital subsidies, this study is, to the best of our knowledge, the first to assess the impact of employment subsidies on new capital formation. In doing so, it offers novel insights into how wage cost reductions influence firm-level investment behavior and factor substitution decisions in a middle-income, high-informality context.

Findings indicate that the 2016 expansion of Turkey's regional employment subsidy had its strongest effects on micro and small manufacturing firms. Micro firms experienced statistically significant employment growth, while small firms responded with increases in capital investment and capital intensity, particularly in tangible assets. These effects were most pronounced among firms near the 10-employee threshold targeted by the policy. In contrast, medium and large firms, despite benefiting the most in monetary terms, exhibited no measurable response in employment or capital outcomes. Additionally, the subsidy had no significant effect on the skill composition of the workforce for any firm size type, suggesting limited structural upgrading.

The paper proceeds as follows: Section II describes the data set. Section III presents the empirical methodology and identification strategy. In Section IV, we share the results of the empirical analyses. Section V concludes.

2. Data

In this study, we rely on rich administrative microdata obtained from the Entrepreneurship Information System (EIS) of the Ministry of Industry and Technology. EIS is a large-scale data integration platform that consolidates firm-level information from multiple public institutions in Turkey. Developed to support data-driven policy design and economic research, EIS provides a unified and standardized view of firm behavior, enabling comprehensive analyses of employment, production, investment, and trade dynamics at both regional and national levels. EIS integrates information from several key administrative sources:

- Revenue Administration (GİB): Financial declarations, including balance sheets and income statements;
- Social Security Institution (SGK): Employment-related data, such as firm registrations, insured employees, and demographic characteristics;
- Ministry of Trade: Foreign trade records;
- Small and Medium Enterprises Development Organization (KOSGEB): Data on SME loans and support programs;
- Turkish Patent and Trademark Office: R&D support records, intellectual property applications, and patent data;

- Ministry of Industry and Technology: Annual operating statement data on actual production quantities.

The database covers all enterprises subject to corporate and income taxes that generate income from commercial or industrial activity and employ workers registered with SGK. It excludes non-commercial entities (e.g., residential associations), freelance professionals (e.g., lawyers, architects), banks, and joint ventures governed under separate reporting rules.

EIS currently includes over 3 million registered firms outside the finance and defense sectors. The data is available at province and county levels, enabling fine-grained geographic analysis. Most variables are consistently available from 2006 onward, allowing for longitudinal analysis of firm outcomes. The firms can be classified across regions, counties and subsidy regions, sectors, firm-size, and technology level.

Firms are categorized by size, sector, region, and technology level. Size classes are based on official Turkish definitions, combining employee count and annual turnover. As for the employee counts, the classification is the following:

- Micro: 0–9 employees
- Small: 10–49 employees
- Medium: 50–249 employees
- Large: 250+ employees

The analysis is restricted to firms in the manufacturing sector, which is a major focus of industrial policy and subsidy programs. Manufacturing firms are further classified into four technology levels, based on international standards: low technology, medium-low, medium-high, and high technology.

EIS provides firm-level employment data disaggregated by age, gender, occupation, and wage level. While individual education levels are not recorded, the dataset includes International Standard Classification of Occupations (ISCO) codes for each job title. To proxy skill level, we map ISCO codes to the ESCO framework, which links occupations to required competencies. This allows us to differentiate between high-skill and low-skill employment segments in our analysis.

EIS employs standardized classification frameworks to ensure consistency and comparability of data: NACE Rev. 2 for classifying economic activities, PRODTR 2010 for industrial products, GTIP, BEC and SITC for trade goods classification.

To ensure cross-agency consistency, the EIS adopts standardized classification systems:

- NACE Rev. 2 for economic activities,
- PRODTR 2010 for industrial products,
- GTIP, BEC, and SITC for trade classifications.

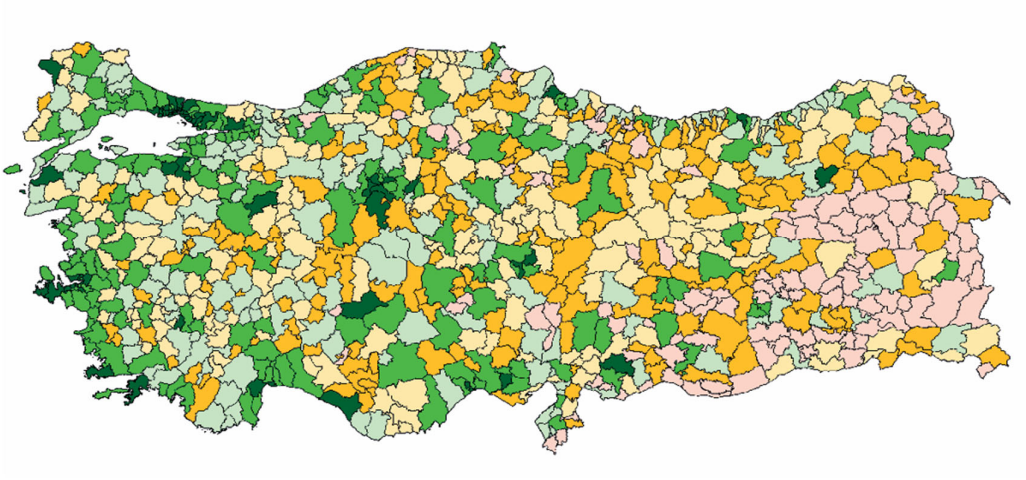
Enterprise records are linked across data sources using tax identification numbers, ensuring high-quality matching and longitudinal tracking. Financial indicators at the enterprise level are distributed across firm locations based on the number of insured workers per branch, which allows for sectoral and regional disaggregation. Purchase and sales data are aggregated from mandatory VAT forms, enabling detailed analysis of firm revenue dynamics.

3. Methodology

We estimate the causal effect of a 2016 policy reform in Turkey that expanded eligibility for an additional 6-percentage-point reduction in employer-side social security contributions to include micro firms. The reform created a quasi-natural experiment, which we exploit using a difference-in-differences (DiD) framework, comparing changes in outcomes for treated and untreated firms before and after the reform. We utilize the same identification strategy as in Aşık et al. (2022).

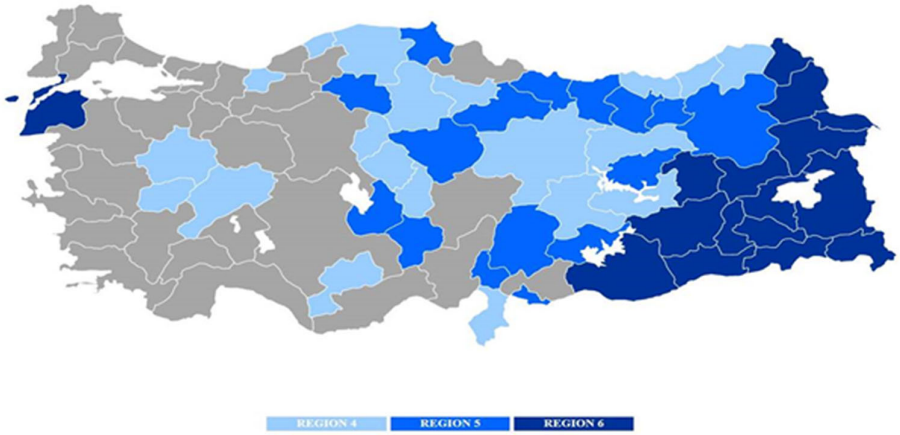
The Turkish government classifies all provinces and counties into six development regions based on a Socio-economic Development Index (SEDI), prepared by General Directorate of Development Agencies (GDDA) of Ministry of Industry and Technology. Region 1 is the most developed and Region 6 is the least developed region. SEDI score computation is based on a principal component analysis and takes into account high number of variables (56 as of 2022) in the dimensions of demography, employment and social security, education, health, finance, competitiveness, innovation and quality of life (GDDA, 2023). The districts are classified in six development levels, taking into account rankings and the natural breaks of the index scores of the districts. According to the results of 2022, there are 67 districts in Region 1, 173 in Region 2, 175 in Region 3, 215 in Region 4, 222 in Region 5 and 121 in Region 6 (Figure 1). The additional 6-point subsidy was targeted to Regions 4, 5, and 6, with eligibility initially defined at the provincial level (Figure 2). In 2016, a policy change expanded the subsidy to include all firms in eligible provinces, regardless of size or hiring behavior. This expansion marked the first time micro firms—previously excluded—became eligible for the subsidy.

Figure 1. Socio-economic development levels by counties in Turkey



Source: General Directorate of Development Agencies (GDDA) (2023)

Figure 2. Provinces eligible for the 6 additional points reduction in 2016



Note: For the west, most province in Region 6, Canakkale, the only eligible districts are two islands, Gokceada and Bozcaada.

Source: Aşık et al. (2022)

However, in August 2020, a subsequent reform redefined regional subsidy eligibility at the county level, recognizing that counties within the same province may differ significantly in their economic development. As a result of this reclassification, 99 counties, previously included in Regions 1–3 due to their provincial affiliation, were reclassified as Region 4 based on local economic indicators (Table A.1). While these counties became eligible for the 6-point subsidy after 2020, they were ineligible during our sample period of 2006–2019.

This temporal and spatial variation in policy rollout provides a credible source of exogenous variation in subsidy exposure. Specifically, the newly eligible counties—though similar in socioeconomic development to the earlier treated counties—were not eligible for the 6-point

subsidy during our study window (2006–2019), making them well-suited as a control group. In contrast, the treatment group consists of firms located in provinces classified as Region 4, which began receiving the subsidy following the 2016 reform.[6]

To improve the comparability of the treatment and control groups, we implement additional sample refinements. First, we exclude seven counties[7] from the control group that were reclassified from Region 4 to Region 3 based on the most recent Socio-Economic Development Index (SEDI, 2022). These counties no longer meet the underdevelopment criteria applied during the study period. Second, we exclude from the treatment group 136 counties classified as Regions 1–3 in terms of development score, but which were included in the subsidy program solely because they belonged to an underdeveloped province. This adjustment mitigates the risk of misclassifying economically stronger counties as treated and enhances the internal validity of our comparison.

By refining both the treatment and control samples in this way, we reduce heterogeneity in baseline development levels, ensuring that our estimates capture the effect of subsidy eligibility rather than underlying differences in regional economic conditions.[8]

In order to show that control group is similar to the treated regions in terms of development level, we also run a simple regression to compare the mean of each group. We find the difference between the mean of SEDI of control and treatment groups are statistically insignificant, while that of between the control and non-treatment group is statistically significant (Table 1).

Table 1. Statistical significance of mean differences between groups

	Treated vs. Control				Non-treated vs. Control			
	Mean (Treated)	**Mean (Control)**	**Mean difference**	**p-value**	**Mean (Not-treated)**	**Mean (Control)**	**Mean difference**	**p-value**
2004	-0.26	-0.24	-0.02	0.74	1.37	-0.24	1.61***	0.000
2017	-0.34	-0.31	-0.03	0.50	0.76	-0.31	1.07***	0.000
2022	-0.40	-0.45	0.05	0.31	0.71	-0.45	1.16***	0.000

*Notes: *** p<0.01, ** p<0.05, * p<0.1*

It is important to note that our DiD estimates should be interpreted as Intention-To-Treat (ITT) effects. The EIS dataset does not contain information on whether individual firms actually received the subsidy, but only indicates their location, which determines eligibility for the program. As such, our estimates capture the average effect of being exposed to treatment, rather than the effect of actual take-up.

[6] We exclude Regions 5 and 6, as the parallel trends assumption before the treatment does not hold for these regions.

[7] These counties (affiliated province) are Kulu (Konya), Havza (Samsun), Yeniçağa (Bolu), Ferizli (Sakarya), İncirliova (Aydın), Nizip (Gaziantep), Gökçebey (Zonguldak).

[8] After the adjustments, for Region 4, the total number of counties in the treatment group is 112 and the total number of counties in the control group is 86.

This distinction is common in program evaluation settings where compliance is unobservable or imperfect, but treatment eligibility is exogenous and well-defined. As Bloom (2008) notes, ITT analysis is not only statistically valid under such conditions, but also policy-relevant, since policymakers often control eligibility and access, but not firm-level participation decisions. In this sense, our estimates reflect the real-world effect of the policy's expansion on eligible firms, regardless of take-up, and are therefore more generalizable for evaluating subsidy design and coverage.

We acknowledge potential challenges to the validity of our identification strategy. The core assumption underlying the DiD framework is that, in the absence of the policy reform, the treatment and control groups would have followed parallel trends in the outcomes of interest. If this assumption does not hold, estimated treatment effects may be biased due to differential pre-trends or unobserved shocks.

To assess the plausibility of the parallel trends assumption, we implement an event study specification, which allows us to visually and statistically examine pre-treatment dynamics. These results, presented in the next section, provide supporting evidence that treatment and control groups were evolving similarly prior to the 2016 subsidy expansion—thereby reinforcing the credibility of our DiD estimates.

Against this background, our core identification strategy compares changes in key firm-level outcomes—including employment (L), capital stock (K), the capital–labor ratio (K/L), and the skill composition of labor—between treated regions and untreated regions before and after the implementation of the 2016 subsidy policy. This DiD approach allows us to isolate the causal effect of subsidy exposure by netting out common time trends and region-specific shocks that may influence firm behavior.

To estimate the causal effect of the 2016 subsidy reform, we employ a DiD regression model of the following form:

$$Y_{i,t} = \beta_0 + \beta_1(\text{Treated}_{i,t} \times D2016_t) + \phi_i + \phi_s + \tau_t + \epsilon_{i,t}$$

where

- i, t, r stand for firm, year, region, respectively.
- $Y_{i,t}$ denotes the outcome variable for firm i in year t,
- ($\text{Treated}_{i,t}$ x D2016t) is the treatment interaction term, equal to 1 for firms in treated counties and years after 2016
- ϕ_i captures firm fixed effects,
- ϕ_s denotes technology-level fixed effects,
- τ_t represents year fixed effects,
- $\epsilon_{i,t}$ is the idiosyncratic error term.

The coefficient of interest is β_1, which captures the average treatment effect of the 2016 policy change—i.e., the introduction of eligibility for the additional 6-point subsidy—on the outcome variable. We refer to this as the DiD coefficient in the result tables. The dependent variables include:

- The logarithm of firm-level employment (L)
- The logarithm of capital stock (K),
- The capital–labor ratio (K/L)
- And the logarithm of employment and employment share disaggregated by skill levels (proxied using ISCO-based occupation categories).

To account for potential confounding variation, we further control for province-specific linear time trends and 4-digit industry-by-year fixed effects, which help relax the strict parallel trends assumption by allowing for differential temporal patterns across regions and sectors.

4. Empirical results

4.1. Employment (L)

We begin the empirical analysis by examining the impact of the 2016 subsidy expansion on firm-level employment in the manufacturing sector. Given that the primary policy goal of the additional 6-point employer-side subsidy was to stimulate job creation in underdeveloped regions, we focus first on how the policy affected the employment trajectories of firms, disaggregated by size. To isolate the treatment effect on existing businesses, we restrict the sample to firms that were already established before 2016, thereby shutting down potential firm entry effects. The analysis covers micro, small, and medium-to-large firms separately.

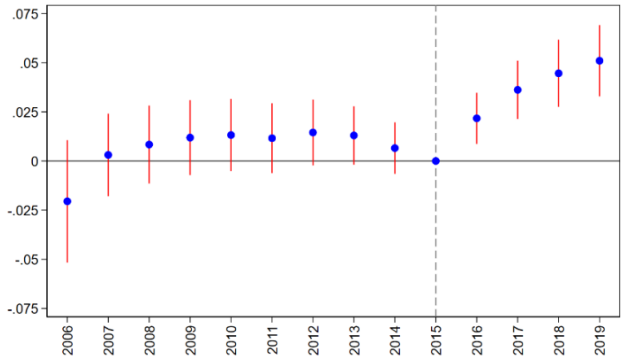
Figure 3 provides an event study specification that plots the dynamic treatment effects over time. In Panel A, micro firms show a clear upward shift in employment after 2016, with statistically significant and sustained gains relative to the control group. The confidence intervals tighten post-reform, further reinforcing the stability of the estimates.

In contrast, Panel B (small firms) and Panel C (medium-large firms) show more muted responses, with coefficient estimates fluctuating around zero and confidence intervals that cross the null line. These patterns imply that the employment response to the policy was largely confined to micro firms, which were newly exposed to the 6-point subsidy following the 2016 expansion.

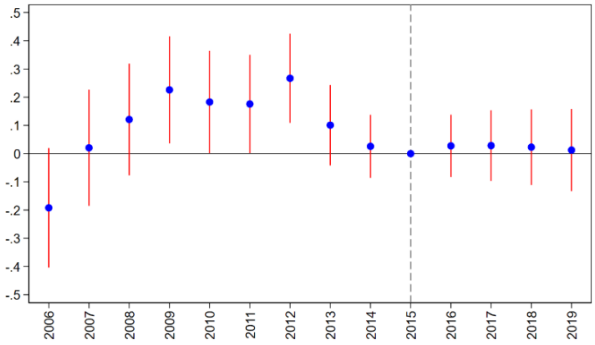
Table 2 presents the main DiD estimates of the policy's impact on log employment. The findings reveal a statistically significant and positive effect for micro firms, with a DiD coefficient of 0.025. This implies that micro firms in treated regions experienced, on average, a 2.5% increase in employment relative to comparable firms in untreated regions following the policy reform. This finding is compatible with the findings of Aşık et al. (2022).

Figure 3. Event study estimates of firm employment growth in treated region 4 counties

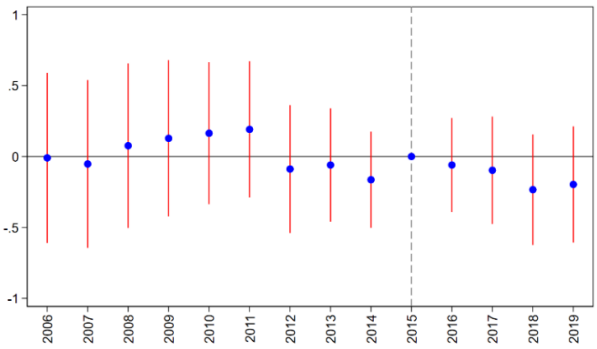
Panel A. Employment growth in micro firms



Panel B.: Employment growth in small firms



Panel C. Employment growth in medium and large firms



Source: Own estimations using EIS Database. The dependent variable is quarterly firm level employment (in natural logs). The figures represent the regression coefficient plots of the interaction between firms in treated counties and year dummies. All estimations include firm fixed effects, year fixed effects, NUTS2 specific linear trends and 4-digit industry-year fixed effects are included. The vertical lines for each coefficient show 95 percent confidence intervals, clustered at province level.

For small firms, the coefficient is negative but statistically insignificant, suggesting no robust effect of the subsidy on this group. Similarly, for medium and large firms, the estimated effect

is positive but also statistically insignificant. These results suggest that the employment effect of the policy was concentrated among the smallest firms, consistent with the design of the reform, which newly extended eligibility to firms with fewer than 10 employees.

Table 2. Firm employment in treated region 4 counties

	Micro	Small	Medium-Large
DID Coefficient	0.0250***	-0.0621	0.0828
	(0.00633)	(0.0668)	(0.230)
Observations	182,797	16,366	3,278
R-squared	0.737	0.590	0.652
Year FE	Yes	Yes	Yes
4 Digit Industry Year FE	Yes	Yes	Yes
Nuts2 Linear Trends	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

*Notes: Robust standard errors are in parenthesis. Clustering is at the firm level. Outcome variable is natural log of firm employment. *** p<0.01, ** p<0.05, * p<0.1*

Together, these results indicate that the policy was effective in stimulating employment growth where it was newly binding—i.e., among firms previously ineligible for the program. This aligns with theoretical expectations that micro firms, which are typically more cost-sensitive, would respond more strongly to reductions in labor costs.

4.2. Capital accumulation (K)

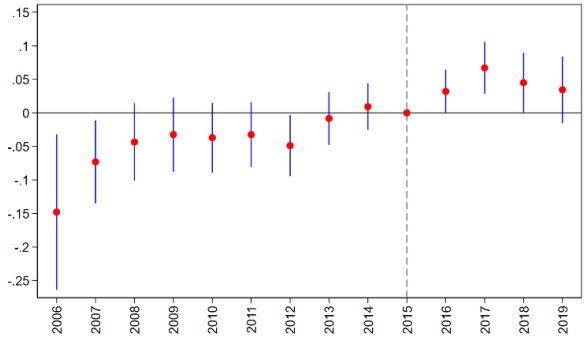
We next investigate whether the 2016 subsidy expansion affected firms' capital accumulation, which serves as a key mechanism through which employment subsidies might generate longer-term productivity gains. In line with the previous theoretical discussions, employment subsidies can alter the marginal rate of substitution between labor and capital, potentially encouraging firms to either substitute labor for capital or invest more to complement expanded labor capacity. In this analysis, we use two distinct measures of capital:

Total Tangible Assets, which captures the firm's entire stock of physical capital (e.g., land, buildings, machinery), and
Machinery and Equipment, a narrower but more directly productivity-linked capital input.

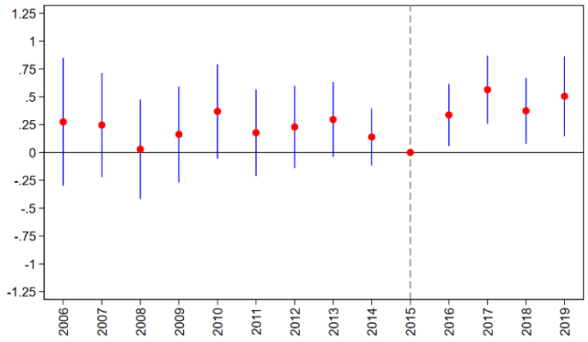
Figure 4 (Panels A–C) displays the dynamic treatment effects on total tangible assets by firm size. In Panel A, micro firms exhibit a visible change in the trend of capital accumulation following the policy; however, the wide confidence intervals surrounding the estimates make it difficult to interpret this as a statistically significant effect. In Panel B, small firms show a gradual and statistically significant increase in capital stock after 2016, suggesting a positive response to the policy reform. In contrast, Panel C indicates that medium and large firms followed a relatively flat trajectory with broad confidence bands, signaling no robust treatment effect. Figure 5 presents the corresponding event study analysis for machinery and equipment investments. None of the firm types exhibit any systematic post-treatment deviation from baseline trends for the machinery and equipment investment.

Figure 4. Event study estimates of firm capital stock growth in treated region 4 counties, (K: total tangible assets, In Logs)

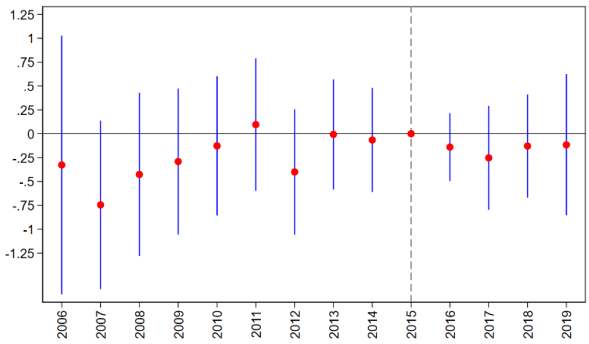
Panel A. Capital stock growth in micro firms



Panel B. Capital stock growth in small firms



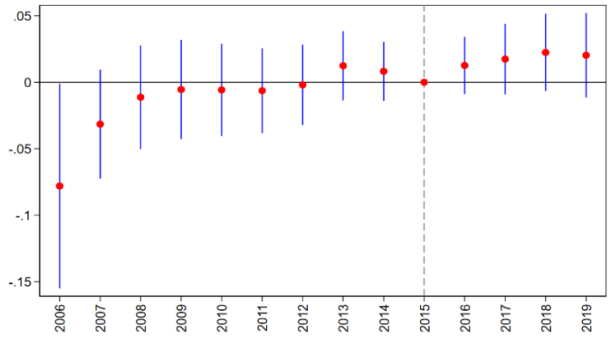
Panel C. Capital stock growth in medium and large firms



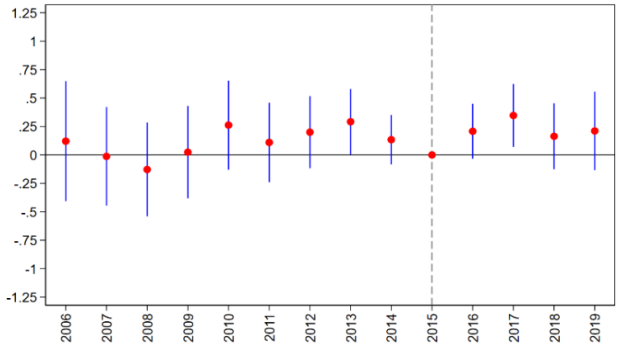
Source: Own estimations using EIS Database. The dependent variable is quarterly firm level tangible assets (in natural logs). The figures represent the regression coefficient plots of the interaction between firms in treated counties and year dummies. All estimations include firm fixed effects, year fixed effects, NUTS2 specific linear trends and 4-digit industry-year fixed effects are included. The vertical lines for each coefficient show 95 percent confidence intervals, clustered at province level.

Figure 5. Event study estimates of firm machinery growth in treated region 4 counties, (K: machinery and equipment, In Logs)

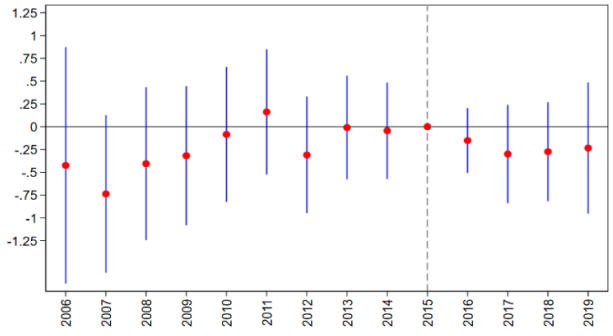
Panel A. Machinery growth in micro firms



Panel B. Machinery growth in small firms



Panel C. Machinery growth in medium and large firms



Source: Own estimations using EIS Database. The dependent variable is quarterly firm level machinery and equipment (in natural logs). The figures represent the regression coefficient plots of the interaction between firms in treated counties and year dummies. All estimations include firm fixed effects, year fixed effects, NUTS2 specific linear trends and 4-digit industry-year fixed effects are included. The vertical lines for each coefficient show 95 percent confidence intervals, clustered at province level.

Table 3 reports the DiD estimates of the policy's impact on the logarithm of capital stock, broken down by capital type and firm size. Panel A shows that the policy led to statistically significant increases in tangible assets for both micro and small firms, with the effect being more pronounced among small firms. In contrast, no significant impact is observed for medium and large firms. Panel B, which focuses on machinery and equipment, reveals no statistically significant effects across any firm size category. These results confirm the findings of the event study.

Table 3. Firm capital stock in treated region 4 counties

	Micro	Small	Medium-Large
Panel A: K=Tangible Assets (in logs)			
DID Coefficient	0.0310*	0.317**	-0.0966
	(0.0179)	(0.145)	(0.262)
Observations	182,797	16,366	3,278
R-squared	0.805	0.752	0.728
Panel B: K=Machinery and Equipment (in logs)			
DID Coefficient	0.00787	0.0908	-0.363
	(0.0115)	(0.138)	(0.356)
Observations	182,797	16,366	3,278
R-squared	0.806	0.808	0.770
Year FE	Yes	Yes	Yes
4 Digit Industry Year FE	Yes	Yes	Yes
Nuts2 Linear Trends	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

*Notes: Robust standard errors are in parenthesis. Clustering is at the firm level. Outcome variable is natural log of firm tangible assets (Panel A) or firm machinery and equipment (Panel B). *** p<0.01, ** p<0.05, * p<0.1.*

These results suggest that small firms—though not directly targeted by the 2016 expansion—have redirected resources toward non-productive capital accumulation. Meanwhile, micro firms, despite employment growth, could not increase productive capital investment, possibly due to liquidity constraints or the nature of their production processes.

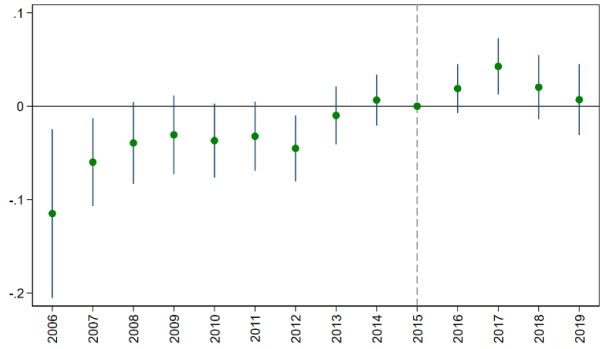
4.3. Capital intensity (K/L Ratio)

In this section, we examine the impact of the 2016 subsidy expansion on capital intensity, measured as the ratio of capital stock to labor input (K/L). Capital intensity provides insight into how firms adjust their input mix in response to changes in labor costs. A decline in labor cost—induced by the subsidy—may reduce capital intensity if firms substitute labor for capital or increase it if firms reinvest cost savings in productivity-enhancing assets alongside labor expansion. As in the previous section, we use the two definitions of capital, i.e., tangible assets and machinery-equipment.

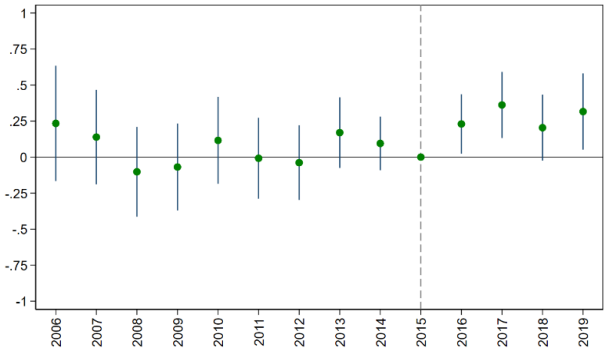
Figure 6 shows the dynamic treatment effects for K/L based on total tangible assets. In Panel B (small firms), there is a clear post-2016 upward shift in capital intensity. In Panels A and C (micro and medium-large firms), the estimates remain close to zero with wide confidence intervals. The results are consistent with the event study results. The only statistically significant result is found for small firms under the capital definition of tangible assets.

Figure 6. Event study estimates of firm capital intensity (K/L) in treated region 4 counties, (K: total tangible assets)

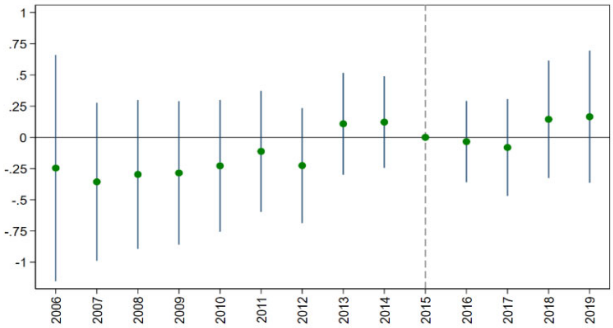
Panel A. Capital intensity in micro firms



Panel B. Capital intensity in small firms



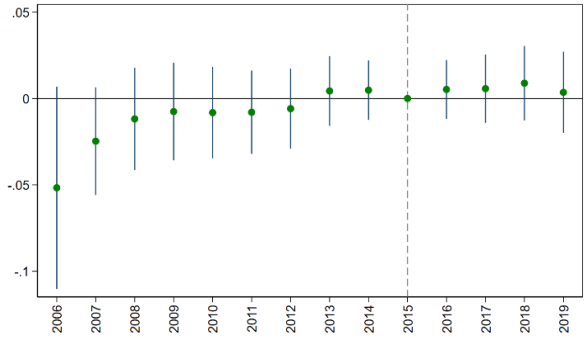
Panel C. Capital intensity in medium and large firms



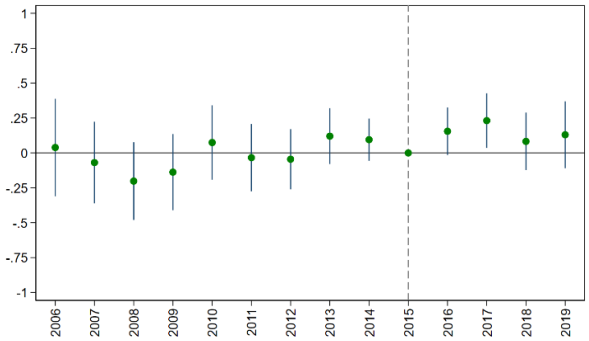
Source: Own estimations using EIS Database. The dependent variable is quarterly firm level capital intensity (tangible assets divided by employment, in natural logs). The figures represent the regression coefficient plots of the interaction between firms in treated counties and year dummies. All estimations include firm fixed effects, year fixed effects, NUTS2 specific linear trends and 4 digit industry-year fixed effects are included. The vertical lines for each coefficient show 95 percent confidence intervals, clustered at province level.

Figure 7. Event study estimates of firm capital intensity (k/l) in treated region 4 counties, (K: machinery and equipment)

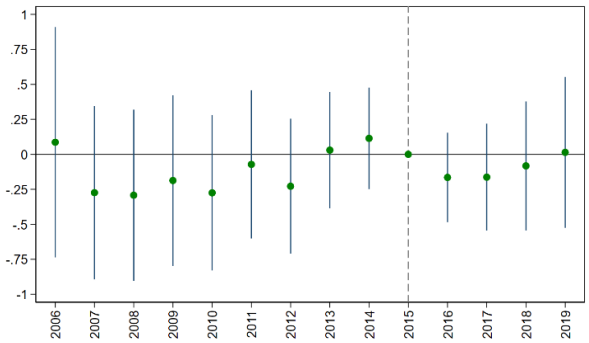
Panel A. Capital intensity in micro firms



Panel B. Capital intensity in small firms



Panel C. Capital intensity in medium and large firms



Source: Own estimations using EIS Database. The dependent variable is quarterly firm level capital intensity (machinery and equipment divided by employment, in natural logs). The figures represent the regression coefficient plots of the interaction between firms in treated counties and year dummies. All estimations include firm fixed effects, year fixed effects, NUTS2 specific linear trends and 4-digit industry-year fixed effects are included. The vertical lines for each coefficient show 95 percent confidence intervals, clustered at province level.

Taken together, the evidence suggests that capital deepening occurred selectively, only at small firms, but for tangible assets not the machinery and equipment. For micro firms, the absence of a capital response alongside employment growth likely reflects a labor-intensive production model or limited access to investment finance. Meanwhile, larger firms do not appear to have systematically adjusted their K/L in response to the policy.

Table 4. Firm capital intensity (K/L) in treated region 4 counties

	Micro	Small	Medium-Large
Panel A: K=Tangible Assets (in logs)			
DID Coefficient	0.0179	0.240**	-0.0770
	(0.0132)	(0.106)	(0.189)
Observations	182,797	16,366	3,278
R-squared	0.793	0.742	0.711
Panel B: K=Machinery and Equipment (in logs)			
DID Coefficient	0.00253	0.102	-0.176
	(0.00828)	(0.0943)	(0.208)
Observations	182,797	16,366	3,278
R-squared	0.792	0.794	0.752
Year FE	Yes	Yes	Yes
4 Digit Industry Year FE	Yes	Yes	Yes
Nuts2 Linear Trends	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

*Notes: Robust standard errors are in parenthesis. Clustering is at the firm level. Outcome variable is capital intensity (K/L) measured by firm tangible assets (Panel A) or firm machinery and equipment (Panel B). *** p<0.01, ** p<0.05, * p<0.1*

4.4. Heterogeneity check by pre-treatment average firm size

To further test the robustness of the findings, we reclassify firms by their average employment during the pre-treatment period (2006–2015). This alternative classification allows us to examine which firms—relative to the original eligibility threshold of 10 employees—were most affected by the 2016 reform. This design helps address potential misclassification caused by temporary employment fluctuations or firm growth and isolates groups more or less likely to be newly treated. Firms are grouped into four size bands based on their pre-reform average employment:

- **1–4 employees:** clearly ineligible before 2016 (micro firms),
- **5–7 employees**: likely close to the eligibility threshold, mostly ineligible,
- **8–12 employees:** near or just above threshold; potentially marginally eligible,
- **13+ employees:** most likely to be eligible pre-reform; expected to serve as placebo.

The results are presented in Table 5, with each row corresponding to a size band and columns reporting DiD estimates for: Log employment (Column 1), Log capital – total tangible assets (Column 2), Log capital – machinery & equipment (Column 3), Capital–labor ratio (K/L) with total tangible assets (Column 4) and Capital–labor ratio (K/L) with machinery and equipment (Column 5).

- **1–4 Employees:** This group shows the strongest and most consistent policy response across all outcomes. Employment rises by 4.93%, and capital stock increases significantly—9.96% for tangible assets and 5.76% for machinery. Capital intensity also

improves, with statistically significant gains in the K/L ratio using tangible assets. These findings challenge the assumption that the smallest micro firms are too resource-constrained to invest and instead suggest that subsidy access can meaningfully enable both labor and capital expansion.

- **5–7 Employees:** This group exhibits positive but statistically insignificant effects across all outcomes. These firms may have been near or partially eligible before the reform, leading to more muted responses.
- **8–12 Employees:** Notably, this group shows statistically significant gains in capital stock and capital intensity, using tangible assets. The coefficient for tangible assets is positive and significant (at the 5% level), and the K/L ratio (based on the same definition) also increases significantly. This indicates that marginally eligible firms responded by investing in broad physical capital, even if employment effects were not statistically significant. The response suggests capital deepening in firms that were already relatively close to full eligibility.
- **13+ Employees:** As expected, no statistically significant effects are observed. These firms were most likely to be eligible before the reform, and their stable post-2016 outcomes serve as a useful placebo check, supporting the validity of the identification strategy.

Table 5. Employment, capital and capital intensity (K/L) in treated region 4 counties

	Employment	Tangible Assets	Machinery & Equipment	K/L (Tang. Assets)	K/L (Mach.&Eqp.)	Obs.
Firm size: 1-4 employees						
DID Coefficient	0.0493***	0.0996**	0.0576*	0.0577*	0.0348	63,630
	(0.0167)	(0.0478)	(0.0312)	(0.0350)	(0.0231)	
Firm size: 5-7 employees						
DID Coefficient	0.00167	-0.0103	-0.121	-0.0112	-0.0461	9,254
	(0.0629)	(0.176)	(0.128)	(0.120)	(0.0868)	
Firm size: 8-12 employees						
DID Coefficient	0.0409	0.567**	0.247	0.389**	0.195	5,869
	(0.105)	(0.266)	(0.244)	(0.190)	(0.162)	
Firm size: 13+ employees						
DID Coefficient	0.0285	0.139	-0.0458	0.0852	-0.0245	23,116
	(0.0921)	(0.147)	(0.166)	(0.0996)	(0.103)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
4 Digit Industry Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Nuts2 Linear Trends	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: Industry-year fixed effects are at 4-digit industry level. Standard errors are clustered at the firm level. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.*

This heterogeneity analysis confirms that the employment subsidy reform had differentiated impacts depending on firms' pre-policy proximity to eligibility thresholds. While the strongest effects are observed in the smallest micro firms (1–4 employees), firms with 8–12 employees also showed significant capital responses—particularly in tangible asset accumulation and capital deepening. These patterns reinforce the finding that relaxing eligibility constraints for small firms can generate multi-dimensional firm growth, both along labor and capital margins.

4.5. Skill composition of labor

In the final component of our analysis, we examine whether the 2016 subsidy expansion affected the skill composition of the workforce. Given the policy's design as a labor cost-reduction tool primarily targeted at formalization and job creation, its potential to induce shifts in the skill profile of employment is theoretically ambiguous. On one hand, lower labor costs could allow firms to hire more skilled workers at reduced effective wages. On the other hand, subsidies may encourage employment of lower-skilled or informal workers, particularly in labor-intensive firms. We evaluate both:

- The share of skilled labor in total employment (Table 6), and
- The level of skilled labor employment, in log terms (Table 7).

Skill categories include total skilled labor, as well as subgroups: managers, professionals, technicians, and craftsmen, based on occupation codes.

Across all firm size categories—micro, small, and medium-large—none of the estimated treatment effects are statistically significant at conventional levels. While some coefficients are positive (e.g., for technicians in micro firms, or total skilled labor in small firms), standard errors are large, and no consistent pattern emerges. A few negative estimates appear (e.g., professionals in medium-large firms), but again, with wide confidence intervals.

Table 6. The share of skilled labor employment in treated region 4 counties

	Total Skilled	Managers	Professionals	Technicians	Craftsmen
Micro firms					
DID Coefficient	0.00108	-0.000313	0.00308	0.00139	-0.0124
	(0.00608)	(0.00224)	(0.00361)	(0.00578)	(0.0132)
Small firms					
DID Coefficient	-0.00264	0.00527	-0.00676	-0.00791	-0.0215
	(0.0180)	(0.00620)	(0.0124)	(0.0171)	(0.0279)
Medium-large firms					
DID Coefficient	-0.00741	0.00598	-0.0402	-0.0134	-0.0105
	(0.0422)	(0.00898)	(0.0234)	(0.0422)	(0.0689)
Year FE	Yes	Yes	Yes	Yes	Yes
4 Digit Industry Year FE	Yes	Yes	Yes	Yes	Yes
Nuts2 Linear Trends	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

*Notes: Industry-year fixed effects are at 4-digit industry level. Standard errors are clustered at the firm level. Outcome variable is the share of employment in total employment. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

These null findings suggest that the subsidy did not materially affect the skill composition of employment. This is consistent with our earlier conclusion that employment gains were concentrated in micro firms, which tend to operate with low-skilled labor and may have limited capacity or incentive to shift toward higher-skilled personnel. It also supports concerns in the literature (e.g., Oskamp and Snower, 2006) that employment subsidies can reduce incentives for skill upgrading, especially when tied to low-wage or informal-sector transitions.

The absence of significant effects on skill upgrading implies that the 2016 subsidy expansion functioned primarily as a job quantity intervention, rather than one that improved job quality or workforce structure.

Table 7. Skilled labor employment in treated region 4 counties

	Total Skilled	Managers	Professionals	Technicians	Craftsmen
Micro firms					
DID Coefficient	0.00517	-0.0107	-0.124	0.140	0.479
	(0.260)	(0.0238)	(0.184)	(0.181)	(0.378)
Small firms					
DID Coefficient	0.308	0.135	-0.0519	0.225	-1.280
	(1.367)	(0.501)	(0.756)	(0.941)	(2.871)
Medium-large firms					
DID Coefficient	-3.550	-7.704	-7.229	11.38	-56.37
	(18.36)	(6.942)	(8.031)	(12.85)	(46.47)
Year FE	Yes	Yes	Yes	Yes	Yes
4 Digit Industry Year FE	Yes	Yes	Yes	Yes	Yes
Nuts2 Linear Trends	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

*Notes: Industry-year fixed effects are at 4-digit industry level. Robust standard errors are in parenthesis. Clustering is at the firm level. Outcome variable is natural log of firm employment. *** p<0.01, ** p<0.05, * p<0.1.*

In sum, the empirical analysis reveals a nuanced but consistent pattern in the impact of the 2016 employment subsidy reform on Turkish manufacturing firms. While micro firms experienced significant increases in employment, small firms responded primarily through increased capital investment—particularly in tangible assets rather than machinery and equipment—and enhanced capital intensity given this definition of the capital. These effects were absent for medium and large firms, suggesting the policy's impact was concentrated among previously ineligible or marginally exposed firms.

Heterogeneity analysis based on pre-treatment firm size further confirms that very small firms (1–4 employees) experienced significant growth across labor and capital margins, while firms near the eligibility threshold (8–12 employees) showed signs of capital deepening. The policy appears to have had no discernible effect on skill composition, as estimates for both skilled labor share and skilled employment levels were statistically insignificant. Overall, the results indicate that the 2016 subsidy expansion functioned effectively as a quantity-focused intervention, stimulating employment and capital accumulation among small firms, without triggering structural upgrading in the workforce.

5. Conclusion

This study examines the firm-level effects of Turkey's 2016 employment subsidy reform, which significantly expanded the scope of existing labor cost support by granting a 6-percentage-point reduction in employer-side social security contributions to all employees of firms in underdeveloped regions—most notably including micro firms for the first time. Using detailed, longitudinal administrative data from the Entrepreneurship Information System (EIS) and a quasi-experimental difference-in-differences design, the study evaluates how firms adjusted not

only their employment levels but also their capital investment, capital–labor ratios, and workforce composition in response to this policy change.

The motivation behind this research lies in the growing but inconclusive literature on whether employment subsidies act merely as short-term job creation tools or whether they also catalyze broader transformations in firm behavior. While prior studies have assessed the effects of such policies on formal employment, relatively little is known about their impact on capital formation, capital–labor substitution, or skill upgrading—particularly in developing and emerging economies. This study contributes to filling this gap by analyzing the heterogeneous effects of the reform across firms of different sizes and stages of formalization.

Our analysis reveals a clear pattern of size-based heterogeneity in firm responses to the policy. The most robust and significant effects were observed among micro firms, which experienced statistically significant employment gains following the reform. These firms had previously been excluded from the subsidy scheme and responded on the extensive margin once eligibility was extended. However, this employment expansion was not accompanied by parallel increases in machinery and equipment investment or capital–labor ratios, suggesting that micro firms used the subsidy primarily to scale labor rather than to transform production technology or input composition.

In contrast, small firms (10–49 employees) exhibited capital deepening in the form of tangible assets, with no significant effects on employment. These results suggest that small firms were more likely to reinvest cost savings into tangible asset accumulation other than machinery and equipment. In other words, firms may have invested in buildings, vehicles, or non-productive fixed assets rather than in productivity-enhancing capital. The impact was especially pronounced in firms near the eligibility threshold prior to the reform (e.g., firms with 8–12 pre-reform employees), pointing to the importance of marginal eligibility status in determining firm responsiveness.

Interestingly, medium and large firms—which benefited the most in absolute monetary terms after the policy shifted from new hires to all employees—exhibited no statistically significant behavioral response in any of the outcomes analyzed. This suggests that for these firms, the policy functioned largely as a fiscal transfer or windfall, with no discernible effect on hiring, investment, or input mix. The absence of any employment or capital response from this group raises questions about the cost-effectiveness of untargeted subsidies and supports arguments in the literature regarding deadweight loss and inefficiency in universal policy designs (e.g., Neumark, 2013; Bloom, 2008).

Turning to the skill dimension, the subsidy appears to have had no significant impact on the skill composition of the workforce across all firm sizes. Both the share and level of skilled employment remained unchanged. This null result complements the non-responsiveness in machinery and equipment investment, reinforcing the interpretation that the policy did not

induce structural transformation or workforce upgrading. The labor and capital adjustments that occurred were primarily extensive rather than qualitative.

These findings carry important implications for both labor economics theory and public policy design. First, the asymmetric responses across firm sizes support theoretical models that highlight the role of credit constraints, production technologies, and marginal incentives in mediating subsidy effectiveness (Petrucci & Phelps, 2005; Crépon & Desplatz, 2003). For micro firms, labor subsidies act as a cost relief mechanism, enabling short-run hiring but without catalyzing more durable investment behavior. In contrast, small firms with more formalized structures may interpret the subsidy as a signal or opportunity for enhancing investment, particularly in tangible capital.

Second, the lack of any observable skill upgrading or capital deepening in technology-intensive assets suggests that subsidies alone are insufficient to push firms toward higher-value production. Without complementary policies—such as vocational training, digitalization incentives, or innovation support—wage subsidies may reinforce low-skill, low-productivity employment structures. This is especially critical in middle-income countries like Turkey, where wage compression, informality, and limited technological absorption remain key challenges.

While the study leverages high-quality data and a credible identification strategy, it is subject to several limitations. First, the analysis uses Intention-To-Treat (ITT) estimates based on firm location and eligibility, not actual subsidy take-up. If compliance varied systematically across firms, the effects may be understated or masked by take-up heterogeneity. Second, the study focuses on short- to medium-run outcomes; longer-term impacts on productivity, survival, or export behavior remain unexplored. Third, the data do not contain education-level information, which would allow for a more precise measurement of human capital changes.

Future research could address these gaps by exploiting administrative data on actual subsidy claims, extending the analysis into the post-pandemic period, and linking firm performance to broader economic outcomes such as innovation, exports, or job quality. Experimental or quasi-experimental evaluations of multi-instrument policy bundles (e.g., wage subsidies plus training or technology adoption grants) would also be highly valuable.

This study provides new and nuanced evidence on how employment subsidies affect firm behavior in a middle-income, high-informality context. The findings suggest that while such policies can stimulate employment and capital accumulation in micro or small enterprises, they are unlikely to drive structural upgrading on their own. Effective labor market policy requires a strategic combination of cost relief, capability building, and investment in workforce quality. Turkey’s experience underscores both the potential and the limits of wage subsidies as a tool for inclusive and productive employment growth.

Reference

Almeida, R., Orr, L., & Robalino, D. (2014). Wage subsidies in developing countries as a tool to build human capital: Design and implementation issues. IZA Journal of Labor Policy, 3(1), 12.

Aşık, G., Bossavie, L. L. Y., Kluve, J., Nas Ozen, S. E., Nebiler, M., & Oviedo Silva, A. M. (2022). The Effects of Subsidizing Social Security Contributions: Job Creation or Informality Reduction? (No. 9904). The World Bank.

Ayhan, S. H. (2013). Do non-wage cost rigidities slow down employment? Evidence from Turkey. IZA Journal of Labor Policy, 2(1), 20.

Balkan, B., Cilasun, S., & Turan, B. (2016, June). The impact of the Turkish employment subsidy programs on increasing the level of social protection for women. In Economic Research Forum Working Papers (Vol. 1022).

Basbuga, H., Kitapci, H., Oguz, E. C., & Elkoca, Y. (2022). Active Labour Market Policies and Macroeconomic Variables on Employment, Informal Employment and Income Effects: The case of Turkey. International Journal of Economics and Financial Issues, 12(2), 72-83.

Betcherman, G., Daysal, N. M., & Pagés, C. (2010). Do employment subsidies work? Evidence from regionally targeted subsidies in Turkey. Labour Economics, 17(4), 710-722.

Bloom, H. S. (2008). The core analytics of randomized experiments for social research. The SAGE handbook of social research methods, 115-133.

Blundell, R., Dias, M. C., Meghir, C., & Van Reenen, J. (2004). Evaluating the employment impact of a mandatory job search program. Journal of the European economic association, 2(4), 569-606.

Crépon, B., & Desplatz, R. (2003). The effects of payroll tax subsidies for low wage workers on firms level decisions. INSEE.

Cruces, G., Galiani, S., & Kidyba, S. (2010). Payroll taxes, wages and employment: Identification through policy changes. Labour economics, 17(4), 743-749.

Daveri, F., & Tabellini, G. (2000). Unemployment, growth and taxation in industrial countries. Economic policy, 15(30), 48-104.

Deidda, M., Di Liberto, A., Foddi, M., & Sulis, G. (2015). Employment subsidies, informal economy and women's transition into work in a depressed area: evidence from a matching approach. IZA Journal of Labor Policy, 4(1), 7.

Fuest, C., & Huber, B. (2000). Why do governments subsidise investment and not employment?. Journal of Public Economics, 78(1-2), 171-192.

Goos, M., & Konings, J. (2007). The impact of payroll tax reductions on employment and wages: A natural experiment using firm level data. Discussion Paper 178, 1-30.

Gruber, J. (1997). The incidence of payroll taxation: evidence from Chile. Journal of labor economics, 15(S3), S72-S101.

Huttunen, K., Pirttilä, J., & Uusitalo, R. (2013). The employment effects of low-wage subsidies. Journal of Public Economics, 97, 49-60.

Judd, K. L. (1987). The welfare cost of factor taxation in a perfect-foresight model. Journal of Political Economy, 95(4), 675-709.

Kugler, A., & Kugler, M. (2009). Labor market effects of payroll taxes in developing countries: Evidence from Colombia. Economic development and cultural change, 57(2), 335-358.

Neumark, D. (2013). Spurring Job Creation in Response to Severe Recessions: Reconsidering Hiring Credits. Journal of Policy Analysis and Management, 32(1), 142-171.

OECD. 2025. Taxing Wages 2025: Decomposition of Personal Income Taxes and the Role of Tax Reliefs. Paris: OECD Publishing.

Oskamp, F., & Snower, D. J. (2006). The effect of low-wage subsidies on skills and employment (No. 1292). Kiel Working Paper.
Petrucci, A., & Phelps, E. S. (2005). Capital subsidies versus labor subsidies: a trade-off between capital and employment?. Journal of Money, Credit, and Banking, 37(5), 907-922.
Shi, S., & Wen, Q. (1999). Labor market search and the dynamic effects of taxes and subsidies. Journal of Monetary Economics, 43(2), 457-495.
Uysal, G. (2013). Incentives increase formal female employment. BETAM Research Brief, 13, 151.

Appendix

Table A1. Countries which were included under region4 after 2020.

Province	Region	County	Subsidy region after 2020
Adana	3	Yumurtalık, İmamoğlu, Karataş, Karaisali	4
Bilecik	3	Gölpazarı, İnhisar, Yenipazar	4
Ankara	1	Haymana, Bala, Çamlıdere	4
Aydın	2	Kuyucak, Germencil, Karacasu, Sultanhisar, Köşk, Buharkent, Yenipazar, İncirliova, Bozdoğan	4
Balıkesir	2	Savaştepe, Dursunbey, Sındırgı Havran, Kepsut	4
Bolu	2	Yeniçağa, Mudurnu, Göynük	4
Burdur	3	Kemer, Ağlasun, Cavdır, Çeltikçi, Yeşilova, Altınyayla	4
Bursa	1	Haymancık, Keleş	4
Çanakkale	2	Bayramiç, Yenice	4
Gaziantep	3	Nizip, Islahiye, Oğuzeli, Nurdağı, Karkamış, Araban, Yavuzeli	4
Isparta	2	Şarkıkaraağaç, Aksu	4
Karabük	2	Eskipazar, Yenice	4
Kayseri	2	İncesu, Felahiye, Yahyalı, Bünyan, Yeşilhisar, Pınarbaşı	4
Konya	3	Kulu, Sarayönü, Hadim, Taşkent, Güneysınır, Kadınhanı, Doğanhisar, Tuzlukçu, Yalıhüyük, Bozkır, Derebucak	4
Denizli	2	Babadağ, Kale, Beyağaç, Baklan, Güney, Çameli	4
Edirne	2	Enez, İpsala, Meriç	4
Eskişehir	1	Alpu, Günyüzü	4
Kırklareli	2	Demirköy, Pehlivanköy	4
Manisa	2	Saruhanlı, Köprübaşı, Ahmetli, Gölmarmara, Selendi	4
Sakarya	2	Kaynarca, Ferizli	4
Mersin	3	Aydıncık, Mut, Gülnar	4
Samsun	3	Kavak, Havza, Alacam, Yakakent, Salıpazarı, Vezirköprü, Asarcık, Ayvacık	4
Zonguldak	3	Kilimli, Gökçebey	4

Source: Aşık et al. (2022)