

Do Sticky Wages Matter? New Evidence from Matched Firm-Survey and Register Data

Online Appendix

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This Online Appendix provides information on the data sources, discusses the treatment of outliers, the construction of sampling weights, the monetary policy shock used for identification and provides additional descriptive statistics, information on the treatment and control groups, as well as pre-treatment trends.

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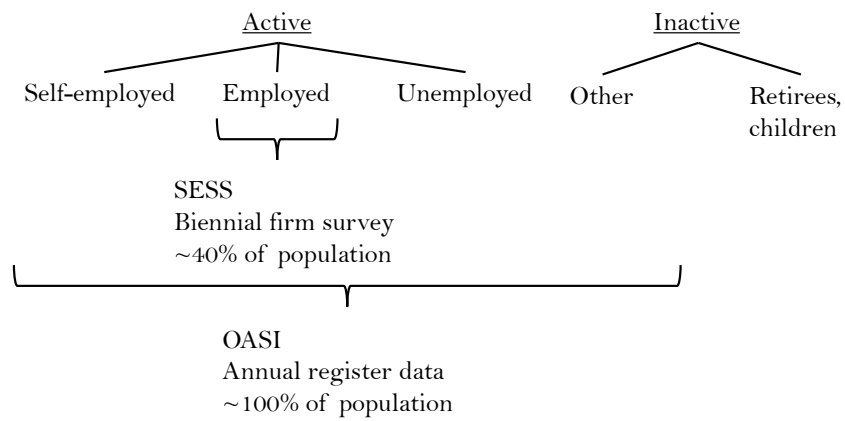
A Data sources

Table A.1 — Data sources

Name	Source	URL
Social security data (OASI)	CCO	https://www.zas.admin.ch/zas/de/home/partenaires-et-institutions-/statistique.html
Wages, socio-economic, and firm data (SESS)	SFSO	https://www.bfs.admin.ch/bfsstatic/dam/assets/6468399/master
Labor market regulation index	OECD	https://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm
Swiss inflation	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/prices/consumer-price-index.html
CHF/EUR exchange rate	SNB	https://data.snb.ch/en/topics/ziredev#!/cube/devkum
Wage index	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/work-income/wages-income-employment-labour-costs.html
Inflation abroad	OECD	https://data.oecd.org/price/inflation-cpi.htm
Gross median income	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/work-income/wages-income-employment-labour-costs.assetdetail.8786111.html
Average social security charges 2014	Federal Social Insurance Office	Page 30 https://fak-basel.ch/wp-content/uploads/2015/10/Soz.vers..Statistik-2013.pdf
Average social security charges 2016	Federal Social Insurance Office	https://www.bsv.admin.ch/bsv/de/home/sozialversicherungen/ueberblick/grsv/statistik.html?cq_ck=1481195805050#-1422866446
Employment	SFSO	https://www.bfs.admin.ch/bfs/de/home/statistiken/industrie-dienstleistungen/unternehmen-beschaefigte/beschaefigungsstatistik/beschaefigte.assetdetail.12967634.html
Input-Output-Table	SECO	https://www.seco.admin.ch/seco/de/home/Publikationen_Dienstleistungen/Publikationen_und_Formulare/Aussenwirtschafts/Globalisierung/die-volkswirtschaftliche-bedeutung-der-globalen-wertschoepfungsk.html and Nathani et al. (2015)
Conversion keys NOGA 2002 to 2008	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/industry-services/nomenclatures/noga/publications-noga-2008.assetdetail.239927.html

Notes: All links accessed on 28/10/2021.

Figure A.1 — Structure of the data



Notes: The braces indicate the population of the firm survey (SESS) and the social security register data (OASI), respectively.

B Treatment of outliers

We consider the OASI register data to be of higher quality than the SESS data because of potential reporting errors in the firm survey. Therefore, we use the OASI data to detect outliers in the SESS. For each year t we estimate a separate linear regression for annual log-employment income net of social security contributions ($y_{i,t}$):

$$y_{i,t}^{\text{SESS}} = \alpha_t + \beta_t y_{i,t}^{\text{OASI}} + \varepsilon_{i,t}, \quad t \in \{2012, 2014, 2016\}$$

where i denotes individuals and $\varepsilon_{i,t}$ is an *iid* error term. We estimate the coefficients α_t, β_t using an outlier-robust regression by [Yohai \(1987\)](#) implemented by [Jann \(2010\)](#).¹ Outliers are defined as observations that deviate more than 150% from the prediction of the linear model:

$$\text{Outlier}_{i,t} = \begin{cases} 1 & , \quad |y_{i,t}^{\text{SESS}} - \hat{\alpha}_t - \hat{\beta}_t y_{i,t}^{\text{OASI}}| > 1.5 \\ 0 & , \quad |y_{i,t}^{\text{SESS}} - \hat{\alpha}_t - \hat{\beta}_t y_{i,t}^{\text{OASI}}| \leq 1.5 \end{cases}$$

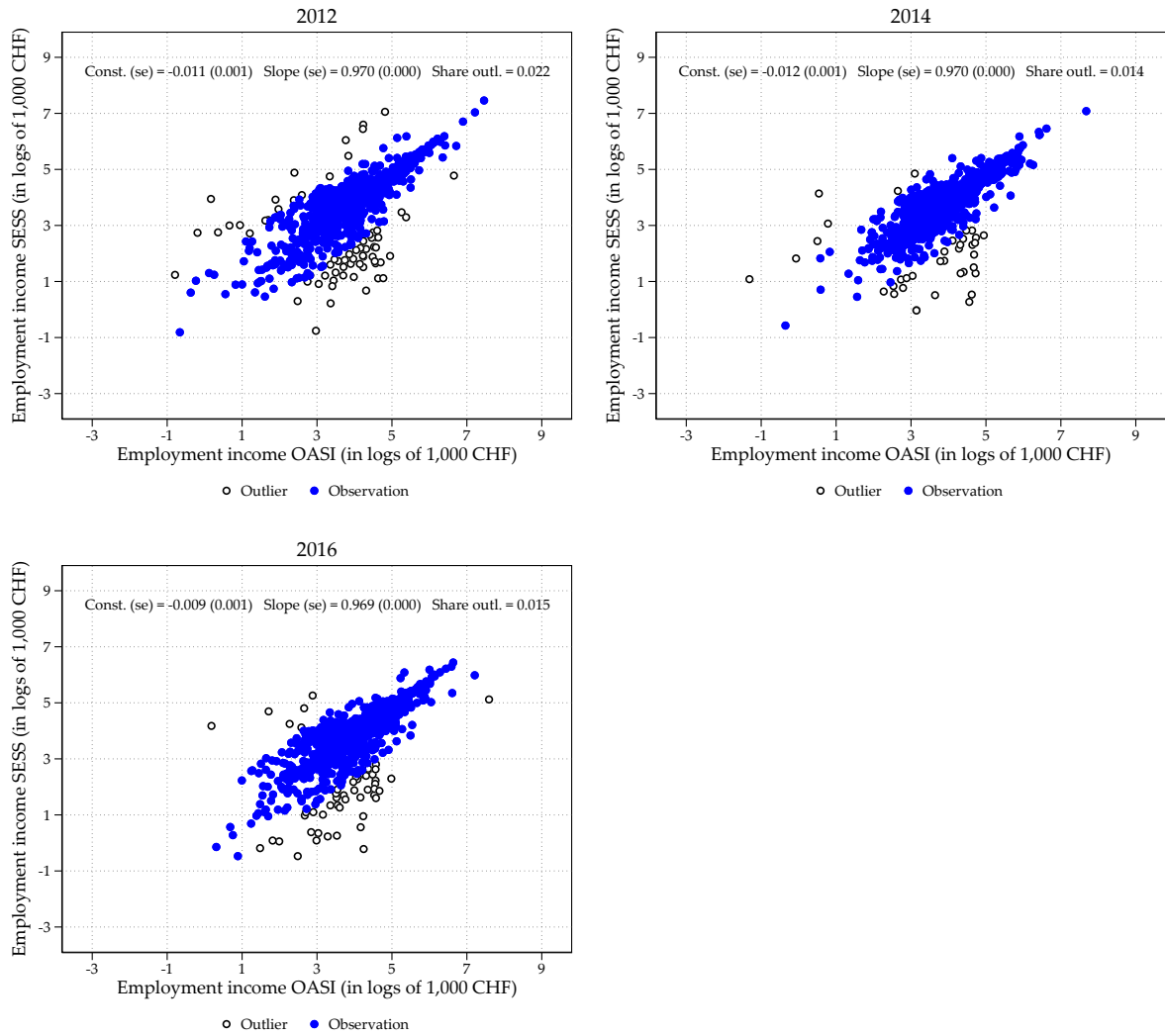
where $\hat{\alpha}_t, \hat{\beta}_t$ denote the parameter estimates.

We allow for relatively large differences between the two data sources. The reason is that OASI data and the SESS do not measure exactly the same income. The SESS comprises only one income source for an individual that is employed for October. Meanwhile, OASI comprises all income sources for individuals employed any time for the entire year.

Figure B.1 shows that the two data sources are on average strongly related. This confirms both data sets are of high quality. The share of outliers is small and falls from 2.2% in 2012 to 1.5% in 2016.

¹Other outlier-robust estimators yield similar results.

Figure B.1 — Detection of outliers



Notes: The figure shows a 0.2% random sample of observations smaller than CHF 5,000,000. The outlier-robust regression coefficients and the share of outliers are based on all data. Outliers are observations where the SESS income deviates more than 150% from the predicted value based on the OASI data.

C Sampling weights

Analyzing wage rigidity with SESS data involves several sample selection problems. First, although the SFSO provides sampling weights, they will yield biased statistics if our sampling decisions remove observations in a non-random fashion. For example, if smaller firms are more likely to use the paper survey, these data suffer from more serious reporting errors, which we remove in the outlier detection scheme. Second, computing the wage growth distribution requires two consecutive wage observations. Therefore, wage growth statistics are based on a sample of employees that are more likely to stay in the labor market.

Indeed, our sampling decisions introduce an upward bias in median income, and a downward bias in employment. Table B.1 comprises aggregate statistics for median income and employment based on different data sets and weighting schemes. The official statistics on median net income amount to CHF 57,000. Our own calculations with the SESS data show a higher income at CHF 60,000 (Table C.1 panels a and b). This bias stems from the sampling decisions. If we additionally condition on observing a biennial wage change the upward bias becomes even more pronounced (panels c and d). The estimates are biased using the unweighted OASI data, as well as using the SESS data with official sampling weights. Conditioning on observing two consecutive wage observations exacerbates these biases. The median income is even higher, because we select individuals that are more likely to remain in the SESS over an extended period, and because low-income individuals probably face a higher risk of becoming unemployed.

To compute representative aggregate statistics we therefore construct new sampling weights. The first accounts for the sampling decisions and therefore yields weights for computing statistics for income and wage levels in 2014 and 2016. The second additionally accounts for conditioning on two consecutive wage observations and therefore yields weights for computing statistics for wage changes in 2014 and 2016. We use information from the OASI data, which cover the population of Swiss residents. For each year and each subsample, we estimate the probability of being observed with a Probit model:

$$P[\mathbf{1}\{i \in \tilde{I}\}|\mathbf{x}_i] = \Phi(\mathbf{x}_i\beta)$$

where $\mathbf{1}\{i \in \tilde{I}\}$ is an indicator that equals one if individual i is observed in the subsample $\tilde{I} \subseteq I$ of population I . For ease of exposition, we do not add time subscripts, but we estimate a separate Probit for each year. $\mathbf{x}_i$ comprises variables that explain whether an individual is observed in the subsample. We control for 400 percentiles of the employment income distribution, as well as dummy variables for unemployment and self-employment.

Then, we use the inverse of the probability that an individual with characteristics $\mathbf{x}_i$ is

Table C.1 — Replication net and gross income SESS

(a) Conditional on being in SESS 2014				
	Official (net)	SESS (net)	Official (gross)	SESS (gross)
Median income (in 1,000 CHF)	57.41	60.33	67.00	69.29
Observations (in 1,000)	.	1,523.99	.	1,523.99

(b) Conditional on being in SESS 2016				
	Official (net)	SESS (net)	Official (gross)	SESS (gross)
Median income (in 1,000 CHF)	57.21	60.53	67.60	69.60
Observations (in 1,000)	.	1,665.34	.	1,665.34

(c) Conditional on observing biennial wage change 2014				
	Official (net)	SESS (net)	Official (gross)	SESS (gross)
Median income (in 1,000 CHF)	57.41	66.23	67.00	76.65
Observations (in 1,000)	.	859.99	.	859.99

(d) Conditional on observing biennial wage change 2016				
	Official (net)	SESS (net)	Official (gross)	SESS (gross)
Median income (in 1,000 CHF)	57.21	68.18	67.60	78.98
Observations (in 1,000)	.	960.73	.	960.73

Notes: Official median income and employment stem from the SFSO. We adjust the official gross income reported by SFSO by our own estimate of the federal social security charges in 2014 and 2016 (14.32% and 15.37%). The sample estimates are based on two subsamples. Panels (a) and (b) restrict the sample to observations in the SESS after our sampling decisions. Panels (c) and (d) additionally restrict the sample to those individuals in the SESS with two consecutive wage observations.

included in the sample as sampling weight:

$$s_i = \begin{cases} 1/P[\mathbf{1}\{i \in \tilde{I}\}|\mathbf{x}_i, i \in \tilde{I}] & , i \in \tilde{I} \\ 1/P[\mathbf{1}\{i \notin \tilde{I}\}|\mathbf{x}_i, \mathbf{1}\{i \notin \tilde{I}\}] = 1 / \left(1 - P[\mathbf{1}\{i \in \tilde{I}\}|\mathbf{x}_i, \mathbf{1}\{i \notin \tilde{I}\}]\right) & , i \notin \tilde{I} \end{cases}$$

If the probability of observing an individual with characteristics $\mathbf{x}_i$ is high, the weight is low because there are many other individuals with similar characteristics in the sample. The formula differs between individuals observed in the subsample ($i \in \tilde{I}$) and individuals not observed in the subsample ($i \notin \tilde{I}$). However, in our application only the weights for observed individuals matters because we compute the statistics only on the subsample with SESS data. Therefore, we obtain representative statistics for the population of all employees in Switzerland.

Table C.2 provides selected coefficient estimates, excluding the indicators for 400 percentiles of the employment income distribution for brevity. The coefficients have the expected sign. In particular, unemployed and self-employed individuals are less likely to be included in the SESS.

Table C.3 shows aggregate statistics for income and employment based on different data sets and weighting schemes. It shows that the sampling weights recover the official median income and employment statistics in 2014 and 2016. For example, for 2014 median income (employment) amounted to CHF 57,410 (4,824,800 persons). Using our sampling weights, we obtain an estimate of CHF 56,670 (4,814,020 persons).

Table C.2 — Probit models weighting

(a) Conditional on being in SESS after sampling decisions (2014)

	1/0 (in SESS)
Unemployed	-0.294*** (0.003)
Self-employed	-0.175*** (0.004)
Constant	-3.083*** (0.013)
Observations	5,576,637
Pseudo R-sq.	0.170

(b) Conditional on being in SESS after sampling decisions (2016)

	1/0 (in SESS)
Unemployed	-0.341*** (0.003)
Self-employed	-0.132*** (0.005)
Constant	-3.015*** (0.012)
Observations	5,593,395
Pseudo R-sq.	0.171

(c) Conditional on observing biennial wage change after sampling decisions (2014)

	1/0 (in SESS)
Unemployed	-0.483*** (0.005)
Self-employed	-0.129*** (0.005)
Constant	-3.443*** (0.022)
Observations	5,576,637
Pseudo R-sq.	0.152

(d) Conditional on observing biennial wage change after sampling decisions (2016)

	1/0 (in SESS)
Unemployed	-0.531*** (0.005)
Self-employed	-0.127*** (0.006)
Constant	-3.262*** (0.017)
Observations	5,593,395
Pseudo R-sq.	0.164

Notes: Probit model coefficients for estimating weights. Indicators for 400 percentiles of the employment income distribution not reported for brevity. ***/**/* denotes statistical significance at the 1%/5%/10% level.

Table C.3 — Data and weighting

(a) Conditional on being in SESS after sampling decisions 2014

	Aggregate statistics		Sample estimates		
	Official statistics	OASI population	OASI unweighted	OASI own weights	SESS official weights
Median income (in 1,000 CHF)	57.41	55.69	75.17	56.76	60.33
Employment (in 1,000)	4,824.80	4,895.73	1,523.99	4,814.02	3,974.69
Observations (in 1,000)	.	4,895.73	1,517.78	1,454.88	1,523.99

(b) Conditional on being in SESS after sampling decisions 2016

	Aggregate statistics		Sample estimates		
	Official statistics	OASI population	OASI unweighted	OASI own weights	SESS official weights
Median income (in 1,000 CHF)	57.21	56.40	75.03	57.24	60.53
Employment (in 1,000)	4,915.50	4,971.26	1,665.34	4,907.56	3,733.10
Observations (in 1,000)	.	4,971.26	1,659.21	1,594.97	1,665.34

(c) Conditional on observing biennial wage change after sampling decisions 2014

	Aggregate statistics		Sample estimates		
	Official statistics	OASI population	OASI unweighted	OASI own weights	SESS official weights
Median income (in 1,000 CHF)	57.41	55.69	80.37	56.60	66.23
Employment (in 1,000)	4,824.80	4,895.73	859.99	4,826.18	1,561.71
Observations (in 1,000)	.	4,895.73	857.90	832.59	859.99

(d) Conditional on observing biennial wage change after sampling decisions 2016

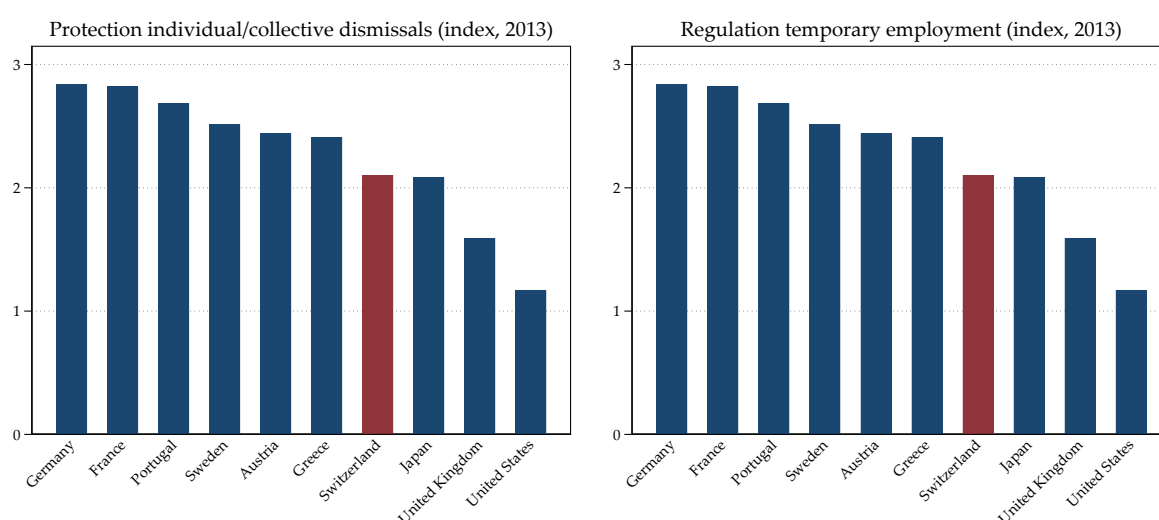
	Aggregate statistics		Sample estimates		
	Official statistics	OASI population	OASI unweighted	OASI own weights	SESS official weights
Median income (in 1,000 CHF)	57.21	56.40	81.94	56.64	68.18
Employment (in 1,000)	4,915.50	4,971.26	960.73	4,959.38	1,425.73
Observations (in 1,000)	.	4,971.26	959.10	935.21	960.73

Notes: Official median income and employment stem from the SFSO. We adjust the official gross income reported by SFSO by our own estimate of the federal social security charges in 2014 and 2016 (14.32% and 15.37%). The sample estimates are based on two subsamples. Panel (a) restricts the sample to observations in the SESS after our sampling decisions. Panel (b) additionally restricts the sample to those individuals in the SESS with two consecutive wage observations.

D Economic environment and Swiss franc shock

One reason why the Swiss economy is an interesting case in which to study downward nominal wage rigidity is its labor market flexibility. As a result, downward nominal wage rigidities are not mainly caused by legal provisions (see [Duarte, 2008](#), for an example on Portugal). In particular, there is no federal minimum wage; minimum wages introduced by single cantons are relatively low (see [Berger and Lanz, 2020](#)); only 20% of the working age population is subject to a (sectoral or cantonal) minimum wage agreement; and finally, only 13% of the working age population is a member of a labor union.² This is supported by indices on labor market regulation by the OECD (see Figure D.1). Switzerland's labor market is less regulated than many European countries, although it is more regulated than the US and UK.

Figure D.1 — Labor market regulation



Source: OECD, see Table A.1.

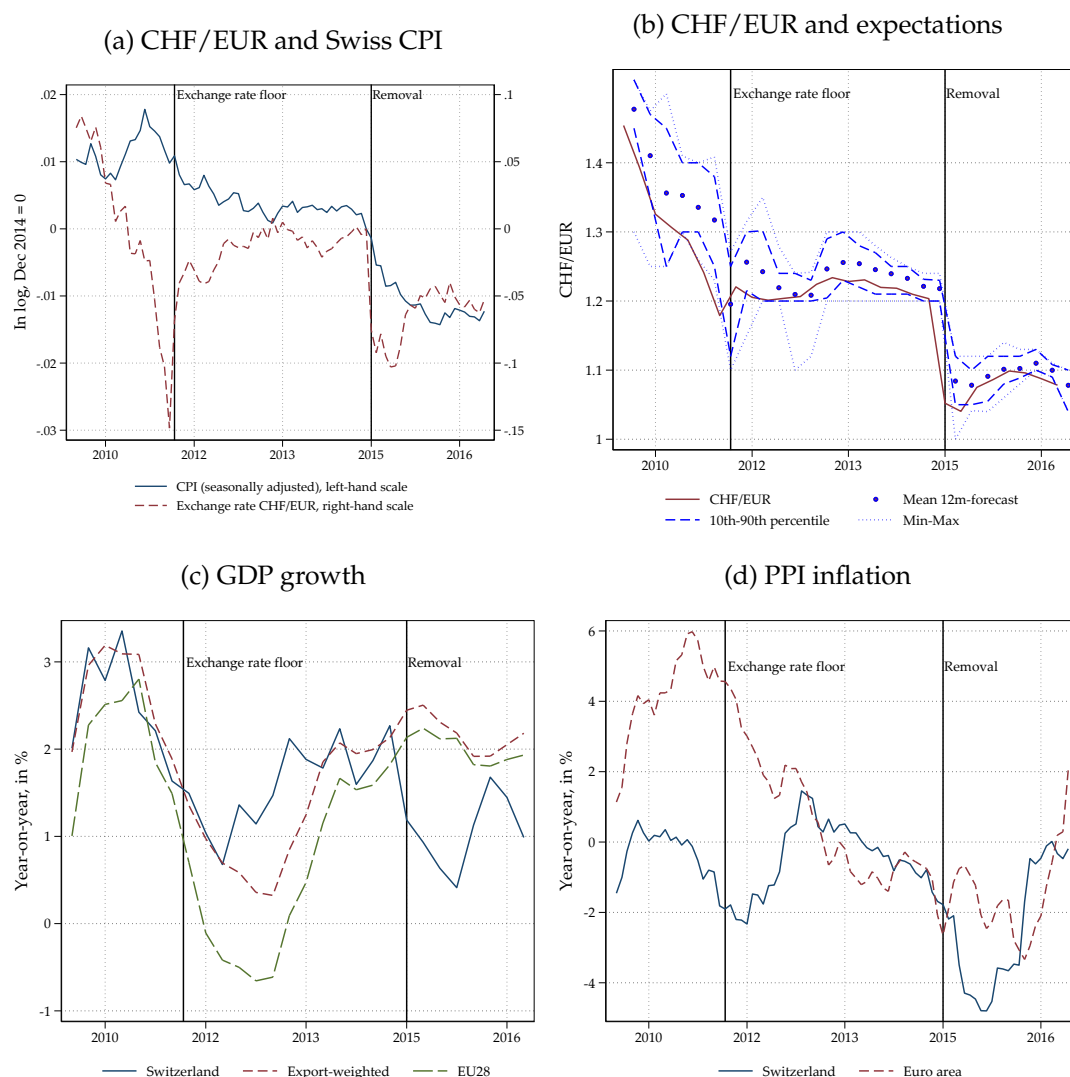
Another reason why Switzerland is an interesting case is that the Swiss franc shock in 2015 can be regarded as an unexpected exogenous economic shock that made downward nominal wage rigidities more binding. At that time, the international economic environment was relatively stable.

The removal of the exchange rate floor led to an unexpected appreciation of the Swiss franc and a decline in the price level. Panel (a) of Figure D.2 shows the Swiss CPI (left-hand scale)

²These data are for 2018 and 2019 and stem from www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb/erwerbstaetigkeit-arbeitszeit/erwerbspersonen/eintritte-austritte-erwerbsbevoelkerung.html, www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb/gesamtarbeitsvertraege-sozialpartnerschaft/lohnverhandlungen.html, www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb/gesamtarbeitsvertraege-sozialpartnerschaft/gewerkschaften.html (accessed on 12/11/2020).

along with the CHF/EUR exchange rate (right-hand scale).³ The Swiss franc immediately appreciated by 10% and stabilized at a level 5% stronger than prior to the shock by the end of 2015. The CPI moved sideways before the removal of the floor. Afterwards, we observe a decline of 1%.

Figure D.2 — The Swiss franc shock



Notes: These figures are reproduced from [Kaufmann and Renkin \(2019\)](#). Panel (a): Monthly CPI and CHF/EUR exchange rate in log and normalized to 0 in Dec 2014. Panel (b): Quarterly CHF/EUR with expectations from the KOF Consensus Forecast, a survey of professional forecasters. Panel (c): Quarterly GDP growth in Switzerland, its main trading partners (export-weighted), and in the European Union. Panel (d): Monthly producer price inflation in Switzerland and the Euro area. Vertical lines denote the introduction and removal of the exchange rate floor at CHF/EUR 1.20. Survey data and export-weighted GDP are retrieved from KOF Swiss Economic Institute. Exchange rate data retrieved from the ECB. GDP and producer price data retrieved from the OECD.

Although most observers believed that the floor was a temporary policy, the end date of the policy was unknown. Its removal on 15 January 2015 surprised most economists and

³Kaufmann and Renkin (2019) show that the Swiss franc appreciated also in trade-weighted terms and against currencies other than the euro.

financial market participants. Panel (b) of Figure D.2 shows forecasts of a panel of informed economists participating in the KOF Consensus Forecast, a survey of professional forecasters. One month before the removal of the floor, all survey participants forecast an exchange rate above CHF/EUR 1.20 over the next 12 months. This is also consistent with the high credibility of the floor found in financial market data (see [Bonadio et al., 2020](#)).

The international macroeconomic environment was relatively stable before and after the removal of the floor (see panel c). In 2013 and 2014, GDP growth in Switzerland's main trading partners stood at about 2%. After the removal of the floor Swiss GDP growth fell by 1 and 1.5 percentage points in Q1 and Q2 2015, respectively. Meanwhile, GDP growth abroad remained relatively stable. Thus, the analysis is not confounded by a sudden change in foreign demand.

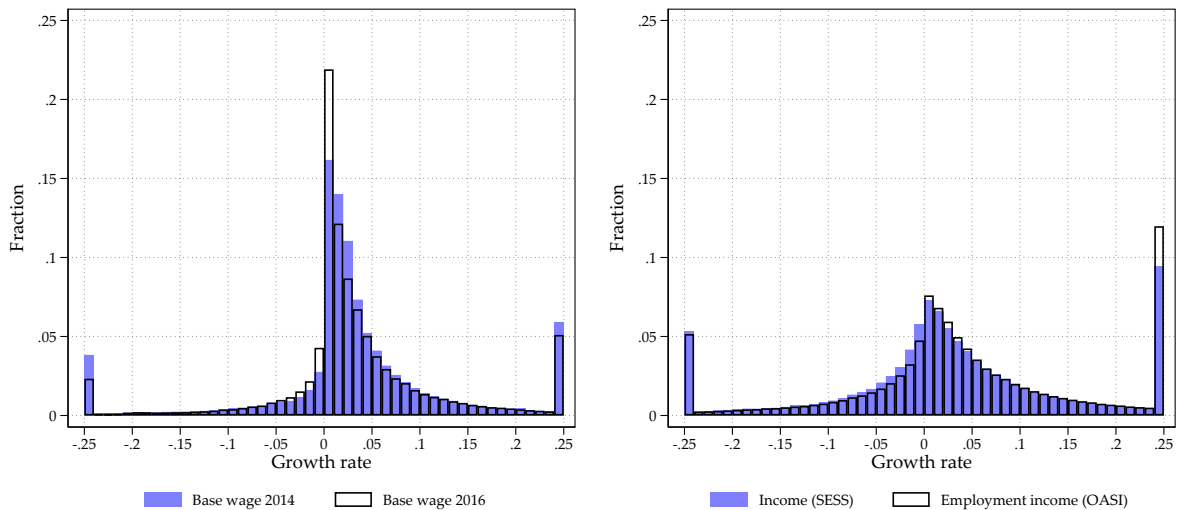
Although the exchange rate floor was introduced in 2011, it took time until relative prices in Switzerland and abroad converged. That is, the appreciation in 2010 and 2011 had relevant effects on prices and competitiveness of Swiss firms well into the exchange rate floor period. Panel (d) shows that producer price inflation in 2012 was lower in Switzerland than in the Euro area. Similarly, Panel (a) shows that the decline in the CPI came to a halt only by 2013. Therefore, we expect the effects of the appreciation before the floor to have an impact on firms well into the exchange rate floor period, which is relevant to interpret the pre-treatment trends in Online Appendix G.

E Descriptive statistics

Because our data has not been analyzed before, this section provides additional descriptive statistics. We first show histograms of the base wage and income growth distributions. Then, we provide information on the importance of irregular payments in employees' compensation. Finally, we report wage setting statistics along various dimensions.

We exploit the base wage growth distribution to identify the causal impact of downward nominal wage rigidity. The biennial base wage growth distribution in 2014 displays a pronounced asymmetry around the origin (see left panel of Figure E.1). Small wage cuts occur less frequently than wage freezes and small wage increases. In addition, the Swiss franc shock leads to a leftward shift of the wage change distribution in 2016 compared to 2014. After the deflationary shock, the share of wage freezes increases by more than the share of small wage cuts. This suggests that a nominal rigidity prevents wages from falling. Otherwise, we would observe more wage cuts.

Figure E.1 — Distribution of biennial base wage and income growth



Notes: The histograms are winsorized at an absolute biennial wage growth rate of 25%. Sampling weights are not taken into account.

The right panel shows that the asymmetry is not present if we compute biennial income growth rather than base wage growth. Indeed, income fluctuates more strongly because of irregular payments, such as bonuses, and changes in the activity rate. Therefore, we prefer the base wage to measure individuals affected by downward nominal wage rigidity.

Previous research has shown that bonus payments, hourly wages, or wages for job movers exhibit less wage rigidity (see e.g. [Altonji and Devereux, 2000](#); [Nickell and Quintini, 2003](#); [Babecký et al., 2019](#); [Grigsby et al., 2021](#); [Kurmann and McEntarfer, 2019](#)). In Switzerland,

however, irregular payments account for a relatively small share of total compensation. Tables E.1 and E.2 show that 91% of employment income stems from base income. We obtain similar results when calculating the average share of base income in the total payroll of firms (see Table E.3). Irregular income, including bonus payments, accounts for 3% of employment income. This suggests that the base income is the most important component in employees' compensation and firms' labor cost. In addition, only 20% of employees are paid on an hourly basis. Finally, more than 80% of employees stay at the same company over two years, and more than 92% have a permanent contract. This suggests that factors typically associated with wage rigidities (the contractual base wage, staying on a job, permanent contract, monthly pay), play an important role in the Swiss labor market.

Table E.1 — Descriptive statistics matched data set 2014

	Mean	Std.	Min.	Max.
<i>Income (OASI)</i>				
Income (in 1,000)	65.10	72.34	0.00	9,880.27
Employment income (in 1,000)	64.17	72.54	0.00	9,880.27
Unemployment benefits (in 1,000)	0.00	0.00	0.00	0.00
<i>Income and wage (SESS)</i>				
Employment income (in 1,000)	60.05	54.28	0.07	9,031.78
Total wage (in 1,000)	69.31	63.12	0.08	9,704.97
Share of base income	0.91	0.07	0.00	1.00
Share of regular income	0.97	0.06	0.00	1.00
Share of irregular income	0.03	0.06	0.00	1.00
Wage T-2 observed	0.49	0.50	0.00	1.00
<i>Activity and contract</i>				
Tenure at firm (years)	7.83	8.70	0.00	60.00
Manager	0.22	0.42	0.00	1.00
Open-ended contract	0.92	0.27	0.00	1.00
Hourly wage	0.20	0.40	0.00	1.00
Stays at company	0.82	0.39	0.00	1.00
<i>Employee</i>				
Age (years)	40.98	12.71	16.00	81.00
Women	0.52	0.50	0.00	1.00
University degree	0.19	0.39	0.00	1.00
Foreigner	0.28	0.45	0.00	1.00
<i>Firm</i>				
Public company	0.25	0.43	0.00	1.00
Collective agreement	0.42	0.49	0.00	1.00
Small firm	0.13	0.34	0.00	1.00
Medium firm	0.19	0.39	0.00	1.00
Large firm	0.68	0.47	0.00	1.00
Observations matched	1,517,784			
Observations SESS	1,523,987			

Notes: All statistics weighted using own sampling weights. Unless otherwise stated the variables are indicators with values of 1/0.

Table E.2 — Descriptive statistics matched data set 2016

	Mean	Std.	Min.	Max.
<i>Income (OASI)</i>				
Income (in 1,000)	65.73	79.20	0.00	16,757.25
Employment income (in 1,000)	64.93	79.30	0.00	16,757.25
Unemployment benefits (in 1,000)	0.00	0.00	0.00	0.00
<i>Income and wage (SESS)</i>				
Employment income (in 1,000)	60.16	62.73	0.25	15,105.29
Total wage (in 1,000)	70.26	73.09	0.20	16,723.77
Share of base income	0.91	0.07	0.01	1.00
Share of regular income	0.97	0.07	0.02	1.00
Share of irregular income	0.03	0.07	0.00	0.98
Wage T-2 observed	0.51	0.50	0.00	1.00
<i>Activity and contract</i>				
Tenure at firm (years)	7.99	8.88	0.00	64.00
Manager	0.21	0.41	0.00	1.00
Open-ended contract	0.93	0.25	0.00	1.00
Hourly wage	0.18	0.39	0.00	1.00
Stays at company	0.81	0.39	0.00	1.00
<i>Employee</i>				
Age (years)	41.62	12.76	17.00	80.00
Women	0.54	0.50	0.00	1.00
University degree	0.20	0.40	0.00	1.00
Foreigner	0.29	0.45	0.00	1.00
<i>Firm</i>				
Public company	0.25	0.43	0.00	1.00
Collective agreement	0.42	0.49	0.00	1.00
Small firm	0.13	0.34	0.00	1.00
Medium firm	0.20	0.40	0.00	1.00
Large firm	0.67	0.47	0.00	1.00
Observations matched	1,659,212			
Observations SESS	1,665,338			

Notes: All statistics weighted using own sampling weights. Unless otherwise stated the variables are indicators with values of 1/0.

Table E.3 — Share base wage in total payroll by firm size (number of employees)

(a) 2014				
	Mean	Std.	Min.	Max.
0-19	0.92	0.06	0.00	1.00
20-49	0.91	0.05	0.54	1.00
50-249	0.90	0.04	0.39	1.00
250-999	0.89	0.05	0.46	1.00
1000-	0.90	0.04	0.63	1.00
Total	0.90	0.04	0.00	1.00
Observations matched	1,517,784			
Observations SESS	1,523,987			

(b) 2016				
	Mean	Std.	Min.	Max.
0-19	0.92	0.06	0.10	1.00
20-49	0.90	0.06	0.26	1.00
50-249	0.89	0.05	0.42	1.00
250-999	0.88	0.05	0.44	1.00
1000-	0.90	0.04	0.63	1.00
Total	0.90	0.05	0.10	1.00
Observations matched	1,659,212			
Observations SESS	1,665,338			

Notes: Share of base wage payments in total payroll at the firm level by firm size according to the number of employees. Unweighted statistics.

We provide base wage setting statistics along various dimensions without commenting on them in detail because they may be useful to researchers calibrating macroeconomic models. The main point to note is that downward nominal wage rigidity is a pervasive phenomenon. Wages are more downward flexible for hourly pay, workers with shorter tenure, and workers changing the firm.

Table E.4 — Base wage rigidity statistics for various characteristics 2014

	Share wage raises (in %)	Share wage cuts (in %)	Share wage freezes (in %)	Share wage cuts prevented (in %)
Overall	70.9	21.4	7.7	26.4
<i>Activity and contract</i>				
Tenure shorter than 5 years	70.6	25.1	4.3	14.7
Tenure longer or 5 years	71.1	19.5	9.4	32.6
No management	70.5	22.4	7.1	24.0
Management	69.7	21.0	9.4	30.9
Temporary contract	60.9	33.4	5.8	14.7
Open-ended contract	71.3	20.9	7.8	27.1
Monthly pay	72.8	18.4	8.8	32.3
Hourly pay	62.1	35.3	2.6	6.8
Changed firm	61.7	35.5	2.8	7.3
Stayed at firm	73.1	18.1	8.8	32.8
<i>Employee</i>				
Older than or 40 years	67.1	23.0	9.9	30.0
Younger than 40 years	77.3	18.8	4.0	17.5
Men	72.4	18.3	9.3	33.6
Women	69.8	23.7	6.5	21.6
University degree	70.2	22.1	7.7	25.8
No university degree	72.0	21.0	7.0	25.1
Foreigner	70.3	21.8	7.9	26.7
Swiss	72.8	20.3	6.9	25.3
<i>Firm</i>				
Private sector	71.7	21.8	6.6	23.1
Public sector	68.7	20.4	10.9	34.8
No collective agreement	67.9	24.1	8.0	25.0
Collective agreement	73.1	19.8	7.1	26.4
Small firm	60.6	29.4	10.0	25.4
Medium firm	62.9	28.4	8.7	23.5
Large firm	73.4	19.4	7.3	27.3

Notes: Wage rigidity statistics based on biennial wage changes according to different characteristics. Wage freezes are defined as growth rates smaller than 0.02% in absolute value. The share of wage cuts prevented is defined as share freezes/(1–share raises). All statistics based on own sampling weights.

Table E.5 — Base wage rigidity statistics for various characteristics 2016

	Share wage raises (in %)	Share wage cuts (in %)	Share wage freezes (in %)	Share wage cuts prevented (in %)
Overall	69.2	21.0	9.8	31.7
<i>Activity and contract</i>				
Tenure shorter than 5 years	70.6	23.4	6.1	20.7
Tenure longer or 5 years	68.6	19.9	11.6	36.8
No management	69.0	21.5	9.5	30.7
Management	72.3	18.1	9.6	34.7
Temporary contract	66.5	26.3	7.2	21.4
Open-ended contract	69.3	20.8	9.9	32.1
Monthly pay	70.0	19.3	10.7	35.7
Hourly pay	64.6	31.8	3.6	10.3
Changed firm	63.4	31.6	5.0	13.5
Stayed at firm	70.6	18.5	10.9	37.1
<i>Employee</i>				
Older than or 40 years	64.8	22.9	12.4	35.1
Younger than 40 years	76.9	17.8	5.3	23.0
Men	67.7	21.0	11.4	35.2
Women	70.5	21.1	8.5	28.7
University degree	68.0	21.9	10.1	31.6
No university degree	74.1	19.0	6.8	26.4
Foreigner	69.2	21.4	9.5	30.7
Swiss	69.4	19.9	10.7	35.0
<i>Firm</i>				
Private sector	68.2	22.4	9.3	29.3
Public sector	71.6	17.6	10.8	38.0
No collective agreement	69.0	20.7	10.3	33.1
Collective agreement	69.5	21.4	9.1	29.8
Small firm	58.8	29.9	11.3	27.4
Medium firm	61.4	26.1	12.5	32.5
Large firm	71.6	19.3	9.1	31.9

Notes: Wage rigidity statistics based on biennial wage changes according to different characteristics. Wage freezes are defined as growth rates smaller than 0.02% in absolute value. The share of wage cuts prevented is defined as share freezes/(1–share raises). All statistics based on own sampling weights.

Table E.6 — Detailed base wage rigidity statistics 2014-2016

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Overall	0.70	0.21	0.09	0.29	1,820,712	27,890	0.91	0.97	3,237,213	37,020
<i>Competence level for job</i>										
Simple tasks	0.60	0.30	0.11	0.27	84,698	7,476	0.92	0.97	177,407	20,364
Practical work	0.71	0.21	0.08	0.26	479,432	19,185	0.91	0.97	883,822	35,393
Special knowledge	0.72	0.17	0.11	0.38	371,670	15,682	0.90	0.96	600,993	31,424
Complex work/problem solving	0.71	0.20	0.08	0.30	494,293	18,236	0.91	0.97	793,391	33,758
Missing	0.69	0.23	0.09	0.27	390,619	16,854	0.91	0.96	781,600	31,192
<i>Job type</i>										
Upper Management	0.66	0.22	0.12	0.36	47,313	12,440	0.88	0.92	98,482	32,663
Middle Management	0.73	0.17	0.10	0.37	147,307	11,952	0.88	0.93	232,007	27,538
Lower Management	0.70	0.18	0.12	0.40	166,510	12,674	0.90	0.95	275,410	28,435
Basic Management	0.72	0.19	0.09	0.32	137,622	10,108	0.91	0.97	227,531	25,253
Without Management Function	0.70	0.22	0.09	0.28	1,272,359	24,928	0.91	0.97	2,291,468	36,543
Missing	0.70	0.29	0.01	0.05	49,601	289	0.95	1.00	112,315	312
<i>Basis for pay</i>										
Hours	0.71	0.20	0.09	0.31	1,692,415	26,893	0.91	0.97	2,972,620	36,941
Lessons	0.61	0.37	0.02	0.05	83,932	1,756	0.93	0.99	122,879	3,326
Other (e.g. commission)	0.61	0.30	0.09	0.23	44,365	2,562	0.90	0.95	93,826	10,162
<i>Contract type</i>										
Open-ended (monthly pay)	0.71	0.19	0.10	0.34	1,418,830	24,825	0.90	0.97	2,379,321	36,582
Open-ended (ann. working time)	0.75	0.16	0.09	0.37	270,695	4,137	0.90	0.95	427,938	10,080
Open-ended (hourly pay)	0.64	0.33	0.03	0.08	74,468	7,867	0.94	0.98	215,007	24,614
Temporary (monthly pay)	0.67	0.26	0.07	0.21	49,325	3,515	0.93	0.99	132,895	11,119
Temporary (hourly pay)	0.57	0.38	0.05	0.11	7,312	1,479	0.95	0.99	33,950	5,656

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Table E.6 – continued from previous page

		Wage growth statistics (share)						Share in total income			
		Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Open-ended commission)	(w.	–	–	–	–	11	2	0.98	0.98	95	7
Temporary commission)	(w.	0.53	0.47	0.00	0.00	71	8	0.91	0.96	119	13
<i>Occupation (ISCO 2-digit)</i>											
Commissioned armed forces officers		0.31	0.67	0.02	0.03	794	39	0.88	0.95	972	60
Non-commissioned armed forces officers		–	–	–	–	49	15	0.90	0.97	76	25
Armed forces occupations, other ranks		0.80	0.17	0.03	0.15	63	10	0.92	0.99	138	16
Managers, further details	w/o	0.81	0.11	0.08	0.44	48,859	4,890	0.90	0.95	72,177	11,650
Chief executives, senior officials and legislators		0.73	0.17	0.11	0.39	31,202	7,308	0.88	0.93	54,490	22,404
Administrative and commercial managers		0.75	0.15	0.10	0.40	31,329	5,122	0.88	0.92	51,610	13,609
Production and specialized services managers		0.69	0.25	0.07	0.21	30,956	4,953	0.90	0.96	44,962	12,872
Hospitality, retail and other services managers		0.87	0.07	0.06	0.47	10,257	609	0.91	0.98	13,072	2,393
Professionals, further details	w/o	0.79	0.13	0.08	0.38	25,315	1,411	0.92	0.97	42,619	3,123
Science and engineering professionals		0.77	0.10	0.13	0.56	27,570	3,263	0.90	0.96	48,725	9,272
Health professionals		0.72	0.19	0.09	0.34	39,514	1,602	0.91	0.97	67,132	4,606
Teaching professionals		0.65	0.30	0.05	0.13	133,718	3,202	0.93	0.99	202,747	6,596
Business and administration professionals		0.68	0.20	0.12	0.37	46,699	5,280	0.91	0.96	81,801	13,451

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Table E.6 – continued from previous page

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Information and communications technology professionals	0.78	0.11	0.11	0.48	32,601	3,073	0.91	0.96	55,468	7,866
Legal, social and cultural professionals	0.72	0.15	0.13	0.47	35,479	3,385	0.92	0.98	57,616	8,262
Technicians and associate professionals, w/o further details	0.81	0.10	0.09	0.47	91,749	4,867	0.91	0.97	132,211	10,249
Science and engineering associate professionals	0.71	0.20	0.09	0.30	73,042	6,838	0.90	0.96	123,118	17,560
Health associate professionals	0.66	0.23	0.11	0.32	76,303	2,503	0.90	0.96	124,392	6,964
Business and administration associate professionals	0.72	0.15	0.13	0.47	97,555	8,971	0.91	0.96	162,864	22,375
Legal, social, cultural and related associate professionals	0.66	0.25	0.09	0.26	17,369	2,498	0.93	0.98	32,169	7,026
Information and communications technicians	0.73	0.17	0.10	0.37	15,652	1,511	0.89	0.95	26,239	3,864
Clerical support workers, w/o further details	0.76	0.20	0.04	0.18	1,598	40	0.91	0.96	1,958	251
General and keyboard clerks	0.70	0.20	0.10	0.34	50,903	8,731	0.92	0.98	99,499	25,961
Customer services clerks	0.70	0.22	0.09	0.29	12,263	1,692	0.94	0.98	21,274	5,144
Numerical and material recording clerks	0.71	0.18	0.11	0.37	25,516	3,330	0.91	0.97	42,598	9,194
Other clerical support workers	0.75	0.23	0.02	0.08	24,767	995	0.93	0.98	30,687	2,592

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Table E.6 – continued from previous page

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Service and sales workers, w/o further details	0.77	0.16	0.08	0.32	5,185	853	0.93	0.98	10,485	2,153
Personal service workers	0.67	0.24	0.10	0.29	52,739	4,915	0.92	0.98	110,821	14,786
Sales workers	0.81	0.16	0.04	0.19	84,706	3,712	0.92	0.98	145,972	11,508
Personal care workers	0.64	0.28	0.07	0.20	43,655	2,476	0.90	0.96	83,302	5,601
Protective services workers	0.79	0.14	0.07	0.35	27,399	1,007	0.91	0.96	42,187	2,662
Market-oriented skilled agricultural workers	0.47	0.09	0.44	0.82	1,490	408	0.93	0.99	4,126	1,850
Market-oriented skilled forestry, fishery and hunting workers	0.77	0.06	0.16	0.71	224	47	0.92	0.99	347	175
Craft and related trades workers, w/o further details	0.73	0.16	0.11	0.39	8,356	466	0.91	0.97	10,806	1,004
Building and related trades workers, excluding electricians	0.61	0.25	0.14	0.37	17,038	2,088	0.91	0.98	45,402	8,127
Metal, machinery and related trades workers	0.73	0.19	0.09	0.32	27,917	3,407	0.89	0.96	55,405	10,110
Handicraft and printing workers	0.73	0.17	0.10	0.37	7,149	1,036	0.90	0.97	14,606	3,244
Electrical and electronic trades workers	0.72	0.21	0.07	0.24	11,437	1,936	0.91	0.97	24,389	5,351
Food processing, wood working, garment and other craft and related trades workers	0.69	0.23	0.08	0.25	11,524	1,946	0.92	0.97	26,563	7,184

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	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Plant and machine operators and assemblers, w/o further details	0.50	0.32	0.18	0.35	325	66	0.92	0.98	691	216
Stationary plant and machine operators	0.62	0.26	0.12	0.31	18,092	2,228	0.88	0.95	31,761	6,008
Assemblers	0.70	0.22	0.08	0.28	11,473	1,127	0.90	0.97	20,062	3,504
Drivers and mobile plant operators	0.56	0.34	0.10	0.22	35,627	2,547	0.91	0.96	60,805	7,290
Elementary occupations, w/o further details	0.58	0.31	0.11	0.25	39,427	3,429	0.92	0.97	77,522	8,974
Cleaners and helpers	0.57	0.30	0.14	0.31	15,890	2,875	0.93	0.98	42,757	11,109
Agricultural, forestry and fishery labourers	0.62	0.26	0.12	0.32	642	162	0.93	0.99	1,674	784
Labourers in mining, construction, manufacturing and transport	0.67	0.25	0.08	0.24	25,998	2,452	0.89	0.95	50,437	6,611
Food preparation assistants	0.56	0.13	0.31	0.70	113	46	0.92	0.98	296	256
Street and related sales and service workers	–	–	–	–	4	1	–	–	4	2
<i>Work permit</i>										
Swiss	0.70	0.22	0.09	0.29	1,355,166	26,184	0.91	0.97	2,257,572	36,822
Short-term resident (L)	0.65	0.28	0.06	0.19	1,655	564	0.93	0.98	14,057	5,321
Resident (B)	0.74	0.19	0.07	0.26	78,527	9,469	0.92	0.97	224,963	26,637
Resident (C)	0.71	0.20	0.09	0.31	267,024	16,448	0.91	0.96	464,460	32,695
Cross-border worker (G)	0.71	0.19	0.10	0.34	116,259	7,806	0.91	0.96	221,251	20,292
Other	0.57	0.38	0.04	0.10	2,081	1,016	0.93	0.97	7,022	3,792
<i>Education</i>										
University	0.75	0.17	0.08	0.31	244,153	10,739	0.91	0.96	421,297	23,954
U Applied Sciences	0.76	0.16	0.08	0.33	163,743	9,697	0.91	0.96	264,837	21,530

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	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Federal Certificate	0.70	0.19	0.10	0.34	212,402	13,828	0.90	0.96	349,355	28,830
Teacher Certificate	0.55	0.33	0.11	0.26	17,941	2,410	0.92	0.99	37,486	7,372
Higher School Certificate	0.67	0.21	0.13	0.38	52,360	6,788	0.93	0.97	102,593	19,393
Vocational Training	0.70	0.21	0.09	0.30	677,486	22,184	0.91	0.97	1,247,472	36,074
On-the-job Training	0.63	0.26	0.11	0.30	68,475	6,110	0.91	0.97	125,896	17,593
Compulsory Education	0.69	0.23	0.08	0.27	171,677	9,570	0.92	0.97	333,414	24,565
Missing	0.71	0.23	0.06	0.20	212,475	1,389	0.92	0.97	354,863	4,714
<i>Region</i>										
Leman	0.70	0.21	0.09	0.29	290,741	5,755	0.92	0.97	529,318	15,680
Espace Mittelland	0.71	0.24	0.06	0.20	470,712	7,280	0.91	0.97	767,480	16,997
Northwest	0.72	0.21	0.07	0.25	219,224	4,523	0.91	0.96	396,212	10,808
Zurich	0.72	0.18	0.10	0.36	486,718	6,439	0.91	0.96	835,040	14,526
East	0.67	0.21	0.12	0.36	160,038	4,503	0.91	0.97	304,867	11,892
Central	0.68	0.24	0.08	0.25	145,859	4,912	0.91	0.97	263,885	11,497
Ticino	0.57	0.23	0.20	0.46	47,420	2,330	0.91	0.97	92,523	6,493
<i>Firm size (number of employees)</i>										
0-19	0.58	0.32	0.10	0.23	37,893	11,294	0.94	0.98	184,117	32,819
20-49	0.61	0.28	0.11	0.29	57,187	8,042	0.93	0.97	177,498	15,549
50-249	0.62	0.27	0.11	0.28	283,583	11,113	0.91	0.97	620,758	15,890
250-999	0.67	0.23	0.09	0.29	310,630	1,951	0.90	0.96	558,839	2,861
1000-	0.74	0.18	0.08	0.30	1,131,419	2,184	0.91	0.97	1,648,113	2,619
<i>Collective agreements</i>										
GAV (association)	0.73	0.20	0.06	0.24	350,050	6,244	0.91	0.97	634,545	17,599
GAV (private and public)	0.71	0.18	0.10	0.36	307,198	1,919	0.91	0.97	493,648	4,045
Collective agreement (without GAV)	0.69	0.24	0.07	0.23	71,922	967	0.92	0.98	120,861	2,219
No collective agreements	0.69	0.22	0.09	0.30	1,039,370	22,139	0.91	0.96	1,841,724	35,015
Missing	0.59	0.35	0.06	0.15	52,172	874	0.92	0.98	146,435	2,434

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		Wage growth statistics (share)						Share in total income			
		Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
<i>Sectors (NACE 1-digit sections)</i>											
Mining and quarrying		0.63	0.27	0.11	0.29	1,621	197	0.91	0.98	3,196	366
Manufacturing		0.72	0.18	0.10	0.35	302,379	7,352	0.89	0.95	537,811	15,587
Electricity, gas and steam supply	a.	0.72	0.20	0.07	0.27	22,239	428	0.88	0.95	32,656	777
Water supply		0.73	0.15	0.12	0.45	7,599	611	0.90	0.97	13,047	1,292
Construction		0.62	0.26	0.12	0.32	54,097	1,580	0.91	0.98	116,038	6,274
Trade; rep. of motor vehicles a. moto.		0.77	0.18	0.05	0.22	217,818	3,236	0.91	0.98	388,139	11,049
Transportation and storage		0.69	0.27	0.04	0.14	173,269	1,199	0.91	0.96	234,770	3,120
Accommod. and food serv. act.		0.62	0.28	0.10	0.26	18,979	1,156	0.92	0.99	65,781	4,749
Information and communication		0.70	0.17	0.13	0.43	75,542	2,459	0.91	0.95	130,299	5,760
Financial and insurance activities		0.67	0.18	0.15	0.44	152,048	2,597	0.89	0.92	252,303	6,100
Real estate activities		0.71	0.20	0.08	0.29	5,744	670	0.93	0.98	16,040	2,096
Prof., scientific and tech. act.		0.69	0.22	0.09	0.29	64,326	3,277	0.92	0.96	147,826	9,915
Admin. and support serv. act.		0.62	0.26	0.12	0.31	42,910	2,064	0.93	0.98	123,657	4,970
Public administration and defence		0.75	0.16	0.09	0.35	173,258	1,101	0.92	0.99	255,820	1,753
Education		0.67	0.26	0.07	0.21	174,887	2,398	0.94	0.99	279,245	4,516
Human health and social work act.		0.67	0.23	0.11	0.32	304,565	3,869	0.91	0.97	517,322	8,707
Arts, entertainment and recreation		0.64	0.27	0.10	0.27	12,904	795	0.94	0.98	30,360	2,224
Other service activities		0.56	0.38	0.06	0.14	16,527	1,440	0.94	0.98	45,015	4,606

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	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
<i>Sectors (NACE 2-digit divisions)</i>										
O. mining and quarrying	0.63	0.27	0.11	0.29	1,617	193	0.91	0.98	3,188	354
Mining support service activities	–	–	–	–	4	4	–	–	46	14
Manufacture of food products	0.76	0.18	0.05	0.23	28,406	635	0.91	0.97	54,660	1,764
Manufacture of beverages	0.65	0.21	0.13	0.38	957	82	0.91	0.97	2,817	213
Ma. of tobacco products	0.83	0.15	0.02	0.12	81	9	0.87	0.92	1,334	19
Ma. of textiles	0.60	0.24	0.15	0.38	3,031	227	0.91	0.97	6,281	518
Ma. of wearing apparel	0.59	0.28	0.14	0.33	1,007	131	0.94	0.98	1,901	353
Ma. of leather and related products	0.52	0.36	0.12	0.25	340	62	0.94	0.99	747	140
Ma. of wood a. of prod. of wood a. cork	0.47	0.38	0.16	0.30	2,341	215	0.91	0.97	9,232	1,143
Ma. of paper and paper products	0.59	0.27	0.14	0.33	4,488	73	0.87	0.94	7,417	148
Printing and reprod. of recorded media	0.31	0.45	0.24	0.35	2,590	188	0.91	0.97	7,473	607
Ma. of coke and refined petroleum prod.	0.68	0.23	0.09	0.28	69	8	0.88	0.95	298	18
Ma. of chemicals and chemical prod.	0.78	0.16	0.06	0.27	15,381	537	0.88	0.93	28,495	939
Ma. of pharmaceutical prod. a. prep.	0.85	0.11	0.03	0.22	42,705	217	0.89	0.91	57,290	368
Ma. of rubber and plastic products	0.61	0.29	0.10	0.26	8,493	359	0.88	0.95	17,805	800
Ma. of o. non-metallic mineral prod.	0.69	0.21	0.10	0.31	4,674	363	0.90	0.97	12,333	843
Manufacture of basic metals	0.61	0.24	0.15	0.38	5,033	106	0.88	0.95	10,805	198

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Table E.6 – continued from previous page

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Ma. of fab. metal prod., except mach.	0.64	0.23	0.12	0.35	17,926	754	0.90	0.96	41,311	2,293
Ma. of computer and electronic prod.	0.71	0.17	0.12	0.41	78,771	1,267	0.89	0.95	127,381	2,474
Manufacture of electrical equipment	0.79	0.14	0.07	0.33	27,542	562	0.90	0.96	39,683	1,055
Ma. of machinery and equipment n.e.c.	0.73	0.15	0.12	0.43	37,202	1,093	0.89	0.96	69,450	2,241
Ma. of motor vehicles	0.67	0.19	0.14	0.44	1,931	142	0.89	0.96	3,497	261
Ma. of o. transport equipment	0.65	0.18	0.18	0.50	2,712	146	0.89	0.95	9,849	267
Manufacture of furniture	0.76	0.10	0.14	0.60	2,424	154	0.92	0.98	5,957	399
Other manufacturing	0.75	0.17	0.08	0.32	11,111	242	0.88	0.93	18,018	748
Rep. and install. of mach. and eq.	0.57	0.26	0.17	0.40	3,164	141	0.90	0.97	6,475	587
Electricity, gas a. steam supply	0.72	0.20	0.07	0.27	22,239	428	0.88	0.95	32,834	778
Water collection, treatment and supply	0.70	0.17	0.13	0.44	1,011	59	0.91	0.98	1,704	138
Sewerage	0.69	0.22	0.10	0.31	1,553	214	0.90	0.96	2,813	458
Waste collection and treatment	0.75	0.12	0.13	0.51	5,016	335	0.90	0.96	8,661	695
Remediation act. and o. waste man. serv.	–	–	–	–	19	7	–	–	55	19
Construction of buildings	0.62	0.32	0.06	0.15	24,833	501	0.91	0.98	47,767	1,356
Civil engineering	0.52	0.29	0.19	0.40	9,741	163	0.90	0.97	17,437	336
Specialised construction activities	0.68	0.14	0.19	0.57	19,523	927	0.91	0.98	51,684	4,734
Trade a. rep. of motor vehicles a. moto.	0.71	0.13	0.16	0.54	9,947	387	0.90	0.97	23,194	2,246

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Table E.6 – continued from previous page

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Wholesale trade, exc. of motor vehicles	0.71	0.20	0.08	0.29	54,371	1,675	0.91	0.96	112,098	4,676
Retail trade, exc. motor vehicles	0.79	0.17	0.04	0.19	153,500	1,217	0.92	0.98	259,361	5,003
Land transp. a. transp. via pipelines	0.69	0.25	0.07	0.21	83,658	723	0.90	0.96	116,714	2,024
Water transport	0.75	0.14	0.11	0.44	164	19	0.91	0.96	709	63
Air transport	0.58	0.39	0.03	0.07	9,200	32	0.92	0.94	13,134	83
Warehousing and sup. act. for transport.	0.60	0.33	0.06	0.16	22,466	262	0.91	0.96	37,980	649
Postal and courier activities	0.72	0.26	0.02	0.07	57,781	170	0.91	0.97	69,610	361
Accommodation	0.56	0.25	0.19	0.43	6,603	514	0.93	0.99	26,672	1,510
Food and beverage service activities	0.64	0.29	0.07	0.20	12,376	648	0.92	0.99	41,761	3,331
Publishing activities	0.52	0.20	0.28	0.58	8,327	465	0.90	0.96	14,887	955
Motion picture	0.57	0.36	0.07	0.16	1,301	311	0.96	0.98	3,887	764
Programming and broadcasting activities	0.63	0.14	0.23	0.63	10,953	85	0.89	0.95	13,459	148
Telecommunications	0.80	0.16	0.05	0.22	33,245	235	0.90	0.94	44,271	409
Computer progr., consult. and rel. act.	0.70	0.17	0.13	0.44	20,173	1,303	0.92	0.95	49,830	3,482
Information service activities	0.69	0.19	0.12	0.39	1,543	91	0.90	0.95	5,034	235
Financial service activities	0.62	0.19	0.19	0.49	84,440	933	0.88	0.91	143,275	1,955
Insu., reinsurance and pension funding	0.74	0.17	0.10	0.37	50,108	474	0.89	0.93	74,013	818
Act. aux. to financial s. a. insu. act.	0.70	0.21	0.09	0.31	17,500	1,221	0.90	0.94	36,323	3,552
Real estate activities	0.71	0.20	0.08	0.29	5,744	670	0.93	0.98	16,695	2,097
Legal and accounting activities	0.59	0.29	0.12	0.29	9,456	496	0.91	0.95	23,326	2,260

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Table E.6 – continued from previous page

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Act. of head offices; man. consult. act.	0.71	0.19	0.10	0.34	24,097	609	0.90	0.95	44,993	1,624
Architectural and engineering act.	0.76	0.16	0.08	0.34	14,605	1,065	0.91	0.97	42,475	3,624
Scientific research and development	0.71	0.24	0.05	0.19	11,832	618	0.94	0.97	23,596	1,106
Advertising and market research	0.55	0.36	0.08	0.19	2,387	266	0.96	0.98	8,359	856
O. prof., scientific and technical act.	0.64	0.23	0.12	0.34	1,504	216	0.93	0.97	5,571	962
Veterinary activities	0.79	0.19	0.02	0.11	445	63	0.95	0.99	1,273	319
Rental and leasing activities	0.51	0.27	0.23	0.46	1,528	70	0.91	0.97	3,315	185
Employment activities	0.63	0.31	0.06	0.16	9,693	971	0.93	0.97	43,513	1,866
Travel agency, tour operator reserv.	0.76	0.12	0.12	0.50	5,465	161	0.91	0.97	10,046	456
Security and investigation act.	0.67	0.29	0.04	0.12	3,561	74	0.95	0.97	10,891	197
Serv. to build. and landscape act.	0.62	0.22	0.16	0.42	18,299	639	0.92	0.98	54,039	1,993
Office admin., office support act.	0.47	0.43	0.10	0.18	4,364	169	0.94	0.98	8,852	436
Public administration and defence	0.75	0.16	0.09	0.35	173,258	1,101	0.92	0.99	258,248	1,754
Education	0.67	0.26	0.07	0.21	174,887	2,398	0.94	0.99	286,729	4,517
Human health activities	0.68	0.20	0.12	0.37	205,860	1,254	0.90	0.97	329,340	4,384
Residential care activities	0.65	0.25	0.10	0.28	75,910	1,976	0.90	0.96	147,696	3,175
Social work act. without accommodation	0.63	0.31	0.06	0.16	22,795	739	0.94	0.99	46,205	1,699
Creative, arts and entertainment act.	0.58	0.19	0.23	0.55	1,605	133	0.93	0.97	4,826	409

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Table E.6 – continued from previous page

	Wage growth statistics (share)						Share in total income			
	Raise	Cut	Freeze	Cut prev.	Obs.	Firms	Base	Regular	Obs.	Firms
Libr., arch., museums and o. cult. act.	0.79	0.14	0.07	0.34	5,815	163	0.93	0.98	10,414	352
Gambling and betting activities	0.49	0.42	0.09	0.17	1,360	36	0.92	0.98	3,071	58
Sports activities and amusement	0.54	0.37	0.09	0.20	4,124	472	0.95	0.98	14,149	1,445
Activities of membership organisations	0.61	0.32	0.07	0.17	12,145	1,132	0.94	0.99	33,145	2,711

Notes: The left panel gives biennial base wage rigidity statistics. Wage freezes are defined as growth rates smaller than 0.02% in absolute value. The share of wage cuts prevented is defined as share freezes/(1-share raises). The right panel provides the share of the base and regular income in total income. Regular income includes the base income and 13th month payments. Total wage includes the base wage, 13th month payments, and irregular payments (overtime, Sunday/night, and bonus payments). All statistics are weighted using our own sample weights. Due to confidentiality restrictions results are only published if they are based on at least 60 employees and five firms.

F Selection into treatment and inverse Mills ratio

Table F.1 shows the difference in the mean of various characteristics between the treatment and control groups, along with the estimated standard error. We see that the two groups differ in a statistically significant way. Economically, however, most of the characteristics are similar.

Table F.1 — Difference in means between treatment and control group

	Difference means freezes – cuts	Std. err. freezes – cuts	Mean freezes	Obs.	Mean small cuts	Obs.
<i>Income (OASI)</i>						
Income (in 1,000)	15.57***	0.71	100.93	68,662	85.36	10,532
Employment income (in 1,000)	15.15***	0.68	99.84	68,662	84.70	10,532
<i>Income and wage (SESS)</i>						
Employment income (in 1,000)	12.17***	0.51	82.94	68,790	70.77	10,591
Total wage (in 1,000)	14.91***	0.61	97.21	68,790	82.30	10,591
Share of base income	-0.01***	0.00	0.89	68,790	0.90	10,591
Share of regular income	-0.01***	0.00	0.96	68,790	0.96	10,591
Share of irregular income	0.01***	0.00	0.04	68,790	0.04	10,591
<i>Activity and contract</i>						
Tenure at firm (years)	1.38***	0.11	14.81	68,790	13.43	10,591
Manager	0.11***	0.00	0.35	68,256	0.24	10,540
Open-ended contract	0.01***	0.00	0.98	68,790	0.97	10,591
Hourly wage	-0.08***	0.00	0.01	68,790	0.10	10,591
Stays at company	0.10***	0.00	0.94	68,790	0.84	10,591
<i>Employee</i>						
Age (years)	2.64***	0.10	49.73	68,790	47.09	10,591
Women	-0.11***	0.01	0.40	68,790	0.50	10,591
University degree	-0.04***	0.00	0.23	61,471	0.26	9,787
Foreigner	-0.00	0.00	0.21	68,790	0.21	10,591
<i>Firm</i>						
Public company	0.08***	0.01	0.40	68,790	0.33	10,591
Collective agreement	-0.04***	0.01	0.37	65,074	0.40	9,750
Small firm	0.02***	0.00	0.07	68,790	0.05	10,591
Medium firm	-0.00	0.00	0.17	68,790	0.17	10,591
Large firm	-0.02***	0.00	0.76	68,790	0.78	10,591

Notes: Tests for difference in means between treatment (wage freezes) and control group (small wage cuts). ***/**/* denotes a statistically significant difference at the 1%/5%/10% level.

We control for most of these characteristics in our model. But there may be unobserved characteristic affecting selection into treatment. We therefore include the inverse Mills ratio in our model in a robustness check. We aim to control for the fact that individuals with certain unobserved characteristics related to selection into treatment are differently affected by the deflationary shock.

In a first step, we estimate the inverse Mills ratio (see [Heckman, 1979](#)). Let us assume that the continuous selection process into treatment in 2014 (that is, the unobserved wage change absent wage rigidities ($\Delta w_{i,2014}^*$)), depends linearly on observed ($\mathbf{x}_{i,2014}$) and unobserved

$(\nu_{i,2014})$ characteristics:⁴

$$\Delta w_{i,2014}^* = \mathbf{x}_{i,2014}\beta + \nu_{i,2014}, \quad \nu_{i,2014} \sim iid N(0, \sigma_\nu^2)$$

Based on this assumption we can estimate the inverse Mills ratio from a Probit model, where we restrict the sample to the treatment and control group in 2014:⁵

$$P[\Delta w_{i,2014} = 0 | \mathbf{x}_{i,2014}] = \Phi(\mathbf{x}_{i,2014}\beta),$$

As control variables, we include a variety of employee and firm characteristics from the SESS. For example, we control for 30 percentiles of the log wage level, age, employment status between 2012 and 2014, whether an individual stayed at the same company between 2012 and 2014, education, job type, whether a firm has collective agreements, firm size, gender, and sector.

Then, we compute the inverse Mills ratio for each individual as (see, e.g., [Wooldridge, 1995](#)):

$$\lambda_{i,2014} = E[v_i | \mathbf{x}_{i,2014}, \Delta w_{i,2014} = 0] = \frac{\phi(\mathbf{x}_{i,2014}\beta)}{\Phi(\mathbf{x}_{i,2014}\beta)}$$

The inverse Mills ratio measures the expected value of the unobserved characteristics affecting selection into treatment conditional on observed characteristics.

Table F.2 shows the estimates of the Probit model. For brevity, we do not report coefficients for the age and wage level percentiles. The coefficients have the expected sign. For example, individuals that were unemployed sometime between 2012 and 2014 were less likely experiencing a wage freeze. Similarly, individuals that stayed at the same firm during this period were more likely to experience a wage freeze.

⁴We drop the constant for readability.

⁵For the remaining observations, we set the inverse Mills ratio to zero.

Table F.2 — Probit for inverse Mills ratio

	1/0 (wage freezes/small cuts)
Unemployed (before 2015)	-0.154*** (0.039)
Stayed at firm (before 2015)=1	0.574*** (0.019)
Middle Management	0.088** (0.038)
Lower Management	-0.033 (0.040)
Basic Management	0.102** (0.044)
Without Management Function	-0.134*** (0.038)
Woman	-0.110*** (0.014)
U Applied Sciences	0.271*** (0.027)
Federal Certificate	0.311*** (0.024)
Teacher Certificate	0.253*** (0.076)
Higher School Certificate	0.612*** (0.044)
Vocational Training	0.517*** (0.020)
On-the-job Training	0.439*** (0.035)
Compulsory Education	0.611*** (0.027)
Observations	79,259
Pseudo R-sq.	0.082

Notes: Model estimated on data for treatment (wage freezes) and control group (small wage cuts). Coefficients for age and tenure percentiles not shown for brevity. Standard errors in parentheses. ***/**/* denotes a statistically significant coefficient at the 1%/5%/10% level.

Table F.2 — Probit for inverse Mills ratio (continued)

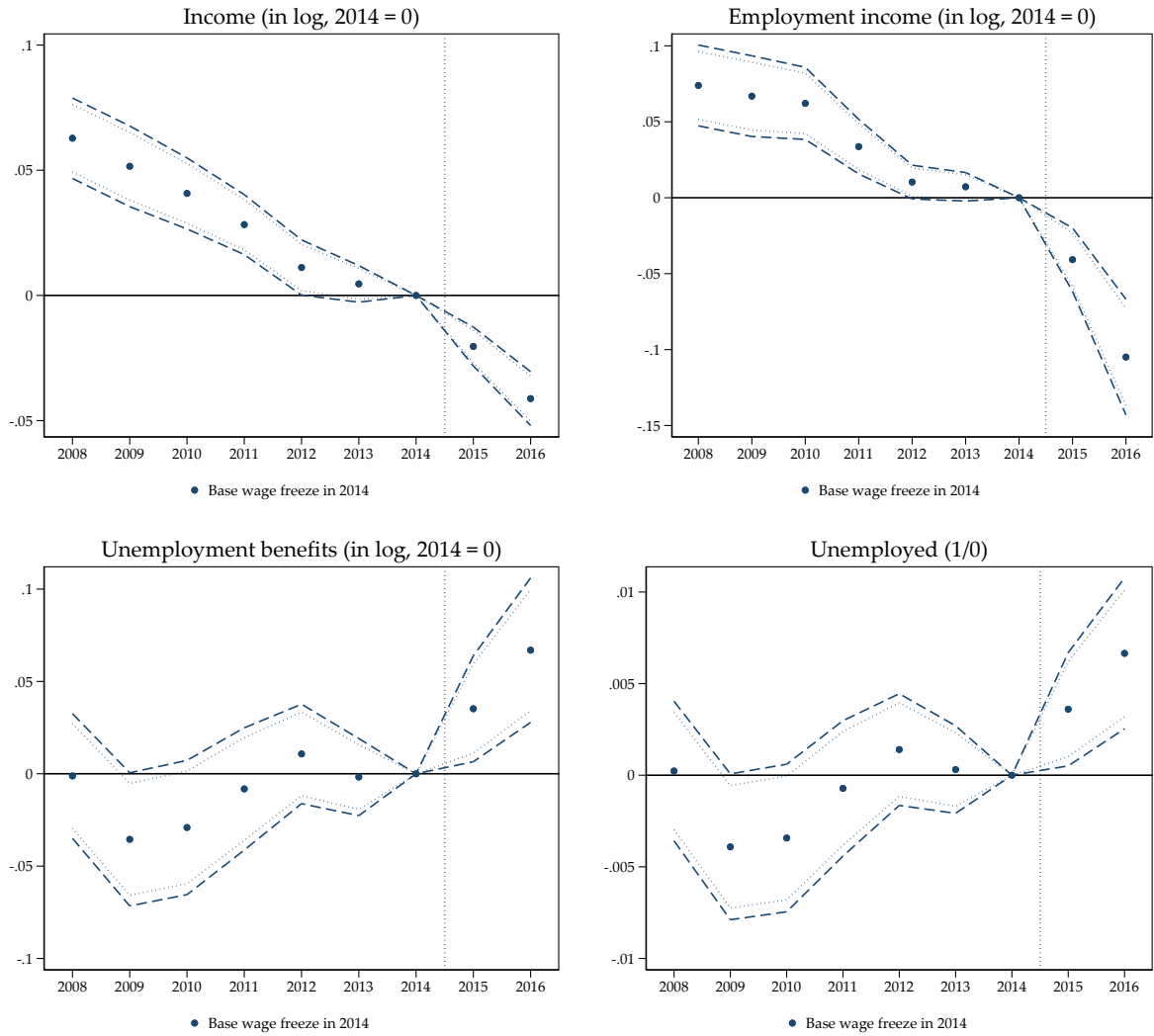
	1/0 (wage freezes/small cuts)
Manufacturing	1.307*** (0.238)
Electricity, gas a. steam supply	1.419*** (0.246)
Water supply	1.703*** (0.256)
Construction	1.053*** (0.241)
Trade; rep. of motor vehicles a. moto.	1.134*** (0.239)
Transportation and storage	0.957*** (0.239)
Accomod. and food serv. act.	1.406*** (0.242)
Information and communication	1.703*** (0.240)
Financial and insurance activities	1.544*** (0.239)
Real estate activities	1.469*** (0.269)
Prof., scientific and tech. act.	1.236*** (0.240)
Admin. and support serv. act.	1.424*** (0.240)
Public administration and defence	1.655*** (0.239)
Education	1.520*** (0.239)
Human health and social work act.	1.470*** (0.239)
Arts, entertainment and recreation	1.513*** (0.248)
Other service activities	1.461*** (0.248)
Collective agreement	0.015 (0.014)
Observations	79,259
Pseudo R-sq.	0.082

Notes: Model estimated on data for treatment (wage freezes) and control group (small wage cuts). Coefficients for age and tenure percentiles not shown for brevity. Standard errors in parentheses. ***/**/* denotes a statistically significant coefficient at the 1%/5%/10% level.

G Pre-treatment trends

We estimate pre-treatment trends to show that the effects can indeed be attributed to the Swiss franc shock. Between 2011 and 2014, the minimum exchange rate floor policy was in place and the international environment was relatively stable. Therefore, we can test whether there is a difference between the treated and non-treated group in absence of a deflationary shock. Figure G.1 shows that incomes of individuals with base wage freezes were quite stable from 2012-2014, but declined before that. This does not come as a surprise, however, because the Swiss franc appreciated significantly between 2008 and 2011 and it took time until relative prices in Switzerland and abroad converged (see Figure D.2). We believe that the pre-treatment trends mirror the delayed effects of the appreciation before the exchange rate floor was introduced. For unemployment and unemployment benefits, the pre-treatment trends are mostly not statistically significant. However, in line with the idea that the first appreciation phase has delayed effects, we observe an increase during 2009-2011.

Figure G.1 — Pre-treatment trends



Notes: The estimates measure the evolution of the treatment group (wage freezes in 2014) to the control group (small wage cuts in 2014) after a 1% decline of the price level. The estimates are normalized to 0 in the base year 2014. The circles give the point estimates. The dashed (dotted) lines represent 95% (90%) confidence intervals based on standard errors clustered according to unique values in the base wage growth distribution in 2014.

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