Walmart and Urban Land Prices: Friend or Foe?

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Abstract

Using a spatial difference-in-differences research design, this paper examined the effect of a new Walmart store on nearby U.S. urban land prices and found that, within one-quarter mile of a new Walmart store locale, land prices increased by almost 39% over the four-year development time period (from site negotiation to the store opening) compared with land located from one to three miles from the new store site. The analysis found that land prices increased almost geometrically over the development period as information leakage implied that a new store would actually be built and that demand for nearby land would increase. Examining the open date, rather than the development period, this investigation also found that land prices within one-quarter mile of the new store locale increased approximately 26% within three years after the open date compared with land located from one to three miles and that sold within three years before the store open date. The analysis also found that commercial land sales, compared with residential land sales, were instrumental in driving the price effect.

1. Introduction

Using a spatial difference-in-differences (DID) research design, this investigation finds that new Walmart stores have a statistically significant effect on nearby land prices. First, this examination finds that, within one-quarter mile of a new Walmart[1] store locale, land prices increased by almost 39% over the four-year development time period (from site negotiation to store opening) compared with land located from one to three miles from the new store site and over the same time period. The analysis finds that land prices increased almost geometrically over the development period as information leakage implied that a new store would actually be built and that shadow-anchored[2] properties would agglomerate nearby. This investigation also found that market participants' quickly capitalized this new information into nearby land prices and that much of the total price increase occurred before the actual open date.

Second, applying the DID analysis to specific dates (store open date, announcement date, and

[1] Wal-Mart Stores, Inc. is the legal trade name of the corporation; however, *Walmart* is a trademark of the company and is often used to describe its stores. In fact, *Walmart* is displayed on all new store fronts and is prominent on all advertising; therefore, this naming convention is used throughout the paper.

[2] Shadow-anchored properties are those that are not part of the large anchor retail store like a Walmart store, but are typically smaller stores that are located nearby and benefit from the increased traffic and visibility that the anchor store provides. Examples of shadow-anchor properties include Office Max, Michaels, Dollar Tree, Game Stop, and Check 'n Go.

close date) rather than a period of time, the analysis finds that land prices within one-quarter mile of the new store locale increased approximately 26% within three years after the open date compared land located from one to three miles and that sold within three years before the store open date. The analysis found that commercial land sales, compared with residential land sales, were instrumental in driving the price effect.

The Walmart store opening date effect was less pronounced (19%) during the pre-peak years (1990–2006) leading up to the Great Recession of 2007–2009, and more pronounced (62%) during the post-peak years (2007–2015). The latter finding suggests that during the recession years there was a flight to safety and that market participants believed that being near a new Walmart store provided the best opportunity for near-term development.

Additional analysis finds that within three years of the announcement date and within one-quarter mile, land prices increased about 35% compared with land that sold within three years before the announcement and from one to three miles from the new store locale. This effect was more modest during the pre-peak years (32%), but more pronounced during the post-peak years (61%).[3]

Because land prices increase during the development period and after the store opening an increase in land values suggests that an area has become more attractive, which may lead to growth in the local economy. Additionally, a positive Walmart effect suggests consumer preference for accessibility to a Walmart. Thus, the findings in this study are relevant to both government officials and citizens of communities where the development of a new Walmart has been proposed.

Confidence in the above results relies on clear identification of the Walmart land price effect. Traditional hedonic models may suffer from omitted variables and a simultaneity problem leading to false identification. For instance, one could argue that perhaps the observed land price increases in the area resulted from positive general economic growth rather than Walmart opening a new store. Or that Walmart

[3] The investigation also finds that store closings, primarily the result of store relocations, had no effect on nearby land prices prior to the Great Recession; however, during the Great Recession, store closings appear to have had a pronounced negative effect (299%). This result is supported with limited data and should be considered with caution.

locates stores in areas that are economically promising and would experience increases in land prices irrespective of Walmart opening a new store. I deal with the simultaneity problem (omitted variables cause land prices to increase or a new Walmart store causes land prices to increase) by employing a spatial difference-in-differences research design.

The remainder of the paper is organized as follows. Section 2 reviews the literature, while Section 3 presents the model. Section 4 summarizes the data, and Section 5 presents the empirical results. Section 6 summarizes falsification tests, and Section 7 concludes the study.

2. Literature

Mr. Sam Walton, the founder of Walmart, opened his first Walmart discount store in 1962 in Rogers, Arkansas. Since then, Walmart has experienced unprecedented growth with store openings in all fifty states and the District of Columbia. From 1962 through June 2015 growth, as defined by the number of stores, was relatively modest for the first 18 years (1962–1980). In the 1990s and 2000s growth expanded in almost a geometric manner, culminating in over 5,200 store locales as of June 2015.[4] This unprecedented growth has been accompanied by much controversy.[5] For instance, when Walmart plans to enter a new market, it often has to overcome concerns about how the new store will affect the local community. Just to name a few, opponents to Walmart are often concerned with the effect a new store will have on wages, employment, crime, traffic congestion, noise and light pollution, and property values. These concerns have motivated numerous research studies. For instance, Basker (2005a) and Hicks (2007) found positive effects on employment and wages, while Neumark et al. (2008), and Dube et al. (2007) reported negative effects. While these findings are inconclusive with regards to the labor market, other studies have found fairly consistent evidence of a positive effect Walmart has on lowering commodity

[4] These data are limited to Walmart discount stores and supercenters and do not include Sam's Clubs, Walmart Neighborhood Markets, or Walmart Express Markets. The data also include all closed and current operating locales.
[5] Terry J. Fitzgerald, senior economist at The Federal Reserve Bank of Minneapolis (2008), in speaking about Walmart said: "There is likely no other enterprise that engenders such strong and conflicting opinions and actions among individuals and the general public."

prices for local households (Hausman and Leibtag, 2007; Basker, 2005b).

Hausman and Leibtag (2007) found that Walmart realizes a price advantage of 15–25% on various food items, while Basker and Noel (2009) found approximately a 10% price advantage on 24 grocery items across several categories. They also found that competing grocery stores reduce their prices by 1–1.2% after the entry of a Walmart Supercenter, but that Supercenters still hold a price advantage of 10%. The net effect of these lower prices, as Hausman and Leibtag (2007) suggested, is a significant increase in consumer surplus.

Other studies have examined Walmart's impact on factors ranging from economic indicators to cultural trends. For example, Goetz and Swaminathan (2006) found that Walmart has a positive impact on the poverty rate. However, Sobel and Dean (2008) found that Walmart has not had a long-run impact on the overall size and profitability of the small business sector in the United States, suggesting that the increase in poverty (if it exists) may come from other sectors. Other studies have looked at the impact Walmart has had on body mass index (Courtemanche and Carden, 2011), social capital (Goetz and Rupasingha, 2006; Carden et al., 2009a), leisure activities (Carden and Courtemanche, 2009), and traditional values (Carden et al., 2009b).

However, despite the broad range of literature on the general economic and social impacts of Walmart, there are few studies that examine the impact that new Walmart stores have on nearby property values, even though real property owners, near a proposed Walmart locale, tend to show considerable interest in the regulatory approval process because of the potential impact (both positive and negative) that the new store may have on their property values.[6] A search of the literature found only two peer-reviewed studies that provide insight into this issue (see Ellickson and Grieco [2013] and Pope and Pope [2015]);

[6] Although not direct studies of Walmart's impact on property values, some studies examine externalities and provide insight into how market participants may perceive the potential impact that a new Walmart store may have on their property values. For instance, Linden and Rockoff (2008) and Pope (2008) found that increases in crime have negative effects on property values, while Downing (1973) and Emrath (2002) found that increases in accessibility to shopping centers have a positive effect. Also, Downing (1973) found that higher levels of traffic have a positive effect, but Smith et al. (2002) found that increases in traffic congestion and decreases in open space have a negative effect.

however, no articles were found that explicitly investigated the effect of new Walmart stores on nearby urban land prices.

Ellickson and Grieco (2013) studied the impact that Walmart stores have on the geography of grocery retailing. They found that Walmart's impact on other firms is "highly localized" within a two-mile radius and that most of the effect is within the first mile. They also find that outlets of larger chains are most negatively impacted by a new Walmart store, but that new smaller firms benefit from economics of density and prefer to be very close to a new Walmart locale. This finding would suggest that smaller firms may be willing to pay a premium for land located in close proximity to a new Walmart store.

Pope and Pope (2015) studied the impact that new Walmart stores have on nearby home prices and find that a new store, on average, has a positive effect on housing prices of about 2–3% for houses within half a mile and that sold within two and a half years after the store opened compared with homes that sold within two and a half years before the store opened. They also find an increase between 1–2% for houses located between one-half and one mile and that sold two and a half years after the store opened compared with homes that sold two and a half years before opening. The magnitude of these results are small in comparison with the findings in the current study on urban land prices near new Walmart stores. This disparity motivates the need to investigate this issue further to understand why these differences may exist; therefore, a portion of the empirical results section of the paper is dedicated to exploring this disparity.

By examining the effect that new Walmart stores have on nearby land prices, I build on the framework by Pope and Pope (2015) and extend the research in multiple dimensions;[7] however, the greatest extension may come from examining the effect of information leakage (new information) that occurs during the development period (from site negotiation to store opening) and how market participants

[7] Pope and Pope (2015) examined housing prices near 159 Walmart store locations in 20 states (30 major markets), whereas I examined land prices near 1,133 Walmart store locales in 41 states (40 major markets). Their study covered the prerecession years (10 years between 1998 and 2008), whereas my study covered both pre- and post-recession years (26.5 years between January 1990 through June 2015). Their study examined the effect of store openings and announcements, whereas my study also investigated the effect of store closings.

capitalize this into nearby land prices.

3. Model

For many years, economists have been using hedonic models to reveal preferences for important locational characteristics (Colwell and Dilmore, 1999); however, a common concern with this approach is the potential for omitted variable and simultaneity bias (Pope and Pope, 2015) that may lead to incorrect identification. For instance, assume that a standard hedonic model includes a binary variable that identifies whether the transaction occurred after (Post) the opening of a new Walmart store. Also assume that the coefficient on the Post variable is positive and significant. This finding may suggest a positive Walmart effect on land prices after the store open date; however, an alternative explanation could be that increasing employment (an omitted variable) leading to general economic growth, rather than the opening of a nearby Walmart store, caused land prices to increase.

Similarly, an incorrect identification could occur geographically. For instance, assume that a standard hedonic model includes a binary variable that identifies whether the transaction occurred near (Near) the new Walmart store. Also, assume that the coefficient on the Near variable is positive and significant. This finding may suggest a positive Walmart effect on nearby land prices; however, an alternative explanation could be that high visibility and high traffic (omitted variables) caused the increase in land prices, not the opening of a new Walmart store.

To mitigate bias, such as in the examples above, recent research has relied on quasi-experimental hedonic models that employ difference-in-differences analysis (see Chay and Greenstone, 2005; Ellickson and Grieco, 2013; Figlio and Lucas, 2004; Linden and Rockoff, 2008; Pope, 2008; Pope and Pope, 2015). This technique, originating from natural experiments, calculates the effect of a treatment on a treatment group versus a control group. The treatment can take place as of a date in time or over a period of time. For instance, pharmaceutical drug studies may examine the effect of a new drug after the date that it was administered (post–treatment date), or they could test the effect of the new drug after it was administered over a period of time (post–treatment period). For purposes of examining the effect of the opening of a

new Walmart store on nearby land prices, there are two treatment effects: near versus far (distance) and before versus after (time—open date or development period). The effect of these treatments are analyzed in the spatial difference-in-differences model specified as follows:

$$ln\ pricesf_{ijyq} = \alpha_{jyq} + \eta \boldsymbol{X}_i + \omega_0 D^{0.25}_{ij} + \beta_0 D^{0.5}_{ij} + \lambda_0 D^{1}_{ij} + (\omega_1 D^{0.25}_{ij} + \beta_1 D^{0.5}_{ij} + \lambda_1 D^{1}_{ij}) * Post_{iyq} + \varepsilon_{ijyq} \quad (1)$$

The $ln\ pricesf_{ijyq}$ is the natural logarithm of the sales price per square foot of land area i by store j in year y in quarter q. The primary variables of interest ($D^{0.25}_{ij}$; $D^{0.5}_{ij}$; D^{1}_{ij} ;) are a series of binary variables of individual land transactions within 0.25, 0.25–0.5, and 0.5–1.0 miles of a Walmart. The omitted variable is an indicator for land transactions from one to three miles from the nearest Walmart, respectively.[8] The variable $Post_{iyq}$ is a binary variable indicating whether the land transaction took place after the development period or after a Walmart was opened (announced or closed), and the vector $\boldsymbol{X}_i$ represents each individual (i) land parcel's observable characteristics. Lastly, a random error term (ε_{ijyq}) is included. Since error terms may be correlated across observations, I cluster correct standard errors at the store level.

By using the spatial difference-in-differences specification with store-by-year-by-quarter fixed effects, time-invariant omitted variables (e.g., high traffic) are differenced away. In addition, this specification controls for time-varying factors constant across areas within a market (e.g., growing economy). As a result, the omitted variable bias is mitigated. However, this specification does not control for time-varying differences between areas closer to and farther from a Walmart. As a result, an important assumption in this paper is that land price trends for areas near Walmart (within one mile) would have been the same as those areas slightly farther away from Walmart (from one to three miles), had the

[8] Ellickson and Grieco (2013) found that Walmart's impact on the grocery industry is highly localized and only affects firms within a two-mile radius. They use alternative control bands of 2–4, 4–6, 6–8, and 8–10 miles away. Holmes (2011) assumes that Walmart's neighborhood is within 2 miles of the store. Orhun (2012) found that a supermarket's impact on its competitors is primarily encompassed within one mile and is essentially insignificant beyond five miles. Pope and Pope (2015) found that the Walmart effect on housing prices drops dramatically beyond one mile and used a control band of between 2-4 miles in their analysis. Given these previous findings, I use a control band between 1–3-miles in the current study.

Walmart store not been built.[9] Additionally, this paper assumes that land price trends for areas from one to three miles from Walmart were not disproportionately affected by other exogenous shocks so that they can be a valid counterfactual for the areas inside the treatment area (0–1 mile radius). In the primary model I employed specifications which include a variety of control variables. The purpose of these variables is to act as a control for other factors that influence the value of a land parcel, such as the land size and use.

The selection of the incremental distances was motivated by the work of Pope and Pope (2015). They used half-mile increments for the first mile, then a one-mile increment for the second mile and an omitted indicator variable (control band) between two to four miles; however, I use quarter-mile increments within the first half mile, a half-mile increment for the second-half mile, and an omitted indicator variable (control band) for the second and third mile increment. Using shorter incremental distances in the first half mile is consistent with the expectation that land very near a Walmart may exhibit a steeper rent gradient often found in commercial land markets. For example, the Walmart effect may be greater for an in-line parcel of land or PAD site than a parcel of land several blocks away, supporting the concept that shadow-anchor properties prefer to agglomerate near a large retail anchor like Walmart to take advantage of increased traffic flows and visibility.

4. Data

Two sets of data were required: Walmart store locations and dates, and nearby land transactions. Following is an overview of each dataset.

4.1 Walmart Data

I obtained a list of all currently operating Walmart discount stores and supercenters from AggData,

[9] Some of the Walmart literature reviewed earlier used county-level data. Given the large size of many counties, it is hard to argue that land price trends for both treatment and control counties are similar before and after a store opening; however, in this case I used a significantly reduced geographic area (three-mile radius) making it much more plausible that land price trends are similar between the treatment and control distances.

Inc., and a list of all abandoned or closed store locations from Walmart.[10] Table 1 shows the number of stores by state from 1962 through June 2015. Texas leads the states, with 566 stores, followed by Florida (305), California (230), Georgia (223), and Illinois (218). Of the 5,233 discount store and superstore locations that have been developed over the 53-year history of the Wal-Mart Corporation, 3,886 stores are currently operating, leaving 1,347 store locations that have been closed. Within the set of current operating stores 1,473, or 37.9%, are discount stores while 2,413, or 62.1%, are supercenters.[11] Almost all (1,034, or 98.57%) of the closed locations were the result of a relocation of a discount store to a supercenter and are within four miles of the original store location.[12]

Figure 1 shows the number of store location openings and closings by year.[13] The figure shows that the number of store openings was quite modest in the 1960s and 1970s, but then experienced geometric growth in the 1980s and early 1990s. A sharp decline occurred in 1996 through 1998 as a result of building fewer but larger stores (fewer discount stores and more supercenters), then growth resumed at a rapid pace until peaking in 2006, the beginning of the Great Recession. Monotonic declines in store openings occurred from 2007 through 2010 before modest growth resumed through the end of the study period.[14] Figure 1 also shows store location closings across time. The first relocation or store closing occurred in 1988 and then closings and relocations accelerated through 1995. Relocations then followed the same general trend in store openings through the boom and bust periods of the 2000s. Table 2 provides the actual frequencies of store location openings and closings by year and shows that discount store and supercenter store

[10] The data excludes all Sam's Clubs, Walmart Neighborhood Markets, and Walmart Express Markets. The data also excludes any stores located in the State of Hawaii. AggData, Inc., compiles store characteristics and location data from Walmart's website. The AggData are current through June 30, 2015. I thank Wal-Mart Corporation for the generous assistance with the data pertaining to closed stores.

[11] Supercenters average 179,000 square feet of building area and offer both merchandise and groceries, while discount stores average 105,000 square feet of building area and typically don't offer groceries (247WallSt.com).

[12] A small number of closings were actually an expansion of a discount store to a supercenter on an adjacent site.

[13] The disproportionate number of openings in 1981 was the result of a deliberate push into the Southeast (i.e., Georgia, South Carolina, and Florida). Fifty percent of the current operating and closed stores are located in eleven states, including Texas (566), Florida (305), California (230), Georgia (223), Illinois (218), North Carolina (198), Tennessee (194), Missouri (192), Ohio (178), Alabama (169), and Pennsylvania (156).

[14] In the more recent years of this study Walmart appears to have focused more on developing smaller formats, such as Walmart Neighborhood Markets and Walmart Express stores. This may account for the recent decrease in the development of discount stores and supercenters.

openings peaked between 2004 and 2006 at about 240 stores each year. Figure 2 shows that even with periodic store closings the cumulative number of open stores has been monotonically increasing since 1962, making Walmart the largest brick-and-mortar retailer in the United States. Figure 3 shows the number of discount store and supercenter openings by year respectively. The figure shows that discount stores was the preferred format during the early years (1962-1994) and supercenters during the later years (1996-2015); however, in 1995 there were just about as many supercenters constructed as discount stores. Discount stores all but petered out by 2008, but made a comeback between 2012 and 2015 as Walmart once again pursued smaller format stores.

Table 3 provides quantile statistics for Walmart discount and supercenter locations. The analysis finds that the median distance to the next nearest store location (currently operating or closed) is 2.52 miles (column 1) and the median distance between current operating stores is 6.95 miles (column 2).[15] Column 3 shows that the median distance of all currently operating stores to the nearest closed location is 7.44 miles, and column 4 shows that the median distance between a relocated store and its closed location is 0.77 miles. These data confirm that relocations were generally placed in the immediate vicinity of the original store and were the result of an expansion from a discount store to a supercenter. The last column (5) shows that the median years between the original store opening and a relocation is 16.07 years.

Table 4 provides frequency statistics of Walmart locations in 40 major metro markets by open and closed store locations as of July 2015. Atlanta had the highest number of opened stores (142), followed by Dallas (130) and Nashville (109) respectively, whereas the highest number of closed locations were found in Nashville (78) followed by Atlanta (66) and Dallas (56) respectively. San Francisco had the fewest opened locations (9), followed by Stockton/Modesto (15), San Jose (16), and Fresno (17) respectively, whereas the fewest closed locations where found in Fresno and Stockton/Modesto (1 each),

[15] Distances are calculated by using the orthodromic (great-circle) distance equation, which calculates the shortest distance between two points on a sphere. Given that driving times or driving routes change intertemporally as street infrastructure changes, the orthodromic distance calculation was considered the best alternative to calculate distance between Walmart stores, and between Walmart stores and the sold land parcels used in this study.

followed by San Francisco, San Jose, and Seattle (2 each) respectively.[16] Table 4 also shows that, as of July 2015, there were 2,477 opened store locales and 703 closed store locales providing for 3,180 total Walmart store locales in the 40 metro markets under investigation. This accounts for over 60% of all of Walmart locales in the U.S.

4.2 Land Transactions Data

Land transactions data were obtained from the CoStar Group, Inc., and include land sales that occurred from January 1990 through June 2015 (26.5 years) in 40 major markets in the United States.[17] The working data set consisted of 219,444 transactions of residential, commercial, and industrial parcels of vacant land that amounted to over $380 billion in total sales price.[18] For each transaction, I was able to obtain the sales price, location, land area (acres), land use, and buyer's state of residency. Within each metro market, I then calculated the distance of each land parcel to its central business district (CBD), highest household income zip code, major airport, and freeway exit. Panel A of Table 5 provides the descriptive statistics of the continuous variables for these data. On average the land parcels sold for $17.92 per square foot, were 21.71 acres in size, were 21.90 miles from the CBD, and were within 2.76 miles of

[16] There are two primary reasons for these findings. First, Walmart concentrated the development of new stores near their headquarters in Arkansas at the beginning, keeping their supply chain close, then over time development of new stores radiated outward from the center; therefore, store locations in California and Seattle were developed much later than locales nearby, such as those in Atlanta, Dallas, and Nashville. Second, the entitlement process in California cities, such as San Francisco, Stockton/Modesto, San Jose, and Fresno, as well as Seattle tend to be more arduous and time consuming resulting in fewer stores.

[17] CoStar Group, Inc., investigates and compiles commercial property and land transactions in most major metropolitan markets in the United States; however, they do not attempt to compile transactions of single-family resident lots or homes. Summaries of the transactions are provided to interested parties, such as appraisers, brokers, and developers, on a subscription basis. Given that some jurisdictions restrict public access to important transaction details it is doubtful that CoStar captures the entire population of real estate transactions in each of the 40 metro markets; however, given their company objectives and their extensive efforts to obtain all transactions that are available, there is every reason to believe that they capture the large majority of transactions in the 40 metro markets under investigation. I thank CoStar Group, Inc. for their generous assistance with the data.

[18] After obtaining the land transaction data from CoStar Group, Inc., initial filters were employed to screen the data for possible input errors and to prepare the data for analysis. These filters include a sales price minimum, a land area minimum and maximum, the availability of latitude and longitude, the identification of the geographic area, the maximum distance from the CBD, and whether the land parcel is located in one of the forty major markets. In addition, only transactions that were considered "arms-length" in nature, i.e., no unusual conditions of sale such as foreclosure or eminent domain transactions, were used in the analysis. After the initial filtering, the data were further screened by trimming the top and bottom one percent of all transactions in each of the forty major markets as indicated by the price per square foot of land area. This resulted in 219,444 transactions.

a freeway exit. The original dataset will be reduced in the forthcoming analysis depending on the intertemporal and distance specifications in the model.

Table 5 panels B and C provide the descriptive statistics of the binary variables for the transactions dataset. The data show that 38.81% of the transactions have a residential land use, 47.16% have a commercial land use, and 14.03% have an industrial land use. Approximately 21% of the land parcels were purchased by out-of-state buyers, and a large portion of the transactions (50.80%) occurred between 1998 and 2006 during the run-up in real estate prices and prior to the Great Recession.

Panel C provides the frequency of the land transactions in each of the 40 metropolitan markets.[19] The table shows a wide dispersion of transactions across the United States, with some of the highest transaction volume occurring in Atlanta, Chicago, Las Vegas, Los Angeles, Phoenix, and Seattle. Some of the markets that experienced the fewest transactions included Greenville, Milwaukee, Nashville, Oklahoma City, and Fort Myers. The table also shows that the volume of commercial land transactions exceeded that of residential and industrial land transactions respectively in a majority of the 40 metro markets. In fact, there were only 8 of the 40 markets where residential land transaction volume exceeded the number of commercial land sales. This finding highlights the nature of the CoStar land transactions data. These data do not include residential lots ready for home building, but represent tracts of vacant land. CoStar attempts to identify all vacant land transactions in each of the metro markets, so there is every indication that the dataset represents the majority of arms-length vacant land transactions in the respective metro markets over the indicated time period.

4.3 Combining the Data

Table 6 provides the first look at the combined Walmart store location and land transactions data by showing the descriptive statistics of the land price per square foot by distance to the nearest Walmart

[19] The data include transactions of land parcels located within a 125-mile radius of 40 major markets in the United States. Because some of these metropolitan markets extend across state boundaries there are a total of 41 states, including the District of Columbia, that are represented in the sample.

store. The top portion of the table provides the descriptive statistics for the incremental distances outlined in the model section of the paper. Specifically, the incremental distances include the first and second quarter miles, the second half mile, and the second and third miles. The mean price per square foot is quite homogeneous within this three-mile radius with the mean price per square foot being $13.56 for land transactions that occurred within one-quarter mile of a Walmart store locale compared with $12.03 per square foot for land transactions occurring two to three miles from a Walmart store locale. The mean price per square foot for the other distances however varies considerably from $0.68 to $40.82 per square foot, suggesting significant heterogeneity in land transactions outside the three-mile radius.

The research design specifies incremental distances to a Walmart store locale pre- and post a specific intertemporal period or date (store development period, announcement date, open date, and close date) to examine the effect on nearby land prices. Although a number of distances and intertemporal periods (dates) will be examined in the empirical results section, Table 7 provides summary statistics of one of these; specifically, land transactions that sold within three years of the store opening date and were located within three miles of a new Walmart store locale. The data are displayed in incremental distances and separated by those sales that occurred pre– and post–store open date.

The average price per square foot is higher in each of the post-opening periods, suggesting a possible positive Walmart effect; however, the average parcel size (post-opening) is typically smaller, which might account for this result. An examination of the other distance variables (miles to CBD, miles to highest income zip code, miles to nearest major airport, or miles to nearest freeway exit) finds these distance variables are relatively stable, pre– and post–store opening, across the alternative incremental distances.

That is not the case, however, with some of the other binary variables. For instance, within the first quarter-mile increment, and prior to the store opening, out-of-state buyers represent 49% of the transactions compared with 43% after the store opens.[20] This is also in stark contrast to the other

[20] Lambson et al. (2004) find that out-of-state buyers tend to pay a premium for real estate compared with local buyers because of anchoring-induced bias and higher search costs. The out-of-state buyer explanatory variable used

incremental distances, where out-of-state buyers typically represent 20 to 31% of the transactions. This suggests that out-of-state buyers are more aggressive in acquiring land within one-quarter mile of a Walmart store locale compared with distances further away (within a three-mile radius). The proportion attributed to commercial land use is also markedly higher within the first and second quarter-mile increments compared with the other incremental distances. This would be consistent with the expectation that commercial properties tend to agglomerate near Walmart store locales, relegating residential uses farther away.

Table 7 also shows that the nearest Walmart store type tended to be a supercenter (63–78%), that the next nearest store type tended not to be a supercenter (34–38%), and that the next nearest store tended to be opened (69–77%) when the land sale took place.

Figure 4 illustrates the number of transactions pre– and post–open date for each of the incremental distances. The chart shows that the transaction volume pre– and post–open date were balanced across the incremental distances.

A search of buyer and seller names in a dataset of land transactions that occurred within 5 miles of a Walmart store found that Walmart was the buyer in 358 transactions and the seller in 212 transactions. Table 8 panel A provides the transaction frequencies for Walmart land acquisitions and sales by year since open date. The data show that Walmart was more active purchasing nearby land prior to the store opening (76.26%) and that the acquisitions and sales were distributed throughout the three years before and after the store opening date.

Table 8 panel B provides the quantile statistics for the miles to the nearest Walmart store, the number of acres purchased or sold, the price per square foot of land area, and the days between the sale date and the store open date. The data show that the median distance was about one-third mile from the new Walmart locale and that 25% of the acquisitions were within about a twelfth of a mile. The median

in the current model could be considered endogenous to the model because out-of-state buyers (other national retail chains) only acquire nearby land once Walmart has committed to a site. Because of this possibility, I removed this variable in robustness tests and there was virtually no change to the primary findings in this study.

number of acres acquired by Walmart was 19 and the median purchase price was $6.13 per square foot, while the median number of acres sold by Walmart was 1.20 and the median sales price per square foot was $14.60. Although some of the land acquisitions may have been the purchase of the actual store site, it appears that many were not and that Walmart was actively buying and selling land parcels near their new store locale. This is additional anecdotal evidence that Walmart was aware of the positive effect that new stores have on nearby land prices and was actively trading on that information.[21]

5. Empirical Results

5.1 Graphical Analysis

Figure 5 shows the mean log price per square foot of land area for each year before and after the store open date for the various incremental distances shown in the model. The chart shows that within the first quarter-mile increment the mean log price per square foot was relatively stable four and five years prior to store opening; however, within four years of a store opening, the mean log price per square foot experienced an increase that continued through the store opening date. Prices in the second quarter-mile increment also exhibited an increasing pattern, but were not as pronounced as the first quarter mile.[22] This graphical analysis suggests a possible positive Walmart price effect on nearby land as market participants became increasingly convinced that a new Walmart store would actually open nearby.

5.2 Spatial Difference-in-Differences Analysis (Treatment Period—Site Negotiation to Store Opening)

Table 9 panel A, column 1 provides the results from the DID regression (Equation 1) that examines

[21] A representative of Wal-Mart Corporation confirmed that periodically additional nearby land is acquired for land speculation. The representative spoke candidly about the "well known" land price increase that occurs near a new Walmart store. The removal of the Walmart land acquisitions and sales in the forthcoming statistical analysis does not change the primary findings.

[22] A representative of Wal-Mart Corporation confirmed that the entire development period for a discount store or supercenter is "typically around 4 years" and in some cases longer depending on how onerous the regulatory and entitlement process is for the city from which they are seeking approval. The typical timeline is as follows: first, initial contact and quiet negotiations take place between a land owner and a Walmart broker partner. Typically, the broker partner is instructed not to disclose who the buyer is. This process typically takes about six months. Second, the entitlement process begins, which typically takes one to two years to complete. Once the regulatory approvals have been obtained, a formal announcement takes place and construction begins. Third, the construction process is completed within about 18 months and the store opens.

the Walmart effect over a treatment period. In this case the treatment period is the typical development time from the beginning of site negotiation to the store open date (four years). This analysis uses land transactions that sold within three miles of the Walmart store locale and that sold within three years before the beginning of site negotiation and within three years after the store opening (Post). The regression analysis then includes the binary distance variables, but also interactions of these variables with an indicator for those land parcels that sold after (Post) the store open date. The parameter results on these variables (distance interacted with post-opening) provide an estimate of the effect that a Walmart store opening had on nearby land prices (controlled for omitted variables) since the beginning of site negotiations. The DID regression analysis also includes the vector $\boldsymbol{X}_i$ that represents each individual (i) land parcel's observable characteristics, including land area, distance variables (miles to CBD, miles to highest income zip code, miles to nearest major airport, and miles to nearest freeway exit)[23], buyer residency status (buyer out of state), and land use (residential, commercial, and industrial).[24] In addition, the analysis includes store by year by quarter fixed effects, and the standard errors are clustered at the store level.[25]

Column 1 shows that land parcels located within 0.25 miles of a Walmart store that sell within three years after the store open date sell at a premium of 38.6% (significant at the 1% level) over similar parcels located from one to three miles of the Walmart store and within three years prior to the beginning of site negotiation. Parcels between 0.25 and 0.50 miles sell at a premium of about 26.6% (significant at the 1% level). The remaining post-interaction results are not statistically significant (at the 1 or 5% level), suggesting a very steep land rent gradient near a new Walmart store.

[23] The primary findings in this study are robust to the removal to these additional distance variables.
[24] The status of nearby Walmart stores was also examined as additional explanatory variables such as whether or not the nearest and next nearest stores were supercenters or discount stores, and whether the next nearest store was opened or closed; however, these variables were found to be highly correlated with the incremental distance variables in the DID model resulting in severe multicollinearity, consequently, these variables were not used in the analysis.
[25] Prior to generating the DID regressions, I examined the pre- and post-opening datasets for each of the incremental distance variables and found them to be quite similar (see Figure 4), providing no evidence that the number of transactions were materially different either before or after the store opening that may influence the DID regression analysis.

Columns 2, and 3 provide the same DID regressions as above, but limits the datasets to residential and commercial land use parcels respectively. Column 2 shows that residential land use parcels located within 0.25 miles of a Walmart store that sell within three years after the store open date sell at a premium of 49% over similar parcels located from one to three miles of the Walmart store and within three years prior to the beginning of site negotiation; however, this result is weak at 10% significance level. The other post distance variables are not significant. Column 3 shows that commercial land use parcels located within 0.25 miles of a Walmart store that sell within three years after the store open date sell at a premium of 22% (significant at the 5% level) over similar parcels located from one to three miles of the Walmart store and within three years prior to the beginning of site negotiation. In addition, commercial land use parcels between 0.25 and 0.50 miles, and between 0.50 and 1 mile sell at a premium of about 32% (significant at the 1% level) and 15% (significant at the 5% level) respectively. These results on commercial land use suggest that commercial land use are instrumental in driving the price premiums.

Column 4 provides the DID regression using the same framework as above, but replaces the store open date with the typical announcement date.[26] Therefore, this analysis examines the Walmart effect from the beginning of site negotiations to the formal announcement date. The analysis finds that parcels within one-quarter mile sell at a premium of about 33% (significant at the 1% level), or 6% less than at the store open date. Parcels between 0.25 and 0.50 miles sell at a premium of about 19% (significant at the 1% level). These results indicate that most of the price effect occurs between the beginning of site negotiations and the formal announcement date, suggesting that by the time the new store is formally announced market participants are highly confident that a new Walmart store will actually be built and have capitalized this

[26] Pope and Pope (2015) estimate that the announcement of a new Walmart store typically occurs 516 days (1.41 years) prior to the store opening date. They arrived at this number by investigating news articles of store announcements and compared these findings with the respective store open dates and then calculated the median. They also note that this finding is consistent with a *Wall Street Journal* news article by Hudson and McWilliams (2006) that reports that construction of a new Walmart store typically takes one-and-a-half to two years; therefore, they deduct 516 days from the store open date to calculate the approximate store announcement date. A Walmart representative confirmed that the Pope and Pope estimate was consistent with his experience of approximately one-and-a-half years between formal announcement and store open date; therefore, the Pope and Pope estimate of 516 days will be used in the current study.

information into nearby land prices.

5.3 Spatial Difference-in-Differences Analysis (Treatment Date—Store Opening)

Table 9 panels B and C use a treatment date as opposed to a treatment period. This approach is similar to the method used by Pope and Pope (2015). Panel B shows the Walmart effect using the store open date as the treatment date, while panel C shows the Walmart effect using the store announcement date and closing date as the treatment dates. Column 1 of panel B shows that land parcels located within 0.25 miles of a Walmart store that sell within three years after the store open date sell at a premium of about 26% (significant at the 1% level) over similar parcels located from one to three miles of the Walmart store and that sold within three years prior to the open date. Parcels between 0.25 and 0.50 miles sell at a premium of about 18% (significant at the 1% level). The remaining post-interaction results are not statistically significant.

Columns 2 and 3 provide the same DID regression framework as above but for residential and commercial land use transactions respectively. Column 2 (residential land use) shows a premium of about 7% post open date for the first quarter-mile and a premium of about 18% post open date for the second quarter-mile; however, neither are statistically significant. Column 3 (commercial land use) shows a premium of about 17% (significant at the 5% level) for the first quarter-mile and a premium of about 14% (significant at the 10% level) for the second quarter-mile. These latter results suggest that the "All Land Use" regression results, shown in column 1 appear to be driven largely by the commercial land use transactions.

Columns 4 and 5 provide robustness tests for the primary results shown in column 1. For instance, column 4 limits the land transactions to those that occurred within two years before and after the nearest Walmart store opening. In this case, the first quarter-mile premium is about 28% (significant at the 1% level) and the second quarter-mile premium is about 18% (significant at the 1% level). Column 5 removes all time constraints, which expands the number of land transactions. In this case, the premium for the first quarter mile is higher at 30% (significant at the 1% level) and about 10% (significant at the 5% level) for

the second quarter mile.

The above results provide evidence that land parcels located within 0.25 miles and 0.25 to 0.50 miles of a Walmart store and that sell within three years after the store open date sell at a premium over similar parcels located from two to three miles of the Walmart store and that sold within three years prior to the open date. The analysis also suggests that the positive Walmart effect is driven primarily by commercial land transactions as opposed to residential land transactions.

Pope and Pope (2015), in their examination of nearby house prices, also finds a positive Walmart effect; however, the difference in magnitude of their results compared with those shown above are substantial; therefore, further investigation is warranted. Pope and Pope (2015) find that on average, a new Walmart store has a positive effect on housing prices of about 2–3% for houses within half a mile and that sold within two and a half years after the store opened compared with homes that sold within two and a half years before the store opened and were located three to four miles away. They also find an increase between 1–2% for houses located between one-half and one mile and that sold two and a half years after the store opened compared with homes that sold two and a half years before opening.

So what may account for the approximately 23% difference in price effects between the two studies? Perhaps one of the most obvious explanations is the different property transactions data used in the respective studies. Pope and Pope (2015) investigate housing prices, while the current study investigates vacant land prices. Not only are the property types different, but the current study uses data that is heavily weighted with commercial land transactions, rather than residential land, so it's reasonable to expect variation in how home prices react to a new Walmart store compared with how vacant land, and especially vacant commercial land, reacts to a new Walmart store. In fact, there is significant anecdotal evidence that shadow-anchor retailers agglomerate near new Walmart stores boosting the demand for nearby land, providing a plausible explanation for the substantial premium in nearby land prices within the first quarter-mile compared with housing price within the first half-mile (Pope and Pope 2015 criteria).

Perhaps another reason for the varying price effects is the different geographic locations and the time periods under investigation. Pope and Pope (2015) examined housing prices near 159 Walmart stores

in 20 states (30 major markets), whereas the current study examined land prices near 1,133 Walmart stores in 41 states (40 major markets). Their study covered the prerecession years (10 years between January 1998 and January 2008), whereas the current study covered both pre- and post-recession years (26.5 years between January 1990 through June 2015).[27] In an attempt to investigate the disparate price effects between the two studies, I have used the research criteria used in the Pope and Pope (2015) study for the land transactions data. Specifically, I have employed the following restrictions: Walmart stores that opened between July 2000 and December 31, 2006, land transactions that occurred between January 1, 1998 and January 31, 2008, and the incremental distance measures of 0 to 0.5 miles, 0.5 and 1 miles, 1 and 2 miles, and 2 to 4 miles (omitted band) respectively. For the DID regressions I also restricted the dataset to include transactions that sold within 2.5 years before and after the nearby store open date.

In the Pope and Pope (2015) study 2% of the transactions are within 0.50 miles, 7% between 0.5 and 1 miles, 25% between 1 and 2 miles, and 66% between 2 and 4 miles, whereas for the current study 5% of the transactions are within 0.5 miles, 8% between 0.5 and 1 mile, 23% between 1 and 2 miles, and 64% between 2 and 4 miles. The primary difference between these data exists in the first one-half mile (2% vs. 5% of the transaction volume). This would be consistent with the presumption that commercial land uses tend the agglomerate near Walmart stores relegating residential uses farther away.

When I applied the Pope and Pope (2015) data restrictions on the land transactions data it quickly became apparent that there was not sufficient land transactions data to reliably replicate their study.[28]

[27] Further investigation of the 159 Walmart stores used in the Pope and Pope (2015) study resulted in some curious findings. First, the 159 stores are located in 140 cities and opened between July 2000 and January 31, 2006 (their store open date restriction); however, during this same period and in the same cities there were an additional 62 Walmart stores that opened. Within the broader metro markets that they analyzed there were an additional 658 stores that opened during this period. Also, nationwide there were 1,346 stores that opened during this period. In their paper there is no explanation why these additional stores were not used. In addition, their analysis does not appear to account for proximity of existing Walmart stores or for Walmart store relocations in the immediate area of their new stores. For instance, 29% or 46 of the 159 stores used in their study are within four miles, the radius of their study, of another operating store. Also, twenty-seven or 58.7% of these other nearby stores were opened prior to the opening date of the stores used in their study and two of the 159 stores used in their study were the result of a relocation where the average distance from the original store was 1.39 miles. The omission of these additional data may also explain some of the differential in price effect. In fact, it could be argued that the omission of these additional data could bias their results downward because some of the Walmart effect may have already been capitalized into nearby home from existing nearby stores.

[28] For instance, after applying the store open date restriction, the transactions date restriction, the radius restriction, and the sold date restriction before and after the store open date, there were only 103 out of 159 stores remaining and the DID regressions were not significant.

However, when I enlarged the geographic area to include the same metro markets where the 159 stores were located (keeping the other data restrictions) the number of land transactions increased considerably.

Table 9 panel C shows the results of the DID regressions using this larger dataset. In particular, the table shows that land parcels located within 0.50 miles of a Walmart store and that sell within 2.5 years after the store open date sell at a premium of about 16% (significant at the 5% level) over similar parcels located from within three to four miles of the Walmart store and that sold within 2.5 years prior to the open date. The other post open date variables are not statistically significant. Column 2 shows that when I open the data to include all 40 metro markets (keeping the other data restrictions), the premium increases to 23% (significant at the 1% level). Column 3 shows that when I narrow the initial incremental distances to one-quarter mile increments in the first half mile and employ data in all 40 markets, but keep the other Pope and Pope (2015) restrictions, the first quarter-mile premium is about 32% (significant at the 1% level) whereas the premium for the second quarter-mile is about 20% (significant at the 1% level).

Although a precise head-to-head comparison is not possible because of the paucity of land transactions near the 159 stores used in the Pope and Pope (2015) study, the close comparison supports the conclusion that housing prices and vacant land prices react quite differently to the opening of a new Walmart store. Both are found to react positively, but the land effect is much stronger.

5.4 Spatial Difference-in-Differences Analysis (Treatment Date—Store Openings Pre and Post Recession)

To examine the structural stability of the results during the Great Recession, I found that national land prices peaked in 2006 (see Sirmans and Slade, 2012) allowing me to identify all transactions prior to and including 2006 as the boom or pre-peak period and all transactions after 2006 the bust or post-peak period. Table 9 panel D columns 1 and 2 provide separate DID regressions for the periods before and after the market peak. This allows me to examine the structural stability of the Walmart land price effect across these two very different economic environments. Land prices peaked in 2006, so column 1 provides the DID regression results using store open dates up to this period. The premium still exists for the first quarter mile (about 19%) and is statistically significant at the 1% level. Column 2 provides the results for the post-

peak years. In this case the price premium post–store opening is very large at 62%, suggesting a possible flight to safety during the recession. To see if there was circumstantial evidence that would support this finding, I examined Walmart's revenue from 2000 through 2015 and compared this with its next nearest three competitors (Target, Costco, and Kroger). As shown in Figure 6, Walmart's revenue increased during the height of the recession, 2006 through 2009, and at a greater rate compared with its competitors. In addition, Walmart's revenue was more than double Target, Costco, and Kroger combined. For retail developers and land bankers this opportunity to purchase land near new Walmart stores that were prospering during the recession may have provided an anticipated safe haven which resulted in land price premiums; however, given the low store count and the low number of land transactions during the bust years these results should be used with caution.

5.5 Spatial Difference-in-Differences Analysis (Treatment Date—Announcement and Closing)

Table 9 panel E examines the impact of Walmart store announcements and store closings (as opposed to openings) on nearby land prices. Using the same DID regression technique shown previously, but using the announcement date as the treatment date, column 1 shows that the positive Walmart price effect also occurred after the announcement for the first two quarter-mile increments. In fact, the magnitude of the positive price effect is higher than after the store opening. For instance, the post-announcement effect for the first quarter-mile is approximately 35%, whereas the post-opening effect was 26%. Columns 2 and 3 show the announcement effect prior to and after the market's peaking in 2006. Similar to the findings for a store opening, the announcement effect is stronger after the market peak (61%) compared with prior to the market peak (33%).

Columns 4, 5, and 6 show the effect that store closings have on nearby land prices. The DID regression analysis finds no effect on nearby land prices within three years of a store closing during the entire period from January 1990 through June 2015, nor for the pre-peak period from January 1990 through 2006 (see columns 4 and 5); however, a dramatic decline is found during the recession years (299% within

the first quarter mile and 50% within the second quarter mile).[29] Initially the findings in columns 4 and 5 may come as a surprise; however, the large majority of store closings in the dataset were not the result of a failed store, but the result of a relocation to a new supercenter in the near vicinity. In addition, I also found that other discount retailers, such as Big Lots, TJ Maxx, and Tractor Supply Co., were often anxious to occupy older Walmart discount stores when Walmart relocates to a new nearby supercenter. Both of these reasons may explain why I found no significant negative price effect related to store closings overall and during the pre-peak years. The result found in column 6, may be caused by the lack of occupancy by other discount retailers during the recession. In other words, during the recession, very few businesses expanded operations; therefore, when Walmart closed a store during the recession years it remained vacant rather than being occupied by another discount retailer.[30]

Table 9 panel F shows the effect of Walmart store openings on nearby land prices conditional on the store announcement. The DID regression analysis shows that land parcels located within 0.25 miles of a Walmart store that sell within three years after the store open date sell at a premium of about 20% (significant at the 1% level) over similar parcels located from one to three miles of the Walmart store and that sold within three years prior to the open date conditional on controlling for store announcement. Land parcels located from 0.25 to 0.50 miles from a Walmart store that sell within three years after the store open date sell at a premium of about 16% (significant at the 5% level) over similar parcels located from one to three miles of the Walmart store and that sold within three years prior to the open date conditional on controlling for store announcement. There data show that even when conditioning for store announcement there is still a positive effect on land prices after the store open date.

6. Falsification Tests

The parallel trends assumption is a key assumption in the DID research methodology but this

[29] The low store and transaction count after the market peak and for store closings suggests that these results should be used with caution.
[30] See Chris Peak, "The Ghost Stores of Walmart."

assumption is untestable; however, I can perform falsification tests to examine the reliability of the primary results in this study. The first falsification test consists of replacing the dependent variable (lnPriceSF) with the individual explanatory variables and regenerating the DID regression analysis. This test determines if the variables that should have no effect on the treatment or event (store opening) actually satisfy that assumption. Table 10 shows that this in fact is the case because none of the post interaction variables are significant at the 1% or 5% level; however, the Miles-to-Airport (column4) for the first quarter-mile is significant at the 10% level. The weak nature of this result does not allow me to reject the parallel trends assumption. In fact, the non-significant results of the other explanatory variables suggest that the explanatory variables have no effect on the treatment (store opening).

The second test, consists of repeating the DID analysis on pre-event periods thereby falsely assuming that the treatment occurs before it actually does. If the results are not statistically significant then I can infer that the observed change is due to the treatment rather than some other influencing factor. In this case I moved the treatment date back three, four, and five years from the open date and regenerated the DID regression results. Table 11 shows no Walmart land price effect (at the 1% or 5% level) for any of the incremental distances after (post) the false open date; however, the regression parameter on the first quarter-mile for the false open date three years before (column1) is significant at the 10% level. Given that land transactions include sales up to and including the open date in this particular regression it is not surprising that the post interaction term would start to show some influence from the store opening. The insignificance of the other two false open dates provide evidence that the post store opening effect on nearby land prices is not the result of some other factor.

Overall, the falsification tests, coupled with the previous difference-in-differences regressions, and the graphical analysis, support the conclusion that new Walmart stores have a positive effect on nearby urban land prices.[31]

[31] A natural extension of this research would be to determine if the positive land price effect found with Walmart is also found with other "big box" retailers such as Target or Staples. Although interesting from a research perspective it doesn't diminish the findings found for land prices near Walmart stores.

7. Conclusion

Whether the establishment of a Walmart store is good or bad for a community and its economy is an ongoing debate, but the fact remains that Walmart's growth since its beginning in 1962 has been remarkable. This study seeks to inform the debate by determining if new stores affect nearby urban land prices and if so in what direction.

I began the analysis by obtaining land transactions from 40 major metropolitan U.S. markets that occurred between January 1990 and June 2015. This resulted in 219,444 vacant land transactions. Next, I gathered data on all Walmart store (discount and supercenter) locales from 1962 through June 2015, resulting in 5,233 store locations. These combined datasets allow for the empirical investigation of the Walmart effect.

Using a spatial difference-in-differences (DID) research design, this investigation finds that new Walmart stores have a statistically significant effect on nearby land prices. First, this examination found that, within one-quarter mile of a new Walmart store locale, land prices increased by 39% over the four-year development time period (from site negotiations to the store opening) compared with land located from one to three miles from the new store site and over the same time period. The evidence indicates that land prices increased almost geometrically over the development period as positive information leakage implied that a new store would actually be built and that shadow-anchor properties would agglomerate nearby. This investigation also found that market participant's quickly capitalized new information into nearby land prices and that much of the total price increase occurred before the actual open date.

Second, applying the DID analysis to specific dates (store open date, announcement date, and close date) rather than a period of time, the analysis finds that land prices within one-quarter mile increased approximately 26% within three years after the open date compared land located from one to three miles of the store locale and that sold within three years before the store open date. The Walmart store opening date effect was less pronounced (19%) during the pre-peak years (1990–2006) leading up to the Great Recession of 2007–2009, and more pronounced (62%) during the post-peak years (2007–2015). The latter

finding suggests that during the recession years there was a flight to safety and that market participants believed that being near a new Walmart store provided the best opportunity for near-term development.

Additional analysis finds that within three years of the announcement date and within one-quarter mile, land prices increased about 35% compared with land that sold within three years before the announcement and from one to three miles from the new store locale. This effect was more modest during the pre-peak years (32%), but more pronounced during the post-peak years (61%).

Robustness and falsification tests were employed to scrutinize the analysis and the primary results held up to these examinations. Overall, the empirical results provide evidence of a positive Walmart land price effect that occurred during the development period and after the store opening. An increase in land values suggests that an area has become more attractive, which may lead to growth in the local economy. Additionally, a positive Walmart effect suggests consumer preference for accessibility to a Walmart. Thus, the findings in this study are relevant to both government officials and citizens of communities where the development of a new Walmart has been proposed.

References

Basker, E. 2005a. Job Creation or Destruction? Labor-Market Effects of Wal-Mart Expansion. *Review of Economics and Statistics* 87: 174–183.

Basker, E. 2005b. Selling a Cheaper Mousetrap: Wal-Mart's Effect on Retail Prices. *Journal of Urban Economics* 58: 203–229.

Basker, E., and M. Noel. 2009. The Evolving Food Chain: Competitive Effects of Wal-Mart's Entry into the Supermarket Industry. *Journal of Economics and Management Strategy* 18(4): 977–1009

Bloomberg. 2016. Company information for Walmart, Kroger, Costco, and Target. *Bloomberg Professional.*

Carden, A., and C. Courtemanche. 2009. Wal-Mart, Leisure, and Culture. *Contemporary Economic Policy* 27: 450–461.

Carden, A., C. Courtemanche, and J. Meiners. 2009a. Does Wal-Mart Reduce Social Capital? *Public Choice* 138: 109–136.

Carden, A., C. Courtemanche, and J. Meiners. 2009b. Painting the Town Red? Wal-Mart and Values. *Business and Politics* 11(2). ISSN (Online) 1469-3569, DOI: 10.2202/1469-3569.1271, August 2009.

Chay, K., and M. Greenstone. 2005. Does Air Quality Matter? Evidence from the Housing Market. *Journal of Political Economy* 113(2): 376–424.

Colwell, P., and G. Dilmore. 1999. Who Was First? An Examination of an Early Hedonic Study. *Land Economics* 75(4): 620–626.

Courtemanche, C., and A. Carden. 2011. Supersizing Supercenters? The Impact of Walmart Supercenters on Body Mass Index and Obesity. *Journal of Urban Economics* 69(2): 165–181.

Downing, P. B. 1973. Factors Affecting Commercial Land Values: An Empirical Study of Milwaukee, Wisconsin. *Land Economics*: 49(1): 44–56.

Dube, A., W. Lester, and B. Eidlin. 2007. Firm Entry and Wages: Impact of Wal-Mart Growth on Earnings Throughout the Retail Sector. *Institute for Industrial Relations*, Working Paper No. iirwps-126-05. Available at SSRN: http://ssrn.com/abstract=841684

Ellickson, P., and P. Grieco. 2013. Wal-Mart and the Geography of Grocery Retailing. *Journal of Urban Economics* 75: 1–14.

Emrath, P. 2002. Explaining Housing Prices. *Housing Economics* 50(1): 9–13.

Figlio, D. N., and M. E. Lucas. 2004. What's in a Grade? School Report Cards and the Housing Market. *American Economic Review* 94(3): 591–604.

Fitzgerald, T. 2008. The Wal-Mart effect: Poison or Antidote for Local Communities? Federal Reserve Bank of Minneapolis, *fedgazette*, January: 1–12.

Goetz, S., and A. Rupasingha. 2006. Wal-Mart and Social Capital. *American Journal of Agricultural Economics* 88(5): 1304–1310.

Goetz, S., and H. Swaminathan. 2006. Wal-Mart and County-Wide Poverty. *Social Science Quarterly* 87(2): 211–226.

Hausman, J., and E. Leibtag. 2007. Consumer Benefits from Increased Competition in Shopping Outlets: Measuring the Effect of Wal-Mart. *Journal of Applied Econometrics* 22(7): 1157–1177.

Hicks, M. 2007. Job Turnover and Wages in the Retail Sector: The Influence of Walmart. *Journal of Private Enterprise* 22(2): 137–159.

Holmes, M. 2011. The diffusion of Wal-Mart and economies of density. *Econometrica* 79, 253-302.

Hudson, K., and G. McWilliams. 2006, September 25. Boxed In: Seeking Growth in Urban Areas, Wal-Mart Gets Cold Shoulder; Retailer's Low-End Image Galvanizes Opposition; Boston Welcomes Target; Rural America Is Saturated. *Wall Street Journal, Eastern Edition* (New York, NY): A1.

Lambson, V., G. McQueen, and B. Slade. 2004. Do Out-of-State Buyers Pay More for Real Estate? An Examination of Anchoring-Induced Bias and Search Costs. *Real Estate Economics* 32(1): 85–126.

Linden, L., and J. E. Rockoff. 2008. Estimates of the Impact of Crime Risk on Property Values from Megan's Laws. *The American Economic Review* 98(3): 1103–1127.

Lutz, A., and M. Nudelman. 2015, June 5. 13 Mind-Blowing Facts about Wal-Mart. *Business Insider*.

National Retail Federation. 2015. Top 100 Retailers. https://nrf.com/2015/top100-table.

Neumark, D., J. Zhang, and S. Ciccarella. 2008. The Effects of Wal-Mart on Local Labor Markets. *Journal of Urban Economics* 63: 405–430.

Orhun, Y. 2012. Spatial differentiation in the supermarket industry: the role of common information. *Quantitative Marketing and Economics* 10, 1-35.

Peak, C. 2015. The Ghost Stores of Walmart. Medium.com.

Pope, J. 2008. Fear of Crime and Housing Prices: Household Reactions to Sex Offender Registries. *Journal of Urban Economics* 64(3): 601–614.

Pope, D., and J. Pope. 2015. When Walmart Comes to Town: Always Low Housing Prices? Always? *Journal of Urban Economics* 87: 1–13.

Sirmans, C. F., and B. Slade. 2012. National Transaction-Based Land Prices Indices. *Journal of Real Estate Finance and Economics* 45: 829–45

Smith, V. K., C. Poulos, and H. Kim. 2002. Treating Open Space as an Urban Amenity. *Resource and Energy Economics* 24: 107–29.

Sobel, R., and A. Dean. 2008. Has Wal-Mart Buried Mom and Pop? The Impact of Wal-Mart on Self Employment and Small Establishments in the United States. *Economic Inquiry* 46(4): 676–695.

Tables and Figures

Table 1
Walmart Discount Store and Supercenter Locations by State*
(1962–June 2015)

	All Locations		Operating Store Locations		Closed Store Locations	
State	Freq.	%	Freq.	%	Freq.	%
AL	169	3.23	102	2.62	67	4.97
AR	142	2.71	84	2.16	58	4.31
AZ	102	1.95	84	2.16	18	1.34
CA	230	4.40	213	5.48	17	1.26
CO	95	1.82	74	1.90	21	1.56
CT	35	0.67	34	0.87	1	0.07
DC	2	0.04	2	0.05	0	0.00
DE	11	0.21	9	0.23	2	0.15
FL	305	5.83	230	5.92	75	5.57
GA	223	4.26	155	3.99	68	5.05
IA	89	1.70	60	1.54	29	2.15
ID	26	0.50	23	0.59	3	0.22
IL	218	4.17	158	4.07	60	4.45
IN	150	2.87	104	2.68	46	3.41
KS	85	1.62	60	1.54	25	1.86
KY	136	2.60	86	2.21	50	3.71
LA	150	2.87	89	2.29	61	4.53
MA	51	0.97	49	1.26	2	0.15
MD	53	1.01	48	1.24	5	0.37
ME	29	0.55	22	0.57	7	0.52
MI	111	2.12	94	2.42	17	1.26
MN	81	1.55	70	1.80	11	0.82
MO	192	3.67	120	3.09	72	5.35
MS	113	2.16	66	1.70	47	3.49
MT	14	0.27	13	0.33	1	0.07
NC	198	3.78	148	3.81	50	3.71
ND	18	0.34	14	0.36	4	0.30
NE	51	0.97	35	0.90	16	1.19
NH	31	0.59	27	0.69	4	0.30
NJ	61	1.17	60	1.54	1	0.07
NM	51	0.97	37	0.95	14	1.04
NV	36	0.69	32	0.82	4	0.30
NY	112	2.14	98	2.52	14	1.04
OH	178	3.40	146	3.76	32	2.38
OK	149	2.85	88	2.26	61	4.53
OR	38	0.73	35	0.90	3	0.22
PA	156	2.98	136	3.50	20	1.48
RI	11	0.21	9	0.23	2	0.15
SC	121	2.31	83	2.14	38	2.82
SD	20	0.38	14	0.36	6	0.45
TN	194	3.71	117	3.01	77	5.72
TX	566	10.82	399	10.27	167	12.40
UT	51	0.97	42	1.08	9	0.67
VA	131	2.50	112	2.88	19	1.41
VT	5	0.10	5	0.13	0	0.00
WA	66	1.26	61	1.57	5	0.37
WI	115	2.20	88	2.26	27	2.00
WV	47	0.90	40	1.03	7	0.52
WY	15	0.29	11	0.28	4	0.30
Total	5,233	100%	3,886	100%	1,347	100%

Data includes Walmart Discount Stores and Walmart Supercenters, but does not include Sam's Clubs, Walmart Neighborhood Markets, or Walmart Express Markets. Of the operating stores, 37.91% (1473) are discount stores and 62.09% (2,413) are supercenters. Supercenters account for 98.57% (1034 stores) of the relocations/expansions and are within four miles of the original Walmart store. The data were obtained from AggData and Wal-Mart Corporation. *As of June 30, 2015.

Table 2
Walmart Discount and Supercenter Location Openings and Closings by Year*
(1962–June 2015)

Year Open	Freq.	%	**Year Closed**	Freq.	%
1962–1969	15	0.30	1962–1969	0	0.00
1970	6	0.11	1970	0	0.00
1971	15	0.29	1971	0	0.00
1972	17	0.32	1972	0	0.00
1973	19	0.36	1973	0	0.00
1974	24	0.46	1974	0	0.00
1975	18	0.34	1975	0	0.00
1976	25	0.48	1976	0	0.00
1977	39	0.75	1977	0	0.00
1978	33	0.63	1978	0	0.00
1979	43	0.82	1979	0	0.00
1980	53	1.01	1980	0	0.00
1981	148	2.83	1981	0	0.00
1982	63	1.20	1982	0	0.00
1983	87	1.66	1983	0	0.00
1984	97	1.85	1984	0	0.00
1985	108	2.06	1985	0	0.00
1986	119	2.27	1986	0	0.00
1987	135	2.58	1987	0	0.00
1988	121	2.31	1988	1	0.07
1989	132	2.52	1989	1	0.07
1990	177	3.38	1990	2	0.15
1991	160	3.06	1991	1	0.07
1992	162	3.10	1992	24	1.78
1993	193	3.69	1993	35	2.60
1994	159	3.04	1994	51	3.79
1995	222	4.24	1995	93	6.90
1996	123	2.35	1996	70	5.20
1997	118	2.25	1997	57	4.23
1998	122	2.33	1998	53	3.93
1999	141	2.69	1999	61	4.53
2000	165	3.15	2000	59	4.38
2001	189	3.61	2001	84	6.24
2002	193	3.69	2002	78	5.79
2003	182	3.48	2003	83	6.16
2004	**242**	**4.62**	**2004**	**111**	**8.24**
2005	**237**	**4.53**	**2005**	**119**	**8.83**
2006	**242**	**4.62**	**2006**	**107**	**7.94**
2007	211	4.03	2007	79	5.86
2008	146	2.79	2008	53	3.93
2009	98	1.87	2009	46	3.41
2010	67	1.28	2010	22	1.63
2011	70	1.34	2011	26	1.93
2012	79	1.51	2012	22	1.63
2013	88	1.68	2013	7	0.52
2014	94	1.80	2014	2	0.15
2015	36	0.69	2015	0	0.00
Total	5,233	100%		1,347	100%

Data includes Walmart Discount Stores and Walmart Supercenters, but does not include Sam's Clubs, Walmart Neighborhood Markets, or Walmart Express Markets. Of the operating stores, 37.91% (1473) are discount stores and 62.09% (2,413) are supercenters. Supercenters account for 98.57% (1034 stores) of the relocations/expansions and are within four miles of the original Walmart store. The data were obtained from AggData and Wal-Mart Corporation. *As of June 30, 2015.

Table 3
Quantile Statistics
Walmart Discount Store and Supercenter Locations
(1962–June 2015)

Column	1	2	3	4	5
Quantile	Miles to Next Nearest Store Location (All Store Locations)+	Miles Between Nearest Operating Stores*	Miles Between All Current Operating Stores and the Nearest Closed Location	Miles Between Relocated Store and Its Closed Location	Years Between Original Store Opening and Relocation
100%–Max	124.58	124.58	210.21	16.77	43.81
99%	40.22	58.37	95.12	5.39	33.58
95%	21.18	31.18	50.22	3.16	28.84
90%	14.18	24.15	37.89	2.46	25.07
75%–Q3	5.58	16.25	20.75	1.52	20.01
50%–Median	**2.52**	**6.95**	**7.44**	**0.77**	**16.07**
25%–Q1	0.69	4.36	1.34	0.34	12.27
10%	0.25	3.21	0.37	0.17	9.57
5%	0.15	2.68	0.20	0.11	8.28
1%	0.03	1.57	0.04	0.02	6.30
0%–Min	0.00	0.02	0.00	0.00	1.18
Mean	**5.29**	**11.61**	**14.80**	**1.11**	**16.89**
Observations	5,233	3,886	3,886	1,347	1,347

Approximately 20% of the currently operating stores (19.56%) are within four miles of another operating store. + Currently operating and closed locations. *As of June 30, 2015.

Table 4
Number of Walmart Locations in 40 U.S. Metro Markets

	Total Locations (July 2015)		Open Locations (July 2015)		Closed Locations (July 2015)	
Metro Market	Obs.	%	Obs.	%	Obs.	%
Atlanta	208	6.54	142	5.73	66	9.39
Austin	58	1.82	42	1.70	16	2.28
Baltimore	62	1.95	59	2.38	3	0.43
Boston	108	3.40	99	4.00	9	1.28
Charlotte	121	3.81	85	3.43	36	5.12
Chicago	129	4.06	107	4.32	22	3.13
Cincinnati	117	3.68	79	3.19	38	5.41
Cleveland	90	2.83	78	3.15	12	1.71
Columbus	87	2.74	70	2.83	17	2.42
Dallas	186	5.85	130	5.25	56	7.97
Denver	78	2.45	61	2.46	17	2.42
Detroit	84	2.64	70	2.83	14	1.99
Fresno	18	0.57	17	0.69	1	0.14
Greenville	116	3.65	79	3.19	37	5.26
Houston	129	4.06	91	3.67	38	5.41
Jacksonville	59	1.86	41	1.66	18	2.56
Las Vegas	29	0.91	24	0.97	5	0.71
Los Angeles	80	2.52	77	3.11	3	0.43
Miami	51	1.60	43	1.74	8	1.14
Milwaukee	90	2.83	73	2.95	17	2.42
Minneapolis	73	2.30	64	2.58	9	1.28
Nashville	187	5.88	109	4.40	78	11.1
New York City	93	2.92	87	3.51	6	0.85
Oklahoma City	121	3.81	73	2.95	48	6.83
Orlando	74	2.33	54	2.18	20	2.84
Philadelphia	91	2.86	81	3.27	10	1.42
Phoenix	65	2.04	57	2.30	8	1.14
Portland	34	1.07	31	1.25	3	0.43
Raleigh Durham	124	3.90	96	3.88	28	3.98
Sacramento	44	1.38	40	1.61	4	0.57
Salt Lake City	43	1.35	36	1.45	7	1.00
San Diego	37	1.16	32	1.29	5	0.71
San Francisco	11	0.35	9	0.36	2	0.28
San Jose	18	0.57	16	0.65	2	0.28
Seattle	39	1.23	37	1.49	2	0.28
Fort Myers	30	0.94	22	0.89	8	1.14
Stockton/Modesto	16	0.50	15	0.61	1	0.14
Tampa	69	2.17	55	2.22	14	1.99
Tucson	22	0.69	16	0.65	6	0.85
Washington	89	2.80	80	3.23	9	1.28
Total	**3,180**	**100**	**2,477**	**100**	**703**	**100**

Note: The data include Walmart store locations within a 125-mile radius of 40 major markets in the United States.

Table 5 Panel A
Descriptive Statistics of Continuous Variables for Land Transactions in 40 US Metro Markets (219,444 transactions from January 1990–June 2015)

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
Sales Price	$1,735,200	$750,000	$4,611,000	$10,000	$540,000,000
Price Per Square Foot	$17.92	$4.75	$81.47	$0.01	$6,427
Land Area (Acres)	21.71	3.79	145.26	0.01	33,810
Miles to CBD	21.90	17.69	16.54	0.03	125.28
Miles to High HHInc Zip	25.03	20.09	18.80	0.04	137.84
Miles to Airport	19.79	16.40	15.35	0.32	153.09
Miles to Freeway Exit	2.76	1.55	3.41	0.00	54.52

Note: The data include transactions of land parcels located within a 125-mile radius of 40 major markets in the United States. The data were obtained from the CoStar Group, Inc.

Table 5 Panel B
Descriptive Statistics of Binary Variables of Land Transactions in 40 US Metro Markets (January 1990–June 2015)

Variables	Obs.	%
Total Obs.	219,444	100.00
Land Use		
Residential	85,170	38.81
Commercial	103,479	47.16
Industrial	30,795	14.03
Buyer Out of State	46,424	21.16
Year		
1990	3,454	1.57
1991	3,046	1.39
1992	3,416	1.56
1993	3,960	1.80
1994	4,014	1.83
1995	5,261	2.40
1996	6,799	3.10
1997	8,237	3.75
1998	10,514	4.79
1999	13,306	6.06
2000	12,553	5.72
2001	9,992	4.55
2002	11,242	5.12
2003	12,927	5.89
2004	14,334	6.53
2005	13,745	6.26
2006	12,903	5.88
2007	11,134	5.07
2008	8,249	3.76
2009	5,188	2.36
2010	5,606	2.55
2011	6,092	2.78
2012	8,397	3.83
2013	10,030	4.57
2014	10,329	4.71
2015 (half year)	4,716	2.15

Note: The data include transactions of land parcels located within a 125-mile radius of 40 major markets in the United States. The data were obtained from the CoStar Group, Inc.

Table 5 Panel C
Frequency Statistics of Land Transactions in 40 U.S. Metro Markets by Land Use (January 1990–June 2015)

	Residential Land Use		Commercial Land Use		Industrial Land Use		All Land Uses	
Metro Market	Obs.	%	Obs.	%	Obs.	%	Obs.	%
Atlanta	6,312	42.20	7,194	48.10	1,450	9.70	14,956	6.82
Austin	551	20.31	1,880	69.30	282	10.39	2,713	1.24
Baltimore	1,135	37.45	1,405	46.35	491	16.20	3,031	1.38
Boston	1,630	42.92	1,610	42.39	558	14.69	3,798	1.73
Charlotte	1,075	34.95	1,697	55.17	304	9.88	3,076	1.40
Chicago	5,141	36.86	6,681	47.91	2,124	15.23	13,946	6.36
Cincinnati	776	32.12	1,388	57.45	252	10.43	2,416	1.10
Cleveland	494	26.47	1,119	59.97	253	13.56	1,866	0.85
Columbus	828	37.59	1,201	54.52	174	7.90	2,203	1.00
Dallas	796	16.33	3,547	72.77	531	10.89	4,874	2.22
Denver	3,421	39.69	4,148	48.13	1,050	12.18	8,619	3.93
Detroit	1,032	30.58	1,842	54.58	501	14.84	3,375	1.54
Fresno	431	30.48	777	54.95	206	14.57	1,414	0.64
Fort Myers	304	25.57	746	62.74	139	11.69	1,189	0.54
Greenville	215	20.13	794	74.34	59	5.52	1,068	0.49
Houston	365	11.05	2,691	81.47	247	7.48	3,303	1.51
Jacksonville	730	31.93	1,292	56.52	264	11.55	2,286	1.04
Las Vegas	5,513	50.74	4,121	37.93	1,231	11.33	10,865	4.95
Los Angeles	5,381	31.50	8,125	47.56	3,578	20.94	17,084	7.79
Miami	3,049	31.25	5,029	51.54	1,680	17.22	9,758	4.45
Milwaukee	168	13.84	881	72.57	165	13.59	1,214	0.55
Minneapolis	553	30.30	1,043	57.15	229	12.55	1,825	0.83
Nashville	172	13.19	1,032	79.14	100	7.67	1,304	0.59
New York City	3,315	37.05	4,806	53.72	826	9.23	8,947	4.08
Oklahoma City	59	5.94	757	76.23	177	17.82	993	0.45
Orlando	2,734	35.51	4,148	53.88	817	10.61	7,699	3.51
Philadelphia	2,451	40.53	2,787	46.09	809	13.38	6,047	2.76
Phoenix	9,142	50.47	6,330	34.94	2,643	14.59	18,115	8.25
Portland	5,956	62.91	2,197	23.21	1,314	13.88	9,467	4.31
Raleigh Durham	420	27.27	1,018	66.10	102	6.62	1,540	0.70
Sacramento	1,335	33.70	1,846	46.60	780	19.69	3,961	1.81
Salt Lake City	753	17.98	2,021	48.26	1,414	5.16	4,188	1.91
San Diego	1,605	39.27	1,509	36.92	973	23.81	4,087	1.86
San Francisco	1,696	33.64	2,385	47.31	960	19.04	5,041	2.30
San Jose	501	38.54	548	42.15	251	19.31	1,300	0.59
Seattle	6,036	56.96	3,389	31.98	1,172	11.06	10,597	4.83
Stockton/Modesto	404	24.92	811	50.03	406	25.05	1,621	0.74
Tampa	2,418	32.32	4,338	57.99	725	9.69	7,481	3.41
Tucson	2,474	54.10	1,441	31.51	658	14.39	4,573	2.08
Washington	3,799	49.96	2,905	38.20	900	33.76	7,604	3.47
Total	85,170		103,479		30,795		219,444	100%

Note: The data include transactions of land parcels located within a 125-mile radius of 40 major markets in the United States. The data were obtained from the CoStar Group, Inc.

Table 6
Land Price per Square Foot by Distance to Nearest Walmart Store Locales
(January 1990–June 2015)

Distance to Walmart (Miles)	No. of Observations	Mean	Std. Dev.	Median	Minimum	Maximum
0-0.25	4,033	**$13.56**	$35.31	$8.60	$0.03	$1,487
0.25-0.50	6,427	**$13.25**	$41.45	$6.96	$0.04	$1,530
0.5-1	16,843	**$10.80**	$31.84	$5.50	$0.03	$1,356
1-2	45,747	**$11.01**	$29.13	$5.00	$0.01	$1,421
2-3	46,082	**$12.03**	$42.81	$4.88	$0.01	$4,448
Subtotal	**119,123**	**$11.58**	**$36.24**	**$5.21**	**$0.01**	**$4,448**
3-4	34,104	$17.00	$81.43	$4.59	$0.02	$4,138
4-5	21,277	$25.29	$128.13	$4.48	$0.01	$5,739
5-6	13,311	$31.91	$145.97	$3.89	$0.02	$4,591
6-7	8,767	$38.87	$178.01	$3.66	$0.01	$6,427
7-8	6,675	$33.65	$90.00	$3.54	$0.02	$2,006
8-9	4,662	$40.82	$92.58	$4.26	$0.01	$1,721
9-10	3,326	$29.37	$66.77	$3.60	$0.01	$1,018
10-20	7,433	$20.53	$70.45	$1.28	$0.01	$1,861
20-30	547	$4.74	$17.87	$0.46	$0.01	$333
30-40	193	$3.84	$14.12	$0.42	$0.02	$114
40-50	20	$0.68	$1.67	$0.09	$0.02	$6
50-70	5	$2.16	$3.86	$0.58	$0.13	$9
Total	**219,444**	**$17.92**	**$81.47**	**$4.75**	**$0.01**	**$6,427**

Note: The data include Walmart store locations within a 125-mile radius of 40 major markets in the U.S.

Table 7
Summary Statistics of Land Transactions by Distance to Walmart Store and Three Years Pre– and Post–Store Opening

Distance Specification	First Quarter Mile		Second Quarter Mile		Second Half Mile		Second and Third Mile	
Store Opening Status	Pre-opening	Post-opening	Pre-opening	Post-opening	Pre-opening	Post-opening	Pre-opening	Post-opening
	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)
Sales Price	2,992,768 (4,033,731)	1,543,324 (2,103,110)	2,323,037 (4,343,585)	2,052,181 (3,096,744)	1,860,330 (3,102,637)	1,952,099 (3,339,268)	1,871,779 (4,322,178)	1,932,212 (3,566,512)
Price Per Square Foot	10.93 (13.58)	14.96 (14.21)	9.07 (10.07)	14.64 (24.97)	9.38 (13.84)	11.18 (17.92)	10.00 (26.48)	11.90 (24.70)
Land Area (in acres)	14.54 (29.60)	5.25 (13.20)	12.45 (24.97)	12.63 (86.33)	12.23 (32.29)	9.38 (21.78)	15.46 (48.13)	13.01 (37.38)
Miles to CBD	22.98 (14.96)	22.53 (14.28)	22.41 (15.08)	21.32 (14.43)	21.79 (16.13)	21.18 (14.60)	20.25 (14.72)	20.11 (14.15)
Miles to High HH Inc.	25.86 (16.63)	25.10 (16.04)	24.35 (18.36)	24.10 (18.09)	24.22 (19.44)	23.62 (17.71)	23.17 (17.18)	22.68 (16.51)
Miles to Airport	20.25 (13.26)	20.75 (13.06)	20.21 (14.23)	19.53 (13.29)	19.21 (15.62)	20.48 (16.93)	17.85 (11.82)	18.09 (12.36)
Miles to Freeway Exit	2.25 (2.72)	2.52 (3.39)	1.87 (2.39)	2.07 (2.86)	2.05 (2.69)	1.87 (2.44)	2.07 (2.31)	1.96 (2.25)
	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
Buyer Out of State	48.58	42.81	31.31	32.04	21.87	24.89	19.58	22.70
Residential Land Use	10.91	7.02	19.93	16.33	28.45	25.22	35.36	32.48
Commercial Land Use	84.70	89.30	68.94	74.44	56.52	61.16	48.53	50.83
Industrial Land Use	4.39	3.68	11.14	9.23	15.03	13.62	16.11	16.69
Nearest Store: Supercenter	77.76	76.84	75.12	72.07	72.67	64.11	79.17	62.54
Next Nearest Store: Supercenter	37.68	33.86	36.39	35.41	36.58	36.98	38.12	37.83
Next Nearest Store: Opened	72.80	69.30	73.27	73.32	76.84	74.51	76.64	76.40
Observations	711	570	808	802	1,870	1,828	12,963	11,670

Note: The data include transactions of land parcels that occurred from January 1990 through June 2015, and that were located within a 125-mile radius of 40 major markets in the U.S., and that were within three miles of a Walmart Discount Store or Supercenter (currently operating or closed location), and that sold within three years of the store open date. The first store open date was restricted to occur in January 1993 to allow three years of transactions prior to the first open date. The last store open date was restricted to occur in June 2012 to allow for three years of transactions after the last open date.

Table 8
Walmart Land Acquisitions and Sales
Panel A: Frequency Table

Years Since Open Date	Acquisitions			Sales		
	Frequency	Percent	Cumulative Frequency	Frequency	Percent	Cumulative Frequency
-3	22	6.15	22	3	1.42	3
-2	97	27.09	119	19	8.96	22
-1	154	43.02	273	31	14.62	53
0	30	8.38	303	58	27.36	111
1	29	8.1	332	57	26.89	168
2	22	6.15	354	33	15.57	201
3	4	1.12	358	11	5.19	212

Panel B: Quantile Statistics

Quantile	Miles to Nearest Walmart		Number of Acres		Price per Square Foot		Days between Sale and Open Date	
	Acquisitions	Sales	Acquisitions	Sales	Acquisitions	Sales	Acquisitions	Sales
100%–Max	4.996	5.000	280.00	30.00	$121.32	$117.16	1092	1093
99%	4.954	4.978	96.00	27.00	$83.25	$117.16	988	1078
95%	4.813	4.802	40.00	15.00	$28.40	$38.26	692	989
90%	4.537	4.617	33.00	9.50	$13.50	$30.49	436	786
75%–Q3	3.520	3.512	25.00	2.10	$8.73	$22.19	-253	476
50%–Median	**0.337**	**0.230**	**19.00**	**1.20**	**$6.13**	**$14.60**	**-421**	**188**
25%–Q1	0.121	0.132	7.30	0.99	$4.25	$9.63	-563	-75
10%	0.064	0.072	3.80	0.78	$2.64	$5.92	-788	-524
5%	0.034	0.039	1.70	0.66	$1.87	$3.48	-924	-721
1%	0.012	0.005	1.00	0.32	$0.84	$0.70	-1058	-905
0%–Min	0.000	0.000	0.52	0.23	$0.23	$0.66	-1085	-1060
Mean	**1.688**	**1.610**	**19.71**	**3.31**	**$9.12**	**$18.43**	**-316**	**155**
Observations	358	212	358	212	358	212	358	212

Note: A search of buyer and seller names in a dataset of land transactions within five miles of a Walmart store (83,860 observations) found that Walmart was the buyer in 358 transactions and the seller in 212 transactions.

Table 9 Panel A
Effect of Walmart New Store Development on Land Prices
(Treatment Period—Begins Four Years Prior to Store Opening)

Column Number	1	2	3	4
	All Land Uses	**Residential Land Use**	**Commercial Land Use**	**All Land Uses**
Temporal Selection	3 years pre– and post–store development period (four years from site negotiation to store *opening*)	3 years pre– and post–store development period (four years from site negotiation to store *opening*)	3 years pre– and post–store development period (four years from site negotiation to store *opening*)	3 years pre– and post–store development period (2.59 years from site negotiation to store *announcement*)
Variables	lnprice sf	lnprice sf	lnprice sf	lnprice sf
Within 0.25 miles	0.1066	0.0984	0.1612*	0.1018
	(0.0677)	(0.1075)	(0.0970)	(0.0642)
Within 0.25 miles * post	**0.3866*** **	**0.4918***	**0.2210** **	**0.3253*** **
	(0.0801)	**(0.2957)**	**(0.1130)**	(0.0701)
0.25 to 0.50 miles	0.0220	0.2140**	-0.0681	0.0412
	(0.0538)	(0.1083)	(0.0802)	(0.0519)
0.25 to 0.50 miles * post	**0.2663*** **	**0.0543**	**0.3213*** **	**0.1919*** **
	(0.0697)	**(0.1546)**	**(0.0927)**	(0.0622)
0.50 to 1.0 miles	-0.0045	0.0339	-0.0427	0.0041
	(0.0348)	(0.0487)	(0.0564)	(0.0338)
0.50 to 1.0 miles * post	**0.0784***	**0.0814**	**0.1481** **	**0.0558**
	(0.0462)	**(0.0919)**	**(0.0685)**	(0.0397)
Store by year by qtr. fixed effects	X	X	X	X
Store-level clustering of std. errors	X	X	X	X
Land location characteristics	X	X	X	X
R-squared	0.7284	0.8394	0.7551	0.7300
Number of Walmart locations	668	623	668	756
Number of Observations	26,446	8,794	13,475	36,521
Store Open/Announce Date Range	1/97-6/12	1/97-6/12	1/97-6/12	5/95-6/12
Land Transaction Date Range	1/90-6/15	1/90-6/15	1/90-6/15	1/90-6/15

Note: Columns 1, 2, and 3 are DID regressions that analyze land prices before (pre) and after (post) the nearest Walmart store opened but with a treatment period (four years prior to store open date) rather than a treatment date. Column 4 is a DID regression that analyzes land prices before (pre) and after (post) the nearest Walmart store announced but with a treatment period (2.59 years prior to store announcement date) rather than a treatment date. The omitted distance variable includes the second and third miles. All land and location characteristics discussed previously are included in the regressions. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 9 Panel B
Effect of Walmart Store Openings on Land Prices
Treatment Dates

Column Number	1 All Land Uses	2 Residential Land Use	3 Commercial Land Use	4 All Land Uses	5 All Land Uses
Temporal Selection	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date	2 years pre– and post–open date	No time restriction
Variables	**lnprice sf**	**lnprice sf**	**lnprice sf**	lnprice sf	lnprice sf
Within 0.25 miles	0.2376*** (0.0447)	0.4148*** (0.1211)	0.2413*** (0.0560)	0.2895*** (0.0526)	0.1594*** (0.0344)
Within 0.25 miles * post	**0.2599***** **(0.0659)**	**0.0776** **(0.2761)**	**0.1652**** **(0.0828)**	**0.2788***** (0.0755)	**0.3007***** (0.0464)
0.25 to 0.50 miles	0.1173*** (0.0373)	0.0919 (0.0999)	0.1248** (0.0505)	0.1560*** (0.0438)	0.1184*** (0.0287)
0.25 to 0.50 miles * post	**0.1807***** **(0.0558)**	**0.1768** **(0.1447)**	**0.1376*** **(0.0752)**	**0.1751***** (0.0662)	**0.0984**** (0.0391)
0.50 to 1.0 miles	0.0349 (0.0300)	0.0188 (0.0546)	0.0776* (0.0415)	0.0586* (0.0346)	0.0138 (0.0229)
0.50 to 1.0 miles * post	**0.0412** **(0.0427)**	**0.0102** **(0.1001)**	**0.0351** **(0.0553)**	**0.0110** (0.0475)	**0.0477** (0.0294)
Store by year by qtr. fixed effects	X	X	X	X	X
Store-level clustering of std. errors	X	X	X	X	X
Land location characteristics	X	X	X	X	X
R-squared	0.7139	0.8371	0.7374	0.7222	0.7392
Number of Walmart locations	685	653	688	841	1,133
Number of Observations	31,217	9,776	16,659	21,722	111,625
Store Open Date Range	1/93–6/12	1/93–6/12	1/93–6/12	1/92–6/13	1/93–6/12
Land Transaction Date Range	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15

Note: Columns 1, 4, and 5 are DID regressions that analyze land prices for all land uses before (pre) and after (post) the nearest Walmart store opened but with alternative temporal selections. Columns 2 and 3 are DID regressions that analyze land prices for residential and commercial land uses respectively before (pre) and after (post) the nearest Walmart store opened. The omitted distance variable includes the second and third miles. All land and location characteristics discussed previously are included in the regressions. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 9 Panel C
Effect of Walmart Store Openings on Land Prices [Pope and Pope (2015) Comparison] Treatment Dates

Column Number	1	2		3
	30 Metro Markets	40 Metro Markets		40 Metro Markets
	2.5 years pre– and post–open date	2.5 years pre– and post–open date		2.5 years pre– and post–open date
Variables	**lnprice sf**	**lnprice sf**	Variables	lnprice sf
Within 0.50 miles	0.2087***	0.1927***	Within 0.25 miles	0.2252***
	(0.0549)	(0.0358)		(0.0511)
Within 0.50 miles * post	**0.1630****	**0.2267*****	**Within 0.25 miles * post**	**0.3243*****
	(0.0678)	**(0.0484)**		(0.0746)
0.50 to 1 mile	0.0131	0.0789**	0.25 to 0.50 miles	0.1263***
	(0.0483)	(0.0350)		(0.0428)
0.50 to 1 mile * post	**0.0376**	**0.0537**	**0.25 to 0.50 miles * post**	**0.1971*****
	(0.0607)	**(0.0475)**		(0.0662)
1-2 miles	0.0060	0.0131	0.50 to 1.0 miles	0.0649*
	(0.0305)	(0.0230)		(0.0344)
1-2 miles * post	**-0.0143**	**0.0046**	**0.50 to 1.0 miles * post**	**0.0516**
	(0.0372)	**(0.0318)**		(0.0479)
Store by year by qtr. fixed effects	X	X	Store by year by qtr. fixed effects	X
Store-level clustering of std. errors	X	X	Store-level clustering of std. errors	X
Land location characteristics	X	X	Land location characteristics	X
R-squared	0.6510	0.6570	R-squared	0.7001
Number of Walmart locations	336	544	Number of Walmart locations	544
Number of Observations	18,965	32,742	Number of Observations	20,583
Store Open Date Range	7/00–1/06	7/00–1/06	Store Open Date Range	7/00–1/06
Land Transaction Date Range	1/98–1/08	1/98–1/08	Land Transaction Date Range	1/98–1/08

Note: Columns 1 and 2 use the Pope and Pope (2015) incremental distance criteria with the omitted distance variable including the third and fourth miles. Column 3 uses the incremental distances in the current study with the omitted distance variable including the second and third miles. All are DID regressions that analyze land prices for all land uses before (pre) and after (post) the nearest Walmart store opened. All land and location characteristics discussed previously are included in the regressions. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 9 Panel D
Effect of Walmart Store Openings on Land Prices
Pre and Post Market Peak Years
(Treatment Dates)

Column Number	1	2
	All Land Uses	All Land Uses
	3 years pre– and post–open date	3 years pre– and post–open date
Temporal Selection	(pre–market peak yrs.)	(post–market peak yrs.)
Variables	lnprice sf	lnprice sf
Within 0.25 miles	0.2479***	0.2293***
	(0.0521)	(0.0856)
Within 0.25 miles * post	**0.1905*** **	**0.6221*** **
	(0.0709)	(0.1792)
0.25 to 0.50 miles	0.1332***	0.0851
	(0.0395)	(0.0967)
0.25 to 0.50 miles * post	**0.1623*** **	**0.1873**
	(0.0574)	(0.1637)
0.50 to 1.0 miles	0.0536	-0.0155
	(0.0344)	(0.0539)
0.50 to 1.0 miles * post	**0.0518**	**-0.1616**
	(0.0448)	(0.1412)
Store by year by qtr. fixed effects	X	X
Store-level clustering of std. errors	X	X
Land location characteristics	X	X
R-squared	0.7064	0.7404
Number of Walmart locations	501	184
Number of Observations	25,138	6,079
Store Open Date Range	1/93–12/06	1/07–6/12
Land Transaction Date Range	1/90–12/09	1/04–6/15

Note: Columns 1 and 2 are DID regressions that analyze land prices for all land uses before (pre) and after (post) the nearest Walmart store opened but with alternative temporal selections being pre market peak years and post market peak years. The omitted distance variable includes the second and third miles. All land and location characteristics discussed previously are included in the regressions. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 9 Panel E
Effect of Walmart Store Announcements and Store Closings on Land Prices
Treatment Dates

	Announcement of New Stores			Closing of Stores		
Column Number	1	2	3	4	5	6
Temporal Selection	3 years pre and post ann. date	3 years pre and post ann. date (pre market peak yrs.)	3 years pre and post ann. date (post market peak yrs.)	3 years pre and post close date	3 years pre and post close date (pre market peak yrs.)	3 years pre and post close date (post market peak yrs.)
Variables	lnprice sf	lnprice sf	lnprice sf	lnprice sf	lnprice sf	lnprice sf
Within 0.25 miles	0.0855*	0.0865*	0.1034	0.2987*	0.2374	0.5027*
	(0.0509)	(0.0548)	(0.1486)	(0.1663)	(0.1955)	(0.2840)
Within 0.25 miles * post	**0.3509*** **	**0.3255*** **	**0.6090*** **	**-0.0076**	**0.1561**	**-2.990*** **
	(0.0650)	(0.0683)	(0.2199)	(0.2478)	(0.2607)	(1.0157)
0.25 to 0.50 miles	0.0995**	0.1323***	-0.1595	0.1991	0.2013	0.2305
	(0.0422)	(0.0433)	(0.1503)	(0.1456)	(0.1900)	(0.1732)
0.25 to 0.50 miles * post	**0.1343****	**0.1005***	**0.3788***	**-0.0124**	**0.0247**	**-0.5054****
	(0.0544)	(0.0561)	(0.1988)	(0.1797)	(0.2154)	(0.2441)
0.50 to 1.0 miles	0.0168	0.0247	-0.0314	0.1873***	0.1604**	0.3192
	(0.0315)	(0.0318)	(0.1356)	(0.0707)	(0.0748)	(0.1699)
0.50 to 1.0 miles * post	**0.0345**	**0.0522**	**-0.2406**	**0.0425**	**0.1175**	**-0.6483***
	(0.0379)	(0.0375)	(0.1803)	(0.0966)	(0.0956)	(0.3623)
Store by year by qtr. fixed effects	X	X	X	X	X	X
Store-level clustering of std. errors	X	X	X	X	X	X
Land and location characteristics	X	X	X	X	X	X
R-squared	0.7203	0.7109	0.7650	0.7120	0.6925	0.7700
Number of Walmart locations	745	575	170	170	114	56
Number of Observations	32,404	28,316	4,088	5,649	4,426	1,223
Store Open Date Range	1/93-6/12	1/93-12/06	1/07-6/12	1/94-6/12	1/94-12/06	1/07-6/12
Land Transaction Date Range	1/90-6/15	1/90-12/09	1/04-6/15	3/91-3/15	3/91-12/09	1/04-6/15

Note: All are DID regressions with columns 1–3 analyzing land prices before (pre) and after (post) the nearest Walmart store announcement date, and columns 4–6 analyzing land prices before and after the nearest Walmart store closing date. Columns 1 and 4 include land transactions that occurred three years before and after the announcement and closing date respectively, while columns 2, 3, 5, and 6 include land transactions the occurred before (1990–2006) and after (2007–2015) the market peak, respectively. The omitted distance variable includes the second and third miles. All land characteristics discussed previously are included in the regressions. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 9 Panel F
Effect of Walmart Store Opening on Land Prices
Conditional on Store Announcement

	3 years pre and post open date conditional on announcement date
Variables	lnprice sf
Within 0.25 miles	0.1512**
	(0.0651)
Within 0.25 miles * post announcement	**0.1502***
	(0.0873)
Within 0.25 miles * post open	**0.2011*****
	(0.0754)
0.25 to 0.50 miles	0.0806
	(0.0530)
0.25 to 0.50 miles * post announcement	**0.0651**
	(0.0687)
0.25 to 0.50 miles * post open	**0.1565****
	(0.0629)
0.50 to 1.0 miles	0.0335
	(0.0407)
0.50 to 1.0 miles * post announcement	**0.0013**
	(0.0516)
0.50 to 1.0 miles * post open	**0.0473**
	(0.0477)
Store by year by qtr. fixed effects	X
Store-level clustering of std. errors	X
Land and location characteristics	X
R-squared	0.7139
Number of Walmart locations	685
Number of Observations	31,217
Store Open Date Range	1/93-6/12
Land Transaction Date Range	1/90-6/15

Note: DID regression analyzing land prices before (pre) and after (post) the nearest Walmart store open date conditional on the announcement date. The omitted distance variable includes the second and third miles. All land characteristics previously are included in the regressions. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 10
Falsification Test—Explanatory Variable Regressions

Column Number	1	2	3	4	5	6	7	8
Temporal Selection	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date	3 years pre– and post–open date
Variables	**Land Acres**	**Miles to CBD**	**Miles to High Income Zip**	**Miles to Major Airport**	**Miles to Freeway Exit**	**Buyer Out of State**	**Residential Land Use**	**Industrial Land Use**
Within 0.25 miles	-2.6512	-0.0063	0.0338	0.0134	-0.1493***	0.2107***	-0.2289***	-0.1449***
	(2.5569)	(0.0275)	(0.0359)	(0.0302)	(0.0547)	(0.0245)	(0.0210)	(0.0159)
Within 0.25 miles * post	**-3.1298**	**0.0512**	**0.0425**	**-0.0735***	**-0.0288**	**-0.0571**	**-0.0128**	**-0.0237**
	(3.0578)	**(0.0403)**	**(0.0534)**	**(0.0395)**	**(0.0647)**	**(.0365)**	**(0.0277)**	**(0.0190)**
0.25 to 0.50 miles	-2.5212*	0.0551	0.0412	-0.0284	-0.2592***	0.0736***	-0.1485***	-0.0866***
	(1.3880)	(0.0260)	(0.0401)	(0.0288)	(0.0473)	(0.0214)	(0.0192)	(0.0189)
0.25 to 0.50 miles * post	**0.7002**	**0.0166**	**0.0507**	**-0.0429**	**0.0192**	**-0.0050**	**0.0050**	**-0.0071**
	(3.2488)	**(0.0372)**	**(0.0449)**	**(0.0373)**	**(0.0550)**	**(0.0302)**	**(0.0270)**	**(0.0225)**
0.50 to 1.0 miles	-0.8078	0.0228	0.0284	-0.0204	-0.1868***	0.0123	-0.0577***	-0.0269*
	(1.0716)	(0.0286)	(0.0354)	(0.0290)	(0.0392)	(0.0138)	(0.0148)	(0.0131)
0.50 to 1.0 miles * post	**-2.1732**	**0.0132**	**0.0491**	**-0.0099**	**0.0095**	**-0.0061**	**-0.0178**	**-0.0302***
	(1.4127)	**(0.0371)**	**(0.0453)**	**(0.0367)**	**(0.0403)**	**(0.0183)**	**(0.0199)**	**(0.0159)**
Store by year by qtr. fixed effects	X	X	X	X	X	X	X	X
Store-level clustering of std. errors	X	X	X	X	X	X	X	X
Land location characteristics	X	X	X	X	X	X	X	X
R-squared	0.4674	0.9982	0.9963	0.9975	0.9236	0.4912	0.5416	0.5133
Number of Walmart locations	685	685	685	685	685	685	685	685
Number of Observations	31,217	31,217	31,217	31,217	31,217	31,217	31,217	31,217
Store Open Date Range	1/93–6/12	1/93–6/12	1/93–6/12	1/93–6/12	1/93–6/12	1/93–6/12	1/93–6/12	1/93–6/12
Land Transaction Date Range	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15	1/90–6/15

Note: DID regressions that replace the outcome variable (lnpricesf) with the individual explanatory variables in the base model. The omitted distance variable includes the second and third miles. All other explanatory variables used previously are included in the model. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 11
Falsification Test
False Store Open Dates

Column	1	2	3
Temporal Selection	**False Store Open Date—Three Years Before** (Data includes 3 years pre and post false open date)	**False Store Open Date—Four Years Before** (Data includes 3 years pre and post false open date)	**False Store Open Date—Five Years Before** (Data includes 3 years pre and post false open date)
Variables	lnprice sf	lnprice sf	lnprice sf
Within 0.25 miles	0.0658	0.1017	0.0732
	(0.0632)	(0.0646)	(0.0686)
Within 0.25 miles * post	**0.1516***	**-0.0466**	**-0.0133**
	(0.0768)	(0.0801)	(0.0812)
0.25 to 0.50 miles	0.0576	0.0628	0.1175**
	(0.0486)	(0.0529)	(0.0575)
0.25 to 0.50 miles * post	**0.0521**	**0.0530**	**-0.0352**
	(0.0631)	(0.0632)	(0.0638)
0.50 to 0.75 miles	0.0267	0.0038	0.0171
	(0.0302)	(0.0336)	(0.0361)
0.50 to 0.75 miles * post	**-0.0040**	**0.0336**	**0.0037**
	(0.0381)	(0.0411)	(0.0446)
Store by year by qtr. fixed effects	X	X	X
Store-level clustering of std. errors	X	X	X
Land characteristics	X	X	X
R-squared	0.7260	0.7288	0.7376
Number of Walmart locations	659	628	596
Number of Observations	31,457	30,272	28,635
Store Open Date Range	1/93-6/12	1/93-6/12	1/93-6/12
Land Transaction Date Range	1/90-6/15	1/90-6/15	1/90-6/15

Note: DID regression analyzing land prices before (pre) and after (post) the false open dates. The omitted distance variable is two to three miles. All land characteristics discussed previously are included in the regression. Standard errors in parentheses are clustered at the store level. The asterisk * means the estimate is significant at the 10% level, ** at the 5% level, and *** at the 1% level.

Figure 1
Walmart Discount Store and Supercenter Location Openings and Closings by Year

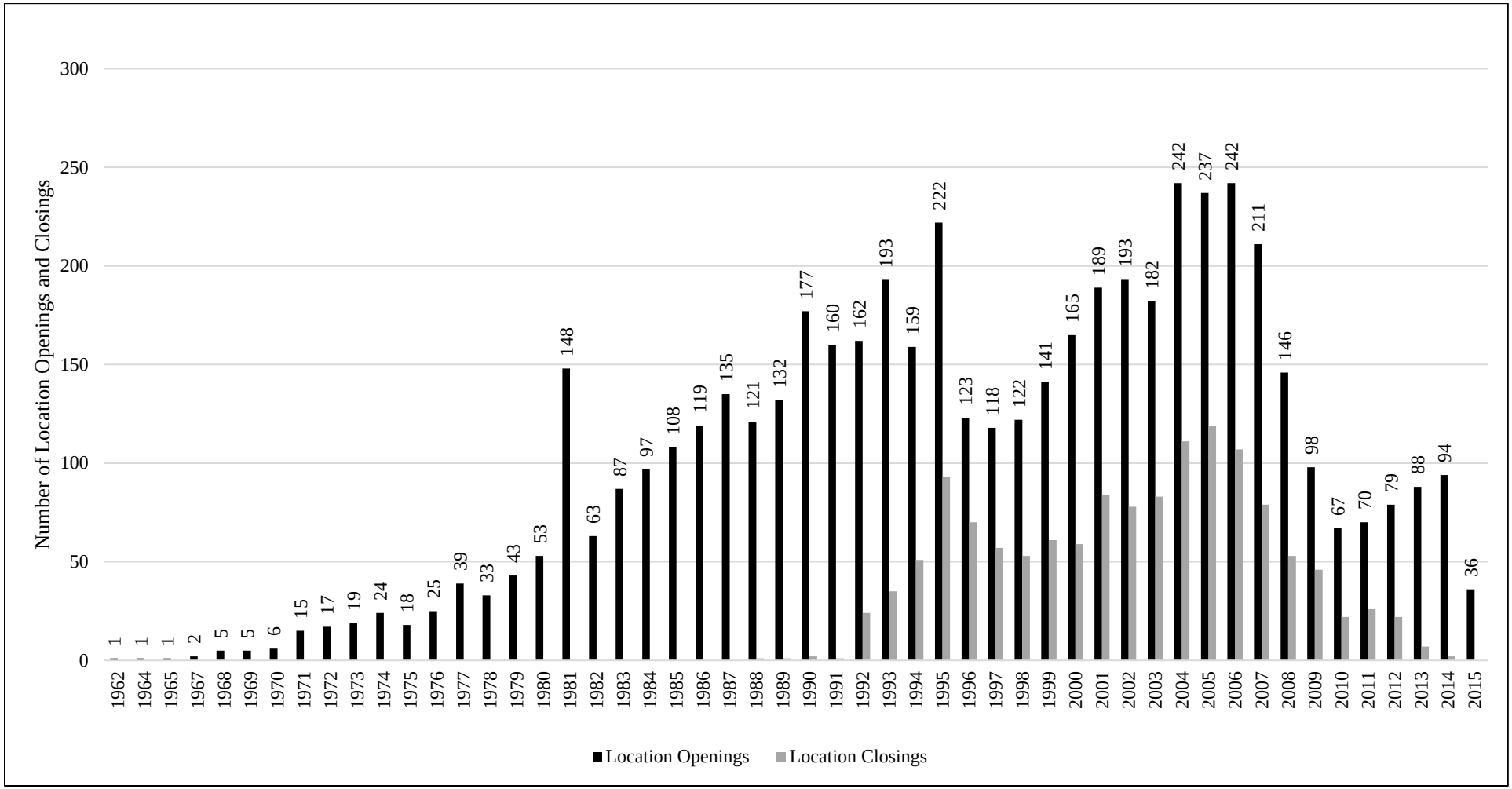


Figure 2
Cumulative Walmart Discount Stores and Supercenters that Remained Open by Year

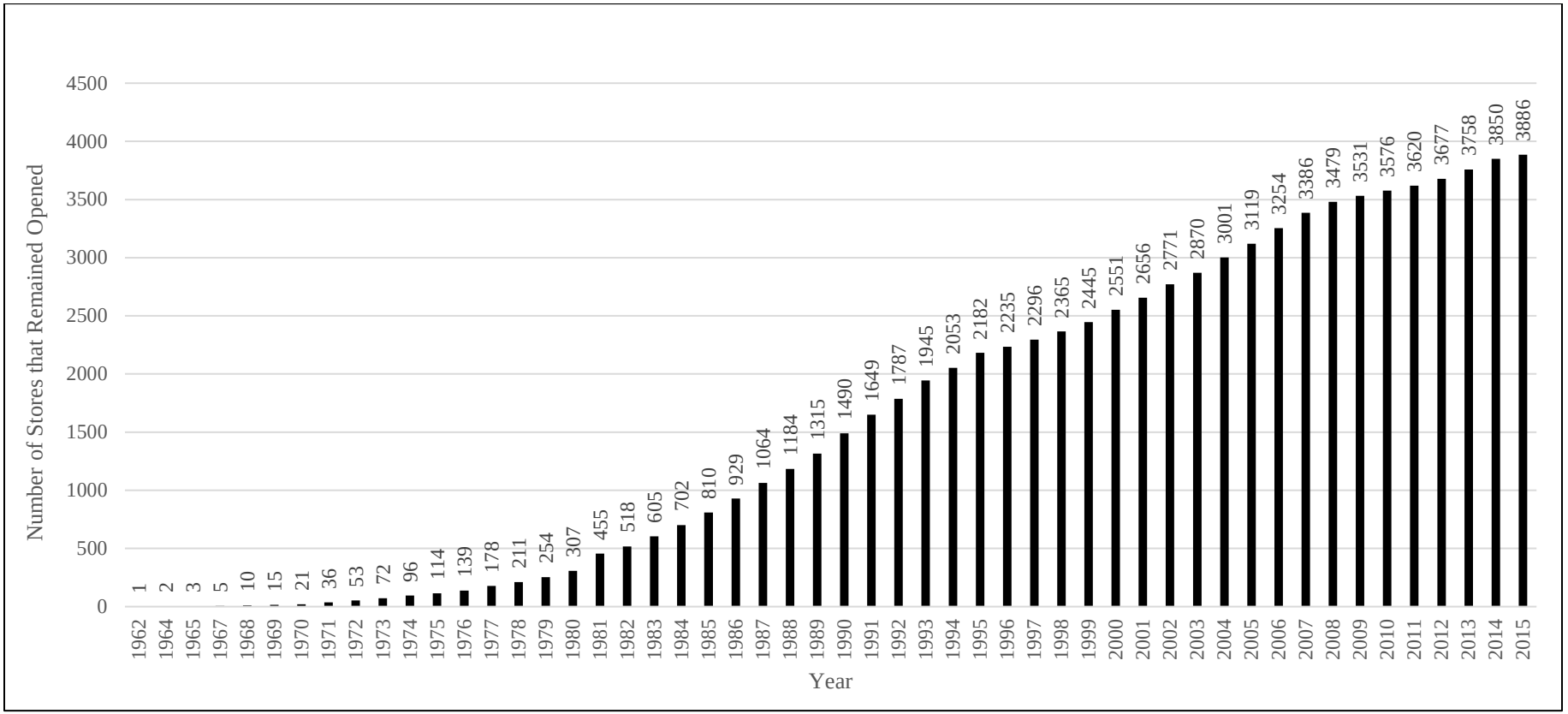


Figure 3
Walmart Discount Store and Supercenter Openings by Year

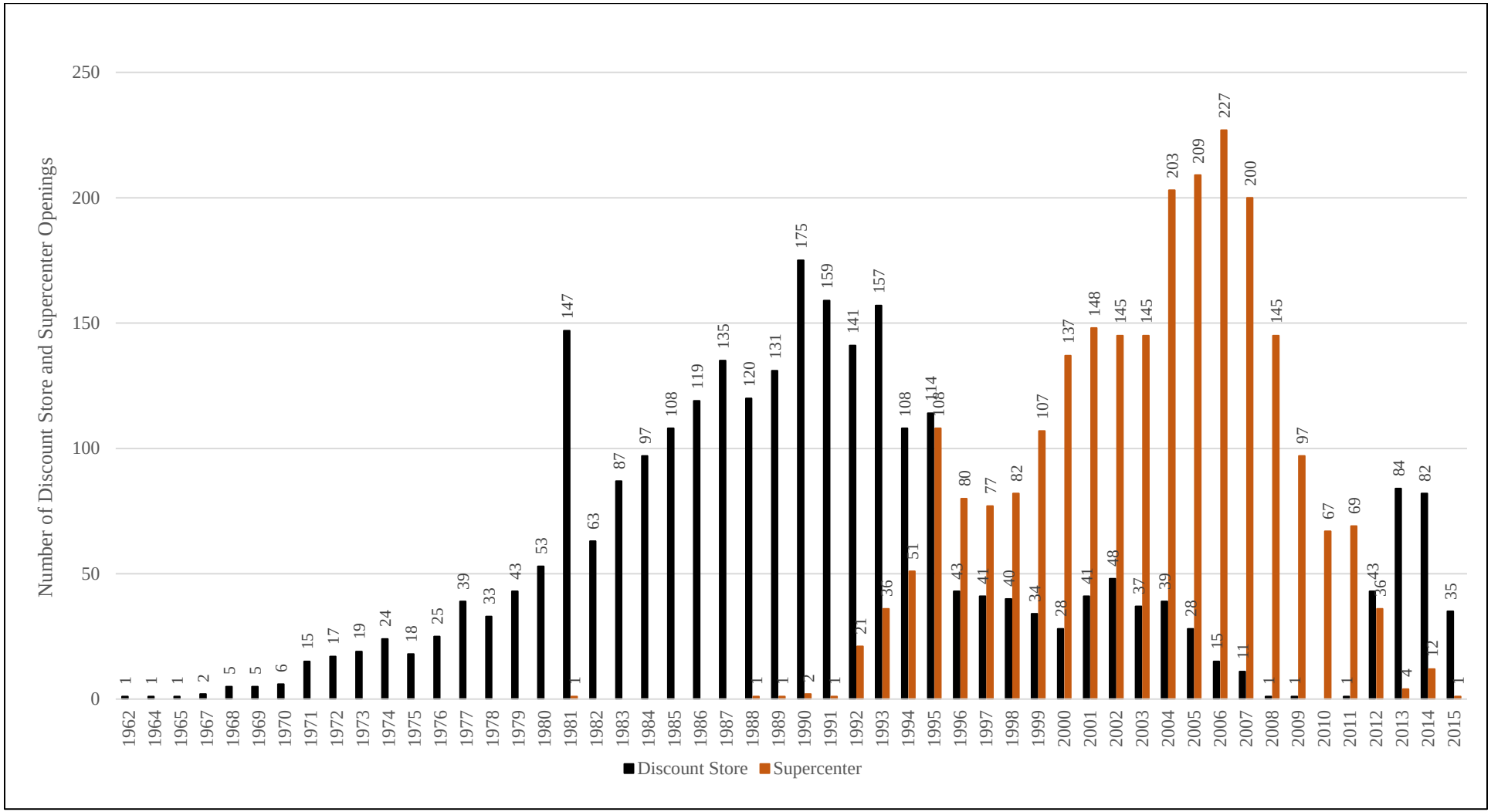


Figure 4
Log Counts of Land Transactions by Distance to Nearest Walmart Store
40 Major U.S. Markets
(January 1990 through June 2015)

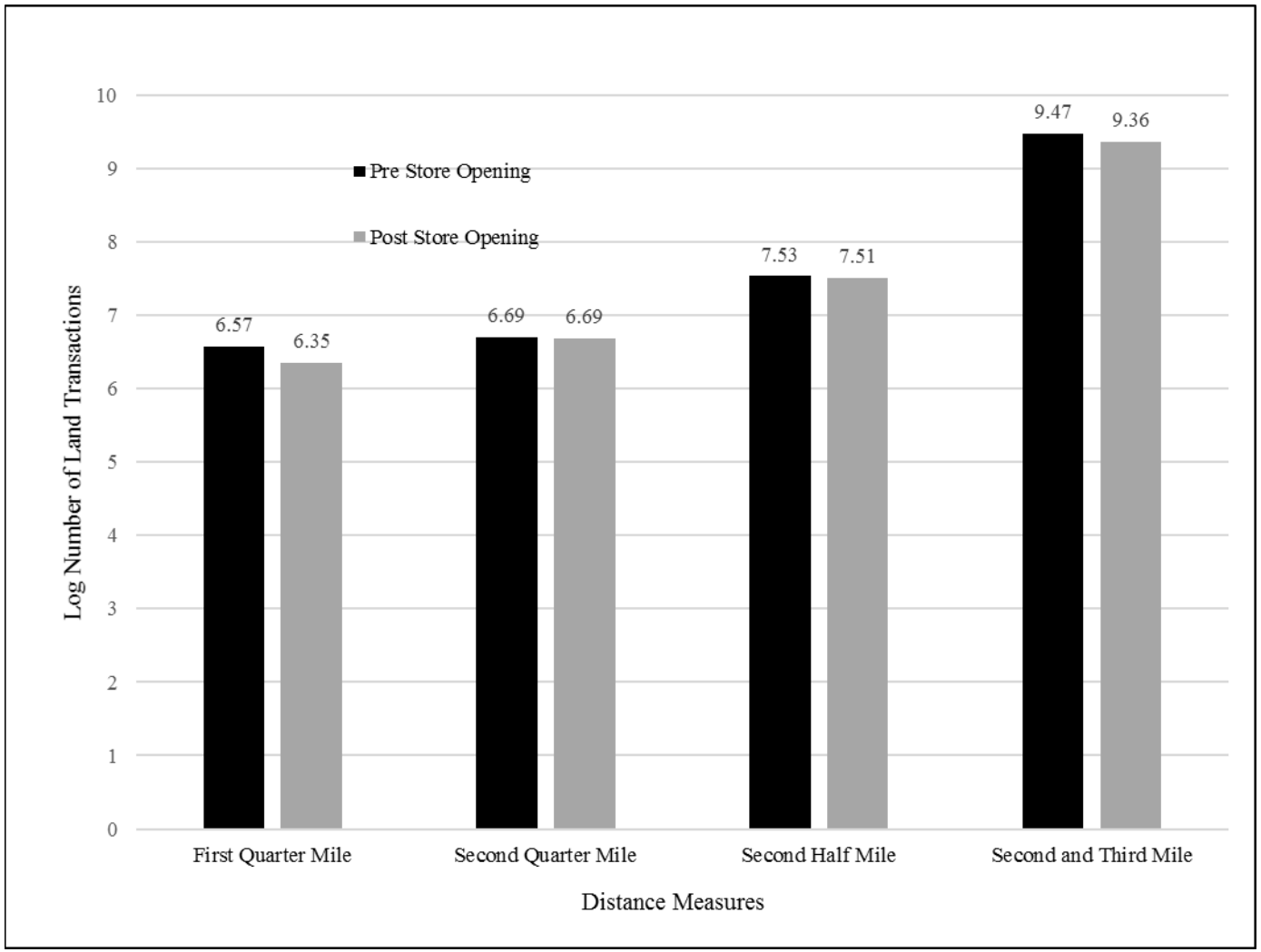


Figure 5
Log Sales Price per Square Foot of Land Area by Years to Store Open Date

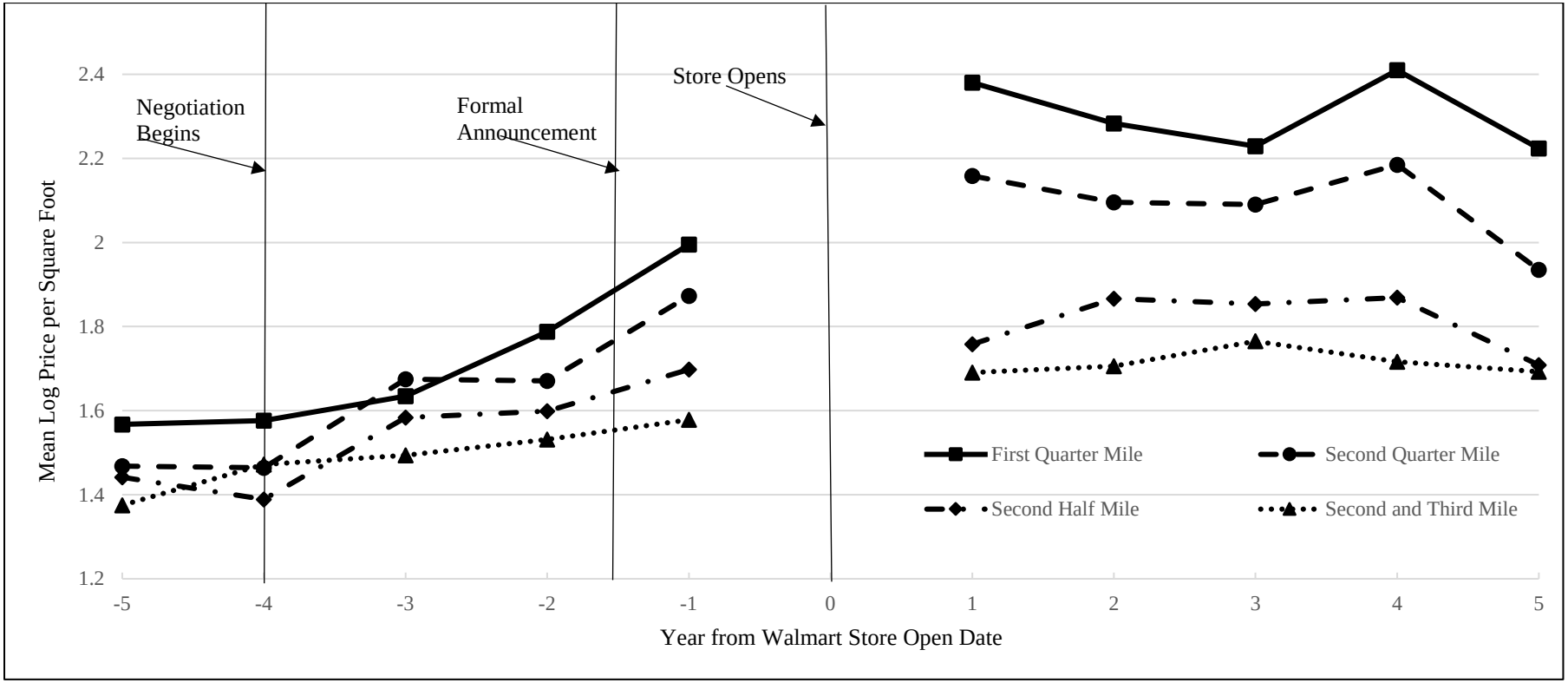
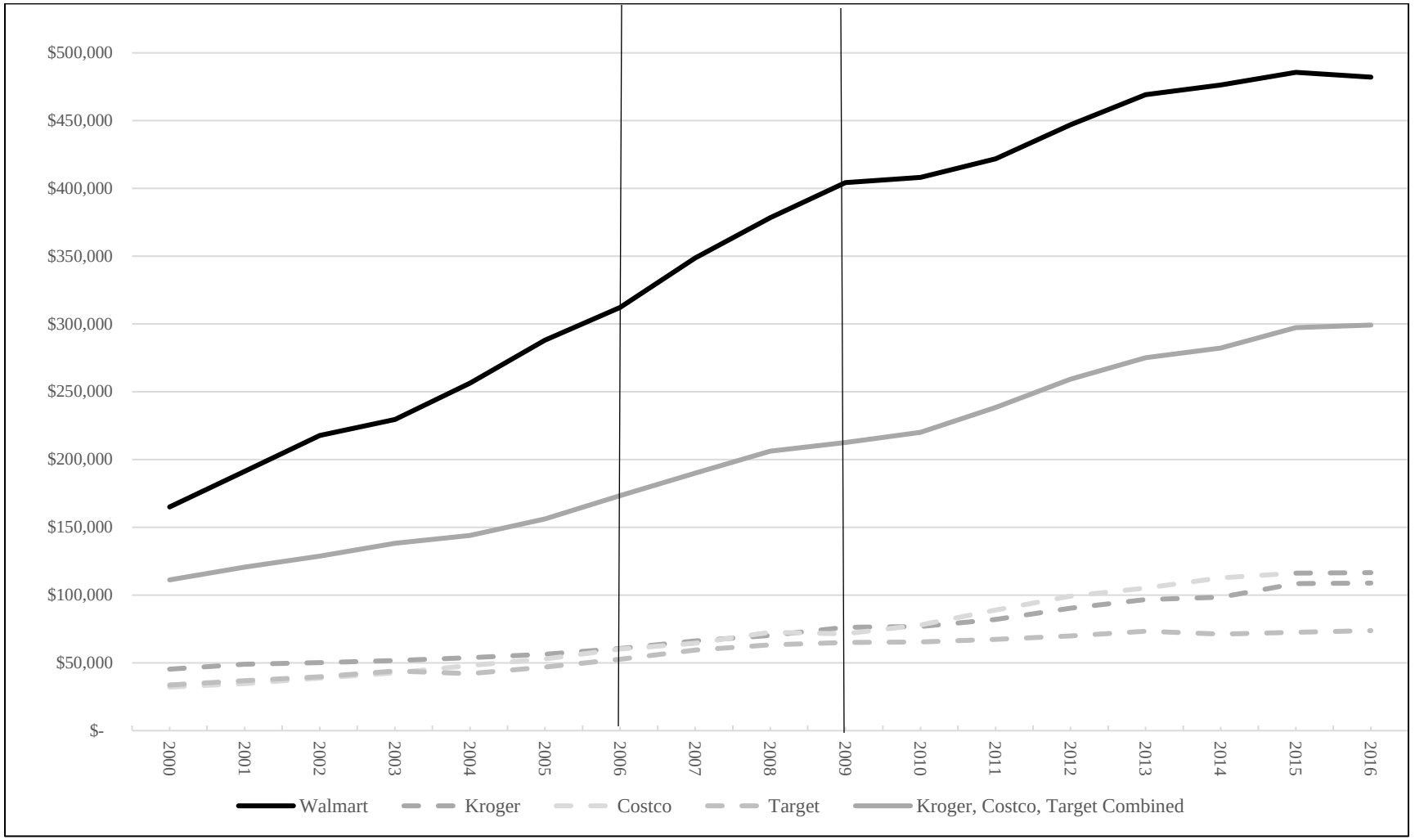


Figure 6
Revenue comparison in Millions of Walmart to Top 3 Competitors (emphasis on recession period)



Source: Bloomberg (2016)