Stimulating part-time work by legal entitlements? Evidence from a German policy experiment using a labour law threshold

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Abstract

Difference-in-difference estimates indicate that the new law on part-time work in Germany has raised the share of part-time workers in those plants that already used part-time employment whereas it has not stimulated the introduction of part-time work in other plants.

Zusammenfassung

Differenz-von-Differenzen-Schätzungen zeigen, dass das neue Teilzeitgesetz in Deutschland zwar den Anteil von Teilzeitbeschäftigten in denjenigen Betrieben erhöht hat, die bereit Teilzeitbeschäftigung einsetzten. Es hat jedoch die Einführung von Teilzeitbeschäftigung in anderen Betrieben nicht angeregt.

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1. Institutional background

On 1 January 2001, a new Law on Part-time Work and Temporary Employment Contracts came into effect in Germany. The law aims to increase the general acceptance of part-time work, prevent the discrimination of part-time workers and safeguard or create jobs. More specifically, the law has facilitated a switch from full-time to part-time work and vice versa, although the employer may refuse an employee's wish to reduce working hours for "business-related reasons" (such as high costs for the firm).

Since employers with 15 employees or less are not subject to this new regulation, the introduction of the law constitutes a sort of natural or policy experiment: By comparing the development of part-time work in establishments with 16 or more employees affected by the new law with that in smaller establishments not subject to the law, it can be analyzed whether entitling workers to reduce working hours is an effective means to stimulate part-time work.

2. Empirical Analysis

Plant-level data on part-time employment and its determinants can be found in the IAB Establishment Panel (Kölling 2000). The representative IAB data show that the existence of part-time employment is positively correlated with plant size. While almost all plants with more than 500 employees did have part-time workers in 2003, this was only the case for one out of two plants with less than ten employees. The (weighted) average share of part-time workers in a plant amounted to 26.6 percent. This average rises to 41.7 percent for those plants with non-zero part-time employment, for which the share of part-time employees decreases with plant size.

Part-time employment (averaged over all plants) has increased through time in Germany. In particular, its average share between 2001 and 2003 is 3.3 percentage points higher than the respective figure for 1998 to 2000. This would be consistent with a positive impact of the new law, but of course other factors may also be responsible.

In what follows, we use a multivariate analysis to investigate how the introduction of the law has influenced part-time employment. We are interested in its impacts on the probability that a plant employs any part-time workers and on the share of part-time workers (within a plant that has part-time employment). The former is estimated with a probit and the latter with a truncated regression.[1] We assume the following relationship:

$$y = \beta_1 x_1 + \beta_2 x_2 + \beta_{12} x_1 x_2 + X\beta + \varepsilon, \qquad (1)$$

where y is either the unobserved propensity to employ any part-time workers or the share of part-time employees within the workforce. X is a vector of control variables that are typically used in studies on the determinants of part-time employment.[2] These include the shares of skilled employees and of apprentices, which are expected to have a negative impact on part-time employment.[3] Since a rise in the standard work week reduces the marginal cost of a full-time compared to a part-time worker, we further expect a negative association between the standard work week and part-time employment. We control for the existence of a works council and for the business cycle of a plant (approximated by the change in total sales), although their expected impact on part-time employment is

[1] Statistical tests and the fact that plant size is positively correlated with the existence of part-time employment in a plant, but negatively correlated with the share of part-time workers in such establishments clearly indicate that a Tobit model would be too restrictive in our context.

[2] Previous microeconometric studies investigating the determinants of part-time work with establishment data include Montgomery (1988), Houseman (2001) and Düll/Ellguth (1999). The latter study is also based on the IAB Establishment Panel.

[3] We do not include the share of female employees since this is clearly co-determined with the share of part-time workers, which would result in endogeneity problems.

theoretically ambiguous. Finally, we include a dummy variable for Eastern Germany as well as six industry dummies.

In order to identify the impact of the new law, we use the facts that it came into effect in 2001 and applies only to plants with more than 15 employees. Thus, x_1 is a dummy indicating that the plant-observation is from 2001 or later, x_2 denotes that the workforce is above 15, and x_1x_2 is an interaction term of these two variables. We compare the change in part-time employment after 2001 in plants below and above the threshold. Assuming that cyclical factors (influencing part-time employment) are equally important for both groups of plants, we can attribute the difference in their development to the introduction of the law. This approach is the classical difference-in-difference estimator, which can be expressed as follows:

$$\alpha_{DD} = \left(E(y \mid x_1 = 1, x_2 = 1) - E(y \mid x_1 = 0, x_2 = 1)\right) - \left(E(y \mid x_1 = 1, x_2 = 0) - E(y \mid x_1 = 0, x_2 = 0)\right) \quad (2)$$

If equation (1) is estimated by a linear method like OLS, then the difference-in-difference is simply given by the estimate of β_{12}. Since this does not carry over to nonlinear models like probit or truncated regression, we will have to simulate the effect following Ai/Norton (2003). As the impact of the new law may depend on plant size, we further replace the dummy variable indicating that the plant has more than 15 employees by four different size categories. This extended specification also includes four interaction terms.

3. Results

Table 1 reports the parameter estimates of the determinants of the existence and extent of part-time employment. We use a pooled sample for 1998 to 2003 that includes three years before and three years after the introduction of the law. Table 1 indicates that (with

one exception) the coefficient estimates of the control variables are statistically significant in all four models estimated. The probability for the existence of part-time employment increases with plant size, while the percentage of part-time workers is lower in large plants. It can also be seen (from the first row of coefficients) that part-time work has become more popular for all plants, both with respect to its existence and extent.

The principle result of course concerns the interaction effect of year and plant size. As can be seen from the third row, its coefficient is highly significant in the truncated specification but insignificant in the probit regression. Hence, one might conclude that the introduction of the law has increased the extent of part-time work in a plant, but not its probability of existence. Allowing the interaction to vary with plant size, it appears that the positive impact on the percentage of part-time workers does not hold for plants with less than 50 employees.

However, in a recent paper Ai/Norton (2003) have shown that in nonlinear models the true interaction effect can differ with respect to magnitude, significance and sign from the coefficient estimate of the interaction term.[4] Following Ai/Norton, the correct estimate of α_{DD} is obtained for the probit model by replacing each of the four terms in equation (2) by the respective predicted probability that part-time work exists. By analogy, for the truncated specification we replace each of the four terms by the respective expected value of the share of part-time workers conditional on being positive. The standard error for the interaction effect is derived by applying the Delta method.[5]

[4] Ai/Norton (2003, p. 123) also point out that "most applied researchers misinterpret the coefficient on the interaction term in nonlinear models" as the true interaction effect.

[5] All computations were performed with Stata 8.2. The marginal effects (and their significance) for the probit model were calculated using the ado-file inteff.ado supplied by Ai/Norton. Our corresponding program for the truncreg-specification is available upon request from the first author of this paper.

In Table 2, we present for both the probit and the truncated model the correct (average) marginal effect of the interaction of the dummy variables, which is our difference-in-differences estimate. The first row shows that the new law did not significantly affect the probability of the existence of part-time work.[6] In contrast, the introduction of the law increased the share of part-time workers (in plants with part-time work) by 1.1 percentage points (although this average estimate is only weakly significant). Model 2 indicates that a clear, statistically highly significant impact of the law can only be found for plants with at least 500 employees. In this group the share of part-time workers has risen by 2.7 percentage points more than in those plants which were not affected by the law.

4. Conclusion

Difference-in-difference estimates indicate that the law on part-time work introduced in Germany in 2001 has slightly raised the share of part-time workers in those (mainly large) plants that already made use of part-time employment whereas it has not stimulated the introduction of part-time work in other plants. While we are not able to infer the aggregate employment effects, our results suggest that entitling workers to reduce working hours is an effective means to facilitate part-time work.

[6] In model (2), the marginal effects for the different size categories in the probit specification are now negative and significant in all but the lowest group. Since most of the larger plants (e.g. 96 percent of those with more than 500 employees) did already have part-time employment before 2001, the slight reduction in the probability of part-time work indicated by these estimates does not imply that plants have given up part-time employment.

References

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Table 1: Determinants of the Existence and Extent of Part-Time Employment in Plants in Germany

	Probit		Truncated Regression	
	(1)	(2)	(1)	(2)
Year[2001+]	0.108 [5.77]***	0.114 [6.09]***	0.044 [3.79]***	0.043 [3.71]***
Plant Size[16+]	0.722 [32.48]***		-0.462 [-27.44]***	
Plant Size[16+] * Year[2001+]	0.004 [0.14]		0.091 [5.36]***	
Plant Size[16,49]		0.507 [19.16]***		-0.386 [-18.66]***
Plant Size[50,199]		0.933 [29.75]***		-0.494 [-21.21]***
Plant Size[200,499]		1.425 [29.15]***		-0.485 [-16.71]***
Plant Size[500+]		1.728 [28.17]***		-0.632 [-19.72]***
Plant Size[16,49] * Year[2001+]		0.058 [1.74]*		0.018 [0.76]
Plant Size[50,199] * Year[2001+]		0.014 [0.38]		0.106 [4.29]***
Plant Size[200,499] * Year[2001+]		0.035 [0.56]		0.101 [3.15]***
Plant Size[500+] * Year[2001+]		0.134 [1.49]		0.193 [5.47]***
Share of skilled employees	0.349 [14.13]***	0.381 [15.27]**	-0.325 [-22.44]***	-0.325 [-22.44]***
Share of apprentices	-0.264 [-3.77]***	-0.160 [-2.29]**	-0.639 [-12.32]***	-0.641 [-12.39]***
Number of normal weekly hours	-0.030 [-12.78]***	-0.026 [-10.77]***	-0.008 [-5.94]***	-0.008 [-6.13]***
Works council (Dummy: 1 = plant has a works council)	0.310 [17.66]***	-0.025 [-1.22]	-0.197 [-17.21]***	-0.166 [-13.03]***
Change in a plant's business activity between two years	0.095 [2.71]***	0.063 [1.78]*	-0.137 [-4.97]***	-0.135 [-4.92]***
East Germany (Dummy; 1 = yes)	-0.529 [-39.68]***	-0.507 [-37.50]***	-0.025 [-2.93]***	-0.028 [-3.28]***
Log Likelihood	-25,419	-24,775	21,541	21,573
$X^2(15/21)$	11,005***	12,293***	3,168**	3,174***
Number of observations	50,635		35,456	

Notes: The dependent variable is a dummy equal to one if the plant employs part-time workers (probit) respectively the share of part-time employees in a plant's total employment, excluding apprentices (truncated regression). Truncated regressions are for plants with non-zero part-time employment only. The regressions also include industry dummies. Numbers shown are coefficient estimates with z-values in brackets. ***, **, * denote significance at the .01, .05 and .10 levels, respectively. The data is taken from the IAB Establishment Panel, 1998-2003.

Table 2: Average Marginal Effects of a Change in the Interacted Variables

	Probit		Truncated Regression	
	(1)	(2)	(1)	(2)
Plant Size[16+] * Year[2001+]	-0.009 [-1.41]		0.011 [1.88]*	
Plant Size[16,49] * Year[2001+]		0.007 [0.01]		-0.003 [-0.47]
Plant Size[50,199] * Year[2001+]		-0.012 [-2.18]**		0.015 [1.94]*
Plant Size[200,499] * Year[2001+]		-0.021 [3.38]***		0.014 [1.58]
Plant Size[500+] * Year[2001+]		-0.022 [3.79]***		0.027 [2.71]***

Notes: Average z-values (calculated according to the Delta method) in brackets. The numbers for different size categories are averages over all plants in the respective size category and in the base category (15 or less).