

THE WALMART EFFECT: LABOR MARKET IMPACTS IN RURAL AND URBAN COUNTIES

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Abstract

The entrance of a Walmart causes a change in full-time and part-time jobs in both urban and rural labor markets. This article analyzes county-level labor market changes of urban and rural labor markets before and after the entrance of a Walmart. I use Beale codes to categorize the counties that experienced their first Walmart entrance after 1990. Although the magnitude of the change appears to be larger in urban counties, I conclude that Walmart entry induces a change in the mix of full-time and part-time jobs in the labor market. We observe increasing employment and downward pressure on wages as total retail payrolls remain constant three years after a Walmart entrance. The increase in employment for both urban and rural counties is greater than 13 percent three years after entry while wages and payroll fluctuate, but settle back to pre-entrance levels. Roughly half the increase in employment represents Walmart replacing existing jobs in the market. This increase could be a result of Walmart attracting employees from existing firms; considering Walmart tends to offer more part-time labor per establishment, the prevailing mix of full-time and part-time labor could change. Although Walmart tends to add jobs within local labor markets, the change in the mix of full-time and part-time labor may result in an underemployed labor force.

This study is intended to further advance the understanding of Walmart's local impact on wages and employment. Specifically, I explore if the effect is different between rural and urban counties. Considering the large discount retailer is the United States' largest private employer with over 1.3 million associates (Walmart Stores, Incorporated 2014), it is important to understand the potential effects Walmart may have on wages. Many studies have analyzed the impact of Walmart on labor markets from employment and wages to entry and exit of firms. A number of these analyses have revealed significant impacts of Walmart on labor markets; however, few studies have distinguished between rural and urban counties. Using county classifications I categorized each U.S. county that saw its first Walmart enter between 1990 and 2012 into one of three separate classifications: urban, rural-adjacent, and rural-non-adjacent (adjacent simply noting whether or not the rural county is located near an urban county). I use these separate classifications to analyze the impact of Walmart entry across different types of labor markets.

The results suggest that Walmart changes the mix of full-time versus part-time retail labor in each of these county classifications. While the results show increasing employment estimates, retail payrolls remain unchanged, suggesting that Walmart places downward pressure on retail wages after entering the labor market (payroll is a function of employment and wages; if employment increases while payroll stays the same, one explanation is that wages are decreasing). While the results show decreasing wages in urban counties that are statistically significant, the estimates for rural counties are not—although estimates for rural counties are negative, and close to generally accepted significance levels. The results for employment are

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consistent with empirical research that suggests Walmart increases retail employment upon entry. And, although establishment estimates are not a focal point of this analysis, I find that an average of eight retail establishments are added in urban counties with five of them remaining after three years. Rural-adjacent and rural-non-adjacent counties do not experience this jump in establishments that sustains after entry. This article is written with a common format to present the analysis: first, a literature review covers existing research; I then delve into the analytical framework used in analyzing the results. Next, I outline the data used in analyzing the Walmart effect followed by the methods section that highlights the equations used in estimation. Finally, I conclude with two sections that outline the results and provide a discussion that puts them in context.

Literature Review

Researchers have long been interested in the Walmart effect, with some of the first inquiries appearing in the early 1990s (Dortch 1992). Walmart studies range from its impacts on retail sales and sales outlets to prices, employment, and total payrolls and wages. Although several studies have been completed, empirical evidence of the Walmart effect on labor markets is still mixed. The ambiguous picture painted by previous research was the impetus for this article.

Some studies report positive impacts on employment. Hicks and Wilburn (2001) find that retail employment in 55 West Virginia counties from 1989–1998 increases by 54 jobs when Walmart enters. Drewianka and Johnson (2006) report more substantially positive impacts—roughly a 2 percent increase in retail employment following Walmart entry, or 160 jobs for a typical county with a Walmart store. Others find negative effects. Neumark, Zhang, and Ciccarella (2008) report retail employment 3 percent lower, or roughly 146 jobs, in counties with an observed entrance of Walmart occurring between 1977 and 2002.

Still others find no evidence, or mixed evidence, that Walmart entry affects local labor market conditions. Ketchum and Hughes (1997) find that retail employment growth in the early 1990s stumbled in Maine, but found no evidence that Walmart was responsible for the lack of growth. Basker (2005) finds a small, positive impact on retail employment from the presence of Walmart but a negative effect on wholesale employment; this could be a result of Walmart's strong supply chain network or an implication of Walmart's higher efficiency. Some of the differences may be due to different regions and time periods used in the analyses. Several studies consider only one state. Some examine primarily urban areas, some primarily rural areas, and others make no distinction. The studies differ in the time periods analyzed and therefore economic conditions at the time of entry. Other differences may arise due to variations in empirical strategies used across studies.

The evidence of Walmart's wage impacts is also ambiguous. Drewianka and Johnson (2006) estimated the impact of the entry of Walmart stores on average wages using a random growth model. They find that Walmart stores negatively affect state- and county-level retail wages. They attribute the negative impact on wages to the use of more part-time labor and to employees with a weak labor-market attachment such as retirees. Neumark, Zhang, and Ciccarella (2008) find Walmart stores reduce total retail payroll but increase general

merchandise payroll, suggesting that Walmart's entrance changes the retail mix between general merchandise and other retail sub-sectors. Although the effect on aggregate levels of payroll is negative, I must note that this could result from employees working fewer hours rather than a wage reduction.

The primary purpose of this article is to examine whether the Walmart effect is exhibited differently between urban and rural counties. Because the prevailing labor markets in these types of communities are different, the Walmart effect on retail employees in urban counties could be significantly different from the effect on their rural counterparts. Only a handful of studies distinguish between rural and urban areas in their models. Neumark, Zhang, and Ciccarella (2008) compare regression models of counties above and below the median population (21,000 in base year 1977) and find no statistically significant impact on retail employment. Drewianka and Johnson (2006) divide their sample into quartiles by population to examine differential impacts in smaller and larger communities. They find some evidence that Walmart entry reduces average weekly retail wages in smaller counties. However, their estimates are small, amounting to a few dollars per week, which they note, "may well be explained by unobserved factors like differences in average hours worked." Bonanno and Lopez (2008) use cross-sectional data for 2004 and find evidence of additional monopsony power in rural areas compared to urban areas, but like Drewianka and Johnson (2006) the authors caution that the economic significance of the estimates is trivial. This article seeks to advance the understanding of the disparate effects felt in urban versus rural communities upon the entrance of a Walmart.

Analytical Framework

Differences in the competitive characteristics of urban and rural labor markets could explain differences in market behavior after Walmart enters a county. There are two primary store formats Walmart uses when it opens a store: regular and super. Regular formats demand between 150 and 200 retail jobs while the range for Supercenters is between 300 and 450 (Holmes 2011a). When Walmart builds either of these formats in urban counties they are drawing from a larger pool of retail job applicants than stores opened in rural counties. Urban areas by definition will have more businesses and institutions that provide similar jobs to those offered by Walmart. In other words, *the market for retail labor in urban counties will be more competitive than that in rural counties*. Table 1 provides descriptive statistics for the number of retail establishments in urban, rural-adjacent, and rural-non-adjacent counties. The average number of retail establishments in urban counties is 450, compared to 216 and 174 for rural-adjacent and rural-non-adjacent counties, respectively (the term "adjacent" refers to rural counties that are next to urban counties). Table 1 supports the idea that urban labor markets are more competitive. Considering urban and rural retail workers face dissimilar markets for labor, we expect the results in these types of localities to be different.

Table 1. Summary statistics for average number of retail establishments.

County	Observations	Average Number	Maximum Number
Urban	64,567	450	30,812
Rural-Adjacent	62,884	216	17,876
Rural-Non-Adjacent	79,678	175	17,876

Urban labor markets are more competitive and as a result firms are price takers—no one firm has the market power to reduce the going wage (Parker and Kusmin 2006). If rural counties have less competitive labor markets, we might observe a higher wage reduction in rural counties as retail workers would have fewer employment alternatives. Figures 1 and 2 illustrate the demand and supply of labor in urban and rural counties. The difference between these illustrations is the slope of the supply curve. Urban markets (Figure 1) are more competitive. I expect a close-to-perfectly elastic supply curve because these markets have a larger pool of employees with similar skills and easier entry and exit. Note if we observe a shift in the demand of labor in Figure 1 the equilibrium wage will remain the same. In contrast, rural counties (Figure 2) may have a more inelastic supply curve due to a thinner labor market. In this case rural wages will be more responsive to shifts in labor demand. Depending on the prevailing elasticities in rural counties, shifts in the demand for labor may potentially alter the prevailing retail wage. If Walmart decreases the demand for labor by crowding-out existing establishments, the market would exhibit a decrease in rural retail wages upon its entrance.

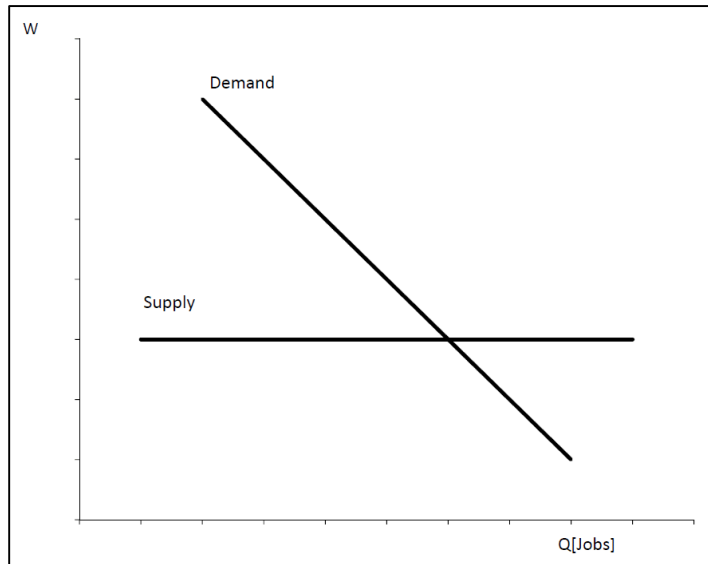


Figure 1. Competitive labor market.

Dube, Lester, and Eidlin (2007) suggest that retail wage reductions in urban counties could be greater than reductions in rural counties as a result of a non-binding minimum wage. The average retail wage in urban counties is greater than in rural counties (see Table 2). Retail wages in rural counties tend to be closer to the minimum wage, which is referred to as a “binding” minimum wage. Figures 3 and 4 graphically depict binding and non-binding minimum wages. If

the spread between average retail wage and the minimum wage in rural counties is smaller compared to urban counties, Walmart entry would not lower wages. Walmart may capitalize on higher labor rents in urban counties that result from higher competitive retail wages. As a result, we may observe a greater reduction in urban retail wages considering Walmart faces a higher spread in labor rents.

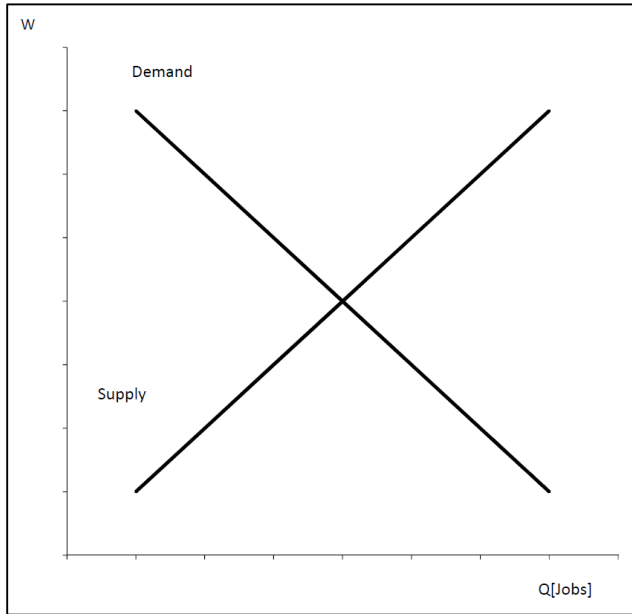


Figure 2. Less-competitive labor market.

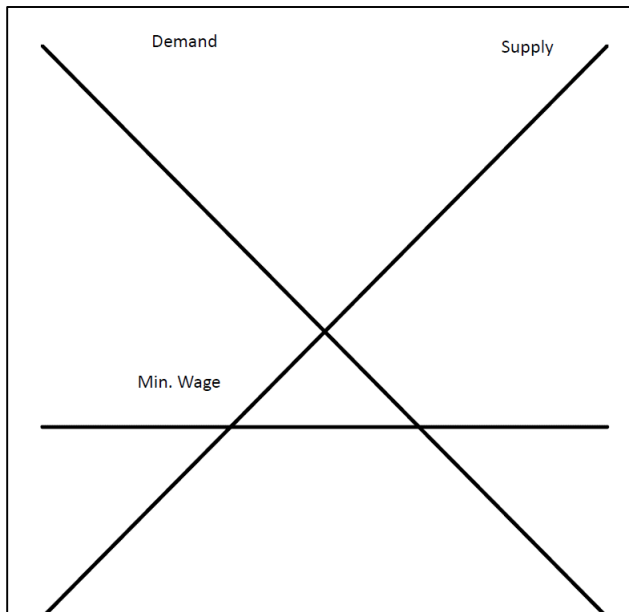


Figure 3. Non-binding minimum wage.

The Walmart corporate web site highlights a few benefits of working with the retailer. One graphic mentions the opportunity for career advancement with the claim that, “Walmart promotes about 160,000 people per year to jobs with more responsibility and higher pay” (Walmart Stores, Incorporated 2014). Another boasts of the company’s number of employees with ten-plus years of service, over 300,000 as of 2013. Quarterly cash bonuses, a health care plan, 401(k) match, and a 10 percent merchandise discount are other examples of how Walmart may pay a lower wage yet still attract employees. Note that smaller retailing businesses—especially those in more rural communities—are less likely to offer these kinds of benefits.

Data

I utilize nationwide, county-level labor statistics from 1990-2012. These data were retrieved from the U.S. Bureau of Labor Statistics’ web site, specifically the “State and County Employment and Wages” section.¹ I include data from the retail sector as well as accommodation and food services and manufacturing industries. Accommodation and food services draws from a lower-skill labor pool similar to the retail industry in which Walmart is classified; thus, we may observe similar market outcomes within this sector. Manufacturing statistics were included as a falsification measure: if manufacturing exhibits similar behavior to that of retail we may conclude the observed outcome is not a result of Walmart’s entrance. Summary statistics for the economic variables in each of these industries are included in Table 2 below.

Table 2. Sample averages of labor market variables.

Retail	Weekly Wage	Employment	Payroll	Establishments
Urban	\$ 389.11	14142	\$ 330,000,000.00	972.99
Rural-Adjacent	\$ 345.62	1610	\$ 31,000,000.00	147.07
Rural-Non-Adjacent	\$ 331.03	825	\$ 15,000,000.00	82.29
Manufacturing				
Urban	\$ 773.70	14667	\$ 660,000,000.00	374
Rural-Adjacent	\$ 617.89	2725	\$ 91,000,000.00	52
Rural-Non-Adjacent	\$ 547.88	1288	\$ 37,000,000.00	28
Acc. & Food Services				
Urban	\$ 215.14	10550	\$ 150,000,000.00	539
Rural-Adjacent	\$ 183.80	1286	\$ 13,000,000.00	87
Rural-Non-Adjacent	\$ 185.60	963	\$ 11,000,000.00	61

Initially, the data were smoothed by taking the natural log of each variable. This data transformation limits the impact outliers can have on the results while allowing us to interpret the coefficients as elasticities. Elasticities are “unit-free;” in other words, one can interpret each result as a percentage change rather than a change in the level of each labor market statistic. The change enables us to compare the results across regions more easily.

¹ Data from Guam, Puerto Rico, Virgin Islands and American Samoa were removed, as well as any county that was unable to report statistics due to limited reporting standards. We do not believe that the number of counties removed raises any concerns about misrepresenting the data as a whole.

Store opening dates and locations were taken from a data file identical to the Walmart data used in the paper *The Diffusion of Walmart and Economies of Density* by Thomas J. Holmes (2011b). This dataset provides designations of each store’s format—regular or Supercenter—store number, opening date, conversion date (if it was converted from regular to Supercenter), and the FIPS code for each store location. I built a dummy variable representing the first entrance of Walmart that equals 1 if a county experiences its first entrance of a Walmart during the analyzed time period. I expected the biggest impact to be felt upon the initial entrance of the retail giant.

An important aspect of this study is the distinction between urban and rural counties. Utilizing Beale code classifications current as of 1993 (available year closest to the beginning of the dataset), I separate the counties into three categories. Beale codes classify counties as metro or non-metro and adjacent or non-adjacent—adjacent counties are more rural counties located near urban areas. I created a variable that encodes each FIPS with an urban, rural-adjacent, or rural-non-adjacent classification and use these labels in order to separate the analysis. Urban counties received a value of 1, rural-adjacent have a value of 2, and rural-non-adjacent counties receive a value of 3.

I include three control variables expected to impact local wages: population density, education attainment levels, and unemployment rates. Population density was included to account for variations within the rural and urban categories described above.² There are densely populated counties with low nominal populations that are considered urban while some very large, sparsely but equally populated counties are considered rural. Education attainment level is measured as the percentage of residents that hold at least a bachelor’s degree as reported by the decennial U.S. Census (2010). County-level unemployment rates were obtained from the Bureau of Labor Statistics Local Area Unemployment Statistics data series (2013). Table 3 provides descriptive statistics of the three control variables included in the analysis.

Table 3. Sample averages of labor market control variables.

County	Population per square mile	Bachelor’s degree	Unemployment rate
Urban	746	22%	5.69%
Rural-Adjacent	62	14%	6.65%
Rural-Non-Adjacent	30	15%	6.31%

Methods

Let average weekly wage in county i and industry k at time t be represented by y_{ikt} . We assume that average weekly wage is defined by

² Population density was calculated by dividing the county land area (in square miles) by its population. These values were gathered from the United States Bureau of the Census’ “USA Counties Data File Downloads” web page.

$$(1) \quad y_{ikt} = \alpha_{oik} + X_{it} + P_{it} + Z_{it} + \theta_W W_{it} + \varepsilon_{ikt}$$

Each county i at time t has unique fixed characteristics that define a base level for the labor market variables and is contained in α_{oik} . Such characteristics would include but are not limited to: access to jobs, access to highways that make employment accessible, minimum wage standards, competition from adjacent counties, and the political environment. The model incorporates three control variables to account for different characteristics that would impact the dependent variables. Each county i at time t has unemployment rate X_{it} . The population density for county i at time t is given by P_{it} and each county's educational attainment level is described by Z_{it} . The impact of Walmart's entrance will be measured by $\theta_W W_{it}$, where W_{it} is a dummy variable that takes a value of 1 for county i in the year of Walmart entry and 0 otherwise. The coefficient θ_W is interpreted as the Walmart effect. Considering the impact of Walmart entry may transpire over a number of years and may not be isolated to the year of entry, we modify Equation (1) to include lags and leads:

$$(2) \quad y_{ikt} = \alpha_{oik} + X_{it} + P_{it} + Z_{it} + \sum_{n=-3}^3 \theta_W^n W_{it}^n + \varepsilon_{ikt}$$

where $n = -3, -2, \dots, 2, \text{ and } 3$ catalogues three years prior to entry of a Walmart and three years after. Walmart entry occurs at time 0.

I approach the estimation in two steps. First, for each county and each industry I regress the dependent variable on a simple time trend given below:

$$(3) \quad \ln(y_{ikt}) = \beta_1 t + \beta_2 t^2 + \partial_{ikt}$$

where y_{ikt} is average weekly wages (or employment, establishments, or payroll) in county i 's industry k in year t .³ Following the time-trend regression, I subtracted the natural log of the predicted value

$$(4) \quad \partial_{ikt} = \ln(y_{ikt}) - \ln(\hat{y}_{ikt})$$

The second estimation of the model uses ∂_{ikt} as the dependent variable. I regress the residual values on Walmart entry variables and the three additional control variables. The equation used in the second estimation is

$$(5) \quad \partial_{ikt} = \alpha_{oik} + X_{it} + Y_{it} + Z_{it} + \sum_{n=-3}^3 \theta_W^n W_{it}^n + \tau_{ikt}$$

In this case, θ_W is the coefficient on each lag variable; however, in this form, the coefficients are not directly interpretable as elasticities considering W_{it} is a dummy variable and the dependent variables were transformed using a semi-logarithmic estimation. I use the equation below to adjust the coefficients into interpretable elasticities (Kennedy 1981)

³ Note that this equation demonstrates the logarithmic transformation on each dependent variable.

$$(6) \quad \Delta = e^{(\theta - 0.5(\theta/t)^2)} - 1$$

A primary concern in analyzing the impact of Walmart on local economic outcomes is how to control for the endogeneity of Walmart's location decisions. Said differently, Walmart does not locate randomly and its decision to locate and time store openings may indicate that the county is different from other counties—i.e., growing faster than other counties or has lower wage rates. Walmart seems to choose specific counties that exhibit favorable conditions to the retailing firm. However, a conclusive instrumental variable has yet to be identified in existing research. Without identifying and accounting for these trends the results may over- or underestimate based on specific county patterns.

I attempt to side-step the issue of endogeneity by focusing exclusively on the counties that experienced their first Walmart entry between 1990 and 2006. This approach, focusing only on counties that experience Walmart entry, reduces the concern of endogeneity. Most studies that incorporate a control for the endogenous location decisions do so in order to identify what makes counties with a Walmart different from counties without a Walmart. Because we only analyze those counties that observed Walmart entry, this concern is suppressed. The results, therefore, should be interpreted as the impact on urban and rural labor markets that result from a specific county's first observation of Walmart entry,⁴ conditional on the presence of a Walmart store in the county at some time during the period analyzed.

Results

Results are presented in Tables 4–7. Each table presents the results from the estimation of Equation (5) by sector and by rural versus urban status. We report the computed marginal effects and associated *p*-values for Walmart entry variables that are of key interest. The marginal effects are more easily interpreted than the regression coefficients. For example, in Table 4 the value reported for urban retail wages one year after entry, -0.90 , can be interpreted as the percentage change in average weekly wages as a result of Walmart's first entry into a county one year after entering. The corresponding *p*-value shows this estimate is significant at the 5 percent level.

Wages

The average weekly wage in the retail industry is rising in urban counties in the years just prior to the entry of Walmart; however, the pattern is reversed once entry occurs. Three years after the first Walmart enters, the average weekly retail wage in urban counties is 1.59 percent lower than it would have been had Walmart not entered. The pattern is similar in non-metro adjacent and rural counties; however, the effect is only marginally significant or insignificant for these county types. One reason why we might not observe any Walmart effect on retail wages in more rural counties is that minimum wages in these counties are binding.

⁴ There may also be some concern for endogeneity in the timing of store entry—the retailer may choose more ideal locations first, and less ideal locations second. The study does not address this potential source of endogeneity.

In the accommodation and food services industry, average weekly wages also decline post-entry in urban counties. This finding is consistent with the idea that these industries employ similar workers. The results for average weekly wages in accommodation and food services results in a three-year decrease of 1.8 percent. There is no statistically significant effect of Walmart entry on average weekly wages for this sector in rural-adjacent or rural-non-adjacent counties. As we would expect, the manufacturing industry does not exhibit a Walmart effect on average weekly wages.

Employment

The year following Walmart entry, urban counties experience a 20 percent increase in retail employment. Considering the average number of retail jobs in urban counties is nearly 15,000, it appears unrealistic to attribute this increase all to Walmart entry, as it would result in roughly 3,000 additional jobs. There are likely other events taking place in urban counties we cannot account for in our model. It might be that Walmart induces entry of other retail firms that benefit from increased customer traffic associated with the “big box” retailer (Basker 2005).

Table 4. Marginal effect estimates—Wages by sector and county type.

	Retail			Accomm. and Food Services			Manufacturing		
	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural
W ₋₃	0.20 (0.68)	0.19 (0.84)	-0.11 (0.93)	0.90*** (0.00)	0.60* (0.09)	0.20 (0.68)	0.20 (0.40)	0.00 (0.99)	0.50 (0.37)
W ₋₂	0.80* (0.08)	0.20 (0.82)	0.49 (0.67)	0.20 (0.39)	-0.40 (0.23)	0.00 (0.98)	0.10 (0.75)	1.41*** (0.00)	0.40 (0.57)
W ₋₁	0.90** (0.03)	1.10 (0.15)	0.90 (0.43)	-0.10 (0.73)	0.10 (0.75)	-0.20 (0.69)	0.00 (0.89)	-0.10 (0.87)	-0.70 (0.23)
W ₀	-0.50 (0.27)	-0.50 (0.56)	-0.80 (0.54)	-1.00*** (0.00)	-0.20 (0.56)	0.30 (0.65)	-0.10 (0.69)	0.20 (0.71)	-1.00 (0.11)
W ₁	-0.90** (0.04)	-1.29* (0.10)	-1.10 (0.40)	-1.29*** (0.00)	-0.80 (0.02)	0.00 (1.00)	-0.20 (0.50)	0.20 (0.67)	-0.30 (0.58)
W ₂	-1.39*** (0.00)	-1.29* (0.10)	-0.90 (0.50)	-1.88*** (0.00)	-0.50 (0.13)	-0.30 (0.62)	-0.30 (0.28)	0.00 (0.96)	-0.30 (0.61)
W ₃	-1.59*** (0.00)	-1.00 (0.21)	-1.00 (0.28)	-0.30*** (0.00)	0.00*** (0.01)	0.00 (0.24)	0.00 (0.87)	-0.80 (0.10)	-0.30 (0.66)
N	17,351	15,846	31,297	15,834	10,989	15,620	17,242	15,407	25,592
R ²	0.003	0.001	0.001	0.013	0.002	0	0.002	0.001	0

Notes: Estimates from Equation (5). Control variable estimations are not reported here. p -values in parenthesis. R^2 is artificially low as county-specific time trends explain close to 99 percent of the variance for each dependent variable. The marginal R^2 is the fraction of the variance of the de-trended variable that can be explained by the model. Significance at the 10 percent level is denoted by *; significance at the 5 percent level by **; significance at the 1 percent level by ***.

The rural-adjacent and rural-non-adjacent estimations make more sense. Average retail employment for rural-non-adjacent counties is 1,763 jobs. The estimated marginal increase after three years is 7.88 percent, or an increase of 138 jobs. Rural-adjacent counties experience a three-year increase of 6.27 percent; with average rural-adjacent employment of 2,088, the corresponding addition to retail employment is 130 jobs. These estimations are roughly half the number of jobs required to run a typical Walmart store. Half of a new Walmart’s workforce represents an increase in retail employment while the other half represents individuals choosing Walmart over their current employer and/or individuals re-entering the workforce. These results parallel those from similar studies on employment such as Hicks and Wilburn (2001) and Drewianka and Johnson (2006). Manufacturing exhibits a decrease of 1.29 percent; however, the change is no longer significant three years after entry.

Table 5. Marginal effect estimates– Employment by sector and county type.

	Retail			Accomm. and Food Services			Manufacturing		
	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural
W ₋₃	14.64*** (0.00)	5.32*** (0.01)	-1.31 (0.46)	0.60 (0.11)	-0.70 (0.25)	1.20 (0.20)	1.41*** (0.01)	1.71* (0.08)	2.73** (0.05)
W ₋₂	19.94*** (0.00)	5.46*** (0.01)	6.31*** (0.00)	-0.30 (0.37)	-0.40 (0.48)	1.10 (0.23)	1.71*** (0.00)	1.30 (0.21)	2.01 (0.15)
W ₋₁	0.86 (0.75)	-2.88 (0.15)	-3.65 (0.04)	-1.19*** (0.00)	-1.00* (0.10)	-0.70 (0.47)	-0.40 (0.49)	-1.59* (0.10)	-1.10 (0.42)
W ₀	-4.05 (0.13)	-10.25*** (0.00)	-4.32*** (0.01)	-0.70** (0.06)	-0.70 (0.25)	0.10 (0.89)	-1.19** (0.02)	1.89** (0.06)	-1.60 (0.24)
W ₁	21.24*** (0.00)	13.18*** (0.00)	17.80*** (0.00)	0.10 (0.82)	0.50 (0.38)	0.00 (0.95)	-1.29*** (0.01)	-0.50 (0.58)	-1.01 (0.49)
W ₂	15.45*** (0.00)	8.85*** (0.00)	12.51*** (0.00)	0.30 (0.45)	1.41*** (0.01)	0.70 (0.46)	-0.70 (0.16)	0.50 (0.63)	-0.31 (0.86)
W ₃	10.04*** (0.00)	6.27*** (0.00)	6.27*** (0.00)	0.49 (0.22)	0.00 (0.32)	0.00 (0.79)	0.00 (0.92)	1.20 (0.22)	0.49 (0.73)
N	17,419	15,943	31,466	15,834	10,989	15,620	17,240	15,375	25,023
R ²	0.011	0.007	0.006	0.005	0.003	0.001	0.016	0.011	0.007

Notes: Estimates from Equation (5). Control variable estimations are not reported here. *p*-values in parenthesis. *R*² is artificially low as county-specific time trends explain close to 99 percent of the variance for each dependent variable. The marginal *R*² is the fraction of the variance of the de-trended variable that can be explained by the model. Significance at the 10-percent level is denoted by *; significance at the 5-percent level by **; significance at the 1-percent level by ***.

Payroll

The aggregate retail sector payrolls in urban counties decrease 1.78 percent three years following a Walmart entrance. This decrease begins in the year prior to entry and continues to grow three years after entry. This result supports the idea that competitors of Walmart have to manage their labor costs in order to stay in business. Before entry, rural-non-adjacent counties exhibit decreasing aggregate retail payrolls; however, this decrease reverses upon entry and remains positive until three years after Walmart entry, when the change is no longer statistically significant. Rural-adjacent payrolls exhibit similar behavior, except the positive increase only lasts until one year following Walmart entry. The accommodation food services sector presents statistically significant results in urban counties, decreasing by 1.39 percent. Manufacturing shows a slight decrease in the year of entry but this decrease of over 1 percent is not statistically significant after three years.

Table 6. Marginal effect estimates– Payroll by sector and county type.

	Retail			Accomm. and Food Services			Manufacturing		
	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural
W ₋₃	0.80** (0.04)	-1.49*** (0.01)	-2.08*** (0.01)	1.51*** (0.00)	-0.10 (0.91)	1.40 (0.21)	1.61*** (0.01)	1.71 (0.12)	3.34** (0.04)
W ₋₂	0.40 (0.31)	-2.37*** (0.00)	-2.08*** (0.01)	-0.10 (0.82)	-0.90 (0.23)	1.10 (0.34)	1.81*** (0.00)	2.73 (0.02)	2.42 (0.13)
W ₋₁	-1.39*** (0.00)	-3.54*** (0.00)	-3.54*** (0.00)	-1.29*** (0.01)	-0.80* (0.24)	-0.90 (0.43)	-0.30 (0.59)	-1.69 (0.12)	-1.89 (0.23)
W ₀	-0.90** (0.02)	1.10* (0.07)	3.15*** (0.00)	-1.59*** (0.00)	-0.90 (0.20)	0.10 (0.92)	-1.29** (0.02)	-1.69 (0.12)	-2.58* (0.09)
W ₁	-0.70** (0.05)	1.71*** (0.00)	3.97*** (0.00)	-1.19*** (0.01)	-0.30 (0.67)	0.00 (0.94)	-1.49*** (0.01)	-0.30 (0.75)	-1.30 (0.41)
W ₂	-1.69*** (0.00)	0.30 (0.64)	2.63*** (0.00)	-1.59*** (0.00)	0.90 (0.19)	0.39 (0.73)	-1.00* (0.09)	0.50 (0.64)	-0.61 (0.71)
W ₃	-1.78*** (0.00)	0.00 (0.97)	0.00 (0.20)	0.19*** (0.00)	0.00 (0.66)	0.00 (0.73)	-0.10 (0.89)	0.49 (0.67)	0.19 (0.89)
N	17,419	15,943	31,466	15,834	10,989	15,620	17,240	15,375	25,023
R ²	0.014	0.009	0.004	0.01	0.002	0.001	0.017	0.010	0.007

Notes: Estimates from Equation (5). Control variable estimations are not reported here. *p*-values in parenthesis. *R*² is artificially low as county-specific time trends explain close to 99 percent of the variance for each dependent variable. The marginal *R*² is the fraction of the variance of the de-trended variable that can be explained by the model. Significance at the 10-percent level is denoted by *; significance at the 5-percent level by **; significance at the 1-percent level by ***.

Establishments

Walmart entry only impacts the number of establishments in urban counties, resulting in a 0.5 percent increase in retail establishments three years following the entrance of a Walmart. Upon entry, a 0.7 percent increase results in an additional eight retail establishments in urban counties after three years on average. By year three, five of the establishments remain. In the year of Walmart entry, rural-adjacent counties experience a 0.6 percent increase in the number of retail establishments that is sustained for one year. Two years following entry this change is no longer statistically significant. This initial jump translates to a little over one additional establishment upon entry, but after two years this increase disappears.

A similar pattern holds for the number of accommodation food services establishments following Walmart entry. Entry results in a 0.6 percent increase in accommodation food services establishments after three years. Rural-non-adjacent counties see a decrease of 1.31 percent after three years. We find no statistically significant impacts on the number of establishments in the manufacturing sector.

Discussion

The results of this analysis suggest the additional employment Walmart adds to retail labor markets, both urban and rural, represents a change in the mix of full-time and part-time employment (or at least a reduction of hours worked considering these sectors provide few full-time jobs). In all three county classifications included in this analysis, we find that the entrance of a Walmart increases employment—although the magnitude of the marginal increase is different across urban and rural counties. The increase in each county remains significant in all three years following entry; however, the behavior of wages and payroll that simultaneously occurs explains how the labor market changes upon Walmart entry.

For both rural-adjacent and rural-non-adjacent counties, we observe an increase in employment while payroll remains statistically unchanged three years following entry. Considering payroll is a function of both employment and wages it appears that the entrance of a Walmart changes the full-time versus part-time mix of rural-adjacent and rural-non-adjacent labor markets. The average Walmart store uses around 300 employees; the average increase in both rural-adjacent and rural-non-adjacent counties was roughly half of that, around 150 jobs. Although Walmart entry induces a net increase in jobs for these types of counties, half of the Walmart store employees represents jobs stripped from other establishments. These competitors are cutting labor to compete with Walmart or they simply cannot afford to keep these employees after Walmart enters the county.

Table 7. Marginal effect estimates– Establishments by sector and county type.

	Retail			Accomm. and Food Services			Manufacturing		
	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural	Urban	Non-Metro	Rural
W ₋₃	-0.40* (0.08)	-0.40 (0.21)	-0.80 (0.12)	0.10 (0.78)	-0.90** (0.05)	0.60 (0.32)	-0.10 (0.84)	0.70 (0.25)	-0.80 (0.38)
W ₋₂	0.20 (0.44)	-0.10 (0.84)	0.10 (0.92)	-0.20 (0.45)	-0.40 (0.37)	-0.50 (0.40)	0.20 (0.45)	0.20 (0.73)	-0.40 (0.67)
W ₋₁	-0.40* (0.05)	-0.10 (0.86)	-0.20 (0.93)	-0.90*** (0.00)	-0.90 (0.04)	-0.30 (0.70)	-0.30 (0.24)	-0.30 (0.55)	0.30 (0.70)
W ₀	0.70*** (0.00)	0.60** (0.05)	0.70 (0.17)	0.30 (0.27)	-0.40 (0.37)	-0.10 (0.89)	-0.20 (0.46)	-0.40 (0.52)	-0.10 (0.87)
W ₁	0.60*** (0.01)	0.60* (0.08)	0.50 (0.33)	-0.70** (0.02)	-0.60 (0.18)	0.00 (0.78)	-0.20 (0.52)	-0.50 (0.40)	-0.20 (0.79)
W ₂	0.70*** (0.00)	0.20 (0.57)	0.10 (0.86)	0.80*** (0.00)	1.00** (0.02)	0.50 (0.40)	0.10 (0.66)	-0.40 (0.44)	0.10 (0.91)
W ₃	0.50* (0.04)	-0.40 (0.19)	-0.40 (0.91)	0.70** (0.03)	0.00 (0.17)	0.00** (0.04)	0.00 (1.00)	-0.40 (0.51)	0.70 (0.44)
N	17,424	15,943	31,466	15,834	10,989	15,620	17,240	15,375	25,023
R ²	0.02	0.001	0	0.002	0.002	0.001	0.001	0.001	0

Notes: Estimates from Equation (5). Control variable estimations are not reported here. p -values in parenthesis. R^2 is artificially low as county-specific time trends explain close to 99 percent of the variance for each dependent variable. The marginal R^2 is the fraction of the variance of the de-trended variable that can be explained by the model. Significance at the 10-percent level is denoted by *; significance at the 5-percent level by **; significance at the 1-percent level by ***.

In urban counties, we observe a decrease in the average weekly wage as well as the payroll for retail establishments. Although the substitution between full-time and part-time work is most likely occurring in urban counties, the statistically significant decrease in average weekly wage deserves further explanation. As mentioned in the analytical framework earlier, Walmart may be able to take advantage of non-binding minimum wages in urban labor markets. The average weekly wage in urban counties is higher than those in both types of rural counties, so the additional spread between the competitive wage and minimum wage in urban counties gives Walmart room to decrease the average wage. Said differently, we might not observe a decrease in the average weekly wage in rural counties because it cannot happen. The minimum wage may be the competitive wage; therefore, Walmart cannot decrease it any further. This conclusion on the effects in more urban counties parallels the research published by Dube, Lester, and Eidlin (2007).

The entry of a Walmart causes urban, rural-adjacent, and rural-non-adjacent labor markets to substitute part-time jobs for full-time jobs. The reported estimates suggest that after the retailer enters, the mix of full-time and part-time labor changes. This result is consistent with the findings of Drewianka and Johnson (2006) and Neumark, Zhang, and Ciccarella (2008). However, we cannot determine employment characteristics of the jobs gained relative to those lost. Is Walmart entry forcing existing establishments to demote full-time employees to part-time or under-employing them? Walmart entry may pull those outside the workforce back in, like retirees or others who have left the workforce voluntarily. Although I cannot distinguish between these two explanations in this study, I can assert the mix of full-time and part-time labor changes after Walmart enters.

There are limitations to this research including the one mentioned above as well as others. The data on employment was a count of jobs rather than employees; in other words, the data would have double-counted any individuals who worked two jobs within the retail sector. It would be interesting to account for this difference and re-analyze the data. Also, the Beale codes used in creating the county classification categorize some very small but densely populated counties as urban. Average retail employment in these counties is noticeably smaller than those in highly-populated counties; although they are considered the same in this analysis, the outcomes in these labor markets may be different.

Further research is necessary if the Walmart effect is to be truly understood. Although empirical research shows the retailer generally increases employment when it enters the labor market, its effect on other economic variables is still unclear. Because of data limitations and complex data reporting, questions on hourly wages are mostly unanswered. With a company as large as Walmart, with as many locations, employees, and products, it is reasonable that many questions still exist. We may never reach a point where the Walmart effect is comprehensively understood, but each attempt to realize a piece of the impact is one step closer to understanding the puzzle.

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