

Minimum Wages and Firm Employment: Evidence from a Minimum Wage Reduction in Greece*

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Abstract

We investigate firm heterogeneity in responses to minimum wage changes leveraging on a policy reform in 2012 in Greece that introduced a youth sub-minimum through a sharp reduction in the minimum wage that was larger for youth. Using administrative linked employer-employee panel data and a difference-in-differences estimator, we find that, although wages decreased across all firms following the policy reform, adult wages decreased by more, whereas youth wages decreased by less in firms with a higher share of youth in employment. We also find that, in these firms, adult employment increased by more, while youth employment increased by less or even decreased and that these changes reflected mainly new hires rather than job separations. These heterogeneous responses to the change in the minimum across firms are not entirely consistent with the competitive model of the labour market.

Keywords: Minimum Wage, Wages, Firm Employment

JEL Classification: J31, J38, J88

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1. Introduction

There is a vast literature on the employment effects of minimum wages, but the debate among economists has not yet been settled (Manning, 2016). In most cases, evidence comes from minimum wage increases, as decreases are quite rare. Nevertheless, minimum wage decreases may provide an alternative test of the prediction of the competitive labour market model that there is a negative relationship between the level of the minimum wage and employment.

We leverage on the unique case of the drastic reduction of the minimum wage in Greece in February 2012 that was larger among youth – the minimum wage decreased by 32% for those younger than 25 years and by 22% for those who were 25 years old or older – to examine whether employers' responses to the policy were heterogeneous. We use administrative linked employer-employee panel data and a difference-in-differences estimator to identify the short-run effect of this policy on wages and employment of youth and adults across firms with different shares of youth in employment.

We find that, between December 2011 and December 2012, although wages decreased across all firms, adult wages decreased by more, whereas youth wages decreased by less, relative to those of adults, in firms with a higher share of youth in employment. We also find that, in these firms, adult employment increased by more, whereas youth employment increased by less, or even decreased in firms with a sufficiently high share of youth in employment. Our results, however, indicate no significant impact of the reform on job separations, or differences in job separations across firms with different shares of youth – implying that the changes in employment reflect entirely changes in new hires.

Overall, these results suggest heterogeneous responses to the change in the minimum wage across firms that are not entirely consistent with the competitive model of the labour market.

2. Data and Descriptive Statistics

The data used in our analysis were drawn from social security records of the Unified Social Security Fund (EFKA) that includes the population of employees and employers in Greece. Our sample includes all employees in EFKA for whom the last two digits of the social security number match a unique randomly selected two-digit number.¹ Records for these employees and their employers were drawn for every December in 2009, 2010, 2011, and 2012

¹ As the number is drawn from the [00, 99] interval, this selection produces a sample that is approximately 1% of the total population of wage and salaried employees in EFKA. The two-digit number selected is unknown to us.

(descriptive statistics for all variables used in our analysis are presented in Tables A.1 and A.2 in the Appendix). These employees remain in our sample at any given period, provided they remain in wage/salaried employment (otherwise they are coded as “not in salaried employment”).

3. Empirical Strategy

We estimate the impact of the February 2012 minimum wage decrease in Greece on firms and their employees using a differential trend adjusted difference-in-difference (DID) empirical strategy that relies on the policy provision stipulating a higher minimum wage reduction for individuals younger than 25 years. The first implication of this is that young workers may have potentially been more affected by the policy. The second implication is that firms with a higher share of employees under 25 years may have also been affected disproportionately – either due to differences in the wage elasticity of labour demand² or due to differences in labour supply responses (e.g., higher turnover rates due to higher youth turnover).

We estimate the impact of the reform on employee outcomes using a differential trend adjusted DID estimator through the following specification:

$$\Delta O_{ijt} = \beta_0 + \beta_1 T_t + \beta_2 AGE25_{it} + \beta_3 Sh25_{jt-1} + \beta_4 T_t * AGE25_{it} + \beta_5 T_t * Sh25_{jt-1} + \beta_6 AGE25_{it} * Sh25_{jt-1} + \beta_7 T_t * AGE25_{it} * Sh25_{jt-1} + \beta_8' X_{ijt-1} + u_{ijt} \quad (1)$$

where ΔO_{ijt} is the change in the outcome of employee i in firm j between the initial period, $t - 1$, and the following period, t ; T_t is an indicator taking the value 1 for outcome changes between December 2011 and December 2012, and 0 for outcome changes between December 2010 and December 2011, when no youth minimum wage was in place; $AGE25_{it}$ is an indicator taking the value 1 if individual i is younger than 25 years in period t ; $Sh25_{jt-1}$ is the share of employees younger than 25 years in firm j in the initial period, X_{ijt-1} is a vector of pre-treatment individual and firm characteristics, and u_{ijt} is an error term.

In the case of firm-level outcomes, the specification we estimate is as follows:

² This follows from the third Hicks-Marshall law of derived demand (Ehrenberg and Smith, 2012), whereby, under certain conditions, the larger the share of a factor in production, the higher is its own-wage labour demand elasticity.

$$\Delta O_{jt}^F = \alpha_0 + \alpha_1 T_t + \alpha_2 Sh25_{jt-1} + \alpha_3 T_t * Sh25_{jt-1} + \alpha_4' X_{jt-1}^F + \varepsilon_{jt} \quad (2)$$

where ΔO_{jt}^F is the change in the outcome of firm j between the initial period, $t - 1$, and the following period, t ; X_{jt-1}^F is a vector of pre-treatment firm characteristics, and ε_{jt} is an error term.

The inclusion of the level of $Sh25_{jt-1}$ among the right-hand side variables of equations (1) and (2) controls for heterogeneity in outcome trends, in the absence of the treatment, across individuals and firms that differ in the intensity of the treatment received (differential trend adjusted DID). The key identifying assumption of this estimator is that differences in trends between treatment and control groups, in the absence of the treatment, in the post-treatment period are the same as those in the pre-treatment period (see Table A.3 in the Appendix for supporting evidence).

4. Results

Table 1 presents our differential trend adjusted DID estimates of the impact of the reform between December 2011 and December 2012 on employee and firm outcomes produced by estimating equations (1) and (2) respectively. The first column of Table 1 includes results from the estimation of equation (1) using as the dependent variable the change in the individual log daily wage between December 2011 and December 2012 (December 2010 and December 2011 for the pre-treatment period) for individuals who were in wage/salaried employment in both periods, including those who changed employer.³ Results show that adult wages decreased by more in firms with a higher share of youth in total employment in December 2011 (-0.177, p-value 0.000), but youth wage decreases did not differ significantly across firms with different shares of youth.⁴ Estimates of wage decreases among youth relative to adults suggest that youth relative wages decreased in firms with share of youth in employment up to around 18%.⁵ In

³ In this case, as well as in the results on the probability of moving to another employer in column three of Table 1, the sample is restricted to individuals who were employed in both periods, and thus results may be subject to sample selection. While it is difficult to address this using standard sample selection correction methods, as this requires identifying suitable instruments, we have checked whether this is a concern in our case by examining whether the treatment is correlated with selection out of our sample (probability that an individual leaves wage/salaried employment in the second period, conditional that they are in wage/salaried employment in the initial period). Results (available upon request) showed no significant impact of the treatment on the probability that an individual leaves wage/salaried employment.

⁴ The corresponding figure is 0.056, calculated as $-0.177 + 0.121$, with p-value 0.251.

⁵ The difference between the marginal effects of the reform on youth and adult wages for firms with shares of youth in this range was between -0.044 (p-value of the null that the difference is zero, 0.014), for firms with share of youth 0%, and -0.022 (p-value, 0.097), for firms with share of youth 18%. For firms with shares above this

December 2011, these firms were around 93% of firms in the data, accounting for around 58% of total youth employment.

Results concerning the employment effects of the reform, estimated at the firm-level (second panel of Table 1), show that, on average, these were positive across age groups. However, whereas effects on adult and total employment (last two columns of Table 1) are increasing with the share of youth at the firm, for youth employment the opposite is the case. A result of this is that in firms with share of youth in employment higher than 15%, our estimates indicate either an insignificant overall effect of the reform on youth employment or a negative and significant effect.⁶ In our data, these firms correspond to around 15% of all firms and account for 48% of total youth employment in December 2011.

We examine further the dynamics underpinning these employment adjustments in the second and third columns of Table 1. The second column includes estimates of the impact of the reform on the probability of leaving the employer, produced from the estimation of equation (1) using as the dependent variable a binary indicator taking the value 1 if an individual employed at a given firm in December 2011 is no longer employed at the same firm in December 2012 (including both those moving to another employer and those leaving wage/salaried employment⁷) and the value 0 if the individual remains employed in the same firm in December 2012. Results suggest no significant change in job separations between December 2011 and December 2012 for adults (0.006, p-value 0.413) and for youth (0.006-0.034=-0.028, p-value 0.204). Moreover, estimates also show no significant differences in the effect of the reform on separations of adult and youth employees across firms with different shares of youth in employment (adults: 0.055, p-value 0.342; youth: 0.055-0.023=0.032, p-value 0.601). It follows that the positive employment effect of the reform, as presented in the sixth column of Table 1, is driven by an increase in new hires rather than by a decrease in separations; while the evidence of larger increases in adult employment and smaller increases (in the majority of cases) in youth employment in firms with higher shares of youth (columns four and five in Table 1), imply that these firms hired adults at a higher rate than youth.

threshold the effect is statistically insignificant; while it turns positive, but remains insignificant, for firms with youth shares above 36%.

⁶ Based on estimates in column four of Table 1, marginal effects of the reform on youth employment are positive and statistically significant for firms with share of youth in employment below 15% (0.035 at 0%, with p-value 0.000, and 0.0143 at 15%, with p-value 0.077); they remain positive, but are insignificant for firms with youth shares up to 25%; they turn negative, but remain statistically insignificant for firms with youth shares up to 55%; and they become negative and statistically significant thereafter (-0.043 at 55%, with p-value 0.098, and -0.11 at 100%, with p-value 0.024).

⁷ This could include a move to unemployment, inactivity, or self (non-salaried) employment.

The third column presents estimates of the impact of the reform on a subset of separations, associated with moving to another job (probability of moving to another employer). These estimates were produced through estimating equation (1) using as the dependent variable a binary indicator taking the value 1 if an individual, employed at a given firm in December 2011, moves to another firm in December 2012, and the value 0 if the individual remains employed in the same firm in December 2012. Estimates indicate that moves to another employer among adults increased by significantly more in firms with higher shares of youth in employment (0.115, p-value 0.042), whereas, for youth, these moves did not differ across firms with different shares of youth in employment (0.115-0.167=0.052, p-value=0.356). Although, we do not know the reasons of job separations, one could make a conjecture that the result for adults is more likely to reflect higher quits in firms where adult wages decreased by more.

Overall, observed wage and employment adjustments to the reform do not seem to be entirely consistent with a negative relationship between wages and employment, as the competitive model of the labour market would predict. This is because, we find that in some firms (those with youth share in employment higher than 15%), despite the fact that youth wages decreased significantly relative to their pre-reform level,⁸ youth employment either did not change or even decreased. Moreover, this could not be explained in terms of substitution of adults for youth, as youth wages, relative to those of adults, either decreased or did not change in these firms. Therefore, this seems to be more in line with models of labour markets with frictions (Manning, 2016), which predict that, under certain conditions, there can be a positive relationship between changes in wages, arising from a change in the minimum wage, and changes in employment. Also consistent with this is the finding that in firms with a higher share of youth, there were higher decreases in adult wages and higher probability that adult employees move to another firm.

5. Conclusion

We evaluate the short-run impact of a policy reform in 2012 in Greece, where the minimum wage was reduced by more for youth, on individual and firm outcomes. Our key finding is that, although wage and employment adjustments to the reform suggest a negative relationship between wages and total employment at the firm level, this relationship reflects

⁸ Based on estimates in column one of Table 1, marginal effects of the reform on youth wages for firms in this range, are between -0.115 at 15%, with p-value 0.000, and -0.163 at 100%, with p-value 0.000.

heterogeneous responses across firms that are not entirely consistent with the competitive model of the labour market.

Table 1: Differential Trend Adjusted Difference-in-Differences Estimates of the Impact of the February 2012 Decrease in the Minimum Wage on Employee and Firm Outcomes, Dec 2011-Dec 2012

	Employee Outcomes			Firm Outcomes		
	Log Daily Wage	Probability of Leaving the Employer	Probability of Moving to Another Employer	Log Number of Employees below 25	Log Number of Employees above 25	Log Number of Employees
Dec 2012	-0.074*** (0.004)	0.006 (0.007)	0.005 (0.008)	0.026*** (0.006)	0.011*** (0.004)	0.013*** (0.004)
Dec 2012 x Younger than 25	-0.036** (0.016)	-0.034 (0.023)	-0.011 (0.022)			
Dec 2012 x Share of Employees below 25	-0.177*** (0.035)	0.055 (0.058)	0.115** (0.057)	-0.143*** (0.049)	0.084** (0.038)	0.062* (0.037)
Dec 2012 x Share of Employees below 25 x Younger than 25	0.121** (0.062)	-0.023 (0.085)	-0.167** (0.081)			
Observations	37559	51050	40237	22392	22392	22392

Notes: Standard errors clustered at the firm level in parentheses, ***significant at 1%, **significant at 5%, *significant at 10%. In all specifications, the sample is restricted to employees or firms in the private sector and the share of employees below 25 is measured as deviation from the average share of employees below 25 in total firm employment in 2011. Specifications for employees' outcomes include controls for employees' and firms' characteristics, and specifications of firm outcomes include controls for firms' characteristics, all measured in the initial period, but coefficients estimates are not reported. Employee controls include gender, full-time, full daily hours schedule, and occupation (1 digit), whereas firm controls include industry (1 digit), region, share of female and share of full-time employees.

References

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Appendix

Table A.1: Descriptive Statistics of Employee and Firm Characteristics in EFKA Data, Dec 2011-Dec 2012

	Employee Characteristics			Firm Characteristics	
	Dec 2011	Dec 2012		Dec 2011	Dec 2012
Male	0.54 (0.50)	0.54 (0.50)	Share female	0.44 (0.34)	0.46 (0.33)
Age	38.61 (9.73)	38.78 (9.78)	Share under 25	0.07 (0.15)	0.06 (0.14)
Under 25 years	0.06 (0.25)	0.06 (0.25)	Share full-time	0.74 (0.36)	0.71 (0.37)
Full-time	0.71 (0.45)	0.62 (0.49)	Number of employees	45.75 (258.00)	50.07 (286.01)
Full daily hours schedule	0.82 (0.39)	0.79 (0.41)	Share of employees with information	0.27 (0.32)	0.25 (0.31)
Gross monthly base pay	1332.62 (997.08)	1156.98 (991.01)	Monthly pay bill	72640.84 (182090.68)	70320.82 (178501.00)
Monthly days of work	23.17 (4.48)	22.24 (5.54)	Monthly pay bill per employee	1793.91 (1282.63)	1618.93 (1292.10)
Daily wage	56.51 (38.95)	50.29 (38.29)	Total monthly days of work	916.50 (7050.84)	970.06 (7439.64)
Number of observations	27343	25629	Number of observations	20697	18685

Notes: Figures are averages with standard deviations in parentheses. All samples are restricted to employees and firms in the private sector. The monthly pay bill includes base pay, bonuses, and arrears.

Table A.2: Occupation, Industry, and Region Composition in the EFKA Data, Dec 2011-Dec 2012

<i>Occupations</i>	Dec 2011	Dec 2012	<i>Industry</i>	Dec 2011	Dec 2012	<i>Region</i>	Dec 2011	Dec 2012
Managers	0.01 (0.08)	0.01 (0.08)	Agriculture, hunting, forestry, and fishing	0.01 (0.07)	0.01 (0.07)	Attica	0.49 (0.50)	0.50 (0.50)
Professionals	0.07 (0.26)	0.08 (0.27)	Mining, energy, and water	0.01 (0.08)	0.01 (0.08)	North Aegean	0.01 (0.11)	0.01 (0.11)
Technicians and associate professionals	0.08 (0.28)	0.09 (0.28)	Manufacturing	0.16 (0.37)	0.16 (0.37)	South Aegean	0.04 (0.19)	0.04 (0.19)
Clerical support workers	0.29 (0.45)	0.30 (0.46)	Construction	0.10 (0.31)	0.08 (0.27)	Crete	0.06 (0.24)	0.06 (0.23)
Services and sales workers	0.18 (0.38)	0.18 (0.38)	Whole and retail trade, hotels, and restaurants	0.40 (0.49)	0.41 (0.49)	Eastern Macedonia and Thrace	0.04 (0.19)	0.04 (0.19)
Skilled agricultural, forestry, and fishing	0.01 (0.06)	0.01 (0.06)	Transport, storage, and communication	0.05 (0.23)	0.06 (0.23)	Central Macedonia	0.15 (0.36)	0.15 (0.36)
Craft and related trades	0.08 (0.27)	0.07 (0.26)	Banking, Finance, and Insurance	0.10 (0.30)	0.11 (0.31)	Western Macedonia	0.02 (0.13)	0.02 (0.13)
Plant and machine operators	0.09 (0.29)	0.09 (0.29)	Public administration, education, and health	0.09 (0.29)	0.10 (0.30)	Epirus	0.02 (0.14)	0.02 (0.13)
Elementary occupations	0.19 (0.39)	0.18 (0.39)	Other services	0.07 (0.26)	0.07 (0.26)	Thessaly	0.05 (0.21)	0.05 (0.21)
Armed forces	0.00 0.00	0.01 (0.08)				Ionian Islands	0.02 (0.14)	0.02 (0.14)
						Western Greece	0.04 (0.19)	0.04 (0.19)
						Central Greece	0.03 (0.18)	0.03 (0.17)
						Peloponnese	0.04 (0.19)	0.03 (0.18)
Number of observations	27343	25629	Number of observations	20697	18685	Number of observations	20697	18685

Notes: Figures are averages with standard deviations in parentheses.

Table A.3: Differences in Outcome Trends across Firms with Different Share of Youth, Dec 2010-Dec 2011

	Employee Outcomes			Firm Outcomes		
	Log Daily Wage	Probability of Leaving the Employer	Probability of Moving to Another Employer	Log Number of Employees below 25	Log Number of Employees above 25	Log Number of Employees
Dec 2011	-0.012*** (0.003)	-0.011** (0.006)	-0.006 (0.005)	0.013** (0.006)	-0.013*** (0.004)	-0.014*** (0.004)
Dec 2011 x Younger than 25	-0.001 (0.012)	-0.034 (0.023)	-0.006 (0.020)			
Dec 2011 x Share of Employees below 25	0.035 (0.023)	0.084 (0.057)	0.050 (0.052)	0.019 (0.044)	-0.005 (0.033)	0.003 (0.034)
Dec 2011 x Share of Employees below 25 x Younger than 25	-0.020 (0.040)	-0.048 (0.081)	-0.044 (0.075)			
Observations	37559	51050	40237	22392	22392	22392

Notes: Standard errors clustered at the firm level in parentheses, ***significant at 1%, **significant at 5%, *significant at 10%. In all specifications, the sample is restricted to employees or firms in the private sector. Specifications for employees' outcomes include controls for employees' and firms' characteristics, and specifications of firm outcomes include controls for firms' characteristics, all measured in the initial period, but coefficients estimates are not reported. Employee controls include gender, full-time, full daily hours schedule, and occupation (1 digit), whereas firm controls include industry (1 digit), region, share of female and share of full-time employees.