Elusive Employment Effect: Online Appendix

This Appendix describes in more detail the results in the main part of the text. All source code is available.

Data Sources

The main data source is the Basic Monthly CPS files.

Wages

Wages are only asked of respondents in the Monthly Outgoing Rotation Group. Hourly wages are computed as straight hourly wages if reported; otherwise weekly earnings divided by actual hours. Outliers are discarded using the upper and lower limits provided in https://www.epi.org/data/methodology/ Table 1. Top-coded observations are multiplied by 1.5. Earnings weights are used.

Employment, Unemployment and Population

These variables are computed from the full Monthly CPS files. Weights are used.

Minimum Wages

State-level minimum wages are taken from the quarterly data in:

Vaghul, Kavya and Ben Zipperer. 2019. "Historical State and Sub-state Minimum Wages." Version 1.2.0, https://github.com/benzipperer/historicalminwage/releases/tag/v1.2.0.

Results

We report the following sets of results, all separately for the age groups 16-19, 20-24 and 25-29:

a. Linear static models for wages and employment rates (these results underpin Figures 1-4 in the main paper.
b. Quadratic static models for wages and employment rates
c. Linear static models for the level of employment.
d. Models in first-differences.
e. Models with lags of the minimum wage and some regressors.

The other regressors always included are state and time fixed effects, the prime-aged unemployment rate and the proportion of the population that is the relevant age group. Standard errors are clustered by state.

The sample is the 50 states plus DC for the period 1979-2019 inclusive. The data is quarterly.

In all cases we report seven models that differ according to the fixed effects and trends that are included. Model (1) just includes state and time fixed effects, model (2) adds state-specific linear trends, model (3) census division time fixed effects, model (4) the both the census division effects and the linear trends, model (5) has a state-specific quadratic trend, model (6) a cubic trend and model (7) a quartic trend. These are chosen because they have been used in the existing literature and are summarized in the Table below.

The Different Specifications

Specification Number		Division* time effects	
		No	Yes
State Time Trends	None	1	3
	Linear	2	4
	Quadratic	5	
	Cubic	6	
	Quartic	7	

For models in first differences, the estimated model is obtained from the basic model but taking first-differences. For Model 1 this would cause state fixed effects to disappear etc.

A. Linear Static Models

The model estimated is:

$$y_{st} = \delta_0 + \delta \ln w_{st}^{m} + \delta_1 x_{st} + \varepsilon_{st} \qquad (1)$$

Where the dependent variable is the mean log hourly wage (Table A1) or the log employment rate (Table A2).

Table A1: Linear Static Models: The Impact on Log Wages

Dependent Variable: Log Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	0.239***	0.211***	0.241***	0.240***	0.217***	0.197***	0.249***
	[0.0228]	[0.0162]	[0.0289]	[0.0262]	[0.0198]	[0.0280]	[0.0317]
Panel B. : Aged 20-24							
Log Min	0.0578***	0.112***	0.122***	0.123***	0.128***	0.0992***	0.152***
	[0.0208]	[0.0187]	[0.0280]	[0.0247]	[0.0224]	[0.0260]	[0.0286]
Panel C. : Aged 25-29							
Log Min	-0.0089	0.0457	0.0615*	0.0261	0.0575*	0.0495*	0.110***
	[0.0198]	[0.0300]	[0.0336]	[0.0284]	[0.0322]	[0.0279]	[0.0300]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Table A2: Linear Static Models: The Impact on Log Employment Rates

Dependent Variable: Log Employment Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	-0.279***	0.0677	-0.191**	0.0945*	0.0723	0.099	0.092
	[0.0699]	[0.0874]	[0.0920]	[0.0477]	[0.0995]	[0.108]	[0.121]
Panel B. : Aged 20-24							
Log Min	-0.0668**	0.0267	-0.0668	0.0251	0.0267	0.0386	0.05
	[0.0332]	[0.0316]	[0.0503]	[0.0341]	[0.0377]	[0.0392]	[0.0379]
Panel C. : Aged 25-29							
Log Min	0.0248	0.0129	0.0249	0.0365*	0.00911	0.0203	0.0318**
	[0.0222]	[0.0140]	[0.0169]	[0.0200]	[0.0152]	[0.0153]	[0.0157]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

B. Quadratic Static Models

The quadratic models which are intended to capture the idea that the impact of the minimum wage is likely to differ according to the level of the minimum wage relative to the prevailing level of wages. The models estimated are now of the form:

$$y_{st} = \delta_0 + \delta \ln w_{st}^{m} + \delta_2 \left(\ln w_{st}^{m} - \ln w_{st}^{30-49} - w_0 \right)^2 + \delta_1 x_{st} + \varepsilon_{st} \qquad (2)$$

Where $\ln w_{st}^{30-49}$ is the mean log hourly wage for the 30-49 age group that we think is not affected by the minimum wage. w_0 is a centering parameter set at the median effective minimum in the data so that the coefficient on the linear term can be interpreted as the marginal effect at the mean.

Because the prime-age wages evolve according to local labor market conditions the normalized minimum wage variables may be subject to an endogeneity problem. As a result we instrument them using the following procedure derived from Autor, Manning and Smith (2016). First, we estimate a model for the prime-age wage as a function of x_{st}. We then take the predicted value from this equation and form the linear and squared normalized minimum wage using the predictions rather than the actual. We then use these predicted values as the instruments – the first stages are always very strong.

If the model (2) contains only the linear minimum wage term this is identical to using the minimum wage alone as the predicted variable is a linear function of the regressors. But where the quadratic term is included using IV does make a difference – effectively one is using the interaction between the regressors and the minimum wage as instruments.

Table A3: Static Quadratic Models: The Impact on Log Wages

Dependent Variable: Mean Log Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	0.228***	0.241***	0.264***	0.284***	0.237***	0.213***	0.301***
	[0.0193]	[0.0172]	[0.0299]	[0.0246]	[0.0195]	[0.0301]	[0.0280]
Log Min	0.411***	0.478***	0.310***	0.459***	0.377***	0.276***	0.580***
Squared	[0.125]	[0.117]	[0.0959]	[0.0730]	[0.0898]	[0.104]	[0.0951]
Panel B. : Aged 20-24							
Log Min	0.0520**	0.136***	0.144***	0.164***	0.139***	0.107***	0.189***
	[0.0224]	[0.0227]	[0.0320]	[0.0295]	[0.0248]	[0.0274]	[0.0275]
Log Min	0.227	0.412***	0.324***	0.439***	0.237**	0.142	0.447***
Squared	[0.146]	[0.155]	[0.0885]	[0.0975]	[0.110]	[0.0950]	[0.100]
Panel C. : Aged 25-29							
Log Min	-0.0124	0.0695**	0.0877**	0.0642**	0.0688**	0.0613**	0.142***
	[0.0188]	[0.0286]	[0.0377]	[0.0287]	[0.0322]	[0.0283]	[0.0329]
Log Min	0.182	0.405**	0.421***	0.420***	0.279***	0.217**	0.399***
Squared	[0.156]	[0.161]	[0.153]	[0.106]	[0.0957]	[0.0870]	[0.131]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Table A4: Static Quadratic Models: The Impact on Log Employment Rates

Dependent Variable: Log Employment Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	-0.227***	0.0717	-0.195**	0.0850*	0.0845	0.116	0.104
	[0.0505]	[0.0894]	[0.0839]	[0.0477]	[0.0992]	[0.107]	[0.129]
Log Min	-0.353	0.0531	-0.335	-0.0834	0.0643	0.244	0.177
Squared	[0.266]	[0.153]	[0.263]	[0.105]	[0.179]	[0.167]	[0.171]
Panel B. : Aged 20-24							
Log Min	-0.0527*	0.0265	-0.0725	0.0158	0.0255	0.0518	0.0509
	[0.0282]	[0.0338]	[0.0479]	[0.0343]	[0.0390]	[0.0385]	[0.0403]
Log Min	-0.161	-0.0338	-0.163*	-0.0993	-0.0794	0.0137	0.00825
Squared	[0.114]	[0.0857]	[0.0945]	[0.0755]	[0.0816]	[0.0601]	[0.0553]
Panel C. : Aged 25-29							
Log Min	0.024	0.0118	0.0252	0.0321	0.00616	0.0312**	0.0355**
	[0.0171]	[0.0155]	[0.0164]	[0.0197]	[0.0161]	[0.0138]	[0.0147]
Log Min	0.083	-0.0222	0.00739	-0.0456	-0.0931	0.0524	0.0609
Squared	[0.0727]	[0.0730]	[0.0663]	[0.0653]	[0.0702]	[0.0566]	[0.0585]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

C. ***Linear Static Models for the Level of Employment***

The argument for this specification put forward by Monras (2019) is that the population itself may respond to the minimum wage. The specification is as in (1) but with the dependent variable now the log of employment. The wage equation is the same as in Table A1 so is not reported.

Table A5: Linear Static Models: The Impact on Log Employment

Dependent Variable: Log Employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	-0.314***	0.0491	-0.181*	0.0692	0.0712	0.101	0.0839
	[0.101]	[0.0909]	[0.103]	[0.0493]	[0.105]	[0.106]	[0.120]
Panel B. : Aged 20-24							
Log Min	-0.0815	0.0188	-0.0473	0.0175	0.0297	0.04	0.0411
	[0.147]	[0.0405]	[0.0818]	[0.0432]	[0.0510]	[0.0480]	[0.0460]
Panel C. : Aged 25-29							
Log Min	0.0164	0.000959	0.0424	0.0255	0.00939	0.0237	0.0224
	[0.141]	[0.0258]	[0.0785]	[0.0245]	[0.0328]	[0.0310]	[0.0282]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

D. ***First-Difference Models***

A model in differences has been suggested by Meer and West (2016). This specification takes the static level specification and estimates in first-differences i.e. estimates:

$$\Delta y_{st} = \delta_0 + \delta \Delta \ln w_{st}^m + \delta_1 \Delta x_{st} + \varepsilon_{st} \qquad (3)$$

The regressors x_{st} are differenced as well so state fixed effects disappear from Model (1), state trends become state fixed effects when differenced etc.

Table A6: First-Difference Models: The Impact on Log Wages

Dependent Variable: Mean Log Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	0.142**	0.141**	0.057	0.0565	0.142**	0.140**	0.141**
	[0.0563]	[0.0567]	[0.0690]	[0.0694]	[0.0572]	[0.0575]	[0.0578]
Panel B. : Aged 20-24							
Log Min	0.0638	0.0629	-0.00276	-0.00375	0.0628	0.0602	0.0609
	[0.0571]	[0.0578]	[0.0731]	[0.0739]	[0.0584]	[0.0593]	[0.0603]
Panel C. : Aged 25-29							
Log Min	-0.0278	-0.0287	-0.0373	-0.0381	-0.0284	-0.0296	-0.029
	[0.0519]	[0.0524]	[0.0518]	[0.0522]	[0.0532]	[0.0537]	[0.0543]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Note that it seems harder to estimate a significant wage effect in the first-differenced specifications.

Table A7: First-Difference Models: The Impact on Log Employment Rates

Dependent Variable: Log Employment Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	-0.139	-0.138	-0.0619	-0.0609	-0.14	-0.141	-0.143
	[0.0926]	[0.0936]	[0.0981]	[0.0987]	[0.0942]	[0.0944]	[0.0947]
Panel B. : Aged 20-24							
Log Min	-0.0137	-0.0134	0.00195	0.00205	-0.0144	-0.0157	-0.017
	[0.0455]	[0.0459]	[0.0461]	[0.0465]	[0.0462]	[0.0463]	[0.0466]
Panel C. : Aged 25-29							
Log Min	-0.0524	-0.0527	0.0162	0.0162	-0.053	-0.0533	-0.0529
	[0.0395]	[0.0397]	[0.0360]	[0.0362]	[0.0400]	[0.0403]	[0.0405]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Note that the employment effects are negative in all specifications for teens here but never significantly different from zero.

E. **Dynamic Models**

This specification estimates a model with lags of some regressors and the minimum wage to allow for the fact that it might take some time for the minimum wage to have its full effect and that lagged economic conditions may better control for pre-trends. The specification estimated here is:

$$y_{st} = \delta_0 + \delta \ln w^m_{st} + \delta_1 x_{st} + \sum_{i=0}^{3} \alpha_i \Delta \ln w^m_{st-i} + \sum_{i=0}^{3} \phi_i \Delta x_{st-i} + \varepsilon_{st} \quad (4)$$

The dynamics on the minimum wage are included in difference-form so the coefficient on the level of the minimum wage can be interpreted as the long-run effect (which is what is reported in the Tables). We include 3 lags of the differences so allows for an impact of minimum wages up to one year previously. Results, reported below, are very similar to the static models.

Table A8: Dynamic Models: The Impact on Log Wages

Dependent Variable: Mean Log Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Panel A. : Aged 16-19				
Log Min	0.249***	0.211***	0.251***	0.252***	0.221***	0.198***	0.253***
	[0.0244]	[0.0160]	[0.0290]	[0.0248]	[0.0195]	[0.0290]	[0.0348]
			Panel B. : Aged 20-24				
Log Min	0.0534**	0.105***	0.129***	0.132***	0.127***	0.0977***	0.154***
	[0.0238]	[0.0202]	[0.0308]	[0.0259]	[0.0233]	[0.0247]	[0.0320]
			Panel C. : Aged 25-29				
Log Min	-0.00652	0.0538*	0.0867**	0.0516	0.0700**	0.0616**	0.131***
	[0.0220]	[0.0286]	[0.0367]	[0.0319]	[0.0320]	[0.0262]	[0.0292]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Table A9: Dynamic Models: The Impact on Log Employment Rates

Dependent Variable: Log Employment Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Log Min	-0.298***	0.0532	-0.241**	0.0731	0.0575	0.0845	0.0364
	[0.0758]	[0.0729]	[0.102]	[0.0560]	[0.0826]	[0.0889]	[0.0984]
Panel B. : Aged 20-24							
Log Min	-0.0692**	0.0179	-0.0886	0.00861	0.0151	0.029	0.0232
	[0.0339]	[0.0296]	[0.0544]	[0.0414]	[0.0335]	[0.0336]	[0.0337]
Panel C. : Aged 25-29							
Log Min	0.0311	0.00894	0.0199	0.0283	0.00813	0.0217	0.0235
	[0.0246]	[0.0183]	[0.0184]	[0.0218]	[0.0174]	[0.0182]	[0.0166]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No