Labor Concessions and Saving Jobs: Lessons from German Metalworking Industry

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Abstract

Against a background of increasing global competition, trade unions in industrialized countries are increasingly making concessions to firms in order to protect jobs. An important question is whether labor concessions do indeed save jobs and raise firm productivity. In this paper I estimate the effects of a recent labor concession made by Germany's largest manufacturing trade union: the increase in workweek to 40 hours for skilled workers in the metalworking industry as part of the 2004 Pforzheim Agreement. The policy raised the workweek more in West Germany than East Germany, leading me to use a difference-in-differences strategy to identify the causal effect of the labor concession of a longer workweek for skilled workers. Using firm panel data from the IAB Establishment Panel Survey for 2000-2008, I find that total employment in the average firm decreased as a result of the policy extending the workweek. Large firms, with over 500 workers at the policy's outset, benefited more from the policy - they are found to hire more skilled workers (but release more unskilled workers for a net reduction in employment), produce more for export markets and make higher profit, while smaller firms hire fewer skilled and unskilled workers, have lower sales and lower profit, due to the policy. Thus, not only was the 2004 Pforzheim Agreement extending the workweek for skilled workers ineffective at saving jobs, it also increased wage inequality between large and smaller firms.

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1 Introduction

Beginning in the 1990s, economists sought to understand the labor market changes brought by globalization; many view globalization as a force behind labor market (de)regulation (e.g., Potrafke (2010)). Trade liberalization, combined with the regulated domestic labor market makes domestically produced goods more expensive and gives an incentive for firms to relocate abroad (Boulhol (2009)). The common fear is that the unskilled jobs in developed countries will move from the manufacturing (high-wage and tradable sector) to the service sector (low-wage and untradeable). As a result workers' bargaining power decreases (Kramarz (2003), Rodrik (1997)), therefore, workers may agree to certain concessions. The concessions may be reflected in lower wages in sectors exposed to foreign competition (e.g., Borjas and Ramey (1995)) or in any other measures which may make firms more competitive, such as longer and more flexible working hours. The proponents of globalization argue for further liberalization of labor markets as it will help reduce labor costs and increase competitiveness.

This paper analyzes an episode of German labor concessions induced by globalization, and its effect on firm employment and performance. The metalworking industry is the largest industry in Germany, accounting for 55% of industrial employment, and exporting 53% of its output. Growing exposure to competition from low-wage countries (China and East Asia) and the possibility of relocating production to low wage East European countries (Hungary, Czech Republic etc.) resulted in trade union concessions during the 2004 round of negotiations with the employers' organization. The specific concession is the increase in the maximum workweek to 40 hours for skilled workers, and is part of the Pforzheim Agreement (Section 2.1 provides details about the policy). The policy extending the workweek effectively decreases the cost of skilled labor, which firms argued was necessary for increasing innovation and productivity. Deutsche Bank Research (2004) estimated that a return to 40-hour workweek would cut manufacturing labor costs by 11%. According to the employers' organization, shorter working hours

alone make labor costs in German metalworking 27% higher than those in Japan and 24% higher than in the U.S. Longer hours may be a better alternative than cutting wage not only because the latter is not politically feasible, but also because longer hours may bring down labor costs without decreasing purchasing power of workers.

An important question is whether the workweek extension under the Pforzheim Agreement was successful in saving jobs and raising firm productivity. The policy raised the workweek more in West Germany than East Germany, leading me to use a difference-in-differences strategy to identify the causal effect of the labor concession of a longer workweek for skilled workers on firm employment and performance. To assess the validity of the parallel trend assumption (i.e., the change over time in firm outcomes in West Germany would have been the same as what is observed for East Germany had the policy not occurred), I do a placebo test using a manufacturing industry that is unaffected by the policy but faces similar business conditions, the plastics and rubber, paper, wood industry.

Using firm panel data from the IAB Establishment Panel covering 2000-2008, I find that the policy significantly decreases the number of workers. Most of the reduction in employment occurs among unskilled workers; the decrease in the number of skilled workers is small in magnitude and not statistically significant. Therefore, workweek extensions for skilled employees lead to the substitution of unskilled employees with skilled employees, and a weak increase in the share of skilled employees.

Perhaps surprisingly, there is no scale effect - the policy does not significantly impact sales. One possible explanation is that the demand for goods and services is inelastic. An alternative hypothesis is that the labor supply of skilled workers is inelastic, which leads to an increase in wage or non-wage benefits following higher demand for skilled workers. Thus, the cost of skilled labor decreased less than designed by the policy.

The impact of the policy extending the workweek to skilled workers varies by firm size. While large firms significantly increase the share of skilled employees, the opposite is

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happening at medium firms. This difference may stem from an inability of medium firms to hire the desired number of skilled employees due to the shortage of skilled personnel reported by German firms (Hamilton and Quinlan (2008)). The literature indicates that large, exporting firms tend to pay higher wages and be more productive (e. g., Helpman, Itskhoki, and Redding (2011), Bagger, Christensen, and Mortensen (2010), Bernard et al (2007)) which makes them more attractive in the eyes of the job seekers. The policy, by enabling large firms to hire more of skilled workers leads large firms to produce more for export markets and have higher profits. In contrast, the policy leaves medium firms with fewer skilled workers, and leads to lower sales and profits. Thus, the policy contributes to the rising wage inequality between large and smaller firms.

The rest of the paper is organized as follows. Section 2 describes the background on the Pforzheim Agreement and related literature. Section 3 outlines the theoretical predictions of the effect of workweek extensions. Section 4 explains the identification strategy used to evaluate the impact of workweek extension. Section 5 gives a description of the firm panel data used in the empirical analysis. Section 6 presents the estimated effects of workweek extensions. Section 7 concludes.

2 Background and Related Literature

2.1 Background on German Manufacturing and the 2004 Pforzheim Agreement

Manufacturing is considered a core of German economy accounting for 23% of GDP and 25% of employment. The decade of the 2000s was characterized by an increase in global competition in manufacturing, especially from Asian countries. In addition, in 2004, several new Eastern European countries joined the European Union. Germany faced a risk of its companies moving production abroad either to rapidly developing coun-

tries in Asia or the new European Union members (low wage countries such as Czech Republic, Slovakia, Hungary) in order to cut costs of production or to move production closer to newer markets. In this environment, the employment protections won by labor in past decades came under increasing scrutiny.

Most of the employment regulation in German manufacturing is done not through country-wide or state-wide laws, but through negotiations between employers' organizations and trade unions at the industry level. The most important provisions of collective agreements include regulation of job dismissal, wages and nonwage benefits, and working time regulation. Given the growing competitive pressure in manufacturing in the 2000s, employers' organizations argued strongly for the need to cut labor costs and/or increase productivity in order to restore competitiveness. In 2003, the employers' organization in the metalworking industry, the largest manufacturing sector employing 55% of the German industrial workforce, started a media campaign in support of longer working hours. In the same year, Chancellor Gerhard Schroeder threatened unions that he would introduce a new law which would give firms the rights to deviate from collective agreement if the unions did not agree to concessions demanded by their employers.

This difficult political atmosphere, coupled with the trade unions' concern over the possibility of job loss for its members because of outsourcing and offshoring, led to certain concessions during the 2004 bargaining round. In the metalworking industry, unions agreed to extend the workweek from 35 to 40 hours for 50% of employees with high qualifications in a particular firm if the share of such employees at the firm exceeded 50% or if the firm could prove that it promoted innovation. The stated purpose of the agreement was to make German firms more competitive and to save jobs. More details were specified at firm or regional level. Some firms agreed not to reduce total number of jobs, others not to relocate the plant abroad but with the possibility to reduce jobs. This agreement, known as the Pforzheim Agreement, was signed on February 2004 and was applicable at first only to western Germany. In a few months it was extended to eastern

Germany. The driving forces behind the reform were the employers, the major political parties, and the government (Bispinck and Schulten, 2005). [1]

Even though the Pforzheim Agreement covered both East and West Germany, and even though in both areas the policy raised the maximum workweek to 40 hours, it increased the workweek more in West Germany than East Germany due to differences in the pre-reform workweek (only 35 in West Germany, but 38 in East Germany). Thus, the policy permits firms to have skilled employees work five hours longer per week without paying overtime premium in West Germany, and only two hours longer in East Germany. Figure 1, which graphs the mean regular workwork reported by firms by year and region of Germany, shows evidence of a larger increase in workweek hours in West Germany than East Germany after 2004. Indeed, after 2004, there was visible increase in working hours for West German firms, but practically no change for East German firms.[2] Thus, we can think of West Germany as having a higher intensity of treatment to a longer workweek relative to East Germany, and I exploit this variation in intensity of treatment between regions to construct a difference-in-difference strategy to identify the causal effect of increasing the workweek. I detail this strategy in Section 4.

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[1]The Pforzheim Agreement effectively moved the German metalworking industry back to the 40-hour workweek. The German metalworking industry had 40-hour workweek until 1984, when a strike of trade union led to a decrease in a workweek to 38.5 hours. Further step-wise reductions in hours took place until 1995, when a 35-hour workweek was reached in West Germany. Reduction of workweek was combined with greater flexibility in working hours. Starting from the mid-1990s hours didn't have to be spread evenly across each day; instead they had to average out to agreed number over a certain number of months. The collective agreement also allowed both East and West German firms to employ 18% of employees for 40 hours (without specifying the type of workers). However, such clauses were not utilized by firms almost until the end of 1990s, when East and West German firms adopted the practice of flexible hours. This practice of flexible hours did not change with the Pforzheim Agreement.

[2]Prior to 2004 average agreed workweek is above 35 hours in West Germany and above 38 hours in East Germany because 18% of employees were allowed to be employed 40 hours per week in both East and West Germany.

2.2 Related Literature

This paper is related to the recent growing literature on the impact of labor concessions on labor market outcomes, such as employment and wages (e. g., Braendle and Heinbach (2010), Heinbach (2006), Ochel (2003), Massa-Wirth and Seifert (2005)).[3] In the context of increasing competition from rapidly industrializing nations with cheaper input costs, labor concessions are made with the goal of saving domestic jobs, preventing firms from relocating production overseas, and stabilizing the collective bargaining system. Studies in this literature tend to find that labor concessions result in wage decreases (Heinbach (2006), Ellguth, Gerner, and Stegmaier (2012)), however the impact on employment and composition of workers is rather mixed and inconclusive (Braendle and Heinbach (2010), Eichhorst (2012)).

In this paper, I examine an episode of labor concession not previously analyzed - the extension of the maximum workweek for skilled workers in the metalworking industry in Germany as part of the 2004 Pforzheim Agreement. While I am not aware of any research that rigorously evaluates any aspect of the Pforzheim Agreement, there are several papers on the impact of workweek legislation. These papers investigate the effect of a *reduction* in workweek on employment and working hours. The general empirical finding is that a reduction in the workweek increases hourly wage leaving total income unchanged and either has a zero or small negative effect on employment (Hunt (1999a) for Germany, Crepon and Kramarz (2002) for France, Gonzaga, Filho, and Camargo (2003) for Brazil). [4]

Most related to my study are Hunt (1999a) and Andrews, Schank, and Simmons (2004), who study the change in workweek in Germany. First, Hunt exploits variation

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[3]This literature is closely tied to the literature on the effects of employment regulation (see Brown (1999) or Betcherman (2012) for a literature review).

[4]Other studies focus only on hourly wage and actual hours worked as outcome variables (e.g., Skans (2004) for Sweden), or employment and actual hours worked (Varejao (2006) for Portugal, Skuterund (2007) for Canada). Additionally, Estevao and Sa (2008) found that labor turnover increases due to a decrease in workweek in France leaving total employment unaffected.

in timing of adopting shorter workweek between 1984 and 1994 for different industries to estimate the impact of the shorter workweek. Using aggregate industry panel data, she finds that the estimated elasticity of employment with respect to standard hours is between -1.2 and -1. Using individual level data from the German Socio-Economic Panel, she estimated elasticity of actual hours per worker is between 0.8 and 1, and no change in total monthly income of an employee due to a rise in wage rate per hour. Second, Andrews, Schank, and Simmons (2004) focus on 1993-1999 and use firm-level data (IAB Establishment Panel) to estimate the employment elasticity with respect to hours in agriculture, manufacturing, and service industry. The findings indicate that workweek reduction leads to an increase in employment (pro-work-sharing effect) with elasticity of -0.839 in small East German manufacturing plants (mainly employing less than 15 employees), but no work-sharing effects for West Germany and insignificant results for larger East German firms. The authors' attribute this difference to the finding that income compensation is lowest for small manufacturing firms in East Germany following a reduction in workweek.

My study contributes to the existing literature on the effect of workweek policy in two main ways. First, I consider the impact of an increase in the workweek; previous studies have studied the impact of a decrease in the workweek. The extension and reduction of workweek are unlikely to have symmetric effects. Because it is politically infeasible to decrease overall income of workers, policies reducing the workweek are often coupled by an increase in hourly wages to keep workers' income constant. Policies increasing the workweek do not stand to lower total income at existing hourly wages, hence they need not be coupled with a wage change, and indeed the 2004 Pforzheim Agreement did not have any hourly wage change stipulated. Second, I use firm-level panel data; previous studies have used individual-level data, or aggregate industry data (the exception is Andrews, Schank, and Simmons (2004), which focuses on employment and wage outcomes, and does not analyze firm performance measures like I do). Since the theoretical models

used to make predictions about the impact of workweek policy concern the behavior of firms, it is natural to test these models using data on firms.

This study also contributes to the more general literature on wage inequality and its sources (see Katz and Autor (1999), Acemoglu and Autor (2011)). The existing literature documents a significant employer-specific wage component for employees with identical skills (Card, Heining, Kline (2012), Abowd, Creecy, and Kramarz (2002)); with more productive, larger, exporting firms tending to pay higher wages (Helpman, Itskhoki, and Redding (2011), Bagger, Christensen, and Mortensen (2010), Bernard et al. (2007)). My study examines whether the policy of longer workweek for skilled workers is a source of rising wage inequality between firms.

3 Conceptual Framework

The Pforzheim Agreement in 2004 allowed an increase in hours worked per week at the regular wage for highly skilled employees, and left unchanged the maximum workweek and wages for less skilled employees. Thus, the policy reduces the cost of an hour of skilled labor relative to an hour of unskilled labor. This happens in several ways. First, the policy increases the regular workweek threshold beyond which overtime wage must be paid to skilled workers, and hence stands to reduce the cost of skilled labor via reducing the number of overtime hours (since, even for the same total hours worked, some of the hours are reclassified from overtime to regular hours due to the lengthening of the regular workweek). Second, the policy enables the firm to reduce the number of skilled workers to obtain a desired number of hours of work or a desired level of output, and the firm may have profit gains from having fewer workers work longer hours. On the one hand, if coordination issues (meeting with supervisor, team work, setting up equipment, etc) increase with number of employees, there may be productivity gains from a longer

allowed workweek; a longer workweek enables fewer employees to supply a given number of labor hours, lowering coordination costs, raising labor productivity and therefore marginal costs of production. On the other hand, if there are fixed costs associated with hiring a worker (e.g., benefits and bonus payment is paid on a per-worker basis, not on hours of work), then fewer workers would mean lower fixed costs for the firm.

When the relative price of skilled labor increases, what happens to a firm's input choice? We can use the standard neoclassical model of the firm's input choice to make predictions (The exposition below follows Hamermesh (1987)).

Consider a firm using two inputs, skilled labor and unskilled labor (we can also think of this latter category as all other inputs; the reform lowers the price of skilled labor relative to all other inputs, including unskilled labor), to produce some output using a production function described by:

$$Y = F(L_s, L_u) \tag{1}$$

where Y is output, L_s and L_u are labor hours of skilled and unskilled labor respectively. Assume that production function is such that $F_i > 0, F_{ii} < 0, F_{ij} > 0$.

The firm faces a cost constraint:

$$w_s L_s + w_u L_u \leq C^0 \tag{2}$$

Suppose the market input prices are w_s and w_u, then the cost-minimizing bundle satisfies the following conditions:

$$\frac{F_s}{F_u} = \frac{w_s}{w_u} \tag{3}$$

The elasticity of substitution between skilled and unskilled labor is defined as the effect of a change in relative factor prices on relative input use, holding output constant:

$$\sigma = \frac{dln(L_u/L_s)}{dln(w_s/w_u)} = \frac{dln(L_u/L_s)}{dln(F_s/F_u)} = \frac{F_u F_s}{Y F_{us}} \tag{4}$$

The own-wage elasticity of demand for skilled labor hours keeping output and wage of unskilled labor constant is equal to:

$$\eta_{SS} = -[1-s]\sigma < 0 \tag{5}$$

where $s = \frac{w_s L_s}{Y}$ is the share of skilled labor in total revenue.

The cross-elasticity of demand is equal to:

$$\eta_{SU} = [1-s]\sigma > 0 \tag{6}$$

When the effective cost of an hour of skilled labor decreases, the substitution effect states that, if output is held constant (i.e., along the same isoquant), the firm will shift toward an input bundle using more skilled labor and less unskilled labor.

However, following a decrease in marginal costs, a profit-maximizing firm will increase the level of output. The output effect depends on the elasticity of product demand, η, and on the share of skilled labor in the total costs. Thus, we get:

$$\eta_{SS}* = -[1-s]\sigma - s\eta \tag{7}$$

$$\eta_{SU}* = [1-s][\sigma - \eta] \tag{8}$$

Overall, the neoclassical model predicts an increase in number of hours hired of skilled labor (L_s). On the other hand, the impact on number of hours hired of unskilled labor (L_u) is ambiguous, as the substitution and output effects can work in opposing directions. The net direction of impact on hours of unskilled labor depends on the degree of complementarity between the two inputs. If they are substitutes (σ is large), then unskilled labor is substituted with skilled labor, thus, demand for unskilled labor

decreases. If they are sufficiently strong complements in production (σ is close to zero), then demand for hours of both skilled and unskilled labor increases.

Though the prediction for hours of skilled labor is theoretically unambiguous, the implications for the number of skilled workers are ambiguous. This is because the 2004 policy enables fewer workers to perform a given number of hours of work, thus unless the increase in demand for skilled labor hours is sufficiently large, the number of skilled workers may well decrease. The decrease could be magnified in the case when the productivity of an hour of labor is decreasing in the number of workers (e.g., due to coordination costs); here, fewer skilled labor hours are needed to attain a given level of output relative to a case when the productivity of labor hours does not depend on the number of workers supplying them.

Also ambiguous is the overall impact on employment, which is the sum of the impact on number of skilled workers and number of unskilled workers.

The above predictions for labor demand (labor hours and number of workers) depend on the supply of labor hours of skilled workers. When the supply of skilled labor hours is perfectly elastic, then an increase in labor demand induced by the Pforzheim Agreement would lead to an increase in equilibrium labor hours for skilled employees while keeping wage constant. Note the regular hourly wage is unchanged, but there is less use of overtime, lower coordination costs, and/or lower fixed costs of hiring skilled labor hours, and it is these factors that led the relative price of skilled labor hours to decrease in the metalworking industry. When the labor supply curve is not horizontal, but has an upward slope (in the extreme case, it is vertical, and changes in wage do not change skilled labor hours supplied), then the increase in equilibrium skilled labor hours will be less than in the perfectly elastic labor supply case. In the 2000s, Germany experienced a shortage of engineers and IT specialists, two categories of skilled labor used in the metalworking industry (Hamilton and Quinlan (2008)). Thus, even if the Pforzheim Agreement lowered the relative price of skilled labor, due to the limited supply of such

workers, some firms that wished to hire more of these workers at the regular wage rate may not have been able to. Wages for skilled workers could be bid up, or workers may choose firms that offer higher non-wage benefits. Thus, with less elastic labor supply, we can expect a combination of an increase in equilibrium skilled hours worked and an increase in total compensation to workers (though regular wage may not necessarily rise if the extra compensation is through non-wage forms).

What are the predictions of the neoclassical model for output? The model indicates that the more elastic is product demand, the more Y increases when relative price of skilled labor decreases. However, the degree of the scale effect also depends on the elasticity of the supply of the skilled labor. In the case when labor supply is fairly elastic, then we expect firms to produce more (marginal cost curve shifts down, so for a given market price of the output then output increases). However, in the case where some skilled labor used by the metalworking industry is in limited supply, there could be different impacts for different types of firms. Firms able to attract the skilled labor would be expected to increase output. But some firms could be unable to attract the desired number of skilled labor hours, or even lose existing ones, hence their output would increase by less than under the perfectly elastic labor supply case, and indeed their output could even decrease. Given the ambiguous predictions for individual firm output, then the impact on total revenue is also ambiguous.

4 Empirical Framework

A major impetus for the 2004 policy was to preserve jobs in metalworking. Section 3 suggests that it is theoretically ambiguous whether extending the workweek increases or decreases skilled employment and overall employment, and ultimately it is an empirical question whether the policy objective was achieved. It is challenging to

estimate the causal impact of the 2004 Pforzheim Agreement extending the workweek. Simple comparison of employment before and after the reform would not allow us to distinguish between changes caused by the Pforzheim Agreement and changes which would have occurred anyway over time. I use firms in the metalworking industry in East Germany to control for these secular changes over time. The Pforzheim Agreement led to a 5 hour increase in maximum workweek for highly skilled employees in West Germany and only a 2 hour increase in East Germany, hence it is plausible to interpret the reform as increasing the workweek more in West Germany than East Germany even though both regions were subject to the policy. Actual data confirms that West German firms increased the length of workweek more relative to East German firms (as shown in Figure 1, which was discussed in Section 2.1). In particular, this suggests a difference-in-differences strategy in which West German firms are treated to a larger increase in the maximum workweek after the Pforzheim Agreement is made in 2004. The regression model I estimate to isolate the effect of the increase in workweek is:

$$y_{it} = \beta post_t * west_i + \gamma_t + \mu_i + \epsilon_{it} \tag{9}$$

where y_{it} is a dependent variable (e. g., total employment, number of skilled employees, number of unskilled employees, share of skilled employees, sales, export) for firm i observed in year t, $post_t$ is a dummy equal to 1 in the time period from 2005 to 2008 (indicating the post-reform period) and 0 otherwise, $west_i$ is a dummy equal to 1 if a firm is located in West Germany and 0 otherwise, γ_t is a year fixed effect controlling for common time effects and μ_i is a firm fixed effect controlling for all firm time-invariant attributes. The interaction term, $post_t * west_i$ is the variable capturing treatment to a larger increase in workweek. The parameter of interest is β, which gives the difference-in-differences in the outcome (in particular, the post-pre difference for West German metalworking firms less the post-pre difference for East German metalworking firms). This provides the causal effect of the increase in workweek under the parallel trend assumption, i.e., the

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assumption that the change over time in outcome would have been the same in West and East German metalworking firms had the change in workweek not occurred.

A natural concern is the possibility of differential time trends in outcomes in East and West Germany. Indeed firms in East and West Germany tend to face different labor markets (with lower wages, longer workweek and higher unemployment in East Germany), different business environment, different infrastructure, and different firm size distribution with greater prevalence of small firms in East Germany. Note the firm fixed effects (which are a less aggregate formulation of West/East Germany dummies) control not only for firm time invariant attributes per se, but also any region variables that do not vary over time, so this already permits levels of the outcomes to differ due to the differences in the business culture or type of infrastructure as well as other things that are thought to be constant by region over the 2000s. However, East and West German metalworking firms may differ not only in levels of the outcomes, but also in trends in outcomes. For example, even conditional on firm fixed effects, East German firms on average may be growing slower or faster than West German firms in terms of employment. But such differences in trends between East and West Germany are likely to exist not only for the metalworking industry, but also for other manufacturing industries. This motivates me to do a placebo test using data on East and West German firms in another manufacturing industry. In particular, I estimate Equation 9 using data on firms in the paper, wood, and rubber and plastics industry. Similar to the metalworking industry, this industry is also large (accounting for the highest share of total European Union value-added for the industry) and export oriented. Thus it is plausible to believe that in the counterfactual without the Pforzheim Agreement, the region-specific time effects that are observed for the rubber and plastic, paper, and wood industry would have applied for the metalworking industry.

Equation 9 provides the average effect of the increased workweek policy. Motivated by recent literature on wage inequality by firm size (Helpman, Itskhoki, and Redding

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(2011), Bagger, Christensen, and Mortensen (2010), Bernard et al. (2007)) it is also of interest to explore heterogeneity in effect of the policy by firm size. I consider three categories of firm size: small, medium and large firms. [5]

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\begin{aligned}
y_{it} = {} & \beta_1 post_t * west_i + \beta_2 medium_i * post_t * west_i + \beta_3 large_i * post_t * west_i \\
& + c_1 post_t * medium_i + c_2 post_t * large_i + \gamma_t + \mu_i + \epsilon_{it}
\end{aligned}
\tag{10}
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where y_{it} is a dependent variable for firm i at year t, $post_t$ is a dummy equal to 1 in the time period from 2005 to 2008 and 0 otherwise, $west_i$ is a dummy equal to 1 if a firm is located in West Germany and 0 otherwise, γ_t is a year fixed effect and μ_i is a firm fixed effect. The firm sizes variables are defined based on employment in the year 2000: $medium_i$ is a dummy equal to 1 for a firm with 50-499 employees, $large_i$ is a dummy equal to 1 for a firm with 500 or more employees, and the omitted category is small firm with less than 50 employees. The coefficients of interest are β_1, β_2, β_3, where β_1 represents effect of workweek extension for small firms, $\beta_1 + \beta_2$ for medium firms (β_2 gives the difference in effect for medium firms compared to small firms) and $\beta_1 + \beta_3$ for large firms (β_3 gives the difference in effect for large firms compared to small firms).

5 Data

I perform my empirical analysis using data from the IAB Establishment Panel Survey, Waves 2000-2008. These data are provided via remote data access at the Research Data Center (FDZ) of the Federal Employment Agency (BA) at the Institute for Employment Research (IAB). An "establishment" is defined as a regionally and economically separate unit with employees subject to social security taxes. A single firm may consist of few establishments if the units are located in different employment agency

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[5]Small is a firm with fewer than 50 employees in 2000, medium firm has 50-499 employees, and large is a firm with 500 or more employees.

districts or constitute a separate economic unit. However, in the data analysis below, I use establishment, company, and firm as interchangeable terms.

The survey started in West Germany in 1993, and was extended to East Germany in 1996 to become a nationwide longitudinal survey designed to study labor demand. The population of the dataset is represented by all establishments with at least one employee paying social security taxes as of June 30 of the previous year. The sample drawn from the population consists of the establishments from previous year (continuers' sample), non-responders from previous year which want to be surveyed again, "new" establishment numbers (newly founded establishments as well as those acquiring employees subject to social security taxes), and an extension sample.

My analysis is based on establishments in the metalworking industry which stayed in the sample for the entire 2000-2008 period.[6] It is attractive to use a balanced panel of establishments because it removes concerns about whether observed differences over time for variables are due at least in part to year to year variation in sample composition.[7] The decision to use post-2000 data is dictated by a change in the classification of economic activities (from WS73 (only 3-digit code) to WZ93 (5-digit code)) in 2000, which makes industry division comparable only to a limited extent (Bertin et al. (2004)). In addition, many new firms for longitudinal analysis were added in 2000, thus, if we want to keep a balanced panel, the sample will be much smaller if we start with an earlier year.

I make the following additional sample restrictions. First, I do not include firms located in Berlin for this analysis because originally the eastern part of Berlin was counted as East Germany and the western part as West Germany, but in 2006 IAB changed the

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[6]Firms in this industry engage in the manufacturing of fabricated metal products, including manufacturing of machinery and equipment, motor vehicles, other transport equipment, and precision and optical equipment.

[7]While it would be of interest to study the impact of the 2004 workweek extension policy on firm entry and exit, the IAB Establishment Panel Survey data is not well suited to study entry and exit decisions—the survey does not cover the universe of firms, and thus leaving and entering the sample does not map into closure and opening of the business. For example, a firm may leave the sample due to non-response, not necessarily firms relocation or closure. The response rate for the orally interviewed continuer establishments was between 81% and 84%. My results based on the nine-year balanced panel pertain to relatively established firms.

classification and Berlin is counted East Germany since then. Second, I eliminate firms which changed industry in order to ensure that the establishment is engaged in the metalworking industry and therefore subject to the Pforzheim Agreement. Finally, I exclude data from the year 2004 because it is a partially treated year (i.e., the Pforzheim Agreement would have been in effect for part of the year). Thus, 2000-2003 are the pre-policy years and 2005-2008 are the post-policy years for my empirical analysis.

The resulting sample has 268 firms over seven years for a total of 1876 firm-year observations. Firms are divided into small (< 50 employees), medium (50 - 499 employees), and large (500 and more employees) based on the firm total employment in 2000. While East and West Germany are dominated by small and medium firms, West Germany has higher share of large firms than East Germany. The IAB database offers a rich set of variables. My empirical analysis uses two sets of outcome variables. First are the employment outcomes: total employment, number of skilled employees, and number of unskilled employees. To more explicitly measure the skill mix of workers, I also use as a dependent variable share of skilled employees in total employment. Unfortunately, the dataset does not contain information on total work hours, hours of skilled workers or hours of unskilled labor. Thus, although the theory in Section 3 had predictions for hours of work and number of workers, in practice I will only be able to look at number of workers.

I also use several measures to assess firms performance, including sales, export share of sales, and measures of firm profitability. I use two measures of profitability: operating profit (annual total revenue minus external and intermediate costs minus annualized total wage bill) and profit margin (profit to sales ratio).

Table 1 displays the means and standard deviations of the dependent variables by region (East/West) and time (pre-2004/post-2004). The data indicates that West German firms are larger than East German firms in terms of employment and total sales, they also have higher share of export sales, higher total wage bill, earn higher profit, and have

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higher profit margin (profit to sales ratio). It can be noted that the regression models described in Section 4 allow a different intercept for each firm, thus permanent employment or productivity differences among firms and between East and West Germany will not be confounding factors in interpreting the difference-in-differences estimate of the effect of the policy extending the workweek. However, these differences in levels of outcomes do raise concerns about whether there are different trends in outcomes too, such as if East Germany is catching up to West Germany. For this reason I also examine data on establishments in the paper, wood and plastics and rubber industry. [8]

6 Results

6.1 Main Results

The results from estimating Equation 9 using ordinary least squares (OLS) with the balanced panel data on firms in the metalworking industry are presented in Table 2, Panel A. The reported coefficient is the estimated β, i.e., the difference-in-differences in the outcome named in the column heading. For the average firm in the metalworking industry, the increase in workweek under the 2004 Pforzheim Agreement significantly decreased total employment. The point estimate in Column 1 indicates that on average, the policy decreased total employment of firms by 35 workers. This reduction comes primarily from a reduction in the number of unskilled workers. Column 3 shows that on average, the policy decreased the number of unskilled workers by 31, which is significant at the 5% level. The difference-in-differences in number of skilled workers is also negative but considerably smaller (-3) and not significant at conventional levels. Since unskilled workers had large, significant decreases while skilled workers did not, there is a relative

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[8]Firms in this industry are engaged in the manufacturing of paper and printing, wood products not including furniture, and plastic and rubber products. To form this sample, I impose the same restrictions as I did for forming my sample of metalworking firms used for the main analysis.

shift toward skilled workers. In Column 4, I use the share of skilled workers in total employment as the dependent variable, and find that the policy increased share of skilled workers by 1.3%, indicative of a shift toward skilled labor. However the coefficient is not significant at conventional levels. Though on average the policy extending the workweek lowered total employment for firms, Column 5 reveals that there was no corresponding decrease in sales (the coefficient is small and insignificant), and Column 6 indicates that the share of exports in total sales increased by 2.9% (significant at the 5% level).

The interpretation of the difference-in-differences coefficients just discussed as the causal impact of extending the workweek hinges on the validity of the parallel trend assumption. If firms in East Germany and West Germany would have had different trends in outcomes, then the difference-in-differences coefficients would encapsulate not only the true impact of the increased workweek but also these region-specific trends. To explore whether the estimates are driven by differential trends between East and West German firms, I do a placebo test using an industry that is not subject to the Pforzheim Agreement but likely exposed to the same regional differences in environment for manufacturing firms - the paper, wood, and rubber and plastics industry. In Table 2, Panel B, I report the results from estimating Equation 9 using OLS with the balanced panel data on firms in the paper, wood and plastics industry. The estimated βs, i.e., the difference-in-differences, have nothing to do with the workweek policy change itself (because this policy did not apply in the paper, wood, and rubber and plastic industry) and only have to do with other region-specific differences between the pre-2004 and post-2004 periods.

The results for manufacturing of paper, wood, and rubber and plastics look quite different from the results for metalworking industry - there is an increase (not decrease) in total employment, a shift away (not toward) skilled labor, higher (not lower) sales, and lower (not higher) export shares. The difference-in-differences coefficients in Panel B are either insignificant or of the opposite sign as the Panel A estimates, meaning that while I cannot reject the presence of region-specific time effects for all the outcomes, it

seems that estimates of the policy effect correcting for these differential trends would be in the same direction and larger in magnitude than what is suggested by Panel A. For example, a triple differences estimate of the effect of the policy would suggest that the policy reduced employment by 41 workers (the -35.32 coefficient in Panel A minus the 5.91 coefficient in Panel B, with the subtraction performed to correct for the differential trend). Likewise, triple differences estimates would indicate an even larger shift in favor of skilled workers. Thus, the results from the placebo test using firms from the paper, wood, and rubber and plastics industry lend confidence to the interpretation of the difference-in-differences estimates using firms in metalworking industry as due to the extension of the workweek, rather than driven by differential trends.

Returning to the Table 2, Panel A estimates, it is striking that the policy increasing the workweek for skilled workers significantly decreased total employment. One of the main objectives of the Pforzheim Agreement was to save manufacturing jobs in Germany, and it was primarily for this reason that the trade union made the concession of increasing to a 40-hour workweek for skilled workers. My identification strategy is comparing firms in a region with a higher intensity of exposure to the longer workweek to firms in a region with a lower intensity of exposure, and so is inherently unable to answer the question of the overall impact of the Pforzheim Policy on total employment. However, my results do suggest that a larger increase in the workweek for skilled workers reduces total employment. While the workweek extension policy appears to have protected the jobs of the party covered by it (skilled workers); it significantly reduced the number of jobs for unskilled workers, and, perhaps, the latter is an unintended, or at least unforeseen, consequence.

It is interesting that the impact on the number of skilled workers is negative, relatively small in magnitude (it is considerably smaller than the estimated impact on number of unskilled workers and total employment) and statistically insignificant. This finding, combined with the fact that some firms did take up on the ability to increase the work-

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week of skilled employees granted by the Pforzheim Agreement (see Figure 1), suggests that total skilled labor hours increased at the average firm due to the policy.[9] This is consistent with the theoretical prediction from Section 3 - the increase in the workweek, through lowering the relative price of skilled labor hours, should raise the demand for skilled labor hours.

The impact on the number of unskilled workers is negative, large and significant. Since their maximum workweek was not changed over the time period studied, total unskilled labor hours must have decreased. From this, we can infer that in the neighborhood of the input bundle chosen by metalworking firms in West Germany, skilled labor and unskilled labor are substitutes and the substitution effect dominates the scale effect.

While there is clear evidence of a substitution effect associated with the relative decrease in price of skilled labor, the scale effect is not readily apparent. The scale effect is expected to be positive due to lower cost of skilled labor. We do not see a significant increase in sales. One potential explanation for the lack of a material scale effect is if the market demand for the firm's output was relatively inelastic. For example, it is possible that the domestic market is saturated and the main growth opportunities are in international markets. Indeed I find that the share of export sales increases.

Another potential explanation might lie in the relatively inelastic supply of skilled workers in Germany. Some of the skills valued in the metalworking industry are highly specialized and take years of apprenticeship and experience to develop and refine. Therefore, even if all firms found it optimal to hire more skilled workers due to the policy, it may not be possible to do so due to the limited supply of such workers. The wage of skilled workers may be bid up by firms wishing to attract more skilled labor. Competition in wage and non-wage benefits may shift the distribution of skilled workers across firms in the post-policy period. If large firms had the advantage in hiring skilled workers, then smaller firms which themselves might want to hire more skilled labor might end

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[9]Unfortunately the IAB Establishment Survey does not have data on actual labor hours, thus I am unable to examine labor hours explicitly.

up having fewer skilled workers. The limited supply of skilled workers, higher wages for skilled workers, and potential movement of skilled workers from numerous smaller firms to few larger firms can all contribute to a small or even negative impact on sales for the average firm due to the policy of increasing the workweek.

6.2 Heterogeneity in Effects by Firm Size

A. Effect on Employment and Composition of Workers

Do the effects of extension of workweek differ for firms of different size? To assess this, I estimate Equation 10 using OLS with the balanced panel data on firms in the metalworking industry. For this analysis, I use three categories of firm size: small (<50 employees in the year 2000), medium ($50-499$ employees) and large firms (500 and more employees). The estimation results are displayed in Table 3. While all three firm size members experienced a decrease in the number of employees (though the decline is significant only for medium and large firms), the skill composition of employees changed differentially by firm size. For medium firms, the significant decrease in employment is comprised of a large decrease in the number of skilled employees and a small increase in the number of unskilled workers. For large firms, the reverse is true - they hired more skilled employees and reduced many more unskilled employees. As a result, the share of skilled employees in total employment decreased by 3% in medium firms (sum of the 1.93 coefficient for $post-2004*west$ and -4.86 coefficient for $post-2004*west*medium$), but increased by 5% in large firms (sum of 1.93 and 3.12). That is, though the negative employment effect found for the average firm in Table 2 reflects the experience of firms of all three firm size categories, the shift away from unskilled labor toward skilled labor found for the average firm in Table 2 reflects only the experience of large firms.

One possible explanation for the difference in impact of the policy extending the workweek on employment at medium and large firms is limitation in the labor market.

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Due to the shortage of skilled labor in Germany in the 2000s, and because potential employees may view large firms as more attractive places to work, medium firms may simply not be able to hire more skilled employees even if they wished to do so. In the extreme case where the supply of skilled workers is perfectly inelastic, an additional skilled worker hired by a large firm is hired away from a smaller firm.

To assess whether medium firms have more unmet demand for skilled labor, I analyze whether they employ existing skilled employees for longer hours. I use share of employees working any number of overtime hours as a dependent variable and report the results in Panel A of Table 3. There is no significant difference in impact of the policy on the share of employees working any overtime between medium and large firms. It can be noted, though, that the overtime work measure is rather crude, capturing use of a worker for overtime at the extensive margin only; it would not capture the increase in overtime hours worked among workers who already worked at least one overtime hour in the pre-policy period. A second way I test the hypothesis about medium firm's inability to hire skilled employees is to use questions in the IAB Establishment Panel Survey regarding vacancies. In Table 4, I present the results of estimating Equation 10 using as the dependent variables whether the firm has vacancies and the number of vacancies. The results are consistent with medium firms being less able to fill their positions for skilled labor: they are more likely to have an open position for skilled labor than large firms, and they have a higher number of open positions for skilled labor than large firms.

B. Effect on Firm Performance

When examining sales, we cannot disentangle change in price and change in quantity; we only know what happens to total revenue (price multiplied by quantity). If markets were competitive, and the East and West German output markets were integrated, then controlling for year dummies would control for common shocks including

price, and estimated policy impacts on sales would be interpretable as changes in quantity. In Panel B of Table 3, I find that sales decrease for both medium and large firms by about 11%, but share of export increases by almost 12% for large firms and decreases by 2.9% for medium firms. Small firms have a small, insignificant increase in both domestic and foreign sales. These results are consistent with the existing literature, which finds that more successful exporters (large firms) use higher quality inputs (in our case more skilled labor) (Manova and Zhang (2012)).

Table 3 Panel B also shows that total labor costs (log of total monthly wage bill) went down for both medium and large firms (by 7 and 11% respectively). The reduction in wage bill is perhaps not surprising considering that total employment decreased, and cost of skilled labor hours is lower.

Finally I estimate the impact of the policy increasing the workweek on firm profitability. I use two measures of profit: operating profit (which is revenues minus intermediate and external costs as well as annualized monthly wage bill) and operating profit margin. I find that total operating profit increased by 19% at large firms. Medium firms experienced a decrease in operating profit (-4%). However, there is essentially no impact on profit margin (ratio of profit to sales) across all firm sizes, meaning the amount of profit on every dollar of sales did not change (the point estimate is positive for large firms and zero for medium firms, but these estimates are extremely imprecise).

C. Discussion

The estimation results for large firms taken together suggest the following. The workweek extension policy lowered the price of skilled labor, and large firms successfully hired more skilled labor, and shed unskilled labor, for a net reduction in number of workers. However, this was a more productive bundle of inputs, such that even with fewer workers, they were able to make higher profits. The higher profits arise from two sources:

the wage bill has gone down (due to the lower number of workers and lower effective cost of skilled labor), and production has shifted toward export markets (which apparently is more profitable, as profit is higher despite lower sales).

For medium firms, a different story is suggested. The workweek extension policy lowered the price of skilled labor, however possibly because the supply of skilled labor was relatively inelastic, medium firms are not observed to hire more skilled workers; in fact, they lose both skilled and unskilled workers, leading to a significant decrease in total employment. Because of this change in their input bundle, they are observed to have lower sales and lower profits. The decline in profit is mitigated by the reduction in the wage bill.

These findings by firm size imply that the policy increasing the workweek under the 2004 Pforzheim Agreement contributed to increasing wage inequality between smaller firms and larger firms. The increase in wage inequality arises from two sources. On the one hand, skilled workers are moving out of medium firms to larger firms, hence average wages would decrease in medium firms and increase in larger firms. On the other hand, skilled workers are instrumental in the production of higher profitability products (e.g., products that German firms can be competitive in producing for export markets), so productivity will grow more at larger firms, which can eventually raise the skilled labor price.

7 Conclusion

This paper provides new empirical evidence whether labor concessions save jobs and help firms become more competitive. I analyze what happens to employment, mix of skilled and unskilled workers, wages, total revenue, and profitability following an increase in the length of workweek for skilled employees in German metalworking industry. The difference in the intensity of treatment between East and West Germany (an increase

in the workweek by two and five hours respectively) allows me apply a difference-in-differences analysis to evaluate the effect of the workweek extension. The placebo test using the unaffected industry (manufacturing of plastics and rubber, paper and wood) confirms that the results are not driven by the differential time trend between East and West Germany.

As a result of this policy, firms significantly reduced their workforces, mostly through dismissing unskilled workers. This led to an increase in the share of skilled employees by 1.26%. A significantly large decrease in the number of unskilled employees may be explained by substitution between skilled and unskilled employees as the relative price of the former group decreased. In addition there is no scale effect; sales do not increase. I relate absence of the scale effect to inelastic demand for goods and services and inelastic labor supply of skilled workers. If the main goal of this policy was to not reduce number of jobs, then the desired outcome was not observed.

Not only did this policy not save jobs, but it contributed to further growth in firm heterogeneity, since medium firms did not increase the share of skilled employees (in fact share of skilled labor decreased by 2.9% at medium firms), only large firms did. This increases the productivity of the latter and makes them more competitive in the global market, which is confirmed by the growing share of export sales (by 12%) and higher operating profit (by 19%) for large firms, but not for medium firms, for which both export share and operating profit have decreased (by -2.86% and -4% respectively). As a result, wage inequality between large and smaller firms increases.

While my findings suggest that labor concessions in German metalworking industsy in the form of workweek extension did not achieve the desired results, whether one would get the same outcomes if the reform took place in a different industry, country, or at different time depends on the underlying characteristics of the the labor markets and the industry. My results hold given the inelastic labor supply of skilled workers in Germany and rather inelastic demand for goods and services produced in metalworking industry.

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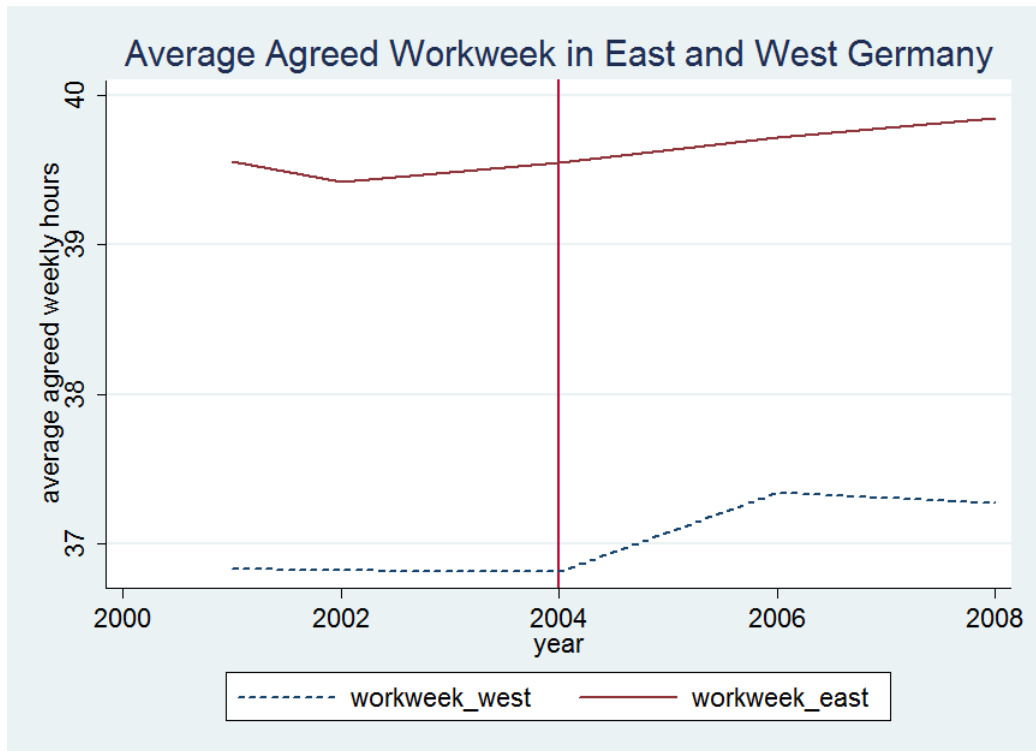
Figure 1: Agreed Average Workweek in East and West Germany

Table 1: Descriptive Statistics for Firms in Metalworking Industry

	All	East		West	
		Before 2004	After 2004	Before 2004	After 2004
Share of small firms in 2000	0.59	0.72	0.72	0.33	0.33
	(0.49)	(0.44)	(0.44)	(0.47)	(0.47)
Share of medium firms in 2000	0.28	0.23	0.23	0.38	0.38
	(0.45)	(0.42)	(0.42)	(0.48)	(0.48)
Share of large firms in 2000	0.13	0.04	0.04	0.29	0.29
	(0.33)	(0.20)	(0.20)	(0.45)	(0.45)
Total number of employees	243	90	94	543	512.6
	(652)	(196.35)	(194.7)	(1046.5)	(993.2)
Number of skilled employees	194	77.73	83.61	403	406.48
	(566)	(181.34)	(181.09)	(895.6)	(889.7)
Number of unskilled employees	36.5	6.13	4.37	114	81.5
	(143)	(21.54)	(18.62)	(261)	(204.6)
Share of skilled employees	74.12	75.08	76.76	68.82	71.78
	(20.85)	(20.72)	(20.19)	(21.96)	(20.53)
Share of employees working overtime	26.24	22.01	28.54	27.59	34.28
	(31.71)	(31.33)	(31.82)	(31.76)	(30.85)
Log sales	15.27	14.48	14.59	16.58	16.7
	(2.32)	(1.66)	(2.03)	(2.31)	(2.33)
Share of export	20.22	10.7	12.99	32.8	37.78
	(29.51)	(21.64)	(23.61)	(31.9)	(35.53)
Total monthly wage bill in euro	758619	196025	241362	1713509	1809770
	(2458491)	(518531)	(579861)	(3851371)	(3958840)
Log of total monthly wage bill	11.31	10.54	10.63	12.63	12.7
	(2.23)	(1.82)	(1.97)	(2.19)	(2.14)
Profit (annual) in euro	13500000	2515813	3316990	28800000	36700000
	(50100000)	(9083236)	(11200000)	(68400000)	(88000000)
Log profit	14.46	13.65	13.77	15.79	15.91
	(2.28)	(1.64)	(1.95)	(2.29)	(2.26)
Profit margin	0.49	0.49	0.48	0.50	0.49
	(0.19)	(0.20)	(0.19)	(0.19)	(0.17)
Number of firms	268	175	175	93	93
Number of firms-year observations	1876	525	700	279	372

Notes: The balanced panel data covers 2000-2008 and includes firms in metalworking sector in East and West Germany from IAB Establishment database (Berlin is excluded from the analysis). The pre-reform period goes from 2000 to 2003, the post-reform period goes from 2005 to 2008. 2004 is omitted because it is a partially treated year. Small firm is defined as a firm with fewer than 50 employees in 2000, medium firm with 50-499 employees, large firm with 500 and more employees. Profit is defined as annual total revenue minus intermediate and external costs minus firm's monthly wage bill in June multiplied by 12. Profit margin is the ratio of profit to sales. Standard deviations in parentheses.

Table 2: Difference-in-Difference Estimates of the Effect of Policy Increasing Workweek in the Metalworking Industry

	(1) Total employment	(2) Number of skilled workers	(3) Number of unskilled workers	(4) Share of skilled workers	(5) Log sales	(6) Share of export
Panel A: Metalworking Industry (True Policy Quasi Experiment)						
post 2004*west	-35.32**	-2.82	-30.99**	1.29	0.01	2.86**
	(5.36)	(6.76)	(5.06)	(1.10)	(0.03)	(1.13)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1876	1876	1876	1876	1874	1873
R-squared	0.0482	0.0057	0.0220	0.0001	0.0021	0.0453
Panel B: Paper, Woods, and Plastics Industry (Placebo Test)						
post 2004*west	5.91**	6.64**	-1.71	-2.01	0.15**	-3.63**
	(2.73)	(3.29)	(3.13)	(2.62)	(0.05)	(1.55)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	693	693	693	693	693	693
R-squared	0.0673	0.0423	0.0013	0.0208	0.1324	0.0057

Notes: The balanced panel data covers 2000-2008 and includes firms inEast and West Germany from IAB Establishment database (Berlin is excluded from the analysis). The pre-reform period goes from 2001 to 2003, the post-reform period from 2005 to 2008. 2004 is omitted because it is a partially treated year. Each coefficient reported in the table comes from a separate regression. Standard errors in parentheses.** significant at 5%, * significant at 10%.

Table 3: Difference-in-Differences Estimates of the Policy Effect by Firm Size in Metal-working Industry

	post 2004*west	post 2004*west *medium	post 2004*west *large	Observations	R-sq
Panel A: Effect on Employment and Composition of Workers					
Total employment	-1.41	-22.68*	-73.98**	1876	0.2368
	(8.15)	(12.42)	(19.09)		
Number of skilled workers	-1.19	-24.24	31.62	1876	0.0464
	(10.54)	(16.05)	(24.67)		
Number of unskilled workers	-0.36	2.62	-96.02**	1876	0.0911
	(7.56)	(11.52)	(17.7)		
Share of skilled workers	1.93	-4.86*	3.12	1876	0.0148
	(1.72)	(2.62)	(4.02)		
Share of employees working overtime	-0.57	3.61	5.60	1217	0.0119
	(4.67)	(7.01)	(11.12)		
Panel B: Effect on Firm Performance					
Log sales	0.04	-0.15**	-0.15	1874	0.0887
	(0.05)	(0.07)	(0.11)		
Share of export	1.08	-3.94	10.91**	1873	0.1395
	(1.75)	(2.67)	(4.11)		
Log total monthly wage bill	0.04	-0.11*	-0.15	1876	0.0223
	(0.05)	(0.08)	(0.12)		
Log profit	0.12	-0.16	0.07	1874	0.0432
	(0.12)	(0.18)	(0.27)		
Profit margin	0.01	-0.01	0.01	1874	0.0069
	(0.02)	(0.03)	(0.04)		

Notes: The balanced panel data covers 2000-2008 and includes firms in metalworking sector in East and West Germany from IAB Establishment database (Berlin is excluded from the analysis). The pre-reform period goes from 2000 to 2003, the post-reform period goes from 2005 to 2008. 2004 is omitted because it is a partially treated year. Small firm is a firm with fewer than 50 workers in 2000, medium firm with 50-499 workers, large firm with 500 and more workers. Each row comes from a separate regression that also controls for firm and year fixed effects, post 2004 * large and post 2004 * medium. Standard errors in parentheses. Data on share of employees working overtime is not available for all years, leading to fewer firm-year observations. Profit is defined as annual total revenue minus intermediate and external costs minus firm's monthly wage bill in June multiplied by 12. ** significant at 5%, * significant at 10%.

Table 4: Estimated Effects of Policy on Firm Vacancies

	post 2004*west	post 2004*west *medium	post 2004*west *large	Observations	R-sq
Open positions for any type of worker (yes=1, no=0)	-0.07 (0.06)	0.04 (0.09)	0.07 (0.14)	1876	0.0854
Number of open positions for any type of worker (including zeros)	-0.08 (1.06)	-0.23 (1.61)	-0.21 (2.47)	1876	0.0027
Open positions for skilled workers (yes=1, no=0)	-0.08 (0.05)	0.07 (0.07)	0.0006 (0.11)	1876	0.0443
Number of open positions for skilled workers (including zeros)	-0.19 (0.88)	0.47 (1.34)	-5.91** (2.06)	1876	0.0003
Open positions for unskilled workers (yes=1, no=0)	-0.02 (0.02)	-0.01 (0.02)	-0.05 (0.04)	1876	0.0045
Number of open positions for unskilled workers (including zeros)	-0.04 (0.15)	-0.004 (0.24)	-0.97** (0.36)	1876	0.0002

Notes: The balanced panel data covers 2000-2008 and includes firms in East and West Germany from IAB Establishment database (Berlin is excluded from the analysis). The pre-reform period goes from 2001 to 2003, the post-reform period from 2005 to 2008. 2004 is omitted because it is a partially treated year. Small firm is a firm with fewer than 50 workers as of 2000, medium firm with 50-499 workers, large firm with 500 and more workers. Each row comes from a separate regression that also controls for firm and year fixed effects, post 2004 * large and post 2004 * medium. Standard errors in parentheses. ** significant at 5%, * significant at 10%.