

Berger, Marius; Lanz, Bruno

Working Paper

Adjusting to minimum wage regulation: Evidence from a direct-democracy experiment in Switzerland

IRENE Working Paper, No. 19-01

Provided in Cooperation with:

Institute of Economic Research (IRENE), University of Neuchâtel

Suggested Citation: Berger, Marius; Lanz, Bruno (2019) : Adjusting to minimum wage regulation: Evidence from a direct-democracy experiment in Switzerland, IRENE Working Paper, No. 19-01, University of Neuchâtel, Institute of Economic Research (IRENE), Neuchâtel

This Version is available at:

<https://hdl.handle.net/10419/213476>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

University of Neuchâtel

Institute of Economic Research

IRENE Working paper 19-01

Adjusting to minimum wage regulation: Evidence from a direct-democracy experiment in Switzerland

Marius Berger

Bruno Lanz

unine

UNIVERSITÉ DE
NEUCHÂTEL

Institut de
recherches économiques

Adjusting to minimum wage regulation: Evidence from a direct-democracy experiment in Switzerland*

Marius Berger[†]

Bruno Lanz[‡]

This version: March 2019

Abstract

We document firms' adjustment channels to minimum wage regulation, leveraging an unexpected Supreme Court ruling mandating the Swiss canton Neuchâtel to enforce a minimum hourly wage of around CHF20 (approx. USD 20) previously accepted via popular ballot. Given policy discontinuity at cantonal borders, we design a simple two-wave survey of restaurants to measure wages, employment, workers characteristics, and prices, and administer it in Neuchâtel as well as in geographically proximate districts of neighboring cantons. Our data covers pre- and post-enforcement outcomes for 113 restaurants, with information on more than 800 employees distributed over two survey waves. Difference-in-differences estimation on restaurant-level outcomes and on the distribution of wages in our sample indicate small and statistically insignificant impacts on employment and prices, although we find evidence of disemployment effects for restaurants with larger workforce and lower pre-treatment sub-minimum wages. Worker-level data further suggests that labor-labor substitution is at work, with an increase in the share of less-qualified workers and employment spillovers for workers with wages above the regulatory minimum.

Keywords: Minimum wage regulation; Wage distribution; Workforce composition; Labor-labor substitution; Low-wage jobs; Restaurant industry.

JEL Codes: J21, J23, J38, C83, R23.

*We would like to thank Michel Dubois, Peter Fiechter, Claude Jeanrenaud, Daniel Kaufmann, Marco Pecoraro and Sylvain Weber for useful discussions and feedback, as well as David Card and Alan Krueger for sharing the questionnaire of their original study (Card and Krueger, 1994). Any remaining errors are ours.

[†]University of Neuchâtel, Department of Economics and Business, Switzerland.

[‡]Corresponding author. University of Neuchâtel, Department of Economics and Business, Switzerland. Mail: A.-L. Breguet 2, CH-2000 Neuchâtel, Switzerland; Tel: +41 32 718 1455; email: bruno.lanz@unine.ch.

Résumé

Ce document offre une évaluation de l'impact du salaire minimum de CHF 19.78 introduit dans le canton de Neuchâtel, premier canton suisse à introduire une telle législation. Le but principal du salaire minimum est de réduire le nombre de travailleurs ayant recours à des prestations sociales. Nous nous concentrons sur le secteur de la restauration, considéré comme particulièrement touché par cette politique. Notre objectif est de quantifier les implications du salaire minimum pour les salaires, l'emploi, et les prix dans ce secteur, et ainsi contribuer au débat en cours dans plusieurs autres cantons suisses sur l'introduction de législations similaires.

Pour quantifier ces impacts, nous avons conduit une enquête téléphonique auprès de 113 restaurants, en deux vagues, interviewés avant et après l'introduction du salaire minimum. Cette enquête nous a permis d'obtenir des données détaillées pour plus de 800 employés répartis sur les deux vagues de l'enquête, notamment sur leur salaire, leur activité au sein du restaurant, leurs qualifications et leur taux d'activité. Une analyse descriptive de notre échantillon montre qu'il est proche des statistiques officielles pour ce secteur publiées par l'Office fédéral de la statistique et par la principale association professionnelle de la branche, GastroSuisse.

Environ la moitié des restaurants interviewés sont dans le canton de Neuchâtel, alors que l'autre moitié est située dans des districts géographiquement proches des cantons limitrophes (Jura, Berne, Vaud et Fribourg). Les restaurants qui ne sont pas concernés par le salaire minimum constituent un groupe de contrôle, ce qui nous permet d'évaluer l'évolution que ce secteur aurait connue à Neuchâtel en l'absence d'un salaire minimum. Ainsi, nous travaillons sous l'hypothèse qu'en l'absence de régulation, l'évolution des salaires, de l'emploi et des prix aurait été la même dans les restaurants du canton de Neuchâtel et dans les zones géographiquement proches. Nous procédons en comparant l'évolution de la situation avant et après l'introduction de la régulation avec celle observée au sein du groupe de contrôle.

Dans un premier temps, l'analyse nous permet de documenter l'augmentation des salaires associée à la législation. Alors que près de 50% des restaurants neuchâtelois déclarent des salaires horaires au-dessous de CHF 19.78 avant l'entrée en vigueur de la régulation (19% des employés), cette proportion est réduite à 10% après (5% des employés). Le plus bas salaire payé par chaque restaurant a augmenté en moyenne d'environ 4% dans les restaurants neuchâtelois, alors que cette augmentation est de 2% dans les restaurants du groupe de contrôle, si bien que

nous estimons l'impact de la législation sur les bas salaires à environ 2%. Le salaire moyen payé dans la restauration n'est cependant pas affecté par la législation.

L'analyse des données ne révèle pas d'effet négatif, en moyenne, du salaire minimum sur le nombre d'employés par restaurant (nombre de postes et équivalents plein temps). Néanmoins, nos données suggèrent que les grands établissements ont réduit l'emploi à la suite de l'entrée en vigueur de la législation, contrairement aux plus petits. Cela peut s'expliquer par le fait qu'un petit établissement a moins de flexibilité pour réallouer les tâches entre employés, et ne peut donc pas réduire l'emploi si les salaires augmentent. L'emploi tend aussi à diminuer auprès des restaurants présentant un écart important entre le plus petit salaire payé avant la législation et le salaire minimum. Ce résultat indique que, pour une minorité de restaurants, le salaire minimum induit une augmentation significative des coûts, entraînant une réduction de l'emploi, alors que pour la moyenne l'impact de la législation est faible et n'a pas de conséquence sur l'emploi.

Les données au niveau des employés indiquent aussi que la plupart des postes payés en-dessous du salaire minimum ont été conservés avec un salaire plus élevé. Cependant, nous observons une diminution des postes avec un salaire au-dessus du minimum légal, ainsi qu'une augmentation de la proportion d'employés sans CFC. Il apparaît donc que certains employés qualifiés payés au-dessus du salaire minimum sont remplacés par des employés moins qualifiés payés au salaire minimum. Un tel ajustement permet de contenir l'augmentation des coûts d'exploitation. Ce résultat contraste avec une absence d'ajustements des prix (soda, café et plat du jour), ce qui peut s'expliquer par une forte concurrence dans le secteur de la restauration.

Dans l'ensemble, les résultats de notre étude indiquent que le salaire minimum a eu un impact limité sur le secteur de la restauration du canton de Neuchâtel. Ce résultat est cohérent avec la faible augmentation de la masse salariale induite par la régulation. Il faut cependant garder à l'esprit que notre approche mesure les impacts à court terme, et qu'un petit groupe d'établissements semble avoir réduit l'emploi et/ou modifié la composition de sa force de travail à la suite de l'introduction du salaire minimum. Ces changements reflètent vraisemblablement une baisse de rentabilité, ce qui pourrait conduire à un effet de composition à plus long terme dans ce secteur.

1 Introduction

Minimum wage regulation is controversial. On the one hand, by increasing wage income for workers in the lower tail of the wages distribution, minimum wage regulation can achieve distributional objectives and reduce reliance of workers on transfer payments by the state (Lee and Saez, 2012). On the other hand, regulation increases the cost of labor for firms, which may imply that some workers loose their jobs (see Allegretto et al., 2017; Neumark and Wascher, 2017, for a recent discussion of empirical results). Achieving higher wages for some workers may thus come at the risk of unemployment for other workers, for example through changes in workforce composition and labor-labor substitution (see e.g. Lang and Kahn, 1998; Giuliano, 2013).

The objective of this paper is to provide evidence on firms's short-term adjustment channels following the introduction of minimum wage regulation. We exploit a plausibly exogenous regulatory shock afforded by a Supreme Court ruling in Switzerland, which led to the enforcement of a minimum wage set at CHF 19.78 (approx. \$20) per hour in the canton of Neuchâtel starting in January 2018.¹ Our empirical work is based on a survey targeting managers in the restaurant industry, and this for three main reasons. First, this sector employs a significant number of workers paid below the regulatory minimum. A report by Council of State of Neuchâtel (2013) suggests that 350 employees earn less than CHF 20 per hour in the restaurant industry of that canton, representing 13 percent of total employment in this sector in 2013. Second, while a large share of minimum wage research focuses on the restaurant industry in the U.S. (see Neumark and Wascher, 2008, for a review), restaurants in Europe arguably employ a wider set of skills and provide a rich context to study firms' adjustment strategies. Finally, focusing on a single industry eliminates potential inter-industry growth differentials unrelated to the regulation, which could confound the estimation of regulatory impacts (Dube et al., 2007).

The questionnaire underlying the survey is largely inspired by the work of Card and Krueger (1994) and measures a number of important outcomes such as employment and prices at each

¹ As we discuss in Section 2, minimum wage regulation was initially accepted during a cantonal ballot in 2011, but a number of appeals were raised to the Federal Supreme Court for violation of constitutional rights. Such appeals, which are relatively frequent in the Swiss direct-democracy system, may invalidate the ballot. We argue that uncertainties in the decision by the court, as Neuchâtel is the first Swiss canton to draft such legislation, together with the abrupt nature of the announcement after years of deliberation, provides a quasi-experimental setup to quantify the impact of minimum wage regulation.

restaurant. In order to document workforce composition effects, we augment the questionnaire to obtain detailed worker-level information on wages, work-time, and worker characteristics for all employees in the restaurants. We administer the questionnaire in September 2017 (before the regulation is enforced), focusing on the situation in the summer season (July and August) 2017, as well as in April 2018 (after enforcement), where we refer to the situation in both spring 2018 and summer 2018 to control for potential seasonal variability. This two-wave approach allows us to measure changes in outcomes (pre- and post-treatment) for participating restaurants and the associated sample of workers.

One key challenge to the identification of minimum wage effects is to credibly estimate counterfactual outcomes for jurisdictions under minimum wage regulation (see Neumark et al., 2014). In our context, we need evidence about how wages, employment, workforce composition and prices would have changed in restaurants of Neuchâtel without regulation. Following a large literature on the topic (see e.g. Card and Krueger, 1994; Addison et al., 2009; Dube et al., 2010; Allegretto et al., 2011; Aaronson et al., 2018), we exploit policy discontinuity at jurisdictional borders and administer our two-wave survey in a set of control areas not subject to minimum wage regulation. Restaurants in the control group are located in geographically proximate districts of neighboring cantons, and are expected to face labor and product market conditions that are comparable to those prevailing in the canton of Neuchâtel, except of course from the introduction of minimum wage regulation (see Allegretto et al., 2017, for empirical evidence supporting this approach).

In this setting, our empirical strategy relies on difference-in-differences (DD), comparing the evolution of outcomes for restaurants in the canton of Neuchâtel against that occurring in neighboring geographical areas. In particular, we use pre- and post-policy wages and employment (both headcount and full-time equivalent, FTE) in control areas to inform counterfactual wages and employment for restaurants in the canton of Neuchâtel. Similarly, we investigate the comparative evolution of workforce composition and prices in treated and control regions. Aside from restaurant-level impacts, we also exploit our worker-level data to document the evolution of the wage distribution in our sample. More specifically, we follow the DD procedure of Harasztosi and Lindner (2015) and Cengiz et al. (2018), and construct a counterfactual post-treatment wage distribution by applying observed changes in the control group to the pre-treatment wage distribution in the canton of Neuchâtel (see also Jardim et al., 2017, for a related

approach). By comparing actual and counterfactual post-treatment wage distributions, we obtain non-parametric evidence on how regulation affects low-wage employment in our sample, and document potential employment spillovers across wage bins.

Our results can be summarized as follows. In the first wave of the survey, 126 restaurant managers completed the questionnaire (60 percent participation rate). Among these, 113 also participated in the second wave (60 in the canton of Neuchâtel), providing detailed information for 846 employees distributed over both survey waves.² Data from the first wave of the survey shows that almost half of the restaurants in the canton of Neuchâtel employ workers below CHF 19.78, while in the second wave around 10 percent still had workers paid below the regulatory minimum.³ Regression-based DD results suggest that part of this decline can be attributed to an industry-wide trend, although regulation is nevertheless estimated to induce a statistically and economically significant reduction in the share of restaurants paying low-wage jobs in Neuchâtel. Moreover, consistent with the intent of the regulation, the lowest hourly wage paid by restaurants increases by two percent on average relative to control (p-val.<0.05).

Despite a decrease in the prevalence of low wage jobs, we find no change in average wages paid by restaurants, suggesting that the regulation has a small impact on restaurants' operation costs at the average. This is confirmed by the fact that, for worker with an hourly wage below the regulatory minimum of CHF 19.78 before the regulation, average wage is CHF 18.77, which implies that the wage increase is relatively small. Our data also shows no impacts of regulation on restaurant-level headcount and FTE employment, which is in line with a large empirical literature finding no or modest employment effects associated with minimum wage regulation. For example, a number of papers study the impact of the 1992 increase in minimum wage in New Jersey, using outcomes in neighboring Pennsylvania to construct local comparisons, with Card and Krueger (2000) reporting no disemployment effects and Neumark and Wascher (2000) finding small negative employment effects. Studies on minimum wage regulation in Europe also report mixed results, with estimates either statistically insignificant or close to zero. For exam-

² Note that, throughout the paper, we exclude data for restaurant managers and members of their family who work in the restaurant. First, these employees are often part of restaurant ownership, and as such they are not subject to minimum wage regulation. In fact, these wages are expected to mainly reflect profitability of the activity. Second, only 29 managers accepted to report their wage rate (a non-response rate above 70 percent).

³ While this result is in line with anecdotal evidence on non-compliance in this context (Giroud, 2018), we may over-estimate compliance given possible measurement error and strategic misreporting by restaurant managers. We come back to non-response and potential selection effects below.

ple, Metcalf (2008) and Leonard et al. (2014) report that the 1999 minimum wage regulation in the U.K. had no significant impact on employment, while Machin et al. (2003) provides evidence that the policy affected specific sectors, resulting in a small reduction of employment and hours worked in the residential care home industry. Similarly, evidence from the 2015 minimum wage regulation in Germany by Ahlfeldt et al. (2018) suggests no significant negative employment effects.

This paper mainly contributes to the literature documenting alternative channels through which minimum wage regulation affect firms. While we find that restaurants did not adjust prices, which is consistent with evidence reviewed in Lemos (2008), firm-level employment effects are found to be heterogeneous along two dimensions. First, using pre-treatment employment as a measure of workforce size, we find that restaurants with more workers do reduce employment in response to the regulation. This result is in line with Ropponen (2011), who shows that large restaurants reduced employment following the 1992 minimum wage increase in New Jersey, at least partly explaining differences in the findings of Card and Krueger (2000) and Neumark and Wascher (2000) mentioned above. Second, we find that higher exposure to regulation, as measured by the wage gap between the lowest pre-treatment wage and the regulatory minimum, is associated with a more pronounced disemployment effect. Taken together, these results suggest that reduced employment is used as an adjustment margins by some restaurants, so that negative profitability impacts and industry composition effects cannot be ruled out over the longer run.

We also contribute to the literature on minimum wage regulation by exploiting our detailed workers-level data to quantify the evolution of the wage distribution and study workforce composition effects. In particular, the DD wage distribution analysis reveals the presence of spillovers for wage bins up to CHF 6 above the regulatory minimum. We find that the decline in employment below the regulatory minimum induces bunching in the wage bin just above, as well as a decline of employment in the subsequent wage bin. In relation to this, we find evidence that the proportion of non-qualified workers increases in restaurants subject to minimum wage regulation relative to control. This finding is consistent with imperfectly competitive models of the labor market, and is related to Giuliano (2013) who shows that an increase in the relative wage of teenagers following an increase of minimum wage in the U.S. led to higher employment for this group of worker. In our context, it indicates that restaurants compensate an increase in

labor cost by substituting high-wage workers with less-qualified workers paid at the regulatory minimum.

The remaining of the paper is structured as follows. In Section 2 we briefly summarize the institutional background that led to the introduction of minimum wage regulation in the canton of Neuchâtel. Section 3 describes the details of our empirical strategy. In Section 4 we provide empirical results derived from our survey. Section 5 concludes.

2 Institutional background and timing of the regulation

In November 2011, 54.64 percent of voters in the canton of Neuchâtel supported the introduction of a minimum wage in the constitution of the canton.⁴ Following the ballot, cantonal authorities established an extra-parliamentary commission to draft the constitutional amendment. The proposal, finalized in November 2013, targeted a *real* wage rate of CHF 20 (approx. \$20) per hour for all employees in the canton, an amount selected to reduce the need for low-wage workers to seek welfare benefits in order to supplement their work income (see Council of State of Neuchâtel, 2013).

Parliamentary discussions on the application of the amendment went on until May 2014, when the parliament accepted a project based on the original CHF 20 per hour wage rate, but with some exemptions (such as independent workers and those in the agricultural sector). In July 2014, however, a number of appeals were brought to the Federal Supreme Court of Switzerland, and these lead to the suspension of the constitutional amendment. One appeal, which involved the main organization representing restaurant owners (GastroNeuchâtel), claimed that such legislation was contrary to the constitutional principle of economic freedom (see Federal Court, 2017). While the Federal Court regularly invalidates ballot procedures if a constitutional right is violated, after an extended period of deliberation the court rejected all the appeals and communicated its decision on August 4, 2017.

Given the unexpected nature of the court ruling and its unanticipated timing, a number of important details remained unknown. This includes the minimum wage rate adjusted for inflation. Therefore, on October 25 2017 cantonal authorities officially announced the imple-

⁴ Any changes to the constitution of the canton of Neuchâtel is automatically submitted to a popular vote. In the present case, the constitutional amendment stems from the cantonal parliament.

mentation of the regulation, with a minimum wage rate adjusted to CHF 19.78 to match price indexation, and compliance controls starting in January 2018 (Bysaeth, 2018) to allow for a short period of adaptation. This made Neuchâtel the first Swiss canton to introduce a minimum wage in its legislation.

Estimates produced during parliamentary discussions suggest that minimum wage regulation would affect 2,700 FTE workers across all sectors in the canton of Neuchâtel, and would cost employers around CHF 9 millions, corresponding to a 0.21 percent increase in the total wage bill of the private sector. Given the relatively small number of employees earning less than CHF 20 per hour at that time (incl. 350 FTE in Neuchâtel's restaurant industry), the report argues that this new legislation would not have negative employment impacts. Importantly, one reason for the relatively small number of affected workers in the restaurants of Neuchâtel industry is the existence of a collective labor agreement (CLA) between employers and employees. The CLA applies to all Swiss-cantons and specifies a minimum hourly wage of CHF 18.98 in small restaurants, CHF 19.58 in seasonal restaurants, and CHF 20.33 in others (ordinary) restaurants.⁵ While all firms have to comply with a CLA negotiated in their sector of activity, exemptions are possible and compliance controls are not systematic. Nevertheless, in principle only small and seasonal restaurants are expected to be affected by the regulation, and even for those the magnitude of the wage increase is relatively small.

We close this section by noting that, while no other Swiss cantons had enforced minimum wage regulation at the time of our survey was administered, such regulation regularly comes up in the political agenda of both individual cantons and at the federal level. For example, the canton of Jura enforces a minimum wage since January 2019, Ticino voted in favor of a minimum wage in 2015 and is expected to adopt the associated legislation, and Geneva, who initially voted against minimum wage regulation during a 2011 ballot, is expected to vote again on the topic as a result of a 2018 popular initiative. At the Federal level, a popular initiative for a minimum wage of CHF 22 per hour was rejected with 73.6 percent of the votes in 2014 (this outcome did not affect the direct democracy procedure following the constitutional change in the canton of Neuchâtel).

⁵ These figures are from the CLA settled in January 2017 (Kontrollstelle L-GAV, 2017). Small restaurants are all restaurants employing less than four FTE employees (excluding the manager, but including the manager's family members), while seasonal restaurants are those which experience one or several peak seasons (defined as a period of 3 to 9 months in which average monthly turnover is at least 35 percent higher than in other months).

3 Empirical strategy

This section describes our empirical strategy. First, we present the questionnaire and its administration to restaurants in the canton of Neuchâtel and neighboring areas. Second, we introduce a set of econometric models used to quantify the impact of minimum wage regulation.

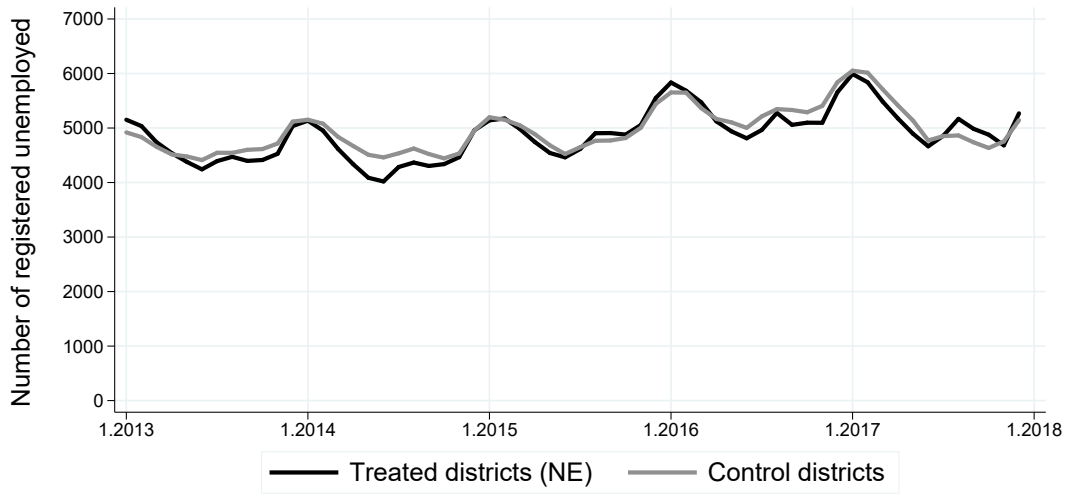
3.1 Survey instrument

The main objective of the survey is to obtain detailed firms-workers data covering pre- and post-regulation for a sample of restaurants in the canton of Neuchâtel as well as in control areas where no regulation is enforced. We follow the approach of Card and Krueger (1994) and design a two-wave survey administered before and after minimum wage regulation is enforced in January 2018.

The questionnaire for the first wave, administered in September 2017, closely follows the structure used by Card and Krueger (1994). We start by eliciting information about opening times, number of meals served, as well as employment and working contracts in the restaurant. To avoid idiosyncrasies associated with the end of peak season (e.g. for seasonal restaurants), the questionnaire explicitly refers to the situation prevailing during the summer season (July and August 2017). The questionnaire also measures prices for a number of key products that can be compared across restaurants.

A notable difference with Card and Krueger (1994) is a set of questions focusing on worker-level information for all employees of the restaurant, including hourly wages, working hours, workers' qualifications, occupation within the restaurant, and family ties with the manager. These additional questions serve two objectives. First, employment and skills in Swiss restaurants is more heterogeneous as compared to U.S. fast food industry considered in Card and Krueger (1994). Data on individual workers is therefore important to capture differences across skills and occupations. Second, worker-level data can be used to study changes in the distribution of wages in the sample, and complement a restaurant-level approach used in Card and Krueger (1994). For restaurants in the canton of Neuchâtel, the last section of the questionnaire focuses on the introduction of a minimum wage. This provides evidence on expectations about upcoming regulation by restaurant managers, including impacts on operation costs, profits and overall management.

Figure 1: Pre-treatment trends in regional unemployment (data: SECO, 2018)



Restaurants invited to take part in the first wave of the survey are selected on the basis of their geographic location. For those in the canton of Neuchâtel, we construct a list of restaurants by merging all entries from the commercial registry in the canton of Neuchâtel and those from the official online directory. For the control group, we follow Dube et al. (2010) and Allegretto et al. (2011) and focus on restaurants located in comparable geographical areas of contiguous cantons, namely french-speaking parts of Bern and Fribourg, the canton of Jura, as well as the district “Jura-Nord vaudois” in Vaud. To document comparability of local labor markets in treated and control regions, Figure 1 provides long-run trends in the total number of registered unemployed workers.⁶ This suggests that both regions are similar in terms of the scale and trend of unemployed workers. Based on this, we proceed by constructing a list of restaurants in control areas using again the commercial registry and official online directory.

We then randomly draw restaurants from the lists in control and treatment areas and we seek to liaise with restaurant managers via the registered phone number. Managers contacted are invited to participate in an independent academic study on economic opportunities in the restaurant sector, and we offer a CHF 30 financial compensation for the time dedicated to our survey. Table 1 summarizes survey administration and response rates across survey areas. We

⁶ The data is available from SECO (2018) and covers all districts in the canton of Neuchâtel, while districts included in the control group are: Jura bernois, La Broye, Jura-Nord vaudois, and all districts in the canton of Jura. Note that this data does not distinguish across sectors or activities.

Table 1: Data collection summary across survey waves and sampling regions

	Total	Control group					Treatment group
		All	Jura	Fribourg	Vaud	Bern	Neuchâtel
<i>First wave (September 2017)</i>							
Manager contact	210	105	33	28	12	32	105
Participants	126	62	28	18	5	11	64
Response rate (%)	60.00	59.05	84.85	64.29	41.67	34.38	60.95
<i>Second wave (April 2018)</i>							
Permanently closed	2	1	1	0	0	0	1
Manager contact	124	61	27	18	5	11	63
Participants	113	53	25	15	4	9	60
Response rate (%)	91.29	86.89	92.59	83.33	80.00	81.82	95.24
Attrition (%)	10.32	14.52	10.71	16.67	20.00	18.18	6.25

Notes: This table summarizes participation in the phone-based survey across waves and sampling areas. Restaurants in the control group are in the canton of Jura, and the districts Jura bernois, La Broye, and Jura-Nord vaudois.

reached 210 restaurant managers randomly drawn from the list, equally split between treatment and control groups.⁷ Among these, 126 (60 percent) completed the first wave of the survey. While participation rate in the first wave varies slightly across cantons in the control areas (lowest for Bern with around 35 percent participation rate, highest for Jura with almost 85 percent), it is very similar across treatment and control groups, with 60.95 percent in the canton of Neuchâtel and 59.05 percent in control areas.

The second wave of the survey, administered in April 2018, focuses on post-treatment outcomes for the set of restaurants that participated in the first wave. We keep the same structure for the questionnaire, but ask managers to report employment and wage data for both spring 2018 and summer 2018 projections in order to account for possible seasonality effects. We also shorten the questionnaire by dropping redundant questions, and increase financial compensation offered to participants to CHF 50 in an attempt to minimize attrition.

As shown in Table 1, the second wave includes data for 113 restaurant, and the implied attrition rate of about ten percent is broadly line with Card and Krueger (1994). In the canton of Neuchâtel, one restaurant ceased operations, and three managers refused to participate,

⁷ Note that for the canton Vaud we focus on a single district, so that the number of contacts for this canton is comparatively small.

yielding a sample of 60 restaurants with data for the two waves. In the control group, one more restaurant closed down, and eight refused to participate, for a total of 53 restaurants in control areas.

3.2 Econometric estimation

We now detail how we exploit data derived from our survey. We begin with a restaurant-level DD approach quantifying average impacts of minimum wage regulation across restaurants in Neuchâtel compared to control. We then turn to a distribution-based approach, which we use to investigate employment impacts across the distribution of wages in our sample.

For both approaches, causal identification of policy impacts rests on an assumption that, in the absence of minimum wage regulation, outcomes for restaurants of the canton of Neuchâtel would have followed the same trend as those in control areas.⁸ While we cannot use data from our survey to document the plausibility of this assumption before treatment, it motivates our choice of geographically proximate control areas building on results in the existing literature (e.g. Dube et al., 2010; Allegretto et al., 2011, 2017) and observed pre-treatment evidence on unemployment trends reported in Figure 1.

3.2.1 Restaurant-level outcomes

Denote outcome j for restaurant i at time t as Y_{jit} . The set of outcomes j includes the share of sub-minimum wage workers, FTE employment, or the price of a glass of soda for example. The set of time periods is *summer 2017*, *spring 2018*, and *summer 2018* (projections). We implement a regression-based DD estimation as a simple OLS regression:

$$Y_{jit} = \alpha_j + \beta_j^{spring} \cdot DD_{it}^{spring} + \beta_j^{summer} \cdot DD_{it}^{summer} + \gamma_j X_{it} + \eta_i + \delta_t + \epsilon_{jit}, \quad (1)$$

where DD_{it}^{spring} and DD_{it}^{summer} are indicator variables equal to one if restaurant i is in the canton of Neuchâtel and t is respectively *spring 2018* or *summer 2018*. By constructions then, the parameters β_j^{spring} and β_j^{summer} represent average impact of regulation for outcome j measured in spring or summer 2018 respectively.

⁸ Technically, we also assume that there is no spillover across treated and control regions. This assumption seems plausible given the relatively small scale of the regulatory shock, as we discuss further below.

The regression-based DD approach allows us to control for time invariant restaurant-specific fixed effects (η_i), industry-wide period-specific fixed effects (δ_t), and a set of time-varying control variables (the vector X_{it}) which can plausibly be assumed not to be affected by the regulation. In our analysis, we consider two variables capturing demand-side shocks, namely the average number of meal served during weekdays and those served over the weekend. Finally, ϵ_{jit} is an error term.

3.2.2 Distribution-based approach

A distribution-based approach allows us to document changes in employment for low-wage jobs in our sample, as illustrated in Figure 2. Starting from a pre-treatment wage distribution, introducing minimum wage W_{min} implies that employees with wages below the regulatory limit can either get a wage increase or lose their job.⁹ In the post-treatment distribution, wage regulation generates excess mass (or bunching) just above W_{min} , which can be interpreted as a non-parametric indicator that jobs below W_{min} are preserved. In turn, this may induce spillovers in employment for wages between W_{min} and \bar{W} . By contrast, since jobs below the regulatory minimum are less likely to affect the top of the wage distribution, attributing changes above \bar{W} to the regulation is questionable.

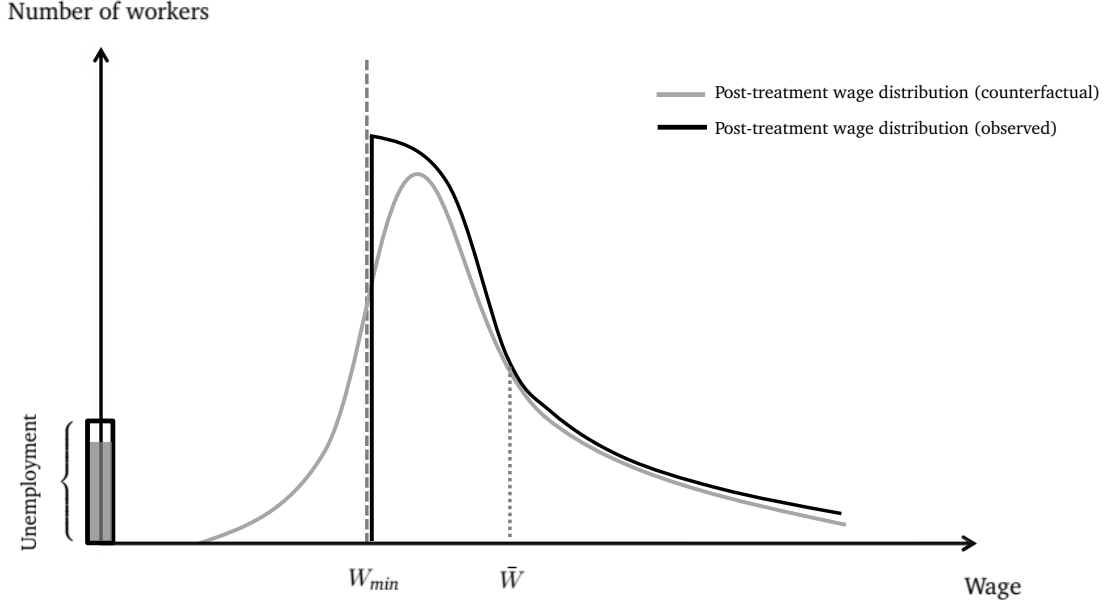
For observations in the canton of Neuchâtel, differences between pre- and post-treatment wage distributions may reflect the influence of other factors changing with time and thus fail to identify regulatory impacts. Following Harasztosi and Lindner (2015) and Cengiz et al. (2018), we use the evolution of the wage distribution in the control group to inform a post-treatment counterfactual wage distribution for the canton of Neuchâtel. We start by discretizing the wage distribution into K intervals, where $k = 0$ represents the wage bin just above the minimum wage. For each k bin, we then compute the count of employees in Neuchâtel and control areas normalized by pre-treatment total employment in the respective regions:

$$e_{rt}^k = \frac{E_{rt}^k}{E_{r,pre}}, \quad (2)$$

where E_{rt}^k is the number of employees in bin k , region $r = \{NE, CTRL\}$, and time $t = \{pre, post\}$, while $E_{r,pre}$ denotes total pre-treatment employment in region r .

⁹ In reality, some employment below W_{min} is likely to be observed after enforcement (Cengiz et al., 2018).

Figure 2: Illustrative impact of minimum wage regulation on the distribution of wages



Next, we construct a post-treatment counterfactual wage distribution, denoted $\tilde{e}_{NE, post}^k$. This can be interpreted as the wage distribution that would have been observed in Neuchâtel if no minimum wage regulation had been enforced, and the evolution of the distribution would have been the same as in neighboring areas. Formally, this is given by:

$$\tilde{e}_{NE, post}^k = \underbrace{\frac{E_{NE, pre}^k}{E_{NE, pre}}}_{\text{Pre-treatment in treatment group}} + \underbrace{\left(\frac{E_{CTRL, post}^k}{E_{CTRL, pre}} - \frac{E_{CTRL, pre}^k}{E_{CTRL, pre}} \right)}_{\text{Change in control group}}. \quad (3)$$

Finally, the change in employment associated with minimum wage regulation in each wage bin k , denoted ρ^k , is defined as the difference between actual and counterfactual post-treatment wage distributions:

$$\rho^k = e_{NE, post}^k - \tilde{e}_{NE, post}^k = \underbrace{\frac{E_{NE, post}^k}{E_{NE, pre}} - \frac{E_{NE, pre}^k}{E_{NE, pre}}}_{\text{Change in treatment group}} - \underbrace{\left(\frac{E_{CTRL, post}^k}{E_{CTRL, pre}} - \frac{E_{CTRL, pre}^k}{E_{CTRL, pre}} \right)}_{\text{Change in control group}}. \quad (4)$$

It follows that total employment impacts are given by the cumulative changes across wage bins up to \bar{W} .

4 Survey results

This section presents the results derived from our survey. We first provide descriptive statistics to document the composition of our sample. Second, we report evidence on the impact of minimum wage regulation by comparing the evolution of outcomes before and after the regulation, and across control and treated areas. We focus on four sets of outcomes: (i) wages, (ii) employment, (iii) workforce composition, and (iv) prices.

4.1 Descriptive statistics

The main objective of this section is to provide descriptive evidence about the outcomes we consider, including sample representativeness and missing observations, and document the prevalence of wages below CHF 19.78 before regulation is enforced in January 2018.

In Table 2, we report pre-treatment averages across subsamples focusing on employment and wages, workforce composition, prices, and the number of meals served. As previously mentioned, employment and wage data exclude managers and members of their family. One implication is that five restaurants have no employees and thus drop out of the analysis on employment and workforce composition, yielding a sample size of 108 restaurants. Furthermore, employee-level information on working hours is missing for 13 restaurants, so that FTE employment can only be calculated for 95 restaurants, and 9 restaurants do not report wages, yielding a sample of 99 restaurants with wage data.¹⁰ Finally, daily meals served and the price of daily specials also feature a small number of missing observations.

Average employment in restaurants is in line with 2016 data from Federal Statistical Office (2017), which reports 4.98 employee and 3.33 FTE per restaurant on average for the canton of Neuchâtel, 6.51 employees and 4.49 FTE in control areas.¹¹ Average prices in Table 2 are also very similar to other data sources, as GastroNeuchâtel (2018) reports that the average price of a soda (3dl) in the canton of Neuchâtel is CHF 3.59, the price of a coffee is CHF 3.32, and

¹⁰ Table A1 in Appendix A documents possible sample selection effects by comparing observable characteristics for restaurants with missing wages and / or work-time information against those included in the estimation sample. Data suggest that restaurants with missing wage information are quite similar to those in the estimation sample, while those with missing work-time information tend to include a larger proportion of workers with no professional qualification but less young workers.

¹¹ Note that our data excludes managers and their family members, which explains differences with averages reported by Federal Statistical Office (2017).

Table 2: Pre-treatment outcomes across control and treated areas

		Control group		Neuchâtel	
	N	N	Mean	N	Mean
<i>Employment and wages</i>					
Headcount employment	108	50	5.86	58	3.84
FTE employment	95	48	4.45	47	2.94
Average wage (CHF / hour)	99	45	22.73	54	22.16
Lowest wage (<i>W</i> , CHF / hour)	99	45	20.67	54	20.79
<i>Workforce composition (within restaurant shares)</i>					
Part-time workers	108	50	0.49	58	0.52
Workers without qualification	108	50	0.71	58	0.72
Young workers (<25 y.o.)	108	50	0.23	58	0.18
<i>Prices (CHF)</i>					
3dl soda	113	53	3.62	60	3.68
Coffee	113	53	3.57	60	3.47
Daily special	110	53	17.42	60	17.73
<i>Daily meals served</i>					
Weekdays (Mon-Thu)	107	50	55.38	57	42.63
Weekends (Fri-Sun)	101	46	73.21	55	49.86

Notes: This table reports pre-treatment averages in control and treatment areas, excluding data for managers and members of their family. FTE employment is based on reported work-time information for each employee and computed only for restaurants with complete working time data. Workers without qualification are employees without a professional degree.

the average price of the daily special is CHF 16.82.

Turning to restaurants affected by minimum wage regulation, Table 3 reports the proportion of restaurants with at least one employee earning less than the regulatory threshold (i.e. $\underline{W} < \text{CHF } 19.78$). Among ordinary restaurants, around 26 percent have at least one employee paid below CHF 19.78 per hour, whereas for seasonal and small restaurants the proportion almost reaches 50 percent. The proportion of restaurants with workers below CHF 19.78 is 46 percent in Neuchâtel and 36 percent in the control group. Hourly wages for these employees are on average CHF 18.77 in Neuchâtel and CHF 18.41 in control areas.

In sum, a significant share of restaurants in both subsamples report wages below CHF 19.78 per hour. Among those in the canton of Neuchâtel, 44 percent report that their cost would be affected by the regulation enforced in January 2018, and 29 percent that their profit margin would deteriorate.

Table 3: Restaurants with pre-treatment hourly wages below CHF 19.78

Type of restaurant	Full sample		Control group		Treatment group	
	N	$\underline{W} < 19.78$ (%)	N	$\underline{W} < 19.78$ (%)	N	$\underline{W} < 19.78$ (%)
Ordinary	31	25.81	18	22.22	13	30.77
Seasonal and small	68	47.06	27	40.74	41	51.22
<i>Total</i>	99	40.40	45	33.33	54	46.30

Notes: This table summarizes the presence of restaurants with hourly wages below CHF 19.78 in control and treatment areas, using pre-treatment data from the first wave of the survey. \underline{W} denotes the lowest wage rate in restaurant (CHF per hour). See footnote 5 for a definition of the types of restaurants. Excludes data for managers and members of their family.

4.2 Impacts of minimum wage regulation

This section reports the main results derived from our survey. First, we quantify impacts of minimum wage regulation on wages paid by restaurants using DD regressions. Second, we consider employment effects using both a distribution-based approach and regression-based DD analysis for headcount and FTE employment. We also provide evidence about treatment effect heterogeneity as a function of pre-treatment employment level and exposure to regulation. Third, we document impacts on restaurant-level workforce composition. Finally, we estimate the effect of minimum wage regulation on prices.

4.2.1 Regulatory impacts on wages

Table 4 reports OLS regression results quantifying regulatory impacts on restaurant-level wages. In columns (1) and (2) the outcome variable is an indicator variable equal to one if the restaurant employs workers paid below CHF 19.78 per hour (denoted $\mathbb{1}_{[\underline{W} < 19.78]}$).¹² In columns (3) and (4) the outcome variable is the natural logarithm of the lowest hourly wage paid by the restaurant (denoted $\ln(\underline{W})$). In columns (5) and (6) the outcome is the natural logarithm of average hourly wages paid in the restaurant (denoted $\ln(\text{avg.}W)$). All specifications include restaurants and time fixed effects. In columns (2), (4) and (6) we further control for potential local demand shocks by including the average number of meals served (“Daily meals served

¹² For restaurants in Neuchâtel, post-treatment outcome essentially measures compliance with the regulation. Also, note that by applying OLS to a binary outcome, we implicitly use a linear probability model. Estimating marginal effects on the sample mean from logit and probit models yields very similar results, so that we prefer the simpler OLS specification.

Table 4: Restaurant-level impacts on hourly wages from OLS regressions

	$\mathbb{1}_{[W < 19.78]}$		$\ln(W)$		$\ln(\text{avg. } W)$	
	(1)	(2)	(3)	(4)	(5)	(6)
DD^{spring}	-0.26*** (0.08)	-0.24*** (0.09)	0.02* (0.01)	0.02* (0.01)	0.001 (0.011)	0.004 (0.012)
DD^{summer}	-0.31*** (0.07)	-0.29*** (0.08)	0.02** (0.01)	0.02** (0.01)	0.004 (0.011)	0.005 (0.012)
δ^{spring}	-0.09** (0.04)	-0.10** (0.05)	0.02*** (0.01)	0.01*** (0.01)	0.020** (0.009)	0.018* (0.010)
δ^{summer}	-0.05 (0.03)	-0.05 (0.04)	0.02*** (0.01)	0.01** (0.00)	0.015* (0.008)	0.013 (0.010)
Constant	0.41*** (0.03)	0.48*** (0.05)	3.02*** (0.00)	3.01*** (0.01)	3.103*** (0.004)	0.131*** -0.024
Controls	N	Y	N	Y	N	Y
R ²	0.30	0.29	0.22	0.21	0.117	0.096
N restaurants	99	94	99	94	99	94

Notes: OLS regression coefficients reported. In columns (1) and (2) the outcome is a binary variable equal to one if at least one employee earns less than CHF 19.78 per hour, zero otherwise (\underline{W} denotes the lowest hourly wage rate in restaurant). In columns (3) and (4) the outcome is the natural logarithm of \underline{W} . In columns (5) and (6) the outcome is the natural logarithm of average hourly wages paid in the restaurants. All specifications include restaurant fixed effects and time-period fixed effects. Columns (2), (4) and (6) include control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun).” Excludes data for managers and members of their family. Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

(Mon-Thu)” and “Daily meals served (Fri-Sun)”) as control variables. Standard errors clustered at the restaurant level are reported in parenthesis.

Results in columns (1) and (2) suggest that minimum wage regulation lead to a large and statistically significant reduction of the proportion of restaurants paying less than CHF 19.78 per hour. Moreover, time fixed effects indicate that this proportion also declines in the control group, suggesting that it would have declined in Neuchâtel even without minimum wage regulation. We also observe that the estimated treatment effect is larger for summer employment, which suggests that compliance increases with time. Therefore, while the possibility of strategic misreporting of wages and measurement error in the second wave of the survey should be kept in mind, as managers may want to signal compliance with the regulation, measuring variation in the proportion of restaurants with $\underline{W} < 19.78$ is consistent with evidence that firms’ regulatory compliance increases with time (see Doyle, 2005). We also note that controlling for demand shocks does not affect the results in any significant manner.

We further find a statistically significant impact of minimum wage regulation on the lowest wage paid by restaurants, which increase by two percent on average relative to control. Here

again there is evidence of a positive trend in control areas, which suggests that \underline{W} increases by one or two percent in restaurants not affected by regulation. By contrast, estimates for the impact of regulation on average hourly wages paid by restaurants is small and not statistically different from zero, with point estimates between 0.1 and 0.5 percent. We note again evidence of a trend increase in control areas where increase in average wages is between one and two percent.

Taken together, our data suggests that the policy intervention had the intended effect on wages, increasing those at the lower tail of the wage distribution while having essentially no impacts on firms' labor costs at the average. In addition, one important message from these regressions is that we are able to measure regulatory impacts quite precisely despite the limited sample size we work with.

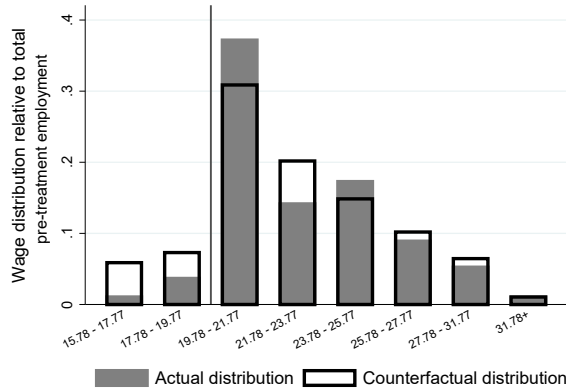
4.2.2 Regulatory impacts on employment

Having quantified the impact of regulation on restaurant-level wages, we now proceed with the estimation of employment effects. We start with the distributional analysis described in Section 3.2.2, and illustrate the results graphically in Figure 3.¹³ More specifically, panel (a) provides observed and counterfactual wage distributions for spring 2018 derived from data on 846 employees distributed over two survey waves. Recall that the counterfactual distribution is an estimate of what would have been observed in Neuchâtel in the absence of minimum wage regulation (equation 3). In panel (b), we report the difference between actual and counterfactual distributions (ρ^k , equation 4), quantifying policy effects for employment in each wage bin. We also draw cumulative employment effects as a solid line for increasing values of \overline{W} . Panel (c) and (d) provide the same information for summer 2018 data.

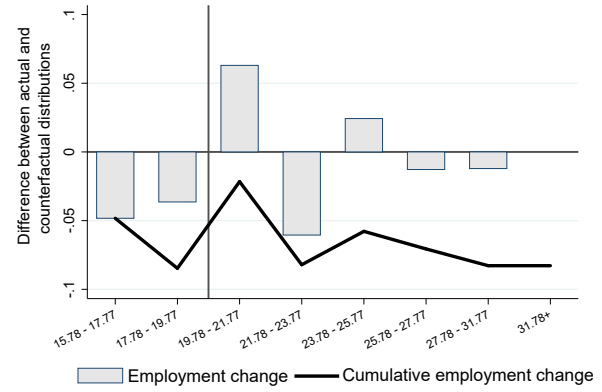
The distribution of wages for spring 2018 in the canton of Neuchâtel reported in panel (a) confirms the presence of employees paid below the regulatory minimum in the second wave of the survey. This is in line with anecdotal evidence reported Giroud (2018) and is a common

¹³ We specify wage bins of CHF 2, so that the discretized wage distribution includes a total of eight bins. The first two bins, labeled -2 and -1, are below the CHF 19.78 cutoff. Consistent with the analysis elsewhere in the paper, we exclude data for managers and members of their family. In Appendix A, Table A2, we report the data underlying these figures.

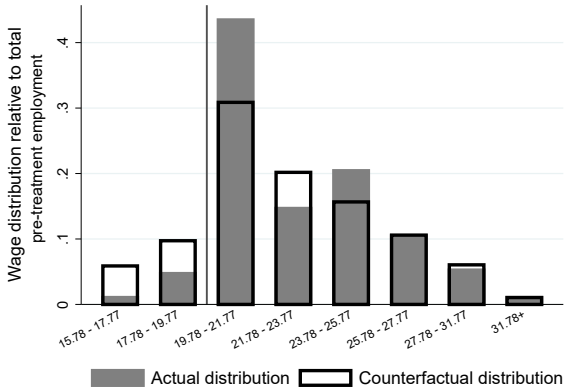
Figure 3: Employment effects by wage bins in Neuchâtel



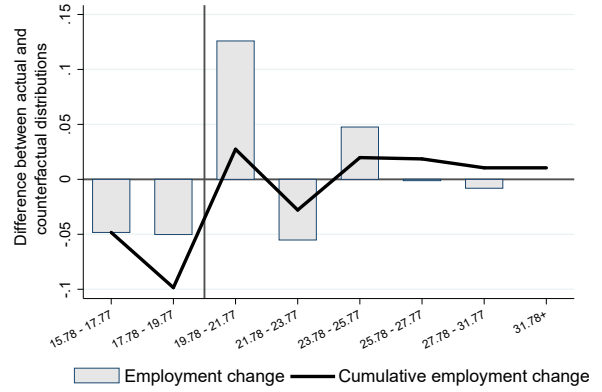
(a) Actual and counterfactual wage distributions, spring 2018



(b) Difference between actual and counterfactual wage distributions, spring 2018



(c) Actual and counterfactual wage distributions, summer 2018



(d) Difference between actual and counterfactual wage distributions, summer 2018

feature in minimum wage research (Cengiz et al., 2018).¹⁴ The wage distribution in the control group also shows a decline of employment in the two lowest wage bins, which is consistent with the positive trend in low-wages reported in regression-based DD evidence above. The counterfactual distribution accounts for these trends observed in restaurants in neighboring areas.

¹⁴ The number of workers in the two wage bins below the regulatory minimum declines from 36 (pre-treatment, summer 2017) to 9 (post-treatment, spring 2018). Relative to total pre-treatment employment, this represents a decline from around 19 percent to less than five percent (see Table A2). As noted previously however, these before/after comparisons do not account for the fact that low-wage employment declines for reasons unrelated to minimum wage regulation.

Moreover, our data suggests that total employment by restaurants in control areas declines by 3.2 percent, which is also captured in the counterfactual distribution reported in panel (a).

Employment effects across wage bins are given by the difference between actual and counterfactual distributions, as reported in panel (b). Our data shows that employment in the two bins below CHF 19.78 declines by 8.4 percent, whereas it increases by 6.3 percent in the wage bin just above CHF 19.78. While this suggests that most of sub-minimum wage jobs have been preserved, cumulative employment change for $\bar{W} = 21.77$ is -2.1 percent. In addition, the fourth wage bin shows a reduction of employment of six percent, which is driven by both a decline in employment for restaurants in Neuchâtel and an increase in this wage bin for control areas, while the fifth bin suggest an increase of 2.4 percent. This indicates significant spillovers of regulation for workers with hourly wages up to CHF 6 above the regulatory minimum, and corresponds to a cumulative change in employment of -5.7 percent for $\bar{W} = 25.77$. Subsequent wage bins only show small differences and are thus less relevant.

The decline in aggregate employment measured for spring 2018 is, however, contradicted by data for summer 2018 reported in panel (c) and (d). First, the decline of employment in wage bins below the regulatory minimum is larger at -9.8 percent. Second, the wage bin just above now shows an increase of 12.6 percent, which more than compensates the decline in job losses below CHF 19.78. This implies that, for $\bar{W} = 21.77$, our data suggests an employment *gain* of 2.7 percent. Third, we again find evidence of substantial spillovers up to $\bar{W} = 25.77$ which reduce the positive employment effect to 2.1 percent.

The distribution-based DD approach is therefore inconclusive with respect to aggregate employment effects, but suggests that spillovers affect workers above the regulatory minimum. As a point of comparison, Cengiz et al. (2018) similarly reports the presence of a spillover effects up to \$3 above the minimum wage. We come back to the presence of spillovers across workers when we discuss workforce composition effects below.

We now move to a restaurant-level DD analysis, and Table 5 reports OLS regression results quantifying the impact of minimum wage regulation in Neuchâtel on headcount employment in levels (columns 1 and 2) and in logs (columns 3 and 4), as well as FTE employment in levels (columns 5 and 6) and in logs (columns 7 and 8). Considering FTE employment impacts is important because about half of the employees in our dataset work part time (see Table 2), although we loose observations for restaurants that do not provide complete information

Table 5: Restaurant-level impacts on employment from OLS regressions

	<i>Headcount</i>		$\ln(\text{Headcount})$		<i>FTE</i>		$\ln(\text{FTE})$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DD^{spring}	-0.32 (0.26)	-0.33 (0.26)	-0.003 (0.06)	0.005 (0.06)	-0.33 (0.21)	-0.37* (0.22)	-0.05 (0.06)	-0.05 (0.06)
DD^{summer}	-0.02 (0.23)	-0.04 (0.25)	0.06 (0.06)	0.06 (0.06)	-0.11 (0.19)	-0.18 (0.21)	0.02 (0.06)	0.004 (0.06)
δ_{spring}	-0.06 (0.17)	0.05 (0.18)	-0.04 (0.03)	-0.02 (0.04)	-0.19* (0.11)	-0.17 (0.13)	-0.07** (0.04)	-0.06 (0.04)
δ_{summer}	0.12 (0.18)	0.25 (0.20)	-0.0005 (0.04)	0.02 (0.04)	-0.07 (0.13)	-0.04 (0.16)	-0.04 (0.04)	-0.02 (0.04)
Constant	4.80*** (0.07)	4.70*** (0.33)	1.24*** (0.02)	1.22*** (0.05)	3.73*** (0.06)	3.76*** (0.23)	0.83*** (0.02)	0.83*** (0.05)
Controls	N	Y	N	Y	N	Y	N	Y
R ²	0.05	0.07	0.04	0.06	0.09	0.09	0.07	0.06
N restaurants	108	102	108	102	95	89	95	89

Notes: OLS regression coefficients reported. In columns (1) and (2) the outcome is headcount employment by restaurants, and in columns (3) and (4) it is the natural logarithm of the same. In columns (5) and (6) the outcome is FTE employment, and in columns (7) and (8) it is the natural logarithm of the same. FTE employment is based on reported work-time information for each employee and computed only for restaurants with complete working time data. All specifications include restaurant fixed effects and period fixed effects. Columns (2), (4), (6) and (8) include control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun).” Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

for their employees (managers and members of their family are excluded). All specifications include restaurant and time fixed effects, and columns (2), (4), (6) and (8) further include control variables (“Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun)”). Robust standard errors clustered at the restaurant level are reported in parenthesis.

Across all specifications, DD estimates reported in the first two rows do not suggest a significant effect of minimum wage regulation on average employment in restaurants. More specifically, results for spring 2018 tend to be slightly negative (statistical significance at 10% is attained when considering FTE jobs in levels and controlling for demand shocks, column 6), while those for summer 2018 are closer to zero or even positive. This is very similar to the distributional analysis, and suggests that negative employment impacts in spring 2018 reflect seasonal variability.

Next, we study heterogeneous regulatory impacts across pre-treatment employment and exposure to regulation. In particular, we first interact both DD^{spring} and DD^{summer} with restaurant-

Table 6: Heterogeneity in employment impacts across restaurants (linear specifications)

	Pre-treatment employment				Pre-treatment wage gap ($\underline{W} - W_{min}$)			
	Headcount		FTE		Headcount		FTE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DD^{spring}	-0.32 (0.22)	-0.26 (0.24)	-0.37** (0.17)	-0.34* (0.18)	-0.32 (0.29)	-0.32 (0.29)	-0.30 (0.23)	-0.34 (0.23)
x N employees	-0.35*** (0.08)	-0.38*** (0.08)	-0.31*** (0.06)	-0.36*** (0.07)	-	-	-	-
x Wage gap (CHF)	-	-	-	-	-0.65*** (0.18)	-0.56*** (0.18)	-0.47** (0.22)	-0.45** (0.21)
DD^{summer}	-0.02 (0.23)	-0.003 (0.23)	-0.13 (0.19)	-0.17 (0.18)	-0.03 (0.25)	-0.03 (0.28)	-0.06 (0.20)	-0.12 (0.23)
x N employees	-0.14** (0.06)	-0.14* (0.07)	-0.11 (0.08)	-0.15* (0.08)	-	-	-	-
x Wage gap (CHF)	-	-	-	-	-0.51** (0.24)	-0.41 (0.28)	-0.23 (0.16)	-0.22 (0.17)
δ_{spring}	-0.06 (0.17)	-0.01 (0.19)	-0.19* (0.11)	-0.21* (0.12)	-0.09 (0.19)	0.03 (0.20)	-0.22** (0.11)	-0.18 (0.13)
δ_{summer}	0.12 (0.18)	0.19 (0.18)	-0.07 (0.13)	-0.08 (0.14)	0.11 (0.20)	0.25 (0.22)	-0.09 (0.14)	-0.04 (0.17)
Constant	4.80*** (0.07)	5.03*** (0.29)	3.73*** (0.05)	4.08*** (0.18)	4.71*** (0.08)	4.53*** (0.31)	3.60*** (0.06)	3.57*** (0.22)
Controls	N	Y	N	Y	N	Y	N	Y
R ²	0.23	0.25	0.31	0.35	0.06	0.09	0.09	0.09
N restaurants	108	102	95	89	99	94	88	83

Notes: OLS regression coefficients reported. In columns (1) to (4) we estimate the effect of minimum wage regulation across restaurant size, as measured by an interaction term between treatment dummies DD and the number of pre-treatment employees. In columns (5) to (8) we estimate the effect of minimum wage regulation as a function of the wage gap, as measured by an interaction term between treatment dummies DD and the difference between pre-treatment lowest wage in the restaurant \underline{W} and the regulatory minimum ($W_{min} = 19.78$). In columns (1), (2), (5) and (6) the outcome is headcount employment, and in columns (3), (4), (7) and (8) the outcome is FTE employment. FTE employment is based on reported work-time information for each employee and computed only for restaurants with complete working time data. All specifications include restaurant fixed effects and period fixed effects, and exclude data for managers and members of their family throughout. Columns (2), (4), (6) and (7) include control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun).” Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

level pre-treatment headcount employment.¹⁵ Results for headcount employment as an outcome are reported in Table 6, columns (1) and (2), and those for FTE employment are in columns (3) and (4). Second, we interact DD^{spring} and DD^{summer} with a measure of regulatory exposure, namely the pre-treatment wage gap that captures the difference between the lowest pre-treatment wage rate \underline{W} and the regulatory threshold W_{min} (the wage gap is zero if the lowest wage paid is higher than the regulatory minimum). Results for headcount employment are reported in columns (5) and (6), while those for FTE employment are in columns (7) and (8). As above, all specifications include restaurant and time fixed effects, columns (2), (4), (6) and

¹⁵ We subtract average pre-treatment headcount employment so that the main effect can be interpreted as the impact of minimum wage regulation on employment at the average value of pre-treatment employment. Note that managers and members of their family remain absent from all calculations.

Table 7: Heterogeneity in employment impacts across restaurants (logarithmic specifications)

	Pre-treatment employment				Pre-treatment wage gap ($\bar{W} - W_{min}$)			
	$\ln(\text{Headcount})$		$\ln(\text{FTE})$		$\ln(\text{Headcount})$		$\ln(\text{FTE})$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DD^{spring}	-0.003 (0.05)	0.02 (0.06)	-0.05 (0.06)	-0.04 (0.06)	-0.01 (0.06)	0.0003 (0.07)	-0.06 (0.06)	-0.06 (0.06)
x N employees	-0.06*** (0.01)	-0.06*** (0.02)	-0.04*** (0.01)	-0.05*** (0.02)	-	-	-	-
x Wage gap (CHF)	-	-	-	-	-0.27*** (0.08)	-0.24** (0.10)	-0.35*** (0.05)	-0.34*** (0.06)
DD^{summer}	0.06 (0.06)	0.07 (0.06)	0.02 (0.06)	0.01 (0.06)	0.05 (0.06)	0.06 (0.07)	0.01 (0.06)	-0.01 (0.06)
x N employees	-0.04*** (0.01)	-0.04** (0.01)	-0.02* (0.01)	-0.03** (0.01)	-	-	-	-
x Wage gap (CHF)	-	-	-	-	-0.24*** (0.08)	-0.21** (0.09)	-0.29*** (0.06)	-0.28*** (0.06)
δ_{spring}	-0.04 (0.03)	-0.03 (0.04)	-0.07** (0.04)	-0.06 (0.04)	-0.04 (0.04)	-0.03 (0.04)	-0.08** (0.04)	-0.06 (0.04)
δ_{summer}	-0.001 (0.04)	0.01 (0.04)	-0.04 (0.04)	-0.03 (0.04)	-0.003 (0.04)	0.02 (0.05)	-0.05 (0.04)	-0.02 (0.05)
Constant	1.24*** (0.02)	1.28*** (0.04)	0.83*** (0.02)	0.88*** (0.04)	1.21*** (0.02)	1.19*** (0.06)	0.78*** (0.02)	0.79*** (0.05)
Controls	N	Y	N	Y	N	Y	N	Y
R ²	0.13	0.16	0.12	0.13	0.08	0.10	0.13	0.14
N restaurants	108	102	95	89	99	94	88	83

Notes: OLS regression coefficients reported. In columns (1) to (4) we estimate the effect of minimum wage regulation across restaurant size, as measured by an interaction term between treatment dummies DD and the number of pre-treatment employees. In columns (5) to (8) we estimate the effect of minimum wage regulation as a function of the wage gap, as measured by an interaction term between treatment dummies DD and the difference between pre-treatment lowest wage in the restaurant \bar{W} and the regulatory minimum ($W_{min} = 19.78$). In columns (1), (2), (5) and (6) the outcome is the natural logarithm of headcount employment, and in columns (3), (4), (7) and (8) the outcome is the natural logarithm FTE employment. FTE employment is based on reported work-time information for each employee and computed only for restaurants with complete working time data. All specifications include restaurant fixed effects and period fixed effects, and exclude data for managers and members of their family throughout. Columns (2), (4), (6) and (7) include control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun).” Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

(8) include control variables for demand shocks. Cluster-robust standard errors are reported in parenthesis. Table 7 provides corresponding results for logarithmic specifications.

Results show that restaurants with a larger number of pre-treatment employees respond to the regulation by reducing employment more than restaurants with a smaller number of employees. The effect is statistically significantly different from zero for all specifications except one (Table 6, column 3). In line with Ropponen (2011), this result illustrates the fact that reducing employment in response to minimum wage regulation is conditioned by the size of the workforce, which highlights the role of substitutability across employees as a margin of adjustment. In the present context, this finding is somewhat unexpected because the CLA requires large restaurants to pay higher wages, and smaller restaurants indeed employ more workers

with low wages (see Table 3).

Regulatory exposure, as measured by pre-treatment wage gap, is also associated with larger disemployment effects. Interaction terms are negative across all specifications, being highly statistically significant for most linear specifications and all logarithmic specifications. This result suggests that restaurants with the largest increase in the marginal cost of labor are more likely to reduce employment. In other words, the scale of the wage regulation is an important driver of the disemployment response.

4.2.3 Regulatory impacts on workforce composition

We now quantify the impact of regulation on employee characteristics at the restaurant level (still excluding managers and members of their family). In Table 8 we report OLS regression results providing DD evidence for three different measures of workforce composition. First, in columns (1) and (2) we focus on within-restaurant share of workers with part-time contracts.¹⁶ Second, columns (3) and (4) consider the share of employees without a professional qualification. The third outcome, reported in columns (5) and (6), is the share of workers that are less than 25 years old. Restaurants and time fixed effects are included in all specifications, and control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun)” are present in columns (2), (4), and (6). Robust standard errors clustered at the restaurant level are reported in parenthesis.

Starting with part-time employment, time fixed effects show evidence of a positive trend in the share of part-time employees. However, while the increase has been more pronounced for restaurants in Neuchâtel, the difference with control areas is not statistically significantly different from zero. Similarly, we observe little evidence that the share of young worker is affected by minimum wage regulation.

More interestingly, results provide evidence of an increase in the proportion of workers with no professional qualification in restaurants of Neuchâtel relative to control. In particular, while time fixed effects suggest no change in control areas, the share of non-qualified workers increases by six to seven percentage points in Neuchâtel. This effect is statistically significantly from zero ($p\text{-val.} < 0.1$), and is more pronounced in data for summer 2018. This result sug-

¹⁶ We again apply OLS to a limited dependent variable, using a non-linear (e.g. logistic) transformation to bound the outcome variable between 0 and 1 yields very similar results.

Table 8: Impacts on workforce composition (within restaurant shares) from OLS regressions

	Part-time workers		Workers without qualification		Young workers (<25 y.o.)	
	(1)	(2)	(3)	(4)	(5)	(6)
DD^{spring}	0.01 (0.05)	0.03 (0.05)	0.06* (0.03)	0.06 (0.04)	-0.02 (0.06)	-0.04 (0.07)
DD^{summer}	0.02 (0.05)	0.03 (0.05)	0.07* (0.03)	0.07* (0.04)	-0.02 (0.05)	-0.03 (0.06)
δ_{april}	0.07** (0.03)	0.06* (0.03)	0.01 (0.02)	-0.01 (0.02)	-0.02 (0.04)	-0.02 (0.05)
δ_{summer}	0.08** (0.03)	0.08** (0.04)	0.01 (0.02)	0.002 (0.02)	0.003 (0.03)	0.003 (0.04)
Constant	0.50*** (0.02)	0.44*** (0.04)	0.72*** (0.01)	0.71*** (0.03)	0.20*** (0.02)	0.23*** (0.05)
Controls	N	Y	N	Y	N	Y
R ²	0.10	0.14	0.08	0.09	0.01	0.02
N restaurants	108	102	108	102	108	102

Notes: OLS regression coefficients reported. In columns (1) and (2) the outcome is the within-restaurant share of employees with part-time contracts. In columns (3) and (4) the outcome is the share of employees without a professional degree. In columns (5) and (6) the outcome is the share of workers that are less than 25 years of age. All specifications include restaurant fixed effects and time-period fixed effects. Columns (2), (4) and (6) include control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun).” We exclude data for managers and members of their family from the estimation. Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

gests that higher wages for low-wage employees leads restaurants to hire relatively more non-qualified workers. This result is reminiscent of Giuliano (2013), and again suggests that firms use labor-labor substitution as an adjustment mechanism, reducing the demand for qualified workers. One possible interpretation is that restaurants substitute qualified workers earning more than minimum wage with less-qualified workers paid at the regulatory minimum, thereby mitigating the impacts of regulation on total payroll expenditures.

4.2.4 Regulatory impacts on prices

Our final set of results quantifies the impact of minimum wage regulation on the price of three standard products sold by restaurants in Switzerland. Specifically, Table 9 reports regression-based DD evidence for the price of a 3dl soda (columns 1 and 2), a cup of coffee (columns 3 and 4), and the daily special (columns 5 and 6). All specifications include restaurants and time fixed effects, and in columns (2), (4) and (6) we further control for demand shocks. Cluster-robust standard errors are reported in parenthesis. Note also that we do not separately measure prices in spring and summer 2018, so that we only have one post-treatment observation.

For all three products we find no evidence of price impacts, as estimates are all small in

Table 9: Restaurant-level impacts on prices from OLS regressions

	Price soda		Price coffee		Price daily special	
	(1)	(2)	(3)	(4)	(5)	(6)
DD^{Post}	-0.002 (0.03)	-0.002 (0.03)	0.02 (0.02)	0.03 (0.03)	0.03 (0.09)	-0.02 (0.09)
δ_{Post}	0.03 (0.02)	0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	0.11 (0.07)	0.13 (0.09)
Constant	3.65*** (0.01)	3.63*** (0.05)	3.51*** (0.01)	3.52*** (0.02)	17.58*** (0.02)	17.54*** (0.04)
Controls	N	Y	N	Y	N	Y
R ²	0.03	0.04	0.01	0.01	0.06	0.07
N restaurants	113	105	113	105	110	102

Notes: OLS regression coefficients reported. In columns (1) and (2) the outcome is the price of a 3dl soda. In columns (3) and (4) the outcome is the price of a coffee. In columns (5) and (6) the outcome is the price of the daily special. All specifications include restaurant fixed effects and period fixed effects. Columns (2), (4) and (6) include control variables "Daily meals served (Mon-Thu)" and "Daily meals served (Fri-Sun)." Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

magnitude and not statistically significantly different from zero. We also do not detect a trend in the control group, as post-treatment fixed effects are also very close to zero. These results are confirmed for logarithmic specifications reported in Appendix A, Table A3. The result that restaurants in Neuchâtel did not adjust their prices in response to minimum wage regulation is consistent with fierce competition on the output market.

5 Concluding comments

In this paper, we have studied alternative adjustment channels through which restaurants in the Swiss canton of Neuchâtel have responded to the introduction of minimum wage regulation. We have argued that the sequence of events that followed a popular ballot supporting the introduction of a minimum wage provides a quasi-experimental setup to quantify how firms adjust to an increased cost of labor. Exploiting policy discontinuity at cantonal borders, we have used a simple two-wave survey administered in Neuchâtel and geographically proximate districts of neighboring cantons to gather detailed firms-workers data.

Our results deliver three main insights about restaurants' adjustment margins. First, while low-wage jobs have benefited from regulation, we observe spillovers affecting workers with pre-treatment wages above the regulatory minimum. Second, we find evidence that restaurants increase their demand for non-qualified workers. Since the wage of non-qualified workers

is expected to increase in response to the minimum wage regulation, this suggests that wage spillovers lead firms to adjust workforce composition and hire less-qualified workers paid at the regulatory minimum. Third, while there is little evidence of restaurant-level negative employment effects at the average, disemployment increases as a function of pre-treatment employment and pre-treatment wage gap. Therefore, while near-zero aggregate employment effects is in line with a large body of empirical research, negative profitability impacts for a subset of restaurants cannot be ruled out, which could in turn affect industry dynamics over the longer run.

We close by emphasizing two features of our work that are important for the interpretation of our results. First, while our survey instrument provides rich firm- and worker-level information, it is not without caveats. On the one hand, managers may strategically misreport information so as to signal compliance with regulation, implying measurement error. On the other hand, the sample size we work with is relatively small. Second, the Swiss context is somewhat peculiar, as it features low unemployment, high wages, and a history of self-regulation (including the CLA negotiated between employers and employees). Therefore, the fact that a set of key results we report concur with existing evidence is important. Nevertheless, consolidating evidence on labor-labor substitution and employment spillovers on workers with pre-treatment wages above the regulatory minimum is an important area for future research.

Appendix A Additional empirical results

Table A1: Pre-treatment outcomes for restaurants with missing wage and work-time information

		Estimation sample		Missing observations			
	N	N	Mean	N	Mean	Diff.	T-stat
<i>Restaurants with missing wage data</i>							
Headcount employment	108	99	4.69	9	5.78	1.09	(0.93)
Part-time workers	108	99	0.52	9	0.32	-0.20	(-1.48)
Workers without qualification	108	99	0.72	9	0.66	-0.06	(-0.52)
Young workers (<25 y.o.)	108	99	0.20	9	0.28	0.08	(0.79)
3dl soda	108	99	3.67	9	3.58	-0.09	(-0.88)
Coffee	108	99	3.52	9	3.53	0.01	(0.17)
Daily special	105	96	17.70	9	16.78	-0.92*	(-1.76)
Daily meals served: Mon-Thu	103	95	44.86	8	105.00	60.14	(1.31)
Daily meals served: Fri-Sun	98	89	57.39	9	101.67	44.28	(1.22)
<i>Restaurants with missing work-time data</i>							
Headcount employment	108	95	4.68	13	5.46	0.78	(0.58)
Part-time workers	108	95	0.51	13	0.49	-0.01	(-0.13)
Workers without qualification	108	95	0.70	13	0.85	0.15***	(2.77)
Young workers (<25 y.o.)	108	95	0.22	13	0.08	-0.14**	(-2.51)
3dl soda	108	95	3.67	13	3.63	-0.04	(-0.56)
Coffee	108	95	3.53	13	3.45	-0.08	(-1.24)
Daily special	105	96	17.69	9	17.04	-0.65	(-1.44)
Daily meals served: Mon-Thu	103	90	49.59	13	49.12	-0.47	(-0.03)
Daily meals served: Fri-Sun	98	86	60.90	12	65.42	4.52	(0.18)

Notes: This table reports balance tests for restaurants with missing data for wages and work-time percentage, using pre-treatment data from the first wave of the survey. Excludes data for managers and members of their family. Workers without qualification are employees without a professional degree. Heteroskedasticity-robust t-statistics reported. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

Table A2: Changes in employment for control and treatment groups by wage bin

Wage bin (CHF)		Control group				Treatment group: Neuchâtel				Counterfactual distribution	Treatment effect
		Pre-treatment		Post-treatment		Pre-treatment		Post-treatment			
		$E_{CTRL, pre}^k$	$e_{CTRL, pre}^k$	$E_{CTRL, post}^k$	$e_{CTRL, post}^k$	$E_{NE, pre}^k$	$e_{NE, pre}^k$	$E_{NE, post}^k$	$e_{NE, post}^k$		
<i>Spring 2018</i>											
-2	15.78-17.77	3	0.012	2	0.008	12	0.063	2	0.010	0.059	-0.048
-1	17.78-19.77	30	0.121	17	0.069	24	0.126	7	0.037	0.073	-0.036
0	19.78-21.77	67	0.271	76	0.308	52	0.272	71	0.372	0.309	0.063
1	21.78-23.77	47	0.190	49	0.198	37	0.194	27	0.141	0.202	-0.060
2	23.78-25.77	63	0.255	57	0.231	33	0.173	33	0.173	0.148	0.024
3	25.78-27.77	20	0.081	18	0.073	21	0.110	17	0.089	0.102	-0.013
4	27.78-31.77	5	0.020	8	0.032	10	0.052	10	0.052	0.065	-0.012
5	31.78+	12	0.049	12	0.049	2	0.010	2	0.010	0.010	0.000
Total		247	1	239	0.968	191	1	169	0.885	0.968	-0.083
<i>Summer 2018</i>											
-2	15.78-17.77	3	0.012	2	0.008	12	0.063	2	0.010	0.059	-0.048
-1	17.78-19.77	30	0.121	23	0.093	24	0.126	9	0.047	0.097	-0.050
0	19.78-21.77	67	0.271	76	0.308	52	0.272	83	0.435	0.309	0.126
1	21.78-23.77	47	0.190	49	0.198	37	0.194	28	0.147	0.202	-0.055
2	23.78-25.77	63	0.255	59	0.239	33	0.173	39	0.204	0.157	0.048
3	25.78-27.77	20	0.081	19	0.077	21	0.110	20	0.105	0.106	-0.001
4	27.78-31.77	5	0.020	7	0.028	10	0.052	10	0.052	0.060	-0.008
5	31.78+	12	0.049	12	0.049	2	0.010	2	0.010	0.010	0.000
Total		247	1	247	1	191	1	193	1.010	1.000	0.010

Notes: This table reports employee-level data across survey waves and sampling areas. The support of the wage distribution is discretized in bins of CHF 2 centered around the regulatory minimum of $W_{min} = 19.78$ (for example, bin 0 includes all employees with hourly wages between CHF 19.78 and 21.77). E_{rt}^k is the number of employees in bin k , region $r = \{NE, CTRL\}$, and at time $t = \{pre, post\}$. $e_{rt}^k = \frac{E_{rt}^k}{E_{r,pre}}$ where $E_{r,pre}$ denotes pre-treatment total employment in region r (see equation 2). The counterfactual distribution $\tilde{e}_{NE, post}^k$ estimates the wage distribution that would have prevailed if Neuchâtel had not introduced the regulation and the evolution of the distribution would have been the same as in control areas (see equation 3). The difference between actual and counterfactual post-treatment wage distributions is ρ^k (see equation 4). Excludes data for managers and members of their family.

Table A3: Restaurant-level impacts on prices from OLS regressions (logarithmic specifications)

	$\ln(\text{Price soda})$		$\ln(\text{Price coffee})$		$\ln(\text{Price daily special})$	
	(1)	(2)	(3)	(4)	(5)	(6)
DD^{Post}	-0.0003 (0.01)	-0.0002 (0.01)	0.01 (0.01)	0.01 (0.01)	0.002 (0.01)	-0.002 (0.01)
δ_{Post}	0.01 (0.01)	0.004 (0.01)	-0.002 (0.01)	-0.005 (0.01)	0.01* (0.004)	0.01 (0.01)
Constant	1.29*** (0.002)	1.29*** (0.01)	1.25*** (0.002)	1.26*** (0.01)	2.85*** (0.001)	2.86*** (0.002)
Controls	N	Y	N	Y	N	Y
R^2	0.03	0.04	0.01	0.02	0.06	0.08
N restaurants	113	105	113	105	110	102

Notes: OLS regression coefficients reported. In columns (1) and (2) the outcome is the natural logarithm of the price of a 3dl soda. In columns (3) and (4) the outcome is the natural logarithm of the price of a coffee. In columns (5) and (6) the outcome is the natural logarithm of the price of the daily special. All specifications include restaurant fixed effects and period fixed effects. Columns (2), (4) and (6) include control variables “Daily meals served (Mon-Thu)” and “Daily meals served (Fri-Sun).” Robust standard errors clustered at the restaurant level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

References

- AAronson, D., E. French, I. Sorkin, and T. To (2018) "Industry dynamics and the minimum wage: A putty-clay approach," *International Economic Review*, 59 (1), pp. 51–84.
- Addison, J., M. Blackburn, and C. Cotti (2009) "Do minimum wages raise employment? Evidence from the U.S. retail-trade sector," *Labour Economics*, 16 (4), pp. 397–408.
- Ahlfeldt, G., D. Roth, and T. Seidel (2018) "The regional effects of Germany's national minimum wage," *Economics Letters*, 172, pp. 127–130.
- Allegretto, S., A. Dube, and M. Reich (2011) "Do minimum wages really reduce teen employment? Accounting for heterogeneity and selectivity in state panel data," *Industrial Relations*, 50 (2), pp. 205–240.
- Allegretto, S., A. Dube, M. Reich, and B. Zipperer (2017) "Credible research designs for minimum wage studies: A response to Neumark, Salas and Wascher," *Industrial and Labor Relations Review*, 70(3), pp. 559–592.
- Bysaeth, L. (2018) "Le salaire minimum sera finalement de 19,70 francs de l'heure dans le canton de Neuchâtel (et non de 20)." ArcInfo / L'impartial / L'Express, issue of the 31 August, Neuchâtel, Switzerland.
- Card, D. and A. Krueger (2000) "Minimum wages and employment: A case study of the fast food industry in New Jersey and Pennsylvania: Reply," *American Economic Review*, 90 (5), pp. 1397–1420.
- Card, D. and A. B. Krueger (1994) "Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania," *American Economic Review*, 84, 4, pp. 772–793, September.
- Cengiz, D., A. Dube, A. Lindner, and B. Zipperer (2018) "The effect of minimum wages on low-wage jobs: Evidence from the United States using a bunching estimator." Center for Economic Performance Discussion Papers No 1531.
- Council of State of Neuchâtel (2013) "Salaire minimum: Rapport du conseil d'état au grand conseil à l'appui d'un projet de loi portant modification de la loi sur l'emploi et l'assurance-chômage." Report 13.048, Cantonal Administration of the canton of Neuchâtel, Switzerland.
- Doyle, J. (2005) "Employment effects of a minimum wage: A density discontinuity design revisited." MIT Sloan School working paper.
- Dube, A., S. Naidu, and M. Reich (2007) "The economic effects of a citywide minimum wage," *Industrial and Labor Relations Review*, 60, 4, pp. 522–543.
- Dube, A., T. W. Lester, and M. Reich (2010) "Minimum wage effects across state borders: Estimates using contiguous counties," *The Review of Economics and Statistics*, 92, 4, pp. 945–964.
- Federal Court (2017) "Arrêt du tribunal fédéral du 21 juillet 2017." Federal Supreme Court of Switzerland, Switzerland.
- Federal Statistical Office (2017) "Statistique structurelle des entreprises." Neuchâtel, Switzerland.
- GastroNeuchâtel (2018) "Sondage 2017, Commentaires et communiqué de presse." Chambre cantonale de l'hôtellerie et de la restauration, St-Blaise, Switzerland.

- Giroud, V. (2018) “Salaire minimum encore transgressé.” ArcInfo / L’impartial / L’Express, issue of the 3 November, Neuchâtel, Switzerland.
- Giuliano, L. (2013) “Minimum wage effects on employment, substitution, and the teenage labor supply: Evidence from personnel data,” *Journal of Labor Economics*, 31 (1), pp. 155–194.
- Harasztosi, P. and A. Lindner (2015) “Who pays for the minimum wage?”. Working paper.
- Jardim, E., M. C. Long, R. Plotnick, E. van Inwegen, J. Vigdor, and H. Wething (2017) “Minimum wage increases, wages, and low-wage employment: Evidence from Seattle.” NBER Working Paper.
- Kontrollstelle L-GAV (2017) “Der Gesamtarbeitsvertrag im Schweizer Gastgewerbe.” Kontrollstelle für den L-GAV des Gastgewerbes, Basel, Switzerland.
- Lang, K. and S. Kahn (1998) “The effect of minimum-wage laws on the distribution of employment: Theory and evidence,” *Journal of Public Economics*, 69 (1), pp. 67–82.
- Lee, D. and E. Saez (2012) “Optimal minimum wage policy in competitive labor markets,” *Journal of Public Economics*, 96 (9-10), pp. 739–749.
- Lemos, S. (2008) “A survey of the effects of the minimum wage on prices,” *Journal of Economic Surveys*, 22, 1, pp. 187–212.
- Leonard, M. L., T. Stanley, and C. Doucouliagos (2014) “Does the UK minimum wage reduce employment? A meta-regression analysis,” *British Journal of Industrial Relations*, 52, 3, pp. 499–520.
- Machin, S., A. Manning, and L. Rahman (2003) “Where the minimum wage bites hard: Introduction of minimum wages to a low wage sector,” *Journal of the European Economic Association*, 1, 1, pp. 154–180.
- Metcalf, D. (2008) “Why has the British national minimum wage had little or no impact on employment?” *Journal of Industrial Relations*, 50, 3, pp. 489–512.
- Neumark, D., J. I. Salas, and W. Wascher (2014) “Revisiting the minimum wage-employment debate: Throwing out the baby with the bathwater?” *Industrial and Labor Relations Review*, 67, pp. 608–648.
- Neumark, D. and W. Wascher (2000) “Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania: Comment,” *American Economic Review*, 90, 5, pp. 1362–1396.
- (2008) *Minimum Wages*: The MIT Press, Cambridge MA, USA.
- (2017) “Reply to Credible research designs for minimum wage studies,” *Industrial and Labor Relations Review*, 70 (3), pp. 593 – 609.
- Ropponen, O. (2011) “Reconciling the evidence of Card and Krueger (1994) and Neumark and Wascher (2000),” *Journal of Applied Econometrics*, 26 (6), pp. 1051–1057.
- SECO (2018) “Labor market statistics.” Swiss State Secretariat for Economic Affairs, Bern, Switzerland.