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Minimum Wage States During Recession

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MINIMUM WAGE STATES DURING RECESSION

BY

LEILA BURROWS

B.A., International Affairs, University of Colorado, 2002

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Master of Arts

Economics

The University of New Mexico
Albuquerque, New Mexico

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Dedication

To my Dad.

Acknowledgment

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ABSTRACT

This study analyzes the effect of minimum wage legislation during a period of economic recession. In particular, I examine whether states with minimum wages higher than the federal minimum wage fared better or worse during the recession that began December 2007. Since minimum wages raise the price of labor above market price, firms subject to this additional cost might experience greater adverse effects of the recession. On the other hand, since state minimum wages are often enacted in states with relatively high market wages, the disemployment effects of minimum wage legislation might be negligible. Despite a large increase in minimum wages during this period, no significant disemployment effects were estimated.

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CHAPTER 1

1.1 Introduction

Federal minimum wage legislation was first enacted under the Fair Labor Standards Act of 1938 with the purpose of reducing extreme poverty. Since then, many states have enacted legislation to raise the state minimum wage above the federal wage floor. Such legislation is generally enacted when the federal real minimum wage experiences a decline, and is most commonly seen in states with higher average wages.

Controversy surrounds minimum wage legislation (both state and federal), and in particular, its effect on employment. The conventional model of labor supply and demand predicts that an increase in the price of labor above the market-clearing price will reduce demand for labor, save for in the extreme case of perfect inelasticity of demand (Stigler 1946, Borjas 1996). If those most likely to be subjected to the minimum wage are also those most likely to experience extreme poverty, any resulting disemployment might be counterproductive to the legislation. The full impact of minimum wage on poverty levels will depend on the labor demand elasticity, with greater adverse effects occurring at larger demand elasticities.

Alternatively, some economists have suggested that an increase in the minimum wage will lead to a slight increase in employment rates (Stigler 1946, Card 1992a, Borjas 1996). This argument implies a monopsonistic labor market, or one in which low-wage employers maintain some degree of market power. In such a market, minimum wage legislation will increase employment by breaking the link between higher wages – which are necessary to attract more workers with higher reservation wages – and an increasing marginal cost of hiring. At the minimum wage, the marginal cost of each additional

worker is constant and equal to the wage floor. Such an increase in labor will allow growth in output levels, and ultimately a decrease in output price (Stigler 1946, Card 1992a, Katz and Krueger 1992).

Another theory suggests that an increase in the price of factors of production, such as with minimum wage, will translate to higher output prices (Card 1992a, Katz and Krueger 1992, Card and Krueger 1994). If we assume that firms are cost-minimizers, every worker is essential to production. At a fast-food restaurant, for example, one worker is needed to run the cash register, one is needed to man the fryer, etc., with no additional capacity. In such a firm, any increase in the price of labor will likely be observed as an increase in the price of output. In the long run, as the price of labor exceeds the price of capital, we might expect to see a greater degree of automation, but this change is not likely to occur instantaneously (Stigler 1946).

Theories also differ as to the likely effect on employment of state minimum wages during periods of recession. One argument suggests that a higher relative wage will lead to greater purchasing power – and thus greater consumer demand – in those states with minimum wages above the federal minimum wage (Stigler 1946). During economic recession, this increase in product demand will offset the disemployment effects of the contraction. However, this argument relies on the uncertain assumption that demand for unskilled workers is inelastic.

On the other hand, an increase in the price of labor above the market-clearing price represents an additional cost burden to those firms that are subject to a state minimum wage. During periods of recession, the labor market is unable to adjust to a

lower wage. This might lead to greater disemployment effects in those states with wage minima above the federal minimum wage.

Finally, since state minimum wages are often enacted in states with relatively high market wages, the disemployment effects of minimum wage legislation, even during a period of recession, might be negligible.

In my analysis, contrary to conventional theories of labor supply and demand, there is no evidence of minimum wage effects despite a sizeable increase in the federal minimum wage.

The plan of this thesis is as follows: the remainder of Chapter 1 examines the relevant literature and establishes a theoretical framework. Chapter 2 describes the data and introduces the regression model. Chapter 2 also examines graphical representation of employment change and estimates minimum wage legislation on nonfarm employment totals. Chapter 3 examines alternative specifications of minimum wage effects, including the impact of minimum wages on industry-level employment, total weekly hours and average weekly earnings. Chapter 4 summarizes the preceding chapters.

1.2 Literature Review

George Stigler (1946) was one of the first to hypothesize the effects of minimum wage legislation, though he never tested his theories empirically. Referring to the federal minimum wage, he contended that minimum wage legislation did not reduce poverty, but simply reallocated wages and increased productivity. The reallocation occurs because those slightly below the minimum wage experience a wage increase, while those far below the minimum wage receive a wage reduction as a result of disemployment or a shift to the informal sector. The productivity gains result from an increase in labor

productivity from fear of termination as the opportunity cost of unemployment rises with the higher wage, and from substituting capital for labor or instituting other efficiencies in production.

Other studies have attempted to measure the effect of both federal and state-level minimum wages on employment with varying results. David Neumark and William Wascher (1992) used 1977-1989 Current Population Survey (CPS) panel data of 50 states and the District of Columbia to measure the disemployment effect of teenagers against coverage-adjusted relative minimum wages. Using fixed-effects OLS to control for state and year differences, the authors examined the effect of minimum wage legislation within states and across time – options not available with time series or cross-sectional analysis. Because of the potential for endogeneity bias at the state level, however, Neumark and Wascher also estimated disemployment effects using the average minimum wage level in geographically bordering states to instrument for state minimum wage. Such endogeneity could occur if legislators schedule enactment of minimum wage legislation so as to minimize disemployment effects. Although the instrumental variable (IV) estimates were greater in magnitude, the standard errors were large enough to render little statistical difference from the OLS estimates.

Neumark and Wascher find a 1-2 percent reduction in teenage employment rates for a ten percent increase in the minimum wage. We should consider this a lower bound, as these elasticities are averages of the disemployment effect for all teenagers, including those not subject to minimum wages. Estimates of the percent affected by minimum wage range from 15 percent of teenagers nationally (Card 1992b) to 50 percent of teenagers in

California (Card 1992a), therefore the disemployment elasticity of affected teens could be as high as 2-13 percent for each ten percent increase in minimum wage.

As the youngest and least skilled workers, teenagers likely experience a greater impact of minimum wage legislation. For instance, in a study of the national retail industry, Joseph Sabia (2009) measured a similar reduction in the employment-population ratio of workers aged 16-64 for a ten percent increase in the minimum wage (1 percent). For teenagers, however, this elasticity jumped to –0.34, reflecting the greater impact of minimum wage legislation on this demographic group. Since roughly 50 percent of those affected by minimum wage legislation are employed in retail trade (Sabia 2009), estimates of the total effect are likely greater.

Other findings measured an even greater disemployment effect. Linda Bell (1997) examined an increase in the federal minimum wage in both Colombia and Mexico using firm-level panel data obtained from the Annual Industrial Survey of each country. In her regression, Bell measured the effect of relative minimum wage on the employment-population ratio, controlling for business cycle fluctuations as measured by real GNP and input and output prices. Similar to Neumark and Wascher, Bell used fixed effects OLS to control for differences in firm size and technology. She also formulated a two-stage least squares estimation to correct for potential bias resulting from differences in aggregation: the unit of observation is the firm, but the minimum wage effects are aggregated across regions. In the first stage of this operation, Bell estimated employment changes against indicators for minimum wage region by year, controlling for firm fixed-effects. In the second stage, she regressed the region-year dummy variable against a year indicator and the regional minimum wage to produce efficient, unbiased standard errors. Her analysis

reveals a reduction in Colombian employment of 2-12 percent with a ten percent increase in minimum wage.

The above values were obtained by dividing the range of the estimated elasticities –0.15 and –0.33, by the percent affected. In this case, Bell assumes all those whose wages fall within 1.5 times the minimum wage – or 27 percent of low-wage workers – were affected by the legislation. Other studies (Katz and Krueger 1992, Card and Krueger 1994) suggest that the impact of minimum wage legislation is not this broad. In their study of the effects of the April 1992 increase in the New Jersey state minimum wage on fast-food employment, Card and Krueger (1992) found very little spillover effects on wages above the new minimum. However, differences between the U.S. and Colombian labor market might preclude such comparison. In either case, Bell's estimated elasticities are consistent with those obtained by Sabia (2009) and Neumark and Wascher (1992).

In a parallel analysis, Bell's study suggests that the Mexican minimum wage is not binding, and therefore the legislation has no effect on employment levels. However, these estimations rely exclusively on data from large, stable manufacturing firms, which constitute only 20 percent of total formal sector employment. Mexican household data indicate that the true impact of minimum wage legislation might be greater than is suggested by the firm-level data; presumably data availability limitations prevented Bell from examining these broader effects.

Like Bell's (1997) analysis of Mexican wage floors, other studies (Card 1992a, Card 199b, Katz and Krueger 1992, Card and Krueger 1994) have found either no effect of minimum wage legislation or a positive effect on employment rates. In one such study, David Card (1992b) examines the April 1990 increase in the federal minimum wage

using the variation in coverage across states to measure the effect on teenage employment levels, as estimated from 1989 and 1990 CPS data. In his study, states were grouped and compared by the degree of impact of minimum wage legislation, with the assumption that those states with low average wages are more likely to experience a negative effect. Card first analyzed the average change in teenage employment rates from 1989 to 1990 by quarter, comparing the differences across impact groups. His results suggest that teenage employment experienced a smaller decline in low-wage states than in medium- and high-wage states (-1.2 percent, -2.7 percent, and –2.7 percent respectively). He credits the relatively high impact of the 1990 recession on medium- and high-wage states for this discrepancy, and tests this hypothesis with a fitted regression. When Card controls for state-group and quarter effects, nearly all of the intergroup variation in teenage employment disappears (-2.5 percent, -2.7 percent, and –2.6 percent respectively). These results suggest that we should expect to see greater disemployment effects in high-wage states during periods of recession that cannot be explained by differences in minimum wage.

To test the robustness of his analysis, Card also estimated the disemployment effects of minimum wages controlling for lagged changes in teenage and overall employment rates, and against the wage change instrumented by the fraction of affected workers in each state. Due to small sample size, Card aggregated state observations across the last three quarters of 1989 and 1990 in these estimations. Despite a 13 percent increase in the minimum wage, no statistically significant disemployment effect was estimated. However, Card's analysis does not consider possible lag effects of minimum wage legislation. Such oversight might obscure the true effect of wage floors.

In another study, Card (1992a) examined the effects of the 1988 increase in the California state minimum wage on the employment-population ratios of teenagers using CPS data. This study was designed as a natural experiment that compared the 1987-1989 employment effects in California to that of a control group of states that did not experience minimum wage increases at that time. Using a difference-in-differences approach, Card estimated a four percent increase in the Californian employment-population ratio relative to the comparison group. This study also examined the effect of the Californian legislation on retail employment and restaurant prices. Although Card estimated a one percent relative decline in Californian employment in eating and drinking establishments, he dismissed this as reflective of long-term trends without further investigation. The sample choice and methodology of Card's study is also criticized for reasons discussed in further detail below.

Like Card's study of the California retail industry, Lawrence Katz and Alan Krueger (1992) measured a positive effect of minimum wage legislation on fast-food restaurant employment in Texas. Fast-food restaurants employ relatively large numbers of low-wage, low-skilled workers, and are therefore more likely to be constrained by minimum wage legislation. Through phone surveys conducted roughly four months prior to and four months following the April 1991 increase in the federal minimum wage, Katz and Krueger used OLS and IV analysis to estimate the disemployment effect of the relative wage gap, measured as the logged ratio of the restaurant's starting wage prior to the increase and the federal minimum wage rate that came into effect in April 1991.[1] In the IV specification, the wage gap was used as an instrument for the change in starting

[1] The wage gap is defined as 0 for those restaurants with pre-legislation starting wages above the April 1991 minimum wage.

wage. Here, as in Card's (1992b) analysis of the effect of the April 1990 increase in the federal minimum wage, the hypothesis holds that those restaurants with the largest impact – as measured by the wage gap – will experience the greatest employment effects. Contrary to conventional labor market theory, this study estimated an *increase* in employment of 2.4-2.6 full-time equivalent (FTE) employment. Moreover, the greatest increase was measured in those restaurants with the largest wage gap.

In a similar study, Card and Krueger (1994) analyzed the effect of the 1992 increase in the New Jersey state minimum wage on fast-food restaurant employment. In their study, the authors compared employment and product price outcomes to similar restaurants in neighboring Pennsylvania – which did not experience an increase in minimum wage at that time. Data for this analysis were obtained from phone surveys of local fast-food chains conducted one month prior to the effective date of legislation and roughly seven months following the minimum wage increase. Using difference-in-differences and first-differences estimations, Card and Krueger measured the change in FTE employment against the change in minimum wage, as measured both by a New Jersey dummy variable and by the proportional distance from the initial starting wage to the new minimum wage.[2] Similar to Katz and Krueger (1992), Card and Krueger measured a 1.7 FTE employment increase relative to Pennsylvania. However, when controlling for regional effects and when estimating the *proportional* change in employment (as measured by the change in employment divided by the average employment of both waves of their survey), the results are statistically insignificant from

[2] In their wage gap estimations, the proportional distance between the initial starting wage and new minimum wage was set to 0 for those NJ restaurants with initial starting wages above the new minimum wage and for all PA restaurants.

zero. The authors credit measurement error for the attenuation of the wage gap coefficient when including regional dummies. The effect of minimum wage on the proportional change in employment recovers its statistical significance when employment change is weighted by the initial employment level. As discussed below, these studies are also faulted for their methodology.

Only a few studies (Card 1992, Katz and Krueger 1992, Card and Krueger 1994) examined an alternative outcome to an increase in the minimum wage: an increase in output price. In their study of the effects of increased minimum wage on New Jersey fast-food restaurants, Card and Krueger predict a roughly 2.2 percent increase in product cost as a result of the 1992 minimum wage increase. They derived this figure by multiplying the percent of affected workers (0.5 percent) by the percent increase in wage (15 percent) and by labor's share of total costs (30 percent). In fact, the authors did observe a four percent relative increase in the price of a basket of goods at New Jersey fast-food restaurants. However, the rate of increase was approximately the same in restaurants with differing degrees of impact, which suggests an alternative reason for the price increase other than an increase in the minimum wage. The authors credit this discrepancy to product market competition, which prevents those restaurants most affected by the minimum wage legislation from raising prices above competitors. If this were the case, why would those restaurants least likely to be affected by the increase in minimum wage raise their prices at all? Moreover, the authors' explanation relies on the assumption that eastern Pennsylvanian restaurants occupy a distinct product market, a questionable notion when taking into account consumer and labor mobility. For instance, Camden, NJ is a short 10 minute drive from Philadelphia, while the Pennsylvanian towns of Levittown,

and Morrisville are less than 10 miles from Trenton, the capital of New Jersey. It is not unrealistic to assume that commuters travel to the larger cities across the border for shopping or work, or that they might purchase fast-food while in the neighboring state.

In their study of the Texas fast-food industry, Katz and Krueger (1992) applied a two-stage least squares regression using the wage gap, or distance from the pre-legislation starting wage to the new minimum wage as an instrument to measure price effects of minimum wage legislation. Their estimates indicate a slight decrease in the price of a full meal in restaurants with large mandated wage increases.[3] Although the estimates obtained are small and imprecise, when combined with the positive employment effects estimated in their earlier analysis such an effect could indicate a monopsonistic labor market.

Another possible effect of minimum wage legislation is a shift in average hours or in the distribution of full- and part-time workers. As Sabia (2009) acknowledges, a priori the direction of the effect is ambiguous. In response to the higher wage, firms could reduce both hours and employment or they could increase hours for retained workers to compensate for the reduction in employment. Using CPS panel data from 1979-2004, Sabia estimated the impact on total hours of the effective minimum wage – the higher of the state or federal minimum wage – controlling for state, month and year effects, and labor market characteristics. He measured a one percent reduction in average weekly hours worked in retail for a ten percent increase in minimum wage. However, when conditioned upon retail employment, minimum wage legislation appears to have little effect on average weekly hours.

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[3] In this study, a full meal consists of a soda, french fries and a main course.

In their respective studies of the fast-food industry, Katz and Krueger (1992) and Card and Krueger (1994) used survey data to measure the relative shift in distribution between full- and part-time labor. Katz and Krueger suggest that imposition of a wage floor could increase relative employment of full-time workers, who are typically older and possibly higher-skilled. If starting wages are constant for both groups of workers, firms would be inclined to employ those with higher productivity. In fact, Katz and Krueger found no evidence of full-time worker substitution. On the other hand, Card and Krueger (1994) measured an average 29 percent increase in full-time employment and a corresponding 16 percent decrease in part-time employment following an increase in the minimum wage. However, as Card and Krueger noted, these shifts in composition could reflect seasonal differences between the two waves of their survey.

One study (Blanchflower and Oswald 1995) has suggested a feedback mechanism between wages and unemployment, which might indicate endogeneity bias when examining the effects of minimum wage legislation. In particular, Blanchflower and Oswald estimate a negative relationship between regional unemployment levels and wages, with reduced wage levels along a "wage curve" at higher levels of unemployment. Using cross-sectional data from 12 countries and a sample of 3.5 million workers, the authors estimate a global average wage elasticity of –0. 10 with an elasticity of –0.08 to –0.11 for the U.S. These elasticities are robust against several specifications, including estimations that use lagged unemployment as an instrument for contemporary unemployment to correct for possible endogeneity bias, and a model that acknowledges aggregation differences between the dependent and independent variables. The authors attribute the negative relationship between wages and unemployment to efficiency wage

theory, which implies that workers are willing to accept lower wages in periods of high unemployment due to the increased opportunity cost of job loss. As an alternative explanation, Blanchflower and Oswald credit union bargaining, whereby unions prioritize jobs over wages when unemployment is high.

Despite the near universal scope of the wage curve, the methodology used in this study and direction of causality between independent and dependent variables are debatable. Indeed, David Card (1995) in a review of *The Wage Curve* (1994), questions Blanchflower and Oswalds's reliance on cross-sectional data to measure the relationship between wages and unemployment, and hints at misspecification leading to composition bias. Card suggests that cross-sectional data do not allow for changes in the characteristics of workers across the business cycle. For example, during periods of economic growth, construction employment and wages might increase, while government employment might rise during recession – a change in average wage levels could simply reflect a change in labor market composition.

Card also suspects spatial correlation between observations in the same region in Blanchflower and Oswald's estimates. In a model that corrects for this correlation by controlling for mean regional worker characteristics, Card estimates a wage elasticity of –0.05, roughly half the value obtained by Blanchflower and Oswald. Even with this correction, however, Card's model still ignores correlation between regions within the same country. Blanchflower and Oswald use annual wage data in their U.S. regressions, but high correlation between unemployment levels and annual hours suggest that the annual wage elasticity is greater than the hourly wage elasticity. In fact, Card estimated an elasticity of –0.20 when estimating the effect on annual earnings – double the value

obtained by the authors of *The Wage Curve*. Perhaps their results are not as robust as they would have us believe.

Although the authors are quick to discredit any resemblance between their curve and the Phillip's curve or a transposed supply function, the causality link between average wages and unemployment seems specious at best. Perhaps their analysis simply measures differing levels of labor demand across regions and countries – a tighter labor market in one region relative to others will lead to both higher wages and greater employment levels. Indeed, Neumark and Wascher (1992) suggest that exogenous shifts in labor demand could produce a positive correlation between employment rates and average wages.

While none of these studies have directly examined the effect of minimum wage legislation during periods of recession, they offer key insight as to the necessary approach of such analysis.

1.3 Components of a Strong Analysis

One of the first considerations of minimum wage analysis is whether to estimate the change in state or federal minimum wages. Several studies have attempted to measure the impact on employment levels of the federal minimum wage as opposed to the state minimum wage (Card 1992b, Katz and Kruger 1992). However, several problems arise when examining federal legislation. The most obvious difficulty is the absence of a control group. One method is to compare years that experienced changes in legislation with those that remain constant. Some studies (Neumark and Wascher 1992) have suggested that inadequate variation exists in such time-series analysis, and that the few changes that do occur are often correlated with changes in social welfare or training

programs. Card (1992b) corrects for this by analyzing the variation in coverage across states. Since minimum wage legislation will have a stronger impact on those states with low average wages, we should expect to observe a greater disemployment effect in low average-wage states. As noted above, Card's estimates suggest that the April 1990 minimum wage had no significant effect on teenage employment.

Other studies have attempted to get around the issue of an inadequate control group by examining changes occurring in individual states (Katz and Krueger 1992, Card and Krueger 1994)). However, such analysis risk selectivity bias – the sample state might not be representative of the national population. For instance, in the study of the disemployment effects on fast-food workers, Card and Krueger (1994) compare the employment rates of New Jersey to neighboring Pennsylvania. The difference in size, demographics, and rate of urbanization, however, might suggest that these states are not comparable. Indeed, the authors measured a four percent increase in prices for affected and non-affected establishments in New Jersey, while Pennsylvania prices remained unchanged. This difference could indicate a discrepancy in the product market that would obviate comparison. Likewise, Card's (1992a) study of the California teenage labor market reveals differences with the comparison states in racial composition, rates of unionization, percentage of college graduates, and mean wages. Such discrepancies could bias the estimates, and conceal the true effect of minimum wage legislation. Meanwhile, the most jarring feature of Katz and Krueger's (1992) study of employment levels in Texas fast-food restaurants is the complete absence of a control group. Moreover, their treatment sample encompasses only those restaurants in metropolitan regions, while

differences in size, demographics and average wage level suggest that Texas might not be representative of all states.

A careful analysis will include data from the entire U.S. labor market, rather than limit analysis to one or two states. Neumark and Wascher (1992) exploit the minimum wage variation across states to estimate the effect on employment levels. By using panel data, or a time-series cross-section, and weighting the minimum wage of each state by coverage, the authors overcome the limitations associated with the federal minimum wage model. Likewise, they avoid the pitfalls mentioned earlier of comparing a few dissimilar states. Panel data allow for potential heterogeneity between sample states. As long as the regression controls for state and year effects, the results will be more precise than in time-series alone.

Another major limitation of past studies is the short time frame used in the analysis. For instance, in his examination of the 1990 increase in the federal minimum wage, Card (1992b) uses data from five calendar quarters before the increase to only three quarters following the increase. If the labor market is slow to respond to changes in input prices, the full impact of minimum wage legislation might not appear for several years. Alternatively, if employers anticipate an increase in the minimum wage, they might incorporate changes in production prior to the effective date of legislation. Such an effect will be overlooked in Card and Krueger's (1994) study, which measures labor impacts only one month prior to the date the law is effected. This study errs on both sides of the legislation: a follow up survey is conducted only seven months following the increase. Moreover, Card's (1992a) estimation of teenage employment in California exhibits an initial increase in employment rates in the first two years following the

legislation, but falls off in the third year. Without further data, it is impossible to know whether this decline was an anomaly or a continuing trend.

Several studies (Neumark and Wascher 1992, Bell 1997, Sabia 2009) have attempted to correct for this discrepancy by using lagged data to examine the long run effects of minimum wage legislation. Neumark and Wascher (1992) measure a slight increase in young adult disemployment following a one-year lag. For example, with zero lags, Neurmark and Wascher estimate elasticities between –0.01 and –0.11; with a one-year lag, these grow to a range of –0.12 to –0.17. Bell's (1997) analysis of the lagged effects of minimum wage on Colombian employment levels is more ambiguous: she measured an employment elasticity of –0.29 following a one-year lag compared to an elasticity range of –0.15 to –0.33 without the lag. In either case, the effect is negative and significant. Sabia (2009) believes a thorough analysis should include cycles of both macroeconomic growth and recession. Contrary to Neumark and Wascher (1992), Sabia measured a smaller disemployment effect when using a lagged minimum wage variable, in fact, the estimates are not significantly different from zero.

Several academics have stressed the effect of geography when estimating minimum wage effects. Jeffrey Thompson (2009) argues that state-level averages conceal larger impacts at the county level. With this in mind, Thompson used county-level data from the 1996-2000 U.S. Census Bureau's Quarterly Workforce Indicators to measure the disemployment effects of the 1996 and 1997 increase in the federal minimum wage. Using a difference-in-differences approach, Thompson followed earlier studies (Card 1992b, Katz and Krueger 1992) by grouping counties by their relative degree of impact. He divided the county observations into thirds and fifths and used dummy variables to

indicate high-impact groups in the quarter following the effective date of minimum wage legislation. Thompson's analysis identifies a 2.6-3.7 percent decrease in employment following a ten percent increase in the minimum wage, with greater adverse effects in smaller counties. For example, in high-impact counties in the thirds grouping, the coefficient on the impact group-quarter indicator increased in magnitude from –0.031 to –0.059 when including only small counties in the regression.

Charlene Kalenkoski and Donald Lacombe (2008) also examined the effect of minimum wages at a county level using the 2000 Decennial Census Summary and state minimum wage data obtained from the Bureau of Labor Statistics. Their analysis rests on the assumption that county-level data are more accurate when analyzing teenagers, who are limited in geographic mobility. Using OLS, Kalenkoski and Lacombe measured a demand elasticity for teenage labor of –0.25 when controlling for logged per capita income – as a proxy for consumer demand – and local labor market conditions. Despite the inclusion of state fixed effects, the authors identify the possibility of unobserved, spatially-correlated factors that affect both employment and minimum wage levels. With this issue in mind, Kalenkoski and Lacombe estimate a spatial autoregressive (SAR) model, which corrects for correlation across dependent variables, such as might arise with agglomeration. In the SAR specification, the disemployment effect increased in magnitude to –0.32. Again, these estimates are consistent with those obtained in other studies (Neumark and Wascher 1992, Bell 1997, Sabia 2009, and Thompson 2009).

Many U.S. studies rely on Current Population Survey (CPS) household data of worker hours and wages. Of those reviewed here, only Card and Krueger (1994), Katz and Krueger (1992), Bell (1997), and Thompson (2009) obtained data directly from

firms. Card and Krueger and Katz and Krueger relied on management surveys of fast-food restaurants, which are limited in scope and prone to survey error. Indeed, McDonald's restaurants were intentionally omitted from their analyses due to low response rates. Thompson obtained his data from the Quarterly Workforce Indicators, which is compiled from state unemployment insurance records, so his data is wider in scope and likely more accurate than individual surveys of affected firms. Linda Bell, in her analysis of minimum wage legislation in Colombia and Mexico, relied on firm data to estimate disemployment effects. Although her estimates for Mexico were restricted to large and stable manufacturing firms – which are less likely to experience a negative impact of an increase in the minimum wage – her data allowed her to track employment rates by firm during the period of analysis.

Similar estimations are possible using the Bureau of Labor Statistics' Current Employment Survey (CES). As a counterpart to the CPS, the CES provides firm-level estimates of employment. Unlike the CPS, monthly CES data are available as state-industry observations, producing larger data sets and allowing measurements of state and industry effects. State-level CPS data are only available as annual estimates.

To summarize: a thorough analysis of the impact of minimum wage legislation on employment levels should include a long time-frame, preferably with periods of both growth and recession; a national sample, perhaps at the county level; and firm data or a longitudinal survey. The disemployment effect of minimum wage legislation, whether at the state or federal level, has been estimated at an elasticity of –0.11 to –0.37, with greater adverse effects for teenagers. There is little convincing evidence of monopsony in markets for unskilled labor, nor is there indication that a mandated wage increase will

trigger high prices. We should also expect to observe a greater impact of minimum wage legislation in small counties and states with low average wages.

CHAPTER 2

2.1 Data

This analysis includes monthly employment totals of the nine 1-digit industries of the North American Industry Classification System (NAICS) for each of the 50 states plus the District of Columbia, from the start of the cyclical downturn in December 2007 to December 2009.[4] (To simplify language, the District of Columbia will be referred to as a state throughout the remainder of this thesis.) These totals were obtained from the Bureau of Labor Statistic's Current Employment Survey, which collects payroll data representing about 400,000 worksites nationwide, corresponding to the payroll that occurs on the 12th of the month. These firm-level data include total employment, average weekly hours, and average weekly wages. Seasonally adjusted data is only available for total employment. The nine industries are Mining and Logging; Construction; Manufacturing; Trade, Transportation and Utilities; Information Services; Professional and Business Services; Leisure and Hospitality; Government; and Other Services. The data also include totals for Nonfarm employment.

Data on average hourly wage were obtained from the Occupational Employment Statistics Survey, also available from the Department of Labor. These data provide the mean hourly wage by state and year for all occupations as of May of the reported year. I use this variable to control for employment effects that result from differences in the

[4] The NAICS is commonly used by the Bureau of Labor Statistics and labor economists. The system is pyramidal with nonfarm totals at the top and the nine industries noted on the second tier. These categories are further subdivided at lower tiers. The industries chosen for my analysis represent the largest category of NAICS industry below the nonfarm level.

dynamism of state economies. For example, states with higher average wages are likely to have greater economic growth rates or tighter labor markets.

State minimum wage data for each month in the study were collected online from each state's department of labor. In instances in which the information on the website was ambiguous, the correct wage floors were confirmed via email. For those states that support 2-tier wage systems, whereby firms with annual sales below a certain threshold or those employing fewer than a minimum number of workers are subject to a lower state minimum wage than larger firms, I followed the example of Neumark and Wascher (1992) by using the higher minimum wage. For those states in which the state minimum wage is below the federal minimum wage, the federal minimum was substituted. I then used the Consumer Price Index, also obtained from the Bureau of Labor Statistics, to calculate the real minimum wage in December 2009 dollars.

In addition to the wage data, my analysis includes annual population by state. These data, from the U.S. Census Bureau's Population Division, correspond to the state population as of July 1 of the reported year. This specification is included to control for any differences in labor market size that might impact employment changes.

The time frame of analysis was chosen for several reasons. First, the Bureau of Labor Statistics places the start of the recession in December 2007. Second, the federal minimum wage has increased each July between 2007 and 2009 with the previous rise in 1997, providing consistent conditions across all years of interest. Third, although the time frame commences less than one year prior to the recession, it can be assumed that the recession was unforeseen – at least at the levels witnessed – and therefore few changes were made in anticipation of the contraction. The end date was chosen as the most recent

month during which data were available at the time the data were obtained. Since the bulk of recessional disemployment effects were felt during 2008 and early 2009, this short cutoff is appropriate.

2.2 Recent History of Federal Minimum Wage

By 2007, a full decade had passed since the last rise in the federal minimum wage, which increased from $4.75 to $5.15 in 1997.[5] Due to the delay, many states unilaterally raised state minimum wages to levels greater than the federal minimum. In fact, by January 2007, 30 states maintained minimum wages greater than the federal minimum wage. That same year, the United States Congress passed an amendment that would raise the federal minimum wage to $7.25 by July 24, 2009, with an initial wage increase to $5.85 in July 2007 and a second increase to $6.55 in July 2008. Just prior to the 2007 rise, the average state minimum wage was a full 20 percent greater than the federal minimum. By December 2009, the number of states with minimum wages greater than the federal minimum fell to 15, while the average state minimum was only two percent greater than the federal level. Consequently, those states that were bound by the federal minimum wage at the start of the recession experienced the greatest minimum wage growth.

2.3 The Regression Model

When determining the effect of minimum wage legislation on employment levels, we cannot fail to consider the impact that a larger population or more dynamic economy might have on employment. If minimum wages are high as a result of a higher average

[5] Department of Labor. http://www.dol.gov/whd/minwage/coverage.htm. Accessed 2/22/10.

wage, analyses that ignore differences in average state wages will be biased. Similarly, if states with larger populations fare differently during periods of economic downturn, models that overlook differences in state population will also be biased.

Following Neumark and Wascher (1992), I have used a dummy variable to separate the data into two groups: those states with a minimum wage higher than the federal minimum in December 2007 at the beginning of the recession, and those states in which the federal minimum is binding. The model is as follows:

$$\Delta E_i = \alpha + \alpha_1 MW + \alpha_2 lnPop_i + \alpha_3 HrMean_i,$$

where ΔE_i is the percentage change in employment levels from December 2007 to December 2009, *MW* is a dummy variable valued at one if the state minimum wage was greater than the federal minimum in December 2007 or zero otherwise, $lnPop_i$ is the logarithm of each state's population in 2007, and $HrMean_i$ is the mean hourly wage by state in 2007.

Since the number of states with minimum wages above the federal minimum decreased from 32 states to 15 during this time period, in an alternative specification, I used a dummy variable to estimate the change in employment for those states that maintained minimum wages above the federal level in December 2009.[6] As in the previous model, the indicator is valued at one if the state minimum wage was greater than the federal minimum in December 2009, or zero otherwise. The control variables remain unchanged for this specification.

[6] Refer to the Appendix for a complete of list of states in this group and in the larger December 2007 group, as well as a list of each state's change in employment from December 2007 to December 2009.

2.4 Graphical Representation of Employment Change

Preliminary analysis of the effects of minimum wages during periods of recession suggests that those states that support minimum wages higher than the federal minimum fared worse during the recent economic downturn. Figures 2.1 and 2.2 provide graphical representation of the average monthly percentage change in employment for both groups of states between January 2006 and December 2009 by industry. These figures reveal several interesting patterns. First, on average, it appears that states with minimum wages above the federal minimum in December 2007 experienced more dynamic shifts in employment. Second, all states and industries suffered a noticeable decline in employment levels usually starting around December 2007, save for government, which experienced an increase in employment for both groups. Construction employment fell as early as June 2006 for those states with minimum wages higher than the federal minimum at the start of the recession; the same month also marked the beginning of the decline in manufacturing employment for both groups of states. Prior to the decline, employment totals for all states and industries remained steady or were slightly rising. Finally, in most instances, the monthly percentage change in employment fell at a greater rate in those states with minimum wages higher than the federal minimum wage compared to those in which the federal minimum was binding. Mining and Logging appear to have undergone the opposite effect, with greater negative change in those states at the federal level, but please note, the percentage decrease was quite small for both groups of states. Even government, which saw an average increase in employment for both groups of states, experienced earlier declines in those states with a higher minimum wage, while those

bound by the federal minimum continued to demonstrate positive change though late 2009.

2.5 Preliminary Statistical Analysis

Table 2.1 provides summary statistics for each variable of interest and for each group of states – those with minimum wages above the federal level in December 2007 or December 2009 and those bound by federal minimum wage legislation. Average employment loss during this period was around 5.6 percent (standard deviation 2.7), however, states with minimum wages greater than the federal minimum experienced a decline a full percentage point greater than those states bound by the federal minimum (6.0 percent and 5.0 percent respectively). Such outcomes seem to support the theory that higher minimum wages created a greater cost burden during the recent downturn., and therefore caused greater relative decreases in employment. In fact, when we examine the decline in employment of the smaller group of 15 states that maintained minimum wages above the federal level in December 2009, the loss of employment is even greater (6.6 percent), suggesting that higher wages do lead to greater disemployment. A quick examination of the percentage change in real minimum wage, however, will soon discredit this assumption.

The average change in state real minimum wage from December 2007 to December 2009 was 11.5 percent, with the greatest increase experienced by New Mexico (24.7 percent) – which saw the state minimum wage grow from $5.85 to $7.50 in only two years. The average change for those states with minimum wages above the federal level was only 6.0 percent, while the growth rate of those states bound by the federal legislation was more than triple that of the first group at 20.8 percent. If conventional

economic theory holds, we should expect to see greater disemployment in those states that experienced the greatest increase in real minimum wage, (those at the federal minimum wage level at the beginning of the period). This is in direct contrast to the results outlined above. This discrepancy becomes clearer when comparing the large decline in employment for those 15 states with minimum wages above the federal level in December 2009 to the relatively small percentage change in real minimum wage levels for these states (6.1 percent).

Even if we examine the change in minimum wage relative to average wage, this contradiction remains. Table 2.2 reports the change in relative minimum wages before and after each shift in the federal minimum wage. The earlier month for each year corresponds to the month just prior to the increase in the federal minimum wage, while the later month reflects the dates of analysis, as well as the month preceding a popular month for state minimum wage increase: January.

For those states with minimum wages above the federal level, minimum wage relative to average hourly wage remained fairly constant from June 2007 to December 2009. This fact is further substantiated by the small percentage change in relative minimum wage experienced by both groups of states that maintained minimum wages above the federal minimum in either December 2007 or December 2009, as reported in Table 2.1 (2.2 percent for both groups of states).[7] In sharp contrast, those states bound by the federal minimum wage experienced a noticeable increase in relative minimum wage – growing from 30 percent to 38 percent of average wages, or a growth rate of 16.0 percent

[7] The average increases in relative minimum wage reported in Table 2.1 do not directly correspond to the same values in Table 2.2, because the former calculation applies only to those states with minimum wages above the federal level in December 2007 or December 2009. The calculations in Table 2.2 refer to those states with minimum wages above the federal level as of the date reported in the table.

for those states that were at the federal level in December 2007 as shown in Table 2.1. Again, these results might suggest that those states bound by the federal minimum wage would face greater disemployment effects during periods of recession, as this group of states experienced comparatively larger increases in relative minimum wages.

2.6 Regression Results

Table 2.3 provides the results of the regression analysis. In column 1, I include only the minimum wage dummy variable for states with minimum wages above the federal floor at the beginning of the recession. In this model, the effect of minimum wages on employment totals was negative and slightly less than 1 percent. However, in this specification, minimum wage effects were statistically indistinguishable from zero.

When the population variable is added to the regression in column 2, the coefficient on the minimum wage variable rises, meaning greater disemployment effects occur when differences in population size are omitted. The population coefficient is both negative and statistically significant, suggesting that states with larger populations suffered greater disemployment during the recession. Again, the minimum wage variable remains statistically insignificant.

In column 3, I include state mean hourly wage as a control for labor market differences, and in column 4, I substitute the December 2009 indicator variable for the December 2007 dummy but include the mean hourly wage and population effects. In these specifications, the minimum wage variable becomes more negative when state average wages are included in the analysis – minimum wage effects are washed out if not set against the backdrop of average wage, as seen when comparing columns 2 and 3.

Moreover, the minimum wage variable is negative and significant in specifications controlling for both population and mean hourly wage.

The estimations shown in columns 3 and 4 suggest that those states that are bound by the higher state minimum rather than the federal minimum experienced greater disemployment during the recent recession. For example, column 3 shows that employment declined 1.5 percentage points more in states with minimum wages higher than the federal level in December 2007 compared to other states. States with minimum wages higher than the federal minimum wage in December 2009 lost 2.3 percentage points more employment than states at the federal minimum, as shown in column 4. When we consider that average employment change during this period was a decrease of 5.6 percent, this result suggests that more than one-fourth of the disemployment during this period is related to minimum wage legislation! However, before coming to any firm conclusions regarding this analysis, I need to check the model for misspecification.

When comparing columns 1 and 2 to column 3, it appears evident that the control variables are justified and well-chosen. The coefficients on both the population and mean hourly wage variables are significant and large, which implies that differences in average wage and labor market size do affect employment levels during periods of economic recession. These effects will be discussed later.

I also tested the model for the "best" set of regressors using the Akaike information criterion (AIC). This test for misspecification comprises a trade-off between minimizing the sum of squared errors and limiting the number of regressors (Griffiths, Hill and Judge 1993). Although additional explanatory variables might reduce

unobserved error, the inclusion of extraneous independent variables will decrease variation in the observations.

The best model is one that minimizes the AIC value as given by the following equation:

$$ln(SSE_i/N) + 2K_i/N,$$

where SSE_i is the sum of squared errors for model i, N is the number of observations, and K_i is the number of coefficients in model i. This test can be performed with Stata or other statistical software. In all instances, the specifications that include controls for both population and mean hourly wage reported the smallest AIC values.

Following other studies (Card 1992b, Katz and Krueger 1992, and Thompson 2009), I wanted to measure the effect of minimum wage by relative degree of impact. A model that includes a variable representing minimum wage relative to average wage will more accurately reflect the effect of the wage floor on employment levels. In states with minimum wages close to the average wage, or those with a high relative minimum wage, more employees are likely impacted by increases in minimum wage than states with low minimum wage to average wage ratios. Furthermore, since both average and minimum wages increased during this period, (and sometimes quite dramatically – the federal minimum wage grew by 24 percent from December 2007 to December 2009), a more precise analysis would measure the percentage change in employment levels against the changed interaction of minimum and average wages.

With this issue in mind, I created a relative minimum wage variable that measures the change in the ratio of minimum wage to average wage from December 2007 to December 2009. This value was then multiplied by 100 to create a variable for the

percentage change in relative minimum wages. This relative minimum wage variable was substituted for the minimum wage dummy in the previous models.

When examining the effect of relative minimum wages on total nonfarm employment (in column 5), the coefficient is positive, though small compared to the overall change in employment and statistically insignificant. The analysis suggests that changes in relative minimum wage had little impact on employment levels during the period of analysis. The coefficients on the population and mean hourly wage variables for this model are similar in sign to the dummy variable specifications, which suggests that the specification is robust against different measures of minimum wage.

This analysis contradicts traditional theories of minimum wage legislation, which assert that large minimum wage increases will lead to greater disemployment. The variable of interest is the relative change in minimum wage across states – a change that was much more dramatic for those states without a unique minimum wage.

To better illustrate this idea, between December 2007 and December 2009, those states with minimum wage levels (as of December 2009) equal to the federal wage floor experienced a 13.8 percent (standard deviation 8.2) average increase in real minimum wage. This is a significant difference when compared to those states in which the federal minimum was not binding in December 2009, which underwent only a 6.1 percent (standard deviation 7.0) average increase in real minimum wage. (This average falls to 4.7 percent with a standard deviation of 4.9 without New Mexico's minimum wage, which increased by an anomalous 24.7 percent during this period.) Thus according to conventional market theory, the states at the federal level should have suffered greater disemployment effects.

The model in column 6 substitutes a variable representing the percentage change in real minimum wage for the relative minimum wage. In this instance, the effect of the change in real minimum wage is indistinguishable from the effect of the relative minimum wage change. The sign and magnitude of the coefficients on these variables, as well as the standard error are exactly the same, while the coefficients on the control variables are nearly identical in both size and variance. This suggests that the change in real minimum wage alone – not the change in its relationship to state mean wage – describes the employment effects observed in column 5. This conclusion is further supported by the relative change in real average wages during this period. As shown in Table 2.1, the average change in the real mean hourly wage from 2007 to 2009 was similar for both groups, 3.7 percent (standard deviation 1.5) for those states above the federal minimum wage, and 4.0 percent (standard deviation 1.4) for those states in which the federal minimum was binding. Again, the change in real minimum wages appears to have had no effect on employment levels.

When comparing the minimum wage dummy models to those using the change in real minimum wage, the results seem to diverge. On the one hand, the minimum wage dummy specifications suggest that states with minimum wages above the federal level undergo greater disemployment during periods of recession – a view consistent with traditional theories of labor economics. On the other hand, the change in minimum wage and relative minimum wage models imply that those states that experienced larger relative growth in minimum wage experienced little change in employment. Is there some inherent difference between those states with minimum wages above the federal minimum that could be driving the negative values obtained in the dummy

specifications? Or alternatively, is there some unique feature of states that are bound by the federal minimum wage level that would facilitate employment growth during periods of recession?

As a final note, the effects of hourly mean wages and population sizes in all specifications were significant though small in magnitude. According to these estimations, a $1 increase in a state's mean hourly wage at the beginning of the period of analysis resulted in an increase in employment of approximately 0.3 percentage points. This appears to demonstrate a positive relationship between average wages and employment. However, this does not support Blanchflower and Oswald's (1995) wage curve theory for two reasons. First, the independent variable in this specification is static – it measures the average wage level at the start of the recession – while the dependent variable measures the average *change* in employment. According to Blanchflower and Oswald, the wage curve does not demonstrate a dynamic response, but rather a static equilibrium. Second, the direction of causality in Blanchflower and Oswald's estimates suggests that high unemployment results in low wages. My analysis credits high average wages for relatively greater employment.

Contrary to mean hourly wage, the effect of relative population size on employment indicates a 1.4 percentage point employment loss for each log-point increase in state population. A likely reason for this population effect is discussed in Section 2.9.

2.7 The Decline of the Construction Industry

Figure 2.2 reveals two potential sources of the paradoxical effects noted above: construction and government employment. I discuss each source in turn.

For both groups of states, the construction industry appears to have been hit harder by the recession than other industries, however, the impact was felt much sooner and to a greater degree by those states with minimum wages above the federal minimum at the start of the recession. In fact, average construction employment began to decline as early as June 2006 in those states with minimum wages greater than the federal level. The construction industries in these states saw an average employment decrease of 24.8 percent (standard deviation 9.3), from an average of 172,000 construction jobs in December 2007 to 132,000 jobs in December 2009, or roughly 40,000 construction jobs lost. In contrast, those states bound by federal minimum wage legislation continued to experience construction employment growth through November 2007. This group of states suffered a slightly smaller percentage loss in construction employment (20.2 percent with a standard deviation of 9.6), and a smaller magnitude of decline – from a peak of 136,000 construction jobs in December 2007 to an average of 111,000 in December 2009, or an average decline in employment of 25,000 jobs. Such figures might imply that the construction industry alone can account for the significant decline in employment for those states with minimum wages above the federal level.

To test this possibility, I created a variable representing the ratio of construction employment to total nonfarm employment in December 2007 for each state with available data.[8] If declines in construction employment are driving the negative effect

[8] Construction employment data were not reported for DC, DE, HI, MD, NE, SD, and TN.
To test whether the changes seen in Table 2.5 are a result of this omission, I reran the regressions in columns 3-6 of Table 2.3 excluding those states for which construction employment were not reported. In these estimates, the minimum wage status at the beginning of the period of analysis had no significant impact on employment totals, however, the disemployment effect in those states above the federal level in December 2009 was greater with the exclusion (-2.7 percentage points). The coefficients on the real and relative minimum wage variables fell by 0.02 percentage points to 0.05 with the omission, but remain statistically insignificant. These results do not reflect the changes seen in Table 2.5.

seen in columns 3 and 4 of Table 2.3, the coefficients on the minimum wage indicators should be insignificantly different from zero in regressions that account for differences in relative size of state construction industries. Unfortunately, as shown in Table 2.5, the results of this analysis seem only to confound the effect of minimum wage legislation on employment changes.

I first examined the effect of construction employment on the simple dummy variable regressions, which include indicator variables for states that supported minimum wages above the federal minimum in either December 2007 or December 2009. Surprisingly, as shown in columns 1 and 2, these estimates suggest that the disemployment effects of minimum wage legislation increase when controlling for differences in construction industry employment. In both regressions, the coefficient on the minimum wage indicator variable is larger in magnitude and precision than the regression without the construction variable. For those states with wages higher than the federal level in December 2007, disemployment effects are 1.7 percentage points greater than those states at the federal level, as compared to a decrease in employment of 1.5 percentage points when excluding the effects of the construction industry. For the group of states with higher wages in December 2009, disemployment effects also rose (became more negative), from -2.3 percentage points in the earlier regression to -2.5 percentage points when controlling for construction industry decline. Such estimates seem to strengthen the hypothesis that minimum wage legislation leads to greater disemployment.

Next, I examined the effects of the change in real minimum wage and relative minimum wage on employment, controlling for differences in relative size of state construction industries. The results of these specifications, as shown in columns 3 and 4,

seem to suggest that the construction industry had some bearing on the overall employment patterns noted in Table 2.3. As in the earlier regression, the coefficients on those variables representing change in real minimum wage and change in minimum wage relative to state mean wage were small and positive. In fact, when controlling for construction industry decline, the effect of the change in real minimum wage becomes statistically significant at the 90 percent confidence level. This suggests that states that experienced greater minimum wage growth, or those at the federal level in December 2007, experienced employment growth of one percentage point for each ten percent increase in real minimum wage when correcting for construction-industry decline. These results coincide with the summary statistics in Table 2.4, which suggest that states bound by federal legislation in December 2007 had higher percentages of employment in construction than other states.

The greater degree of construction employment in those states at the federal level also explains the increased disemployment effect observed in columns 1 and 2 as compared to similar specifications in Table 2.3. When controlling for the impact of the declining construction industry – which produced a greater disemployment effect in those states at the federal level – the decrease in employment is enhanced in states above the federal wage floor relative to those bound by the federal minimum wage.

Here are a few final thoughts on the regressions that include differences in construction industry employment. In all specifications the negative effect of relative population size is enhanced compared to those estimates that omit construction industry effects. However, the state mean hourly wage seems to have diminished in importance in models including construction industry employment. Finally, the negative and extremely

precise coefficient on the construction employment variable indicates that a ten percent increase in construction employment relative to total nonfarm employment during the period of analysis led to an 8.7 percentage point decrease in total employment.

2.8 Job Growth in Government Services

One glaring outlier in the graphical analysis is government employment – the only industry to witness an average growth in employment from December 2007 to December 2009. The average employment change in government services during this period was an increase of 1.3 percent (standard deviation 2.2). For those states with minimum wages above the federal minimum in December 2007, this growth averaged only 0.7 percent (standard deviation 2.4). This is in stark contrast to those states bound by the federal minimum during the same period, which experienced average growth in government employment of 2.4 percent (standard deviation 1.5). States that maintained minimum wages above the federal level in December 2009, or those that exhibited the largest employment decreases, witnessed an average *decrease* in government employment of 0.1 percent (standard deviation 2.6) during the period of analysis These summary statistics suggest that states at the federal minimum wage level might be cushioned from the impact of the recession and simultaneous increase in minimum wage by maintaining a larger percentage of total employment in government services. In fact, regressions including a variable representing relative differences in percentage of government employment seem to support this conclusion.

For this analysis, I estimated the simultaneous effects of government services and construction employment, minimum wage, and change in minimum wage on employment levels. In these specifications, I included a variable similar to that for construction

employment to control for the percentage of total nonfarm employment in government services. Interestingly, as shown in Table 2.6, the inclusion of the government employment variable washes out the effect of the December 2007 minimum wage indicator seen in column 1 of Table 2.5. This suggests that higher minimum wages have no significant effect on employment levels during periods of recession if the relative size of the construction industry and government employment are included in the analysis.

Since states at the federal level maintained greater degrees of government employment at the beginning of the recession and experienced greater growth in government services, the negative effects seen in columns 1 and 2 of Table 2.5 could reflect a relatively smaller increase in government employment during the period of analysis combined with roughly equal disemployment in other non-construction industries.

The results of the specifications including the change in real minimum wage and relative minimum wage also confirm this outcome. In each of these analyses, the positive employment effects that were observed in the earlier regression disappear, leaving only the government and construction variables statistically significant. This also suggests that relative increases in government services, and not monopsony, account for the positive effect of the change in real minimum wage seen in column 4 of Table 2.5. In estimations omitting the construction-employment effects (results not shown), the relative size of government employment is the only statistically significant effect of minimum wage legislation in three of the four specifications – even population size is insignificant in these specifications. This outcome implies that differences in population size are most strongly felt in differences in relative government size. Likewise, these results suggest

that the effect of average wages on employment levels is primarily influenced by government employment. In fact, in estimates not shown, mean hourly wage was found to be positively correlated with relative government size.

Surprisingly, the effect of the minimum wage dummy variable for those states that maintained minimum wages above the federal level in December 2009, as shown in Table 2.6, still remains negative and significant despite the inclusion of the relative size of government employment. Moreover, in spite of the dramatic increase in the federal minimum wage during this period, the minimum wage status of a state in December 2009 appears to have a stronger bearing on employment levels than any other wage factor. In fact, in all analyses this specification exhibits greater explanatory power as represented by the adjusted R^2 value than any other estimation of the same group – a gap of ten percentage points in some instances.

Finally, this analysis suggests that a ten percentage point increase in the percentage of total employment in government services contributed to an average employment increase of approximately 4.9 percentage points during the recession that began in December 2007. I hesitate to generalize this outcome, however, because the government response might differ in degree of urgency following other economic downturns.

One explanation for the evident lack of disemployment in those states that experienced the largest increase in minimum wage suggests that the federal minimum wage was not binding during the period of analysis – the market wage was already above the minimum wage level. In fact, the large number of states with minima above the federal level in December 2007 – more than 60 percent of total states – provides support

for this possibility. Moreover, as shown in Table 2.1, summary statistics suggest that a gap in real minimum wage in December 2007 between those states above the federal level and those bound by the federal legislation disappeared following the federal minimum wage increase of 2009. Indeed, the real minimum wage differential shrunk from an average of $1.09 in December 2007 to only $0.25 in December 2009. If $7.25 is closer to the true market wage, then the effect of an increase in minimum wage to this level would have little impact on average employment levels.

2.9 Robustness Checks for Dummy Variable Estimations

The above analyses indicate some factor unique to the group of 15 states with minimum wages higher than the federal minimum in December 2009 that is driving the estimated disemployment effects. Based on the results of these specifications, those states that had minimum wages above the federal requirement in December 2009 experienced a 1.8-2.5 percentage point average decrease in employment compared to those states bound by the federal minimum. Unfortunately, there do not seem to be any obvious characteristics linking these states other than the higher minimum wage. The states of this group are not situated in a specific geographic region, nor do they support a distinct industry.

Perhaps not coincidentally, three of the states in this group, Nevada, California and Michigan also appear in the top five states with the highest decreases in employment during the period of analysis (see Tables A.1 and A.2 of the Appendix). If these three are driving the disemployment effect seen in column 4 of Table 2.3, estimates that omit these states should produce a statistically insignificant coefficient on the variable indicating minimum wage status at the end of the period of analysis. However, even in

specifications excluding states that are particularly vulnerable to recession (results not shown), the minimum wage effect of those states with minimum wages above the federal level in December 2009 is still large, negative and statistically significant from zero at the 90 percent confidence level (-1.52 percentage points).

If the absolute minimum wage rather than relative minimum wage is driving the results shown in Tables 2.3, 2.5 and 2.6, then we should expect to observe disemployment effects when the dummy variable is replaced by the nominal minimum wage in the employment change estimations. In fact, as shown in Table 2.7, the effects of nominal minimum wages on employment levels is statistically insignificant from zero when controlling for relative differences in construction and government employment. According to these specifications, those states with minimum wages above the federal level in December 2009 experienced similar employment change to other states during the period of analysis. This suggests that another labor market variable common to these 15 states caused greater relative unemployment and also influenced minimum wage policy.

Omitted variable bias might explain the relative disemployment effect seen in this group. With this possibility in mind, I reran the regressions in column 4 of Table 2.3 and column 2 of Table 2.6 with additional labor market control variables, as shown in Table 2.8. Following Kalenkoski and Lacombe (2008), I estimated the effect of minimum wage on employment change, controlling for state median income as a proxy for consumer demand. If relative declines in employment in these states are reflective of changes in product demand, we should expect to see attenuation in the coefficient for the December 2009 dummy variable. As with the earlier regressions, those states with minimum wages

above the federal level in December 2009 continue to exhibit relative employment decreases even when controlling for differences in consumer demand and relative sizes of construction and government employment (-1.6 percentage points). Surprisingly, the effect of differences in median income had no effect on changes in employment.

Finally, as many studies have done before (Katz and Krueger 1992, David Card 1992a, David Card 1992b, Neumark and Wascher 1992, Kalenkoski and Lacombe, Sabia 2009, Thompson 2009), I included in the analysis the unemployment rate as reported at the beginning of the recession. Again, the coefficient of the December 2009 dummy variable remained statistically significant in all specifications except when controlling for *both* construction and government employment. This suggests that this group of states experienced higher rates of disemployment on average relative to other states, regardless of minimum wage levels. However, with five explanatory variables and only 44 observations, it is possible that the additional variable has eroded the variation in the data. To assess this possibility, I performed an AIC test on the estimation in column 2 of Table 2.6 both with and without the unemployment rate. If variation has been compromised from the inclusion of an extraneous variable, the AIC on the specification incorporating unemployment should be greater than the model without the unemployment rate. In fact, the AIC is minimized in the specification that controls for differences in unemployment, which justifies the inclusion of the variable.

Differences in average levels of unemployment might explain the population effect noted above. In estimates not shown, population is positively correlated with unemployment rates, which suggests that larger populations maintain relatively higher unemployment rates, and therefore experience greater negative employment growth.

Incidentally, there is little evidence of the downward-sloping wage curve described by Blanchflower and Oswald (1995). Indeed, in a measurement of the state mean hourly wage against the state unemployment rate controlling for population differences (results not shown), the coefficient is positive and statistically significant. The regression measured a $0.78 increase in the average hourly wage for a one percentage point increase in the unemployment rate. However, differences in aggregation between dependent and independent variables might also explain this discrepancy – the population and average wage data are reported annually, while the unemployment rate is reported monthly. To correct for this, I calculated the average annual 2007 unemployment rate using the monthly rates available through the Bureau of Labor statistics. Even using the annual data, however, I am unable to confirm the results of the wage curve estimations. In this specification, the effect of the unemployment rate on average wages is still positive, though statistically insignificant.

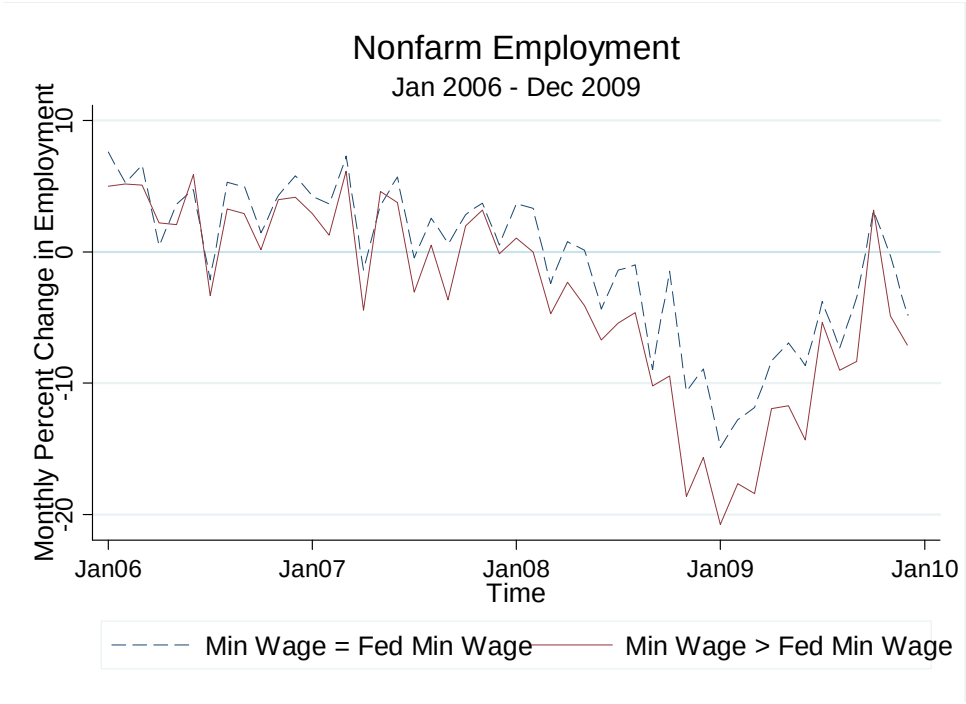
In summary, there appear to be no disemployment effects of minimum wage legislation despite a large increase in the federal minimum wage during the period of analysis. Although, simple regressions that use dummy variables to separate states by minimum wage status suggest that minimum wage legislation caused greater disemployment in states not bound by the federal wage floor, when controlling for other state-level economic conditions, such as the relative size of the construction industry, the degree of government employment, and the unemployment rate, these negative effects disappear. These results coincide with estimations of the impact of real and relative minimum wage changes on employment, which indicate no statistical evidence of minimum wage effects. Likewise, differences in state median income levels appear to

have no effect on employment levels, and the data offer little support for the wage curve theory.

Figures and Tables

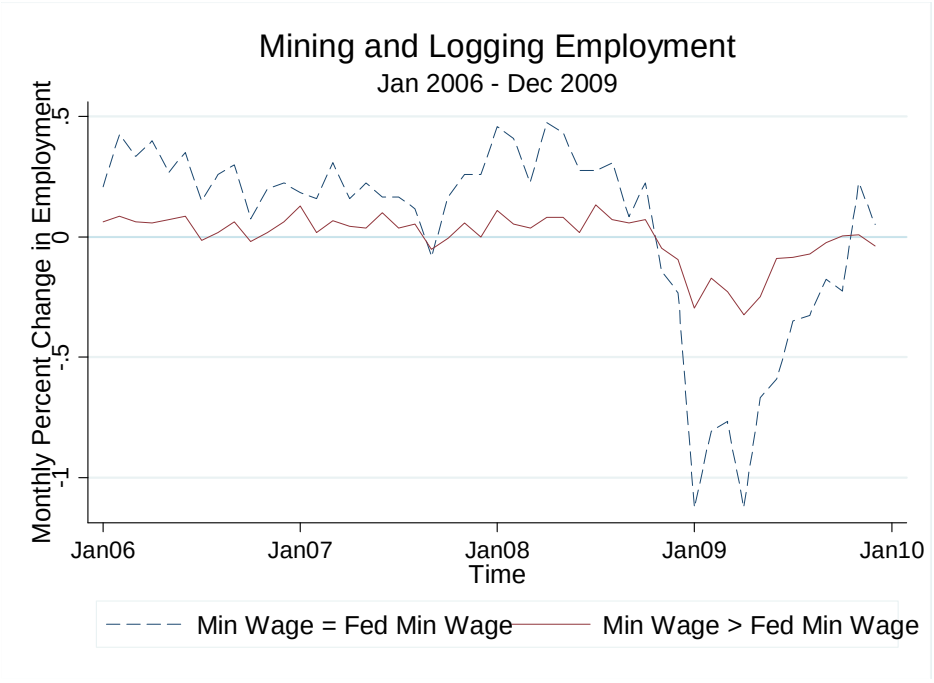
Figure 2.1

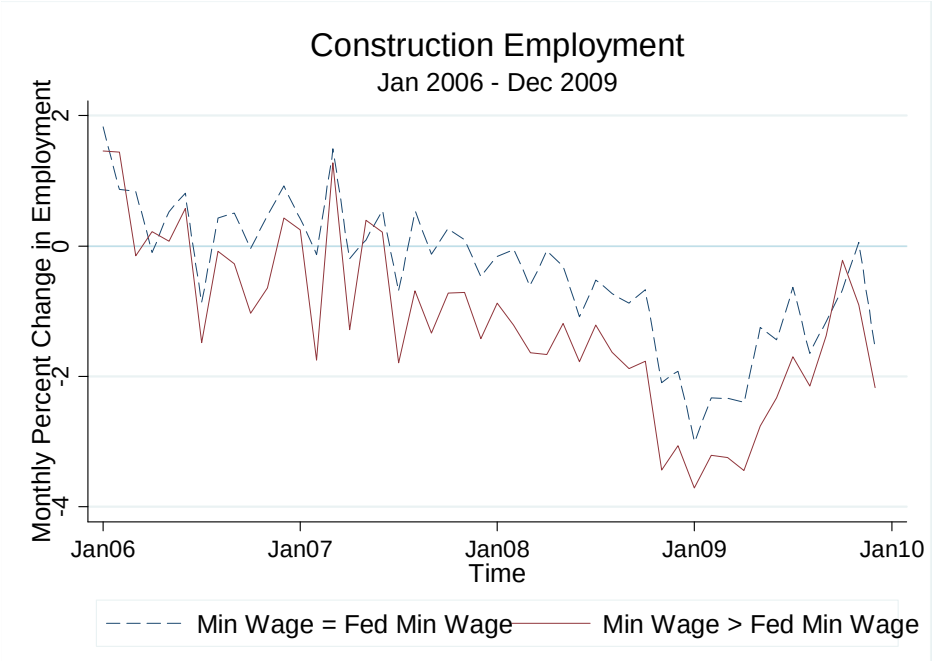
Employment Change by Industry



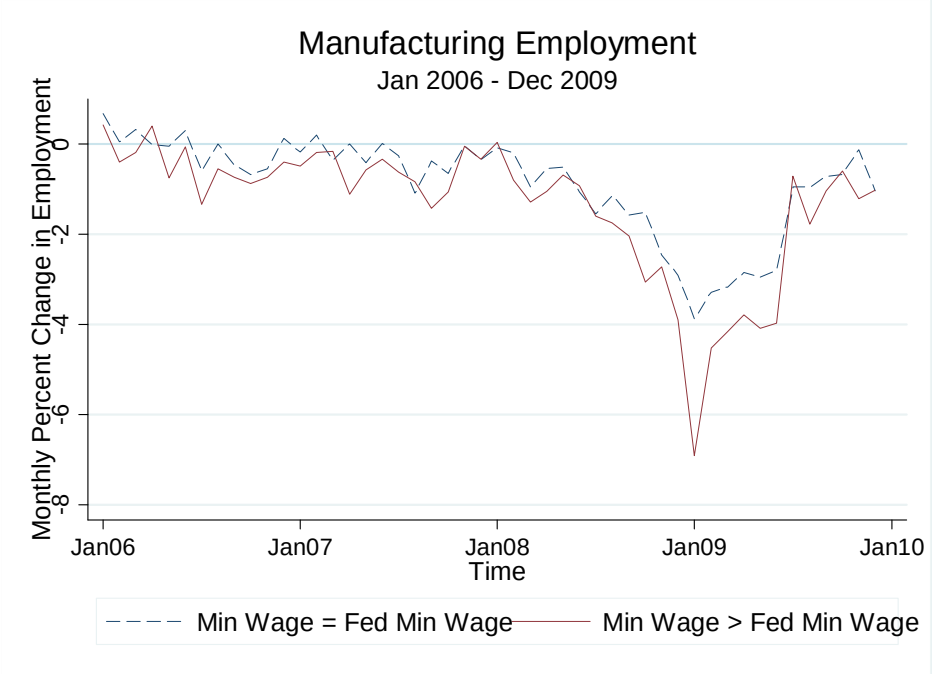
*The solid red line corresponds to those states with minimum wages greater than the federal minimum wage in December 2007. The dashed blue line represents those states bound by the federal minimum wage.

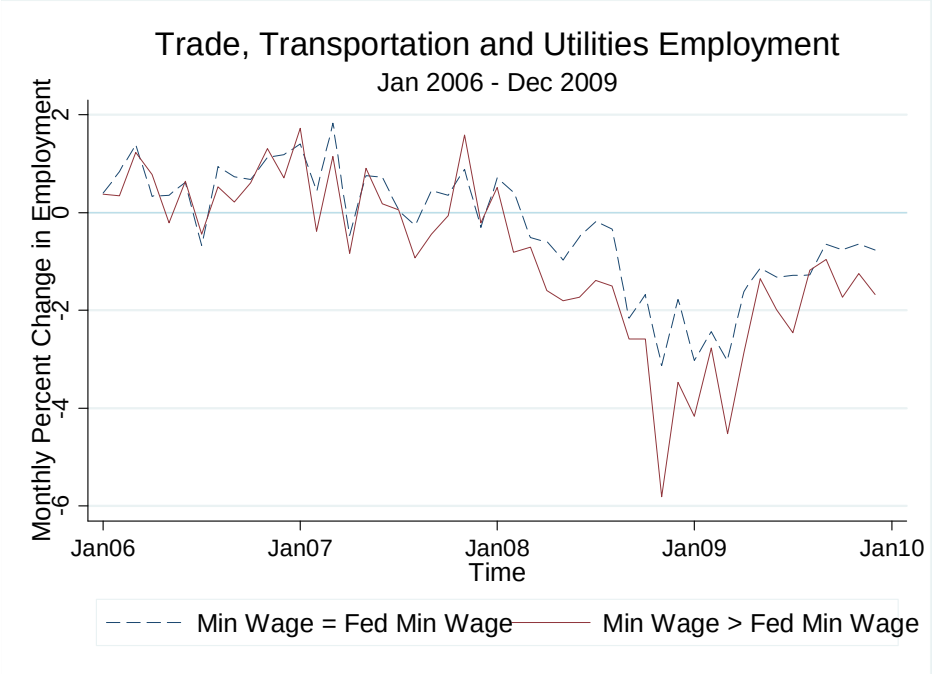
Figure 2.2



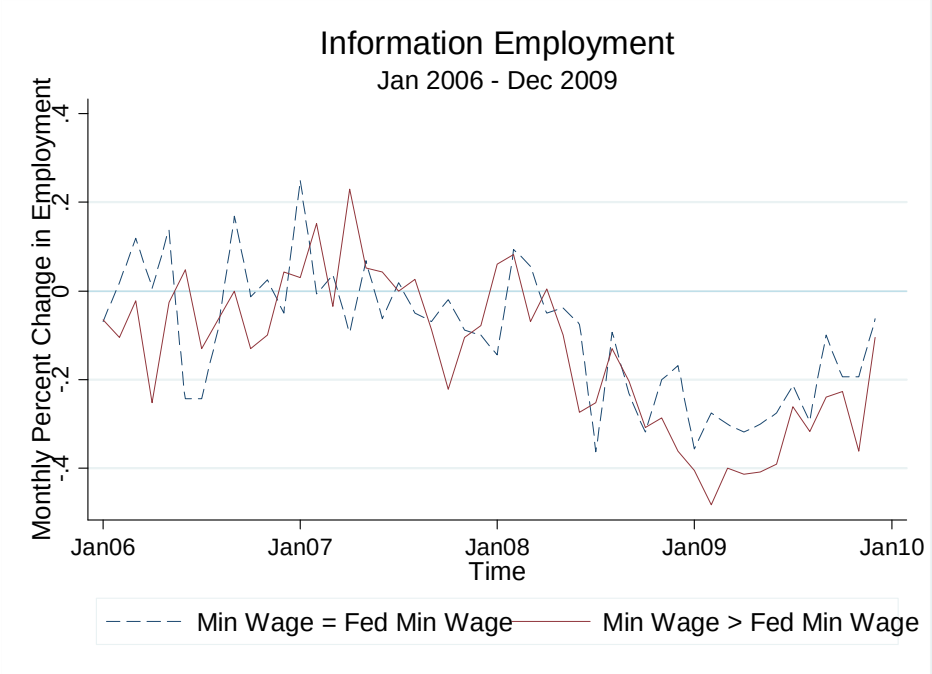


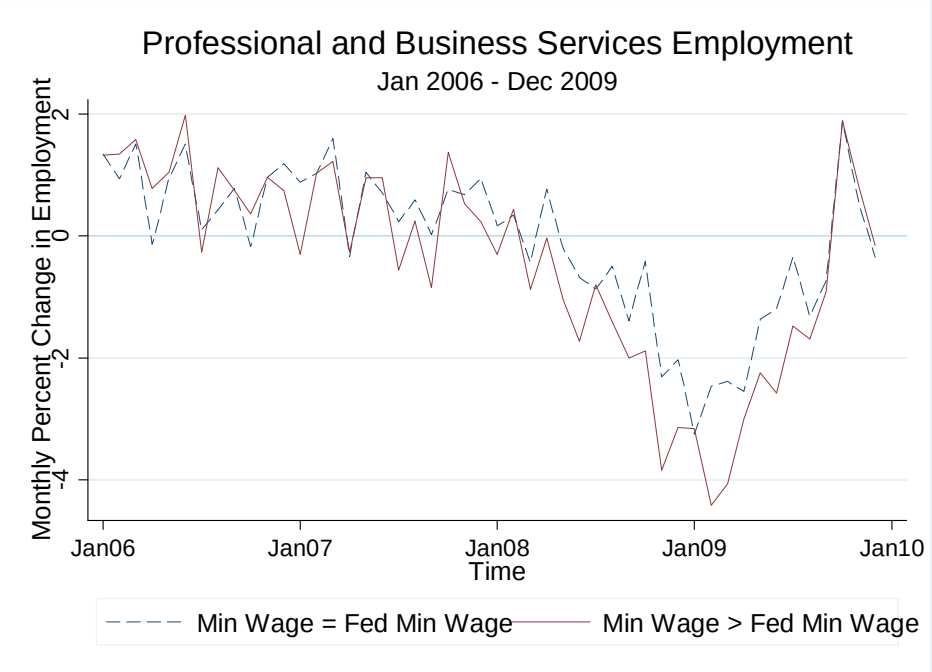
*The solid red line corresponds to those states with minimum wages greater than the federal minimum wage in December 2007. The dashed blue line represents those states bound by the federal minimum wage.



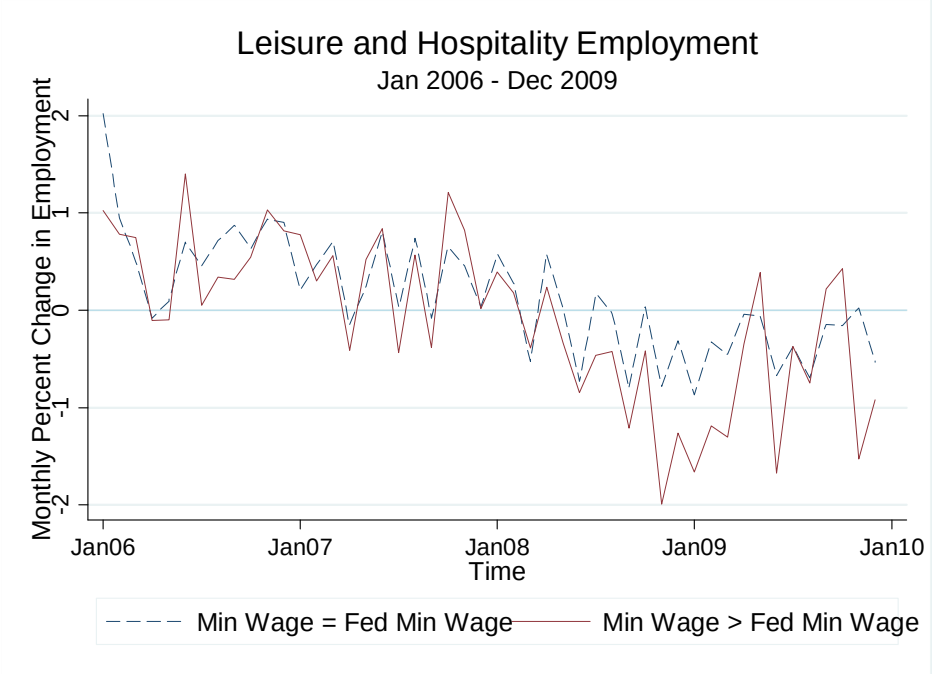


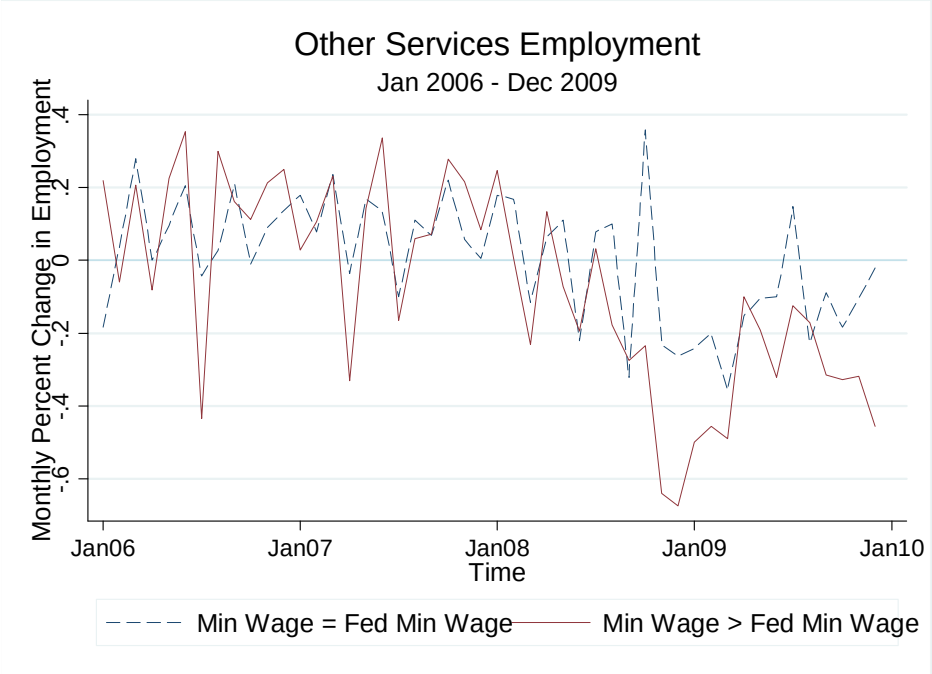
*The solid red line corresponds to those states with minimum wages greater than the federal minimum wage in December 2007. The dashed blue line represents those states bound by the federal minimum wage.



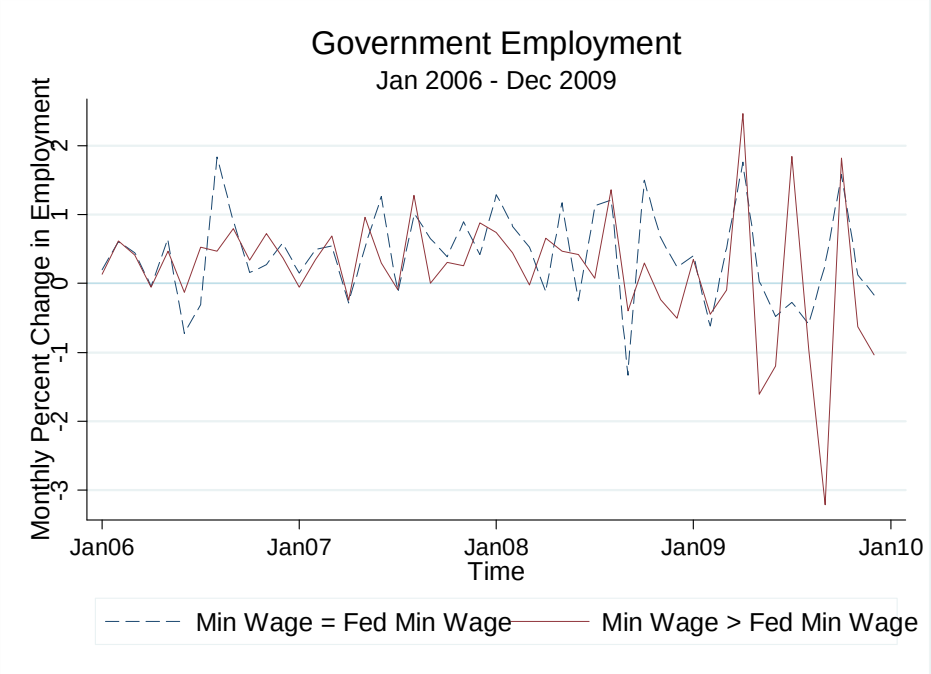


*The solid red line corresponds to those states with minimum wages greater than the federal minimum wage in December 2007. The dashed blue line represents those states bound by the federal minimum wage.





*The solid red line corresponds to those states with minimum wages greater than the federal minimum wage in December 2007. The dashed blue line represents those states bound by the federal minimum wage.



*The solid red line corresponds to those states with minimum wages greater than the federal minimum wage in December 2007. The dashed blue line represents those states bound by the federal minimum wage.

Table 2.1

State Labor Market Outcomes by Minimum Wage Status
(Standard Deviation in Parentheses)

Variable	State Totals	State Min Wage > Federal Min Wage in Dec 2007	State Min Wage = Federal Min Wage in Dec 2007	State Min Wage > Federal Min Wage in Dec 2009
% Change in Employment, Dec 2007 - Dec 2009	-5.6	-6.0	-5.0	-6.6
	(2.7)	(2.8)	(2.5)	(3.0)
% Change in Relative Minimum Wage, Dec 2007 - Dec 2009	7.4	2.2	16.0	2.2
	(8.0)	(5.4)	(1.5)	(5.7)
% Change in Real Minimum Wage, Dec 2007 - Dec 2009	11.5	6.0	20.8	6.1
	(8.6)	(5.8)	(1.0)	(7.0)
% Change in Real State Mean Hourly Wage, Dec 2007 - Dec 2009	3.9	3.7	4.1	3.7
	(1.4)	(1.5)	(1.3)	(2.0)
% Change in Minimum Wage Relative to Industry Mean Wage, Dec 2007 - Dec 2009[a]	10.2	4.8	19.8	5.4
	(11.6)	(8.4)	(10.1)	(9.1)
Real Minimum Wage Dec 2007	6.70	7.10	6.01	7.39
	(0.68)	(0.55)	0	(0.58)
Real Minimum Wage Dec 2009	7.42	7.51	7.26	7.81
	(0.34)	(0.40)	(0.06)	(0.42)
State Mean Hourly Wage 2007	18.85	19.89	17.10	20.79
	(2.82)	(2.99)	(1.20)	(3.39)
Ln State Population 2007	15.1	15.2	15.0	15.1
	(1.0)	(1.1)	(0.1)	(1.2)
Number of states	51	32	19	15

Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
a There are insufficient data for Mining and Logging and Information Services industry wages, so these industries were excluded from this regression. Mining and Logging wage data were only reported for WV and WY during the period of analysis. Information Services wage data were only reported for CA, IL, MA, MI, NC, NY, PA, TN, UT, and WA.

Table 2.2

State and Federal Minimum Wage Outcomes
(Standard Deviation in Parentheses)

	States With Minimum Wage Above Federal Minimum Wage	Federal Minimum Wage	Average % Difference Between State & Federal Minimum Wage	Relative Minimum Wage	
				State Minimum Wage> Federal Minimum Wage	State Minimum Wage= Federal Minimum Wage
Jun 2007	32	5.15	19.9	0.35	0.30
			(17.9)	(0.04)	(0.02)
Dec 2007	32	5.85	11.3	0.35	0.34
			(11.4)	(0.04)	(0.02)
Jun 2008	33	5.85	12.8	0.35	0.33
			(12.4)	(0.04)	(0.02)
Dec 2008	26	6.55	6.09	0.35	0.36
			(7.38)	(0.04)	(0.03)
Jun 2009	28	6.55	7.50	0.36	0.35
			(8.43)	(0.05)	(0.03)
Dec 2009	15	7.25	2.82	0.36	0.38
			(4.69)	(0.05)	(0.04)

Source: Employment totals and mean hourly wage data were obtained from the Bureau of Labor Statistics; and minimum wage data were obtained from each state's department of labor.

Table 2.3

Effects of Minimum Wages and Relative Minimum Wage on Employment
(Standard Error in Parentheses)

Nonfarm Totals	1	2	3	4	5	6
Minimum Wage Dummy 2007	-0.92 (0.79)	-0.70 (0.72)	-1.54* (0.79)	-	-	-
Minimum Wage Dummy 2009	-	-	-	-2.33*** (0.78)	-	-
% Change in Relative Minimum Wage Dec 2007- Dec 2009	-	-	-	-	0.07 (0.05)	-
% Change in Real Minimum Wage Dec 2007- Dec 2009	-	-	-	-	-	0.07 (0.05)
Ln Population 2007	-	-1.09*** (0.34)	-1.14*** (0.32)	-1.20*** (0.31)	-1.14*** (0.33)	-1.12*** (0.33)
Hourly Mean Wage 2007	-	-	0.30** (0.14)	0.35*** (0.13)	0.29* (0.14)	0.28* (0.14)
Constant	-5.04*** (0.62)	11.3** (5.07)	6.87 (5.27)	6.59 (4.99)	5.64 (5.70)	5.27 (5.76)
Adjusted R^2	0.01	0.17	0.23	0.30	0.20	0.21

Dependent variable is the percentage change in total nonfarm employment from December 2007 to December 2009.
Source: Employment totals amd mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 2.4

State Labor Market Outcomes by Minimum Wage Status
(Standard Deviation in Parentheses)

Variable	State Totals	State Min Wage > Federal Min Wage in Dec 2007	State Min Wage = Federal Min Wage in Dec 2007	State Min Wage > Federal Min Wage in Dec 2009
% of Total Employment in Construction, Dec 2007	5.6	5.3	6.1	5.5
	(1.5)	(1.5)	(1.4)	(1.7)
% of Total Employment in Government, Dec 2007	17.4	16.8	18.5	17.1
	(3.6)	(4.0)	(2.4)	(5.2)
Average Household Median Income 2007-2008	51,557	53,933	47,554	54,434
	(7,602)	(7,544)	(5,964)	(5,758)
2007 Annual Unemployment Rate	4.5	4.7	4.1	5.1
	(1.0)	(0.9)	(1.1)	(0.9)
Number of states	51	32	19	15

Source: Employment totals were obtained from the Bureau of Labor Statistics; state median income was obtained from the U.S. Census Bureau and corresponds to the two-year average median household income from 2007 to 2008; and seasonally adjusted unemployment rates were obtained from the Local Area Unemployment Statistics database of the Bureau of Labor Statistics and correspond to the December 2007 monthly unemployment rate.

Table 2.5

Effects of Minimum Wages and Relative Construction Industry Employment on Total Employment
(Standard Error in Parentheses)

Nonfarm Totals	1	2	3	4
Minimum Wage Dummy 2007	-1.71**	-	-	-
	(0.80)	-	-	-
Minimum Wage Dummy 2009	-	-2.52***	-	-
	-	(0.76)	-	-
% Change in Relative Minimum Wage Dec 2007 – Dec 2009	-	-	0.08	-
	-	-	(0.06)	-
% Change in Real Minimum Wage Dec 2007 – Dec 2009	-	-	-	0.10*
	-	-	-	(0.06)
% of Total Employment in Construction Dec 2007	-0.82***	-0.67***	-0.79***	-0.86***
	(0.24)	(0.23)	(0.25)	(0.26)
Ln Population 2007	-1.29***	-1.40***	-1.30***	-1.31***
	(0.36)	(0.34)	(0.37)	(0.37)
Hourly Mean Wage 2007	0.19	0.30*	0.21	0.27
	(0.18)	(0.17)	(0.22)	(0.22)
Constant	15.9***	14.4**	13.9**	12.8**
	(5.87)	(5.51)	(6.43)	(6.31)
Adjusted R^2	0.31	0.40	0.26	0.29
N	44	44	44	44

Dependent variable is the percentage change in total nonfarm employment from December 2007 to December 2009.
Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 2.6

Effects of Minimum Wages and Relative Construction Industry and Government Employment on Total Employment
(Standard Errors in Parentheses)

Nonfarm Totals	1	2	3	4
Minimum Wage Dummy 2007	-0.52 (0.76)	-	-	-
Minimum Wage Dummy 2009	-	-1.80** (0.67)	-	-
% Change in Relative Minimum Wage 2007-2009	-	-	0.02 (0.05)	- -
% Change in Real Minimum Wage 2007-2009	-	-	-	0.04 (0.05)
% of Total Employment in Construction Dec 2007	-0.88*** (0.21)	-0.79*** (0.20)	-0.87*** (0.21)	-0.91*** (0.22)
% of Total Employment in Government Services Dec 2007	0.50*** (0.13)	0.45*** (0.12)	0.52*** (0.12)	0.50*** (0.13)
Ln Population 2007	-0.68* (0.35)	-0.83** (0.32)	-0.65* (0.35)	-0.69* (0.35)
Hourly Mean Wage 2007	0.16 (0.16)	0.30* (0.15)	0.17 (0.19)	0.22 (0.18)
Constant	-1.82 (6.90)	-1.56 (6.21)	-3.22 (6.77)	-3.40 (6.70)
Adjusted R2	0.49	0.56	0.48	0.49
N	44	44	44	44

Dependent variable is the percentage change in total nonfarm employment from December 2007 to December 2009.
Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 2.7

Effects of Nominal Minimum Wages on Total Employment
(Standard Errors in Parentheses)

Nonfarm Totals	1	2	3	4	5	6
Nominal Minimum Wage Dec 2007	-1.24*	-	-1.02	-0.95	-	-0.63
	(0.64)		(0.78)	(0.63)		(0.86)
Nominal Minimum Wage Dec 2009	-	-1.75	-0.70	-	-1.40	-0.75
		(1.19)	(1.43)		(0.97)	(1.32)
% of Total Employment in Construction Dec 2007	-	-	-	-0.90***	-0.82***	-0.86***
				(0.21)	(0.21)	(0.22)
% of Total Employment in Government Services Dec 2007	-	-	-	0.49***	0.52***	0.50***
				(0.12)	(0.12)	(0.12)
Ln Population 2007	-1.13***	-1.20***	-1.15***	-0.74**	-0.68*	-0.73**
	(0.33)	(0.33)	(0.33)	(0.35)	(0.33)	(0.34)
Hourly Mean Wage 2007	0.35**	0.29**	0.37**	0.32	0.23	0.31
	(0.15)	(0.14)	(0.15)	(0.19)	(0.16)	(0.19)
Constant	12.8**	20.0**	16.6*	2.47	6.24	5.53
	(5.58)	(9.27)	(9.56)	(7.46)	(9.16)	(9.26)
Adjusted R2	0.23	0.21	0.21	0.51	0.51	0.50
N	51	51	51	44	44	44

Dependent variable is the percentage change in total nonfarm employment from December 2007 to December 2009.
Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 2.8

Effects of Minimum Wages on Employment Levels Controlling for Differences in Consumer Demand and Unemployment
(Standard Errors in Parentheses)

Nonfarm Totals	1	2	3	4
Minimum Wage Dummy 2009	-2.38***	-1.58**	-2.02**	-1.05
	(0.79)	(0.72)	0.84)	(0.65)
Median Income 2007	0.00	0.00	-	-
	(0.00)	(0.00)		
Unemployment Rate Dec 2007	-	-	-0.40	-0.98***
			(0.38)	(0.31)
% of Total Employment in Construction Dec 2007	-	-0.86***	-	-0.99***
		(0.21)		(0.19)
% of Total Employment in Government Services Dec 2007	-	0.50***	-	0.47***
		(0.13)		(0.10)
Ln Population 2007	-1.25***	-0.59	-1.07***	-0.53*
	(0.31)	(0.42)	(0.33)	(0.30)
Hourly Mean Wage 2007	0.44**	0.05	0.36***	0.27*
	(0.17)	(0.31)	(0.13)	(0.13)
Constant	8.11	-4.86	6.07	-0.49
	(5.30)	(7.20)	(5.01)	(5.60)
Adjusted R2	0.30	0.56	0.30	0.65
N	51	44	51	44

Dependent variable is the percentage change in total nonfarm employment from December 2007 to December 2009.
Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population and median income data were obtained from the U.S. Census Bureau; minimum wage data were obtained from each state's department of labor; and seasonally adjusted unemployment rates were obtained from the Local Area Unemployment Statistics database of the Bureau of Labor Statistics and correspond to the December 2007 monthly unemployment rate.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

CHAPTER 3

3.1 Estimation of Minimum Wage Effects by Industry

There are several limitations associated with the use of nonfarm employment totals, many of which can be corrected by using a larger sample of nine 1-digit NAICS industries. One of the most glaring shortcomings of the nonfarm regressions is the small sample size. By expanding the selection to include subcategories of nonfarm industries, we can improve the precision of the estimates. Moreover, if minimum wage effects have a stronger impact in some industries than in others, nonfarm employment totals, which average changes across industries, might wash out the industry-level effects. Finally, industry-level data allow estimation of the effect of a change in minimum wage relative to the industry mean wage, which should provide a better approximation of the true impact of minimum wage legislation. With these concerns in mind, I reran the previous regressions of the change in employment from December 2007 to December 2009 by state and across 1-digit NAICS industries.[9]

Table 3.1 presents the results of these industry-level regressions, including a specification that controls for industry average wages. When comparing Table 3.1 to Table 2.3, the most notable change is the loss of precision on the minimum wage indicator variable in column 1. Expanding the sample size appears to have eroded the disemployment effect seen in Table 2.3 for those states that maintained minimum wages above the federal level in December 2007. In contrast, those states at the higher wage in

[9] Mining and Logging employment data were not reported for AL, CT, DC, DE, FL, GA, HI, LA, MA, MD, NE, NH, NJ, RI, SC, SD, TN and VT. Construction employment data were not reported for DC, DE, HI, MD, NE, SD, and TN. Manufacturing employment data were not reported for AL, DC, DE, and HI. Information services employment data were not reported for HI, ME, MS, NM, NV, OK, OR, RI, VT, and WV.

December 2009 appear to have experienced a *larger* negative effect in the industry-level specification. As shown in column 2, the disemployment effect seen in this smaller group of states increased (became more negative) by nearly one percentage point in the later specifications, from -2.3 percentage points to -3.1 percentage points.

As shown in columns 3 and 4, the impact of the change in real and relative minimum wages is very similar to the estimates in Table 2.3 (an employment increase of 0.6 percentage points for each one percent increase in relative or real minimum wage compared to an increase of 0.7 percentage points in the nonfarm model). As in the nonfarm regression, the change in these minimum wage variables is positive, but has no significant effect when using the larger sample.

As a final comparison, the control variables of logged population and state mean wages are similar in sign to the nonfarm regressions, however, the magnitude of the effect is increased in all instances, and the effect of state mean wages loses some statistical significance in the industry-level regressions. For example, in Table 2.3, the coefficients on the logged population variable range from –1.12 to –1.20, while those in the industry-level regressions measure –1.37 to –1.50. This is approximately a 20-25 percent increase in the effect of population size on employment levels. State mean hourly wage coefficients increased from a range width of 0.28 to 0.35 in the nonfarm estimates to 0.23 to 0.39 using industry-level data. The range of the possible effect of average wages on employment levels has more than doubled in the state-industry specifications.

Since larger samples are often more precise, these differences likely reflect the more detailed nature of the industry-level data, whereas the loss of variety in the nonfarm estimates minimizes distinctions. Alternatively, the exaggerated effects of the industry-

level estimates relative to the nonfarm results suggests that correlation across industries within the same state in the industry-level regressions has overstated the negative effect of minimum wage legislation. For example, state tax policy or average levels of state educational attainment might have similar effects on industries within states, but not necessarily across states.

As an alternative specification, I estimated the disemployment effects of the change in minimum wage relative to the industry mean wage.[10] As with those studies that measure the relative impact of minimum wage legislation (Card 1992b, Katz and Krueger 1992, Thompson 2009), we should expect to observe greater disemployment effects in those state-industries where the industry average wage is relatively close to the real minimum wage. As the ratio of minimum wage to industry mean wage nears one, a greater percentage of workers in that industry are likely subject to the minimum wage. In fact, in those states with minimum wages above the federal level in December 2007, minimum wages relative to industry mean wages at the beginning of the period were nearly identical to those states bound by the federal legislation (ratios of 0.35 and 0.34 respectively). By 2009, however, this ratio had grown by only two percentage points in those states with minimum wages above the federal level, while those at the federal minimum saw a seven percentage point increase (to 0.37 and 0.41 respectively). These statistics suggest that a greater proportion of workers were subject to minimum wage

[10] Construction wage data were not reported for DC, DE, HI, MD, NE, NH, SD, and TN. Manufacturing wage data were not reported for DC, MT, NM, NV, and WY. Other Services wage data were not reported for AK, AR, DE, HI, ID, KY, LA, ME, MO, MS, MT, NE, NH, NM, NV, OK, RI, SD, UT, VT. There are insufficient data for Mining and Logging and Information Services industry wages, so these industries were excluded from this specification. Mining and Logging wage data were only reported for WV and WY during the period of analysis. Information Services wage data were only reported for CA, IL, MA, MI, NC, NY, PA, TN, UT, and WA.

legislation at the end of the period of analysis in those states at the federal level, while those states bound by the higher state minimum wage saw little change.

In column 5 of Table 3.1, I estimate employment change against the change in minimum wage relative to industry-average wages. As with the real and relative minimum wage specifications in columns 3 and 4, there appears to be little evidence that changes in minimum wage relative to industry-average wages impact employment levels.

3.2 Industry-Level Estimates Excluding Construction and Government Employment

As in the nonfarm employment regressions, I suspected differences in relative government size and construction industry employment to explain the contradictory effects observed in these regressions. In fact, as shown in Table 3.2, the estimates from specifications excluding either construction or government employment are similar in sign and precision to the results obtained in Tables 2.5 and 2.6. However, the impact of construction and government employment on the disemployment effects of minimum wages are reversed in the industry-level specifications. Unlike the nonfarm estimates, which saw an increase in disemployment in specifications controlling for construction industry decline, in regressions excluding construction industry employment the effects of the variables of interest are dampened. For instance, the minimum wage indicator variables in columns 1 and 2 are both smaller in magnitude than in regressions that include all industries. The negative effects of relative population size have also diminished (become less negative) in the regressions excluding construction employment. The effects of the change in real and relative minimum wages, as shown in columns 3 and 4, have decreased, though they remain positive and statistically insignificant as in the

earlier regressions. And, once again, those states that maintained minimum wages above the federal level in December 2009 seem to have experienced the greatest disemployment effects during this period.

In contrast to those regressions that exclude construction employment, the estimates omitting employment in government services appear nearly identical to those seen in Table 2.6, with the not surprising exception of the effect of maintaining a minimum wage above the federal wage floor in December 2009. Again, in this specification, as shown in column 6, the effect of supporting a minimum wage above the federal level in December 2009 is large, negative and statistically significant. Consistent with the assumption that relatively high levels of government employment protect against the negative effects of recession, the coefficient on the December 2009 indicator variable (though not on the December 2007 dummy variable) has shifted upward in magnitude from –3.13 percentage points to –3.25 percentage points in the estimate that excludes the impact of government employment.

These conflicting magnitudinal shifts between the nonfarm variables of interest and those of the industry-level estimates when controlling for construction and government employment are troubling. We should expect the effect to decrease or increase in tandem across both specifications. The obvious explanation for this divergence is that construction and government employment are not measured in the same manner in each specification. In the nonfarm analysis, construction and government employment are taken as a percentage of nonfarm employment, while the industry-level specifications simply omit these industries from the estimation. In industry-level

estimations that include construction employment as a percentage of total employment, the coefficients move in the same direction as those of the nonfarm regressions.

In summation, the employment effects of all variables in the industry-level regressions are slightly exaggerated relative to the estimates of nonfarm employment totals. In all instances, there are relatively large disemployment effects associated with those states that possessed a minimum wage above the federal level in either the beginning or end of the period of analysis, with the worst impact seen in those specifications excluding government services. The effects of real and relative minimum wages on employment totals is positive, though small and insignificant in all cases.

3.4 Effects of Nominal Minimum Wages

To discern whether the nominal minimum wage effects seen in Table 2.7 were the same with the larger sample, I reran the regressions of Table 2.7 using the industry-level data. I assumed, as in the earlier estimations, that minimum wage effects would be statistically insignificant from zero when measured as nominal wages. As predicted, (in results not shown), the nominal minimum wage in either December 2007 or December 2009 had no impact on employment levels when excluding construction employment. The omission of government employment, on the other hand, only lessened the negative effect of minimum wage legislation on employment levels. The results of these regressions point again to an alternative factor that drives both minimum wage legislation and greater relative disemployment in those states with minimum wages above the federal minimum.

3.5 Effects of Minimum Wage on Hours and Earnings

Following the example of Sabia (2009), I used CES data to estimate the change in average weekly hours against different measures of minimum wage. One extension of minimum wage legislation suggests that employers adjust total hours worked rather than workers employed when faced with increases in labor costs. If this is the case, we should expect to observe a significant decrease in hours in those states that experienced the largest increase in minimum wage, or those at the federal minimum wage level.

In fact, as shown in Table 3.3, states saw an average decrease in total weekly hours of 12 percent (standard deviation 9.7) from December 2007 to December 2009. For those states that are bound by the federal minimum wage, the decrease in hours worked was roughly 11.1 percent (standard deviation 9.1), while those states that maintained minimum wages above the federal level lost an average of 13.2 percent (standard deviation 10.2). These differences, though slight, are reflected in regression estimates of the effects of minimum wage.

In Table 3.4, I measure the effect of minimum wage legislation on the change in total weekly hours by state and industry. In these specifications, data for Government Services were not reported and insufficient data were available for Mining and Logging, so only seven of the nine 1-digit NAICS industries were included. As is shown in Table 3.2, the exclusion of government employment had little effect on minimum wage outcomes, so this omission should not constitute a problem. Likewise, mining and logging industries, which have high average wages, are not likely affected by minimum wage legislation, so the exclusion of this industry group should have little bearing on the

estimation results. Average weekly hours data are not reported for nonfarm totals.[11] The dependent variable was constructed by multiplying average weekly hours by employment to obtain the total hours worked per week per state-industry. The results of these analyses mirror those obtained in the employment estimates.

As shown in columns 1 and 2, those states not bound by federal legislation at the beginning and the end of the period of analysis witnessed an average decline in total weekly hours relative to those states at the federal level. For those states with minimum wages above the federal level in December 2007, the decrease in hours worked was roughly 2.7 percentage points relative to states at the federal level. For the group of states that maintained minimum wages above the federal wage floor in December 2009, the decrease in total hours was about 3.1 percentage points more than in states bound by the federal minimum.

On the contrary, and paralleling the results from the employment regressions, the effects of changes in real and relative minimum wage during this period were positive, though again, their influence was small and imprecise. As in the earlier regressions, the change in minimum wage relative to industry average wage appears to have no effect on total hours worked. And again, the negative effects of maintaining a minimum wage above the federal minimum wage disappear when the dummy variables are replaced with

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[11] Construction hours data were not reported for DC, DE, HI, MD, NE, NH, SD, and TN. Information services hours data were not reported for AK, AL, AR, AZ, CO, CT, DC, DE, FL, GA, HI, IA, ID, IN, KS, KY, LA, MD, ME, MN, MO, MS, MT, ND, NE, NH, NJ, NM, NV, OH, OK, OR, RI, SC, SD, TX, VA, VT, WI, WV, and WY. Manufacturing hours data were not reported for DC, MT, NM, NV, and WY. Other services hours data were not reported for AK, AR, DE, HI, ID, KY, LA, ME, MO, MS, MT, NE, NH, NM, NV, OK, RI, SD, UT, and VT.
In regressions excluding information services, dummy variable estimates are slightly greater than those listed in Table 3.1 (-2.7 percentage points for the December 2007 dummy and –3.4 percentage points for the December 2009 dummy). The coefficients on both the relative and real minimum wage variables are small, positive, and not statistically significant from zero.

nominal wages (results not shown), and when the estimate excludes construction employment, as shown in Table 3.5.

As an alternative analysis, I estimated the change in average weekly hours against the minimum wage status of a state at either the beginning or end of the period of analysis and against the change in real and relative minimum wages. If increases in minimum wage lead to a decrease in average hours worked, such an impact might appear in these specifications. In fact, as shown in Table 3.3, average weekly hours fell about 1.8 percent (standard deviation 5.0) during the period of analysis. Like the other labor statistics, those states with minimum wages above the federal level in December 2007 experienced a larger decrease in average weekly hours than those bound by the federal legislation (2.1 percent and 1.4 percent respectively).

Consistent with previous estimations, however, the change in average hours worked is not a direct result of minimum wage legislation. In fact, in estimates measuring the effect of real and relative minimum wages on average weekly hours (results not shown), none of the independent variables, including controls for mean wage, population size, median income and unemployment rate, appear to have any bearing on the negative outcomes seen in Table 3.3. This suggests that the decline in total hours observed in Tables 3.4 and 3.5 is a result of decreases in employment, and not a reduction in average hours.

In a final specification, I estimated the impact of minimum wages on average weekly earnings. If minimum wages adversely affect high-impact states, we might observe the outcome as a decrease in earnings, in accordance with a reduction in hours.

Alternatively, we might measure an increase in earnings as a result of the higher wage if hours are unaffected by the legislation.

During the period of analysis, average weekly earnings fell 8.4 percent (standard deviation 12.0) for all states, 9.0 percent (standard deviation 11.9) for those states with minimum wages above the federal level at the beginning of the recession and only 7.3 percent (standard deviation 12.2) for those states bound by the federal minimum wage – results suggestive of adverse effects of minimum wage legislation. Again the effect was the strongest in the smaller group of 15 states that maintained minimum wages above the federal level in December 2009, (-10.7 percent with a standard deviation 10.8).

In regression analysis, as shown in Table 3.6, the effect of minimum wage legislation on average weekly earnings is negligible despite an average decrease in hours of 12 percent. In fact, none of the independent variables appear to have any effect on the change in earnings, which could indicate model misspecification. An alternative explanation is that too little variation exists in the state-industry data for accurate estimation.

In conclusion, I failed to discern any effects of the increase in minimum wage on employment levels, hours worked, or average weekly earnings. Industry-level estimations of the effect of minimum wage legislation on employment change are similar in sign and precision to the results obtained in nonfarm regressions. Again, those states that maintained minimum wages above the federal minimum in December 2009 appear to have suffered the greatest degree of disemployment during the period of analysis. This negative outcome remains in specifications omitting either construction or government employment, though the disemployment effect is not present in regressions substituting

nominal minimum wages for the indicator variables. As with the nonfarm regressions, the change in real and relative minimum wages appear to have no impact on employment levels, despite the large increase in minimum wage levels during the period of analysis. Likewise, there were no statistically significant disemployment effects from the change in minimum wage relative to industry mean wage. Minimum wage legislation cannot account for the decrease in total weekly hours that occurred during the period of analysis, and there was no discernable effect on average weekly hours. Finally, average weekly earnings appear to be unaffected by changes in minimum wage.

Tables

Table 3.1

Effects of Minimum Wages and Relative Minimum Wage on Employment
by State and Industry
(Standard Error in Parentheses)

Industry Totals	1	2	3	4	5[a]
Minimum Wage Dummy 2007	-1.59	-	-	-	-
	(0.98)	-	-	-	-
Minimum Wage Dummy 2009	-	-3.13***	-	-	-
	-	(1.02)	-	-	-
% Change in Relative Min Wage 2007-2009	-	-	0.06	-	-
	-	-	(0.06)	-	-
% Change in Real Min Wage 2007-2009	-	-	-	0.06	-
	-	-	-	(0.06)	-
% Change in Min Wage Relative to Industry Mean Wage 2007-2009	-	-	-	-	0.07
	-	-	-	-	(0.05)
Ln Population 2007	-1.42***	-1.50***	-1.43***	-1.41***	-1.37***
	(0.41)	(0.41)	(0.42)	(0.42)	(0.50)
Hourly Mean Wage 2007	0.28	0.38**	0.24	0.23	0.39*
	(0.18)	(0.18)	(0.19)	(0.19)	(0.20)
Constant	8.95	8.01	8.33	8.00	2.52
	(6.61)	(6.50)	(7.14)	(7.25)	(8.18)
Adjusted R2	0.03	0.04	0.02	0.02	0.03
N	418	418	418	418	270

Dependent variable is the percentage change in total industry employment from December 2007 to December 2009.
Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
a There are insufficient data for Mining and Logging and Information Services industry wages, so these industries were excluded from this specification. Mining and Logging wage data were only reported for WV and WY during the period of analysis. Information Services wage data were only reported for CA, IL, MA, MI, NC, NY, PA, TN, UT, and WA.
*Significant at the 90% level. **Significant at the 95% level. ***Significant at the 99% level.

Table 3.2

Effects of Minimum Wages on Employment by Industry excluding Construction and Government
(Standard Errors in Parentheses)

	Industry Totals excluding Construction				Industry Totals excluding Government			
	1	2	3	4	5	6	7	8
Minimum Wage Dummy 2007	-0.99	-	-	-	-1.53	-	-	-
	(0.80)				(1.01)			
Minimum Wage Dummy 2009	-	-2.13**	-	-	-	-3.25***	-	-
		(0.84)				(1.05)		
% Change in Relative Minimum Wage Dec 2007- Dec 2009	-		0.03		-	-	0.05	-
			(0.05)				(0.07)	
% Change in Real Minimum Wage Dec 2007- Dec 2009	-		-	0.03	-	-	-	0.05
				(0.05)				(0.06)
Ln Population 2007	-1.22***	-1.26***	-1.23***	-1.21***	-1.48***	-1.55***	-1.49***	-1.47***
	(0.34)	(0.33)	(0.34)	(0.34)	(0.43)	(0.42)	(0.43)	(0.43)
Hourly Mean Wage 2007	0.21	0.29**	0.17	0.18	0.29	0.41**	0.23	0.23
	(0.14)	(0.14)	(0.15)	(0.15)	(0.19)	(0.18)	(0.20)	(0.19)
Constant	8.37	7.56	8.55	8.03	8.25	7.10	8.04	7.81
	(5.38)	(5.30)	(5.80)	(5.88)	(6.81)	(6.69)	(7.38)	(7.48)
Adjusted R^2	0.03	0.05	0.03	0.03	0.03	0.05	0.03	0.03
N	374	374	374	374	367	367	367	367

Dependent variable is the percentage change in total industry employment from December 2007 to December 2009.
Source: Employment totals and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
*Significant at the 90% level. **Significant at the 95% level. ***Significant at the 99% level.

Table 3.3

State Labor Market Outcomes by Minimum Wage Status
(Standard Deviation in Parentheses)

Variable	State Totals	State Min Wage > Federal Min Wage in Dec 2007	State Min Wage = Federal Min Wage in Dec 2007	State Min Wage > Federal Min Wage in Dec 2009
% Change in Total Weekly Hours, Dec 2007-Dec 2009[a]	-12.0	-12.6	-11.1	-13.2
	(9.65)	(9.96)	(9.05)	(10.2)
% Change in Average Weekly Hours, Dec 2007 – Dec 2009[a]	-1.82	-2.05	-1.41	-1.74
	(5.06)	(4.69)	(5.66)	(4.62)
% Change in Average Weekly Earnings, Dec 2007 - Dec 2009[a]	-8.41	-9.02	-7.32	-10.7
	(12.0)	(11.9)	(12.2)	(10.8)
Number of states	51	32	19	15

Source: Weekly earnings and hours data were obtained from the Bureau of Labor Statistics.
a There are insufficient data available for Mining and Logging industry wages, so this industry was excluded from the mean. Mining and Logging hours and earnings data are only reported for WV and WY during the period of analysis.

Table 3.4

Effects of Minimum Wage on Total Weekly Hours Worked
(Standard Error in Parentheses)

Total Weekly Hours	1	2	3	4	5
Minimum Wage Dummy Dec 2007	-2.66** (1.36)	-	-	-	-
Minimum Wage Dummy Dec 2009	-	-3.12** (1.40)	-	-	-
% Change in Relative Minimum Wage Dec 2007-Dec 2009	-	-	0.11 (0.09)	-	-
% Change in Real Minimum Wage Dec 2007- Dec 2009	-	-	-	0.09 (0.08)	-
% Change in Minimum Wage Relative to Industry Mean Wage Dec 2007-Dec 2009	-	-	-		0.08 0.05
Ln Population 2007	-1.29** (0.56)	-1.40** (0.56)	-1.30** (0.56)	-1.28** (0.57)	-1.29** (0.56)
Hourly Mean Wage 2007	0.58** (0.25)	0.61** (0.24)	0.53** (0.26)	0.49** (0.25)	0.46** (0.23)
Constant	-1.72 (8.94)	-1.34 (8.85)	-3.10 (9.68)	-2.90 (9.80)	-2.07 (9.11)
Adjusted R^2	0.03	0.03	0.02	0.02	0.02
N	283	283	283	283	283

Dependent variable is the percentage change in total weekly hours from December 2007 to December 2009. There are insufficient data for Mining and Logging hours, so these industries were excluded from all specifications. Mining and Logging hours data were only reported for WV and WY during the period of analysis.
Source: Average weekly hours and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor. Total weekly hours variable was calculated by author.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level

Table 3.5

Effects of Minimum Wage on Total Weekly Hours excluding Hours Worked in Construction
(Standard Error in Parentheses)

Total Weekly Hours Excluding Construction	1	2	3	4
Minimum Wage Dummy Dec 2007	-1.92* (1.05)	-	-	-
Minimum Wage Dummy Dec 2009	-	-1.70 (1.08)	-	-
% Change in Relative Minimum Wage Dec 2007- Dec 2009	-	-	0.10 (0.07)	-
% Change in Real Minimum Wage Dec 2007- Dec 2009	-	-	-	0.09 (0.06)
Ln Population 2007	-1.13*** (0.43)	-1.19*** (0.43)	-1.12*** (0.43)	-1.10** (0.43)
Hourly Mean Wage 2007	0.54** (0.18)	0.42** (0.18)	0.43** (0.19)	0.41** (0.19)
Constant	0.48 (6.90)	1.24 (6.87)	-1.33 (7.44)	-1.47 (7.52)
Adjusted R^2	0.04	0.04	0.03	0.03
N	240	240	240	240

Dependent variable is the percentage change in total weekly hours from December 2007 to December 2009. There are insufficient data for Mining and Logging hours, so these industries were excluded from all specifications. Mining and Logging hours data were only reported for WV and WY during the period of analysis.
Source: Average weekly hours and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor. Total weekly hours variable was calculated by author.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level

Table 3.6

Effects of Minimum Wage on Average Weekly Earnings
(Standard Error in Parentheses)

Average Weekly Earnings	1	2	3	4
Minimum Wage Dummy Dec 2007	-0.01 (1.27)	-	-	-
Minimum Wage Dummy Dec 2009	-	-0.99 (1.30)	-	-
% Change in Relative Minimum Wage Dec 2007 – Dec 2009			0.01 (0.08)	
% Change in Real Minimum Wage Dec 2007-Dec 2009	-	-	-	-0.02 (0.07)
Ln Population 2007	-0.35 (0.52)	-0.37 (0.52)	-0.35 (0.52)	-0.37 (0.53)
Hourly Mean Wage 2007	-0.26 (0.23)	-0.18 (0.23)	-0.25 (0.24)	-0.28 (0.23)
Constant	12.5 (8.36)	11.5 (8.28)	12.3 (9.00)	13.4 (9.11)
Adjusted R^2	-0.00	0.00	-0.00	-0.00
N	283	283	283	283

Dependent variable is the percentage change in average weekly earnings from December 2007 to December 2009. There are insufficient data for Mining and Logging earnings, so these industries were excluded from all specifications. Mining and Logging earnings data were only reported for WV and WY during the period of analysis.
Source: Average weekly earnings and mean hourly wages data were obtained from the Bureau of Labor Statistics; population data were obtained from the U.S. Census Bureau; and minimum wage data were obtained from each state's department of labor.
*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level

CHAPTER 4

Conclusion

Much controversy surrounds minimum wage legislation and its impact on employment levels. Conventional theories of labor economics suggest that increases in minimum wage above the market wage will lead to disemployment. Studies estimate disemployment elasticities of minimum wage legislation in the range of -0.15 to -0.37, and as high as -1.2 in some instances. There is little convincing evidence of monopsony, or an increase in employment following implementation of a wage floor, nor is there indication that a minimum wage increase will provoke higher prices. Despite the growing popularity of the wage curve, which credits high unemployment for low average wages, questionable methodology and other discrepancies give doubt to these findings. Finally, studies suggest that small counties and states with low average wages will experience a greater adverse impact of minimum wage legislation.

Analyses of minimum wage effects often differ in their choice of dataset and methodology. Several fundamental components seem to strengthen the findings of some studies relative to others. These requirements include a national sample, preferably at the state- or county-level, a long time-frame of analysis or estimation of lagged minimum wage effects, and the inclusion of state-specific control variables. Firm-level data provide a clear demand response to minimum wage legislation, while county-level data offer more variation to the analysis than can be obtained through state averages.

Although most states suffered disemployment during the period of analysis, and those states with minimum wages above the federal level experienced a larger effect, the employment decrease cannot be attributed to minimum wage. When controlling for

differences in relative construction and government employment, and measuring the effects of nominal minimum wages rather than variables indicating minimum wage status, the negative impact of minimum wage legislation disappears. Adverse effects observed in those states that maintained minimum wages above the federal level in December 2009 are likely the result of other factors, perhaps higher average unemployment rates. Moreover, in all but one specification, the impact of the changes in real and relative minimum wage had no statistically significant effect on employment levels. Differences in employment seem to respond most dramatically to differences in population and relative construction industry size. These outcomes are consistent across estimates of nonfarm employment, industry-level employment and total weekly hours. The effect of minimum wages on average weekly earnings was negligible.

One possible explanation for the seemingly innocuous effect of the real minimum wage increase for those states at the federal level suggests that the federal minimum wage was not binding during the period of analysis. Indeed, state mean hourly wages were nearly three times the federal minimum wage level at the start of the recession, and remained more than double the federal wage floor when subtracting one standard deviation. An estimation that uses smaller industry categories to isolate those workers most likely to be affected by minimum wage legislation might better determine the likelihood that federal minimum wage was binding during this time period. A possible extension to my analysis would examine only those lower-tiered NAICS industries that are most likely subject to minimum wage legislation, the retail industry, for example.

An alternative rationalization suggests that the monopsonistic impact of minimum wage legislation was overridden by an increased disemployment effect of the recession in

those states above the federal level. However, when accounting for construction industry decline, government employment and the unemployment rate, the effect of minimum wages on employment levels remained statistically insignificant in all regressions. If there were evidence of monopsony, we should expect to see positive, precise estimates of minimum wage effects when controlling for other economic conditions.

Alternatively, the absence of minimum wage effects could be attributed to homogeneity in the data. For example, insufficient variation in relative minimum wages might prevent comparison across states. Indeed, during the period of analysis, average relative minimum wages were very similar in states with minimum wages above the federal level as compared to those bound by the federal legislation. On the other hand, real minimum wages exhibited relatively greater variation during this time-frame, but the effect of the change in real minimum wages was virtually identical to that of relative minimum wages.

As mentioned previously, the true impact of minimum wage legislation might be obscured by positive correlation of observations across industries within a state. Such an effect would cause downward bias of regression estimates. However, correcting for this possibility would lessen the incidence of disemployment as a result of minimum wage legislation, rather than strengthen negative effects.

Finally, there is some concern that the control variables used in my estimates do not adequately reflect state economic conditions at the end of the period of analysis. The controls chosen describe economies as they were at the beginning of the recession, but they do not account for subsequent changes. For example, population shifts in response to high unemployment rates could obscure minimum wage effects. That being said,

statistics show little evidence of huge population shifts during the period of analysis. Moreover, as was shown in the data, the state mean wage experienced only a slight increase during this time period, with similar growth rates across states.

Teasing out the broader effects of minimum wage legislation has its challenges. Unfortunately, we cannot place the economy under a microscope or administer controlled experiments to determine the true effect of legislated wage floors. Negative effects of minimum wage legislation could have real consequences for the most vulnerable members of our labor force, or those whom the legislation aims to protect. As economists, we strive to uncover these negative outcomes, so governments can correct the resulting inequalities and inefficiencies of policy. A well-formulated, comprehensive analysis should provide the best assessment of minimum wage legislation.

APPENDIX

Tables

Table A.1

States with Minimum Wages above the Federal Minimum Wage

December 2007		December 2009	
State	Minimum Wage	State	Minimum Wage
MD	$ 6.15	CO	$ 7.28
MN	$ 6.15	OH	$ 7.30
MT	$ 6.15	MI	$ 7.40
NC	$ 6.15	RI	$ 7.40
IA	$ 6.20	NM	$ 7.50
AR	$ 6.25	ME	$ 7.50
NV	$ 6.33	NV	$ 7.55
MO	$ 6.50	CA	$ 8.00
NH	$ 6.50	CT	$ 8.00
WI	$ 6.50	IL	$ 8.00
WV	$ 6.55	MA	$ 8.00
DE	$ 6.65	VT	$ 8.06
FL	$ 6.67	DC	$ 8.25
AZ	$ 6.75	OR	$ 8.40
CO	$ 6.85	WA	$ 8.55
OH	$ 6.85		
DC	$ 7.00		
ME	$ 7.00		
AK	$ 7.15		
MI	$ 7.15		
NJ	$ 7.15		
NY	$ 7.15		
PA	$ 7.15		
HI	$ 7.25		
RI	$ 7.40		
CA	$ 7.50		
IL	$ 7.50		
MA	$ 7.50		
VT	$ 7.53		
CT	$ 7.65		
OR	$ 7.80		
WA	$ 7.93		

Source: Minimum wage data were obtained from each state's Department of Labor.

Table A.2

Employment Change by State from December 2007 to December 2009

State	% Employment Change	State	% Employment Change
NV	-13.1	MT	-5.6
AZ	-10.8	MN	-5.4
FL	-10.1	ME	-5.3
MI	-9.5	NM	-5.2
CA	-9.0	MO	-4.9
OR	-8.5	MA	-4.6
ID	-8.2	MD	-4.5
GA	-8.1	WY	-4.3
OH	-7.8	AR	-4.4
AL	-7.8	PA	-4.4
TN	-7.8	VA	-4.4
IN	-7.6	IA	-4.3
RI	-7.5	KS	-4.3
IL	-7.1	VT	-4.2
SC	-6.9	WV	-3.7
NC	-6.8	NY	-3.6
UT	-6.8	OK	-3.6
HI	-6.6	NH	-3.5
DE	-6.5	TX	-2.9
WI	-6.5	NE	-2.9
WA	-6.3	LA	-2.8
CO	-6.2	SD	-2.0
MS	-6.1	DC	0.3
CT	-5.6	AK	0.7
NJ	-5.6	ND	1.2
KY	-5.6		

Source: Bureau of Labor Statistics

Bureau of Labor Statistics Data

The Bureau of Labor Statistics reconfigured their website several times in the six months since beginning my analysis, causing me many headaches and much confusion. Entire webpages were removed, and seasonally adjusted 5-year benchmarks were revised with significant impact on my estimations. Despite these implementation hiccups, the BLS website is vastly improved. Most statistics are easily accessible through the interactive search feature under the Databases and Tables tab, and data are now downloadable in Microsoft Excel. However, limitations in reporting still prevail. Below is a table listing the data availability of each of the dependent variables in my analysis.

Data are available for all 50 states plus Puerto Rico and the Virgin Islands, in some cases, and statewide or by metropolitan region. The nine 1-digit NAICS categories are Mining and Logging; Construction; Manufacturing; Trade, Transportation and Utilities; Information Services; Professional and Business Services; Leisure and Hospitality; Other Services, and Government. Data are also available for Nonfarm Totals and many of the NAICS subcategories. Data are reported monthly from January 2000.

Variable	Number of 1-digit state-level NAICS observations for December 2009	
Seasonally Adjusted		
All Employees, in Thousands	469	Puerto Rico and Virgin Islands data are not reported
Not Seasonally Adjusted		
All Employees, in Thousands	468	
Average Weekly Hours of All Employees	285	Puerto Rico and Virgin Islands data are not reported; Nonfarm Totals and Government Services are not reported
Average Weekly Earnings of All Employees, in Dollars	285	Puerto Rico and Virgin Islands data are not reported; Nonfarm Totals and Government Services are not reported
Average Hourly Earnings of All Employees, in Dollars	285	Puerto Rico and Virgin Islands data are not reported; Nonfarm Totals and Government Services are not reported
Production or Nonsupervisory Workers		
Employees, in Thousands	39	Virgin Islands data are not reported; Nonfarm Totals, Other Services and Government Services are not reported
Average Weekly Hours	89	Nonfarm Totals and Government Services are not reported
Average Weekly Earnings, in Dollars	89	Nonfarm Totals and Government Services are not reported
Average Hourly Earnings, in Dollars	89	Nonfarm Totals and Government Services are not reported

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