Do Minimum Wages Raise Employment? Evidence from the U.S. Retail-Trade Sector

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Abstract

This paper examines the impact of minimum wages on earnings and employment in selected branches of the retail-trade sector, 1990-2005, using county-level data on employment and a panel regression framework that allows for county-specific trends in sectoral outcomes. We focus on specific subsectors within retail trade that are identified as particularly low-wage. We find little evidence of disemployment effects once we allow for geographic-specific trends. Indeed, in many sectors the evidence points to modest (but robust) positive employment effects.

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A common approach in the recent literature on the effect of minimum wages on employment has been to examine labor market outcomes in specific sectors of the economy that tend to pay workers at or close to the minimum. Studies using this approach initially focused on the fast-food restaurant sector, using data collected following or surrounding an increase in the minimum wage (for example, see Katz and Krueger, 1992; Card and Krueger; 1994; Card and Krueger, 2000; Neumark and Wascher, 2000). The general tenor of findings from the fast-food sector offered at most slight support for the presumption that higher minimum wages lead to lower employment.[1]

Other specific low-wage sectors of the labor market have not received the same attention as the restaurant sector. One exception is the general retail sector, where a limited number of studies have investigated potential disemployment effects (Kim and Taylor, 1995; Partridge and Partridge, 1999; Sabia, 2008). Although the prevalence of minimum-wage workers in the general retail sector is considerably lower than in the case of restaurants, these studies have universally supported the notion that minimum wages lower employment.

The present paper adds to the research examining minimum wages in sectors other than restaurants by focusing on employment effects in specific subsectors of the retail trade sector. Our choice of particular subsectors hinges principally on their tendency to pay wages near the minimum wage. Using *county-level* data on employment reported by establishments in the period 1990-2005, we are able to examine how employment levels vary with the current minimum wage in that particular state. Our panel-data regression framework is similar to that of Neumark and Wascher (1992), allowing for both county and time fixed effects. One important enhancement to their framework, however, is our ability to allow for county-specific trends in

[1] More recent studies by Dube, Lester, and Reich (2007) and Addison, Blackburn, and Cotti (2008) that use a more comprehensive sample and extended time frame to examine minimum-wage effects in the restaurant sector also fail to provide support for the existence of disemployment effects.

sectoral outcomes, which specification materially impacts the estimate of the minimum wage effect.

Our results provide little support for the presence of disemployment effects in the retail trade sectors we examine. In fact, many of our estimated elasticities actually suggest that increasing the minimum wage may modestly increase sectoral employment.

I. The Previous Literature on Minimum Wages in the Retail Sector

In his case study of California's experience with raising its minimum wage in 1988, Card (1992) presented evidence that employment change in that state's retail trade sector developed in a manner similar to that of comparative states in which minima remained unchanged. Surprised by the apparent absence of disemployment effects, Kim and Taylor (1995) sought to re-examine employment outcomes in the retail trade sector in California in a more formal manner. Given the single change in the minimum wage for California, it was not possible to estimate minimum-wage effects directly, so the authors instead attempted to estimate labor-demand functions for the various sectors making up the retail trade industry. This was accomplished primarily by looking at how employment changes within sectors of retail trade related to wage changes within those sectors.[2] The authors' primary data source is the County Business Patterns data from 1984 to 1989. Kim and Taylor acknowledge that measurement error and the usual endogeneity problems in estimating demand functions will cause problems for ordinary least squares estimates, so they estimate their equations instrumenting for the change in wages using the lagged wage level and average establishment size in the sector as instruments. Estimating their labor-demand functions separately for changes in adjacent years, both their OLS and instrumental variables results yield

[2] They also performed a very similar analysis using cross-county variation in the same variables, this time measured for all retail trade employment. The change variables were measured as the change in California minus the change in the rest of the United States, thereby differencing out any industry-specific effects present in all states.

little support for a negative impact of wages on employment before the minimum wage change in 1988. However, regression estimates using 1988-89 changes (surrounding the 1988 minimum-wage increase) provide strong evidence of a downward-sloping demand curve, with an elasticity of roughly -1. It is argued that the exogenous variation in wage changes created by the hike in the minimum wage explain the strong findings for the 1988-89 comparisons that are not replicated in the regressions for the individual years prior to the minimum-wage increase.

Card and Krueger (1995) criticize Kim and Taylor (1995) for the use of inadequate data and for an unsatisfactory choice of instruments. In their re-analysis, Card and Krueger also point out that the results are not robust to the use of a two-year difference (1987-89), even though the same minimum wage changes are just as relevant to those outcomes as they are to the 1988-89 difference. We, too, find Kim and Taylor's choice of instruments unconvincing. In particular, in order to identify a demand equation one would normally use factors that shift wages strictly because of supply considerations. Yet, models – not least in the minimum wage literature – often assume that demand responds to wages with a lag. Likewise, establishment size can be seen as a factor relevant to the determination of labor demand. Further, the lack of direct variation in minimum wages across sample observations in the setup of Kim and Taylor makes it difficult to argue convincingly that minimum wage changes led to the observed employment changes.

A combination of retail trade and nonprofessional industries in Iowa was studied in the analysis by Orazem and Mattila (2002). Part of their analysis examined how one-quarter (or four-quarter) employment changes in a specific sector and year responded to the ratio of the minimum wage to the (predicted) average wage for that sector and year. Their general finding was that employment growth was lower in sectors where the minimum wage ratio was higher (in a regression that examined a four-quarter difference in employment.) One peculiarity of their

specification is that they use the employment growth rate as the dependent variable, whereas the typical specification in the literature uses the level (or log of the level) of employment. Orzarem and Mattila's analysis is also weakened by the fact that all county/sectors experience the same time pattern for minimum wage changes. This renders their treatment similar to a state-level panel data analysis, but with no cross-state variation in the minimum wage. In these circumstances, they are able to estimate a minimum wage effect by using minimum wages divided by the county's average wage as their independent variable, so that average wage variation largely identifies the minimum wage effect.[3] One weakness of their results is that there is little evidence that the minimum wage effect differs with the minimum-wage coverage rate in the sector. A separate analysis in their paper focuses on firm-level data, where covered and uncovered firms can be identified, but again the evidence suggests minimum wage effects that are just as large in uncovered firms as in covered firms.

Partridge and Partridge (1999) considered minimum-wage effects in retail trade using state-level data on employment taken from *Employment and Earnings* for 1984-89. As in Kim and Taylor (1995), the data set is assembled from an establishment-level survey on employment levels, which Partridge and Partridge use to estimate panel data models similar in construction to those of Neumark and Wascher (1992). Their results point to a negative influence of minimum wages on retail employment, although this negative impact only operates via a lagged effect of the minimum wage. Like Orazem and Mattila (2002), they estimate a regression in which the growth in employment is the dependent variable (although their minimum wage variable is not deflated by average wages). As their reported estimates have a positive coefficient for the contemporaneous minimum wage variable and a negative coefficient for the lagged minimum

[3]They also do not include time effects in their model, so some of the variation in the minimum wage variable stems from changes over time in the minimum wage.

wage, their findings are actually consistent with a positive minimum wage impact on employment if the typical specification is correct.[4]

Sabia (2008) used data from the Outgoing Rotation Group sample of the Current Population Survey to consider whether minimum wages affected general retail trade employment over the 1979-2004 period.[5] He also uses the state-level panel data setup of Neumark and Wascher (1992), but with the dependent variable being the percentage of the adult population employed in retail trade.[6] His results point to a negative impact of raising the minimum wage on retail trade employment, suggesting an elasticity of roughly -0.1. The negative influences are even larger when focusing on the percentage of teenagers in retail trade, with an elasticity for this group in the range -0.3 to -0.4. Similar elasticities are reported when the overall teenage employment-to-population ratio is used as the dependent variable. Sabia's estimates of a negative impact of higher minimum wages on employment are sensitive to the inclusion of state-specific trend in his models, as the minimum wage coefficient becomes positive and statistically significant once these trends are included. An analysis of work hours of teenagers in the retail trade sector points to minimum wages having no effect on average work hours among those who stay employed.

In what follows, we also use the state-panel approach of Neumark and Wascher (1992) to examine potential minimum-wage effects on employment and earnings in retail trade. Our approach differs from that of Sabia (2008) in at least two important ways. First, we use more

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[4] If employment (E) is determined by the minimum wage (MW) in the (log) level equation $E_t = \beta_0 + \beta_1 MW_t + u_t$, the first-difference specification of Partridge and Partridge would be $\Delta E_t = \beta_1 MW_t - \beta_1 MW_{t-1} + \Delta u_t$. A positive coefficient on MW_t and a negative coefficient on MW_{t-1} could then be consistent with a positive minimum-wage effect.

[5] A substantial change in the industrial coding in the CPS occurred over this period. In particular, eating and drinking establishments are no longer included as part of the retail trade industry in the newer NAICS coding. Sabia uses consistent coding over time, although it is not clear whether he sought to be consistent with the newer coding or the older coding.

[6] He also considers the percentage employed in small businesses, with qualitatively similar results to those for retail employment.

complete data on employment in retail trade by using county-level counts of employment from the Quarterly Census of Employment and Wages. In contrast, much of the previous research has used employment estimates from the Current Population Survey, which are often based on small samples when measured at the state level. Second, as sectors within retail trade vary substantially in the degree to which they can be characterized as "low-wage," at the outset we identify those particular retail sectors where employers are most likely to face higher costs as a result of minimum-wage increases. Furthermore, our analysis is based on a nationwide sample, rather than the limited geographic focus inherent in Kim and Taylor (1995) and Orazem and Mattila (2002). Finally, our empirical models can also be interpreted as reduced-form, thereby avoiding the particular endogeneity problems faced by Kim and Taylor.

II. Data

A. *The QCEW*

The primary data source used in this study is the Quarterly Census of Employment and Wages (QCEW) from the Bureau of Labor Statistics (BLS).[7] The QCEW reports quarterly county-level payroll data on private employment and earnings for narrowly defined industries. These data are collected from paperwork employers file in conjunction with the unemployment insurance program, which according to the BLS covers 99.7 percent of all wage and salary civilian employment.[8] The industry definition of all firms in the data is coded according to the North American Industrial Coding System (NAICS), and aggregations of the data by county,

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[7] The QCEW program is often referred to as the ES-202 program, as it is derived from an obsolete transmittal with that number that was part of the Employment Security (Unemployment Insurance) program. Before changing the name to QCEW, the program was known as the Covered Employment and Wages program**.**

[8] See http://www.bls.gov/cew/cewfaq.htm

industry, and quarter are available to users, beginning with the initial data collection for the first quarter of 1990.

The data contained within the QCEW survey have many advantages over information found in other employment surveys. Principally, the QCEW provides census (rather than sample) observations of employment and earnings for detailed industries within a large number of narrowly defined geographic regions (in our case counties). The county level of aggregation provides a reasonable approximation of a labor market, especially for the retail sector. Even in metropolitan areas with several counties, the large number of employers in this sector within a county (lowering the necessity of long commutes) suggests that potential employees would typically look to nearby establishments as a source of employment. Even in more urban areas, which might encompass several counties, the large number of employers in the retail sector within any particular county suggests that potential employees would be likely to search for employment with establishments that are in close proximity. Moreover, the data are available since 1990 and reported with a reasonably high frequency (that is, quarterly). The combination of all of these characteristics makes the QCEW a strong and flexible resource in the study of minimum wage effects.

That said, the QCEW is not without imperfection. Notably, the survey does not distinguish between part-time and full time employees, and there is no measure of hours worked or the average wage. The sole earnings measure available is information on the average weekly earnings per worker in a specific industrial sector by county.[9] Even so, the QCEW provides accurate and comprehensive measures of employment and earnings in highly disaggregated markets, and represents a data source that has been underutilized in research examining minimum-wage impacts on employment and earnings.

[9] This measure includes most wage-like compensation, including tips, bonuses, stock options, and employer contributions to retirement plans.

B. *Dependent Variables*

Drawing from the QCEW, the dependent variables utilized in the present study are formed from an extract of quarterly observations of county-level employment and earnings for sub-sectors of the U.S. retail industry for the years 1990-2005. Specifically the sectors analyzed are *Food and Beverage Stores* (NAICS 445), *Supermarkets* (NAICS 44511), *Convenience Stores* (NAICS 44512), *Specialty Food Stores* (NAICS 4452), *Beer, Wine, and Liquor Stores* (NAICS 4453), *Gasoline Stations* (NAICS 447), *Sporting Goods, Hobby, Book*, *and Music Stores* (NAICS 451), *General Merchandise Stores* (NAICS 452), *Department Stores* (NAICS 4521), and *Miscellaneous Store Retailers* (NAICS 453). The method for selecting these sectors is provided in detail in the next section of the paper.

The BLS does censor sector-specific observations on employment and earnings if the number of establishments in the county is below a certain level in a particular quarter. Specifically, the BLS withholds publication of data when necessary to protect the identity of cooperating employers, as there are industry/county combinations where the QCEW data would include a very small number of establishments. These data are duly suppressed in the QCEW public-use data for that industry/county, but may be included in the data at less detailed levels of aggregation (for example, in a more general definition of industry for that county). Hence, data on more disaggregated sectors will have much smaller sample sizes and be increasingly dominated by larger counties. Moreover, our samples were further reduced as we restricted our analysis to a balanced panel of counties, and so exclude any counties that failed to meet the censoring threshold in any of the quarters from 1990 to 2005.

The top two panels of Table 1 provide sector-specific summary statistics on the two dependent variables utilized in this analysis, while the final column of the table provides the

number of counties available in each sector that meet the balanced panel restriction.[10] One notable aspect of the employment averages presented in Table 1 is that average employment in certain highly disaggregated sectors (for example, supermarkets) actually exceeds the average employment in the more aggregated sector of which it is a part (for example, food and beverage stores). Although this would be impossible if the averages were drawn from the same sample, in this case it is simply because disaggregated samples are much more heavily censored; hence, averages are dominated by much larger counties.

C. *Independent Variables*

The primary variable of interest is the enforced minimum wage in the relevant state, where the minimum wage variable is calculated as the higher of the state minimum wage (if one exists) and the federal minimum wage. Information on state minimum wages was collected from the material on state labor-law changes presented annually in the January edition of the *Monthly Labor Review*, along with previously published information on state minimum wages at the start of our sample period (see Addison and Blackburn, 1999). In the first quarter of 1990, there were fifteen states with minimum-wage levels above the federal mandate of $3.35. Over the next 63 quarters there were 75 increases in state-level minimum wages in which the resulting minimum wage was above the federal standard. Further, there were four separate federal minimum wage increases over this period.

As we will discuss in detail in the followings section of the paper, we wish to supplement data on employment and earnings from the QCEW with additional measures that might reflect supply-and-demand factors in low-wage labor markets in a particular county. Specifically, the inclusion of additional controls is needed to capture the effects of other factors that may

[10] Since the information in this column pertains to the number of counties that meet the balanced panel restriction of having data available throughout the 64 quarters, the number of quarterly observations utilized for each sector is simply the number of counties multiplied by 64.

influence employment or earnings and vary across the sample through time. In attempting to measure county-specific, time-varying supply and demand factors that might influence employment and earnings, we collected data on total county employment and average weekly earnings for all industries combined from the QCEW.

Data were also gathered on other measures that may be relevant to outcome indicators in low-wage labor markets; specifically, county-level population estimates (from the U.S. Census Bureau's Population Estimates Program), county-level unemployment rates (from the Local Area Unemployment Survey), and state-level school enrollment rates for those aged 16-24 (from the Current Population Survey).

The bottom panel of Table 1 provides summary statistics for all of the independent variables employed in our study. The averages provided were calculated from the sample of counties consistent with all analysis performed for the *Food and Beverage Stores* sector, the largest sample utilized in the primary component of the analysis.

III. Empirical Specifications

Our empirical models are based on a theoretical model of minimum wage effects (on employment) that allows for the possibility that minimum wages may not be effective or binding in a particular labor market. This possibility arises because the equilibrium wage may settle at a wage that is above the legislated wage floor. As demonstrated in Addison, Blackburn, and Cotti (2008), a constant-elasticity demand function leads to the following relationship between observed employment (E) and the minimum wage (w_{min}):

$$\log(E) = d\eta \log(w_{min}) + \gamma' x \quad , \qquad (1)$$

where x includes other demand and supply factors that affect the employment outcome. The equation for average wages is:

$$\log(w) = d\log(w_{min}) + \lambda' x \quad . \qquad (2)$$

This formulation shows that the coefficient on the minimum wage in the standard employment equation is a product of the underlying elasticity of labor demand ($\eta < 0$) and a dummy variable (d) equal to one if the minimum wage is above the competitive equilibrium wage. The effect of minimum wages on employment would be zero if either the elasticity of labor demand were 0 or the minimum wage were ineffective. The coefficient on the minimum wage in the average wage equation helps to sort out whether or not the minimum wage tends to be effective.

Our primary econometric model for estimating equations (1) and (2) can be written:

$$\log(Y_{ist}) = \varphi \log(MW_{st}) + \gamma' X_{ist} + \mu_i + \lambda_i t + \tau_t + \varepsilon_{ist} \quad ,$$

where i, s, and t respectively indicate the county, state and quarter of observation and Y represents either employment or earnings. This specification allows for both fixed county effects and fixed quarter effects, as well as a time-trend in the error term that is county-specific. Given that our estimation incorporates fixed effects, the vector X need include only factors that vary across counties and over time. Although the inclusion of fixed county and time effects is common in these type models, it is less common that a geographic-specific time trend is incorporated. Our concern is that, given the long time period from which our data are drawn, there may be a tendency for minimum wages to increase in counties as a result of an improvement in local-area employment conditions. Ignoring this tendency could lead to the spurious finding of positive employment effects.[11]

A model incorporating geographic-specific trends has been termed a "random growth" model in the literature. When allowing for these trends, we estimate the model using a generalization of the fixed effects estimator that implicitly controls for the presence of these

[11] Sabia (2008) also considered the importance of state-level trends in his analysis, finding that accounting for these trends no longer provided evidence of a disemployment effect in the retail sector. Neumark and Wascher (2007) found that adding state-level trends tended to lead to insignificant minimum wage coefficients, although this seems partly due to the increase in standard errors caused by this inclusion.

trends in the error term (see Wooldridge, 2002, pp. 317-322). The method involves sweeping out a county-specific linear trend in the independent variables, and using the detrended data to estimate the model. There remains the potential for the idiosyncratic error terms (ε) to be correlated across observations. Such correlation is a particular concern for error terms in the same state (given that the minimum wage is measured at the state level), so we provide "clustered standard errors" for the coefficient estimates which allows for an arbitrary pattern of correlation in the error terms across different observations from the same state. In estimating our models, we weight each observation by the average population size (across the 64 quarters) for that county. Population varies considerably across counties in the United States – at least partly because some states have more finely-defined county disaggregations than others – and we want counties that are a larger proportion of the overall labor market to be given more importance in estimating the coefficients.

The independent variables included in our equations are intended to capture influences on demand and/or supply in low-wage labor markets. As our dependent variable in the employment equations is total employment in a particular sector, we include two different controls for the size of the labor market (total employment across all industries, and population). Given that our regressions include population in logarithmic form as a control, they can be thought of as a model in which the dependent variable is the log of employment per capita. The total average weekly earnings variable (across all sectors) controls for the equilibrium wage being high or low, which could have both demand and supply effects. Business-cycle effects are accounted for by the county-level unemployment rate, while the enrollment rate captures potential supply influences in low-wage labor markets.[12]

[12] The inclusion of this variable in minimum-wage models has been controversial**,** it being argued that the enrollment choice may itself be a function of the decision to work (see Card, Katz, and Krueger, 1994). However,

Disemployment effects from minimum wages are likely to be more evident in lower-wage labor markets. Although the retail trade sector is well known to be a low-wage sector, the general sector is perhaps too broad – with too many workers earning more that the minimum wage – to anticipate strong effects from minimum wages. One advantage of the QCEW as a data source is that it is often possible to look at disaggregated subsectors of a main sector such as retail trade. As we have noted, the QCEW does not contain information on hourly wages. We therefore use data from the Outgoing Rotations Group sample of the Current Population Survey (CPS-ORG) from 2005 to identify particular sectors on which to focus our analysis.[13]

The CPS-ORG provides sufficient information to identify the hourly wage of workers paid by the hour, along with the detailed industry codes for the worker based on the 2002 Census coding system. A crosswalk is provided which makes it easier to match up Census industry codes with NAICS codes (the coding system used in the QCEW), so we can usually link hourly wages by detailed industry in the CPS-ORG to sectors provided in the QCEW. To identify low-wage sectors that might be most affected by minimum wages, we calculated for each detailed industry the percentage of all workers who were paid by the hour and who had a wage that was (a) equal to or less than their minimum wage, (b) no more than $1 above their minimum wage, or (c) no more than $2 above their minimum wage.[14] Table 2 provides a listing of every detailed industry where the percentage within $2 of the minimum wage was at least 20 percent.

When these percentages are calculated across all workers in the United States, we find that 2 percent are at or below the minimum, 5 percent at no more than $1 above the minimum, and 9 percent no more than $2 above the minimum. The general retail trade sector does exhibit a

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this reverse causality effect is likely to be considerably less important when examining employment in more disaggregated sectors of the economy.

[13] Note that the real value of the minimum wage was not high in 2005, as the federal minimum wage had not been increased since 1997. In particular, the average (population-weighted) minimum wage in 2005 was $5.78 (in 2006 dollars), while over the 16-year period it was $5.77. We thereby avoid selecting a year in which minimum wage percentages would be particularly high (or low) because of high (or low) minimum wages.

[14] In these calculations, we used the prevailing minimum wage in the state of residence of the worker.

somewhat greater prevalence of low-wage workers, as the respective percentages here are 2 percent, 8 percent, and 17 percent. And roughly one-half of the detailed industries that we identify in Table 2 are in the retail sector. Not surprisingly, the restaurant and other food services sector has some of the highest percentages of low-wage workers. But Table 2 also makes it clear that there are high concentrations of low-wage workers within particular subsectors of the retail trade industry as well.

Our particular choices of sectors for study attempts to balance concerns about a sufficient prevalence of low-wage workers with concerns that the QCEW also provide a sufficient number of counties for examination. The fact that both grocery stores and specialty food stores exhibit a high number of low-wage workers led us to examine the general food and beverage store sector (NAICS code 445), as well as its particular subsectors. Given the relatively large employment size in the grocery store sector, we decided to examine the separate supermarket and convenience store breakdown of that sector. Although the beer, wine, and liquor store sector did not meet the cutoffs for inclusion in Table 2, we nevertheless thought it would provide a useful comparison for the other subsectors of the food and beverage store sector.

Although the initial focus of our estimated models is upon food and beverage stores, we will subsequently address minimum wage effects in other parts of the retail trade sector that tend to have a high number of low-wage workers. Within the retail trade sector, gasoline stations actually have one of the highest percentages of workers within $2 of the minimum wage.[15] We group the sporting goods, hobby, book, and music stores together as one sector (NAICS 451) as each tends to display relatively high numbers of low-wage workers. This sector also makes for an interesting comparison with some of the others, as the demand for its products might be substantially affected if minimum wage increases primarily lead to an expansion in the

[15] We calculate that only shoe stores have higher percentages, but the small size of the subsector makes it impractical to study using QCEW data because of censoring.

discretionary budgets of teenagers. Both general merchandise and other store retailers show some evidence of a prevalence of low-wage workers, too, so we shall also examine them at a later stage in the paper.

There are a handful of other detailed industries outside the retail trade sector that meet our low-wage cutoff, but we chose not to examine them here. Cases in point are bowling centers, retail bakeries, videotape and disc rental stores, and car washes. These generally have such a small number of establishments per county that a good-sized sample was not obtainable from the QCEW. Similarly, the private household service sector is not suitable for study with the QCEW given the informal nature of much of the employment in this sector. For its part, cut and sew apparel manufacturing raises an interesting possibility for future study, although our sense is that modeling the mobility of firms across counties becomes important when examining industries in which the firm does not need to be located in the same county as its consumer base.

All of our estimates are calculated using a balanced panel of counties for that sector. This requires that there be a sufficient number of establishments in that county such that the number of establishments never falls below the censoring point for that sector. We chose to consider only the balanced panel, as we were concerned that the movements in and out of censored status could themselves be determined by the minimum wage: variation in the minimum wage could cause old establishments to close down or new ones to open (an issue we address in section IV). Again, the actual size of the sample will vary with the particular sector, as more finely-defined sectors will cause censoring to increase.[16]

[16] As sample sizes do vary significantly depending on the level of disaggregation involved, there may be concerns that this difference in the counties included in the sample will lead to differences in estimation results between sectors, hence complicating inference. In order to test for this potential bias, we re-estimated the equations for larger-sample sectors using the same group of counties used in much smaller-sample sectors. The results were robust, indicating that differences in county samples do not drive differences in results observed across sectors.

IV. Empirical Results

A. *Basic Results for the Food and Beverage Store Sector*

Our first set of estimated equations examine employment and earnings outcomes in the food and beverage store sector, along with the four subsectors that make up that sector. So as to demonstrate the importance of accounting for county-specific trends, we first present results using fixed-effects estimates that do not incorporate these trends. The fixed-effects results are presented in Table 3. In our estimations, we weight by the average population size of the county and cluster standard errors at the state level.

As noted in the discussions of equation (1) and (2), the prediction from competitive-market theory is that we should observe negative coefficient estimates for the minimum wage variable in employment equations and positive coefficients in earnings equations. As can be seen from the table, only two of the five sectors meet this expectation (convenience stores together with beer, wine, and liquor stores), and in each case one of the coefficient estimates is not statistically significant.

The general sense of the results in Table 3 is not supportive of the predictions of the competitive model. Evidence of a positive earnings effect is expected, but the coefficient estimate is positive and statistically significant in only one case (beer, wine, and liquor stores). Indeed, the estimate is actually negative in two of the equations. Given that the coefficient in this equation should reflect the percentage of employees in the market affected by the minimum wage (see equation 2), it would be surprising if minimum wages would not show some effect on average earnings. It is also noteworthy that three of the minimum wage coefficient estimates in the employment equations are actually positive (although these are not statistically significant). Of course, this pattern of results might be indicative of the irrelevance of minimum wages to this

sector (and subsectors), although this seems unlikely given the percentage of workers potentially affected by minimum wage increases reflected in Table 2.

Estimates obtained from equations that allow for a county-specific trend in the error term are provided in Table 4, and show the importance of accounting for these trends. As noted above, if minimum wages are effective in the food and beverage retail sector (grocery stores, etc.), then we should expect to find increasing effects on average earnings. For the sector as a whole, however, the estimated coefficient is only slightly positive, and is statistically insignificant. This result seems to be largely driven by the negative, but small and statistically insignificant coefficient estimate in the "supermarket and other grocery store" subsector that makes up the large majority of employment in the sector. Coefficient estimates in the earnings equations for the other subsectors are all positive and statistically significant, and the larger coefficient estimates in convenience stores and specialty food stores compared to beer, wine, and liquor stores are sensible given the greater prevalence of low-wage workers in those two sectors.

The nature of the estimated employment effects from minimum wage changes are quite similar across the five equations – all coefficient estimates are positive, and four are statistically significant. Note, too, that estimated effects are non-negligible: a ten percent increase in the minimum wage is estimated to have a one to two percent increase in employment in these sectors. This is at odds with the conventional prediction of disemployment effects. But, as was observed earlier, much of the prior sector-specific research on fast foods has failed to find evidence of disemployment effects. Of course, disemployment effects are more commonly pointed to in the examination of the general retail-trade sector.

Is it obvious that the results with county-specific trends are to be preferred to the simpler fixed-effects results? While we find the positive earnings effects estimated in specifications with county-specific trends to be supportive of the former estimation approach, it may be that the

results without trends are more appropriate, and that the minimum wages are just not binding in the counties we examine. Since the fixed-effects specification is nested within the specification that includes trend effects, if the results differ significantly between these specifications it would be appropriate to focus on results that incorporate the trends. A Hausman test that the probability limits of the coefficient estimates differ between the two specifications is provided in Table 4, and the results (in 7 out of 10 cases) allow us to reject that the coefficients are the same.[17] In fact, the standard errors of the coefficient estimates generally tend to be lower in the specifications that incorporate trends compared to those without them, suggesting that a loss in efficiency is not a reason to consider estimates without trends.[18]

What might explain the positive employment effects suggested by the results in Table 4? The modern literature on minimum wages has offered alternative theoretical predictions to those of the competitive model. Both efficiency wage and monopsony models have been stylized to illustrate situations in which mandated wage increases would lead to employment increases. Admittedly, these arguments have not attracted a great degree of support.[19] An alternative explanation may well reside in product demand shifts resulting from the increased earnings ceded low-wage workers by minimum wage increases.

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[17] This test focuses on the coefficients for the six continuous variables only. A standard Hausman test is not appropriate, as the potential correlation in error terms (recognized in the use of clustered standard errors) implies that the fixed-effects estimator is not efficient under the null. Instead, we use a variance estimator (for the difference in coefficient estimates) that allows the two sets of coefficient estimates to be correlated (see Cameron and Trivedi, 2005, pp.271-273).

[18] Neumark and Wascher (2007) also perform a Hausman test for state-specific trends in their models estimated using CPS data, and find evidence of such trends being important. For this reason, they decide to estimate most of their models including these trends**.** Sabia (2008) argues against the inclusion of such trends in his model because they may reduce "potentially important identifying variation." The fact that standard errors in our estimation fall after incorporating these trends alleviates this concern.

[19] See the discussion in Chapter 11 of Card and Krueger (1995). The monopsony explanation has been criticized for the lack of evidence that increases in minimum wages lead to price reductions, as would be predicted by that model (see, for example, Aaronson, French, and MacDonald, 2008). Likewise, an efficiency wage explanation that involved employment increases would also predict price decreases. What evidence there is on prices is confined to the restaurant sector, and it is not clear whether the same result would be forthcoming in the retail trade sector.

The pattern of employment effects in Table 4 is particularly intriguing in this regard. Overall product-demand effects from minimum wage increases might be modest given the small number of minimum-wage workers, but such product-demand effects as there are are likely to be concentrated in sectors of the economy that make up a greater part of consumption for low-wage workers. Income effects in food purchases are likely to be large at the low end of the income distribution, and additional food purchases by low-wage workers are more likely in supermarkets and convenience stores than they are in specialty-food stores that cater more to high-income individuals. Finally, although the estimated employment effects in alcoholic beverage stores are smaller, it seems reasonable to surmise that the marginal propensity to consume alcoholic beverages among low-wage workers could be non-negligible. These patterns are at best speculative, although we think they would be a fruitful avenue for future consideration using data on consumer expenditures.[20]

B. *Robustness Checks*

The failure to find evidence of a positive earnings effect in supermarkets is puzzling, especially given that the results with state-specific trends suggest a positive employment effect for that sector. We offer one potential explanation in the next subsection, but first it is perhaps useful to consider the extent to which our results are sensitive to the specification and sample choices that we make in constructing the Table 4 estimates.

The first issue we address is the potential endogeneity of the minimum wage with respect to employment conditions in the county. We believe these problems are somewhat mitigated by the time-varying county-specific economic controls we include in the regression, namely**,** total

[20] One theoretical limitation of the product-demand story is the possibility that minimum wage increases may be passed on fully as price increases in the long-run, thereby dampening any product-demand effects. However, to the extent that minimum wages actually represent transfers from firms to workers, rather than from consumers to workers, increased product demand could still occur. The fact that minimum-wage workers (such as teenagers) may have a higher marginal propensity to consume than consumers in general could also affect whether product demand effects are relevant.

employment and the unemployment rate. In order for endogeneity to be a problem, it would need to be the case that minimum wages tend to be raised not just when employment conditions are good (relative to trend) but when employment conditions for retail trade in particular are good. Nevertheless, as a check for this problem we considered what would happen to our estimated models if we identified our minimum-wage effects using only that part of the sample made up of states that raised their minimum wage above the federal minimum at some point over the period examined. These are the states that are most likely to be susceptible to potential endogeneity, so if this is a problem we should expect a larger bias among this population.[21] Results from this subsample are reported in row 1 of both panel (a) and panel (b) of Table 5. In fact, the estimated minimum wage coefficients on employment tend to be smaller using this subsample relative to those reported for the full sample in Table 4, suggesting endogeneity may not be a serious problem.

A second potential cause of concern with our estimated models is that large counties may dominate our regression results, while the minimum wage has its largest "bite" in small counties with low wages. Even though we do have controls for the average wage in the model, we do not consider whether the minimum wage effect varies with the size or average wage of the county.[22] A simple extension of our model addresses this concern by incorporating an interaction term of the minimum wage with population size; these results are presented in row 2 of the two panels in

[21] For example, assume that the true coefficient on minimum wages varies across states. Then our expectation is that states that endogenously choose to raise their minimum wage will be those with a higher coefficient (zero, or even positive) on minimum wages, as these states do not experience the disemployment effect felt by their counterpart states with lower minimum wage coefficients. If this supposition is correct, estimation using just these states should reveal a higher coefficient on the minimum wage.

[22] It might be thought that a good way to address this concern is to estimate models in which the (log of) the minimum-wage/average-wage ratio is the independent variable. This formulation has often been estimated in the literature, and is actually a special case of the functional form we estimate (in which the minimum wage and average wage variables have equal but opposite signs). We view the average wage as potentially having effects on retail employment independent of its "scaling" effect for the minimum wage, and believe the less-restricted form should be estimated. Indeed, while the minimum wage and average wage coefficients do tend to be of opposite sign in the employment equations, they are often quite different in magnitude.

Table 5.[23] The estimated interaction coefficients are never statistically significant in either the earnings or employment equations. Furthermore, the signs of the estimated coefficients do not follow any pattern. Although the interactions are clearly imprecisely estimated, there appears to be no clear evidence suggesting minimum wage effects vary with the population of the county.

A final concern has to do with the potential selectivity of choosing to use a balanced panel, as counties drop out of the sample if the number of establishments in the county drop below the censoring level (see the discussion in II.B). We tackle this issue in two ways. First, using the sample of counties that are sometimes in and sometimes out of the sample (because of censoring), we estimated a linear probability model for the probability that the county was censored in the QCEW in any given quarter. These specifications were estimated as linear probability models so as to incorporate county-specific trends, and are reported in the bottom panel of Table 5. If increases in the minimum wage were leading to increased censoring because of stores shutting down in response, we would expect a positive coefficient on the minimum wage in these models. In fact, all of the estimated coefficients are negative, and are actually statistically significant in two of the five cases. Second, as a similar check, we re-estimated our earnings and employment equations artificially raising the censoring level for inclusion to 10 establishments in the county. These results are reported in row 3 of the top two panels of Table 5, and provide very similar results to those in Table 4. We can see no evidence that the censoring of data in the QCEW leads to a selection bias in our models.

C. *Right-to-Work Laws and the Supermarket Sector*

We earlier alluded to the absence of a positive earnings impact from minimum wages in the supermarket sector as puzzling. The presence of this puzzle may in turn cast doubt on our

[23] The interactions are formed as the product of the minimum wage and population, where population is expressed as deviation from the overall mean of population in the sample. So the coefficient on the non-interacted minimum wage variable can be interpreted as the impact of minimum wages when population is at its mean value.

empirical approach for estimating minimum wage effects from the QCEW data. For example, supermarkets may respond to minimum wage increases not by decreasing employment but by decreasing hours per week for their workers, thereby causing both employment and weekly earnings to be unaffected by minimum wages. Unfortunately, the QCEW does not allow us to evaluate this explanation directly. On the other hand, it may be that minimum-wage workers are so unimportant in the supermarket sector that it is difficult to uncover the small positive effect on earnings given the precision of the estimates. We do not find this latter explanation convincing in general, given the large numbers of low-wage workers in the general grocery store sector reported in Table 2 (and the fact that the supermarket subsector makes up the large majority of employment in the grocery store sector in any given county). However, this explanation might hold in certain states if institutional forces help to keep wages of hourly workers consistently above the minimum wage.

An interesting characteristic of the grocery store sector is its high unionization rate. While the overall unionization rate in retail trade is only 6 percent, within the grocery store sector it is 20 percent.[24] The grocery store sector is again exceptional in this regard, as none of the other sectors that we consider has a unionization rate in excess of 8 percent. A strong union presence in a particular state should lead to higher average wages for workers in the grocery sector, as well as a less dispersed wage distribution that is likely to limit the number of workers being paid at (or close to) the minimum. In an attempt to address the importance of the union impact, we separated our sample into states with and without right-to-work laws.[25] Our

[24] These values are union coverage rates for 2005, and are taken from the *Union Membership and Coverage Database* of Barry Hirsch and David Macpherson (available at http://unionstats.com). Separate figures are not available for the supermarket and convenience store sectors, although our expectation is that union coverage is considerably higher in the supermarket wing of the grocery store sector.

[25] According to the CPS-ORG, during our sample period unionization in the grocery store sector in right-to-work states is 7 percent, while in non-right-to-work states union coverage is 29 percent. Moreover, the average hourly wage in the grocery store sector in right-to-work states ($8.58 in 2005 dollars) is lower than that in non-right-to-work states ($9.89). Also, the average difference between a worker's hourly wage and the relevant minimum wage

expectation is that the absence of a right-to-work law typically indicates a strong union environment in a state that should show up both in higher union percentages and a greater concern about potential unionization among grocery store employers.[26] Our expectation, then, is that the evidence for the usual effects of minimum wages should be concentrated in the right-to-work states.

Estimated regressions with county-specific trends are reported separately for right-to-work and non-right-to-work states in Table 6. We provide estimates for the general food and beverage store sector, as well as for the two subsectors that make up grocery stores. As is apparent, we now find statistically significant evidence of a disemployment effect in supermarkets, albeit restricted to states with right-to-work laws. This result is mirrored in the general food and beverage store sector results. The results also suggest a positive earnings effect in supermarkets, again consistent with a high proportion of workers in that sector being directly affected by the minimum wage increase. In non-right-to-work states, we do not find statistically significant evidence for either employment or earnings – consistent with minimum wages not being generally effective in those states.

The results for the convenience store subsector are considerably more similar between the two types of states, perhaps reflecting a low union threat in that sector, even in non-right-to-work states. Positive earnings effects are found for both types of states, and the positive employment effect (statistically significant only in non-right-to-work states) may indicate a demand effect from the increase in the income of minimum wage workers.

D. *Regression Estimates Using Border Counties*

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is higher by more than a dollar in non-right-to-work states, demonstrating that minimum wages are much more likely to be effective in right-to-work states.

[26] Whether right-to-work laws directly inhibit unionization attempts, or simply reflect a general negative attitude towards the union movement in that state, has long been debated in the literature (see, for example, Moore, 1998). This debate is not important to our use of right-to-work status as an indicator of the general health of the union movement.

Our analysis controls for influences on retail trade employment that may evolve over time by incorporating county-specific trends in our model. A recent paper by Dube, Lester, and Reich (2007) suggests an alternative approach for controlling for trends that does not involve a functional form assumption about that trend. Specifically, the authors assume a common trend for counties that border each other but are located in different states, and then allow this trend to follow any possible pattern over time. The fact that minimum wages will often differ between border counties allows for identification of a minimum wage effect. As a consideration of the robustness of our findings to the method for handling trend effects, we applied this border-county approach to our data from the food and beverage sector.

Estimation of the regression model allowing border-county effects would be straightforward if each border county in a given state bordered only one county from the border state. In practice, this is not the usual case, so that any given border county will share a border with up to eight counties in the other state. We follow the approach of Dube, Lester, and Reich (2007) by including a given county in the regression analysis multiple times, once for each county it borders. For example, suppose a given county has two border counties. The 64 observations (over time) for that county will be included in the sample the first time with a fixed effect that is shared with one of the border counties. This fixed effect is allowed to be different in each quarter, which in essence serves to difference all the variables between the two counties. Then, the same 64 observations for that county will be included a second time, on this occasion with a fixed effect shared with the other border county. **(**The observations for a given county are weighted by the inverse of the number of border counties for that county in the sample, to attempt to account for the repeated entries of the observation for a given county.**)**

There are some obvious problems with this approach. For instance, a large number of observations are sacrificed given the large number of non-border counties in the United States.

Of more concern is the modeling inconsistency involved in assuming that any given border county observation can be modeled several times, each time with a different fixed effect. In the example noted above, the observed employment in a county is modeled once with a dummy variable effect shared with one border county. Then, that same observation is modeled omitting this effect but now including a separate effect shared with another border county (an effect not included when that observation was modeled the first time). As a concrete example, Horry county in South Carolina (a tourist coastal county containing Myrtle Beach) borders both Brunswick county (another coastal county) and Columbus county (a rural inland county) in North Carolina. While Brunswick may be a reasonable comparison county for Horry, the nature of the economies in Columbus and Horry County are very different.[27] Yet, the border-county approach will include two observations – one for Horry County and one for Columbus County – that assumes that these two counties share a common economic effect. Arguably, there is no common effect between these counties, so these observations appear in the regressions essentially without any trend controls. Given the differences across states in the average size of counties, such examples of poor matches across state borders could be rather common.

While we find this kind of modeling inconsistency as a limiting feature of the border-county approach, we do note that it has the advantage that the assumed trends in any country do not have to follow a linear form over time. So as an additional robustness consideration, we explore whether employing this alternative approach leads to conclusions different from those using our detrended analysis.

Regression estimates for the food and beverage retail sector using the Dube, Lester, and Reich border county approach are reported in Table 7. The general pattern of results is largely similar to the pattern observed using the detrended data (Table 4), although there are some

[27] For example, in 2000 the unemployment rate was 3.5 percent in Horry and 4.6 percent in Brunswick, suggesting similar economic conditions. But it was 7.7 percent in Columbus.

differences in the magnitude of the effects. Using the border-county approach, there is little indication of any disemployment effects, with some of the sectors providing large positive employment effects. Indeed, the estimated employment elasticities of roughly 0.5 in the convenience store and alcoholic-beverage store subsectors are difficult to believe. On the other hand, the magnitude of the estimated effects on average earnings is quite similar in Tables 4 and 6, especially for convenience, specialty food, and alcoholic-beverage stores. However, due to a higher imprecision in the border-county estimates, the estimates from the border-county analysis are not statistically significant in two of those sectors.

E. *Minimum Wage Effects in Other Retail Trade Sectors*

As noted in the discussion of Table 2, there are several other sectors of the retail trade industry with a relatively high frequency of low-wage workers. As before, we are limited in examining some of the more detailed sectors (such as shoe stores) by the county-level censoring in the QCEW. However, in Table 8, we present results – using our detrended data approach – for some of the more frequently available subsectors that also tend to have a high prevalence of low-wage workers.

Given its typically small establishment size and high product demand, the gasoline station sector offers a natural focus**.** Moreover, it also has one of the highest percentages of workers earning within $2 of the minimum wage in the entire retail trade. Our minimum-wage coefficient estimate in the employment equation for this sector is positive but statistically insignificant, while the minimum-wage effect on average earnings in the sector appears to be positive. This pattern of results is as we would expect were minimum wages to have essentially no effect on employment and so increase the earnings of workers in that sector. The positive employment effect from minimum wages suggested for the sporting goods, hobby, book, and music stores agglomeration is consistent with a strong product demand effect in that sector,

which might be expected given the large number of teenagers among minimum-wage workers. Again, the estimated effects are consistent with a positive average earnings effect in that sector – one that appears to be smaller than among gasoline stations, as might be expected given the somewhat high prevalence of low-wage workers in the latter branch.

Table 8 also presents estimates for the general merchandise store sector, as well as for the department store subsector. The general merchandise sector is actually made up of two primary subsectors: department stores; and miscellaneous general merchandise. While Table 2 only identifies the latter subsector as low-wage, the department-store sector only narrowly misses the cutoff (19 percent of workers are at a wage no more than $2 above the minimum). For general merchandise, and for department stores, we find the expected positive earnings impact. We find it somewhat surprising, however, that there are such strong suggested positive employment effects indicated in these regressions, especially the large estimated effect for department stores. Department stores are increasingly made up of discount stores (such as Wal-Mart) over this period, so some positive employment effect is perhaps not altogether surprising.

Finally, we examined establishments classified as part of miscellaneous store retailers. This hodgepodge includes florists, office supplies, gift and novelty shops, used merchandise, pet supplies, art dealers, and even home dealers. Given this composition, strong product demand effects are not likely, and our estimates do not suggest that minimum wages increase employment in this sector. It will be recalled that there was some indication in Table 2 that at least some of the subsectors within this sector had a high prevalence of low-wage workers – particularly workers in used merchandise stores, where 7 percent of workers were paid at the

minimum wage in 2005. To this extent, the evidence of an increasing impact on earnings in this sector is not unexpected.[28]

V. Summary and Discussion

We have used county-level employment statistics in low-wage retail-trade sectors to examine whether or not employment in these sectors responds to changes in the minimum wage specific to that county. Our estimated regression models do not suggest that increasing the minimum wage tends to reduce employment levels in the sectors we examine, and in many cases we find evidence pointing to increased employment from increasing the minimum wage. A crucial component of our empirical models is the inclusion of county-level trends in our regressions, a specification generalization often ignored in previous research. In our results, there is some suggestion that the minimum wage effect may vary across location – for example, a finding of no employment effect from the minimum wage in the grocery store sector in general masks the fact that there appears to be a small reducing impact of the minimum wage in right-to-work law states. That said, the general impact of the minimum wage in the retail trade sectors is *not* consistent with the reductions in employment suggested in prior research for the retail trade sector as a whole.

The census-type QCEW data we analyze is arguably preferable to the sample-based individual-level or establishment-level data deployed in much prior research on the retail trade sector. Nevertheless, it is not without blemish: although the QCEW does provide information on number of employees, it does not provide any indication of the work hours of those employees. One of the possible explanations for our findings of positive employment effects in some retail trade sectors is that increases in the minimum wage cause firms to reduce work hours per

[28] A separate analysis of the used merchandise sector was not feasible, however, given the typically small number of such establishments in most counties.

worker. We doubt this explanation, for two reasons. First, Zavodny (1999) has carefully examined the impact of minimum wages on the work hours of teenagers in general, failing to find reliable evidence that minimum wages reduce hours.[29] Second, and more importantly, our own estimates suggest that minimum wages tend to increase the weekly earnings of workers in most sectors, with estimated effects that are of similar magnitude to the percentages that might be directly affected by minimum wages in those sectors. If minimum wages were leading to reductions in work hours, we would anticipate that the minimum wage impact on weekly earnings per worker would be small (or even negative).[30]

What can explain a positive employment effect of minimum wages in some sectors? Both monopsony and efficiency-wage arguments have been offered for this phenomenon, and may be of some relevance here. For example, efficiency-wage arguments might be particularly persuasive given that we are studying sectors where employee theft is always a concern of firms. We have also suggested the possibility of a product-demand effect. Positive employment effects are observed for convenience, alcoholic-beverage, and hobby-type stores, even though in most cases the prevalence of low-wage workers in these sectors is not particularly high. If minimum-wage increases do tend to increase the purchasing power of low-wage workers, then this pattern of product-demand shifts would seem likely. We readily concede that our evidence is at best suggestive in this regard, and that a more complete evaluation of this explanation requires additional data on actual consumer behavior in these sectors.

[29] As noted earlier, Sabia (2008) also studies effects on work hours in the retail trade sector, and finds no evidence that minimum wages reduce the working hours of retail-trade employees (among those who remain employed after a minimum wage change).

[30] The one exception is the lack of evidence of any effect from minimum wage increases on weekly earnings in grocery stores in non-right-to-work law states. Although this finding might reflect a decrease in hours for workers in those states, we think the more compelling explanation is that the minimum wage is so unlikely to be effective in those states that any increasing impact on earnings is necessarily difficult to isolate in our data.

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Table 1	**Descriptive Statistics for the County Sample: 1990-2005**		
	County Level Means		
Variable	Mean	Std. Dev.	Number of Counties (balanced sample)
Total Employment in Sector			
Food and Beverage Stores	1,267	3,344	2,158
Grocery Stores	1,691	3,538	1,269
Supermarkets and Other Grocery Stores	2,628	4,481	620
Convenience Stores	276	389	412
Specialty Food Stores	746	837	403
Beer, Wine, and Liquor Stores	262	371	398
Gasoline Stations	360	644	2,371
Sporting Goods, Hobby, Book, and Music Stores	659	1,339	877
General Merchandise Stores	2,119	3,864	1,132
Department Stores	3,303	4,275	361
Miscellaneous Store Retailers	536	1,345	1,565
Average Weekly Earnings			
Food and Beverage Stores	311	77	2,158
Grocery Stores	323	80	1,269
Supermarkets and Other Grocery Stores	348	91	620
Convenience Stores	266	72	412
Specialty Food Stores	405	136	403
Beer, Wine, and Liquor Stores	369	149	398
Gasoline Stations	278	64	2,371
Sporting Goods, Hobby, Book, and Music Stores	290	81	877
General Merchandise Stores	311	62	1,132
Department Stores	326	60	361
Miscellaneous Store Retailers	334	105	1,565
Other Variables			
Total Private Employment	44,824	140,296	2,158
Total Private Average Weekly Earnings	533	132	2,158
Population (annual)	122,086	339,023	2,158
Unemployment Rate (all industries)	5.93	2.67	2,158
Real Minimum Wage	5.65	0.42	2,158
Enrollment Rate (State-level)	0.46	0.11	2,158

Note: All wage and earnings variables are in 2005 dollars.
Sources: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW); Bureau of Labor Statistics, Monthly Labor Review; Bureau of Labor Statistics, Local Area Unemployment Survey (LAUS); U.S. Bureau of the Census, Population Estimates Program; and U.S. Bureau of the Census, Current Population Survey

Table 2	**Industries with at least 20 Percent of Workers Earning No More than $2 Above the Minimum Wage in 2005**			
Industry (NAICS Code)	Percentage of Work Force	Percentage at or below the Minimum Wage	Percentage below the Minimum Wage plus $1	Percentage below the Minimum Wage plus $2
Manufacturing				
Retail bakeries (311811)	0.1%	6.0%	14.6%	27.6%
Cut and sew apparel (3152)	0.2	7.1	15.1	21.9
Retail Trade				
Grocery stores (4451)	2.2	3.0	12.6	26.9
Specialty food stores (4452)	0.2	5.1	14.7	23.5
Gasoline stations (447)	0.4	2.9	13.4	30.9
Clothing and accessories, except shoes (most of 448)	0.6	4.3	11.8	23.9
Shoe stores (44821)	0.1	2.6	14.7	31.8
Sporting goods, camera, and hobby stores (44313,45111,45112)	0.3	1.5	10.1	23.6
Sewing, needlework, and piece goods stores (45113)	0.04	1.4	12.2	23.0
Music stores (45114,45122)	0.1	3.5	15.7	26.7
Book stores and news dealers (45121)	0.1	4.6	13.2	22.9
Misc. general merchandise (4529)	0.4	4.4	17.7	27.8
Used merchandise (4533)	0.1	6.9	16.4	28.5
Gift, novelty, and souvenir shops (45322)	0.2	3.1	13.7	29.0
Information				
Motion picture and video industries (5121)	0.2	2.9	13.8	22.7
Real Estate and Rental and Leasing				
Video tape and disc rental (53223)	0.1	6.2	28.9	45.5
Arts, Entertainment, Recreation, Accommodation, and Food Services				
Bowling Centers (71395)	0.04	6.4	17.4	28.0
Other amusement, gambling and recreation (most of 713)	1.2	4.0	11.9	21.3
Restaurants and other Food Services (most of 722)	6.0	14.4	29.0	42.0
Drinking places, alcoholic beverages (7224)	0.2	9.7	17.5	26.1
Other Services				
Car washes (811192)	0.1	7.5	20.8	35.5
Private household (814)	0.7	6.3	13.2	23.9
Source: 2005 CPS-ORG *Notes:* Excludes workers in the agriculture, forestry, and fishing industries. The prevailing minimum wage in the worker's state is used in constructing the percentages. The statistics represent the percentage of workers that are both paid by the hour and have a wage in the stated range. These percentages are taken across all workers, both hourly and salaried.				

Table 3	**Fixed Effects Regression Estimates for the Food and Beverage Store Sector**				
Industry	Food and Beverage Stores	Supermarkets and Other Grocery Stores	Convenience Stores	Specialty Food Stores	Beer, Wine, and Liquor Stores
NAICS Code	445	44511	44512	4452	4453
Dep. Variable	*(a) Earnings*				
Minimum Wage	-0.077 (0.094)	-0.130 (0.110)	0.039 (0.074)	0.045 (0.160)	0.168** (0.076)
Population	0.104** (0.044)	0.089 (0.074)	-0.098 (0.120)	-0.262** (0.111)	0.156 (0.186)
Total Employment	0.038 (0.027)	0.068 (0.056)	0.147 (0.094)	0.235** (0.073)	0.094 (0.074)
Total Average Weekly Earnings	0.082** (0.025)	0.037 (0.038)	0.126** (0.064)	0.074 (0.070)	0.175 (0.071)
Unemployment Rate	0.007** (0.002)	0.011** (0.003)	0.001 (0.003)	-0.004 (0.005)	0.011** (0.004)
Enrollment Rate	-0.022 (0.026)	-0.040 (0.039)	-0.148** (0.064)	0.040 (0.062)	0.036 (0.068)
Dep. Variable	*(b) Employment*				
Minimum Wage	0.170 (0.134)	0.128 (0.167)	-0.314* (0.177)	0.197 (0.201)	-0.183 (0.194)
Population	0.334** (0.113)	0.151 (0.265)	0.911** (0.359)	0.238 (0.199)	-0.246 (0.176)
Total Employment	0.400** (0.055)	0.418** (0.146)	0.234 (0.257)	0.672** (0.132)	0.683** (0.130)
Total Average Weekly Earnings	0.064* (0.037)	0.052 (0.059)	-0.141 (0.136)	-0.090 (0.096)	0.014 (0.096)
Unemployment Rate	-0.001 (0.004)	-0.003 (0.006)	-0.010 (0.013)	0.003 (0.009)	0.012 (0.008)
Enrollment Rate	-0.020 (0.550)	-0.004 (0.095)	-0.289** (0.135)	-0.170** (0.077)	-0.103 (0.097)

Notes: All dependent variable and independent variables are in logarithmic form, except the unemployment rate and enrollment rate. Standard errors are given in parentheses and are corrected to allow for possible non-independence of observations within a state through clustering. All regressions included fixed-effects for county and quarter, and are weighted by the average population size of the county. **,* denote statistical significance at the 0.05 and 0.10 levels, respectively.

Table 4	**Regression Estimates with County-Level Trends: Food and Beverage Store Sector**				
Industry	Food and Beverage Stores	Supermarkets and Other Grocery Stores	Convenience Stores	Specialty Food Stores	Beer, Wine, and Liquor Stores
NAICS Code	445	44511	44512	4452	4453
Dep. Variable	*(a) Earnings*				
Minimum Wage	0.021	-0.006	0.300**	0.266**	0.100**
	(0.046)	(0.052)	(0.059)	(0.049)	(0.042)
Population	0.118	0.085	0.794**	0.123	0.420
	(0.144)	(0.224)	(0.166)	(0.311)	(0.261)
Total Employment	-0.021	-0.043	0.161**	-0.008	0.030
	(0.039)	(0.067)	(0.055)	(0.056)	(0.066)
Total Average Weekly	0.098**	0.069**	0.101	0.161**	0.049
Earnings	(0.019)	(0.027)	(0.075)	(0.066)	(0.039)
Unemployment Rate	0.005**	0.007**	-0.003	-0.003	0.006**
	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Enrollment Rate	-0.020	-0.020	-0.054**	0.080**	-0.010
	(0.018)	(0.024)	(0.028)	(0.049)	(0.045)
P-Value: Hausman Test	0.0781*	0.1116	0.0000**	0.0031**	0.2882
Dep. Variable	*(b) Employment*				
Minimum Wage	0.225**	0.210*	0.227**	0.067	0.101**
	(0.114)	(0.128)	(0.116)	(0.110)	(0.048)
Population	0.414**	0.526**	0.821	-0.693	-0.035
	(0.154)	(0.231)	(0.581)	(0.521)	(0.273)
Total Employment	0.468**	0.520**	0.509**	0.903**	0.468**
	(0.053)	(0.090)	(0.138)	(0.176)	(0.112)
Total Average Weekly	-0.052	-0.043	-0.122**	-0.179**	-0.036
Earnings	(0.032)	(0.056)	(0.060)	(0.058)	(0.033)
Unemployment Rate	-0.002	-0.003	-0.006	-0.005	-0.000
	(0.003)	(0.004)	(0.008)	(0.008)	(0.005)
Enrollment Rate	-0.052	-0.057	0.050	-0.219**	-0.032
	(0.032)	(0.056)	(0.067)	(0.064)	(0.038)
P-Value: Hausman Test	0.0062**	0.2277	0.0001**	0.0202**	0.0678*

Notes: See Notes to Table 3. These regressions also include a linear trend variable with a county-specific coefficient. The Hausman test p-value is for a test of the null hypothesis that the probability limits of the coefficient estimates for the six continuous independent variables in each specification are the same in specifications with and without county-specific trends.

Table 5	**Estimated Employment and Earnings Effects under Alternative Samples and Specifications: Food and Beverage Store Sector**					
	Industry	Food and Beverage Stores	Supermarkets and Other Grocery Stores	Convenience Stores	Specialty Food Stores	Beer, Wine, and Liquor Stores
	NAICS Code	445	44511	44512	4452	4453
Sensitivity		***(a) Earnings***				
1) Sample of States that Change their Minimum	Minimum Wage	0.004 (0.041)	0.017 (0.044)	0.253** (0.034)	0.203** (0.066)	0.013 (0.033)
2)Models with Minimum Wage/Population Interactions	Minimum Wage	0.021 (0.046)	-0.007 (0.052)	0.296** (0.059)	0.268** (0.047)	0.099** (0.042)
	MW*Pop Interaction	0.022 (1.056)	-0.830 (1.722)	-2.670 (1.632)	1.817 (2.360)	-0.611 (1.892)
3) County Sample with at Least 10 Establishments	Minimum Wage	0.021 (0.458)	-0.006 (0.052)	0.295** (0.059)	0.260** (0.048)	0.103** (0.043)
		(b) Employment				
1)) Sample of States that Change their Minimum	Minimum Wage	0.105 (0.090)	0.100 (0.101)	0.153 (0.143)	0.075 (0.083)	-0.023 (0.048)
2Models with Minimum Wage/Population Interactions	Minimum Wage	0.225** (0.113)	0.209* (0.126)	0.232** (0.117)	0.068 (0.110)	0.101** (0.047)
	MW*Pop Interaction	0.520 (1.12)	-0.236 (2.136)	4.749 (4.001)	0.608 (2.215)	-0.023 (1.660)
3) County Sample with at Least 10 Establishments	Minimum Wage	0.221** (0.112)	0.206 (0.126)	0.223** (0.114)	0.063 (0.110)	0.099** (0.047)
		(c) Dummy for Being Censored				
4) Linear Probability Models for Occurrence of OCEW Censoring	Minimum Wage	-0.643** (0.163)	-0.119 (0.220)	-0.227 (0.186)	-0.143 (0.160)	-0.459* (0.259)
Note: See Notes to Table 4.						

Table 6	**Estimates with County-Level Trends for the Food and Beverage Store Sector, by Right-To-Work Status**						
	Right-to-Work States				**Non-Right-to-Work States**		
Industry	Food and Beverage Stores	Supermarkets and Other Grocery Stores	Convenience Stores		Food and Beverage Stores	Supermarkets and Other Grocery Stores	Convenience Stores
NAICS Code	445	44511	44512		445	44511	44512
Dep. Variable	*(a) Earnings*				*(b) Earnings*		
Minimum Wage	0.387**	0.523**	0.238*		0.050	0.017	0.257**
	(0.079)	(0.053)	(0.140)		(0.033)	(0.043)	(0.043)
Population	0.335**	0.638**	0.759**		-0.045	-0.287	0.837**
	(0.104)	(0.169)	(0.296)		(0.166)	(0.201)	(0.209)
Total Employment	0.027	0.042	0.106		-0.026	-0.044	0.130**
	(0.041)	(0.077)	(0.106)		(0.050)	(0.075)	(0.049)
Total Average Weekly Earnings	0.118**	0.091	0.166**		0.093**	0.067**	0.090
	(0.030)	(0.079)	(0.074)		(0.020)	(0.022)	(0.084)
Unemployment Rate	0.004**	0.004*	0.001		0.005**	0.007**	-0.005
	(0.001)	(0.003)	(0.005)		(0.002)	(0.003)	(0.003)
Enrollment Rate	-0.088**	-0.066	-0.090		0.001	-0.009	-0.020
	(0.034)	(0.058)	(0.077)		(0.023)	(0.029)	(0.035)
Dep. Variable	*(c) Employment*				*(d) Employment*		
Minimum Wage	-0.186*	-0.391**	0.292		0.167	0.171	0.244*
	(0.111)	(0.124)	(0.249)		(0.120)	(0.150)	(0.145)
Population	-0.089	-0.138	1.168		0.626**	0.835**	0.664
	(0.207)	(0.396)	(0.855)		(0.170)	(0.293)	(0.866)
Total Employment	0.338**	0.349**	0.360*		0.506**	0.519**	0.586**
	(0.059)	(0.165)	(0.202)		(0.054)	(0.098)	(0.162)
Total Average Weekly Earnings	-0.074	-0.099	0.038		-0.036	-0.023	-0.163**
	(0.036)	(0.083)	(0.111)		(0.041)	(0.062)	(0.062)
Unemployment Rate	-0.003*	-0.005	-0.009		-0.003	-0.005	-0.005
	(0.002)	(0.003)	(0.015)		(0.004)	(0.006)	(0.009)
Enrollment Rate	0.028	0.069	0.130		-0.078	-0.110	0.066
	(0.049)	(0.085)	(0.217)		(0.052)	(0.107)	(0.092)
Note: See Notes to Table 4.							

Table 7	**Regression Estimates for the Food and Beverage Store Sector: Border County Analysis**				
Industry	Food and Beverage Stores	Supermarkets and Other Grocery Stores	Convenience Stores	Specialty Food Stores	Beer, Wine, and Liquor Stores
NAICS Code	445	44511	44512	4452	4453
Dep. Variable	*(a) Earnings*				
Minimum Wage	0.080* (0.046)	0.087 (0.081)	0.319** (0.071)	0.240 (0.174)	0.107 (0.098)
Population	0.003 (0.015)	0.025 (0.039)	-0.096** (0.026)	-0.163* (0.089)	0.164* (0.085)
Total Employment	0.066** (0.011)	0.001 (0.029)	0.082** (0.021)	0.299** (0.078)	0.057 (0.076)
Total Average Weekly Earnings	0.047 (0.024)	0.163** (0.043)	0.157** (0.062)	-0.193 (0.140)	0.050 (0.115)
Unemployment Rate	0.003* (0.002)	0.006* (0.003)	0.006 (0.005)	0.015* (0.008)	-0.009 (0.008)
Enrollment Rate	-0.029 (0.033)	-0.017 (0.047)	-0.017 (0.084)	0.053 (0.095)	-0.171 (0.105)
Dep. Variable	*(b) Employment*				
Minimum Wage	0.262** (0.129)	0.023 (0.182)	0.484* (0.290)	-0.013 (0.341)	0.466* (0.277)
Population	0.497** (0.027)	0.656** (0.072)	0.381* (0.227)	0.461** (0.126)	-0.057 (0.227)
Total Employment	0.482** (0.024)	0.312** (0.047)	0.254* (0.153)	0.631** (0.094)	0.563** (0.128)
Total Average Weekly Earnings	-0.320** (0.054)	-0.005 (0.046)	-0.377 (0.242)	-0.708** (0.176)	0.729** (0.361)
Unemployment Rate	0.004 (0.004)	-0.021** (0.007)	-0.011 (0.020)	0.033** (0.015)	0.008 (0.019)
Enrollment Rate	0.295** (0.077)	0.027 (0.081)	0.471 (0.301)	-0.176 (0.116)	0.387 (0.316)

***Notes**:* Sample includes only counties that border another state. These regressions include a fixed effect that varies over time and is specific to the two counties in a border-county matched pair. Standard errors are calculated robust to arbitrary correlation in the error terms for any observations from the same state. A given county observation is weighted by the average population in the county multiplied by the inverse of the number of border counties also in the sample.

Table 8	**Regression Estimates with County-Level Trends for Other Retail Sectors with Low Hourly Wages**				
Industry	Gasoline Stations	Sporting Goods, Hobby, Book, and Music Stores	General Merchandise Stores	Department Stores	Miscellaneous Store Retailers
NAICS Code	447	451	452	4521	453
Dep. Variable	*(a) Earnings*				
Minimum Wage	0.159** (0.048)	0.118** (0.032)	0.079** (0.025)	0.106** (0.042)	0.220** (0.052)
Population	0.536** (0.168)	0.422** (0.130)	0.273* (0.160)	0.063 (0.203)	0.301** (0.127)
Total Employment	0.127** (0.035)	0.089** (0.037)	-0.003 (0.038)	0.002 (0.053)	0.160** (0.040)
Total Average Weekly Earnings	0.107** (0.036)	0.076** (0.025)	-0.004 (0.026)	0.001 (0.044)	0.158** (0.036)
Unemployment Rate	0.001 (0.001)	-0.003 (0.003)	-0.001 (0.002)	-0.003 (0.003)	-0.003* (0.002)
Enrollment Rate	-0.017 (0.023)	-0.048** (0.023)	0.031 (0.033)	0.010 (0.036)	-0.001 (0.018)
Dep. Variable	*(b) Employment*				
Minimum Wage	0.073 (0.045)	0.148** (0.071)	0.094** (0.036)	0.261** (0.059)	0.089 (0.057)
Population	0.163 (0.219)	0.545 (0.319)	0.431** (0.209)	0.994** (0.327)	0.495** (0.165)
Total Employment	0.365** (0.034)	0.677** (0.115)	0.536** (0.061)	0.499** (0.108)	0.546** (0.067)
Total Average Weekly Earnings	-0.064** (0.014)	-0.108** (0.036)	-0.149** (0.029)	-0.155** (0.047)	-0.009 (0.026)
Unemployment Rate	0.001 (0.002)	0.002 (0.003)	-0.002 (0.005)	0.003 (0.006)	-0.006 (0.003)
Enrollment Rate	0.025 (0.028)	-0.028 (0.019)	0.013 (0.035)	0.024 (0.039)	-0.050** (0.024)
Note: See Notes to Table 4.					