Who pays for the minimum wage?

Online Appendix

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A1. Pseudo Experiments in Pre-Policy Periods and Testing for SUTVA

In this section we carry out a pseudo-experiment to provide further evidence on the employment effects of the minimum wage and to test for SUTVA. Using our pre-reform data we apply equivalent sample restrictions as in our benchmark sample, but we assume that the minimum wage increase occurred in 1998. Then we look at the employment changes between 1998 and 2000 and contrast it to our estimates between 2000 and 2002.

To create this new "placebo" sample we drop the following firms from our sample: those in sectors mentioned in the main text (Section 2.2); firms with the highest and lowest 1 percent growth rate in employment between 1997 and 1998; and firms where the average wage per worker is less than 90 percent of their minimum wage. We further restrict the sample to include only firms which existed between 1997 and 1998 and had at lest 5 employees in that period. Due to data limitations we only restrict firms based on their characteristics in the two years before 1998 and not based on the last four years as in our benchmark sample. To reflect this difference we also create an alternative version of the benchmark sample, where we use restrictions on firm characteristics between 1999 and 2000. We will refer to this as the "main sample" in this Section, and we will contrast our estimates on the "placebo sample" to the estimates on this sample.

Panel (a) in Figure A11 shows the non-parametric binscattered relationship between change in employment between 2000 and 2002 and the fraction of workers who earn below the 2002 minimum wage in 2000 (red squares). The estimated parameters for the linear fit are shown at the bottom left panel. The slope of the line highlights that firms where 100 percent of the workers are directly affected by the minimum wage experience a 10.4 percent (s.e. 0.8 percent) decrease in their employment relative to firms with no direct exposure to the minimum wage. The blue line shows the relationship between employment change between 1998 and 2000 (the pre-minimum wage period) and the fraction of workers who earn below the 2002 minimum wage in 1998 (blue dots). There is a slight negative relationship between exposure to the minimum wage and employment changes even in absence of the minimum wage. The point estimates suggests that 100 percent exposure to the minimum wage leads to a 3.8 percent (s.e. 1.0 percent) decline in employment in years when no minimum wage was introduced.

The differences between the main estimation's slope (red line) and the placebo estimation's slope (blue line) can be interpreted as an effect of the minimum wage on employment. This is 6.6 percent (10.4 percent minus 3.8 percent), which is slightly lower than our benchmark estimate (7.6 percent) in 2002 shown in Column 2 in Table 2. In panel (b) of Figure A11 we show estimates for the change in cost of labor. The difference in the coefficient on FA between the main estimates and placebo estimates is 37.2 percent (55.6 percent minus 18.4 percent) which is also slightly lower than our benchmark estimate (49 percent) in 2002 shown in Column 2 in Table 2.

The implied employment elasticity with respect to cost of labor is -0.18 (-6.6/37.2) based on these estimates on employment and cost of labor. It is notable that even if our sample selection differs from our benchmark sample, the implied employment elasticity is almost the same as our benchmark elasticity estimate (-0.17 in Panel C in Column 2 in

Table 2).[39]

Figure A12 shows the "placebo" estimates and the main estimates when we include industry dummies in the regression. The difference between the main estimate and the placebo estimate is 5.9 percent (10.1 percent minus 4.2 percent), which is again slightly lower than the estimated employment effect (6.8 percent) in Panel C of Column 3 in Table A7. Panel (b) in Figure A12 shows that the effect on cost of labor is also slightly smaller. As a result, the implied elasticity with respect to cost of labor (-0.16) is very similar to -0.15, which is the estimate based on the benchmark sample shown in Table A7. These results highlight that alternative sample selections do not alter the main conclusions of the paper.

The pseudo experiment presented here can be also used to test for SUTVA. As discussed in the main text, an important assumption in our regression analysis is that firms with no exposure to the minimum wage, $FA = 0$, are not affected by the minimum wage. We believe it is unrealistic that untreated firms would be substantially affected by the minimum wage, simply because the share of minimum wage workers in their total production is small.

Panel (a) in Figure A11 shows that the employment change at firms with no exposure to the minimum wage is very similar in the placebo sample (when there was no minimum wage hike) and in the main sample (when there was). The change in employment at the intercept (no exposure to the minimum wage) is -0.042 (s.e. 0.005) in the Placebo sample, while -0.049 (s.e. 0.006) in the main sample. These differences are not statistically different from each other. The differences when industry dummies are used in the regression (see Figure A12) is even smaller: the intercept in the placebo years is -0.043 (s.e. 0.005), while in the main specification it is -0.047 (s.e. 0.006). Therefore, we do not find any indication that the drop in non-treated firms was particularly large or small after the minimum wage hike. This provides further evidence that the SUTVA assumption holds in our data.

This pseudo experiment on SUTVA complements the other evidence on SUTVA presented in the paper. The bunching evidence used to calculate the employment effect of the minimum wage discussed briefly in Section 6 exploits aggregate data and before-after comparisons, and so it is not reliant on SUTVA. We present further evidence in Appendix A.2 on the effect of the minimum wage by exploiting differences in exposure to the minimum wage across demographic groups and regions. While the SUTVA assumption might not hold in the grouping regression either, the spillovers to the untreated groups are likely to be different in the firm-level and in the group-level regressions. For instance, if the main spillover happens across firms, which is the case in the Burdett and Mortensen (1998) Model, then our group-level estimates will be unaffected. Therefore, the similarity between the findings in Section A.2. and in the main text suggests that the spillovers of the minimum wage to employment in the untreated group ($FA = 0$) must be limited.

[39] If we only rely on estimates based on the main sample for calculating the elasticity we get -0.19 (-0.104/0.556), which is also very close to our benchmark estimate (-0.17). So even if the disemployment effects and the wage effects in the "main sample" used in this section, which is different from the "benchmark sample" used in the main text, are driven by pre-existing trends the ratio of these two will not be very different from the benchmark estimates.

A2. Group-Level Analysis of the Employment Effect of the Minimum Wage

To provide further evidence on employment we also implement a grouping estimator in the style of Blundell et al. (1998)**?**. We assign people to mutually exclusive groups formed from combinations of the 7 regions (NUTS 2), age in five categories (16-19, 20-24, 25-34, 45-54, 55-60), gender, and education (low skilled, medium skilled and high skilled). We estimate the following group-level regression:

$$epop_{gt} = \alpha + \beta_1 FA_g \times After_t + \beta_2 FA_g + \gamma X_{gt} + \theta_g + \xi_t + c_g t + \varepsilon_{gt} \quad \text{(A1)}$$

where $epop_{gt}$ is the employment to population ratio in group g at time t and FA_g is the group-level exposure to the minimum wage measured by the fraction of workers in that group who earn below the 2002 minimum wage in 2000.[40] The β_1 coefficient on $FA_g \times After_t$ measures the effect of the minimum wage on employment. In equation (A1) we control for the logarithm of population and the enrollment rate in secondary and higher education. The latter is crucial as the expansion of higher education was quite rapid around this period.[41] We also include age, education, region and sex dummies (denoted with θ_g) in the regression and we allow for group-specific time trends. We cluster the standard errors by group and we weight the regressions by the number observations used in calculating group-level exposure, FA_g.[42]

Table A10 summarizes the key results. In Panel A, we show estimates of the relationship between exposure to the minimum wage and the employment-to-population rate changes after the minimum wage hike. In Column (1) we report the results without controlling for the expansion in higher education. In that case the employment effect is large and negative (-0.12 percentage point, s.e. 0.04). This effect is driven by a large drop in employment-to-population rate and a similar increase in the school enrollment rate for the younger cohorts. Once we control for school enrollment (Column (2)), group-specific time trends (Column (3)), or both (Column (4)) the strong relationship weakens and the disemployment effects become small and insignificant. In Column (5), we also report separate estimates on only prime-age adults (25-55 years old) to explore whether the presence of the oldest cohorts drives the results. The effects we estimate for this subgroup are similar to those we estimate for all workers.

We also calculated the employment elasticities *with respect to the minimum wage*. To get the percentage changes in employment we divided the estimated effects by the av-

[40] We measure FA_g from the Hungarian Structure of Earnings Survey, while the $epop_{gt}$ is from the Hungarian Labor Force Survey. This latter data covers all workers including the self-employed and the workers at the very small firms. Therefore, our grouping estimates can also be interpreted as evidence on a group of workers that are not covered in our firm-level analysis.

[41] While schooling decisions can be affected by the minimum wage (Neumark and Wascher, 1996), we believe this is not the case here. The enrollment rate in higher education increased from 11 percent in 1996 to 17 percent in 2000. This increase was boosted further by a generous student loan program that was introduced in 2001. As a result, the enrollment rate increased to 24 percent by 2004. We note that the growth in enrollment is very similar between 1996 and 2000 and between 2000 and 2004.

[42] We calculate FA_g from the Hungarian Structure of Earnings Survey (SES) that covers employed workers. Therefore, this weighting adds more weight to groups with higher employment in 2000.

erage employment-to-population rate in year 2000. The estimated elasticities are lower than our firm-level estimates in all cases except for the estimates with no controls or group-specific time trends (Column (1)), but the difference is not statistically significant. Given that the group-level exposure is more noisily estimated, the slightly lower elasticities estimated here might be the consequence of attenuation bias in these regressions.

Panel B of Table A10 reports the relationship between group-level exposure to the minimum wage and the changes in average wage. All specifications highlight that wages significantly increased for highly exposed groups relative to less exposed ones after the reform. However, the estimated effect on wages, similarly to employment, is lower than the firm-level estimates in Table 2, since exposure to the minimum wage is more noisily estimated. We also calculate the implied elasticity *with respect to average wage*. Except for the estimates without controls presented in Column (1), the estimates are between -0.32 (Column (2)) and -0.13 (Column (3)). Overall, these elasticities are in line with the firm-level estimates shown in Table 2, which suggests that our results are robust to using alternative data sources and identification procedures.

A3. Appendix Tables and Figures

This section present some additional tables and figures.

Table A1 shows the share of materials in the total production in various European countries (2007-2010). We used the International Corporate Database of Bureau van Dijk (Orbis) to calculate these numbers. The table highlights that expenses on intermediate goods and services are around 66-68 percent of total revenue in Western Europe, while it is 70-74 percent in Eastern Europe. This highlights that the large share of intermediate goods and services in total production is not a uniquely Hungarian phenomenon.

Table A2 explores alternative ways of dealing with the problem that wage changes are only observed for firms which survived the minimum wage change. Our benchmark method calculates the employment elasticity by taking the ratio of the employment effects estimated for all firms and the wage effects estimated for the firms that survived. This method, therefore, assumes that the firms that survived responded to the minimum wage in terms of wage change similarly to the firms exited. Row (1) shows the benchmark results measuring exposure by fraction affected and row (2) using GAP measure of exposure. Rows (3) and (4) provide estimates with selection correction following Johnson et al. (2000). The key identification assumption of this procedure is that the wage increase of the firms that shut down is above the median wage change. This procedure has two steps. First, we impute a 100 percent (average) wage increase for those firms that shut down. Second, we estimate equation 1 using a least absolute deviation (LAD) estimator on the sample that includes the imputed wage changes as well. Finally, row (5) simply reports the estimated the relationship between employment change and the GAP measure for all firms ("first stage"). Remember, the GAP measure captures the wage increase firms would have experienced in the absence of spillovers in 2002. Therefore, the relationship between the GAP measure and the employment change would capture the actual employment elasticity if there were no wage spillovers. The table highlights

that the estimated employment elasticities with respect to the minimum wage are quite robust to alternative ways of dealing with the missing wage problem.

Table A3 provides more details about the estimates presented in Table 5 ("Incidence of the Minimum Wage"). The table shows the relationship between fraction affected and various items in equation 2. We report the standard errors of the estimates on the changes between 2000 and 2002 and on the changes between 2000 and 2004. We also report the "placebo changes", which equal to the year 1998 outcomes minus the year 2000 outcomes.

Table A4 provides further details about the heterogeneity in responses to the minimum wage increase. We show the relationship between the fraction affected and various outcomes by sector. We estimate regression equation 1 for each of the following sectors: manufacturing, construction, service, tradable and non-tradable.

In Table A5 we explore heterogeneity in the effect of the minimum wage across various firm characteristics. Instead of separately examining the effect of various characteristics as in Figure 6, here we include all characteristics in the regression at the same time to disentangle which characteristics drive the results. In particular, we run regressions similar to equation 1 but we include interactions between a set of control variables and the fraction of workers affected by the minimum wage reform as well. We demean all variables in the regression so the coefficients of the interaction terms show the effect of the minimum wage for an "average" firm in the sample. In addition to the control variables we included in our previous analyses, we also control for the industry-level Herfindahl index. In Panel A we show the short term effects (two years after), in Panel B the medium term effects (four years after), while in Panel C we test the presence of pre-existing trends.

Table A.6 shows additional estimates of the method of the moments estimates in Table 6. The table shows estimates based on the short term effects (changes between 2000 and 2002), based on the estimates with industry fixed effects. Columns (4)-(6) deviate from the model presented in Section 5 and assume imperfect pass-through of the minimum wage. In particular, we assume that prices would only increase by 70 percent of what would be predicted by the benchmark model.

Tables A7 and Table A8 present the results that are discussed in Section 6, for the short term changes (2000 to 2002) and medium term changes (2000 to 2004), respectively. The tables include estimates with the GAP measure of the minimum wage, with industry FEs and explore alternative sample selection.

Table A9 shows the relationship between industry-level exposure to the minimum wage and entry rate in the pre-reform years (1998 and 2000) and the post reform years (2002 and 2004) at various industry levels. The relationship between fraction affected and entry rate is positive even before the reform. This is likely to reflect that newly entering firms tend to be low wage firms, which mechanically creates a (reverse) correlation between entry rate and fraction affected. We do not see any clear change in entry rate after the minimum wage hike (Column 4-7).

Table A10 shows the results related to the group-level regression discussed in details in Appendix A.2.

Figure A1 shows the evolution of real minimum wage between 1994 and 2008. The graph shows that there was a clear regime shift in the level of minimum wage between 2000 and 2002.

Figure A2 plots the evolution of some key macroeconomic variables around the time of the reform. Panel (a) shows that real per capita GDP growth was around 4 percent before and after the reform. In line with the positive growth rate, panel (b) highlights that the aggregate labor market conditions were gradually improving: the employment to population rate increased by 0.5 percent each year between 1997 and 2004 and the unemployment rate fell to 5 percent by 2001 and then remained at this low level. Panel (c) shows that inflation (cpi) was relatively high (around 10 percent in 2000) and it was slowly declining. Finally, panel (c) highlights the exchange rate was also stable around the time of the reform.

Figure A3 compares the strictness of employment protection legislation in OECD countries. The strength of employment protection in Hungary was in the bottom third of OECD countries, at a level similar to Switzerland or Japan.

Figure A5 shows the non-parametric relationship between employment and the fraction affected (panels (a) and (b)) and between average cost of labor and fraction affected (panels (c) and (d)). The figure underscores that the linearity assumption made in equation 1 holds.

Figure A6 plots the effect of the minimum wage on wages, on non-wage benefits, and on social security contributions. Remember in the main text we distinguish two forms of remuneration: wage and labor cost. The latter includes wages, social security contribution expenses, and non–cash benefits. Differences in the percentage changes in the average wage and in the cost of labor can be caused by two reasons. First, the cost of labor has higher value in the baseline and so if non-cash benefits and social security contributions are unaffected by the minimum wage, the same change in average wage yields a lower percentage change in the cost of labor than the percentage change in the average wage. Second, the minimum wage hike might lead to a change in non-cash benefits if firms offset the wage increase by cutting non-cash benefits. The primary goal of A6 is to disentangle what drives the lower cost of labor effect shown in Figure 2 panel (b). To do that, we estimate the change in wage relative to the cost of labor in 2000 (red solid line), the change in social security contributions relative to the cost of labor in 2000 (blue dashed line) and the change in non-cash benefits relative to the cost of labor in 2000 (black dotted line). Since we normalize all the outcome variables with the cost of labor in 2000, the magnitudes for the three outcome variables are comparable. The figure shows that the effect of the minimum wage on non-cash benefits is close to zero, which suggests that the firms did not offset the wage increase by cutting non-wage benefits. Therefore, the lower impact on the labor cost simply reflects that the wage increase is compared to a higher base.

Figure A7 plots various estimates of the employment elasticity with respect to own wage (the labor demand elasticity in the standard model) from the previous literature. We only plot studies where the standard error around the point estimate is less than 1. See the details in Online Appendix Part A.4.

Figure A8 shows the non-parametric relationship between various outcomes and the fraction affected. The figure underscores that the linearity assumption made in equation 1 holds.

In Figure A9 we plot the effect on employment (panel (a)) and on revenue (panel (b)) over time in the tradable and in the non-tradable sectors. Even though the pre-existing trends are very similar in the two sectors before 2000, there is a large divergence after the reform. The medium term disemployment effect of the minimum wage is considerably larger in the tradable (-19 percent) than in the non-tradable sector (-4 percent). Moreover, the medium term effect of the minimum wage on revenue is positive in the non-tradable sector but negative in the tradable.

Figure A10 shows the relationship between the fraction affected and the entry rate at the 2-digit industry level over time. The figure highlights what we concluded based on Table A9: the industry-level relationship between the entry rate and the fraction affected is not altered after the minimum wage hike.

Figures A11 and A12 provide further evidence on the employment effects of the minimum wage by carrying out a pseudo-experiment. Using our pre-reform data we apply equivalent sample restrictions as in our benchmark sample, but we assume that the minimum wage increase occurred in 1998. This analysis also allows us to test for SUTVA. See the details in the Online Appendix Part A.1.

Figures A13 and A14 show the evolution of the earnings distribution from 1998 to 2004 relative to the earnings distribution in 2000. The timing of the minimum wage increase is visible on the histograms. Panels (a) and (b) show that the pre-reform distributions laid on top of each other, indicating that the earnings distribution was quite stable preceding the reform. In 2001 the minimum wage increased by 0.30 log points, which generated a large excess mass in the 2001 earnings distribution. The running sum on Figure 2 highlights that employment effect converges to a small but positive number. In 2002, when the minimum wage was raised by 0.13 log points on the top of the 2001 increase, the size of the bunching and the number of workers below the minimum wage increased further. In that year the running sum converges to our benchmark estimate shown in Table 2. In 2003 the minimum wage was slightly lower in real terms than the 2002 minimum wage. The estimated employment effect is slightly larger than the firm-level one. Finally, in 2004 the minimum wage was kept at a similar level as in 2003, but an unrealistically high level of excess jobs showed up in the new earnings distribution. This highlights a limitation of our bunching estimator. Our underlying assumption is that the earnings distribution would be stable without the effect of the minimum wage. As we go further in time from 2000 this assumption is less likely to hold. This can be also seen in Appendix Figure A15, which shows the kernel densities over time. Overall,

the bunching evidence provides further graphical support for the finding that the overall employment effect of the large minimum wage hike was limited.

TABLE A1—SHARE OF MATERIALS IN THE TOTAL PRODUCTION IN VARIOUS EUROPEAN COUNTRIES (2007-2010)

	(1) Manufacturing	(2) Service
Austria	0.65	0.66
Belgium	0.70	0.70
Bulgaria	0.69	0.76
Czech Republic	0.70	0.76
Germany	0.66	0.64
Spain	0.62	0.62
Finland	0.60	0.57
France	0.62	0.61
Hungary	0.69	0.78
Italy	0.68	0.68
Poland	0.74	0.74
Portugal	0.58	0.64
Romania	0.72	0.77
Sweden	0.59	0.58
Slovenia	0.67	0.71
Slovakia	0.69	0.72
Mean (all countries)	0.66	0.68
Mean (Eastern Europe)	0.70	0.74

Source:: Source: Own calculations from the International Corporate Database of Bureau van Dijk (Orbis). The table shows the material share (intermediate goods and services) in the total production (revenue) in various European countries. We use only firms with at least 5 employees from 2007 and 2010. The table shows that firm-level material share is quite high across Europe and it is somewhat higher in the Eastern European region. The Hungarian material share is in line with the regional average.

TABLE A2—EXPLORING THE EFFECT OF ALTERNATIVE WAYS DEALING WITH MISSING WAGES ON THE EMPLOYMENT ELASTICITY WITH RESPECT TO COST OF LABOR ESTIMATES

	(1)	(2)
	Changes Between 2000 and 2002	Changes Between 2000 and 2004
Benchmark (with FA)	-0.16	-0.23
	(0.02)	(0.03)
Benchmark (with GAP)	-0.15	-0.19
	(0.02)	(0.04)
Selection Correction (with FA)	-0.13	-0.18
	(0.02)	(0.04)
Selection Correction (with GAP)	-0.13	-0.18
	(0.02)	(0.03)
GAP (first stage)	-0.15	-0.17
	(0.02)	(0.03)

Note: This table calculates the employment elasticity with respect to cost of labor using alternative ways of dealing with the fact that wages are missing for firms exiting after 2000. Our benchmark method calculates the employment elasticity by taking the ratio of the employment effects estimated for all firms and the wage effects estimated for the firms survived. This method, therefore, assumes that the survived firms responded to the minimum wage in terms of wage change similarly to the firms exited. Row (1) shows the benchmark results measuring exposure by fraction affected and row (2) using GAP measure of exposure. Row (3) and (4) provide estimate with selection correction following Johnson et al. (2000). The key identification assumption of this procedure is that the wage increase of the firms that died is above the conditional median wage change. This procedure has two steps. First, we impute a 100 percent (average) wage increase for those firms that died. Second, we estimate equation 1 using a least absolute deviation (LAD) estimator on the sample that includes the imputed wage changes as well. Finally, row (5) simply reports the estimated the relationship between employment change and the GAP measure for all firms ("first stage"). Remember, the GAP measure captures the wage increase firms would experience in the absence of spillovers in 2002. Therefore, the relationship between the GAP measure and the employment change would capture the actual employment elasticity if there were no wage spillovers. For all elasticities reported in the table we control for firm age, the legal form of organization (e.g. limited liability company, publicly traded etc.), and the following variables and their squares: average export share between 1997 and 2000; average profitability between 1997 and 2000; the average share of labor between 1997 and 2000; average depreciation rate between 1997 and 2000; the average share of wage cost in total labor cost between 1997 and 2000; and the average industry level import exposure between 1997 and 2000. Regressions are weighted by the logarithm of revenue in 2000. Robust standard errors are reported in parentheses.

TABLE A3—THE INCIDENCE OF THE MINIMUM WAGE (MORE DETAILED VERSION OF TABLE 5 IN THE MAIN TEXT)

	Main results		Placebo
	Changes between 2000 and 2002 (1)	Changes between 2000 and 2004 (3)	Changes between 2000 and 1998 (5)
Panel A: Change in total labor cost (relative to revenue in 2000)			
Fraction Affected	0.038	0.021	-0.005
	(0.002)	(0.003)	(0.002)
Panel B: Change in revenue (relative to revenue in 2000)			
Fraction Affected	0.066	0.036	-0.020
	(0.013)	(0.018)	(0.015)
Panel C: Change in materials (relative to revenue in 2000)			
Fraction Affected	0.033	0.014	-0.013
	(0.011)	(0.014)	(0.013)
Panel D: Change in Miscellaneous Items (relative to revenue in 2000)			
Fraction Affected	0.006	0.005	-0.004
	(0.002)	(0.002)	(0.001)
Panel E: Change in Depreciation (relative to revenue in 2000)			
Fraction Affected	0.001	0.003	-0.002*
	(0.001)	(0.001)	(0.001)
Panel F: Change in Profits (relative to revenue in 2000)			
Fraction Affected	-0.011	-0.008	0.006
	(0.003)	(0.004)	(0.004)
Observations	19,485	19,485	19,485
Controls	yes	yes	yes
Industry	no	no	no

Note: This table provides more details about the estimates in Table 5. The table shows the relationship between fraction affected and various outcome variables from equation 2. Columns (1) shows the effect of fraction affected on the changes between 2000 and 2002, while Column (2) shows between 2000 and 2004. Column (3) tests the presence for pre-existing trends by looking at the effect on "placebo" changes, which equal to the year 1998 outcome minus the year 2000 outcome. We use the same controls as in Table 5 and we also apply the same weighting and winsorizing.

TABLE A4—EFFECT ON FIRM-LEVEL OUTCOMES BY SECTORS

	Av. Cost of Labor	Employ-ment	Total Labor Cost	Revenue	Materials	Profit	Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Change between 2000 and 2002 (short term)							
All Firms	0.485	-0.076	0.325	0.066	0.049	-0.011	0.148
(obs= 19485)	(0.009)	(0.010)	(0.013)	(0.013)	(0.014)	(0.003)	(0.034)
Manufacturing	0.453	-0.078	0.298	0.039	0.007	-0.006	0.074
(obs = 6312)	(0.014)	(0.017)	(0.023)	(0.025)	(0.027)	(0.006)	(0.049)
Construction	0.505	-0.073	0.351	0.231	0.217	0.014	0.188
(obs = 2914)	(0.023)	(0.027)	(0.036)	(0.046)	(0.050)	(0.010)	(0.093)
Service	0.502	-0.070	0.342	0.051	0.041	-0.018	0.190
(obs = 10259)	(0.013)	(0.014)	(0.019)	(0.017)	(0.018)	(0.004)	(0.051)
Tradable	0.441	-0.112	0.240	0.012	-0.002	-0.018	0.050
(obs = 4557)	(0.018)	(0.020)	(0.028)	(0.030)	(0.032)	(0.008)	(0.056)
Non-Tradable	0.538	-0.050	0.410	0.080	0.052	-0.010	0.197
(obs = 6196)	(0.016)	(0.018)	(0.024)	(0.021)	(0.021)	(0.004)	(0.060)
Panel B: Change between 2000 and 2004 (medium term)							
All Firms	0.435	-0.100	0.238	0.036	0.021	-0.008	0.270
(obs= 19485)	(0.011)	(0.014)	(0.020)	(0.018)	(0.019)	(0.004)	(0.054)
Manufacturing	0.403	-0.127	0.166	-0.024	-0.071	-0.002	0.147
(obs = 6312)	(0.019)	(0.024)	(0.034)	(0.033)	(0.036)	(0.007)	(0.082)
Construction	0.459	-0.071	0.269	0.179	0.211	0.002	0.245
(obs = 2914)	(0.028)	(0.036)	(0.051)	(0.055)	(0.060)	(0.011)	(0.146)
Service	0.457	-0.078	0.294	0.043	0.034	-0.013	0.390
(obs = 10259)	(0.016)	(0.019)	(0.028)	(0.023)	(0.025)	(0.005)	(0.081)
Tradable	0.389	-0.192	0.068	-0.069	-0.106	-0.010	0.107
(obs = 4557)	(0.024)	(0.029)	(0.040)	(0.039)	(0.044)	(0.009)	(0.089)
Non-Tradable	0.477	-0.037	0.377	0.050	0.016	-0.008	0.332
(obs = 6196)	(0.020)	(0.025)	(0.035)	(0.030)	(0.031)	(0.005)	(0.100)
Panel C: Placebo Change between 2000 and 1998							
All Firms	-0.035	0.002	-0.031	-0.020	-0.008	0.006	-0.006
(obs= 19485)	(0.005)	(0.009)	(0.009)	(0.015)	(0.019)	(0.004)	(0.015)
Manufacturing	-0.044	-0.019	-0.066	-0.002	-0.003	0.014	-0.073
(obs = 6312)	(0.009)	(0.017)	(0.016)	(0.024)	(0.030)	(0.007)	(0.024)
Construction	-0.024	-0.011	-0.022	-0.007	0.025	0.014	-0.045
(obs = 2914)	(0.017)	(0.026)	(0.028)	(0.047)	(0.058)	(0.010)	(0.042)
Service	-0.036	0.011	-0.024	-0.040	-0.031	-0.002	0.034
(obs = 10259)	(0.008)	(0.013)	(0.013)	(0.021)	(0.026)	(0.005)	(0.022)
Tradable	-0.038	-0.012	-0.054	-0.001	0.015	0.014	-0.083
(obs = 4557)	(0.011)	(0.021)	(0.02)	(0.029)	(0.033)	(0.009)	(0.029)
Non-Tradable	-0.042	-0.031	-0.074	-0.040	-0.027	-0.001	-0.039
(obs = 6196)	(0.009)	(0.016)	(0.016)	(0.025)	(0.032)	(0.005)	(0.025)

Note: We estimate equation 1 for each sector separately. In each regression we control for the same variables as in Table 3, and we also apply the same weighting and winsorizing. Panel C shows the effect on "placebo" changes, which equal to the year 1998 outcome minus the year 2000 outcome. Robust standard errors are in parentheses.

TABLE A5—EFFECT ON FIRM-LEVEL OUTCOMES BY FIRM CHARACTERISTICS

	Av. Cost of Labor	Employ-ment	Total Labor Cost	Revenue	Materials	Profit	Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Change between 2000 and 2002 (short term)							
Fraction Affected (FA)	0.485	-0.097	0.301	0.058	0.038	-0.011	0.148
	(0.009)	(0.010)	(0.014)	(0.014)	(0.015)	(0.003)	(0.033)
FA×Export share	0.031	-0.082	-0.049	-0.110	-0.131	-0.008	0.211
	(0.049)	(0.043)	(0.065)	(0.064)	(0.074)	(0.013)	(0.159)
FA×Labor share	-0.171	-0.187	-0.531	0.154	0.085	0.007	-0.400
	(0.054)	(0.058)	(0.078)	(0.086)	(0.095)	(0.024)	(0.200)
FA×Profit share	-0.092	0.054	0.228	0.216	0.222	-0.092	0.056
	(0.086)	(0.081)	(0.112)	(0.123)	(0.125)	(0.040)	(0.239)
FA×log(Employment)	-0.038	-0.017	-0.042	-0.036	-0.034	0.004	0.006
	(0.008)	(0.009)	(0.013)	(0.013)	(0.013)	(0.003)	(0.027)
FA×Market Herfindahl	0.085	0.025	0.050	-0.172	-0.205	-0.015	0.183
	(0.105)	(0.113)	(0.161)	(0.162)	(0.174)	(0.036)	(0.341)
Panel B: Change between 2000 and 2004 (medium term)							
Fraction Affected (FA)	0.449	-0.138	0.202	0.017	-0.004	-0.011	0.273
	(0.012)	(0.014)	(0.020)	(0.018)	(0.020)	(0.003)	(0.054)
FA×Export share	0.141	-0.234	-0.138	-0.343	-0.400	-0.023	0.156
	(0.063)	(0.062)	(0.100)	(0.081)	(0.096)	(0.013)	(0.255)
FA×Labor share	-0.242	-0.190	-0.617	0.153	0.118	0.001	-0.681
	(0.068)	(0.078)	(0.108)	(0.112)	(0.131)	(0.027)	(0.306)
FA×Profit share	-0.186	0.029	0.247	0.050	0.123	-0.100	0.022
	(0.103)	(0.106)	(0.149)	(0.156)	(0.160)	(0.044)	(0.335)
FA×log(Employment)	-0.015	-0.046	-0.062	-0.054	-0.064	0.001	0.027
	(0.011)	(0.013)	(0.019)	(0.017)	(0.019)	(0.003)	(0.048)
FA×Market Herfindahl	-0.028	0.151	0.104	-0.310	-0.392	-0.039	0.657
	(0.154)	(0.162)	(0.243)	(0.228)	(0.257)	(0.038)	(0.627)
Panel C: Placebo Change between 2000 and 1998							
Fraction Affected (FA)	-0.045	-0.003	-0.042	-0.041	-0.035	0.007	-0.017
	(0.006)	(0.009)	(0.009)	(0.013)	(0.017)	(0.003)	(0.015)
FA×Export share	-0.033	0.078	0.031	0.030	0.062	0.026	0.024
	(0.025)	(0.040)	(0.042)	(0.056)	(0.073)	(0.011)	(0.060)
FA×Labor share	0.041	0.161	0.175	0.248	0.306	0.081	0.211
	(0.034)	(0.056)	(0.061)	(0.088)	(0.144)	(0.025)	(0.101)
FA×Profit share	0.014	-0.020	-0.032	-0.187	-0.042	0.004	0.060
	(0.050)	(0.097)	(0.101)	(0.176)	(0.228)	(0.042)	(0.150)
FA×log(Employment)	0.012	-0.015	0.009	0.009	0.003	-0.003	-0.035
	(0.005)	(0.009)	(0.009)	(0.011)	(0.014)	(0.002)	(0.014)
FA×Market Herfindahl	0.028	-0.090	-0.091	-0.052	-0.184	0.035	-0.313
	(0.064)	(0.101)	(0.095)	(0.143)	(0.185)	(0.026)	(0.188)

Note: We estimate equation 1 with the interaction terms between FA and various firm-level characteristics. In each regression we control for the same variables as in Table 3, and we also apply the same weighting and winsorizing. Panel C shows the effect on "placebo" changes, which equal to the year 1998 outcome minus the year 2000 outcome. Robust standard errors are in parentheses.

TABLE A6—METHOD OF THE MOMENTS ESTIMATES, ALTERNATIVE SPECIFICATIONS

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Estimated Parameters						
Output Demand, μ	0.11	-0.12	-0.42	-0.03	1.27	1.75
	(0.22)	(0.15)	(0.23)	(033)	(0.65)	(0.59)
Capital-Labor Substitution, σ_{KL}	3.35	1.43	2.73	3.32	2.70	2.29
	(0.62)	(0.36)	(0.65)	0.63	(1.01)	(0.83)
Material-Labor Substitution, σ_{ML}	0.03	0.13	0.14	0.05	0	0.04
	(0.06)	(0.04)	(0.06)	(0.06)	(0.11)	(0.14)
Panel B: Empirical Moments						
Employment Elasticity	-0.23	-0.15	-0.19	-0.23	-0.31	-0.49
Revenue Elasticity	0.08	0.14	0.26	0.08	-0.05	-0.17
Materials Elasticity	0.05	0.10	0.10	0.05	-0.17	-0.26
Capital Elasticity	0.62	0.30	0.57	0.62	0.37	0.28
Price Elasticity					0.25	
Panel C: Moments Predicted by the Estimated Parameters						
Employment Elasticity	-0.23	-0.16	-0.27	-0.23	-0.32	-0.50
Revenue Elasticity	0.16	0.20	0.15	0.13	-0.03	-0.13
Materials Elasticity	-0.01	0.05	0.01	0.02	-0.16	-0.30
Capital Elasticity	0.58	0.28	0.22	0.60	0.33	0.27
Price Elasticity	0.18	0.18	0.18	0.13	0.16	0.18
Share of Labor, s_L	0.18	0.18	0.18	0.18	0.23	0.25
Share of Capital, s_K	0.08	0.08	0.08	0.08	0.07	0.08
Share of Materials, s_M	0.74	0.74	0.74	0.74	0.70	0.67
No of Moments Used	4	4	4	4	4	4
No of Estimated Parameters	3	3	3	3	3	3
Sum of Squares	5.64	9.24	5.09	1.95	0.17	0.21
Sample	All	All	All	All	Manufact	Tradable
Year	2004	2002	2004	2004	2004	2004
Industry FEs	no	no	yes	no	yes	yes
Pass-Through	Full	Full	Full	70 percent	70 percent	70 percent

Note: Column (1)-(3) estimate the parameters of the model presented in Section 6 using a minimum-distance estimator. In each column we use the empirical moments that are based on our benchmark estimates with controls. The estimated parameters with standard errors can be found in Panel A. Panels B and C report the empirical and the predicted moments, respectively. In Columns (4)-(6) we deviate from the model and assume imperfect pass-through of the minimum wage. In particular, we assume that prices would only increase by 70 percent of what would be predicted by the benchmark model.

TABLE A7—ROBUSTNESS OF THE IMPACT OF THE MINIMUM WAGE, CHANGE BETWEEN 2000 AND 2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Wage							
FA or GAP	0.58	1.23	0.59	1.24	0.57	0.60	0.57
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)
Panel B: Cost of Labor							
FA or GAP	0.49	1.05	0.50	1.06	0.48	0.51	0.49
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)
Panel C: Employment							
FA or GAP	-0.076	-0.145	-0.068	-0.121	-0.078	-0.059	-0.086
	(0.010)	(0.022)	(0.011)	(0.024)	(0.009)	(0.008)	(0.009)
Panel D: Employment elasticity wrt. Cost of Labor							
Employment elasticity	-0.17	-0.15	-0.16	-0.14	-0.16	-0.11	-0.17
wrt. MW	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)
Panel E: Total Labor Cost							
FA or GAP	0.325	0.692	0.352	0.736	0.315	0.376	0.345
	(0.013)	(0.032)	(0.015)	(0.036)	(0.012)	(0.012)	(0.013)
Panel F: Revenue							
FA or GAP	0.066	0.152	0.100	0.222	0.050	0.093	0.066
	(0.013)	(0.030)	(0.015)	(0.032)	(0.012)	(0.012)	(0.013)
Panel G: Material							
FA or GAP	0.049	0.115	0.080	0.185	0.031	0.079	0.048
	(0.014)	(0.032)	(0.016)	(0.034)	(0.013)	(0.013)	(0.014)
Panel H: Profits							
FA or GAP	-0.011	-0.022	-0.003	-0.005	-0.010	-0.015	-0.007
	(0.003)	(0.007)	(0.004)	(0.008)	(0.003)	(0.003)	(0.003)
Panel I: Capital							
FA or GAP	0.148	0.202	0.156	0.209	0.140	0.148	0.157
	(0.034)	(0.073)	(0.037)	(0.079)	(0.031)	(0.032)	(0.036)
Observations*	19,485	19,485	19,485	19,485	22,766	29,138	16,980
Controls	yes	yes	yes	yes	yes	yes	yes
Exposure Measure	FA	GAP	FA	GAP	FA	FA	FA
NACE 3 dummies	no	no	yes	yes	no	no	no
All Industry	no	no	no	no	yes	no	no
Small Firms	no	no	no	no	no	yes	no
Firms Survived till 2004	no	yes	no	no	no	no	yes

Note: This table estimates the short term relationship between exposure to the minimum wage and various outcomes for alternative specifications. Column (1) reports the benchmark estimates. Columns (2) and (4) show estimates using the GAP measure of exposure. Columns (3) and (4) add three digit industry dummies to the benchmark specification. Column (5) includes all industries in the regressions, Column (6) includes firms with less than 5 employees, while Columns (7) restricts the sample on firms that survived till 2004. Robust standard errors are in parentheses.

TABLE A8—ROBUSTNESS OF THE IMPACT OF THE MINIMUM WAGE, CHANGE BETWEEN 2000 AND 2004

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Wage							
FA or GAP	0.54	1.12	0.57	1.15	0.53	0.59	0.54
	(0.01)	(0.03)	(0.01)	(0.04)	(0.01)	(0.01)	(0.01)
Panel B: Cost of Labor							
FA or GAP	0.43	0.91	0.46	0.94	0.42	0.47	0.44
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)
Panel C: Employment							
FA or GAP	-0.100	-0.169	-0.087	-0.133	-0.114	-0.079	-0.116
	(0.014)	(0.031)	(0.015)	(0.033)	(0.012)	(0.012)	(0.013)
Panel D: Employment elasticity wrt. Cost ofLabor							
Employment elasticity	-0.23	-0.19	-0.19	-0.14	-0.27	-0.17	-0.26
wrt. MW	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.02)
Panel E: Total Labor Cost							
FA or GAP	0.238	0.506	0.286	0.591	0.207	0.299	0.272
	(0.020)	(0.045)	(0.022)	(0.049)	(0.018)	(0.017)	(0.020)
Panel F: Revenue							
FA or GAP	0.036	0.124	0.083	0.228	-0.005	0.081	0.040
	(0.018)	(0.039)	(0.019)	(0.042)	(0.016)	(0.015)	(0.018)
Panel G: Material							
FA or GAP	0.021	0.090	0.075	0.209	-0.019	0.076	0.025
	(0.019)	(0.042)	(0.021)	(0.045)	(0.017)	(0.017)	(0.020)
Panel H: Profits							
FA or GAP	-0.008	-0.111	-0.0004	0.006	-0.011	-0.013	-0.008
	(0.004)	(0.008)	(0.004)	(0.009)	(0.003)	(0.003)	(0.004)
Panel I: Capital							
FA or GAP	0.270	0.427	0.280	0.488	0.221	0.177	0.304
	(0.054)	(0.120)	(0.060)	(0.132)	(0.050)	(0.049)	(0.060)
Observations*	19,485	19,485	19,485	19,485	22,766	29,138	16,980
Controls	yes	yes	yes	yes	yes	yes	yes
Exposure Measure	FA	GAP	FA	GAP	FA	FA	FA
NACE 3 dummies	no	no	yes	yes	no	no	no
All Industry	no	no	no	no	yes	no	no
Small Firms	no	no	no	no	no	yes	no
Firms Survived till 2004	no	yes	no	no	no	no	yes

Note: This table estimates the medium term relationship between exposure to the minimum wage and various outcomes for alternative specifications. Column (1) reports the benchmark estimates. Columns (2) and (4) show estimates using the GAP measure of exposure. Columns (3) and (4) add three digit industry dummies to the benchmark specification. Column (5) includes all industries in the regressions, Column (6) includes firms with less than 5 employees, while Columns (7) restricts the sample on firms that survived till 2004. Robust standard errors are in parentheses.

TABLE A9—RELATIONSHIP BETWEEN ENTRY RATE AND FRACTION AFFECTED AT THE INDUSTRY LEVEL

	(1) 1998	(2) 2000	(3) 2002	(4) 2004
Panel A: 2-digit level Industries				
FA_k	0.067	0.041	0.073	0.054
	(0.019)	(0.018)	(0.020)	(0.022)
Constant	0.062	0.056	0.037	0.045
	(0.006)	(0.006)	(0.007)	(0.007)
Number of observation	32	32	32	32
R-squared	0.299	0.143	0.308	0.172
Panel B: 3-digit level Industries				
FA_k	0.018	0.027	0.056	0.043
	(0.019)	(0.014)	(0.012)	(0.013)
Constant	0.082	0.059	0.043	0.047
	(0.007)	(0.005)	(0.004)	(0.005)
Number of observation	151	151	151	151
R-squared	0.006	0.026	0.130	0.068
Panel C: 4-digit level Industries				
FA_k	0.020	0.030	0.024	0.050
	(0.013)	(0.010)	(0.010)	(0.009)
Constant	0.079	0.057	0.054	0.041
	(0.005)	(0.004)	(0.004)	(0.003)
Number of observation	373	373	373	373
R-squared	0.006	0.023	0.015	0.078

Note: The table show the relationship between exposure to the minimum wage and firms entry at two-digit industry level in 1998, in 2000, in 2002 and in 2004. Panel B and C shows the same at three-digit and four-digit industry level. Each column represent a separate regression of the entry rate at the industry level on the fraction of affected workers in that sector in a particular year. Regression weighted by the number if firms in the sector in 1997. We only use industries that are in our benchmark sample (see the details on sample restriction in Section 2.2.)

TABLE A10—EMPLOYMENT EFFECT OF THE MINIMUM WAGE, GROUPING ESTIMATOR

	(1)	(2)	(3)	(4)	(5)
Panel A: Effect on Employment-to-Population (epop)					
After 2000 × FA_g	-0.12	-0.03	-0.02	-0.02	-0.02
	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)
After 2000	0.05	0.05	0.002	0.001	0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
FA_g	-0.31	-0.22	-0.36	-0.24	-0.31
	(0.13)	(0.10)	(0.13)	(0.10)	(0.14)
Employment elasticity	-0.24	-0.07	-0.05	-0.05	-0.04
wrt. MW (directly affected)	(0.08)	(0.07)	(0.06)	(0.06)	(0.08)
Panel B: Effect on the Average Wage					
After 2000 × FA_g	0.12	0.14	0.24	0.24	0.24
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)
After 2000	-0.06	-0.06	-0.03	-0.03	-0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
FA_g	-0.87	-0.82	-0.93	-0.87	-0.97
	(0.10)	(0.09)	(0.10)	(0.09)	(0.12)
Employment elasticity	-1.40	-0.32	-0.13	-0.13	-0.14
wrt. wage	0.65	0.35	0.21	0.21	0.24
Time FEs	yes	yes	yes	yes	yes
Demographic-Region FEs	yes	yes	yes	yes	yes
Controls	no	yes	no	yes	yes
Demographic-Region time trend	no	no	yes	yes	yes
Age range	16-60	16-60	16-60	16-60	25-55
Epop in 2000	0.71	0.71	0.71	0.71	0.75
Number of observation	1792	1792	1792	1792	1008

Note: Table shows the group level relationship between exposure to the minimum wage (FA_g) and employment and wages (see regression specifications in equation A1). Groups are created based on demographics, age, education and the region where the workers live. The coefficient on the variable After 2000 × FA_g estimates the effect of the minimum wage. In Panel A we show the effect on the employment-to-population rate. Panel B shows the effect on the average wage and the implied elasticity wrt. the *wage*. The regressions are weighted by the number of observations used in calculating FA_g. Clustered standard errors at the group-level are reported in parentheses.

FIGURE A1. EVOLUTION OF REAL MINIMUM WAGE

Note: This figure shows the evolution of the minimum wage after adjusted by the consumer price index (CPI). The graph shows the radical shift in real minimum wages occurred after 2000.

(a) GDP growth

(b) Employment and Unemployment trends

(c) Inflation Rate

(d) EUR/HUF Exchange Rate

FIGURE A2. MACROECONOMIC TRENDS

Note: Panel (a) shows the seasonally adjusted, year to year real GDP growth rate between 1996 and 2006 in Hungary; panel (b) shows the evolution of employment to population rate and the unemployment rate between 1993 and 2009; panel (c) the year-to-year inflation rate (consumer price index), while panel (d) the EUR/HUF (or ECU/HUF before 1999) exchange rate. The major (red) vertical line indicates the 4th quarter in 2000 (or year 2000 in panel d), the last quarter (or year in panel d) before the minimum wage hike. Panel (a) shows that the GDP growth was stable around the examined period. Panel (b) highlights that the labor market was gradually improving around the reform. Panel (c) shows that the inflation rate was stable at around 10% before 2001, and it fell shortly afterwards. Panel (d) shows that the EUR/HUF exchange rate was increasing until 1998 and stabilized afterwards.

Chart 2.1. **The overall summary index and its three main components**

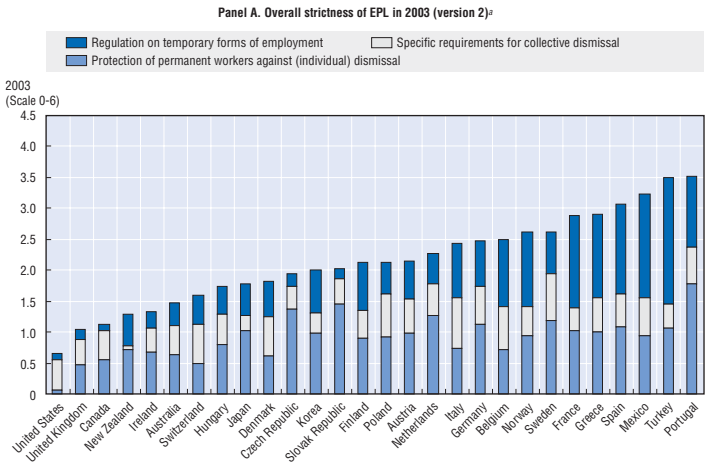
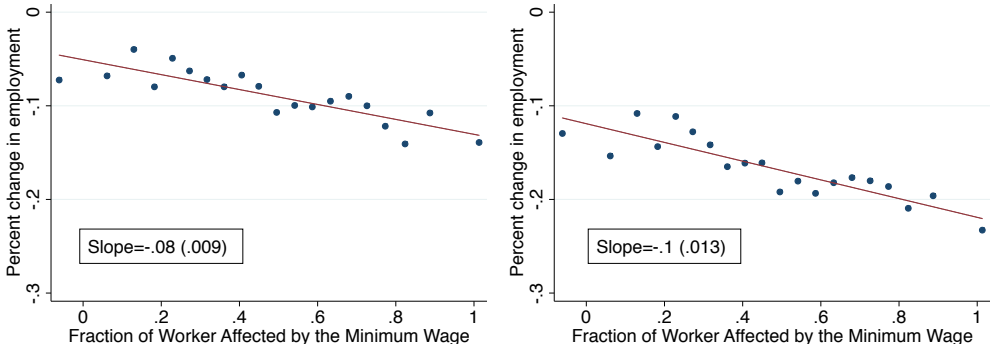


FIGURE A3. EMPLOYMENT PROTECTION LEGISLATION IN OECD COUNTRIES

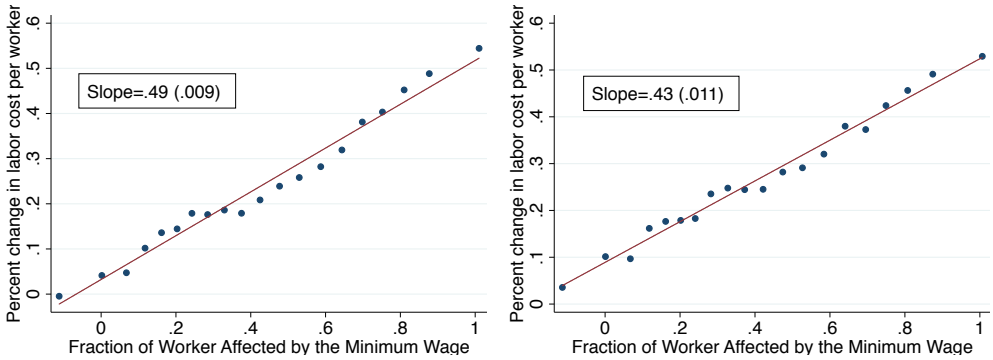
Source: OECD Employment Outlook in 2004. This figure shows the strictness of employment protection legislation in various OECD countries including Hungary. The data is from 2003, but the ranking was very similar in 1999. The strictness of employment protection is in the bottom third of the OECD countries.

FIGURE A4. NON-PARAMETRIC RELATIONSHIP BETWEEN EMPLOYMENT/AVERAGE LABOR COST CHANGE AND THE FRACTION OF AFFECTED WORKERS



(a) Employment Change 2000-2002

(b) Employment Change 2000-2004



(c) Average Labor Cost Change 2000-2002

(d) Average Labor Cost Change 2000-2004

FIGURE A5. NON-PARAMETRIC RELATIONSHIP BETWEEN EMPLOYMENT/AVERAGE LABOR COST CHANGE AND THE FRACTION OF AFFECTED WORKERS

Note: These figures show the binned scatterplot between the fraction of affected workers by the minimum wage and changes in employment (panel (a) and (b)) and changes in average labor cost (panel (c) and (d)). Panel (a) and (c) show the short-term effects (changes between 2002 and 2000) while panel (b) and (d) show the medium term ones (changes between 2004 and 2000). The red lines represent the best linear fits, while in the boxes we report the slopes of lines. Controls are included in the regression. The figures highlight that the relationships between the fraction affected and changes in employment and between the fraction affected and the changes in average labor cost are approximately linear.

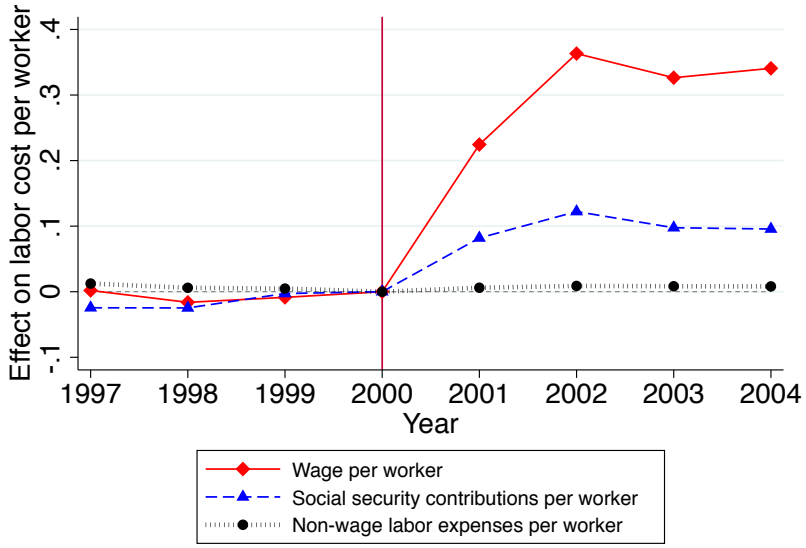


FIGURE A6. EFFECT OF THE MINIMUM WAGE ON WAGES, NON-WAGE BENEFITS, AND SOCIAL SECURITY CONTRIBUTIONS

Note: This figure shows firm-level regressions of percentage change in wage compensation (relative to 2000) on fraction affected by the minimum wage (beta coefficients from equation (1) over time). The red solid line show the effect on wage per worker, the blue dashed line on the social security contribution per worker, while the black dotted line on the non-wage benefits per worker. To make the magnitude of the different outcomes comparable we normalise the changes relative to the total labor cost in 2000. The figure shows the effect of the minimum wage on non-wage benefits was negligible and so we do not find evidence that the increase in wages were offset by cutting non-cash benefits.

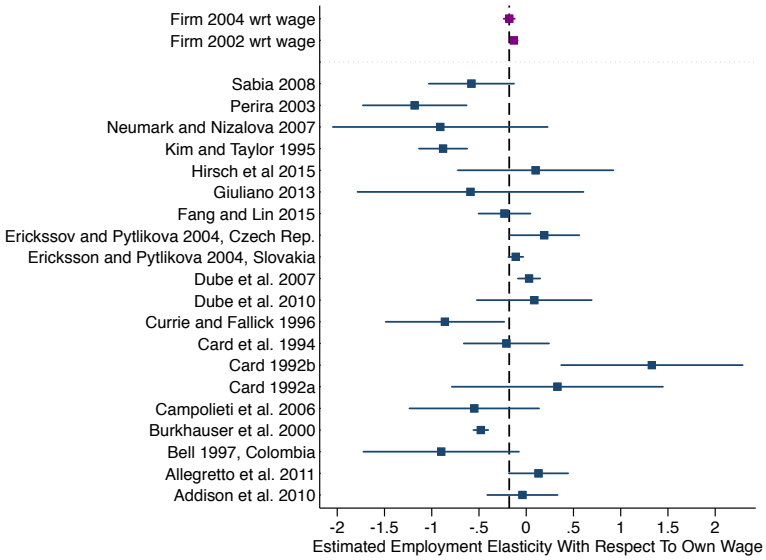


FIGURE A7. EMPLOYMENT ELASTICITY IN THE LITERATURE AND IN THIS PAPER

Note: This figure summarizes the estimated employment elasticity with respect to wage and compares it to the previous estimates in the literature. The dashed vertical line shows our preferred estimate for the employment elasticity, which is -0.18. In cases where the standard errors of the labor demand elasticity was not directly reported by the authors we used the delta method to obtain the standard errors (see the details in the Online Appendix Part A.4.).

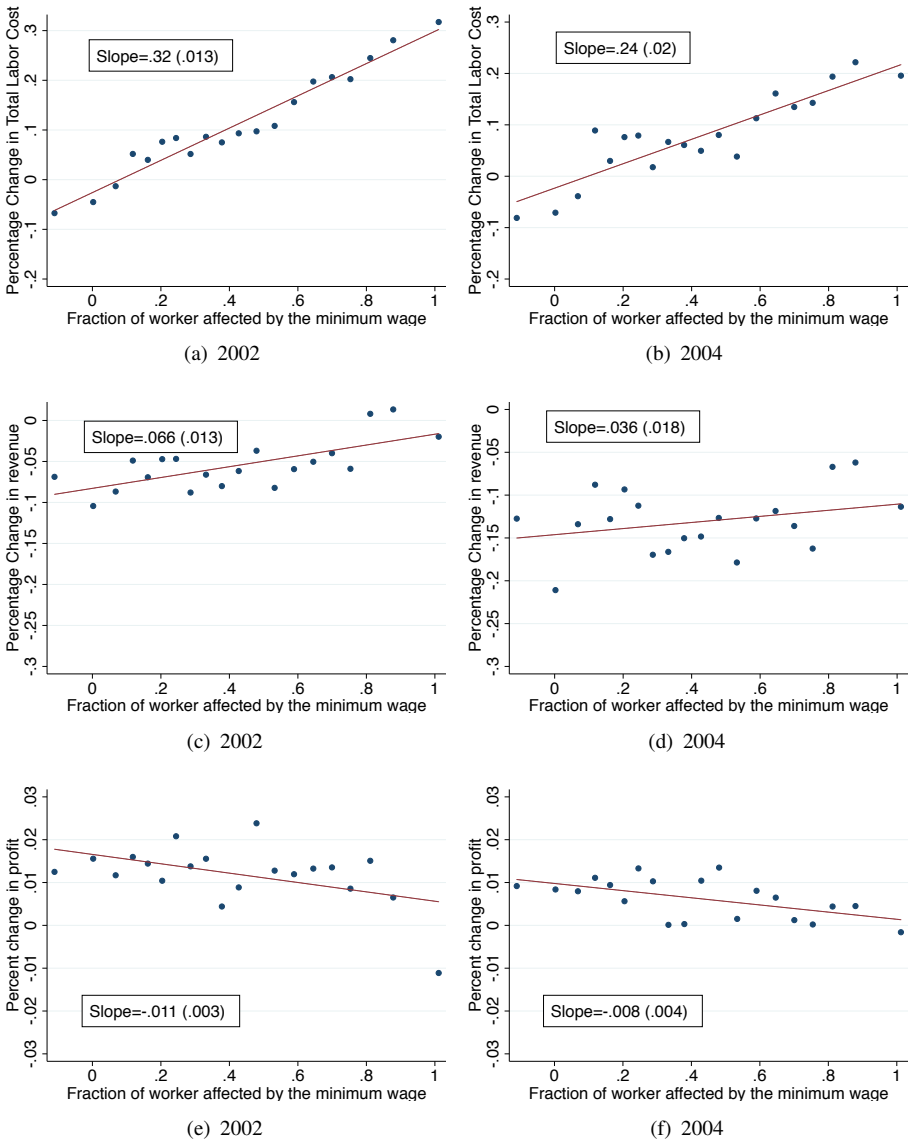
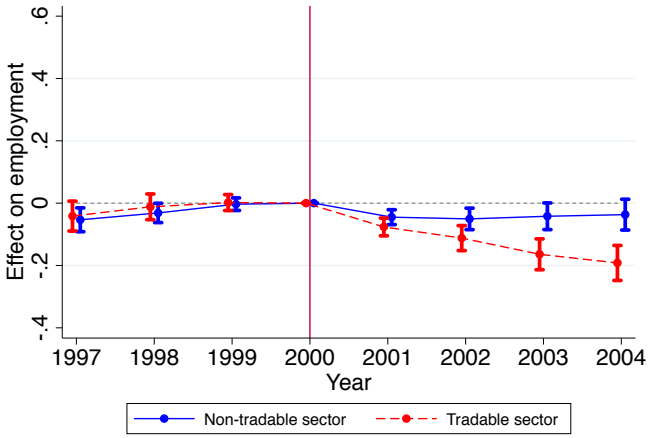
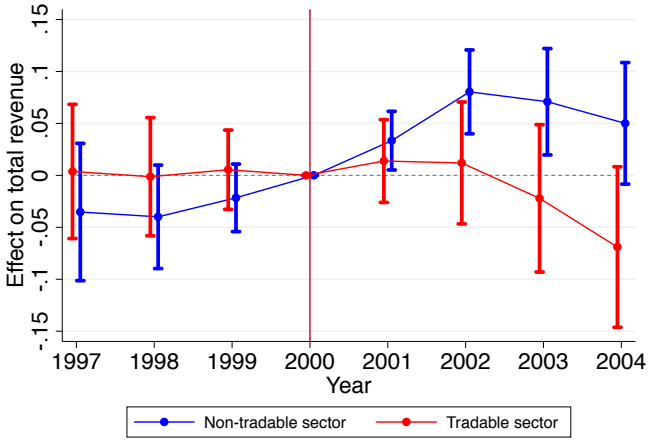


FIGURE A8. NON-PARAMETRIC RELATIONSHIP BETWEEN REVENUE/PROFIT/TOTAL LABOR COST CHANGE AND FRACTION AFFECTED BY THE MINIMUM WAGE

Note: This figure shows the binned scatterplot between fraction affected by the minimum wage and change in total labor cost (Panel (a) and (b)), revenue (panel (c) and (d)) and profits (panel (e) and (f)). Panels (a),(c),(e) show the effect on employment in the short term (changes between 2000 and 2002) while panels (b),(d),(f) show the medium term effects (change between 2000 and 2004). The red line represents the best linear fit, while in the box we report the slope of that line. Controls are included in the regressions.



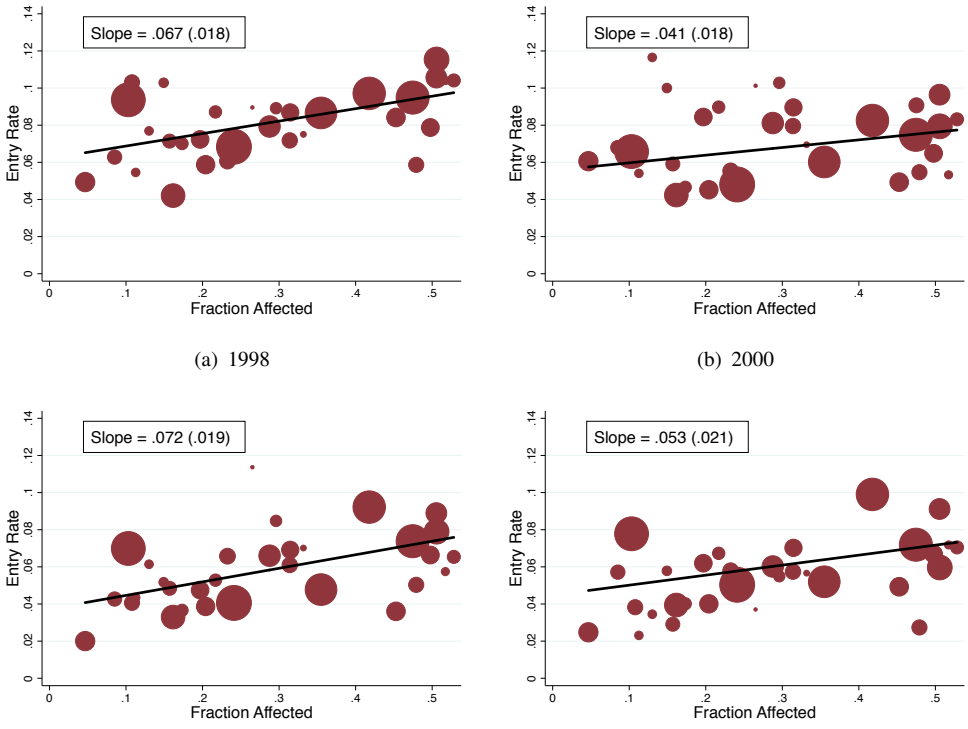
(a) Effect on Employment



(b) Effect on Revenue

FIGURE A9. EFFECT ON EMPLOYMENT AND ON REVENUE BY TRADABLE AND NON-TRADABLE SECTORS

Note: Panel (a) shows the firm-level relationship between fraction affected by the minimum wage and employment changes over time by tradable and non-tradable sectors (we report the beta coefficients with their 95 percent confidence intervals from equation 1). We classify sectors by following the procedure in Mian and Sufi (2010) (see the details in the text). It is clear that disemployment effects are larger in the tradable than in the non-tradable sector. Panel (b) shows the relationship between revenue and exposure to the minimum wage by the tradable and non-tradable sectors. The graph highlights that revenue in the tradable sector drops in response to the minimum wage, while it increases in the non-tradable sectors. Controls are included in the regression.

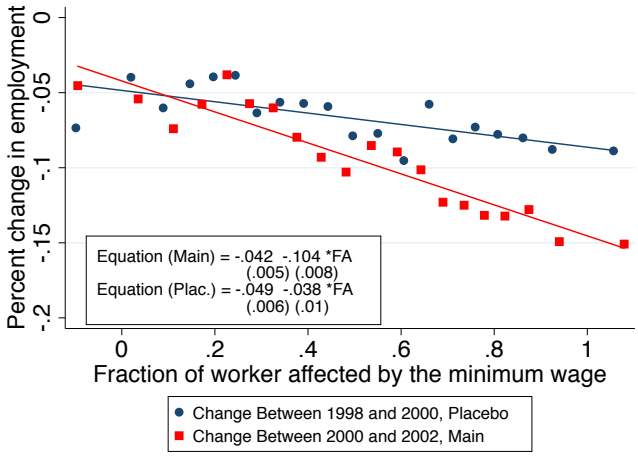


(a) 1998 (b) 2000

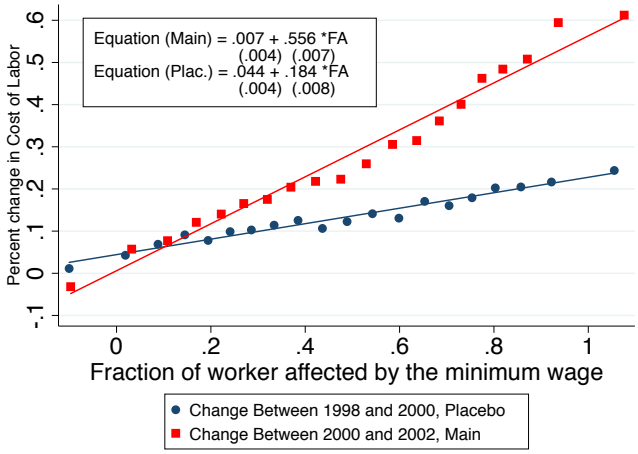
(c) 2002 (d) 2004

FIGURE A10. FIRMS ENTRY AND FRACTION AFFECTED AT THE TWO-DIGIT INDUSTRY LEVEL

Note: This figure shows the relationship between exposure to the minimum wage and firms entry at two digit industry level in 1998 (panel a), in 2000 (panel b) in 2002 (panel c) and in 2004 (panel d). Each scatterplot relates the entry rate in a two-digit industry to the fraction of affected workers in that sector. In each graph the fitted regression line is the outcome from a corresponding OLS regression weighted by the number if firms in the sector. The regression slope along with the standard errors are indicated in the top left corner.



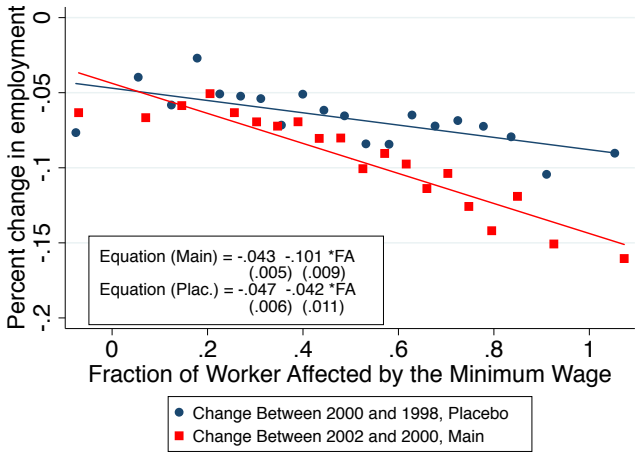
(a) Effect on Employment



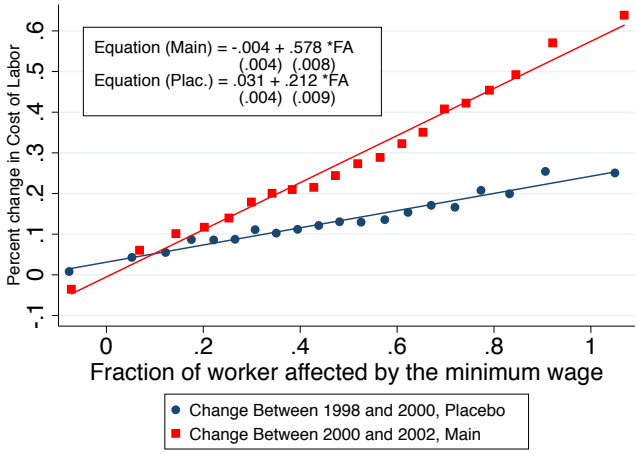
(b) Effect on Average Labor Cost

FIGURE A11. TESTING FOR SUTVA, BENCHMARK SPECIFICATION

Note: Panel (a) shows the non-parametric binscattered relationship between change in employment between 2000 and 2002 and the fraction of workers who earn below the 2002 minimum wage in 2000 (red squares, main sample) and the change in employment between 1998 and 2000 and the fraction of workers who earn below the 2002 minimum wage in 1998 (blue dots, placebo sample). The estimated intercepts and beta coefficients of the linear fits are shown in the bottom left panel. Panel (b) shows the same for the change in cost of labor. The difference between the placebo and the main beta coefficient estimates the employment effect of the minimum wage, while the difference in the intercepts tests for SUTVA. Controls are included in the regressions. Further discussion can be found in the Online Appendix Part A.1.



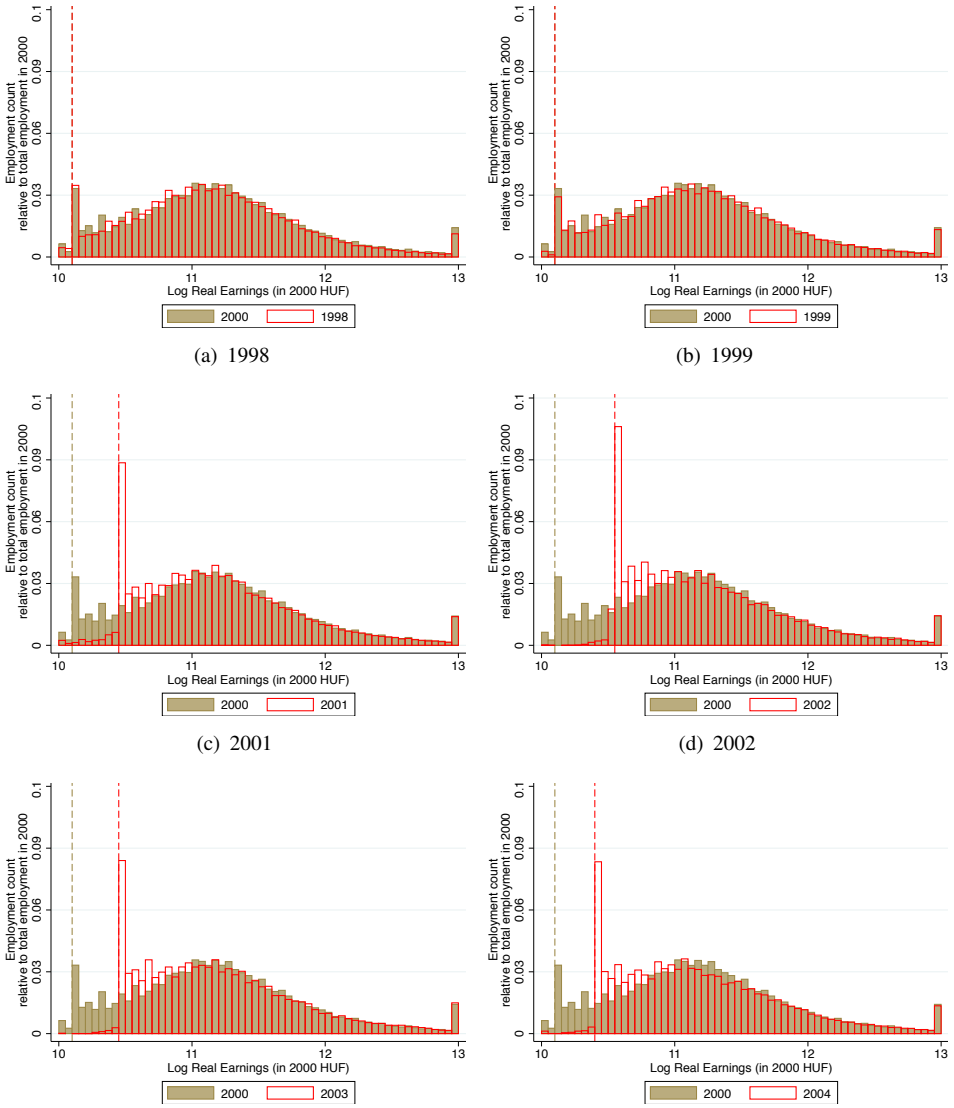
(a) Effect on Employment



(b) Effect on Average Labor Cost

FIGURE A12. TESTING FOR SUTVA (WITH INDUSTRY CONTROLS)

Note: Panel (a) shows the non-parametric binscattered relationship between change in employment between 2000 and 2002 and the fraction of workers who earn below the 2002 minimum wage in 2000 (red squares, main sample) and the change in employment between 1998 and 2000 and the fraction of workers who earn below the 2002 minimum wage in 1998 (blue dots, placebo sample). The estimated intercepts and beta coefficients of the linear fits are shown in the bottom left panel. Panel (b) shows the same for the change in cost of labor. The difference between the placebo and the main beta coefficient estimates the employment effect of the minimum wage, while the difference in the intercepts tests for SUTVA. Controls and industry dummies are included in the regressions. Further discussion can be found in the Online Appendix Part A.1.



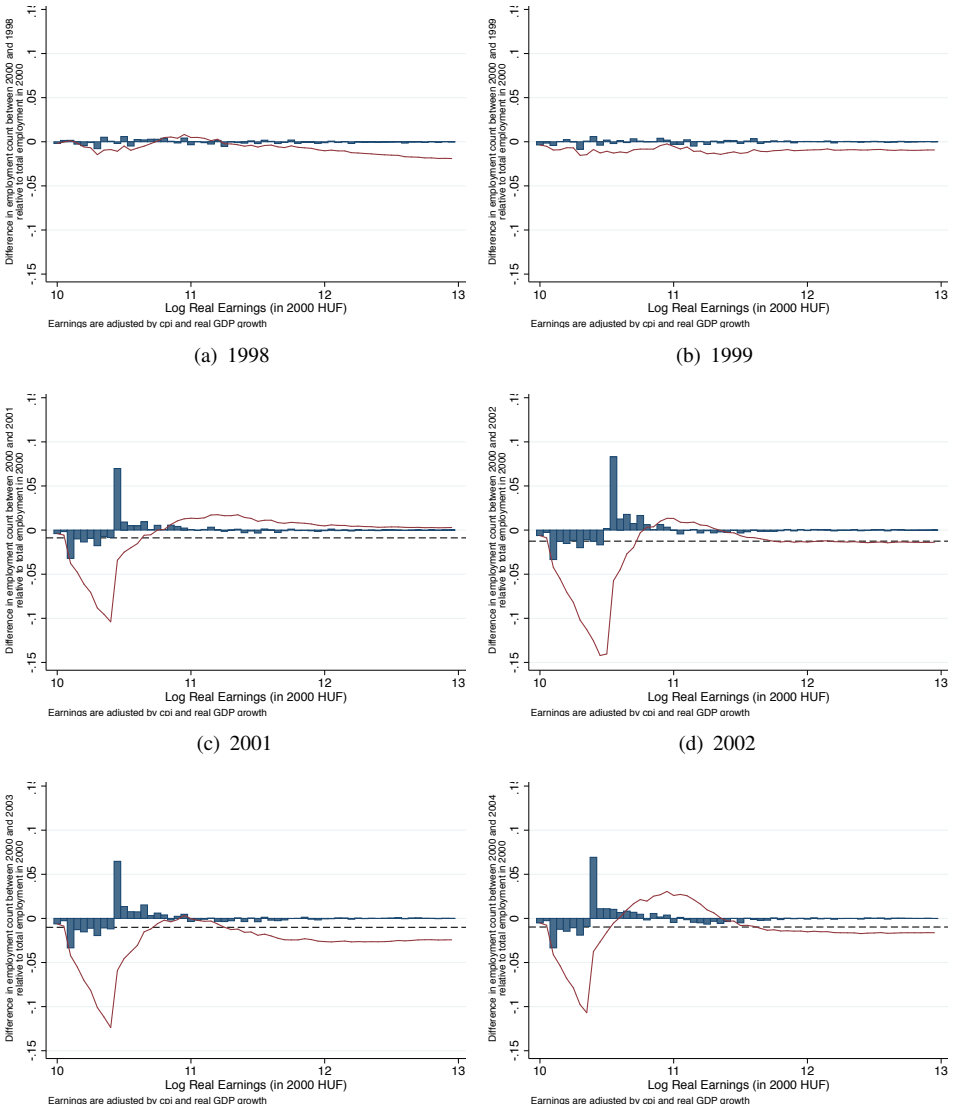
(a) 1998 (b) 1999

(c) 2001 (d) 2002

(e) 2003 (f) 2004

FIGURE A13. EVOLUTION OF FREQUENCY EARNINGS DISTRIBUTIONS OVER TIME

Note: The figures show the distribution of monthly log earnings over time. Each panel shows the earnings distribution in year t (red outlined bars) compared to 2000 earnings distribution (brown solid bars). We express the number of jobs in terms of year 2000 total employment. The dotted vertical lines (brown in 2000, red in other years) show the bar in where the minimum wage is located in the earnings distribution.



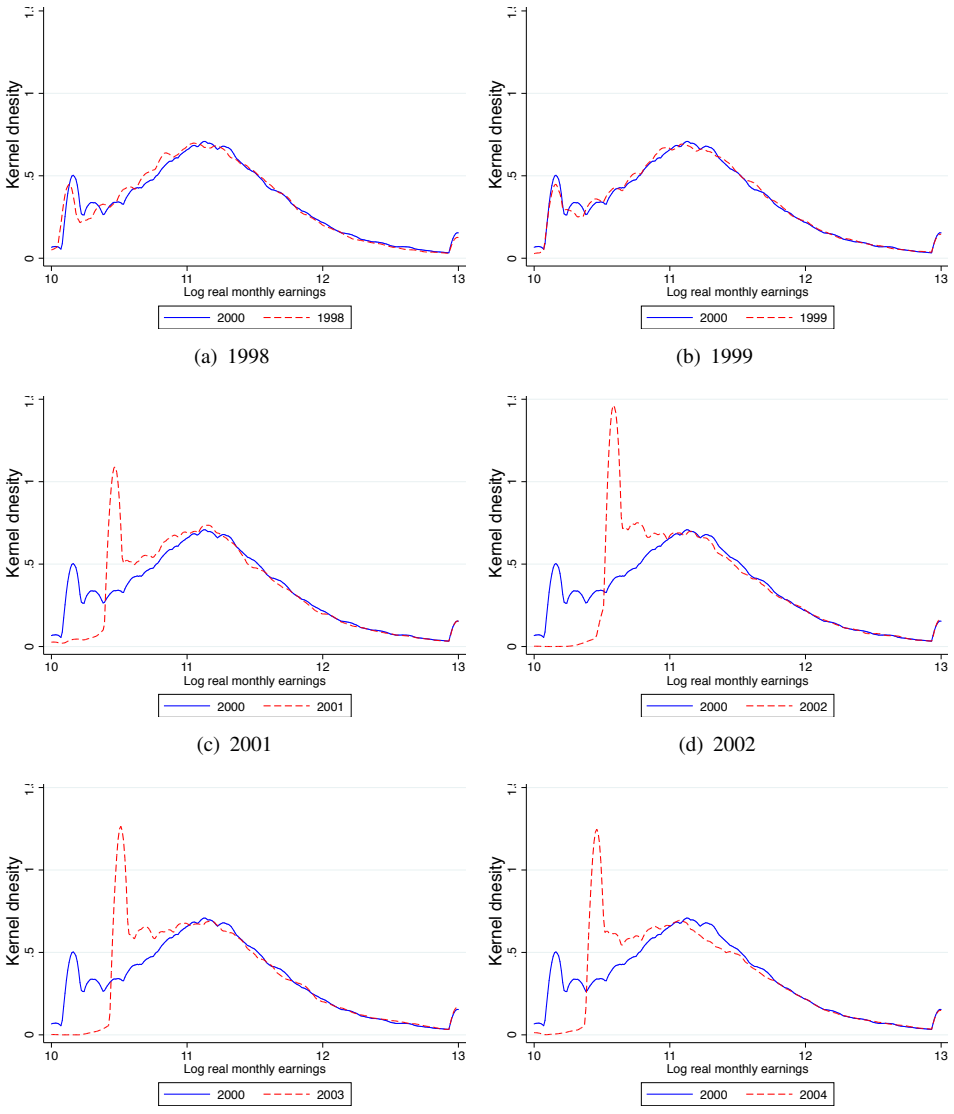
(a) 1998 (b) 1999

(c) 2001 (d) 2002

(e) 2003 (f) 2004

FIGURE A14. EVOLUTION OF DIFFERENCE BETWEEN THE ACTUAL AND THE YEAR 2000 EARNINGS DISTRIBUTION OVER TIME

Note: The figure shows the difference between the year t frequency distribution (red outlined bars in Figure A13) and the 2000 distribution (brown bars is Figure A13). We express the number of jobs in terms of year 2000 total employment. In each panel the red solid line shows the running sum of employment changes up to the wage bin it corresponds to. The dashed horizontal lines in the post 2000 panels show the value where 10 percent of the directly affected jobs is destroyed.



(a) 1998 (b) 1999

(c) 2001 (d) 2002

(e) 2003 (f) 2004

FIGURE A15. EVOLUTION OF KERNEL DENSITIES OVER TIME

Note: The kernel density of monthly log earnings over time are shown between 1998 and 2004 (red dashed line) relative to 2000 (blue line).

A4. Employment Elasticity with respect to the Wage

In Figure A7 we compare our estimate on the employment elasticity with respect to the *wage* to the existing evidence in the literature. Notice that this employment elasticity is not the same as the employment elasticity with respect to *the minimum wage*, which is reported in most minimum wage papers. The following table shows the studies published in peer reviewed academic journals where the employment elasticity with respect to the *wage* was reported directly or we were able to calculate it (since both the effect on *wage* and on *employment* is reported).

Reference	Title	Journal	Elasiticty wrt **wage**	Note	Citation as of March, 2017
Addison et al (2010)	The Effect of Minimum Wages on Labour Market Outcomes: County-Level Estimates from the Restaurant-and-Bar Sector	British Journal of Industrial Relations	-0.04 (0.19)	Wage (Table 3 Col 1) Emp (Table 3 Col 2)	45
Allegretto et al. (2011)	Do Minimum Wages Really Reduce Teen Employment? Accounting for Heterogeneity and Selectivity in State Panel Data	Industrial Relations	0.13 (0.16)	Table 3 Column 4	197
Bell (1997), Mexico	The Impact of Minimum Wages in Mexico and Colombia	Journal of Labor Economics	-1.08 (1.42)	Wage (Table 8 Col 5) Emp (Table 8 Col 3)	407
Bell (1997), Colombia	The Impact of Minimum Wages in Mexico and Colombia	Journal of Labor Economics	-0.90 (0.42)	Wage (Table 8 Col 5) Emp (Table 8 Col 6)	407
Burkhauser et al. (2000)	A Reassessment of the New Economics of the Minimum Wage Literature with Monthly Data from the Current Population Survey	Journal of Labor Economics	-0.48 (0.04)	Wage (Table 2 Col 2) Emp (Table 3 Col 3)	256
Campolieti et al. (2006)	Minimum Wage Impacts from a Prespecified Research Design: Canada 1981-1997.	Industrial Relations	-0.55 (0.35)	Table 4 (including prime_age skilled employment rate)	43
Card (1992a)	Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage	Industrial and Labor Relations Review	0.33 (0.57)	Table 4, Column 5	560

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Reference	Title	Journal	Elasiticty wrt **wage**	Note	Citation as of March, 2017
Card (1992b)	Do Minimum Wages Reduce Employment? A Case Study of California, 1987-89	Industrial and Labor Relations Review	1.33 (0.49)	Table 4	535
Card et al. (1994)	Comment on David Neumark and William Wascher, 'Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws.	Industrial and Labor Relations Review	-0.21 (0.23)	Table 2, Row 2	157
Currie and Fallick (1996)	The Minimum Wage and the Employment of Youth: Evidence from the NLSY	Journal of Human Resources.	-0.86 (0.32)	Wage (Table 4, panel B, Col 2) Emp (Table 2 Col 4)	204
Dube et al (2010)	Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties	Review of Economics and Statistics	0.08 (0.28)	Table 2, col 6	522
Dube et al (2007)	The Economic Impacts of a Citywide Minimum Wage	Industrial and Labor Relations Review	0.03 (0.06)	Wage (Table 7 Col 1) Emp (Table 2 Col 4)	114
Draca et al. (2011)	Minimum Wages and Firm Profitability	American Economic Journal: Applied Economics	-0.15 (1.46)	Table 5 Col 2	175
Eriksson and Pytlikova (2004) Slovakia	Firm-level Consequences of Large Minimum-wage Increases in the Czech and Slovak Republics	Labour	-0.11 (0.04)	Table 7 Column 3	35
Eriksson and Pytlikova (2004) Czech Republics	Firm-level Consequences of Large Minimum-wage Increases in the Czech and Slovak Republics	Labour	0.19 (0.05)	Table 6 Column 3	35

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Reference	Title	Journal	Elasiticty wrt **wage**	Note	Citation as of March, 2017
Fang and Lin (2015)	Minimum wages and employment in China	IZA Journal of Labor Policy	-0.23 (0.14)	Wage (Table 5 Col 4) Emp (Table 5 Col 4)	52
Giuliano (2013)	Minimum Wage Effects on Employment, Substitution, and the Teenage Labor Supply: Evidence from Personnel Data	Journal of Labor Economics	-0.59 (0.61)	Wage (Table 4 Col 6) Emp (Table 4 Col 6)	56
Hirsch et al (2015)	Minimum Wage Channels of Adjustment	Industrial Relations	0.10 (0.42)	Table 4, Col 7, panel A	83
Kim and Taylor (1995)	The Employment Effect in Retail Trade of California's 1988 Minimum Wage Increase	Journal of Business & Economic Statistics,	-0.88 (0.13)	Table 4	105
Machin et al. (2003)	Where the Minimum Wage Bites Hard: Introduction of Minimum Wage to a Low Wage Sector	Journal of European Economic Association	-0.35 (0.16)	Table 6 Column 7	167
Neumark and Nizalova (2007)	Minimum Wage Effects in the Longer Run	Journal of Human Resources	-0.91 (0.58)	Wage (Table 2 Col 1) Emp (Table 2 Col 2)	85
Pereira (2003)	The impact ofminimum wages on youth employment in Portugal	European Economic Review	-1.18 (0.28)	Wage (Table 1 Col 1) Emp (Table 2 Col 2)	72
Sabia et al (2012)	Are the Effects of Minimum Wage Increases Always Small? New Evidence from a Case Study of New York State	Industrial and Labor Relations Review	-2.13 (1.23)	Wage (Table 2 Col 6) Emp (Table 3 Col 6)	60
Sabia (2008)	The Effects of Minimum Wage Increases on Retail Employment and Hours: New Evidence from Monthly CPS Data	Journal of Labor Research	-0.58 (0.23)	Wage (Table 3 Col 2) Emp (Table 3 Col 5)	39

Where the standard errors of the elasticity are not reported we calculate them using the delta method. To do this we assume that the covariance between the estimated employ-

ment effect and the estimated wage effect is zero. In Figure A7 we report only studies where the standard error on the employment elasticity is less than one.

A5. Description of the main data sets and the main variables

CORPORATE INCOME TAX DATA

The Hungarian Corporate Income Tax Data (CIT) covers the universe of firms with double book-keeping. The data contains information on firms' balance sheet and income statements, and so it allows us to assess firms' income and cost structure. Here we list the definitions of our key variables:

TABLE A11—DESCRIPTION OF THE KEY VARIABLES

Employment	The average full-time equivalent employment in a calendar year reported by the firm.
Revenue	Total operating revenue including exports. After 2001 reported revenue includes excise taxes. Note that sectors subject to excise taxes are excluded from analysis.
Profit	Operating profit (EBIT): all operating revenues - all operating expenses
Material expenses	Intermediate goods and expenses. It includes cost of goods for resale, cost of raw material and services, and subcontracts.
Labor cost	Sum of all employee's labor costs. This comprises wages, social security contributions. It also includes bonuses, allowances (including travel, housing) and other near cash income.
Wage cost	Sum all wages paid to workers. It includes bonuses, but allowances, social security contributions and near cash income are not part of it
Average cost of labor	Labor cost divided by the employment statistic.
Average Wage	Wage cost divided by the employment statistic.
Value Added:	Value added is calculated in the following way: Profits + Depreciation + Labor cost.
Depreciation expenses	Depreciation is a non-cash expense that represents the declining economic value of an asset. Depreciation is not an actual cash outflow and so depreciation is added back to after tax profit when firm's cash flow is calculated. Depreciation is part of value added.
Miscellaneous items:	This item includes other operating expenses, i.e. losses on bad debts, damages to stocks and inventories, fines and penalties, local taxes and levies, accruals and deferrals.
Capital Stock	Calculated from past real investments using the perpetual inventory method (see the details in Békés and Harasztosi, 2013). We use the investment flows from 1992 (or the year of establishment for firms established later). In the initial period we take the value of fixed assets as investments. In later periods investments is the sum of depreciation and the change in tangible fixed assets. To turn nominal values into real ones, we use sector level investment deflators from Central Statistics Office of Hungary.

STRUCTURE OF EARNINGS SURVEY

The Hungarian Structure of Earnings Survey (SES) is a large annual enterprise survey providing detailed information on worker-level wages, job characteristics and demographic characteristics. The key advantage of the data is that it can be used to calculate both employment and wages. However, the sample covers only firms with at least 10 workers before 2000 and firms with at least 5 workers from 2000 on.

The sample design of the SES is the following. Firms employing 5-20 (10-20 before 2000) workers are randomly selected from the census of enterprises. Individual data are reported on each employee working at these firms as of May 31st in the given year. All firms with more than 20 workers are supposed to report data for the SES. However, in spite of obligatory reporting, some companies do not respond to the survey. The statistical office reports that the non-response rate is around 10 percent for larger firms and 50 percent per cent for the smaller companies. These non-response rates are very similar to the non-response rates for the establishment surveys conducted by the BLS in the U.S (CPAF, 1998 **?**). Responding firms report information on a random sample of their workers based on workers' date of birth. Every blue-collar worker born on the 5th or on the 15th day of any month is selected into the sample. For white-collar workers, the 5th, the 15th and the 25th day of any month are used for selecting. Therefore white-collar workers are over-sampled in the SES.

Due to the SES's complex sampling design we weight our observations when we present the distributional evidence in Section 6. Weights are calculated with the following procedure. For large firms, where not all individuals were observed, within-firm weights are calculated based on a blue-collar indicator and a full-time worker indicator. Between-firm weights are calculated based on 1-digit NACE industry codes and 4 firm size categories (11-20, 21-50, 51-300, more than 300) using all double-book keeping firms. To get the individual weights, the within- and between-firms weights are multiplied by each other. Finally, we adjust the weights to follow the aggregate employment trends of firms with more than 20 employees reported by the Hungarian Statistical Office. We decided to use this time-series because this is what the Hungarian Statistical Office has been consistently reporting since 1998.

CONSTRUCTION OF THE FRACTION AFFECTED VARIABLE

The key advantage of the CIT dataset is that it covers the universe of double book-keeping firms, and so we observe the evolution of employment, labor cost, and other balance sheet items for a large part of the private sector. However, the CIT does not record data on individual workers and so it is not possible to directly calculate the fraction of workers affected by the 2002 minimum wage.

However, we can observe the fraction of affected workers for the subset of firms that are surveyed in the SES. We use this sample to estimate the relationship between the average cost of labor (observed for all firms in the CIT) and the fraction of workers affected (observed in the SES). In particular, we run a tobit regression for the subset of

firms where at least 5 employees are observed in the SES data:[43]

$$FA_{it}^{Measured} = \alpha_t + \beta_{1t} AvCostLabor_{it} + \beta_{2t} AvCostLabor_{it}^2 + \varepsilon_{it} \quad \text{(A2)}$$

where $FA_{it}^{Measured}$ uses the SES data to measure the fraction of workers affected by the 2002 minimum wage increase, while $AvCostLabor_{it}$ uses the CIT data. In each year we adjust $FA_{it}^{Measured}$ and $AvCostLabor_{it}$ by inflation and real GDP growth when we compare it to the 2002 minimum wage.

The non-parametric binscattered fit between $FA_{it}^{Measured}$ and $AvCostLabor_{it}$ is shown in the following figure:

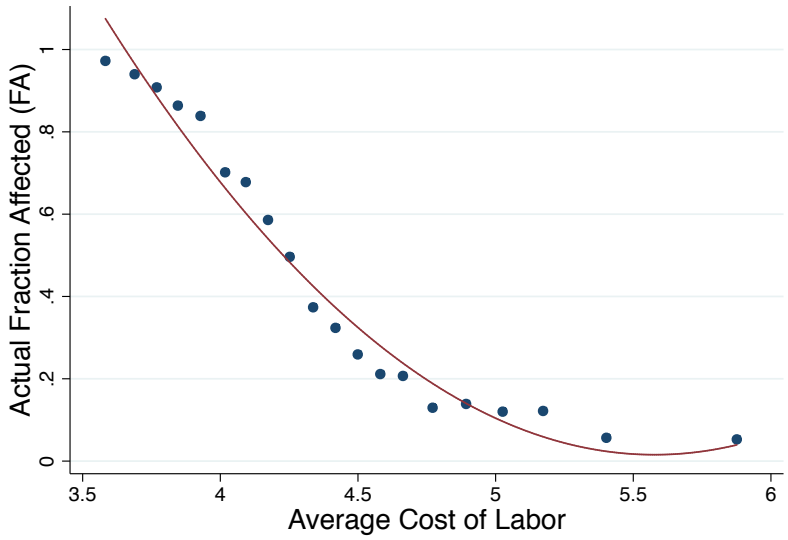


FIGURE A16. RELATIONSHIP BETWEEN $FA_{it}^{Measured}$ AND $AvCostLabor_{it}$ IN 2000

[43] We also explored alternative prediction models to equation A2, including estimating equation A2 with an OLS, including higher order terms for average cost of labor, and using control variables besides average cost of labor. The tobit model performed better in terms of R-squared than the one simply estimates using OLS. Moreover, including higher order terms and additional control variables added only a minor improvement to the R-squared. Therefore, we decided to use the more parsimonious model. However, our results are robust to the different prediction models.

Using the estimated β_{1t} and β_{2t}, we predict $\widehat{FA_{it}}$ for all firms in the CIT data for each year between 1997 and 2000 and cap it between 0 and 1.

$$\widehat{FA_{it}} = min\{0; max\{1; \alpha + \beta_{1t} AvCostLabor_{it} + \beta_{2t} AvCostLabor_{it}^2\}\}$$

The non-parametric binscattered relationship between the measured fraction affected and the predicted one in 2000 is shown in the following figure:

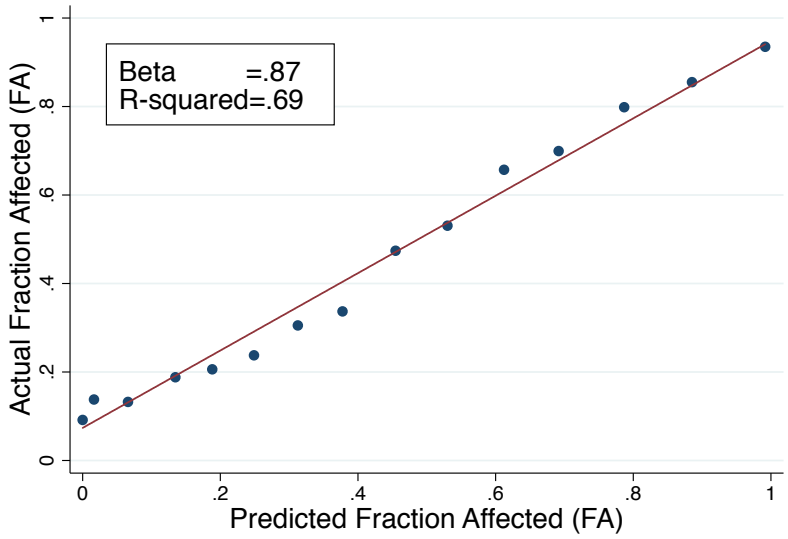


FIGURE A17. RELATIONSHIP BETWEEN THE PREDICTED AND THE MEASURED FRACTION AFFECTED IN 2000

The relationship between the actual and the predicted fraction affected is linear, which suggest that the prediction performs well throughout the distribution of $\widehat{FA_{it}}$. The top-left box in the figure above assesses the accuracy of the prediction model. A perfect match between the actual fraction affected and the predicted fraction affected would yield $R^2 = \beta = 1$. The R^2 is 0.69, which suggests that around 69 percent of the variation in fraction affected can be explained by the prediction model. The β equals 0.87, highlighting that our prediction is biased slightly downward and so our prediction model underestimates the actual exposure to the minimum wage.

Finally, to reduce noise in the measure of fraction of affected workers we take the average between 1997 and 2000. Formally,

$$FA_i = \frac{1}{4} \sum_{t=1997}^{2000} FA_{it}$$

This leads us to the following distribution of the fraction of affected workers:

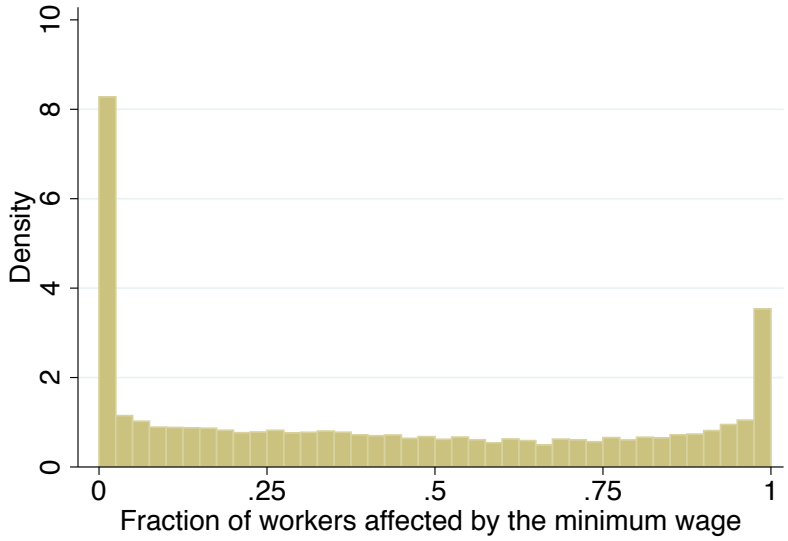


FIGURE A18. THE HISTOGRAM OF FRACTION AFFECTED BY THE MINIMUM WAGE

To assess whether the prediction model causes a bias in our estimates we explore whether using the actual or the predicted fraction affected leads to different estimates. The following table summarizes the estimates on employment and cost of labor for firms where we can calculate both the actual and predicted fraction affected. Here we restrict the analysis to the fraction affected that is based on the 2000 SES data ($\widehat{FA_{i2000}}$).

Panel A shows the employment effects using the actual fraction affected (measured in the SES) and the employment effects using the predicted fraction affected. The employment estimates using the predicted fraction affected (Columns 1 and 3) are larger than for the benchmark specification in Table 2, which comes from the fact that the SES over-sampled larger firms which experienced a larger drop in employment. The differences between the estimates using actual fraction affected in (Columns 1 and 3) and the estimates using predicted fraction affected (in Columns 2 and 4) highlight that the predicted fraction affected leads to higher employment and labor cost estimates than the regressions using the actual figures. The larger estimates are consistent with the fact that the predicted fraction affected understates the actual exposure. However, the differences

TABLE A12—RESULTS USING ACTUAL VS. PREDICTED FRACTION AFFECTED

	(1)	(2)	(3)	(4)
	Changes between 2000 and 2002		Changes between 2000 and 2004	
	Predicted	Actual	Predicted	Actual
Panel A: Change in Firm-Level Employment				
Predicted Fraction Affected ($\widehat{FA_{i,2000}}$)	-0.137		-0.169	
	(0.022)		(0.031)	
Actual Fraction Affected ($FA_{i,2000}^{Measured}$)		-0.095		-0.139
		(0.020)		(0.028)
Number of Observation	2928	2928	2928	2928
Panel B: Change in Firm-Level Average Cost of Labor				
Predicted Fraction Affected ($\widehat{FA_{i,2000}}$)	0.446		0.403	
	(0.021)		(0.026)	
Actual Fraction Affected ($FA_{i,2000}^{Measured}$)		0.364		0.322
		(0.019)		(0.024)
Number of Observations	2780	2780	2585	2585
Employment Elasticity wrt. cost of labor	-0.30	-0.26	-0.42	-0.43

Note: Standard errors in parentheses.

might simply reflect that the actual fraction affected, which is calculated based on a random sample of workers, is noisier than the predicted fraction affected, which is based on the actual total labor cost. The measurement error in the actual fraction affected variable can potentially induce an attenuation bias in the estimates in Columns 2 and 4.

Nevertheless, the table highlights that the employment elasticity does not depend on whether we use the actual or the predicted fraction affected. This indicates that the bias in the employment and cost of labor estimates cancel each other when we take the ratio and calculate the employment elasticity. It is also worth pointing out that standard errors are very similar in the regression using the actual and using the predicted fraction affected. This suggests that using predicted fraction affected unlikely to introduce substantial bias in the standard errors.

We also assess whether uncertainty about the prediction model substantially affects the standard errors reported in the main text. We implement a double bootstrap procedure to assess whether the standard errors are over or underestimated:

1) First, we produce 500 bootstrap estimates for the prediction model. We take a random sample with replacement from the Structure of Earnings Survey (SES) and for each sample we estimate the relationship between actual fraction affected and average cost of labor. Using the estimated relationship, we provide a prediction

for the fraction affected for all firms. Since the parameters of the prediction model differ slightly for each bootstrap sample, the predicted fraction affected will also differ for each bootstrap sample.

2) Second, using the bootstrap estimates from step 1, we produce a second step bootstrap estimate of the fraction affected on the change in various firm-level outcomes (see equation 1). In this second step we take a random sample with replacement from the 19,485 firms in the benchmark sample and we estimate the relationship between (the bootstrapped) predicted fraction affected and various firm-level outcomes. In each sample we use one of the bootstrap estimates from step 1.

In Table A13 we compare our benchmark estimates on employment and cost of labor to the bootstrapped estimates. We report "1-step bootstrap" which only bootstraps the samples for the prediction model (step 1), but does not bootstrap the benchmark sample (step 2). These estimates show the error that would be introduced by the imputation procedure if the benchmark regression (with the true FA) were error free. The standard errors around these estimates are extremely low, which highlights that the uncertainty about the prediction model adds very little noise to our estimates.

The "double bootstrap" standard errors in column (3) can be compared to the robust standard errors estimated in the benchmark analysis (column 1). The table shows that the standard errors are identical up to 2 decimal places in all cases. This highlights that the imputation had only a negligible effect on our estimates. Since the double bootstrapping procedure is computationally intensive, we report the robust standard errors throughout the paper.

TABLE A13—STANDARD ERRORS WITH BOOTSTRAPPED PREDICTION

	(1) Benchmark Estimate	(2) 1-Step Bootstrap	(3) Double Bootstrap
FA on emp in 2002 (Table 2, Column 2, Panel A)	-0.076	-0.076	-0.076
	(0.008)	(0.0006)	(0.009)
FA on emp in 2004 (Table 2, Column 4, Panel A)	-0.100	-0.100	-0.100
	(0.012)	(0.0008)	(0.013)
FA on cost of labor (Table 2, Column 2, Panel C)	0.49	0.49	0.49
key	(0.01)	(0.002)	(0.01)
FA on cost of labor in 2004 (Table 2, Column 4, Panel C)	0.43	0.43	0.43
	(0.01)	(0.002)	(0.01)
FA on elasticity in 2002 (Table 2, Column 2, Panel C)	-0.16	-0.16	-0.16
	(0.02)	(0.001)	(0.02)
FA on elasticity in 2004 (Table 2, Column 4, Panel C)	-0.23	-0.23	-0.23
	(0.03)	(0.001)	(0.03)

Note: Standard errors in the parentheses. Robust standard errors estimated in Column (1) and bootstrapped standard errors in Column (2) and (3).

FINAL SAMPLE BASED ON IMPUTED FRACTION AFFECTED

The working age population in Hungary is 7.6 million out of which 3.8 million have a job. Of these, around 1 million work in the public sector (public administration, education, healthcare) and 0.7 million are self-employed according to the Hungarian Labor Force Survey. The CIT covers 2.1 million workers who work at around 200,000 firms. Around 1.7 million of these work at the 44,000 firms with at least 5 employees in 2000. When we omit the publicly owned, agricultural and other sectors mentioned above our sample shrinks to 1.3 million workers at 32,000 firms. Our main regression uses firms which existed between 1997 and 2000 and had at least 5 workers on average. The 22,000 firms which satisfy these criteria represent around 1.1 million workers. Finally, the remaining sample restrictions discussed in Section 2.2 lead to our final sample which includes almost 20,000 firms employing 1 million workers.

ANNUAL SURVEY OF INDUSTRIAL PRODUCTION

The Hungarian Annual Survey of Industrial Production (ASIP) is an annual firm-level survey of manufacturing firms and contains product-level information on the total volume and value of production. We calculate firm-level Laspeyres price changes, P_{it}^L, relative to the previous year, formally,

$$P_{it}^L = \frac{\sum_j p_{j,t} s_{j,t-1}}{\sum_j p_{j,t-1} s_{j,t-1}}$$

where j is the product at firm i and $s_{j,t-1}$ the revenue share of the product j from the previous (base) years. This price change can only be calculated for a product j which was present at times t and $t-1$. Therefore, we calculate the revenue share for that subset of goods only and so $\sum_j s_{j,t-1} = 1$.
Then we calculate the price change between 2000 and year t using the the following formula (if $t > 2000$)

$$\triangle P_{it} = \sum_{i=2001}^{t} P_{it}^L$$

and if $t < 2000$

$$\triangle P_{it} = \frac{1}{\sum_{i=t}^{2000} P_{it}^L}$$

This $\triangle P_{it}$ is used in the regressions shown in Table 4.

LABOR FORCE SURVEY (LFS)

The Hungarian LFS is a large household sample survey which provides quarterly information on self-reported employment status. While the sample covers all workers (e.g. self-employed and workers at small firms), there is no wage information in the survey. To relate group-level employment status to minimum wage exposure, therefore, we rely on the SES data.

HUNGARIAN HOUSEHOLD BUDGET SURVEY (HBS)

To assess the distributional consequences of the minimum wage in Section 4 of the Appendix we exploit the Hungarian Household Budget Survey. This dataset contains detailed income and consumption measures of broadly 10,000 households per year.

A6. Institutional Context and Policy Changes

EXPANSION OF HIGHER EDUCATION

Between 1990 and 2001, the number of students in higher education in Hungary increased threefold, from 101,000 to 298,000 (Farkas 2002). Moreover, the Hungarian government introduced a generous student loan system in 2001 that made access to higher education easier (Berlinger 2009). The following graph shows the enrollment rate (into any education institution) and employment to population rate for the 16-19 and for the 20-24 year olds between 1996 and 2004.

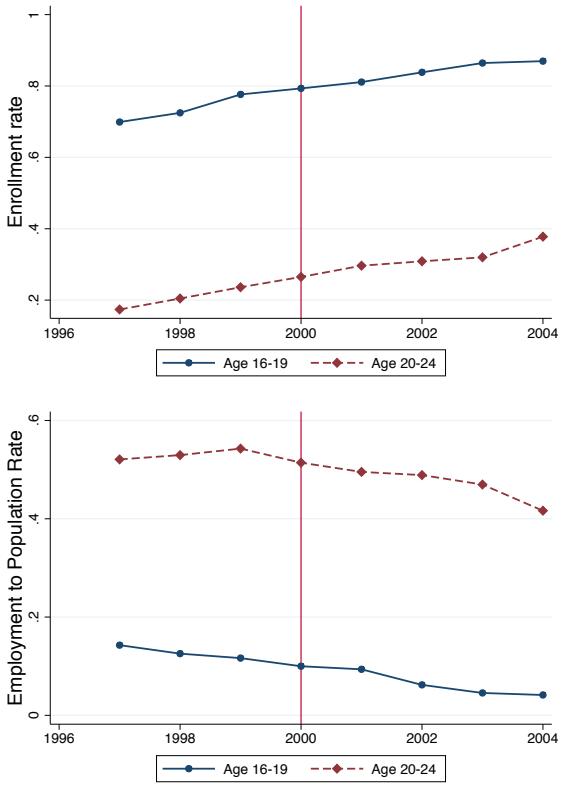


FIGURE A19. ENROLLMENT RATE AND EMPLOYMENT TO POPULATION BETWEEN 1996 AND 2004

Source: Hungarian Labor Force Survey (2nd quarter from each year)

For both age groups there is a clear upward trend in the enrollment rate, while at the same time there is a downward trend in the employment to population rate. Moreover, given that we do not see a break in these trends around the year 2000, schooling decisions are unlikely to have been affected by the minimum wage hike. The presence of strong pre-trends in the employment rate of the younger population highlights the importance of including group specific trends in the grouping estimator in Online Appendix Part A.2.

LARGE INCREASE IN PUBLIC SECTOR WAGES

On September 1, 2002, the newly elected left-wing government executed a sudden and large wage increase in the public sector Telegdy (2018). We exclude the public sector from our analysis and so this change does not have a direct effect on our results. Still, the sudden salary rise in the public sector could potentially influence our estimates indirectly. First, the increase in the purchasing power of the public sector workers could work as a Keynesian stimulus in the economy. However, if the public sector consumption pattern is not tilted towards minimum wage goods our difference-in-difference estimates are not affected by this change. Second, the higher wages in the public sector might push up wages in the private sector as well. Telegdy (2018) estimates that the effect of public sector wage increase had a small effect on private sector wages.

EXEMPTION OF THE MINIMUM WAGE FROM PERSONAL INCOME TAXES IN 2002

In 2002 the newly elected left-wing government decided to exempt the minimum wage from income tax. This policy did not affect the cost of labor, but increased workers' after tax salary. The higher salary might have attracted more workers and increased the number of workers searching for jobs. To test for this, we report the effect of the minimum wage on the inactivity rate in the following table.

The table shows that apart from the estimates in Column (1) which are likely to be contaminated by the expansion of higher education (see the text for details), there is no relationship between the exposure to the minimum wage and the inactivity rate. This suggests that the exemption of the minimum wage in 2002 did not pull many inactive workers to the labor market.

SMALL SUBSIDIES IN 2001 AND 2002

The Hungarian government introduced small compensation schemes in 2001 and 2002 to help firms absorb the massive minimum wage shock. Firms needed to apply for the subsidy and the government decided case by case. The 2001 compensation scheme spent 208 million HUF and reached altogether 1099 firms. The average subsidy per firm was 189 thousand HUF, which covered the cost of less than two minimum wage workers. The 2002 scheme reached more than 4000 firms and the average subsidy per firm was 404 thousand HUF (which covered four minimum wage workers). We obtained firm-level data on the amount of subsidy received in 2002 and we merged it to the corporate income tax data. The following figure shows the relationship between exposure to the minimum wage and the size of the subsidy relative to the total wage bill.

TABLE A14—UNEMPLOYMENT EFFECT OF THE MINIMUM WAGE, GROUPING ESTIMATOR

	(1)	(2)	(3)	(4)	(5)
Panel A: Effect on Inactivity Rate					
After 2000 × FA_g	-0.08**	-0.03	-0.01	-0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
After 2002 × FA_g	-0.08**	-0.01	-0.03	-0.01	-0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
After 2000	0.03	0.03	-0.01	-0.00	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
After 2002	0.01	0.01	-0.01	-0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
FA_g	-0.34	-0.24	-0.40	-0.26	-0.37
	(0.14)	(0.10)	(0.14)	(0.10)	(0.14)
Time FEs	yes	yes	yes	yes	yes
Demographic-Region FEs	yes	yes	yes	yes	yes
Controls	no	yes	no	yes	yes
Demographic-Region time trend	no	no	yes	yes	yes
Age range	16-60	16-60	16-60	16-60	25-55
Epop in 2000	.76	.76	.76	.76	.8
Number of observation	1792	1792	1792	1792	1008

Note: p¡0.01, ** p¡0.05, * p¡0.1. Table shows the group level relationship between group-level exposure to the minimum wage (FA_g) and inactivity rate. Groups are created based on demographics, age, education and the region where the workers live. The coefficient on the variable After 2000 × FA_g estimates the short term effect of the minimum wage, while the After 2002 × FA_g estimates the combination of long-term effect and exemption of the minimum wage from income taxes. The regressions are weighted by the number of observations used in calculating FA_g. Clustered standard errors at the group-level are reported in parentheses.

We draw attention to two features of Figure A20. First, there is a strong relationship between the size of the subsidy and our measure of exposure to the minimum wage. This suggests that the fraction of affected workers indeed captures the "real" exposure to the minimum wage. Second, the amount of subsidy is very low relative to the effect on wages. As we showed in Panel A of Table 3 the effect of the minimum wage on total labor cost was 33 percent in 2002. If we subtract the 4 percent extra subsidy at highly exposed firms, then the wage bill still increases by 29 percent. This highlights that the size of the subsidy was trivial in comparison to the minimum wage shock.

There was no compensation scheme after 2002. Therefore, our medium term estimates are not contaminated by the subsidies.

TAX EVASION

There are two basic forms of tax evasion in our context: (1) not registering employment and (2) registering employment, but under-reporting actual earnings. These two modes of tax evasion would affect our results differently. If an employed person is not registered then neither she nor her employer pays any taxes or social security contribu-

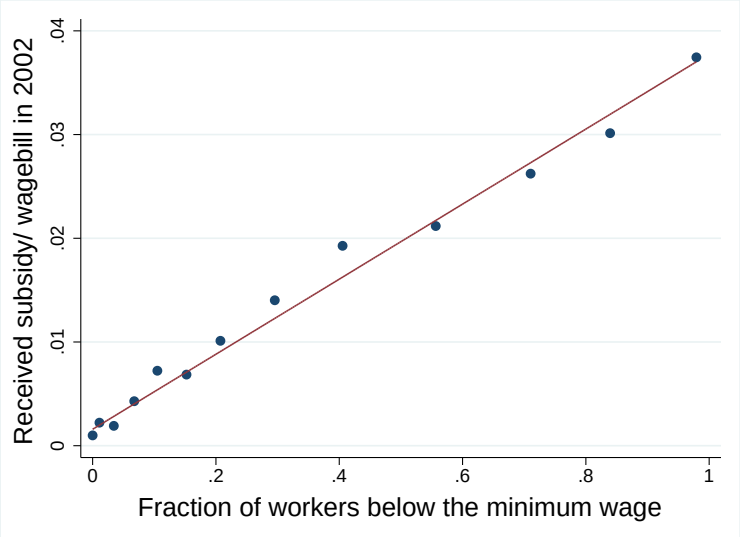


FIGURE A20. THE RELATIONSHIP BETWEEN THE SUBSIDY AND EXPOSURE TO THE MINIMUM WAGE

tions. Such undeclared employment is estimated to be 16-17 percent in Hungary (Elek, Scharle, Szabó, Szabó, 2009). In response to the minimum wage hike, registered workers might be pushed into the informal sector for cost saving purposes. Our firm-level estimates show the effect of the minimum wage on registered employment, but do not take into consideration that some jobs might be created in the informal sector. Therefore, in the presence of unregistered employment, the firm-level estimates overstatethe total employment losses (informal plus formal).

The other form of tax evasion is when a worker is registered, but receives some of her salary "under the table" (Elek, Köllő, Reizer, Szabó, 2011). Firms and workers with under-reported earnings could absorb the minimum wage shock by reporting previously undeclared earnings. While declaring income increases labor costs to some extent, the change in reported wages would overstate the actual wage change. Moreover, this could also explain why the employment responses are relatively small. However, if the main response to the minimum wage is simply reporting, it is not clear why firms would adjust their capital stock or raise their prices. Moreover, under-reporting of wages is usually associated with over-reporting of other cost items either by reporting personal consumption as company cost items, or by securing additional invoices. This over-reporting helps to reduce tax payments on profits (Mosberger, 2016). If our firm-level results were driven by such a behavior then we would expect the minimum wage to have a negative effect on materials (intermediate goods and services). However, material expenses in the data did not decline in response to the minimum wage.

Throughout the paper we use various data sources which are exposed to tax evasion and reporting issues to different extents. For instance, firms in the corporate income tax data have incentives to lie about their key variables. Therefore, to alleviate these concerns,

we exclude the smallest firms (less than 5 employees from the analysis). At the same time, firms and workers have no incentive to lie in the Structure of Earning Survey or in the Labor Force Survey. Finding similar employment responses across different data sources suggests that any effects of tax evasion are likely to have only a limited effect on our results.

Finally, it is worth discussing two recent papers that examine the effect of tax evasion in the minimum wage context in Hungary. Using the Household Budget Survey, Tonin (2011) shows that households who appeared to benefit from the 2001 minimum wage hike actually experienced a drop in their food consumption. Tonin (2011) explains this finding by arguing that the main effect of minimum wage hike was reporting previously undeclared income, which lead to a fall in after-tax income. However, the drop in non-durable consumption might simply reflect a change in the consumption pattern. For instance, if households buy expensive durable goods (e.g. a vehicle) as a result of the upward shift in their income trajectory then food consumption could fall even in the absence of any tax evasion (see Aaronson, Agarwal, French, 2012 for recent evidence on that). Moreover, the sample used by Tonin (2011) is not comparable to our sample. Tonin (2011) uses all workers (including self-employed and those working at micro enterprises) who moved from the old to the new minimum wage. However, in our data (SES) we have very few of those workers as the spike at the minimum wage is small in 2000 (see Figure 7). Therefore, the results reported by Tonin (2011) are unlikely to hold in our sample where we exclude self-employed and micro enterprises.

Another important study is Elek, Köllő, Reizer, Szabó (2011) which identifies cheaters and non-cheaters by estimating a structural double hurdle model using data from 2006. Elek, Köllő, Reizer, Szabó (2011) exploit a policy change that increased incentives to report true wages and show that their structural model performs well in identifying workers with under-reported earnings. Unfortunately, we cannot directly assess the relevance of Elek, Köllő, Reizer, Szabó (2011), since their structural model did not converge in year 2000. The main reason why their model fails in our context is the lack of a (substantive) spike in the 2000 minimum wage distribution (see Figure 7 in the paper). Their model predicts that in the presence of substantial tax evasion a large fraction of workers should earn exactly at the minimum wage. However, in the data we find only a small spike in 2000 (see Figure 7 in the paper).

Our employment results are only affected by tax evasion if cheaters and non-cheaters responded differently to the minimum wage. However, if this was the case, we would expect that the composition of workers at the bottom of the wage distribution would change. The share of high skilled workers (who are more likely to have cheated, conditional on reporting low earnings) would increase. However, we do not find evidence that the composition at the bottom of the wage distribution changed in response to the minimum wage.

A7. Derivations for the "Hicks-Marshall Style" Analysis

We derive here the key empirical moments shown in Section 5. First we derive the output demand elasticity given consumer preferences. Then we show that consumer

preferences imply that firms set a constant mark-up. As a result, the key steps in deriving the Hicks-Marshall rule of derived demand holds. To prove that we follow the steps in Hamermesh (1993).

CONSUMER'S DECISION

We consider a demand function for a market where firms sell differentiated goods. Consumers buy goods produced by this market and they also spend their money on other goods X. The consumers' preferences are determined by the following nested CES function.

$$U = \left(a \left[\left(\int_0^1 q(\omega)^{\frac{\kappa-1}{\kappa}} d\omega \right)^{\frac{\kappa}{\kappa-1}} \right]^{\frac{\theta-1}{\theta}} + (1-a) X^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}}$$

where $q(\omega)$ is the consumption of variety ω, and X is the spending on other goods. Denote $Q = \left(\int_0^1 q(\omega)^{\frac{\kappa-1}{\kappa}} d\omega \right)$. The consumers face the following budget constraint:

$$\int_0^1 p(\omega) q(\omega) d\omega + X = I$$

where I is income and X is chosen as a numeraire.

It is relatively straightforward to derive the demand for variety ω. The consumer's constrained optimization problem can be solved by the Lagrangian

$$\mathcal{L} = \left(a \left[\left(\int_0^1 q(\omega)^{\frac{\kappa-1}{\kappa}} d\omega \right)^{\frac{\kappa}{\kappa-1}} \right]^{\frac{\theta-1}{\theta}} + (1-a) X^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}} - \lambda \left[\int_0^1 p(\omega) q(\omega) d\omega + X - I \right]$$

Take the FOCs:

(A3)

$$\frac{\partial L}{\partial q(\omega)} = \left(a \left(Q^{\frac{\kappa}{\kappa-1}} \right)^{\frac{\theta-1}{\theta}} + (1-a) X^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}-1} a \left(Q^{\frac{\kappa}{\kappa-1}} \right)^{\frac{\theta-1}{\theta}-1} Q^{\frac{\kappa}{\kappa-1}-1} q(w)^{\frac{\kappa-1}{\kappa}-1} - \lambda p(\omega) = 0$$

(A4)

$$\frac{\partial L}{\partial X} = \left(a \left(Q^{\frac{\kappa}{\kappa-1}} \right)^{\frac{\theta-1}{\theta}} + (1-a) X^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}-1} (1-a) X^{\frac{\theta-1}{\theta}-1} - \lambda = 0$$

Taking the ratio of equation A3 for two varieties ω_1 and ω_2 yields relative demand:

$$\frac{q(\omega_1)^{-\frac{1}{\kappa}}}{q(\omega_2)^{-\frac{1}{\kappa}}} = \frac{p(\omega_1)}{p(\omega_2)}$$

which can be rearranged to

$$q(\omega_1) = \left(\frac{p(\omega_1)}{p(\omega_2)}\right)^{-\kappa} q(\omega_2)$$

Multiplying both sides by $p(\omega_1)$ and taking the integral with respect to $p(\omega_1)$:

$$\int_0^1 p(\omega_1)q(\omega_1)d\omega_1 = p(\omega_2)^{\kappa} q(\omega_2) \int_0^1 p(\omega_1)^{1-\kappa} d\omega_1$$

The left-hand side is consumers' total expenditure on all varieties – the consumers' income minus spending on X.

$$q(\omega_2) = (I - X) \frac{p(\omega_2)^{-\kappa}}{\int_0^1 p(\omega_1)^{1-\kappa} d\omega_1} = (I - X)\, P^{\kappa-1} p(\omega_2)^{-\kappa}$$

where we denote $P = \left(\int_0^1 p(\omega_2)^{1-\kappa} d w_2\right)^{\frac{1}{1-\kappa}}$.

Using the optimal $q(\omega_2)$ one can easily express $Q^{\frac{\kappa}{\kappa-1}}$:

$$Q^{\frac{\kappa}{\kappa-1}} = \left(\int_0^1 \left[(I - X) \frac{p(\omega_2)^{-\kappa}}{\int_0^1 p(\omega_1)^{1-\kappa} d\omega_1}\right]^{\frac{\kappa-1}{\kappa}} d\omega_2\right)^{\frac{\kappa}{\kappa-1}} = (I - X) \left(\int_0^1 p(\omega_2)^{1-\kappa}\right)^{-\frac{1}{1-\kappa}}$$

Denote $P = \left(\int_0^1 p(\omega_2)^{1-\kappa} d w_2\right)^{\frac{1}{1-\kappa}}$ the composite price index for the market-level production of Q and then $Q^{\frac{\kappa}{\kappa-1}} = (I - X)\, P^{-1}$.

Now we calculate the optimal X using equation A4 and A3:

$$a \left(Q^{\frac{\kappa}{\kappa-1}}\right)^{\frac{\theta-1}{\theta}-1} Q^{\frac{\kappa}{\kappa-1}-1} q(\omega) = (1 - a) X^{\frac{\theta-1}{\theta}-1} p(\omega)$$

Multiplying both sides by $q(\omega)$ and taking the integral between 0 and 1 leads to the following expression:

$$a \left(Q^{\frac{\kappa}{\kappa-1}}\right)^{\frac{\theta-1}{\theta}} = (1 - a) X^{\frac{\theta-1}{\theta}-1} \int_0^1 p(\omega)q(\omega)d\omega$$

We solve for X by plugging into this expression $Q^{\frac{\kappa}{\kappa-1}} = (I - X)\, P^{-1}$ and using that $\int_0^1 p(\omega)q(\omega)d\omega = I - X$ gives

$$X = \frac{\left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}}{1 + \left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}} I$$

and

$$I - X = \frac{1}{1 + \left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}} I$$

Therefore the firm level demand for good $q(\omega)$ is given by the following expression:

$$q(\omega_2) = I \frac{1}{1 + \left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}} P^{1-\kappa} p(\omega_2)^{-\kappa}$$

Define $h(q(\omega_2)) \equiv \left(I \frac{1}{1+\left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}} P^{\kappa-1} \right)^{\frac{1}{\kappa}} q(\omega_2)^{-\frac{1}{\kappa}}$. This equation also implies

$$\frac{\partial \log p(\omega_2)}{\partial \log q(\omega_2)} = -\frac{1}{\kappa}$$

Define $q(p(\omega_2)) \equiv I \frac{1}{1+\left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}} P^{\kappa-1} p(\omega_2)^{-\kappa}$. This equation implies that the elasticity of demand with respect to its own price change is

$$\frac{\partial \log q(\omega)}{\partial \log p(\omega)} = -\kappa \tag{A5}$$

The percentage demand change in response to a market-level price change:

$$\frac{\partial \log q(\omega)}{\partial \log P} = -1 - \frac{\left(\frac{1-a}{a}\right)^{\theta} (\theta - 1) P^{\theta-1}}{1 + \left(\frac{1-a}{a}\right)^{\theta} P^{\theta-1}} \tag{A6}$$

FIRMS' PROBLEM

Firms producing variety ω maximize the following objective function

$$\text{Max } p(q(\omega), \omega) q(\omega) - C(w, r, p_m, q(\omega))$$

If the production function has constant returns to scale then $C(w, r, p_m, q(\omega)) = c(w, r, p_m) q(\omega)$. The first order condition of this problem is:

$$p_q(\omega) q(\omega) + p(\omega) - c(w, r, p_m) = 0$$

$$\left(\frac{p_q(\omega) q(\omega)}{p(\omega)} + 1 \right) p(\omega) - c(w, r, p_m) = 0$$

In the previous section we derived that $\frac{p_q(\omega) q(\omega)}{p(\omega)} = -\kappa = \mu$ and so

$$p(\omega) = \frac{c(w, r, p_m)}{1+\mu}. \tag{A7}$$

Notice that the optimally set prices only depend on the mark-up, μ, and the input prices (wage, interest rate, price of materials). As long as these variables are constant, the price set by the firms remains the same. This implies that when the minimum wage is raised, the prices for firms without minimum wage workers will remain the same.[44] And, in particular, the price charged by a minimum wage firm producing variety ω is given by

$$p(\omega) = \frac{c(MW, r, p_m)}{1+\mu}.$$

What is the effect of changing the minimum wage on prices charged by minimum wage firms? First we take the logarithm and the derivative with respect to wage MW:

$$\frac{\partial \log p(\omega)}{\partial MW} = \frac{\partial \log c(MW, r, p_m)}{\partial MW} - \frac{\partial \log(1+\mu)}{\partial MW}$$

Given that mark-up $\mu = -\kappa$ is constant, $\frac{\partial \log(1+\mu)}{\partial MW} = 0$ and this expression simplifies to

$$\frac{\partial \log p(\omega)}{\partial MW} = \frac{c_{MW}}{c}$$

using Shephard's lemma ($l = c_w q$) this expression leads to the price equation in Section 6.

$$\frac{\partial \log p(\omega)}{\partial \log MW} = \frac{MW \times l}{cq^l(\omega)} = \frac{MW \times l}{C} \equiv s_L$$

where s_L is the share of labor cost in total cost of minimum wage firms.

Based on this it is relatively straightforward to derive the effect on total revenue (pq):

$$\frac{\partial \log p(\omega)q(\omega)}{\partial \log MW} = \frac{\partial \log p(\omega)q(\omega)}{\partial \log MW} + \frac{\partial \log q(\omega)}{\partial \log p(\omega)} \frac{\partial \log p(\omega)}{\partial \log MW}$$

which leads to equation 4 in the paper:

$$\frac{\partial \log p(\omega)q(\omega)}{\partial \log MW} = s_L - \eta s_L$$

where we denote $\frac{\partial \log q(\omega)}{\partial \log p(\omega)} \equiv -\eta$. As we showed in the previous section, the effect of the price on output depends on the extent to which other prices move as a result of the minimum wage change. If only one firm employs minimum wage workers, then

[44] Remember that we are in a partial equilibrium framework and so we treat the wages of the high-skilled workers, interest rates and the price of materials as fixed. In a general equilibrium framework, these prices can also change and may be affected by the minimum wage. In that case, the all firms may change their prices.

that firm will face demand elasticity $\eta = \kappa$. However, if all firms are using minimum wage workers, every firm raises prices by s_L and so the relevant demand elasticity is determined by equation A6.

Now we turn to deriving the effect of the wage change on the optimal choice of labor for a minimum wage firm producing variety ω. Taking the logarithm of Shephards' lemma ($l = c_w q$) and the derivative with respect to w leads us to the following equation:

$$\frac{\partial \log l(\omega)}{\partial MW} = \frac{c_{ww}}{c_w} + \frac{\partial \log q(\omega)}{\partial MW} \tag{A8}$$

Using that $MW \frac{\partial \log q(\omega)}{\partial MW} = \frac{\partial \log q(\omega)}{\partial \log p(\omega)} \frac{\partial \log p(\omega)}{\partial MW} MW = -\eta s_L$, gives

$$\frac{\partial \log l(\omega)}{\partial \log MW} = MW \frac{c_{ww}}{c_w} - \eta s_L. \tag{A9}$$

Now we express $MW \frac{c_{ww}}{c_w}$ in terms of the Allen partial elasticity of substitution. The Allen partial elasticity between two inputs has the following form by definition:

$$\sigma_{ij} = \frac{CC_{ij}}{C_i C_j} = \frac{cc_{ij}}{c_i c_j}$$

Moreover, the cost function, $qc(w, r, p_m) = wl + rk + p_m m$, and Shephard's lemma imply that

$$c(MW, r, p_m) = MW c_w + r c_r + p_m c_{p_m}$$

Taking the derivative with respect to the wage leads to

$$0 = MW c_{ww} + r c_{rw} + p_m c_{p_m w}$$

which can be rearranged to

$$MW c_{ww} = -\frac{r c_r}{c} \frac{c c_{rw}}{c_w c_r} - \frac{c_{p_m} p_m}{c} \frac{c c_{p_m w}}{c_w c_{p_m}}$$

By Shephard's lemma:

$$MW \frac{c_{ww}}{c_w} = -\frac{r c_r}{c} \frac{c c_{rw}}{c_w c_r} - \frac{c_{p_m} p_m}{c} \frac{c c_{p_m w}}{c_w c_{p_m}}$$

and so using the definition of the Allen Partial elasticity we can express:

$$MW \frac{c_{ww}}{c_w} = -s_K \sigma_{KL} - s_M \sigma_{ML}$$

where $s_l = \frac{rk}{qc} = \frac{rk}{C}$ is the share of labor in total cost in minimum wage firms and $s_m = \frac{mp_m}{qc} = \frac{mp_m}{C}$ is the share of material expenses in total cost in minimum wage firms. Plugging this expression on $MW \frac{c_{ww}}{c_w}$ into equation A9 leads to equation 3 in the paper:

$$\frac{\partial \log l(\omega)}{\partial \log MW} = -s_K \sigma_{KL} - s_M \sigma_{ML} - \eta s_L.$$

Now we show the effect of the wage change on optimal capital choice in minimum wage firms (the derivation for materials follow similar steps). We start from Shephard's lemma ($k = c_r q$) and take the logarithm and the derivative with respect to w.

$$\frac{\partial \log k(\omega)}{\partial M w} = \frac{\partial \log c_r}{\partial MW} + \frac{\partial \log q}{\partial MW}.$$

Using again that $MW \frac{\partial \log q}{\partial MW} = \frac{\partial \log q(\omega)}{\partial \log p(\omega)} \frac{\partial \log p(\omega)}{\partial MW} MW = -\eta s_L$ this equation can be rearranged to

$$\frac{\partial \log k(\omega)}{\partial \log MW} = MW \frac{c_{rw}}{c_r} - \eta s_L.$$

Using that the Allen partial elasticity between capital and labor is $\sigma_{kl} = \frac{c c_{rw}}{c_r c_w}$ this can be rewritten to

$$\frac{\partial \log k(\omega)}{\partial \log MW} = \frac{MW c_w}{c} \frac{c c_{rw}}{c_r c_w} - \eta s_L.$$

and using Shephard's lemma again ($k = c_r q$) we get equation 5 in the paper:

$$\frac{\partial \log k(\omega)}{\partial \log MW} = s_L \sigma_{KL} - \eta s_L.$$

A8. Who Buys the Goods Produced by the Minimum Wage Workers?

We follow MaCurdy (2015) to assess who buys the goods produced by the minimum wage workers. Similarly to MaCurdy (2015) we make three crucial assumptions:

1) consumers do not reduce consumption as prices rise;

2) all increased labor costs are passed onto consumers as higher prices; and

3) low-wage workers remain employed at the same number of hours after the minimum wage increases.

Our results show that these assumptions hold approximately, since we have shown that (1) consumer demand is very inelastic (see Table 6); (2) revenue (see Table 3) and prices (see Table 4) increased in response to the minimum wage; and (3) the disemployment effect of the minimum wage is limited (see Table 2 and Table A10).[45]

Under these assumptions, the effect of the minimum wage on consumers can be assessed in the following steps (see MaCurdy, 2015 for details):

[45] We have not shown the effect on hours here. In the SES data we see hours worked and most people in the data work 40 hours per week. We do not find evidence that group-level exposure to the minimum wage is related to changes in average hours after the reform. This suggests that responses at that margin were likely to be limited.

1) We begin by determining the industries that employ low-wage workers. From the Hungarian Structure of Earning Survey we calculate the share of workers who earn below the 2002 minimum wage in total production, sh_s^{MW}, at the industry-level. To obtain sh_s^{MW} we divide the wage bill of the directly affected workers by the total wage bill in that industry. Then we muliply that measure by 2/3, the share of labor in value added (with the remaining 1/3 of expenses related to capital). The obtained measure estimates the minimum wage content in the industry-level value added.

2) The next step is to translate the value-added exposure to the total exposure by taking the minimum wage content of the intermediate goods into consideration. Using Hungarian Input-Output tables from 2000 (Timmer et al 2015), we construct matrix B, where the (i,j) element represents the share of commodity j produced by industry i, and matrix U, where the (i,j) element represents the proportion of commodity i's output used by industry j. Then we calculate the total exposure as $(I - BU)^{-1} B \cdot sh_s^{MW}$. Table A15 shows the share of affected workers in production, the direct exposure to the minimum wage $B \cdot sh_s^{MW}$, and the total exposure to the minimum wage.

3) We take the Household Budget Survey and match each product to a particular industry. Then, for each individual, we calculate spending on goods produced in each industry. The minimum wage content of total consumption measures the spending weighted total exposure for each individual. Figure 5 shows the non-parametric relationship between household income and the minimum wage content of the consumption bundle. The figure highlights that poorer households spend slightly more of their income on goods produced by minimum wage workers than richer households.

It is worth highlighting that MaCurdy (2015) in Step 2 also takes into account that some of the final goods are used for producing capital and not spent on final consumption. As a result, capital also has some minimum wage content and so the cost of capital might also be affected by the minimum wage. To address the effect of this channel he uses detailed capital flow tables. Unfortunately, no comparable table exists for Hungary and so we had to skip that step.

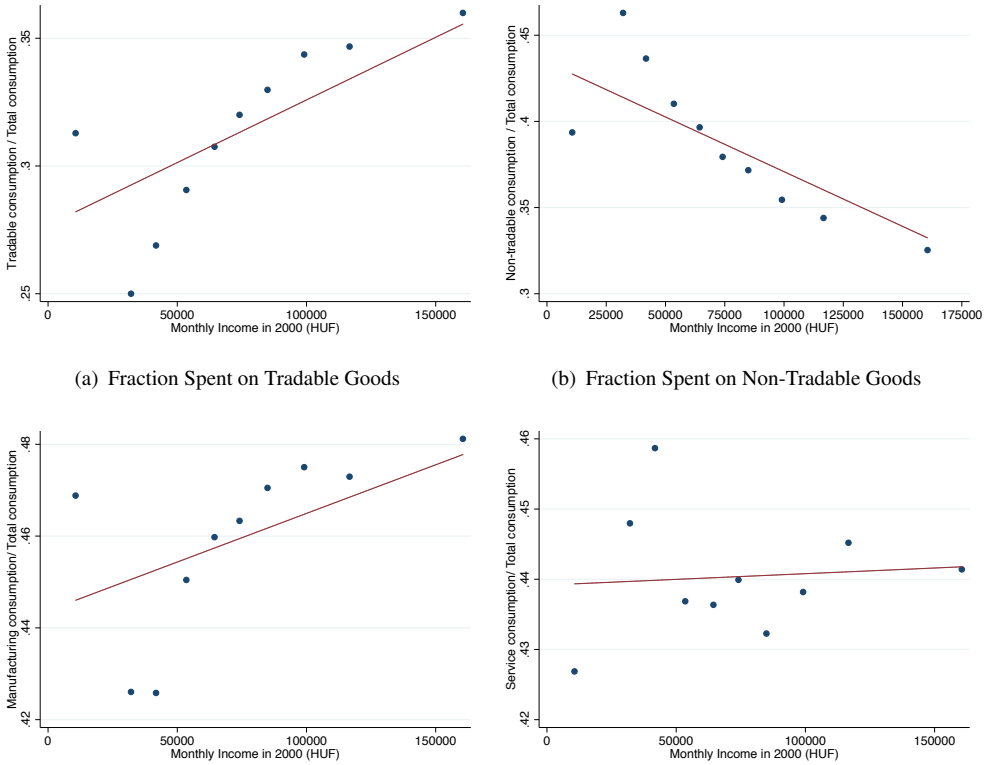
MaCurdy's (2015) procedure assumes that the effect of the minimum wage on consumer prices is the same across all sectors. However, it is possible that the firm-level price changes in the tradable sector affect consumers less than the firm-level price changes in the non-tradable sectors. This might be because in the tradable sectors consumers can substitute easily the goods hit by the minimum wage hike to cheaper ones that were not hit by the minimum wage (e.g. by importing goods from other countries). To explore the potential effect of this on our results, first we examine whether spending on tradable and non-tradable goods are related to household income. Figure A21 highlights that poor households spend larger fraction of their income on non-tradable goods and so they might be more exposed to the output prices changes.

TABLE A15—EFFECT ON FIRM-LEVEL OUTCOMES BY SECTORS

		Fraction Affected	Direct Exposure	Total Exposure
AtB	Agriculture, Hunting, Forestry and Fishing	0.102	0.031	0.061
C	Mining and Quarrying	0.016	0.015	0.029
15t16	Food, Beverages and Tobacco	0.049	0.050	0.088
17t18	Textiles and Textile Products	0.147	0.028	0.043
19	Leather, Leather and Footwear	0.129	0.026	0.036
20	Wood and Products of Wood and Cork	0.154	0.038	0.054
21t22	Pulp, Paper, Paper , Printing and Publishing	0.051	0.025	0.045
23	Coke, Refined Petroleum and Nuclear Fuel	0.000	0.010	0.025
24	Chemicals and Chemical Products	0.006	0.015	0.033
25	Rubber and Plastics	0.036	0.016	0.030
26	Other Non-Metallic Mineral	0.030	0.017	0.029
27t28	Basic Metals and Fabricated Metal	0.034	0.017	0.034
29	Machinery, Nec	0.020	0.016	0.030
30t33	Electrical and Optical Equipment	0.017	0.010	0.020
34t35	Transport Equipment	0.011	0.011	0.020
36t37	Manufacturing, Nec; Recycling	0.120	0.028	0.044
E	Electricity, Gas and Water Supply	0.003	0.009	0.024
F	Construction	0.120	0.019	0.033
50	Sale, Maintenance and Repair of Motor Vehicles and Motorcycle	0.125	0.020	0.038
51	Wholesale Trade and Commission Trade, Except of Motor Vehicle	0.062	0.026	0.048
52	Retail Trade, Except of Motor Vehicles and Motorcycles	0.140	0.021	0.040
H	Hotels and Restaurants	0.153	0.029	0.047
60	Inland Transport	0.028	0.012	0.030
61	Water Transport	0.033	0.017	0.023
62	Air Transport	0.001	0.033	0.040
63	Other Supporting and Auxiliary Transport Activities	0.048	0.021	0.037
64	Post and Telecommunications	0.005	0.013	0.034
J	Financial Intermediation	0.007	0.013	0.036
70	Real Estate Activities	0.058	0.011	0.031
71t74	Renting of M&Eq and Other Business Activities	0.067	0.016	0.038
75+	Public Sector	0.070	0.013	0.036
	Imports	0.000	0.000	0.000

What is the effect of these differences in spending patterns on the minimum wage content of consumption? To evaluate the extent to they affect our estimates, we calculate the minimum wage content of consumption by assuming that the effective price increase in the tradable sector is zero as consumers simply replace the more expensive minimum wage producers with producers which are not hit by the minimum wage. The key findings summarized in Figure A22. The figure shows the minimum wage content of consumption under the benchmark assumption (shown in Figure 5 in the main text) and under the assumption that the price increase in the tradable sector does not affect the final consumers (red dots). Under the alternative price passthrough assumption, the minimum wage content of consumption falls as we expect and the relationship between household income and minimum wage content become slightly steeper. Nevertheless,

the overall picture about the relationship between household income and the minimum wage content remains very similar.



(a) Fraction Spent on Tradable Goods

(b) Fraction Spent on Non-Tradable Goods

(c) Fraction Spent on Manufacturing

(d) Fraction Spent on Services

FIGURE A21. RELATIONSHIP BETWEEN HOUSEHOLD INCOME AND SPENDING ON TRADABLE GOODS, ON NON-TRADABLE GOODS, ON SERVICES AND ON MANUFACTURING

Note: This figure shows the relationship between household income and spending on tradable goods (panel a), on non-tradable goods (panel b), on manufacturing (panel c) and on services (panel d).

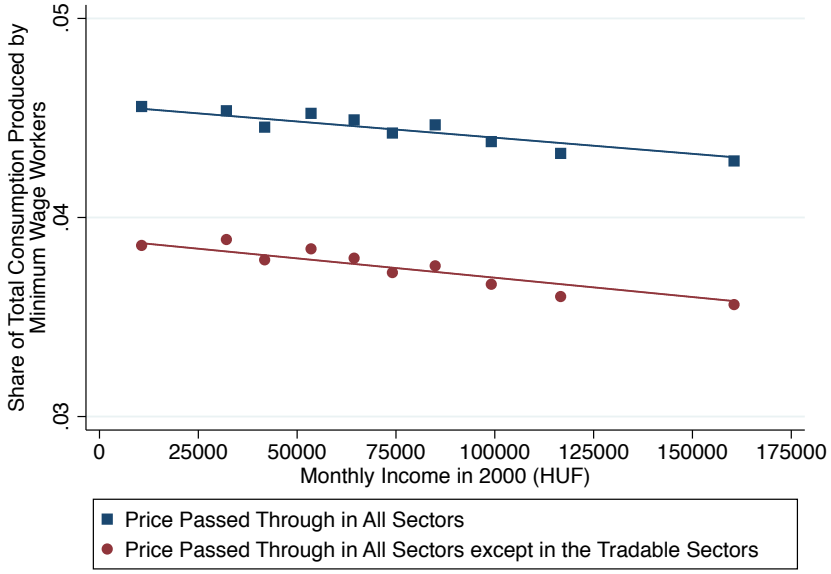


FIGURE A22. RELATIONSHIP BETWEEN HOUSEHOLD INCOME AND THE MINIMUM WAGE CONTENT OF CONSUMPTION UNDER ALTERNATIVE PRICE PASS-THROUGH ASSUMPTIONS

Note:
This figure shows the relationship between minimum wage content of consumption and household income under alternative price pass-through assumptions. The blue squares show the share of consumption produced by minimum wage workers for each household decile under the benchmark assumption (shown in Figure 5 in the main text). In the benchmark case we assume that the price increase has the same effect on consumers in all sectors (service, manufacturing, tradable and non-tradable). The red dots show the share of consumption produced by minimum wage workers for each household decile under the assumption that the price change in the tradable sector has no effect on final consumers. This latter assumption is motivated by our finding that in the non-tradable sectors consumers are more responsive to the firm-level price changes, which suggests that in those sectors it is easier to substitute away from producers by minimum wage workers to producers which are not hit by the minimum wage (e.g. imported goods). We calculate the minimum wage content of consumption following MaCurdy (2015), see Section A.8 in the Online Appendix for the details.

A9. Classification of sectors and main characteristics

This table lists the four digit sectors used in our analysis. The sector classification is TEAOR 98 which is the Hungarian equivalent of NACE rev 1 used by the Central Statistical Office in Hungary. We follow the classification procedure by Mian and Sufi (2014) and classify tradability as follows. Tradable sectors are where the import-to-sales or export-to-sales ratio is higher than 10 percent. We classify sectors as non-tradable if ratios are both below 10 percent and Geographical Herfindahl (Geo. Herf.) index is below median (0.17). The retail (5200-5299) and catering (5530-5999) sectors are also classified as non-tradable. We classify TEAOR codes 4500-4599 as construction and remaining sectors are classified as others. Additional statistics in the table show average employment in the sector for firms with more than 5 employees and the fraction of employment affected by the minimum wage increase. The geographical Herfindahl calculates the (NUTS 3) regional concentration of industries.

Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
1511	Production and preserving of meat	Non-tradable	14801	26.7	9.2
1512	Production and preserving of poultry-meat	Tradeable	15332	23.6	15.8
1513	Production of meat and poultry-meat products	Tradeable	5795	26.2	19.9
1520	Processing and preserving of fish and fish products	Tradeable	198	78.4	42.9
1531	Processing and preserving of potatoes	Other	478	13.0	85.8
1532	Manufacture of fruit and vegetable juice	Tradeable	1818	30.0	24.6
1533	Processing and preserving of fruit and vegetables n.e.c.	Tradeable	10084	31.7	13.8
1541	Manufacture of crude oils and fats	Non-tradeable	89	78.3	14.0
1542	Manufacture of refined oils and fats	Other	721	3.0	95.7
1551	Operation of dairies and cheese making	Non-tradeable	8338	17.4	14.4
1561	Manufacture of grain mill products	Non-tradeable	6592	21.5	11.4
1571	Manufacture of prepared feeds for farm animals	Non-tradeable	4569	19.2	10.6
1572	Manufacture of prepared pet foods	Other	617	15.5	80.5
1581	Manufacture of bread; manufacture of fresh pastry goods and cakes	Non-tradeable	18909	60.4	8.7
1582	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes	Other	2311	26.2	25.3
1583	Manufacture of sugar	Other	1891	0.4	22.7
1584	Manufacture of cocoa; chocolate and sugar confectionery	Other	4388	26.0	60.9
1585	Manufacture of macaroni, noodles, couscous and similar farinaceous products	Other	1139	47.2	42.1
1586	Processing of tea and coffee	Other	1540	13.7	54.3
1587	Manufacture of condiments and seasonings	Tradeable	1216	15.6	38.1
1589	Manufacture of other food products n.e.c.	Tradeable	1460	45.3	24.7
1591	Manufacture of distilled potable alcoholic beverages	Other	1665	30.2	34.4
1593	Manufacture of wines	Tradeable	4372	36.0	20.9
1596	Manufacture of beer	Other	3541	7.7	25.9
1598	Production of mineral waters and soft drinks	Other	4903	15.9	37.2
1711	Preparation and spinning of cotton-type fibers	Non-tradeable	2111	46.4	15.9
1712	Preparation and spinning of woollen-type fibres	Other	248	31.0	46.1
1713	Preparation and spinning of worsted-type fibres	Other	480	52.3	48.4
1721	Cotton-type weaving	Other	3192	30.9	35.4

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
1725	Other textile weaving	Other	374	63.7	35.2
1730	Finishing of textiles	Other	1128	67.7	37.8
1740	Manufacture of made-up textile articles, except apparel	Tradeable	12801	65.0	29.5
1751	Manufacture of carpets and rugs	Tradeable	712	48.6	48.0
1753	Manufacture of non-wovens and articles made from non-wovens, except apparel	Tradeable	531	17.0	28.3
1754	Manufacture of other textiles n.e.c.	Tradeable	3660	37.9	34.7
1760	Manufacture of knitted and crocheted fabrics	Tradeable	1358	45.6	24.5
1771	Manufacture of knitted and crocheted hosiery	Other	886	58.8	15.4
1772	Manufacture of knitted and crocheted pullovers, cardigans and similar articles	Tradeable	2911	71.7	19.7
1810	Manufacture of leather clothes	Tradeable	1708	64.4	32.0
1821	Manufacture of workwear	Tradeable	4871	71.6	15.5
1822	Manufacture of other outerwear	Tradeable	42719	61.4	15.2
1823	Manufacture of underwear	Tradeable	14125	39.0	15.3
1824	Manufacture of other wearing apparel and accessories n.e.c.	Tradeable	4007	65.9	17.9
1830	Dressing and dyeing of fur; manufacture of articles of fur	Tradeable	121	63.4	40.6
1910	Tanning and dressing of leather	Tradeable	649	37.3	31.5
1920	Manufacture of luggage, handbags and the like, saddlery and harness	Tradeable	3526	48.2	17.1
1930	Manufacture of footwear	Tradeable	17887	51.9	14.2
2010	Sawmilling and planing of wood; impregnation of wood	Tradeable	5624	61.6	8.1
2020	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards	Tradeable	2293	18.1	23.4
2030	Manufacture of builders' carpentry and joinery	Tradeable	8048	55.4	15.1
2040	Manufacture of wooden containers	Tradeable	2450	71.3	11.4
2051	Manufacture of other products of wood	Tradeable	3166	72.3	10.2
2052	Manufacture of articles of cork, straw and plaiting materials	Tradeable	278	59.2	26.9
2112	Manufacture of paper and paperboard	Tradeable	1516	12.1	59.2
2121	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	Tradeable	4966	26.7	41.3
2122	Manufacture of household and sanitary goods and of toilet requisites	Other	1310	8.8	76.3
2123	Manufacture of paper stationery	Tradeable	844	17.8	44.6
2125	Manufacture of other articles of paper and paperboard n.e.c.	Tradeable	1235	25.4	15.6
2211	Publishing of books	Tradeable	2426	25.0	51.1
2212	Publishing of newspapers	Other	3645	10.1	53.7
2213	Publishing of journals and periodicals	Other	1535	27.6	61.7
2214	Publishing of sound recordings	Tradeable	194	17.5	94.9
2215	Other publishing	Tradeable	536	53.0	40.6
2221	Printing of newspapers	Other	1664	29.8	38.3
2222	Printing n.e.c.	Tradeable	9483	35.7	41.2
2223	Bookbinding	Other	1762	81.6	18.4
2224	Pre-press activities	Other	340	41.1	27.4
2225	Ancillary activities related to printing	Other	3123	55.5	38.2

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
2232	Reproduction of video recording	Tradeable	126	21.3	82.9
2233	Reproduction of computer media	Tradeable	127	37.9	54.0
2411	Manufacture of industrial gases	Other	1171	0.0	49.3
2412	Manufacture of dyes and pigments	Tradeable	204	10.6	33.1
2413	Manufacture of other inorganic basic chemicals	Tradeable	1058	9.7	34.8
2414	Manufacture of other organic basic chemicals	Tradeable	2275	11.7	33.3
2415	Manufacture of fertilizers and nitrogen compounds	Other	1891	3.4	54.5
2416	Manufacture of plastics in primary forms	Tradeable	6368	4.5	74.5
2420	Manufacture of pesticides and other agro-chemical products	Tradeable	651	9.2	56.8
2430	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	Tradeable	1773	15.6	46.7
2441	Manufacture of basic pharmaceutical products	Tradeable	578	11.4	59.6
2442	Manufacture of pharmaceutical preparations	Tradeable	13955	1.3	50.8
2451	Manufacture of soap and detergents, cleaning and polishing preparations	Other	1933	17.4	86.5
2452	Manufacture of perfumes and toilet preparations	Tradeable	1040	22.4	40.1
2461	Manufacture of explosives	Other	267	22.2	48.8
2463	Manufacture of essential oils	Tradeable	102	7.9	83.7
2466	Manufacture of other chemical products n.e.c.	Tradeable	1048	22.5	31.1
2511	Manufacture of rubber tyres and tubes	Tradeable	3042	3.3	37.6
2512	Retreading and rebuilding of rubber tyres	Non-tradeable	120	62.6	14.8
2513	Manufacture of other rubber products	Tradeable	4355	29.3	19.1
2521	Manufacture of plastic plates, sheets, tubes and profiles	Tradeable	5632	19.9	13.7
2522	Manufacture of plastic packing goods	Tradeable	6520	31.3	11.4
2523	Manufacture of builders' ware of plastic	Tradeable	1986	36.1	19.8
2524	Manufacture of other plastic products	Tradeable	11758	31.6	10.6
2612	Shaping and processing of flat glass	Tradeable	1270	35.1	23.4
2613	Manufacture of hollow glass	Tradeable	4723	30.6	20.9
2615	Manufacture and processing of other glass, including technical glassware	Tradeable	764	33.2	27.2
2621	Manufacture of ceramic household and ornamental articles	Tradeable	4136	22.6	36.2
2625	Manufacture of other ceramic products	Other	227	70.0	64.6
2626	Manufacture of refractory ceramic products	Tradeable	640	7.8	28.1
2630	Manufacture of ceramic tiles and flags	Tradeable	1408	18.9	63.5
2640	Manufacture of bricks, tiles and construction products, in baked clay	Non-tradeable	3526	33.1	29.0
2652	Manufacture of lime	Other	210	37.9	25.3
2661	Manufacture of concrete products for construction purposes	Non-tradeable	3795	23.1	11.7
2663	Manufacture of ready-mixed concrete	Non-tradeable	983	28.7	20.7
2664	Manufacture of mortars	Other	444	2.0	38.5
2665	Manufacture of fibre cement	Other	379	3.5	39.4
2666	Manufacture of other articles of concrete, plaster and cement	Non-tradeable	443	60.7	16.0
2670	Cutting, shaping and finishing of ornamental and building stone	Other	678	67.2	27.9
2681	Production of abrasive products	Tradeable	287	1.8	72.6
2682	Manufacture of other non-metallic mineral products n.e.c.	Tradeable	2228	4.8	28.2

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
2710	Manufacture of basic iron and steel and of ferro-alloys	Tradeable	6200	4.8	64.9
2722	Manufacture of steel tubes	Tradeable	543	12.4	54.3
2731	Cold drawing	Tradeable	547	19.2	58.9
2735	Wire Drawing	Tradeable	262	11.3	45.3
2742	Aluminum production	Tradeable	4379	31.2	61.7
2751	Casting of iron	Non-tradeable	1757	22.2	28.9
2752	Casting of steel	Non-tradeable	830	23.6	18.9
2753	Casting of light metals	Other	2130	19.8	33.7
2811	Manufacture of metal structures and parts of structures	Tradeable	22070	37.1	8.8
2812	Manufacture of builders' carpentry and joinery of metal	Non-tradeable	1571	38.9	19.8
2821	Manufacture of tanks, reservoirs and containers of metal	Tradeable	1959	23.6	11.5
2822	Manufacture of central heating radiators and boilers	Other	2710	16.9	28.4
2830	Manufacture of steam generators, except central heating hot water boilers	Other	1162	11.1	28.1
2840	Forging, pressing, stamping and roll forming of metal; powder metallurgy	Non-tradeable	1343	19.2	17.4
2851	Treatment and coating of metals	Non-tradeable	2913	41.4	11.6
2852	General mechanical engineering	Non-tradeable	8181	42.9	10.9
2861	Manufacture of cutlery	Tradeable	173	30.9	48.6
2862	Manufacture of tools	Tradeable	3678	24.7	15.3
2863	Manufacture of locks and hinges	Tradeable	1810	21.9	56.8
2871	Manufacture of steel drums and similar containers	Non-tradeable	862	32.2	17.1
2872	Manufacture of light metal packaging	Other	2128	12.9	28.4
2873	Manufacture of wire products	Tradeable	1351	25.6	29.4
2874	Manufacture of fasteners, screw machine products, chain and springs	Tradeable	1146	44.1	15.9
2875	Manufacture of other fabricated metal products n.e.c.	Tradeable	6054	34.0	15.2
2911	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	Other	1179	41.6	19.1
2912	Manufacture of pumps and compressors	Tradeable	2844	17.6	17.8
2913	Manufacture of taps and valves	Tradeable	2423	14.2	26.2
2914	Manufacture of bearings, gears, gearing and driving elements	Tradeable	2419	16.7	34.6
2921	Manufacture of furnaces and furnace burners	Other	254	37.3	34.7
2922	Manufacture of lifting and handling equipment	Tradeable	3087	28.1	15.1
2923	Manufacture of non-domestic cooling and ventilation equipment	Tradeable	4360	22.1	18.3
2924	Manufacture of other general purpose machinery n.e.c.	Tradeable	8352	22.3	21.2
2932	Manufacture of other agricultural and forestry machinery	Tradeable	7257	21.3	12.6
2940	Manufacture of machine tools	Tradeable	2845	17.5	12.0
2951	Manufacture of machinery for metallurgy	Other	1078	4.9	60.9
2952	Manufacture of machinery for mining, quarrying and construction	Tradeable	4323	9.1	16.4
2953	Manufacture of machinery for food, beverage and tobacco processing	Tradeable	2280	29.0	15.9

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
2954	Manufacture of machinery for textile, apparel and leather production	Tradeable	741	18.8	23.4
2955	Manufacture of machinery for paper and paperboard production	Tradeable	295	25.4	52.6
2956	Manufacture of other special purpose machinery n.e.c.	Tradeable	4679	18.7	23.9
2971	Manufacture of electric domestic appliances	Tradeable	8078	17.2	62.9
2972	Manufacture of non-electric domestic appliances	Other	2343	20.4	22.1
3001	Manufacture of office machinery	Other	627	22.8	28.3
3002	Manufacture of computers and other information processing equipment	Tradeable	10941	18.3	82.8
3110	Manufacture of electric motors, generators and transformers	Tradeable	7490	17.8	31.8
3120	Manufacture of electricity distribution and control apparatus	Tradeable	9852	15.2	34.7
3130	Manufacture of insulated wire and cable	Tradeable	7323	22.8	51.5
3140	Manufacture of accumulators, primary cells and primary batteries	Tradeable	764	21.8	36.2
3150	Manufacture of lighting equipment and electric lamps	Tradeable	21059	18.2	61.8
3161	Manufacture of electrical equipment for engines and vehicles n.e.c.	Tradeable	17177	13.8	20.0
3162	Manufacture of other electrical equipment n.e.c.	Tradeable	9657	72.8	70.1
3210	Manufacture of electronic valves and tubes and other electronic components	Tradeable	22690	22.7	15.0
3220	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	Tradeable	5142	21.5	68.1
3230	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods	Tradeable	14721	12.1	29.4
3310	Manufacture of medical and surgical equipment and orthopaedic appliances	Tradeable	5346	27.6	41.2
3320	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment	Tradeable	5351	15.7	21.0
3330	Manufacture of industrial process control equipment	Other	1375	13.9	39.0
3340	Manufacture of optical instruments and photographic equipment	Tradeable	2156	23.1	41.5
3350	Manufacture of watches and clocks	Tradeable	40	56.9	40.1
3410	Manufacture of motor vehicles	Tradeable	8530	0.9	57.4
3420	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	Tradeable	2259	12.6	39.8
3430	Manufacture of parts and accessories for motor vehicles and their engines	Tradeable	22439	10.0	16.4
3511	Building and repairing of ships	Non-tradeable	217	51.4	16.6
3512	Building and repairing of pleasure and sporting boats	Tradeable	118	62.2	31.0
3520	Manufacture of railway and tramway locomotives and rolling stock	Tradeable	4873	8.9	22.3
3530	Manufacture of aircraft and spacecraft	Other	1301	5.7	71.2
3542	Manufacture of bicycles	Other	621	50.4	44.4
3611	Manufacture of chairs and seats	Tradeable	6428	41.0	10.3

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
3612	Manufacture of other office and shop furniture	Tradeable	1908	55.6	14.6
3613	Manufacture of other kitchen furniture	Non-tradeable	1440	42.1	21.3
3614	Manufacture of other furniture	Tradeable	7007	60.0	10.5
3622	Manufacture of jewellery and related articles n.e.c.	Other	707	56.3	58.7
3630	Manufacture of musical instruments	Tradeable	176	41.6	26.1
3640	Manufacture of sports goods	Tradeable	578	53.3	44.0
3650	Manufacture of games and toys	Tradeable	2055	73.0	29.1
3662	Manufacture of brooms and brushes	Tradeable	1870	77.0	23.6
3663	Other manufacturing n.e.c.	Tradeable	2495	32.6	26.9
3710	Recycling of metal waste and scrap	Non-tradeable	1249	29.5	30.0
3720	Recycling of non-metal waste and scrap	Other	324	55.5	61.0
4511	Demolition and wrecking of buildings; earth moving	Construction	4227	58.9	16.3
4512	Test drilling and boring	Construction	189	72.4	18.5
4521	General construction of buildings and civil engineering works	Construction	59911	46.3	22.5
4522	Erection of roof covering and frames	Construction	5075	67.7	30.1
4523	Construction of motorways, roads, airfields and sport facilities	Construction	7197	26.4	46.7
4524	Construction of water projects	Construction	1610	32.0	11.2
4525	Other construction work involving special trades	Construction	12028	48.0	29.9
4531	Installation of electrical wiring and fittings	Construction	9031	43.9	22.1
4532	Insulation work activities	Construction	1614	58.2	22.4
4533	Plumbing	Construction	8506	51.1	23.4
4534	Other building installation	Construction	6153	44.1	29.7
4541	Plastering	Construction	437	76.9	18.5
4542	Joinery installation	Construction	819	64.2	24.5
4543	Floor and wall covering	Construction	1296	63.6	22.0
4544	Painting and glazing	Construction	2154	70.7	14.6
4545	Other building completion	Construction	2888	59.2	40.7
4550	Renting of construction or demolition equipment with operator	Construction	561	16.9	63.4
5010	Sale of motor vehicles	Non-tradeable	22146	46.3	27.2
5020	Maintenance and repair of motor vehicles	Other	8274	58.2	21.6
5030	Sale of motor vehicle parts and accessories	Non-tradeable	6257	50.3	23.5
5040	Sale, maintenance and repair of motorcycles and related parts and accessories	Non-tradeable	310	64.5	25.4
5050	Retail sale of automotive fuel	Non-tradeable	5368	68.6	35.3
5111	Agents involved in the sale of agricultural raw materials, live animals, textile raw materials and semi-finished goods	Non-tradeable	1249	55.9	13.9
5112	Agents involved in the sale of fuels, ores, metals and industrial chemicals	Other	577	29.6	50.2
5113	Agents involved in the sale of timber and building materials	Non-tradeable	664	57.2	20.4
5114	Agents involved in the sale of machinery, industrial equipment, ships and aircraft	Other	759	24.2	39.6
5115	Agents involved in the sale of furniture, household goods, hardware and ironmongery	Other	375	66.9	28.2
5116	Agents involved in the sale of textiles, clothing, footwear and leather goods	Other	735	63.5	46.3
5117	Agents involved in the sale of food, beverages and tobacco	Non-tradeable	935	60.0	12.3

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
5118	Agents specialising in the sale of particular products or ranges of products n.e.c.	Other	912	37.2	51.1
5119	Agents involved in the sale of a variety of goods	Other	4318	35.5	49.8
5121	Wholesale of grain, seeds and animal feeds	Non-tradeable	3523	36.5	23.3
5122	Wholesale of flowers and plants	Non-tradeable	551	84.8	15.7
5123	Wholesale of live animals	Non-tradeable	404	65.5	9.5
5124	Wholesale of hides, skins and leather	Other	39	62.8	14.0
5131	Wholesale of fruit and vegetables	Non-tradeable	2942	48.5	26.1
5132	Wholesale of meat and meat products	Non-tradeable	1990	48.7	14.8
5133	Wholesale of dairy produce, eggs and edible oils and fats	Other	1530	38.0	27.0
5134	Wholesale of alcoholic and other beverages	Non-tradeable	2675	62.3	12.0
5136	Wholesale of sugar and chocolate and sugar confectionery	Non-tradeable	733	58.7	15.4
5137	Wholesale of coffee, tea, cocoa and spices	Other	800	27.6	47.2
5138	Wholesale of other food, including fish, crustaceans and molluscs	Other	5674	32.4	27.5
5141	Wholesale of textiles	Other	2433	70.3	32.0
5142	Wholesale of clothing and footwear	Other	5338	73.4	52.6
5143	Wholesale of electrical household appliances and radio and television goods	Other	2387	41.8	39.7
5144	Wholesale of china and glassware, wallpaper and cleaning materials	Non-tradeable	520	55.4	18.5
5145	Wholesale of perfume and cosmetics	Other	1709	16.4	56.9
5147	Wholesale of other household goods	Other	6110	45.9	31.7
5151	Wholesale of solid, liquid and gaseous fuels and related products	Non-tradeable	622	36.4	90.0
5152	Wholesale of metals and metal ores	Other	1057	24.3	43.0
5153	Wholesale of wood, construction materials and sanitary equipment	Non-tradeable	5817	47.9	19.8
5154	Wholesale of hardware, plumbing and heating equipment and supplies	Other	3993	27.3	22.5
5155	Wholesale of chemical products	Non-tradeable	2982	27.1	24.7
5156	Wholesale of other intermediate products	Other	558	15.4	40.6
5157	Wholesale of waste and scrap	Non-tradeable	1615	48.3	22.1
5161	Wholesale of machine tools	Non-tradeable	532	31.8	15.6
5162	Wholesale of mining, construction and civil engineering machinery	Other	494	20.7	42.3
5163	Wholesale of machinery for the textile industry and of sewing and knitting machines	Other	151	64.3	38.9
5164	Wholesale of computers, computer peripheral equipment and software	Other	2544	23.4	54.9
5165	Wholesale of other machinery for use in industry, trade and navigation	Other	1862	27.2	43.6
5166	Wholesale of agricultural machinery and accessories and implements, including tractors	Other	2209	8.3	25.3
5170	Other wholesale	Other	22898	33.0	53.1
5211	Retail sale in non-specialised stores with food, beverages or tobacco predominating	Non-tradeable	59240	46.5	21.8
5212	Other retail sale in non-specialised stores	Non-tradeable	16093	38.3	27.6
5221	Retail sale of fruit and vegetables	Non-tradeable	610	81.8	32.5
5222	Retail sale of meat and meat products	Non-tradeable	1195	80.6	10.7

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
5224	Retail sale of bread, cakes, flour confectionery and sugar confectionery	Non-tradeable	653	86.3	20.2
5225	Retail sale of alcoholic and other beverages	Non-tradeable	356	48.2	33.8
5227	Other retail sale of food, beverages and tobacco in specialised stores	Non-tradeable	2425	78.1	22.5
5233	Retail sale of cosmetic and toilet articles	Non-tradeable	1929	28.2	49.1
5241	Retail sale of textiles	Non-tradeable	1513	71.9	25.3
5242	Retail sale of clothing	Non-tradeable	8974	76.0	26.4
5243	Retail sale of footwear and leather goods	Non-tradeable	1618	56.6	43.8
5244	Retail sale of furniture, lighting equipment and household articles n.e.c.	Non-tradeable	3902	55.4	35.2
5245	Retail sale of electrical household appliances and radio and television goods	Non-tradeable	4258	52.2	22.7
5246	Retail sale of hardware, paints and glass	Non-tradeable	6804	62.3	10.2
5247	Retail sale of books, newspapers and stationery	Non-tradeable	4226	35.6	23.4
5248	Other retail sale in specialised stores	Non-tradeable	12041	61.6	28.2
5250	Retail sale of second-hand goods in stores	Non-tradeable	1765	45.0	54.9
5261	Retail sale via mail order houses	Non-tradeable	553	7.2	89.8
5262	Retail sale via stalls and markets	Non-tradeable	369	70.9	49.1
5263	Other non-store retail sale	Non-tradeable	1193	55.1	32.9
5271	Repair of boots, shoes and other articles of leather	Non-tradeable	697	84.6	43.2
5272	Repair of electrical household goods	Non-tradeable	1658	78.3	14.1
5273	Repair of watches, clocks and jewellery	Non-tradeable	206	66.8	38.2
5274	Repair n.e.c.	Non-tradeable	1155	55.7	32.3
5511	Hotels with restaurants	Other	18533	26.4	55.9
5512	Hotels without restaurants	Other	1064	55.7	34.4
5521	Youth hostels and mountain refuges	Other	164	93.8	24.4
5522	Camping sites, including caravan sites	Other	628	36.7	61.4
5523	Other provision of lodgings n.e.c.	Non-tradeable	1016	43.8	12.7
5530	Restaurants	Non-tradeable	23016	75.7	27.5
5540	Bars	Non-tradeable	2546	89.9	19.8
5551	Canteens	Non-tradeable	5104	60.7	35.6
5552	Catering	Non-tradeable	2028	61.9	44.3
6010	Transport via railways	Other	57001	12.4	80.0
6021	Other scheduled passenger land transport	Other	41953	8.0	19.4
6022	Taxi operation	Other	650	67.5	41.2
6023	Other land passenger transport	Non-tradeable	1113	37.0	16.8
6024	Freight transport by road	Non-tradeable	26293	35.2	15.4
6311	Cargo handling	Other	658	34.4	33.9
6312	Storage and warehousing	Other	2495	21.8	41.7
6321	Other supporting land transport activities	Other	5055	15.6	51.7
6322	Other supporting water transport activities	Other	139	19.7	42.5
6323	Other supporting air transport activities	Other	310	8.6	70.2
6330	Activities of travel agencies and tour operators; tourist assistance activities n.e.c.	Other	4001	37.6	70.6
6340	Activities of other transport agencies	Other	7683	15.8	36.9
7011	Development and selling of real estate	Other	808	32.2	70.8
7012	Buying and selling of own real estate	Other	8133	53.6	40.5
7020	Letting of own property	Other	9014	28.5	41.1
7031	Real estate agencies	Other	1911	57.8	34.1
7032	Management of real estate on a fee or contract basis	Other	5103	21.1	40.2
7110	Renting of automobiles	Other	669	14.5	74.3

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Sector	Name	Classification	Employ -ment (5+)	Fraction affected (%)	Geo. Herf.
7121	Renting of other land transport equipment	Non-tradeable	106	22.1	36.3
7131	Renting of agricultural machinery and equipment	Other	64	19.0	33.3
7132	Renting of construction and civil engineering machinery and equipment	Other	1021	30.7	51.6
7133	Renting of office machinery and equipment, including computers	Other	162	15.7	96.4
7134	Renting of other machinery and equipment n.e.c.	Other	507	43.6	38.3
7140	Renting of personal and household goods n.e.c.	Other	559	61.9	38.5
7210	Hardware consultancy	Other	707	44.7	49.9
7220	Publishing of software and consultancy	Other	9626	19.5	65.5
7230	Data processing	Other	4050	37.6	73.7
7240	Database activities	Other	508	25.9	70.0
7250	Maintenance and repair of office, accounting and computing machinery	Other	1555	36.0	35.6
7260	Other computer related activities	Other	2571	21.1	73.6
7310	Research and experimental development on natural sciences and engineering	Other	3744	12.2	59.3
7411	Legal activities	Other	2122	28.4	77.1
7412	Accounting, book-keeping and auditing activities; tax consultancy	Other	8534	42.6	43.2
7413	Market research and public opinion polling	Other	1330	29.3	57.4
7414	Business and management consultancy activities	Other	6795	27.5	58.6
7415	Management activities of holding companies	Other	2351	9.8	60.2
7420	Architectural and engineering activities and related technical consultancy	Other	15969	27.1	45.0
7430	Technical testing and analysis	Other	2930	20.3	43.4
7440	Advertising	Other	3185	36.9	78.5
7450	Labour recruitment and provision of personnel	Other	11410	28.0	33.3
7460	Investigation and security activities	Other	21869	55.8	42.3
7470	Industrial cleaning	Other	16061	68.7	34.4
7481	Photographic activities	Other	853	50.5	39.2
7482	Packaging activities	Other	2353	58.7	27.6
7483	Secretarial and translation and call centre activities activities	Other	559	26.7	55.6
7484	Other business activities n.e.c.	Other	9790	37.5	33.7
8511	Hospital activities	Other	1265	37.9	65.7
8512	Medical practice activities	Non-tradeable	4131	47.1	17.2
8513	Dental practice activities	Non-tradeable	909	64.5	14.7
8514	Other human health activities	Non-tradeable	1350	42.8	34.2
8520	Veterinary activities	Non-tradeable	196	65.5	25.8
8532	Social work activities without accommodation	Other	1733	92.5	24.9

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