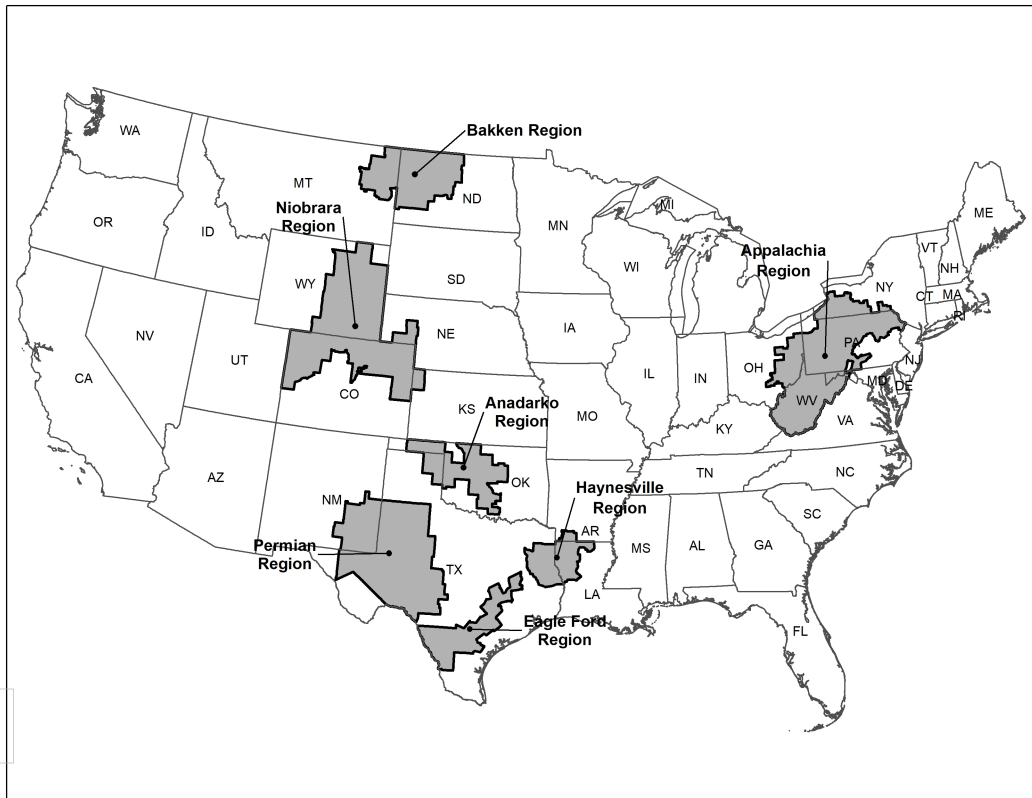# A For Online Publication

A.1 Appendix Figures
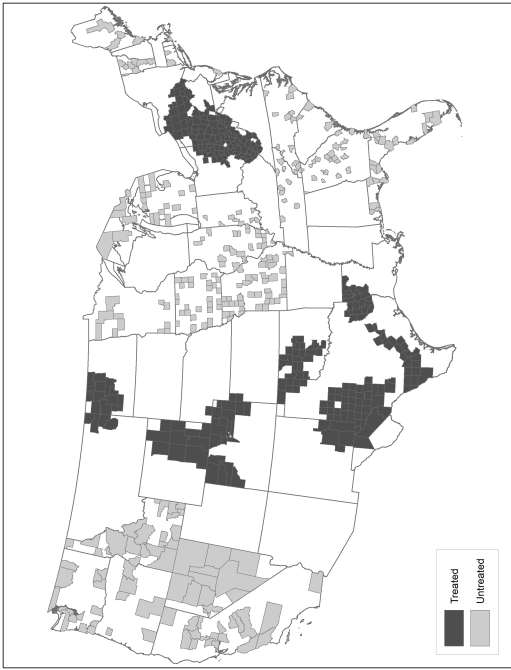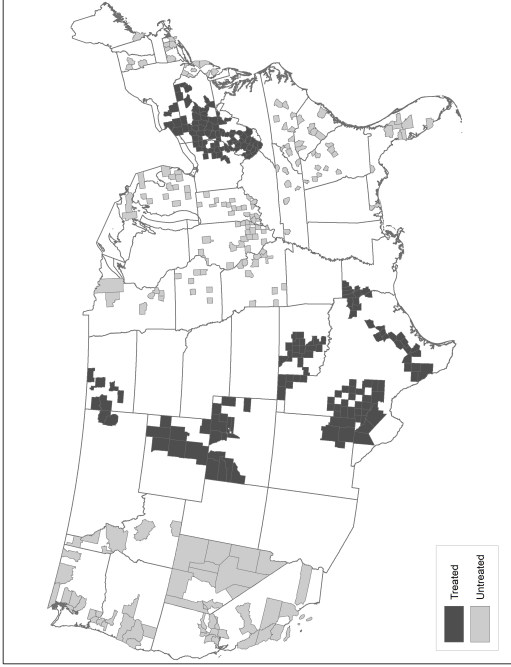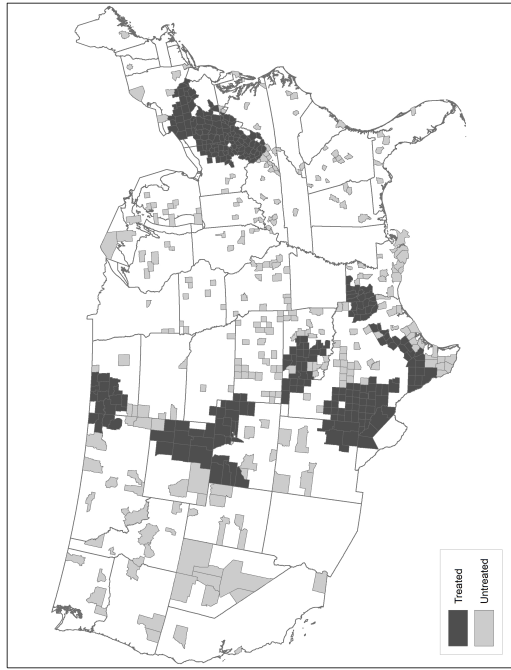

Figure A.1: U.S. Shale Plays
Source: EIA Drilling Productivity Report

(b) Baseline Specification - Small Sample

(a) Baseline Specification - Full Sample

(d) All Counties - Small Sample

(c) All Counties - Full Sample

Figure A.2: Treated and Control Counties

Baseline specification removes counties in shale boom states, or in states with counties directly adjacent to shale boom counties from potential propensity score match control group. All counties specification includes all U.S. counties as potential propensity score match control group, regardless of geographic proximity to shale boom areas. Shale boom county categorizations are based on EIA's Drilling Productivity Reports.

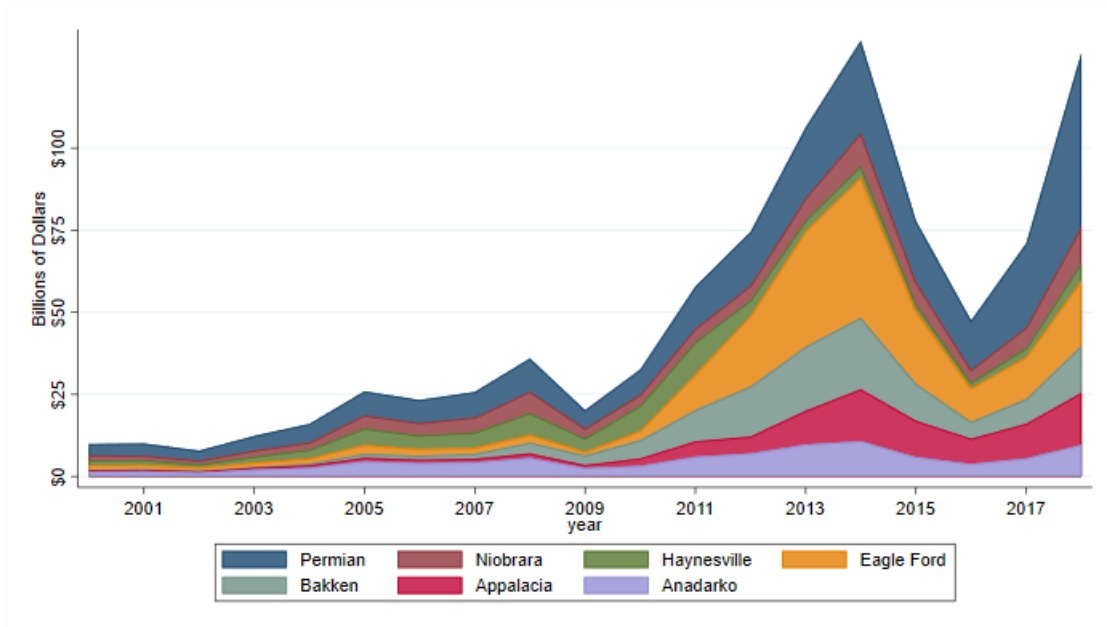Figure A.3: Value of New Production by Shale Play. Source: Enverus and EIA. Includes the value of oil and gas produced from wells that reported first production within the prior 12 months. West Texas Intermediate oil price and Henry Hub natural gas price alongside oil and natural gas production respectively are used to calculate values.

Table A.1: Impact of Shale Boom on Employment and Earnings by Sector

	Employment				Earnings			
	(1) Full Sample	(2) Small Sample	(3) Mining Sector	(4) Non-Mining Sector	(5) Full Sample	(6) Small Sample	(7) Mining Sector	(8) Non-Mining Sector
Panel A: All Workers								
Treated	0.053***	0.058***	0.469***	0.035***	0.085***	0.100***	0.149***	0.081***
	(0.004)	(0.005)	(0.018)	(0.004)	(0.003)	(0.003)	(0.006)	(0.003)
Panel B: Workers with at Least A College Degree								
Treated	0.015***	0.018***	0.430***	-0.000	0.057***	0.067***	0.136***	0.052***
	(0.004)	(0.004)	(0.018)	(0.004)	(0.003)	(0.003)	(0.010)	(0.003)
Panel C: Workers with A High School Diploma or Lower								
Treated	0.065***	0.070***	0.465***	0.045***	0.104***	0.120***	0.161***	0.100***
	(0.005)	(0.005)	(0.018)	(0.005)	(0.003)	(0.004)	(0.006)	(0.004)
Panel D: Male Workers								
Treated	0.080***	0.090***	0.472***	0.057***	0.094***	0.110***	0.150***	0.092***
	(0.006)	(0.006)	(0.019)	(0.006)	(0.003)	(0.003)	(0.007)	(0.003)
Panel C: Female Workers								
Treated	0.021***	0.019***	0.468***	0.013***	0.049***	0.019***	0.147***	0.050***
	(0.003)	(0.004)	(0.018)	(0.003)	(0.002)	(0.004)	(0.008)	(0.002)
N	8,176	5,432	5,432	5,432	8,176	5,432	5,432	5,432

Dependent variables are the natural log of total employment and natural log of monthly average earnings (USD) in column (1)-(4) and (5)-(8), respectively. Standard errors are clustered at county and year level and are reported in parentheses. ***p≤0.01, **p≤0.05, *p≤0.1.

Table A.2: Impact of Shale Boom on Employment and Earnings Differentials by Sector - Recession Robustness Check

|	Employment Differentials				Earnings Differentials			
	(1) Full Sample	(2) Small Sample	(3) Mining Sector	(4) Non-Mining Sector	(5) Full Sample	(6) Small Sample	(7) Mining Sector	(8) Non-Mining Sector
Panel A: College (+) / High School (-)								
Treatment	-0.015***	-0.014***	-0.012***	-0.012***	-0.032***	-0.036***	-0.020***	-0.034***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.006)	(0.002)
Treatment × Recession	-0.000	-0.003**	0.004	-0.003***	0.007***	0.010***	0.010	0.010***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.002)	(0.007)	(0.002)
Panel B: Male / Female								
Treatment	0.037***	0.043***	-0.009	0.025***	0.031***	0.036***	0.004	0.029***
	(0.003)	(0.003)	(0.013)	(0.003)	(0.002)	(0.002)	(0.005)	(0.002)
Treatment × Recession	-0.013***	-0.012***	-0.003	-0.006**	-0.010***	-0.009***	-0.009	-0.008***
	(0.003)	(0.003)	(0.015)	(0.003)	(0.002)	(0.002)	(0.006)	(0.002)
N	8,176	5,432	5,432	5,432	8,176	5,432	5,432	5,432

Dependent variables are the natural log differentials in employment and monthly average earnings in columns (1)-(4) and (5)-(8), respectively. Recession and recovery time period is from 2009 to 2011. Standard errors are clustered at county and year level and are reported in parentheses.***$p \leq 0.01$, **$p \leq 0.05$, *$p \leq 0.1$.

Table A.3: Decomposing Changes in Earnings Differentials - 2005 Treatment Begin Year Robustness

	(1) Mining Sector	(2) Non-Mining Sectors	(3) Employment Migration & Substitution	(4) Total
Panel A: College (+) / High School (-)				
Point Estimates	-1.61%	-2.81%	-	-3.04%
Share of Pre-Boom Employment	1.82%	98.18%		100%
Percent Change in Earnings Differential	-0.029%	-2.76%	-0.25%	-3.04%
Relative Contribution	0.63%	93.05%	6.33%	100%
Panel B: Male / Female				
Point Estimates	0.09%	2.85%	-	3.66%
Share of Pre-Boom Employment	1.82%	98.18%		100%
Percent Change in Earnings Differential	0.002%	2.8%	0.86%	3.66%
Relative Contribution	0.05%	76.38%	23.58%	100%

Table A.4: Decomposing Changes in Earnings Differentials - 2006 Treatment Begin Year Robustness

	(1) Mining Sector	(2) Non-Mining Sectors	(3) Employment Migration & Substitution	(4) Total
Panel A: College (+) / High School (-)				
Point Estimates	-1.79%	-2.93%	-	-3.23%
Share of Pre-Boom Employment	1.87%	98.13%		100%
Percent Change in Earnings Differential	-0.034%	-2.87%	-0.33%	-3.23%
Relative Contribution	1.04%	88.79%	10.17%	100%
Panel B: Male / Female				
Point Estimates	0.26%	2.74%	-	3.53%
Share of Pre-Boom Employment	1.87%	98.13%		100%
Percent Change in Earnings Differential	0.005%	2.69%	0.84%	3.53%
Relative Contribution	0.14%	76.09%	23.78%	100%
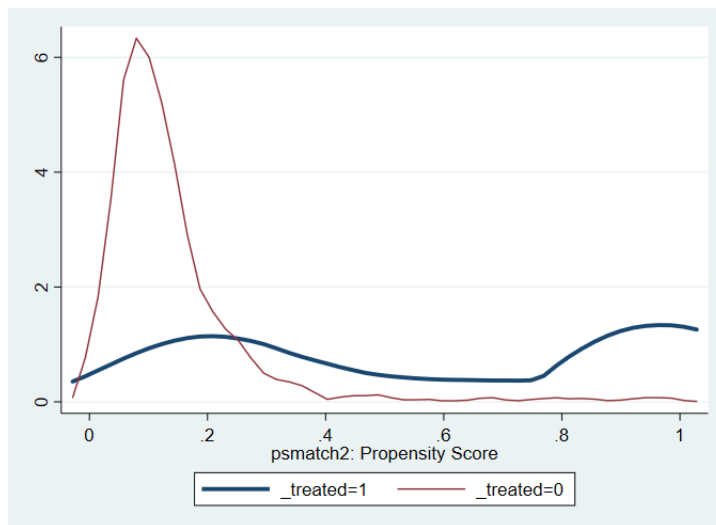
(a) Baseline Specification - Full Sample
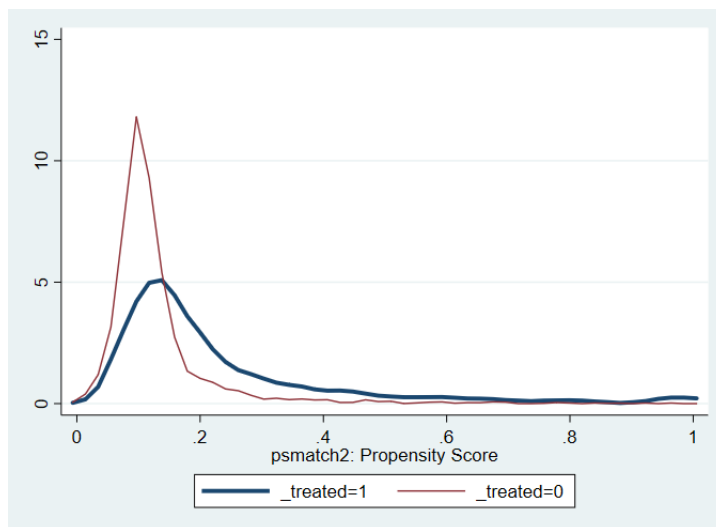
(b) All Counties - Full Sample

Figure A.4: Overlap in propensity scores. Comparison of baseline specification (See Figure A.2a) and full sample specification (See Figure A.2c).

Table A.5: Decomposing Changes in Earnings Differentials - 2008 Treatment Begin Year Robustness

	(1)	(2)	(3)	(4)
			Employment	
	Mining	Non-Mining	Migration &	
	Sector	Sectors	Substitution	Total
Panel A: College (+) / High School (-)				
Point Estimates	-1.40%	-2.89%	-	-3.21%
Share of Pre-Boom Employment	2.04%	97.96%		100%
Percent Change in Earnings Differential	-0.028%	-2.83%	-0.36%	-3.21%
Relative Contribution	0.89%	87.98%	11.13%	100%
Panel B: Male / Female				
Point Estimates	0.21%	2.60%	-	3.25%
Share of Pre-Boom Employment	2.04%	97.96%		100%
Percent Change in Earnings Differential	0.004%	2.55%	0.70%	3.25%
Relative Contribution	0.13%	78.41%	21.46%	100%

A.2 Decomposition

Channel 1: Earnings Differentials within Mining Sector   We define Γ_m as the percent change in the earnings differential in the local labor market associated with only the change in the earnings differential within the mining industry. In words, it is simply the share of the economy in the mining industry in the pre-boom time period multiplied by the estimated percent change in the earnings differential *within* the mining industry, where $\left(\frac{\overline{N_{m,t0}}}{\overline{N_{t0}}} \right)$ is simply the average share of employment (N) in the mining sector in the pre-boom time period. We sum mining employment and non-mining employment within the mining sample (from Table 1) for consistent comparison. $\left(\%\widehat{\Delta \frac{e_{H,m}}{e_{L,m}}} \right)$ is the estimated percent change in the earnings differential between high and low skilled workers in the mining industry associated with the shale boom.

$$\textit{Skilled/Unskilled: } \Gamma_m = \left(\frac{\overline{N_{m,t0}}}{\overline{N_{t0}}} \right) \times \left(\%\widehat{\Delta \frac{e_{H,m}}{e_{L,m}}} \right) = \frac{670}{33,410 + 670} * -1.6\% = -0.031\%$$

In words, of the 3.3% decrease in earnings differentials between skilled and unskilled workers, $\approx 0.031\%$ is associated with a change in the earnings differential within the mining sector.

$$\textit{Male/Female: } \Gamma_m = \left(\frac{\overline{N_{m,t0}}}{\overline{N_{t0}}} \right) \times \left(\%\widehat{\Delta \frac{e_{M,m}}{e_{F,m}}} \right) = \frac{670}{33,410 + 670} * 0.0\% \approx 0.0\%$$

In words, of the 3.3% increase in earnings differentials between male and female workers, none is associated with a change in the earnings differential within the mining sector.

Channel 2: Earnings Differentials within Non-Mining Sector   We define Γ_o as the percent change in the earnings differential associated with

only the change in the earnings differential within the non-mining (i.e. other) industries. In words, it is simply the share of the economy in the non-mining industries in the pre-boom time period multiplied by the estimated percent change in the earnings differential *within* the non-mining industries.

$$\textit{Skilled/Unskilled: } \Gamma_o = \left(\frac{H_o + L_o}{H + L_{t0}} \times \%\Delta\widehat{\frac{e_{H,m}}{e_{L,m}}} \right) = \left(1 - \frac{670}{33,410 + 670} \right) \times -3.0\% \approx -2.94\%$$

In words, of the 3.3% decrease in earnings differentials between skilled and unskilled workers, 2.94% is associated with a change in the earnings differential within the non-mining sectors.

$$\textit{Male/Female: } \Gamma_o = \left(\frac{M_o + F_o}{M + F_{t0}} \times \%\Delta\widehat{\frac{e_{M,m}}{e_{F,m}}} \right) = \left(1 - \frac{670}{33,410 + 670} \right) \times 2.6\% \approx 2.55\%$$

In words, of the 3.3% increase in earnings differentials between male and female workers, 2.55% is associated with a change in the earnings differential within the non-mining sectors.

Channel 3: Residual - Labor Market Composition We define Γ_s as the residual percent change in the earnings differential that is associated with a change in the labor market composition itself. It is simply the total change in earnings differentials (Γ_T) less that share associated with the changes within the mining (Γ_m) and non-mining (Γ_o) industries respectively.

Skilled/Unskilled: $\Gamma_s = \Gamma_T - (\Gamma_m + \Gamma_o) = -3.3\% - (-0.031\% + -2.94\%) = -0.33\%$

In words, of the 3.3% decrease in earnings differentials between skilled and unskilled workers, 0.33% is associated with a disproportionate growth in unskilled employment in the higher paying mining sector.

Male/Female: $\Gamma_s = \Gamma_T - (\Gamma_m + \Gamma_o) = 3.3\% - (0.00\% + 2.55\%) = 0.75\%$

In words, of the 3.3% increase in earnings differentials between male and female workers, 0.75% is associated with a disproportionate growth in male employment in the higher paying mining sector.