

The Impact of Minimum Wage Legislation in Minnesota vs. Wisconsin: Contra Williams

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In a recent CROWE *Policy Brief*, Noah Williams (2018) argues that the recent increases in Minnesota’s minimum wage relative to Wisconsin’s is a central reason why Minnesota’s employment in limited service restaurants (aka fast food establishments) has declined. We reproduce a key graph in his argument below.

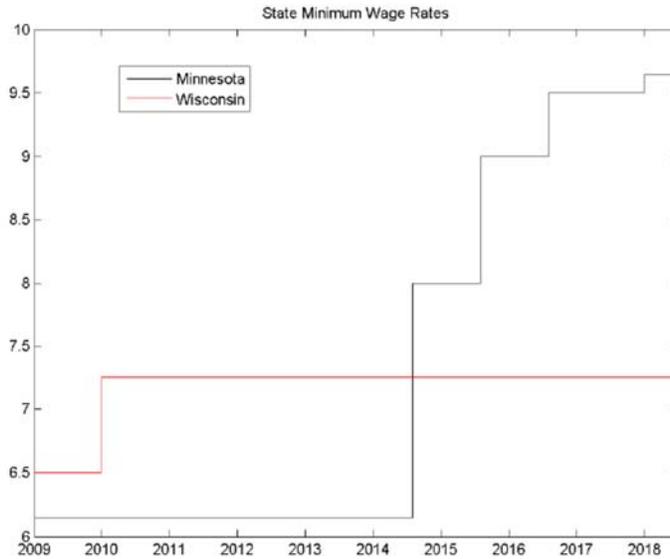


Figure 1: State Minimum Wage Rates in Minnesota and Wisconsin (large employers).

Source: Williams (2018).

In his analysis, Williams asserts that (1) the drastic increase in the Minnesota minimum wage relative to that in Wisconsin has (1) driven down Minnesota relative employment in “fast food restaurants”, (2) driven down Minnesota relative employment of 16-24 year olds, and (3) driven up Minnesota fast food restaurants costs.

In the following sections, we evaluate these propositions. Specifically, we undertake a more systematic time series analysis. We realize the limitations of such a study – the impact of many confounding factors³. A micro level study would be superior. But at a minimum we can investigate what the time series evidence can and cannot tell us.

³ See, for example, the issues raised in Neumark (2018) especially sections III and IV.

1. Is there a systematic relationship between the minimum wage and employment in “fast food restaurants,” otherwise known as limited service eating establishments, and the minimum wage.

Williams’s Figure 2, when taken in conjunction with his Figure 1, seems to support the view there is one. Below, we extend Figure 2 from 2010-2018M05 to 1990-2018M07 (see data appendix for sources/definitions).

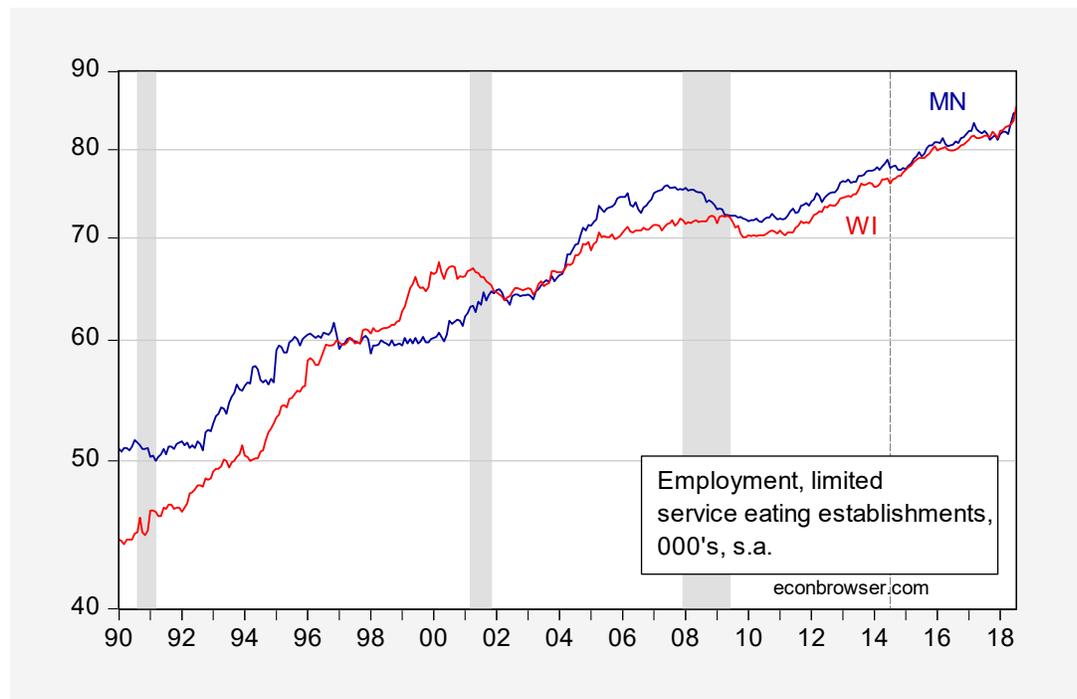


Figure 1: Employment in limited service eating establishments in Minnesota (dark blue) and Wisconsin (red), in 000’s, s.a., on log scale. NBER defined recession dates shaded gray. Dashed line at 2014M07, time of large MN minimum wage increase. Source: BLS, NBER.

Theory suggests there is a relationship, but depending on the nature of the markets – fully competitive, monopsonistic, asymmetric information – the effect can be negative or positive or nearly indistinguishable from zero at the short, medium and long run horizons.

This is seemingly an easy issue to resolve. Simply plotting the log ratio of Minnesota to Wisconsin employment against the log ratio of minimum wages should give us some idea.

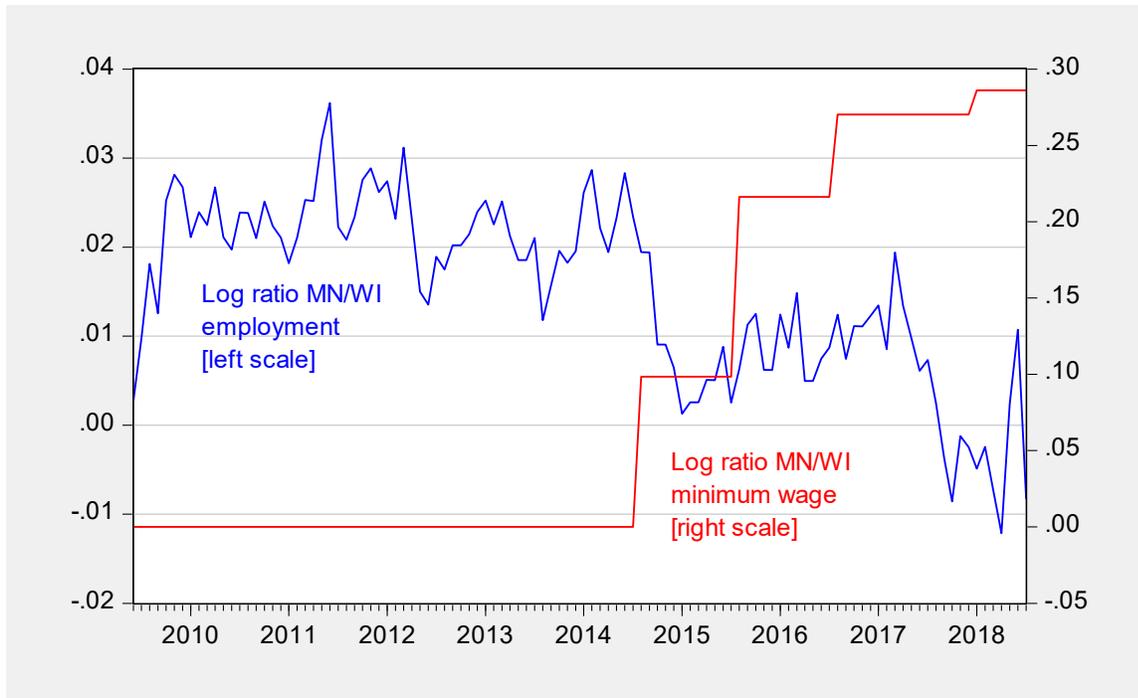


Figure 2: Log ratio of MN employment in limited service eating establishments to Wisconsin (blue, left scale), and log ratio MN/WI minimum wage (red, right scale). Source: BLS, author's calculations.

There appears to be a bivariate relationship, although of unclear strength. To investigate the relationship between the minimum wage and employment, we apply a battery of estimation methods to the data. Overarching these results is the issue of nonstationarity. None of key variables (individually or as ratios) rejects the unit root null hypothesis, using conventional tests and significance levels. We could recover some understanding of these links if there existed a long run cointegrating relationship between the relevant variables -- technically, if there exists a linear combination of the variables that is stationary, the variables are cointegrated.⁴

Unfortunately, the standard methodology for testing for cointegration – the Johansen maximum likelihood procedure associated with Johansen and Johansen (1992, 1993) uniformly fails to reject the no cointegration null, both in the short and long samples. In such instances, where there is no evidence of cointegration, the appropriate route is to estimate in first difference. In no instance is any statistically significant relationship detected.

⁴ See Chinn (1991) for a primer.

To investigate, *assuming* a long run relationship, we regress the log ratio of Minnesota/Wisconsin employment in limited service eating establishments on the log ratio of Minnesota/Wisconsin minimum wages, and log ratio of total nonfarm payroll employment ex.-limited eating establishment employment.

$$(1) \text{empl}^{MN} - \text{empl}^{WI} = \beta_0 + \beta_1(\text{minw}^{MN} - \text{minw}^{WI}) + \beta_2(\text{nfp}^{MN} - \text{nfp}^{WI}) + u$$

Lower case letters denote log terms, *empl* is employment in limited service eating establishments, *minw* is effective minimum wage, and *nfp* is the nonfarm payroll employment ex.-limited service eating establishment employment.

The minimum wage represents the opportunity cost of hiring to limited service eating establishments. Nonfarm payroll employment proxies for alternative demand for fast food employment, so as this demand rises, labor is pulled out of fast food employment. Omitting this factor will bias the estimates.

The specification imposes common coefficients, e.g., the same price elasticity of demand for labor in Minnesota as in Wisconsin; it also imposes a linear structure.

The results are presented in Table 1.

Table 1: Relative employment, relative minimum wages, and labor demand

	1990M01-2018M07			2010M01-2017M09		
coefficient	[1]	[2]	[3]	[4]	[5]	[6]
constant	0.026*** (0.007)	-0.023* (0.012)	-0.118 (0.153)	0.021*** (0.001)	0.017*** (0.003)	0.209 (0.095)
min wage	-0.053* (0.031)	0.088* (0.047)	0.097* (0.047)	-0.058*** (0.008)	-0.048*** (0.009)	-0.007 (0.027)
NFP		-1.006*** (0.290)	-1.711 (1.131)		-0.187** (0.093)	0.453 (0.279)
Time x1000			0.156 (0.251)			-0.349** (0.175)
adj.R sq.	0.005	0.145	0.147	0.534	0.549	0.595
N	343	343	343	94	94	94
DW	0.028	0.039	0.045	0.610	0.644	0.675

HAC robust standard errors in parentheses. *(**)[***] denotes significance at the 10%(5%)[1%].

Columns 1-3 pertain to the full sample, while columns 4-6 pertain to the post-Great Recession period, up to 2017M09, the latest benchmarked employment data. the minimum wage alone exhibits a negative

sign in columns 1 and 4 in accord with some models of the minimum wage. However, the proportion of variation explained is essentially zero. Notice also that the inclusion of overall employment boosts the proportion of variation explained substantially, and the minimum wage coefficient becomes *positive* and statistically significant. The NFP coefficient exhibits the expected sign, with statistical sign. The results are robust to the inclusion of a time trend.

We conduct several diagnostic tests. The extremely low Durbin-Watson statistics indicate very high levels of positive serial correlation, which can be suggestive of misspecification. Truncating the sample to the post-Great Recession period,⁵ one finds the Durbin-Watson statistics are much higher, indicating serial correlation in the range of 0.75-0.80. Once again, ignoring the draw of labor demand, one finds (column (4)) the negative coefficient on the minimum wage. The negative coefficient survives inclusion of a labor demand variable, but not the inclusion of a time trend. The result is that the minimum wage coefficient is no longer statistically significant and the labor demand variable coefficient is positive and but not statistically significant.

The bottom line is that there is no reliably estimated relationship between employment rates in fast food restaurants and the minimum wage after controlling for the usual suspects.⁷

2. Does a higher minimum wage lower young adult employment?

Williams (2018) provides this plot which seemingly demonstrates the negative impact of the minimum wage on employment of young adults (age 16-24).

⁵ We estimate 2010M01-2017M09; the end-point is selected since that is the latest available observation benchmarked to Quarterly Census of Employment and Wages (QCEW).

⁷ Even if there is a negative coefficient on the minimum wage, the impact on the overall wage bill might be an even more useful statistic. Neither Williams (2018) nor this study addresses this point.

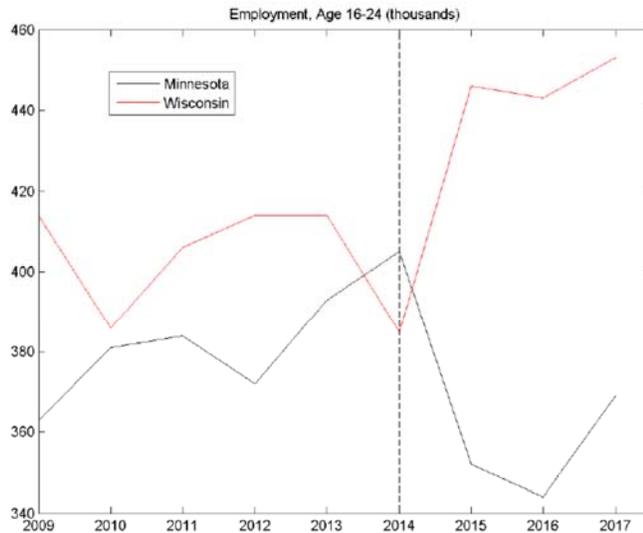


Figure 3: Employment, Age 16-24 in Minnesota and Wisconsin (annual data, thousands of people).

Source: Williams (2018)

Williams notes that there are several factors that affect employment levels, in addition to the minimum wage, but does not mention them specifically. A hint that there are other factors is that Wisconsin youth employment drops while Minnesota increases in 2014, the year that Minnesota minimum wage increases while no such change occurs in Wisconsin. It is, however, important to remember that measurement errors associated with the employment numbers derived from the state-level household survey are relatively large (see discussion in Chinn and LeCloux (2018)).

We can re-express the data in relative terms to obtain the following graph:

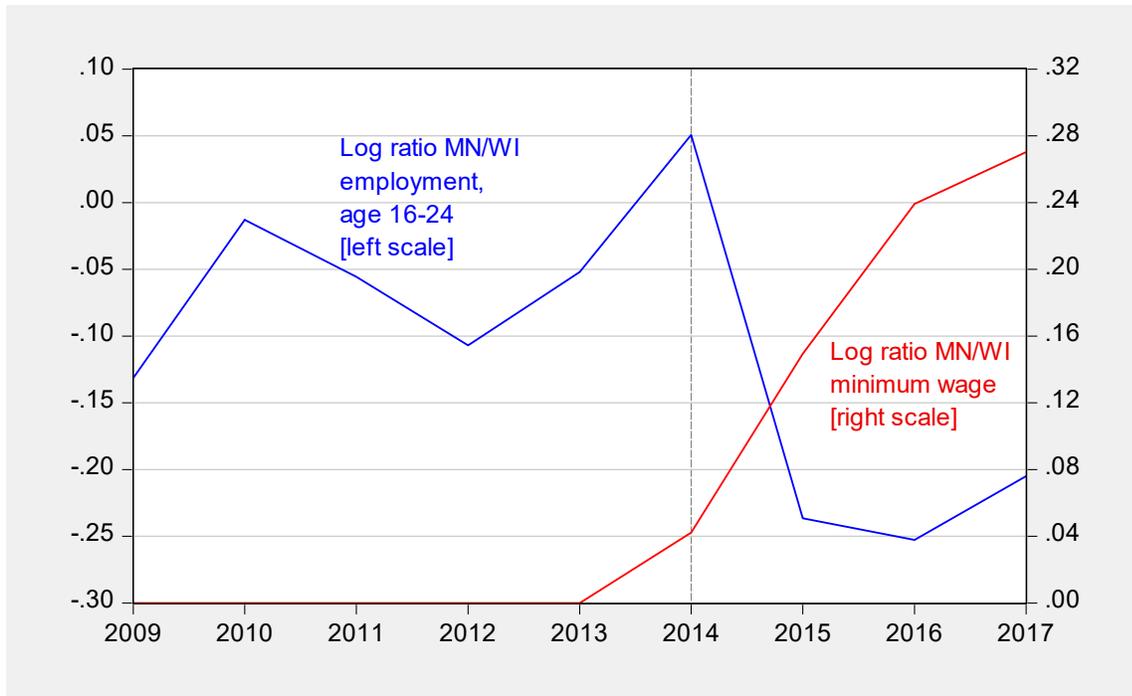


Figure 3: Log ratio of MN/WI employment, age 16-24 (blue, left scale), and log ratio MN/WI minimum wage.

A regression of the log ratio of employment on the log ratio of minimum wages does indeed yield a statistically significant coefficient of -0.71, in accord with (some) priors. A fair amount of variation is explained (52%). However, other factors like the state of the labor market overall likely have an impact. In addition, there are separate trends in the employment series in the two states. Estimating the regression augmented with employment ex.-age 16-24, and a linear time trend provides the following estimate:

$$(2) \text{empl1624}^{MN} - \text{empl1624}^{WI} = -2.42 - 2.19 \times (\text{minw}^{MN} - \text{minw}^{WI}) - 9.57(\text{ce}^{MN} - \text{ce}^{WI}) + 0.075 \times \text{time} + u$$

Adj-R²=0.53, N=9, DW=2.48. **Bold** figures denote significance at 10% marginal significance level.

Where *empl1624* is log employment of 16-24 age group, *minw* is the log minimum wage, *ce* is civilian employment ex.-age 16-24, and *time* is a time trend.

Taken literally, the estimates indicate a higher minimum wage results in lower relative employment, as does more overall other employment. However, *none* of the coefficients are statistically significant. And

if one looks at employment age 16-19, where minimum wages are thought to bind most tightly, the negative coefficient is also not statistically significant. Hence, while there is a surface appeal to the proposition of higher minimum wage measurably results in lower relative employment, the data do not support it.

3. Does a rising minimum wage raise fast food prices?

Williams (2018) argues the increase in labor costs induced an increase in fast food restaurant prices. To buttress his point, he presents this graph of *Minnesota* food prices.

Restaurant Prices

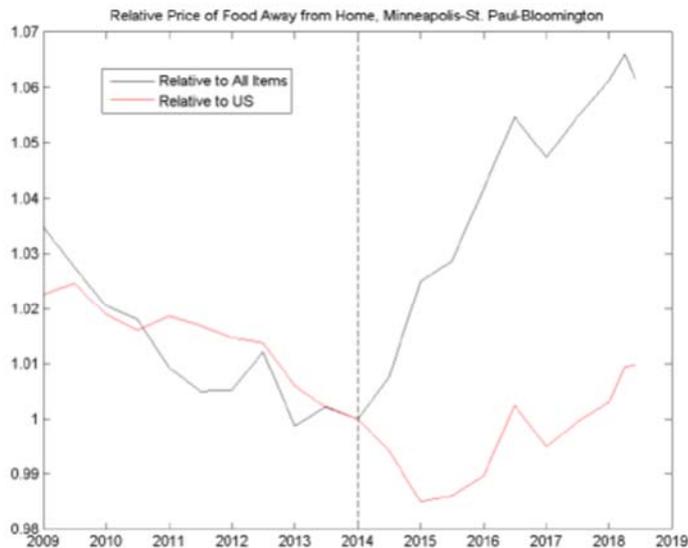


Figure 4: Relative Price of Food Away from Home, Minneapolis-St. Paul-Bloomington MSA. (Semi-annual data through 2017 plus Jan.-Mar.-May 2018.)

Source: Williams (2018).

Instead of comparing MSP to the rest of the country, or to the all-CPI, we once again do a ratio analysis, Minneapolis-St. Paul vs. Milwaukee-Racine (i.e., MSP vs. MKE). The two key series are the log food prices in MSP vs MKE, and the corresponding log ratio of minimum wages. The prior would be that with symmetrical responses, the higher the minimum wage, the higher food prices, *ceteris paribus*. This does not obviously hold in the data.

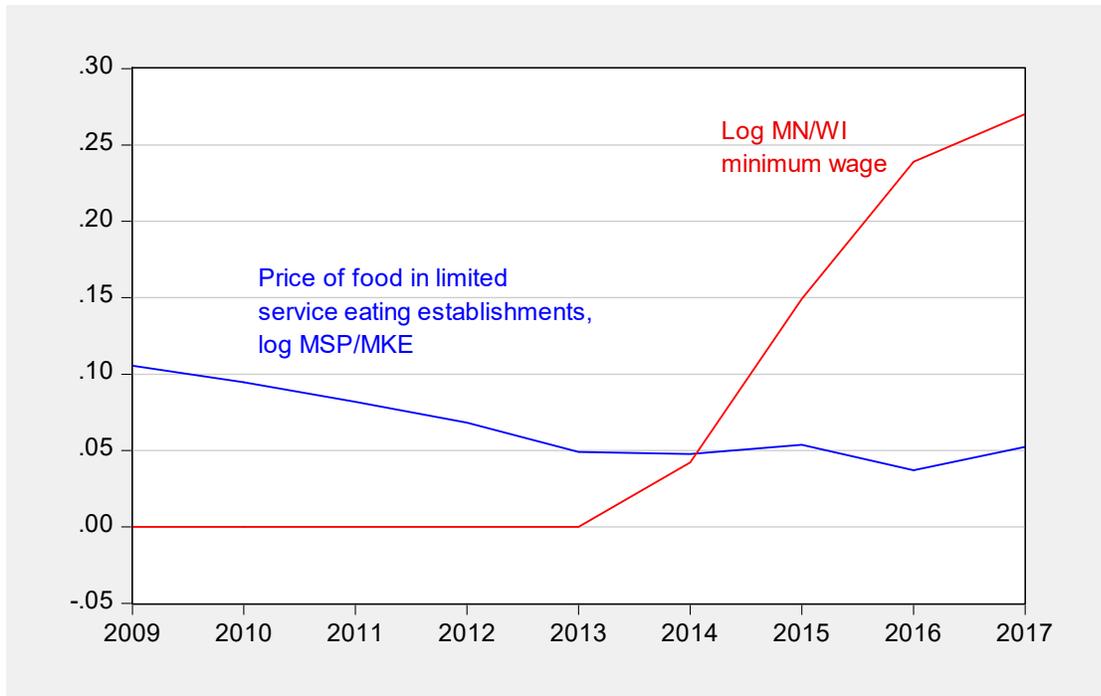


Figure 4: Log price of food in limited service eating establishments, Minneapolis-St. Paul vs. Milwaukee-Racine (blue), and log Minnesota/Wisconsin minimum wage. Source: BLS, and author's calculations.

Inference is complicated by (at least) one factor. The first is that the MSP data relates to a Core Based Statistical Area, while MKE relates to a Milwaukee-Racine Combined Metropolitan Statistical Area. If there are unobservable factors associated with each type of statistical reporting area, then differencing can eliminate the bias associated with the presence of these effects (as long as the unobservables are time-invariant). The following regression equation (2) ends up being a sort of differences-in-differences regression:

$$(3) \quad p^{MN} - p^{WI} = \alpha_0 + \alpha_1(dummy) + u$$

Where p is the log food price and $dummy$ is a binary variable taking on a value of 1 in 2014 onward. Results of this regression are reported in Table 2, column 1, spanning 2009-17 (4 years before and 3 years after).

Table 2: Food Price and Minimum Wage Link, 2009-17

coefficient	[1]	[2]	[3]	[4]
constant	0.080*** (0.012)	0.332*** (0.082)	0.076*** (0.013)	0.434*** (0.022)
Δ minwage	-0.032*** (0.013)	0.010 (0.012)	-0.129*** (0.055)	-0.391*** (0.043)
Time		-0.009*** (0.003)		-0.013*** (0.001)
adj.R sq.	0.449	0.753	0.286	0.901
N	9	9	9	9
DW	1.087	1.259	0.595	2.833

HAC robust standard errors in parentheses. *(**)[***] denotes significance at the 10%(5%)[1%]. The relatively high Durbin-Watson statistics suggest that nonstationarity is not an issue.

While the coefficient on the dummy is statistically significant, the sign is negative, rather than positive, suggesting that the 2014 increase in the Minnesota minimum wage in 2014 *lowered* food prices in Minnesota, relative to Wisconsin. There is a long trend apparent in the pre-2014 price variable; accounting for that trend makes the coefficient positive, in accord with priors, but that estimate is not statistically significantly different from zero (column 2).

What if we substitute the actual (log) ratio of minimum wages? (columns 3, 4) The regression results no longer takes on the spirit of a differences-in-differences, but now the we estimate a quasi-pass through coefficient (imposing a common elasticity). The estimate is negative, rather than positive, regardless of inclusion of time trend or not.

4. Conclusions

The empirical evidence regarding the impact of minimum wage changes is mixed, with most studies indicating a negative, but small, effect on employment (Doucouliagos and Stanley, 2009). In addition, the impact on costs, following the Card and Krueger (1994) is also mixed. These empirical results are counterintuitive only if one is wedded to the competitive model of labor markets. If instead one believes that markets are monopsonistic, or that employers pay efficiency wages, one would have different priors.

We believe the jury is still out regarding the negative outcomes associated with minimum wage increases, insofar as Minnesota and Wisconsin are concerned. We find that the negative impact on

employment of minimum wage increases in relative terms is not robust. The positive impact on costs is also fragile. Our time series analysis indicates no clear relationship between minimum wages and employment in relevant demographics or sectors in Minnesota and Wisconsin.

References

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Data Appendix

Data file: http://www.ssc.wisc.edu/~mchinn/chinn_johnston_data_nov2018.xls

Employment by age, civilian employment over age 16: BLS Current Population Survey.

Employment in limited service eating places, nonfarm payroll employment: BLS Current Establishment Survey.

Minimum wages, by state, by month: Equitable Growth, Historical State and Substate Minimum Wage Dataset. https://github.com/equitablegrowth/VZ_historicalminwage/releases

Consumer Price Index for All Urban Consumers, Food away from home in Minneapolis-St.Paul-Bloomington, MN-WI (CBSA), Index 1982-1984=100, Annual, Not Seasonally Adjusted, and in Milwaukee-Racine, WI (CMSA). Source: BLS via FRED.