Does Employment Respond Differently to Minimum Wage Increases in the Presence of Inflation Indexing?*

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Abstract The minimum wage literature focuses heavily on "the" employment elasticity of minimum wage increases. In contrast, this paper studies heterogeneity in minimum wage policy. Specifically, we study whether minimum wage increases lead to differential employment effects in states where minimum wages are indexed to inflation. We find evidence they do. To the best of our knowledge, this paper is the first to empirically study inflation indexing. On balance, our results imply that the immediate disemployment effect of an increase in the minimum wage in a state that indexes its minimum wages to inflation is around 3 times the magnitude of the disemployment effect associated with a nominal increase in the minimum wage. Our finding is robust across both "canonical" and "county-pair" models, though it does not hold in our most restrictive specification. Examining the timing of the employment response reveals the disemployment effect associated with a change in the minimum wage is concentrated in the first 14 quarters after a state begins indexing minimum wages to inflation.

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1 Introduction

The size of the minimum wage literature is unsurprising given the minimum wage's importance in assessing different models of the labor market and its prominence in policy debates. It is a credit to today's economists that, despite hundreds of existing studies[1], in the past decade the minimum wage literature continues to grow, introducing productive debate over new empirical methods (e.g., Dube, Lester, Reich, 2010; Neumark, Salas and Wascher, 2014; Clemens and Wither, 2014; Clemens, 2015; Dube and Zipperer, 2015; Clemens and Strain, 2017; Clemens and Strain, 2018) and extending minimum wage analysis to study new topics – including, among others, the effect of minimum wages on prices, turnover, and worker performance (Hirsch, Kaufman, and Zelenska, 2015), on poverty (Sabia and Burkhauser, 2010), on where immigrants choose to locate (Orrenius and Zavodny, 2008), on worker flows (Gittings and Schmutte, 2016), on health outcomes (Horn, Maclean, and Strain, 2017), on job growth (Meer and West, 2015), and even on youth drinking and drunk driving (Sabia, Pitts, and Argys, 2014) – often motivated by a richer understanding of the economics of minimum wages.

We build on these developments by continuing to move the literature beyond "the" employment impact of minimum wages. This paper studies heterogeneity across minimum wage policy design. We ask whether indexing minimum wages to inflation – a relatively new policy – leads to differential employment effects of minimum wage increases. Specifically, we ask whether the employment response to minimum wage increases is different in states that index their minimum wages to inflation than in states that do not index.

We find evidence that it is. On balance, we find that the disemployment effect of increasing the minimum wage in a state that indexes its minimum wage to inflation is around 3 times the magnitude of the disemployment effect associated with a nominal minimum wage increase. To the best of our knowledge, our paper is the first to empirically study the effects

[1] A recent Google Scholar search found over 7,000 papers with the exact phrase "minimum wage" in the title of the article.

of this minimum wage policy design.

Given costly capital investment and transition costs, firms may be reluctant to change their labor force specifically and production functions generally in response to a nominal minimum wage increase under the expectation that such an increase will be temporary, eaten away as prices rise. This suggests that indexing minimum wages to inflation – and thereby making them "permanent" – could induce firms to respond very differently to minimum wage increases. If firms think they will have to live with higher and growing minimum wages into the long term, they may be much more willing to adjust their production functions, including their labor forces, in response to the increase. In addition to affecting continuing firms, entry and exit decisions by firms may be affected by the policy, driven in part by their capital-labor ratios and their ability to adjust those ratios (Aaronson et al., 2018).

It is interesting that while we find a differential employment response to minimum wage increases between states that do and do not index their minimum wages to inflation, we do not find a differential wage response. That is, wages do not increase more following minimum wage increases in states that do index relative to states that do not. Consistent with the argument above, this suggests firms are differentially adjusting employment for reasons other than a larger wage bill. Our results suggest the permanent nature of the increase may be one such reason.

Our paper is related to Sorkin (2015), which differentiates between the employment effect of temporary and permanent minimum wage increases by building on the putty-clay model used in Gourio (2011) and Aaronson and French (2007). In this model, firms can only adjust labor demand if the amount of capital in use is being changed as well. Since capital adjusts slowly, labor demand responses to minimum wage changes will also be larger in the long run. Using a version of his model calibrated to the restaurant industry, Sorkin simulates the employment response to different types of minimum wage increases and finds much stronger (i.e., more negative) responses to permanent increases. We build on Sorkin by directly testing whether permanent increases admit different employment responses than nominal increases.

There is an active debate in the literature on the best way to estimate minimum wage effects – whether the canonical two-way fixed effects estimator or the "border-county-pair" identification strategy applied on a sample of "contiguous-border counties" is the preferred method (see, e.g., Neumark, Salas, and Wascher, 2014). We do not attempt to settle that debate, and instead estimate models on samples in the spirit of both methods. Our findings are robust across methods.

More specifically, we estimate three models: A canonical two-way fixed effects model estimated on data from all available counties, a border-county model with county-pair and period effects estimated on contiguous-border counties, and a border-county model with county-pair-by-period effects, also estimated on contiguous-border counties (the last following Dube, Lester, and Reich, 2010). We study employment in the restaurant industry (the industry with the largest share of minimum wage workers) to maintain continuity with the previous literature. In the first two models, we find a differential employment impact of indexing minimum wage increases to inflation of -0.344 and -0.268, respectively – 3.34 and 2.97 times larger than the effect we find for nominal minimum wage increases. Both of these estimates are statistically significantly different than zero. These results are similar in magnitude to the long-run elasticities in Sorkin's simulations. In the third model, the coefficient on the impact of inflation indexing is an order of magnitude smaller than in the other models (0.036) and not statistically significant.

In addition, we study the dynamics of the policy response. We find the differential employment response to minimum wage increases between states that index their minimum wages to inflation and states that do not index lasts for 14 quarters following the implementation of the indexing policy. This dynamic response is consistent with adjustments to permanent minimum wages that might take place within firms – changing capital-labor mix in production, for example – and within an industry, through the entry of relatively capital-intensive firms and the exit of relatively labor-intensive firms (Aaronson et al., 2018). These dynamics further suggest that firms react quite differently to permanent and temporary minimum wage increases.

We then estimate the same three models, but allow the differential response in indexing states to vary by whether 14 quarters have elapsed after indexing is implemented. In these models, the magnitude of the differential employment response to minimum wage increases in indexing states is similar to models described above, and the coefficient of interest is estimated with precision using conventional levels of statistical significance in all three models. After 14 quarters post-implementation have passed, there is no longer a differential employment response in indexing states.

2 Related Literature

The economics literature on minimum wages is massive, and we do not attempt to survey it here. For excellent surveys, see Neumark and Wascher (2008), Card and Krueger (1995), and Brown (1999). We provide a short review of the literature that is directly relevant to our paper. Specifically, we survey the literature as it relates to inflation-adjusting minimum wages and to empirical strategies.

2.1 Inflation Indexing and Minimum Wages

Economics majors are often surprised by the saw-tooth pattern of inflation-adjusted minimum wages over time. This commonly used graph is a useful heuristic to teach undergraduates the important lesson that inflation erodes nominal values over time.

It is less remarked upon by economists and the policy community that the saw-tooth pattern indicates that the real value of the minimum wage has had a (relatively) flat trend for several decades. In other words, in real terms, the minimum wage hasn't experienced nearly as much of an increase of any sustained length of time as its nominal value suggests.[2]

[2]The inflation-adjusted trend is obviously sensitive to the measure of inflation used in the calculation. We use the "Consumer Price Index for All Urban Consumers (CPI-U)" provided by the BLS, but broadly speaking, the point remains.

We present a version of this graph in Figure 1. The dashed line is the nominal, statutory federal minimum wage. The solid line is the nominal wage adjusted for a measure of consumer price inflation. Since 1990, the real minimum wage has fluctuated between $6 per hour and $8 per hour, rising when the statutory minimum is increased and falling thereafter.

This pattern over time for the real value of minimum wages has significant implications for interpreting the existing literature on minimum wages. Most of the minimum wage literature estimates short-run employment responses – often contemporaneous, within quarter. Short-run responses don't leave much room for employment effects that are driven by the slower process of substituting capital for labor, or by other adjustments that likely take longer than three months (Baker, Benjamin, and Stranger, 1999; Hamermesh, 1995). Still, the literature's focus on the short-run response of employment to minimum wage increases is reasonable given relatively high turnover rates and hours flexibility in industries that employ large numbers of minimum wage workers (Brown, Gilroy, and Kohen, 1982; Card and Krueger, 1995).

The literature's focus on the short-run response is also reasonable if firms expect the minimum wage increase to be temporary, and therefore don't engage in structural changes to their production functions in response to it. But the employment elasticity of an inflation-adjusted – permanent – minimum wage increase may be very different than the employment elasticity of a nominal, temporary minimum wage increase (Sorkin 2015).

In addition to Sorkin (2015), Aaronson et al. (2018) attempt to differentiate between short- and long-run responses to minimum wage increases using a putty-clay model. Using a calibrated model, they find long-run employment elasticities that are three to five times as large as short-run elasticities. Industry-level adjustment to minimum wage increases occurs not within continuing restaurants – which can't change employment after entry in a putty-clay framework – but through the slower process of entry by capital-intensive restaurants and exit by labor-intensive restaurants. While we do not explicitly study entry and exit, our direct test of whether inflation indexing (which can be thought of as a permanent, long-run increase in the minimum wage) differentially affects employment relative to nominal minimum wage increases generates estimates that are in the same range as the calibration results in Aaronson et al.[3]

These issues were understood clearly seven decades ago by Richard A. Lester, writing in the *American Economic Review* in March 1946: "From much of the literature the reader receives the impression that methods of manufacture readily adjust to changes in the relative costs of productive factors. But the decision to shift a manufacturing plant to a method of production requiring less or more labor per unit of output because of a variation in wages is not one that the management would make frequently or lightly. Such action involves the sale (at a loss?) of existing facilities not usable under the new method and the purchase of new facilities and equipment to replace those discarded, to say nothing of retraining workers and readapting the whole organization. Such new investment presumably would not be undertaken simply to reduce a current and expected net loss, or *if there was a likelihood that the wage change would only be temporary* or that the cost relationships between factors would be considerably altered again in the near future" (italics ours).

Minimum wage increases have been temporary for the entire existence of modern empirical labor economics – until the past several years. The literature stretching back at least to Lester suggests that forward-looking firms may react quite differently to these "permanent" increases in the cost of low-skilled labor than they do to temporary increases.[4] We seek to test that in this paper.

[3]Our estimates do indirectly capture the effects of entry and exit because we study the total level of employment in each county.

[4]A different strand of the literature has used inflation to identify the impact the minimum wage on employment, by studying workers who were "freed" from the minimum wage as real wages increased, but the minimum wage did not (Abowd, Kramarz and Margolis 1999; Abowd et al 2000a, Abowd et al 2000b). These papers find mixed results using longitudinal data from France and the United States, with two papers finding evidence of negative employment elasticities (1999, 2000a), but another finding no strong evidence (2000b).

2.2 Empirical Approach

There is currently a lively debate among labor economists over the appropriate econometric strategy for uncovering the employment effects of minimum wage increases. One strategy can be likened to case studies. In a seminal paper, Card and Krueger (1994) provided a case study of New Jersey's 1992 minimum wage increase by comparing New Jersey employment with employment in neighboring Pennsylvania, both before and after the increase. Dube, Lester, and Reich (2010) significantly advanced this empirical approach by generalizing it to the entire nation. In their paper, they compare counties that share a border but are located in different states – and whose workers are thus subject to different minimum wage laws – to estimate the employment effect of minimum wage increases. They do not find a statistically significant effect of minimum wages on employment.

The case study method is motivated by the observation that variation in minimum wages across states is not random and that employment trends vary significantly across states as well. The risk of spurious correlations between minimum wage increases and employment may be large. To address this, the case study method focuses its analysis on contiguous counties that share a state border, allowing for the inclusion of (in one version) border-county-pair-by-period effects, intended to control for common local area shocks experienced by both counties and to isolate the effect of the minimum wage policy change using the associated within variation.

The appeal of the case study method is clear, and its methods to identify treatment effects are a significant contribution to applied econometrics. But it has not been universally embraced by economists. Because these border-county specifications include thousands of fixed effects (county-pair-by-period effects, county-pair effects, etc.), it is natural to ask whether these models are oversaturated. In addition, these specifications exclude the many counties that do not lie on a state border, potentially ignoring a significant amount of useful information.

In a paper colorfully titled "Revisiting the Minimum Wage-Employment Debate: Throwing Out the Baby with the Bathwater," Neumark, Salas, and Wascher (2014) write the following: "We think the central question is whether, out of their concern for avoiding minimum wage variation that is potentially confounded with other sources of employment change, Allegretto, Dube, and Reich (2011) and Dube, Lester, and Reich (2010) have thrown out so much useful and potentially valid identifying information that their estimates are uninformative or invalid; that is, have they thrown out the baby along with – or worse yet, instead of – the contaminated bathwater? Our analysis suggests they have." Economists who find this argument convincing tend to support the canonical two-way fixed effects econometric model, which estimates the employment elasticity by exploiting minimum wage changes across jurisdictions using jurisdiction and time fixed effects.

In this paper, we do not attempt to adjudicate this important debate. Instead, we employ strategies in the spirit of both approaches, and present results generated both on a county-pair sample using border-county econometric techniques and on the traditional all-county sample using the canonical econometric specification.

3 Data

The Quarterly Census of Employment and Wages (QCEW) program, formerly known as the ES-202 program, is a cooperative statistical program administered by the Bureau of Labor Statistics (BLS) and state workforce agencies. The data provide monthly employment levels, quarterly wages, and quarterly establishment counts by industry for the U.S. as a whole and at the state and county levels.

The QCEW data are based on quarterly reports that are submitted by nearly all employers in the U.S., Puerto Rico, and the U.S. Virgin Islands. Included in the employment numbers are workers who are covered by the U.S. Unemployment Insurance system – 97 percent of all wage and salary civilian employment.[5]

[5]Workers who are not in the QCEW employment counts include self-employed workers, most agricultural workers on small farms, all members of the Armed Forces, elected officials in most states, most employees of

This paper uses county-level QCEW data by industry from the first quarter of 1990 through the fourth quarter of 2016. The restaurant sector is the largest employer of minimum wage workers, and therefore it has received most of the attention in the literature, (including Dube, Lester, and Reich 2010 (hereafter, DLR)). We therefore focus our main analysis on privately owned restaurants which include the industry groups full-service restaurants and limited-service eating places.[6] In the robustness section we consider four other major industries.[7]

It is worthwhile to note that many restaurant workers receive tips as a significant part of their compensation. Although the tip credit reduces the base wage employers are required to pay these workers, their total wage needs to comply with the statutory minimum wage. That said, most tipped workers earn far more than the federal minimum wage,[8] so their employment is likely to not be directly affected by changes in the minimum wage.

Our earnings variable for restaurant workers is the average across the QCEW's average weekly wage in those industries. To calculate quarterly employment, we take the average across the three months of employment data in each quarter. We then sum across the two industries in our data to obtain total restaurant employment.[9]

We create two samples for our analysis. The first sample is a county-level dataset that includes 2,776 counties in the United States. The second sample consists of 1,151 adjacent border-county-pairs; we use the list of county-pairs generously provided by DLR to create this dataset. In both samples, counties have at most 108 quarters of data between the first

railroads, some domestic workers, most student workers at schools, and employees of certain small nonprofit organizations.

[6]The QCEW uses the North American Industry Classification System (NAICS). From 1990 through 2006 and from 2007 through 2010, the QCEW uses NAICS 2002 and NAICS 2007, respectively. After 2010, the QCEW uses NAICS 2012. Full-service restaurants and limited-service eating places change codes from NAICS 2002/2007 to NAICS 2012; they shift from 7221 to 722511 and 7222 to 722513, respectively.

[7]See the robustness section for analyses on other industries: accommodation and food services (NAICS 72), retail trade (NAICS 44-45), manufacturing (NAICS 31-33), and health care and social assistance (NAICS 62).

[8]The BLS reports the mean hourly wage for "Waiters and Waitresses" (OCC 35-3031) to be $12.15 as of May 2017.

[9]In our samples, we exclude observations for which the QCEW's disclosure code is non-missing; a non-missing disclosure code indicates that the data are suppressed to protect confidentiality.

quarter of 1990 and the fourth quarter of 2016.[10] In both samples, Alaska, Puerto Rico, and the U.S. Virgin Islands are excluded from the sample.[11] In the contiguous county sample, Hawaii is excluded as it does not border another state.

In addition to using data from the QCEW, our analysis uses state minimum wage data and population data. We use government-sourced data and data from DLR to populate our database of minimum wages.[12] The Census Bureau also provides annual, county-level population estimates. We keep only those estimates that approximate the number of people living in the county as of July 1 of the relevant year.

Table 1 reports the states that have indexed their minimum wages to inflation.[13] Washington was the first state to enact this policy in 1999, and then Oregon followed suit in 2003. Eight states (Arizona, Colorado, Florida, Missouri, Montana, Nevada, Ohio, and Vermont) around the country adopted the policy between 2005 and 2007, and three states (Alaska, New Jersey, and South Dakota) and the District of Columbia have recently started indexing their minimum wages to inflation. Figure 2 shows both counties along a state border with a minimum wage differential at some point in our sample (the light-gray counties) and also those counties in states that adopted the indexing policy (the dark-gray counties). Our sample consists of both sets of counties, with the dark-gray counties providing the variation used to identify our main result.

Table 2 reports summary statistics for both the all-county sample and the contiguous-border-county-pair sample. While the county-pair sample is not randomly selected from the all-county sample, the two groups appear similar for most characteristics. The county-pair sample has slightly lower levels of restaurant employment, but the two groups have similar

[10] We analyze balanced panels as a robustness check.

[11] Alaska is excluded because their county definitions change too much over the time period to be able to establish a consistent series.

[12] In 2004 San Francisco started setting its minimum wage independent of the state of California. We incorporate its minimum wage rates at the county-level. For more information on San Francisco's minimum wage, see "Minimum Wage Ordinance (MWO)," City and County of San Francisco. Santa Fe, NM and Albuquerque, NM also set their own minimum wages independent of New Mexico. We do not take into account those cities' minimum wages as they are not set at the county level.

[13] The reported year is the year the policy became effective.

restaurant earnings and minimum wages.

The top panel in Table 3 reports summary statistics for the all-county sample broken down by type of state. The first two columns report the mean and standard deviation, respectively, of variables for non-indexing states. The third and fourth columns report the mean and standard deviation of variables for states when they first begin indexing, and the final two columns report summary statistics for the quarters after indexing states have adopted the policy. The bottom panel of Table 3 is analogous to the top panel and reports summary statistics for the contiguous-border-county-pair sample.

Table 3 provides a first look at whether states that adopt the inflation-indexing policy are different from states which do not. States that adopt the policy are larger and report higher earnings on average. Indexing states also report higher minimum wages and make larger changes in the minimum wage when they first adopt the policy. However, after the policy has been enacted, the subsequent changes in the minimum wage are smaller than are changes in non-indexing states. These comparisons hold in both the all-county sample and the contiguous-border-county-pair sample.

4 Empirical Methods

We start by following the standard approach in the literature and estimate a canonical difference-in-differences model of the following form:

$$ln(y_{it}) = \alpha + \beta ln(MW_{it}) + X_{it}\Gamma + \phi_i + \tau_t + \epsilon_{it} \quad (1)$$

where y_{it} is the log of employment in the restaurant sector in county i and quarter t. The independent variable of interest is the log of a county-quarter's minimum wage, and the coefficient of interest is β. We include county effects, represented in equation (1) as ϕ_i, and quarter effects, represented as τ_t. X represents a set of county specific controls. County-level population and the unemployment rate are included in order to hold constant demographic and business-cycle changes.

We extend these models to allow for heterogeneous impacts of the minimum wage by interacting a dummy variable equal to one for state-periods in which the minimum wage is indexed to inflation with the minimum wage variable. The interaction term captures whether the impact of the minimum wage on employment is affected by the minimum wage being indexed to inflation. This model specification is:

$$ln(y_{it}) = \alpha + \beta ln(MW_{it}) + \gamma[ln(MW_{it}) * indexed_{it}] + \eta \ indexed_{it} + X_{it}\Gamma + \phi_i + \tau_t + \epsilon_{it} \quad (2)$$

where γ captures the differential impact of inflation indexing. We demean $ln(MW)$ for each sample so the interpretation of the η coefficient is in reference to the average minimum wage and not a minimum wage of 0.

It is important to be clear about the counterfactual we are considering. We are interested in comparing the immediate responsiveness of a minimum wage increase in a state without indexing to the immediate responsiveness of a minimum wage increase in a state with indexing. This differential responsiveness is captured in the coefficient on the interaction term between the (log) level of the minimum wage and the dummy variable for whether the state in question indexes its minimum wage to inflation.

There are well-known concerns about the standard difference-in-differences model, arising most generally from the fact that a state's minimum wage is not randomly assigned. The county effect is a powerful control, holding constant all time-invariant factors for each county. But even still, factors that move (perhaps slowly) over time could drive both lower employment in a state and could influence a state to adopt a higher minimum wage. This concern also applies to states that choose to index their minimum wage to inflation. We test for this concern by analyzing whether states that eventually adopt inflation-indexing policies had larger disemployment effects before they adopted the indexing policy.

In addition, we estimate models in the spirit of the innovative research design employed by DLR and estimate β on a contiguous-border-county-pair sample identified using border-county-pair specifications. Specifically, we limit the estimation sample to counties that share a common border but that are located in different states (county pairs), and employ a border-county econometric strategy, with two variants of this equation:

$$ln(y_{ipt}) = \alpha + \beta ln(MW_{it}) + X_{it}\Gamma + \phi_i + \psi_p + \tau_t + \epsilon_{ipt} \tag{3}$$

where y_{ipt} represents the employment in the restaurant sector in county i that is part of county-pair p at time t, and X_{it} and MW_{it} are the same as equation (1). We estimate two border-county models. One model includes the county effect (ϕ_i), county-pair effect (ψ_p), and period effect (τ_t) as shown in equation (3). The second model replaces the county-pair and period effect with a county-pair-by-period effect (ψ_{pt}). As with the canonical model, both county-pair models control for the state unemployment rate and for county population.

While we do control for county population, we do not weight by county population. Weighting the regressions would allow larger counties to contribute more information to the regression estimates. Not weighting is equivalent to giving equal weight to each county, regardless of population. There are good arguments both for weighting and for not weighting. Our regressions are unweighted to maintain comparability with DLR, and with the broader literature.[14]

The first of our two border-county specifications exploits the Card and Krueger logic by using within-border-county-pair variation to estimate the employment effect of minimum wage increases, but, *contra* DLR, does not restrict the effect to be estimated on within-border-county-pair-*by-period* variation. Given the dynamic nature of the effects we are estimating, broadening the "comparison" of two counties in different states within the same period to two counties in different states across periods is interesting. We present both border-county models in our results.

[14] An exception to the common practice of not weighting by population is Neumark, Salas, and Wascher (2014), who find stronger disemployment effects when using population weights.

We extend these models to study the heterogeneous effect of inflation indexing in the same way as with the canonical models. The counterfactual interpretation of the border-county-pair models is the same as in the canonical models, as well.

Whether the border-county-pair research design is most appropriate is a subject of active debate in the literature. We do not attempt to adjudicate this debate. Rather, for each of the specifications used in the following analysis, we estimate both the standard canonical, all-county specification and the border-county-pair specifications on the border-county-pair sample.

5 Results

Table 4 reports the results of the traditional analysis of the minimum wage, measuring its impact on earnings and employment. Column 1 reports the results of the canonical model estimated on the all-county sample, and columns 2 and 3 report results from border-county specifications estimated on the border-county-pair sample. Model estimates reported in each column include different combinations of control variables, which are reported in the table.

In all three specifications, the impact of changes in the minimum wage on weekly wages is statistically significant with the estimates ranging from 0.213 to 0.236, as reported in the top panel. The bottom panel reports the estimates for the impact of the minimum wage on employment. The results we find are consistent with the minimum wage literature: Depending on the fixed effects scheme employed and the sample on which the model is estimated, the coefficient on the minimum wage is estimated with or without precision. Precise estimates find employment elasticities just under -0.2, consistent with the "consensus range" of estimates found in studies that employ the canonical research design.

The results from the canonical model estimated on the all-county sample are reported in column 1. We find an employment elasticity of -0.185. Our first border-county specification – estimated on the border-county-pair sample with county-pair effects, but not with county-pair-by-period effects – is reported in column 2. This specification also includes county fixed effects and period fixed effects, as described in the table. Using this specification and sample, we find an employment elasticity of -0.153, close to the all-county estimate. The third model we estimate is reported in column 3, is estimated on the county-pair sample, and includes county and county-pair-by-period effects. The coefficient on the minimum wage is estimated imprecisely, with a magnitude close to zero.

Table 5 reports results from estimating the differential impact of inflation-indexing minimum wages on earnings and employment. The structure of the table is similar to that of Table 4, with column 1 reporting results from estimating the canonical model on the all-county sample and columns 2 and 3 reporting results from estimating border-county models using the county-pair sample. The coefficient of interest – the coefficient on the interaction term, comparing the immediate responsiveness of a minimum wage increase in a state that has enacted inflation indexing to the immediate responsiveness of a minimum wage increase in a state without indexing – is reported in the third row of each panel.

In the two specifications with precisely estimated coefficients of interest, reported in columns 1 and 2, the coefficient is larger in magnitude than the coefficient on the minimum wage variable. These estimates suggest that firms' employment response to an inflation-indexed – i.e., permanent – minimum wage may be significantly larger than their response to a nominal minimum wage increase. More specifically, in both specifications we find that increases associated with inflation indexing leads to a response around 3 times greater than traditional, nominal increases.

Results from our all-county specification are reported in column 1, and find an employment elasticity of -0.147. The coefficient on the interaction term, which captures the additional effect of inflation indexing, is -0.344. According to these results, the employment effect of inflation indexing is approximately 3.3 times the employment effect of nominally increasing the minimum wage. Our first border-county specification is again reported in column 2. Here, the employment elasticity is estimated to be -0.136, and the additional impact of indexing the minimum wage to inflation is estimated to be -0.268 – the effect of indexing is close to three times as large as the standard employment effect. Column 3 reports the results of our second border-county specification, which uses within-county-pair-by-period variation. Our estimate of the effect of indexing is an order of magnitude smaller than in the other two specifications and close to zero (0.036), and it lacks statistical significance.

It is interesting to note that we find no wage effect of indexing minimum wages to inflation. In the top panel of Table 5 – which reports the effect of permanent minimum wages on earnings – we find that minimum wage increases increase wages, but that indexing the minimum wage to inflation provides no additional increase in wages. So the employment effects of permanent minimum wages that we find are likely not driven simply by the higher wages that are a consequence of indexing. Instead, firms may be responding to the permanency of minimum wage increases, knowing that those increases won't be eroded over time by price inflation, by changing their production functions to rely less on workers. At the industry level, it may be that net employment is affected differentially due to entry and exit decisions driven in part by labor utilization. This hypothesis is consistent both with the absence of a wage response to indexing, and with the presence of a stronger disemployment effect of indexing relative to nominal increases.

In addition to the average effect of inflation indexing, we are interested in the dynamics of the response, illustrated in Figure 3. There are three lines in the figure, each corresponding to one of our three specifications.[15] Specification 1 corresponds to the canonical model estimated on the all-county sample. Specifications 2 and 3 correspond to the two county-pair models estimated on the contiguous-border-county sample. Each point on the graph corresponds to an estimate of the interaction term – the coefficient of interest discussed above – for every two quarters after indexing has begun. Stated generally, the point on the graph for each of the three series at quarter t is equal to the coefficient on the minimum

[15]We drop observations for the three states that have started inflation indexing since 2014 (District of Columbia, New Jersey, and South Dakota), as there has not been enough time after implementation to analyze dynamic effects.

wage variable interacted with a dummy variable equal to one if state s is indexing in quarter t or $t-1$, and equal to zero for all other observations (even if state s continues to index after quarter t).

The three series each follow a similar pattern. For every quarter after indexing, the employment response to minimum wage increases in state-quarters that index their minimum wages to inflation is more negative than the quarter before for two to three years. Thereafter, the responsiveness is less negative, until 14 quarters following the onset of indexing, when the effect stabilizes.

For more precision, we reestimate all three specifications in Table 6. The only difference between the models reported in Table 6 and Table 5 is that in Table 6 we create two dummy variables for whether a state-quarter indexes its minimum wage to inflation, and we create two interaction terms between the indexing variable and the (log) level of the state-quarter minimum wage. The first indexing dummy variable, labeled "Inflation-Indexed Pre 14" in Table 6, is equal to one if a state-quarter both indexes its minimum wage to inflation and is in the first 14 quarters of doing so. The second indexing dummy variable, labeled "Inflation-Indexed Post 14," is equal to one if a state-quarter both indexes its minimum wage to inflation and has been indexing for over 14 quarters. The interaction terms are defined analogously.

The results reported in Table 6 confirm the presentation in Figure 3. The coefficients on the interaction term between the minimum wage and the dummy variable "Inflation-Indexed Post 14" are estimated without precision. The coefficients on the interaction term between the minimum wage and the "Inflation-Indexed Pre 14" variable are statistically different from zero for all three specifications.

The results measuring the differential effect of inflation indexing in the first 14 quarters following a state's implementation of inflation indexing are, taken as a whole, stronger than the results measuring the differential effect for all quarters following indexing (shown in Table 5), both in magnitude and in statistical significance. Importantly, the effect is statistically significant in all three models when studying only the first 14 quarters following the implementation of indexing, whereas the coefficient of interest in the models presented in Table 5 – in which we pool all post-implementation quarters – is statistically significant in two of the three models.

Overall, we interpret the results presented in Table 6 as strong evidence in favor of the hypothesis that the immediate responsiveness of employment to a minimum wage increase in a state with indexing is larger and more negative than the immediate responsiveness of employment to a minimum wage increase in a state without indexing, and that this effect has important dynamics. These dynamics might be driven, for example, by within-industry exit of labor-intensive firms and entry of capital-intensive firms (Aaronson et al., 2018.) and by capital-labor adjustments by continuing firms (Sorkin, 2015). Overall, the evidence presented here is of a relatively long adjustment process when compared to nominal minimum wage increases, perhaps driven by the permanent nature of the increase in the presence of inflation adjustment.

6 Robustness Checks

If it's the case that states that index their minimum wage to inflation have always responded differently to minimum wages than other states, then the results shown above may not be due to the inflation-indexing policy, but instead due to some other factor common to all the indexing states. To check whether this is the case, we construct a dummy variable that is equal to 1 for states which adopt the indexing policy, for the periods before they start inflation indexing. We also remove the observations for when inflation indexing is actually in effect. We then interact this dummy variable with the local minimum wage in a similar manner as before. The interaction term on this variable then checks whether these indexing states have historically responded differently to minimum wages than did states that have never indexed their minimum wages to inflation.

Table 7 presents these results. The upper panel presents the results for earnings and the bottom panel for employment.[16] In all three specifications of the bottom panel, the coefficient on the interaction term is close to zero and is not statistically significant. This suggests that states which eventually adopt the policy of indexing their minimum wages to inflation do not respond differently to changes in minimum wages prior to the implementation of indexing, relative to non-indexing states.

We next check whether the results presented above are sensitive to choices we made when conducting the analysis. We first check the sensitivity of our results when limiting our sample to a balanced panel. We then examine whether the effect of indexing the minimum wage to inflation is similar in other sectors of the economy. These results are presented in Table 8. The table presents only the results when using employment as the dependent variable.

The first panel of Table 8 presents the results using a balanced sample of counties. The results from the balanced sample are qualitatively similar to the main results.

This paper focuses on restaurant employment. However, other sectors could also be impacted by permanent minimum wage changes. To examine this possibility, we reestimate our employment results using data from other sectors, specifically the manufacturing (NAICS 31-33), retail (NAICS 44-45), accommodation and food services (ACFS) (NAICS 31-33) and health care and social assistance (NAICS 62) sectors. These results are presented in the bottom four panels of Table 8.

Across these other four sectors, only employment in ACFS responds to indexing in a similar manner as restaurant employment. This is not entirely surprising as restaurants are a significant component of ACFS. Results for the manufacturing, retail, and health care sectors do not show any significant response to inflation-indexed minimum wage increases. This is most likely due to the low fraction of workers in these industries who earn wages near the minimum wage.

[16] The main effect of the before-indexing dummy is excluded as its collinear with the county fixed effects.

7 Conclusion

Rather than focusing on "the" employment effect of increasing the minimum wage, we study heterogeneity in minimum wage policy design. Specifically, we study whether the immediate responsiveness of employment to a minimum wage increase is different in states that index their minimum wages to inflation relative to states that do not.

We find evidence that it is. To the best of our knowledge, this paper is the first to empirically study the increasingly common policy design of indexing the minimum wage to inflation. On balance, our results show the disemployment effect of inflation-indexed minimum wage increases is around 3 times the magnitude of the disemployment effect associated with nominal minimum wage increases. Our finding is robust across both canonical and county-pair models, although it does not hold in the most restrictive specification. Interestingly, this differential employment response does not seem to be driven by a differential wage response.

We go on to examine the dynamics of the disemployment responses, and show the response is concentrated within the first 14 quarters after the inflation-indexing policy is adopted. After that time, states that have adopted the policy no longer exhibit a differential response to increases in the minimum wage. We interpret this as evidence that adjustment, both at the industry and firm levels, takes some time, after which firms are in a position to absorb expected inflation adjustments to the minimum wage in a way similar to nominal increases.

These results should provide a note of caution to policymakers considering adopting the policy of indexing minimum wage to inflation. Inflation-adjusted minimum wages may offer businesses more certainty over their future wage bill than sporadic nominal increases. This policy could admit more employment stability, especially over the long run, after firms and industries have adjusted. At the same time, the policy works to make labor permanently more expensive, in contrast to nominal minimum wage increases, which erode over time with inflation. Our results show that firms' response to a permanent change in the minimum wage is stronger than to temporary, nominal changes.

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Table 1: State Level Adoption of Inflation-Indexed Minimum Wages

State	Year Enacted
Alaska	2015
Arizona	2007
Colorado	2007
District of Columbia	2014
Florida	2005
Missouri	2007
Montana	2007
Nevada	2007
New Jersey	2014
Ohio	2007
Oregon	2003
South Dakota	2015
Vermont	2007
Washington	1999

Notes: The date corresponds to the year of the first minimum wage increase that was a part of the law that established inflation indexing became effective.

Table 2: Descriptive Statistics of QCEW Data, 1990-2016

This table reports descriptive statistics for the QCEW data. The first two columns report the mean and standard deviation for the all-county sample respectively. The second two columns report the mean and standard deviation of the contiguous county-pair sample respectively.

	All-County Sample		County-Pair Sample	
	Mean	SD	Mean	SD
Variable	(1)	(2)	(3)	(4)
Population, 2000	151,588	(391,777)	140,953	(281,100)
Population Density	390	(2,190)	423	(2,876)
Land Area (square miles)	992	(1,444)	1,316	(2,289)
Overall Private Employment	52,134	(153,707)	50,185	(126,685)
Overall Private Earnings ($)	556	(186)	564	(193)
Restaurant Employment	3,772	(10,279)	3,503	(7,831)
Restaurant Earnings ($)	196	(59)	197	(60)
Accom. and Food Svc. Employment	5,855	(15,718)	5,837	(15,255)
Accom. and Food Svc. Earnings ($)	215	(72)	220	(79)
Retail Employment	7,247	(18,254)	6,875	(14,059)
Retail Earnings ($)	378	(98)	377	(99)
Manufacturing Employment	7,418	(20,532)	6,981	(13,953)
Manufacturing Earnings ($)	724	(282)	731	(285)
Health Care Employment	10,010	(23,030)	9,787	(19,566)
Health Care Earnings ($)	591	(195)	600	(193)
Minimum Wage	5.78	(1.34)	5.78	(1.35)
Number of Observations	206,368		156,990	
Number of Counties	2,776		1,012	
Number of County-Pairs			1,151	
Number of States	50		49	

Notes: All measures of “earnings” are the reported ”Average Weekly Wage” in the QCEW. The District of Columbia is included in both samples, whereas Alaska is excluded from both, and Hawaii is excluded from just the county-pair sample.

Table 3: Descriptive Statistics of QCEW Data by State Regime, 1990-2016

This table reports descriptive statistics for the QCEW data. The top panel reports statistics for the all-county sample whereas the bottom panel reports statistics for the county-pair sample. Columns 1 and 2 are for states that have not indexed their minimum wage to inflation. Columns 3 and 4 are for states when they first index their minimum wage to inflation. Columns 5 and 6 are for indexing states after they indexed their minimum wage to inflation.

	Non-Indexing States		At Indexing States		After Indexing States	
	Mean	SD	Mean	SD	Mean	SD
Variable	(1)	(2)	(3)	(4)	(5)	(6)
			All-county sample			
Population, 2000	149,125	(394,781)	170,478	(338,877)	180,530	(354,048)
Population Density	401	(2,272)	331	(1,049)	259	(694)
Land Area (square miles)	942	(1,347)	1,521	(2,247)	1,576	(2,202)
Overall Private Employment	51,051	(154,050)	61,406	(143,180)	64,827	(149,233)
Overall Private Earnings ($)	547	(185)	607	(203)	662	(162)
Restaurant Employment	3,641	(10,185)	4,734	(10,343)	5,316	(11,221)
Restaurant Earnings ($)	191	(57)	214	(52)	256	(52)
Accom. and Food Svc. Employment	5,648	(15,260)	7,309	(18,927)	8,094	(19,879)
Accom. and Food Svc. Earnings ($)	209	(69)	239	(81)	280	(74)
Retail Employment	7,083	(18,127)	8,570	(18,537)	9,170	(19,595)
Retail Earnings ($)	370	(97)	419	(75)	464	(73)
Manufacturing Employment	7,518	(21,062)	6,536	(13,666)	6,257	(12,812)
Manufacturing Earnings ($)	712	(281)	789	(322)	863	(259)
Health Care Earnings ($)	578	(192)	618	(163)	720	(174)
Health Care Employment	9,819	(23,070)	10,494	(19,286)	11,879	(22,634)
Minimum Wage	5.62	(1.27)	6.71	(0.67)	7.63	(0.75)
Mininum Wage Change (excl. zeros)	0.54	(0.23)	1.21	(0.46)	0.21	(0.13)
Number of Observations	190,052		418		15,898	
Number of Counties	2,753		418		494	
Number of States	50		13		13	
			County-pair sample			
Population, 2000	140,780	(283,500)	146,816	(258,161)	142,829	(251,670)
Population Density	436	(2,986)	410	(1,427)	261	(885)
Land Area (square miles)	1,214	(2,098)	2,331	(3,596)	2,495	(3,662)
Overall Private Employment	49,839	(127,806)	58,527	(123,455)	54,045	(112,629)
Overall Private Earnings ($)	555	(193)	627	(206)	675	(167)
Restaurant Employment	3,419	(7,695)	4,437	(9,094)	4,459	(9,194)
Restaurant Earnings ($)	192	(58)	217	(56)	256	(50)
Accom. and Food Svc. Employment	5,595	(13,815)	8,604	(26,369)	8,468	(26,083)
Accom. and Food Svc. Earnings ($)	214	(75)	250	(92)	288	(84)
Retail Employment	6,842	(14,097)	7,534	(14,048)	7,245	(13,603)
Retail Earnings ($)	370	(98)	423	(83)	461	(74)
Manufacturing Employment	7,148	(14,306)	5,523	(9,708)	5,049	(8,713)
Manufacturing Earnings ($)	720	(285)	809	(291)	858	(255)
Health Care Employment	9,717	(19,733.71)	10,840	(18,172.77)	10,473	(17,801.73)
Health Care Earnings ($)	586	(189.24)	643	(184.56)	734	(176.64)
Minimum Wage	5.62	(1.26)	6.82	(0.74)	7.69	(0.77)
Minimum Wage Change (excl. zeros)	0.54	(0.23)	1.20	(0.48)	0.23	(0.15)
Number of Observations	144,437		346		12,207	
Number of Counties	1,001		155		194	
Number of County-Pairs	1,150		336		406	
Number of States	49		13		13	

Notes: All measures of "earnings" are the reported "Average Weekly Wage" in the QCEW. The District of Columbia is included in both samples, whereas Alaska is excluded from both, and Hawaii is excluded from just the county-pair sample.

Table 4: Minimum Wage Effects on Earnings and Employment, 1990-2016.

This table reports estimates of the effect of the log minimum wage on average weekly wages and employment in the restaurant sectors. Column 1 reports the results from the base specification for the all-county sample, and columns 2 and 3 report the results for the county-pair sample.

	(1) All-County Sample	(2) County-Pair Sample	(3) County-Pair Sample
		ln(Earnings)	
ln(Minimum Wage)	0.232***	0.236***	0.213***
	(0.027)	(0.032)	(0.031)
		ln(Employment)	
ln(Minimum Wage)	-0.185**	-0.153*	-0.002
	(0.084)	(0.078)	(0.051)
Controls			
County effects	Y	Y	Y
Period effects	Y	Y	
County-Pair effects		Y	
Pair * Period effects			Y
Num of Dummies	2,776	2,154	56,378
Observations	206,368	156,981	108,962

Notes: All specifications control for the unemployment rate, and all employment specifications also control for population. Robust standard errors, in parentheses, are clustered at the state level for specification 1 and at the state and border segment levels for specifications 2 and 3. Significance: *** 0.01, ** 0.05, * 0.1.

Table 5: Effect of Indexing Minimum Wage to Inflation on Earnings and Employment, 1990-2016.

This table reports estimates of the effect of the log minimum wage interacted with an indicator for an inflation adjusted minimum wage on average weekly wages and employment in the restaurant sectors. Column 1 reports the results from the inflation-indexing specification for the all-county sample, and columns 2 and 3 report the results for the county-pair sample.

	(1) All-County Sample	(2) County-Pair Sample	(3) County-Pair Sample
		ln(Earnings)	
ln(Minimum Wage)	0.215***	0.203***	0.208***
	(0.026)	(0.026)	(0.029)
Inflation-Indexed	-0.001	0.006	0.021
	(0.018)	(0.025)	(0.016)
Indexed * ln(Min Wage)	0.054	0.066	-0.055
	(0.061)	(0.079)	(0.055)
		ln(Employment)	
ln(Minimum Wage)	-0.147**	-0.136*	-0.011
	(0.072)	(0.068)	(0.056)
Inflation-Indexed	0.065**	0.068***	-0.002
	(0.028)	(0.024)	(0.036)
Indexed * ln(Min Wage)	-0.344**	-0.268***	0.036
	(0.134)	(0.085)	(0.125)
Controls			
County effects	Y	Y	Y
Period effects	Y	Y	
County-Pair effects		Y	
Pair * Period effects			Y
Num of dummies	2,776	2,154	56,378
Observations	206,368	156,981	108,962

Notes: All specifications control for the unemployment rate, and all employment specifications also control for population. Robust standard errors, in parentheses, are clustered at the state level for specification 1 and at the state and border segment levels for specifications 2 and 3. Significance: *** 0.01, ** 0.05, * 0.1. Inflation-indexing variable is equal to one for all states listed in Table 1 after enacting policy, except for Alaska.

Table 6: Dynamic Effects of Indexing Minimum Wages to Inflation on Earnings and Employment, 1990-2016.

This table reports estimates of the effect of the log minimum wage interacted with indicators for an inflation adjusted minimum wage before and after 14 quarters since the enactment on average weekly wages and employment in the restaurant sectors. Column 1 reports the results from the inflation-indexing specification for the all-county sample and columns 2 and 3 report the results for the county-pair sample.

	(1) All-County Sample	(2) County-Pair Sample	(3) County-Pair Sample
		ln(Earnings)	
ln(Minimum Wage)	0.250***	0.233***	0.191***
	(0.041)	(0.045)	(0.046)
Inflation-Indexed Pre 14	-0.004	0.016	0.034
	(0.016)	(0.022)	(0.022)
Inflation-Indexed Post 14	0.011	0.028	0.008
	(0.015)	(0.018)	(0.009)
Indexed Pre 14 * ln(Min Wage)	0.030	-0.018	-0.079
	(0.067)	(0.089)	(0.082)
Indexed Post 14 * ln(Min Wage)	-0.040	-0.035	0.018
	(0.034)	(0.034)	(0.030)
		ln(Employment)	
ln(Minimum Wage)	-0.115	-0.024	0.115
	(0.192)	(0.142)	(0.110)
Inflation-Indexed Pre 14	0.024	0.045	0.031
	(0.031)	(0.028)	(0.029)
Inflation-Indexed Post 14	-0.051	-0.036	-0.003
	(0.031)	(0.023)	(0.027)
Indexed Pre 14 * ln(Min Wage)	-0.255*	-0.420***	-0.350*
	(0.139)	(0.133)	(0.178)
Indexed Post 14 * ln(Min Wage)	-0.033	-0.125	-0.147
	(0.181)	(0.118)	(0.095)
Controls			
County effects	Y	Y	Y
Period effects	Y	Y	
County-Pair effects		Y	
Pair * Period effects			Y
Num of dummies	2,776	2,154	56,028
Observations	205,957	156,501	108,262

Notes: All specifications control for the unemployment rate, and all employment specifications also control for population. Robust standard errors, in parentheses, are clustered at the state level for specification 1 and at the state and border segment levels for specifications 2 and 3. Significance: *** 0.01, ** 0.05, * 0.1. Inflation-indexing variable is equal to one for all states listed in Table 1 that enacted policy before 2014.

Table 7: Effect of Before Indexing Minimum Wage to Inflation on Earnings and Employment, 1990-2016.

This table reports estimates of the effect of the log minimum wage interacted with an indicator for inflation-indexing states before they adopted the policy. Column 1 reports the results from the inflation-indexing specification for the all-county sample, and columns 2 and 3 report the results for the county-pair sample.

	(1) All-County Sample	(2) County-Pair Sample	(3) County-Pair Sample
		ln(Earnings)	
ln(Minimum Wage)	0.214***	0.205***	0.206***
	(0.026)	(0.026)	(0.029)
Before Indexed MW * ln(Min Wage)	0.003	-0.016*	-0.004
	(0.036)	(0.009)	(0.004)
		ln(Employment)	
ln(Minimum Wage)	-0.143**	-0.133*	-0.003
	(0.070)	(0.068)	(0.056)
Before Indexed MW * ln(Min Wage)	0.008	0.010	-0.001
	(0.126)	(0.013)	(0.012)
Controls			
County effects	Y	Y	Y
Period effects	Y	Y	
County-Pair effects		Y	
Pair * Period effects			Y
Num of dummies	2,776	2,154	56,378
Observations	206,368	156,981	108,962

Notes: All specifications control for the unemployment rate, and all employment specifications also control for population. Robust standard errors, in parentheses, are clustered at the state level for specification 1 and at the state and border segment levels for specifications 2 and 3. Significance: *** 0.01, ** 0.05, * 0.1. Inflation-indexing variable is equal to one for all states listed in Table 1 before enacting policy, except for Alaska. Observations for when the policy is in effect are excluded.

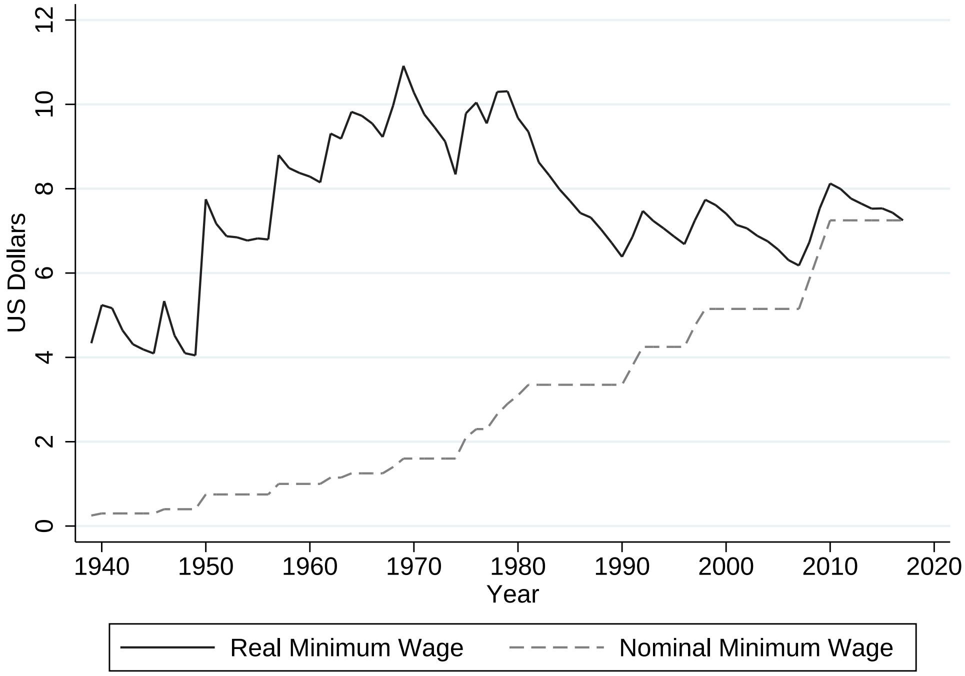
Table 8: Robustness Checks for Effect of Indexing Minimum Wage on Employment, 1990-2016.

This table reports estimates of the effect of the log minimum wage interacted with an indicator for an inflation adjusted minimum wage on employment for a balanced sample and the manufacturing, retail, accommodation and food services, and health care sectors. Column 1 reports the results from the inflation-indexing specification for the all-county sample and columns 2 and 3 report the results for the county-pair sample.

	All-County Sample (1)	County-Pair Sample (2)	County-Pair Sample (3)
Balanced			
ln(Minimum Wage)	-0.168**	-0.181***	-0.068
	(0.065)	(0.064)	(0.091)
Inflation-Indexed	0.080**	0.101***	-0.090*
	(0.031)	(0.035)	(0.048)
Inflation-Indexed * ln(Min Wage)	-0.371**	-0.350***	0.212
	(0.144)	(0.110)	(0.194)
Num of dummies	969	920	20,078
Observations	104,652	80,676	39,312
Manufacturing			
ln(Minimum Wage)	-0.009	-0.003	-0.185*
	(0.098)	(0.131)	(0.108)
Inflation-Indexed	0.013	-0.057	0.125*
	(0.057)	(0.051)	(0.065)
Inflation-Indexed * ln(Min Wage)	0.143	0.266	-0.208
	(0.201)	(0.181)	(0.250)
Num of dummies	2,257	2,965	101,561
Observations	221,223	290,291	198,832
Retail			
ln(Minimum Wage)	-0.037	-0.070	-0.118*
	(0.031)	(0.053)	(0.066)
Inflation-Indexed	0.024*	0.052	0.053
	(0.014)	(0.034)	(0.040)
Inflation-Indexed * ln(Min Wage)	-0.047	-0.044	0.029
	(0.040)	(0.098)	(0.105)
Num of dummies	3,098	2,312	125,129
Observations	328,182	250,041	245,660
Accom. and Food Svc.			
ln(Minimum Wage)	-0.189***	-0.205***	-0.031
	(0.055)	(0.056)	(0.062)
Inflation-Indexed	0.005	0.025	-0.014
	(0.024)	(0.020)	(0.035)
Inflation-Indexed * ln(Min Wage)	-0.167*	-0.244***	-0.037
	(0.090)	(0.059)	(0.105)
Num of dummies	2,940	2,241	67,757
Observations	231,570	175,307	131,404
Health Care			
ln(Minimum Wage)	0.011	-0.061	-0.116
	(0.067)	(0.065)	(0.083)
Inflation-Indexed	-0.037	-0.033	-0.016
	(0.023)	(0.043)	(0.038)
Inflation-Indexed * ln(Min Wage)	0.140	0.245*	0.101
	(0.084)	(0.127)	(0.101)
Num of dummies	2,809	2,194	48,541
Observations	194,008	148,144	93,274

Notes: All specifications control for the unemployment rate, and all employment specifications also control for population. Robust standard errors, in parentheses, are clustered at the state level for specification 1 and at the state and border segment levels for specifications 2 and 3. Significance: *** 0.01, ** 0.05, * 0.1. Inflation-indexing variable is equal to one for all states listed in Table 1 after enacting policy, except for Alaska.

Figure 1: Real and Nominal Federal Minimum Wage, 1940-2017



Notes: Data is from FRED for 1939-2017. Unadjusted CPI-U used as deflator and base period is January 1, 2017.

Figure 2: Contiguous Border County-Pairs with a Minimum Wage Differential and in Indexing States, 1990-2016

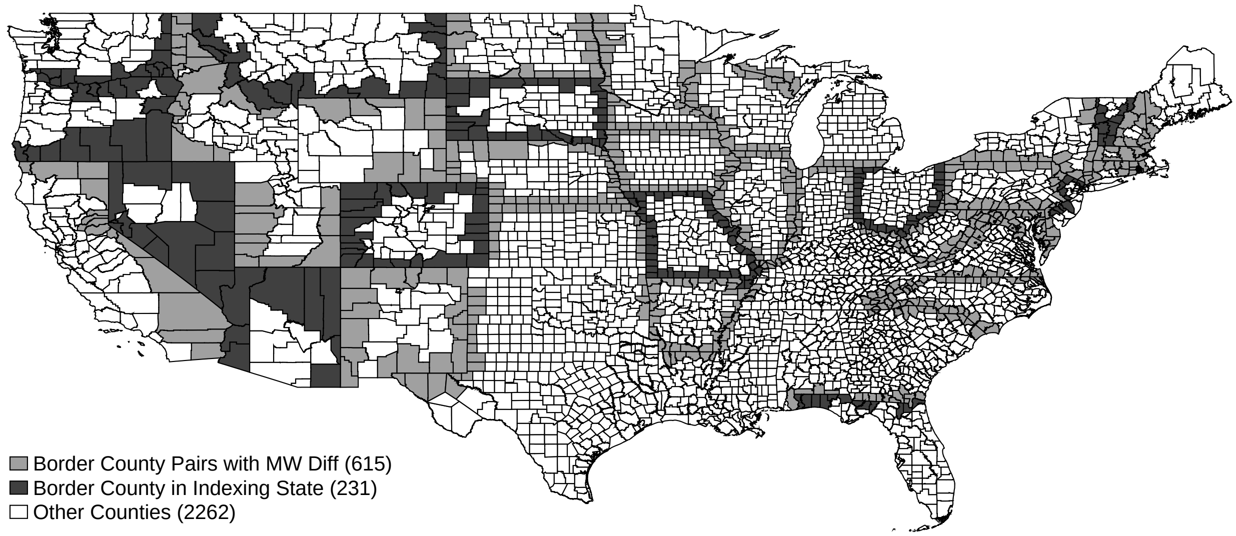
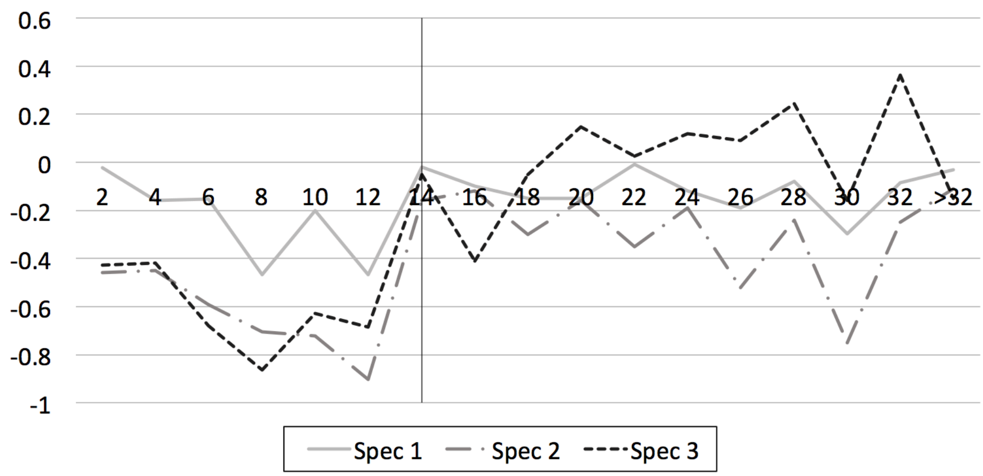


Figure 3: Time Paths of Minimum Wage Effects on Employment



Notes: Observations for states which adopted the inflation-indexing policy after 2013 are excluded.