Colloque international **DARES** direction de l'animation de la recherche, des études et des statistiques · OIT

Polarisation(s)
sur les marchés du travail

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MINISTÈRE DU TRAVAIL

Current Landscape

o 30 states have a minimum wage higher than the federal minimum wage of $7.25.

o Examples: $11 in Washington State and $11.50 in the District of Columbia.

o Seattle and Sea-Tac now reaching $15.

Objective

o Explore whether minimum wages induces substitution away from workers whose jobs are more easily automated.

Our Added Value

o Quantify how shares in automatable employment change following a minimum wage change.

o Provide a full picture of labor market adjustments across industries and demographic groups

o Analyze whether particular types of individuals working in automatable jobs are less likely to stay in the same occupation following a minimum wage increase.

Data

o CPS data from 1980-2015

o Distinguish between occupations that are intensive in automatable tasks by drawing on definitions provided in Autor and Dorn (2013) and Autor et al. (2015).

Headline Findings

o Increasing the minimum wage decreases significantly the share of automatable employment held by low-skilled workers.

o An increase of the minimum wage by $1 decreases the share of low-skilled automatable jobs by 0.43 percentage point (an elasticity of −0.11).

o Average effects mask significant heterogeneity.

o Larger effects on the shares of automatable employment in manufacturing (0.73 percentage point decline)

o The share of older, female and Black workers in automatable employment also declines sharply.

Methodology (1)

Focus on low skilled workers

Use data Autor and Dorn (2013) and Autor et al. (2015) measure of routine task intensity.

$$RTI_k = \ln(T_k^R) - \ln(T_k^M) - \ln(T_k^A)$$

Calculate for each industry i, within each area, in year t, a routine employment share:

$$RSH_{iat} = \left(\sum_{k=1}^{K}(L_{iat}) \cdot 1[RTI_k > RTI^{P66}]\right)\left(\sum_{k=1}^{K}(L_{iat})\right)^{-1}$$

First analysis focuses on:

$$RSH_{iat} = b_1 MW_{st} + A_a\gamma + T_t\lambda + I_i\varphi + \varepsilon_{iat}$$

Data (1)

o CPS samples from 1980-2015 matched to monthly state-level data on the minimum wage

o Allow for a period of adjustment by defining the minimum wage as the average over the current month plus the last 11 months.

o Measure of routine task intensity is from Autor and Dorn (2013).

Methodology (2)

We also estimate the effects of being in an automatable job on the probability a person remains employed in the next period:

$$Emp_{jiai+1}=b_1(RSH_{jiat}\cdot MW_{at})+ b_2RSH_{jiat} +T_t\cdot S_s\lambda + I_i\varphi + \varepsilon_{jia}$$

A variation of the above equation considers occupational switchers

Data is drawn from the Annual Social and Economic Supplement (ASEC) of the CPS.

Full Sample Estimates, Shares of Employment in Automatable Jobs

Full sample estimates, shares of employment in automatable jobs.

	(1) Pooled	(2) Construction	(3) Manufacturing	(4) Transport	(5) Wholesale	(6) Retail	(7) Finance	(8) Services	(9) P. Adm.
Dependent variable = share of automatable employment									
Log Min Wage	−0.031	0.003	−0.073	−0.052	0.025	−0.021	−0.002	−0.049	−0.013
	(0.014)	(0.018)	(0.040)	(0.025)	(0.043)	(0.023)	(0.059)	(0.035)	(0.095)
N	30,963	3157	3157	3152	3147	3157	3138	3156	3060

Notes: OLS coefficient estimates of Eq. (3) are reported, with standard errors in parentheses. Standard errors are clustered by state. Low-skilled workers are defined as those who have a high school diploma equivalent or less. The share of automatable employment is based on Eq. (2), with data derived from Autor and Dorn (2013) and Autor et al. (2015). A job is classified as automatable at the three-digit occupation code level. The share of automatable employment is calculated by industry, state (urban and nonurban areas), and year. All regressions include area (state x urban) and year fixed effects. The minimum wage is measured in 2015 dollars (for which the average minimum wage is $6.77).

Disaggregated Estimates, Shares of Employment in Automatable Jobs

Disaggregated Estimates, Shares of Employment in Automatable Jobs

	(1) Pooled	(2) >=40 years	(3) 26-39 years	(4) <=25 years	(5) Male	(6) Female	(7) White	(8) Black
Dependent Variable = Share of Automatable Employment								
Pooled								
Log Min Wage	-0.031	-0.051	-0.036	-0.052	0.025	-0.021	-0.002	-0.049
	(0.014)	(0.027)	(0.040)	(0.025)	(0.043)	(0.023)	(0.059)	(0.035)
N	30963	30963	30963	30963	30963	30963	30963	22800
Manufacturing Only								
Log Min Wage	-0.073	-0.132	-0.051	-0.009	-0.046	-0.177	-0.065	-0.322
	(0.040)	(0.071)	(0.033)	(0.033)	(0.034)	(0.078)	(0.041)	(0.129)
N	3157	3157	3157	3157	3157	3157	3157	2538

Individual Level Estimates

o   Effects of remaining employed have consistent narrative to shares of employment analysis

o   Small significant effect on pooled estimates (-0.001), and larger effects for older (-0.0062) and Black (-0.0038) workers.

o   Male and female estimates are closer together (-0.0039 versus -0.0028).

o   Manufacturing effects are always the largest (-0.0048).

o   We also find significant effects on the probability of switching jobs

(-0.0213 on pooled). Across industries, the effect is negative and significant in manufacturing, transport, wholesale, finance, services, and public administration

Comment on Hours Analysis

o   Significant decreases in hours worked for those initially in automatable jobs, following a minimum wage increase.

o   For example a $1 increase in the minimum wage generates a -1.646 hours decrease in hours worked for low-skilled individuals who held an automatable job in the previous period.

o   Across demographic groups, the estimated coefficients are also mostly significant and negative. For example, a $1 increase in the minimum wage is estimated to reduce hours worked for low-skilled males who held an automatable job in the previous period by 2.669.

Comment on Contemporary Analysis

o   Move towards automation has accelerated over time, technology has been getting cheaper, and labor more expensive.

o   The substitution towards automation in place of low-skilled workers in response to a minimum wage increase is stronger in an analysis of more recent years.

Conclusions

o Minimum wage increases affects the share of low-skilled employment available in automatable jobs, and the the probability that a low-skilled individual working in an automatable job stays employed (or in the same occupation).

o Document considerable heterogeneity in effects across demographic groups, and across industries.

Discussion

o Sharp minimum wage increases may shape the types of jobs held by low-skilled workers.

o We identify some workers who are more vulnerable to substitution of machines for people.

o Definitions of automatable work by Autor and Dorn (2013) are very useful for a retrospective analysis.

o In the future many more occupations that employ low-skill workers are on track to be automated, even if they are not currently labelled as 'automatable.'

o Effects may spread to more workers in the future as other jobs become automatable.

Questions? Comments?