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Honors Thesis

IS COSTCO WORTH INCENTIVIZING?
AN ANALYSIS FROM THE CITY'S PERSPECTIVE.

By

McCord Lethco

Submitted to Brigham Young University
in partial fulfillment of graduation requirements for University Honors

Economics Department
Brigham Young University

August 2023

Advisor: Jaren Pope

Reader: Dave Simpson

Coordinator: John Stovall

ABSTRACT

IS COSTCO WORTH INCENTIVIZING?
AN ANALYSIS FROM THE CITY'S PERSPECTIVE.

McCord Lethco

Economics Department

Bachelor of Science

Costco stores have significant economic implications for smaller cities, often becoming pivotal points in their development. These cities eagerly invite Costco to establish stores within their borders, offering substantial financial incentives to facilitate this growth. The effects of a new Costco store can be diverse, impacting local municipalities in both positive and negative ways. This study focuses on two key aspects: changes in sales tax revenue and property values, keeping in mind the agglomeration¹ effects that Costcos bring about.

I examine three Utah cities to estimate the impact on taxable sales and analyzes Costco's influence on residential property values in Sacramento and Orange counties, California. Utilizing a synthetic control strategy, the study reveals a notable increase in sales tax revenue, measured as a percentage of taxable sales. However, employing a

¹ A central tenant to urban economics, agglomeration economics, captures the idea that when firms are located near one another, they experience increased efficiency. Some firms use this to their advantage, locating a near a Costco, creating a hub of commerce where consumers can choose from a wider selection of goods and services. While the impact of Costco is technically different from that of the agglomeration of following businesses they cannot here be disentangled. Therefore, when I refer to the effect of Costco, for the purposes of this paper, I mean the effect of Costco and the following agglomeration of businesses.

difference in differences strategy, I do not find a significant effect on single-family property values.

Combining these findings, I consider a city's incentive package as an investment and evaluates the timeframe required for the economic effects of Costco, as well as the subsequent growth of local businesses, to recoup the initial incentives. Based on the analysis of Spanish Fork, a midsized city in Utah, it is estimated that a Costco store can pay for itself in five years or less. This indicates the importance and potential benefits of enticing Costco to these communities.

ACKNOWLEDGMENTS

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This thesis would be a fraction in breadth and depth if it were not for my wonderful thesis committee: Jaren Pope, Dave Simpson, and John Stovall. They pushed me to make this thesis what it is today.

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1. Introduction

While some long-range population projections foretell eventual population decay, many cities today across the world are looking for strategies to grow. In part due to the continuous population expansion since the Renaissance, societies and cities within those societies have become accustomed to population growth and the consequential economic growth. As population growth decreases, cities compete more fervently for people and businesses to move within their borders and pay their taxes. Additionally, in areas such as the United States, where people have a wide range of types of cities and a larger capacity to move to a new city, even though population decay has not yet come in great force to every part of the United States, cities still need to compete to keep and attract more people and businesses.

Cities seeking growth often attempt to attract larger corporations and brands in order to entice larger populations, faster agglomerations of businesses, and greater tourism. These cities often create alluring prospects for these potentially defining core locations and stores by offering tax breaks, financial backing for construction, and other incentives, hoping that in the long run these investments will pay for themselves.

Many economists in various subdisciplines have analyzed this problem. The seminal model introduced by Tiebout (1956) structures this problem of cities competing for populations (and by extension businesses) as a problem of public goods and externalities. Tiebout compares cities to a competitive market, where people vote for the types of cities that they want to live in by choosing where to live. Therefore, a city that has a large, popular store may seem more attractive to a larger population, and by

extension, their money. This decision to attract a large corporation might also deter other people with different preferences from moving to that city.

While this model is extremely useful in motivating why a city should get involved in economic development, it also has limitations. While people move often for a city or state that better aligns with what they want, the cost of moving, and lack of perfect information about potential destination cities, are major frictions, distancing reality from the proposed Tiebout model. Another important item to consider is that people often cross city boundaries every day, shopping at stores in another city, working in another city, and driving on roads that are maintained by another city. Thus, a city's public goods and amenities are often enjoyed by those populations that live nearby.

Another perspective that cities should consider is how people and businesses may perform a cost-benefit analysis when considering the incentives, public goods, and associated prices of where they live and do business. Here, too, economists have contributed, such as Sherwin Rosen's (1974) Hedonic Model, the relates property values to the bundle of spatial goods that comes with the location of a house.

The Hedonic Model can be applied to the housing market. When an individual chooses to buy a home, they are choosing the type of house, as well as other, local characteristics, such as surrounding stores, road conditions, and more. However, when one of these conditions changes, that affects who is interested in that home and its associated bundle of goods. Economists continue to use these models and identification strategies, such as synthetic control and difference in differences, to measure how much these changes affect the hedonic pricing.

The most applicable work to my paper is Pope and Pope's (2015) paper "When Walmart Comes to Town: Always Low Housing Prices? Always?" In it they measure the effect a new Walmart has on local housing prices, using a difference in differences strategy. In order to capture the gradation of treatment, presumably less the further away from the Walmart the house is, they use buffer distances to capture the levels of effect. They find a small, significantly positive increase in property values, with a larger effect on houses near the new Walmart.

Other work on this problem focuses on the effects of the entering business on the particular city and community. One such paper includes an analysis on cities' original investment to build a sports stadium and finds that the positive effects found in increases in tourism and jobs do not justify the original investment (Coates, et al. 2003). Similarly, a synthetic control analysis testing for increased housing quality after a major stadium found a null result (Propheter 2020). Another synthetic control paper found increased employment (13% mainly in the service sector) due to the shock of a large research university (Lee 2019). This result indicated that the large demand for students and employees induced by a university could bring immediate benefits to the community beyond externalities of education.

Another paper used a difference in differences approach to estimate the real estate market surrounding tech campuses, finding a causal increase in property values of 7.1% after two years (Chapple 2021). They also found that there were large amounts of market speculation before a tech company announced its campus, putting already vulnerable neighborhoods at greater risk. Huge projects, like sports stadiums or tech or university campuses, often capture the imagination and attention of headline news, but given the

potential billion-dollar price tag, happen less often than some of the more common economic incentive packages that city economic development staff prepare. While these comparatively lack luster projects often fly under the radar of national news, they often have long-term effects upon the cities in which they enter. Cities need to decide how to incentivize these medium to small projects. A recent paper analyzed publicly funded downtown revitalization programs and found no significant increase in economic activity (Van Leuven 2022). There is, however, a wide variety of projects that face smaller cities other than a downtown revitalization program.

In this paper I analyze the economic effect of a Costco on its municipality. Costco is often a huge project for medium-sized cities, but when compared to a stadium, falls in the medium realm of public-private incentive. All the same, given the wide range of measured effects of public and private shocks to city markets, this analysis is important for landowners and city officials and staff.

Because data is not available for some key variables used in this analysis country wide, I limited my study to the states of Utah, for an analysis on changes to sale tax revenue, and California, for an analysis on changes to property values, and by extension, property tax revenue. In Utah, I focused my efforts on three Costcos, and their respective municipalities, using a synthetic control method, after considering a difference in differences approach. For my analysis in California, I study the effect of Costco on single family detached residential properties in Sacramento and Orange Counties.

Costco likely affects property values through two major avenues. The first is positive, capturing increased access to a major warehouse store, which provides medium income jobs and a widely valued amenity in the United States. Some people may value

living near a Costco and increase the nearby property values. The second avenue captures the negative externalities of a Costco, such as the likely increased traffic, trash, and noise that a Costco attracts and produces.

I find a significant increase in sales tax revenue (measured as a percentage of taxable sales), but no evidence of a change in property values. Given these results, using the Costco in Utah with the most promising synthetic control result (as I will discuss later), I estimate that a Costco pays off its incentive package in about five years.

I also share possible further research ideas that could be done to better capture some of the potentially underrepresented externalities inherent in big box stores, such as Costco. Furthermore, I discuss strategies that cities could adopt, in relation to economic growth and urban planning.

2. Data Section

To estimate the sales tax revenue effect, I used data on taxable sales, population, sales tax rates, and median income, all of which are administrative data. Taxable sales are collected by the individual cities and then provided to the state who then lists them². Cities collect the data for accounting purposes to ensure appropriate compensation. Population, as well as the population estimates, are collected and predicted by the Census Bureau³. The Census is done in order to correctly define and distribute congressional districts and votes. Sales tax rates are collected by the cities and states for accounting purposes and are provided by the Utah State Tax Commission⁴. The median income I

² These data can be found at <https://tax.utah.gov/econstats/sales>

³ These data can be found and filtered from <https://www.census.gov/>

⁴ These data can be found and compiled on <https://tax.utah.gov/sales/rates>

used was based on county aggregates collected by the US Bureau of Economic Analytics⁵. I also used a published list of Costco openings from 2000 to 2020⁶.

Summary Statistics

Variable	Observations	Mean	Std Dev	Min	Max
Taxable Sales	19,161	4.38E+07	1.39E+08	-1.88E+07	2.78E+09
Median Income	540	32453.57	13171.72	14959	156537
Sales Tax Rate	18,456	0.0639778	0.0049301	0.0575	0.0905
Population Estimate	4,318	10219.05	23425.68	22	204087
Property Sale Price	190,781	184,411.90	480,694.80	0	6.82E+07

Table 1

Taxable sales were used to measure the effect of Costco and the following agglomeration of stores on the city's economy. Since this is an absolute value rather than a relative value, I used population as a control in order to scale the taxable sales. Median income was also used to estimate the number of people I would expect to shop at Costco and how much disposable income they had to spend there. The sales tax rates control for any disincentive that variances in across counties could create toward buying something.

Although I had access to the data for all 11 Costcos' opening dates in Utah, due to constraints on my identification strategy (synthetic control) and due to the population distribution within Utah itself, I limit my analysis to just three Costcos, namely Lehi, Spanish Fork, and West Bountiful, ranging from 24 August 2006 to 25 October 2012. This range also lines up with the other data for the covariates.

All the data to estimate the effect on sales tax revenue, except for taxable sales and Costco opening dates, are annual. For the data to match across the data set, I aggregated the data by year, which decreased the number of observations I could use and

⁵ These data can be found and filtered on <https://www.bea.gov/data/income-saving/personal-income-county-metro-and-other-areas>

⁶ Available upon request. Each location has its opening date listed on its home page.

increased the number of confounding treatments. In the case of treatment, a Costco being built or announced (as I will discuss later), I decided to count a Costco being built in a particular year if it was built/announced in the last quarter of the previous year or the first three quarters of that year. For example, if a Costco were built in December 2001, then I count it as being built in 2002.

To estimate the property value effect, I use one additional dataset. This data describes single family residential properties that sold in areas where the Costco stores opened, including sales price and characteristics of the home such as square footage and number of bedrooms⁷. Due to a lack of data here in Utah⁸, I chose instead to focus on Costcos and house prices in California. This is ideal, not only for the availability of data, but also because of the plethora of Costcos in California (133 in 2022). I further limited my analysis to the two densest counties in terms of number of Costco, being Orange County (10 Costcos) and Sacramento County (7 Costcos). However, some of these stores opened before the beginning of my housing data, which range from the late 1990's to the mid 2010's. The actual number of Costcos that I analyze totals to 9 (3 in Sacramento and 6 in Orange). Data here is split up into quarters, so selling prices and Costco openings are represented in the respective quarters.

⁷ Available upon request.

⁸ Utah is a non-disclosure state.

Housing Characteristics

Costco Distance	Sale Price	Square Feet	Lot Size	House Age	Bedrooms	Bathrooms	Count
0.5	\$200,970.40	1,650.10	0.17	27.13	3.21	2.05	615
	-268820.9	-669.4509	-0.1058648	-19.69723	-0.9244895	-0.6935705	
1	\$245,093.10	1,714.54	0.17	25.09	3.15	2.21	2,518.00
	-334404.6	-768.0183	-0.0940417	-20.76151	-0.9634054	-0.8190953	
2	\$200,937.10	1,684.99	0.18	30.52	3.22	2.15	10,901.00
	-290985.5	-742.8753	-0.1714388	-20.7794	-0.8780421	-0.7713566	
4	\$188,505.70	1,717.39	0.18	30.59	3.22	2.14	35,012.00
	-293143.1	-765.9302	-0.1467903	-20.60082	-0.9055297	-0.8048273	
6	\$178,725.40	1,704.40	0.19	33.06	3.21	2.1	44,891.00
	-326791.8	-766.4985	-0.2492313	-18.88599	-0.9145245	-0.7879064	
Total	\$186,978.00	1,706.91	0.18	31.59	3.21	2.12	94,000.00
	-310621.2	-763.0938	-0.2033961	-19.89137	-0.9085079	-0.7930097	

Table 2

3. Identification Strategies

Identifying the causal impact of building a Costco on the sales tax revenue growth of a municipality is challenging. In an ideal research world, we could randomly assign some municipalities to build a Costco (treatment) and some municipalities to keep the status quo (control). We could then test to see the difference in sales tax revenue growth between the treatment municipalities and the control. However, we do not get this ideal research world and Costco does not randomly determine where they will build a Costco. Instead, I was motivated to do this research by a unique situation in two municipalities in Utah.

Costco was deciding between two adjacent, medium-sized cities, Springville and Spanish Fork to build a new store. Spanish Fork eventually was selected by Costco with a bid that offered to pay utility costs for the first four years of operation and rebate of all the store's sales tax collected during the first year, with a maximum rebate of \$1 million.

Spanish Fork is estimated to have incentivized Costco with a package worth about 2.5 million dollars. This seems to be a story in which Costco wanted to enter a certain market, but was indifferent between the two cities, so its choice was as good as random. This assumption lends itself easily to a difference in differences strategy to analyze the effect. However, I found that the critical parallel trends assumption did not hold. Also, the assumption that Costco was randomly choosing between adjacent cities is probably too strong.

I therefore used synthetic control as the identification strategy to estimate the change in taxable sales. Synthetic control is ideal when the treated sample is small, even as little as one. In my application, it creates a weighted average of nontreated cities, or cities without a Costco, to create a synthetic city as a control. Note that the weighted average, much like difference in differences, depends on the parallel trends assumption. Additionally, the synthetic control should match the treated city extremely well in levels before treatment. This synthetic city then serves as the counterfactual against which the treated city is compared to find the effect of Costco on taxable sales.

While the synthetic control is ideal for this situation, it does bring up some concern for external validity. Because the treatment is only seen in one case, it is impossible to capture an average effect. However, analyzing the effects of three different Costcos on three different cities, gives somewhat of a better idea of the general effect of a Costco on taxable sales within a city.

In this case, I interpreted the effect of Costco as well as the agglomeration of other businesses as:

$$Y_{Treated\ t} - Y_{Synth\ t} \text{ (Equation 1)}$$

where Y_{Treated} = the taxable sales of a given treated city and Y_{Synth} = the synthesized counterfactual to a treated city's taxable sales. I measure this difference across time t . Due to the limitations of the aggregated data (years 2002 to 2019) and the requirements of synthetic control I only analyze three Utah cities: Spanish Fork, West Bountiful, and Lehi. In order to build the synthetic controls, I use the covariates from the difference in differences analysis as well as at least two years' taxable sales prior to the Costco being built.

In this case the difference that is estimated in equation (1) certainly does not measure just the effect of a single Costco on the city's taxable sales, but also those other businesses that decided to build in the same city as a result of having Costco having been built there first. In other words, the difference measures Costco's effect plus the agglomeration effect it creates cannot be disentangled.

For the synthetic control analysis, I consider the effect of Costco announcing a new store location and Costco building a store in that city with each reactionary agglomeration. In the case of Spanish Fork, Costco officially announced its decision to build there a little over a year before its opening date. This difference in treatment year is important because it includes those businesses that may have heard about Costco's new location plans and decided to build a store in reaction to that announcement, before Costco's opening. These stores may be thought of as smaller, possibly secondary function stores strategically placed around a Costco because Costco is a destination store or hub of business in the area. Because my data is annual, I standardize the announcement date to be one year previous to that of opening.

As I have already established, Costco likely does not randomly choose where to build its stores, therefore Costco locations and housing prices may be endogenous. For example, the same city that was able to incentivize an expensive Costco may also attract higher housing prices due to higher quality amenities or public goods.

To compensate for this possible endogeneity, I have adopted a similar approach used in Pope and Pope (2015) on their analysis of the impact that building a Walmart has on housing prices. The authors used a difference in differences approach, comparing houses at various distances to Costco. This succinct design allows for a gradient of treatments while also setting up Costco's entrance to be quasi-experimental. Note that this is an extension of Rosen's 1974 hedonic model, which has been used ever since to measure household preferences as to the bundle of goods that different locations (cities, geographies, etc.) provide. Developments on this original model, concerned with endogeneity, expanded upon the classically used cross-sectional data, opting to choose panel data, in order to control for time invariant fixed effects. This would capture much of the endogeneity of cities that attract Costcos may also bring in more expensive homes.

One important difference between their paper and my own is that their distances were based on a study that shows people who live within 2 miles of a Walmart are more likely to shop there on a weekly basis. The average Walmart shopper visits 65 times a year (about once a week) while the average Costco shopper visits 23 times a year (about every other week). These and other differences indicate that while both companies clearly land in the big box store camp, they attract very different populations. In order to capture the difference in treatment I decided to widen my rings of treatment to 6 miles,

with houses between 6 and 8 miles serving as the control group. My difference in differences equation therefore is

$$\text{Property Value} = B_0 + BX_i + F(D_{it}^k) + [F(D_{it}^k)] \text{POST}] + E \text{ (Equation 2) where}$$

$$F(D_{it}^k) = AD_{it}^5 + CD_{it}^1 + GD_{it}^2 + HD_{it}^4 + JD_{it}^6 \text{ (Equation 3)}$$

BX_i represents various controls (such as square footage, number of bedrooms, and proximity to the coastline) and A, C, G, H, and J represent the gradient of causal effects a Costco has on respective property values given distances .5, 1, 2, 4, or 6 (represented by super script k). The subscript i represent the individual houses in that ring, and t is an indicator for time.

An important assumption for this differences-in-difference strategy is that had Costco not built at a given location, the trends of residential property prices both near Costco and those further away would have continued unchanged. Due to the ring strategy I use here, I assume that housing prices within an eight mile radius of the Costco would have been unchanged, had the Costco not been built there.

4. Results

4.1 Sales Tax Revenue

I see a dramatic change in Spanish Fork's taxable sales compared to its synthetic control. By 2019, there was a measurable difference of more than 200 million dollars in annual taxable sales when using the Costco *opening* as treatment. A measurable difference of more than 400 million dollars in annual taxable sales is present when using Costco's *announcement* as treatment. As seen in Figures 1 and 2, Spanish Fork is highly unusual when compared to its counterpart Utah cities post-treatment. In the case of

measuring treatment as the opening of Costco, the odds of taxable sales increasing as much as they did by chance is under 3% (Figure 4). In the case of measuring treatment as the announcement of Costco, this probability falls to under 1% (Figure 3). Recall that an original motivation to this paper was Costco's decision between Spanish Fork and Springville. This motivated possibly experimenting with a difference in differences strategy. If the assertion that these two cities were nearly identical, then Springville would surely appear as a major contributor to Spanish Fork's synthetic control. This however is not the case; in fact, the synthetic control algorithm weighted Springville at only 8.2%, whereas Pleasant Grove, another northern Utah city, is weighted at 55.2%. In this, synthetic control is an ideal identification strategy because it mitigates potential bias that one might inject into the model by choosing an incorrect control. However, Pleasant Grove is an ideal control for Spanish Fork's synthetic control because both have similar populations and similar economic development, as measured by number of businesses. Spanish Fork has the most convincing case of Costco's effect on taxable sales because of the very well-established parallel trends and identical levels, particularly when announcement of the new Costco is considered the treatment; however, the other two cities I consider here, West Bountiful, and Lehi also have some interesting results.

Weights of Cities for Spanish Fork Synthetic Control

Treatment = Announcement

City Name	Weight
Cedar City	0.063
Taylorsville	0.454
Blanding	0.181
Monticello	0.141
Gunnison	0.141
Vernal	0.02

Treatment = Opening

City Name	Weight
Boulder	0.001
Panguitch	0.001
Tropic	0.001
Cedar City	0.127
Brian Head	0.035
Riverton	0.001
South Salt Lake	0.001
Taylorsville	0.071
Monticello	0.057
Ephraim	0.001
Vernal	0.007
Pleasant Grove	0.552
Springville	0.082
Ogden	0.041
Roy	0.006

Table 3

Table 4

Synthetic Control Figures for Spanish Fork: Effect Analysis

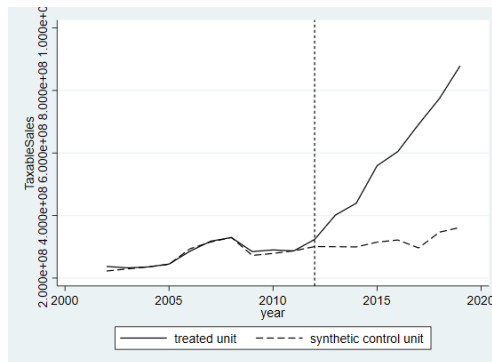
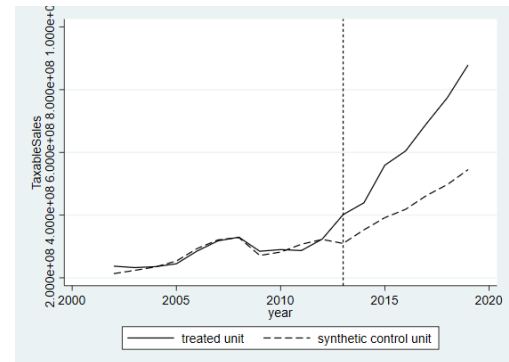


Figure 1: Treatment = Announcement

Figure 2: Treatment = Opening⁹

⁹ Notice that there is a clear divergence between the treated city (Spanish Fork) and the synthetic control unit diverges a year before when treatment = opening of the Costco. This supports the ideal that smaller, secondary businesses as well as land owners are reacting to the announcement of Costco (1 year previous) instead of the opening of Costco.

Synthetic Control Figures for Spanish Fork: Inference Analysis¹⁰

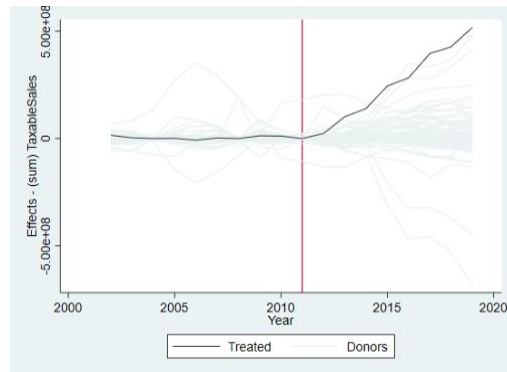


Figure 3: Treatment = Announcement

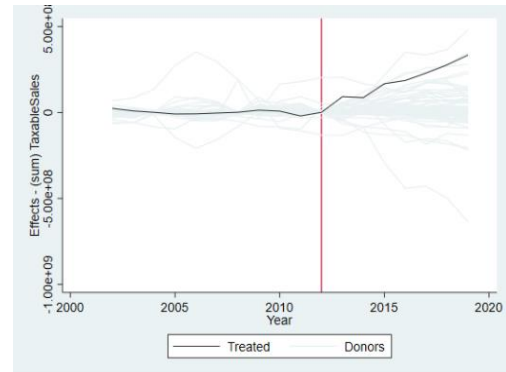


Figure 4: Treatment = Opening

Spanish Fork Announcement Inference			Spanish Fork Opening Inference		
Years From Announcement	Taxable Sales	P Values	Years From Opening	Taxable Sales	P Values
1	2.29E+07	0.074866	1	9.19E+07	0.0107
2	1.01E+08	0.010695	2	8.63E+07	0.02139
3	1.40E+08	0.005348	3	1.67E+08	0.0107
4	2.44E+08	0.005348	4	1.86E+08	0.02139
5	2.83E+08	0.016043	5	2.29E+08	0.02139
6	3.96E+08	0.005348	6	2.77E+08	0.01604
7	4.28E+08	0.005348	7	3.34E+08	0.01604
8	5.17E+08	0.005348			

Table 5

Table 6

Although the Lehi and West Bountiful Costcos were built within a year of each other, they had surprisingly different results. Lehi displays a large amount of geometric growth, outclassing its synthetic counterfactual's taxable sales. The results are highly

¹⁰ Notice that the treated line is one of the highest in both instances. This gives reasonable assurance that the change seen in taxable sales is not random. The tables below the figures give more exact P values for what is shown in the graph.

significant, even more so than Spanish Fork's, with a 98% confidence interval when treatment is either announcement or opening.

Weights of Cities for Lehi Synthetic Control

Treatment = Announcement

City Name	Weight
Taylorsville	0.19
Heber	0.81

Table 7

Treatment = Opening

City Name	Weight
Cedar City	0.086
Lindon	0.377
Heber	0.537

Table 8

Synthetic Control Figures for Lehi: Effect Analysis

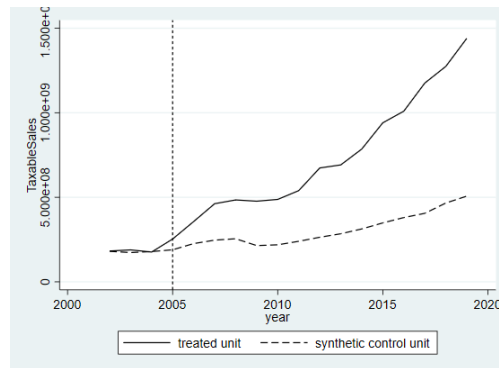


Figure 5: Treatment = Announcement

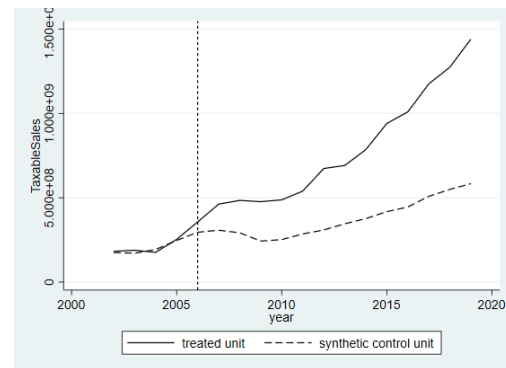


Figure 6: Treatment = Opening

Synthetic Control Figures for Lehi: Inference Analysis

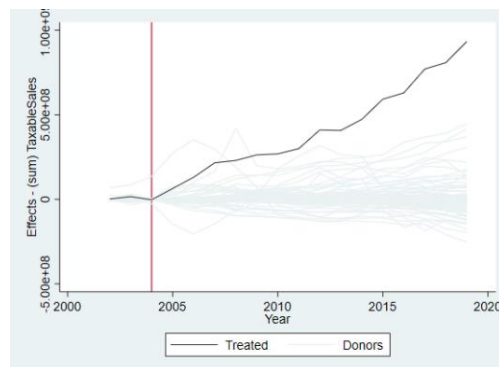


Figure 7: Treatment = Announcement

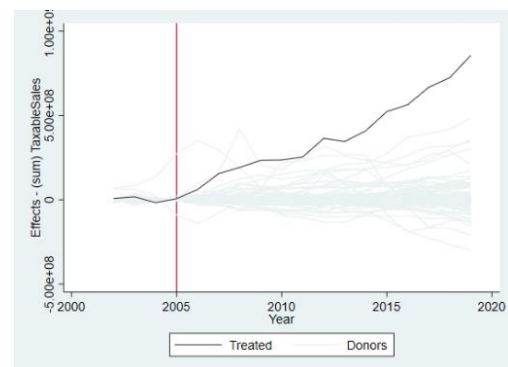


Figure 8: Treatment = Opening

Lehi Announcement Inference				Lehi Opening Inference		
Years From Announcement	Taxable Sales	P Values		Years From Opening	Taxable Sales	P Values
1	6.37E+07	0.016043		1	6.12E+07	0.016043
2	1.30E+08	0.010695		2	1.55E+08	0.010695
3	2.16E+08	0.005348		3	1.92E+08	0.005348
4	2.29E+08	0.005348		4	2.34E+08	0
5	2.63E+08	0		5	2.36E+08	0
6	2.68E+08	0		6	2.54E+08	0
7	3.00E+08	0		7	3.65E+08	0
8	4.10E+08	0		8	3.46E+08	0
9	4.07E+08	0		9	4.09E+08	0
10	4.72E+08	0		10	5.23E+08	0
11	5.92E+08	0		11	5.64E+08	0
12	6.29E+08	0		12	6.67E+08	0
13	7.71E+08	0		13	7.24E+08	0
14	8.08E+08	0		14	8.57E+08	0
15	9.34E+08	0				

Table 9

Table 10

West Bountiful tells a very different story. The increase in taxable sales is far more immediately drastic than that seen in Lehi. However, while Lehi seems to be an exponential relationship, West Bountiful appears to be closer to a logarithmic relationship. While West Bountiful's results are still significant, the results are far less dramatic than in the previous two examples in the long run.

Weights of Cities for West Bountiful Synthetic Control¹¹

Treatment = Announcement

City Name	Weight
Milford	0.331
Minersville	0.211
Corinne	0.183
Deweyville	0.074
Elwood	0.047

Table 11

Treatment = Opening

City Name	Weight
Milford	0.242
Minersville	0.196
Corinne	0.185
Deweyville	0.101

Table 12

Synthetic Control Figures for West Bountiful: Effect Analysis

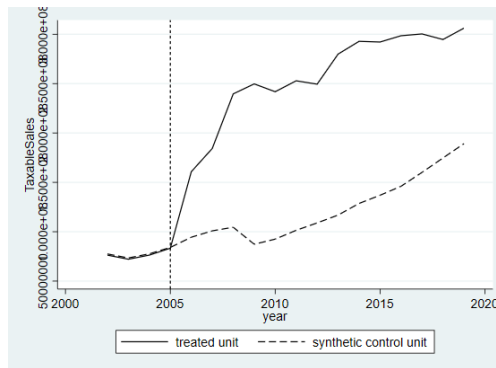


Figure 9: Treatment = Announcement

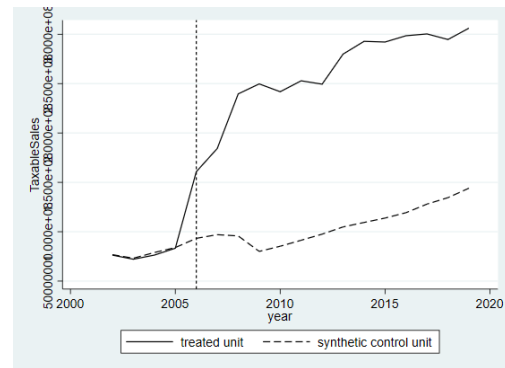


Figure 10: Treatment = Opening

Synthetic Control Figures for West Bountiful: Inference Analysis

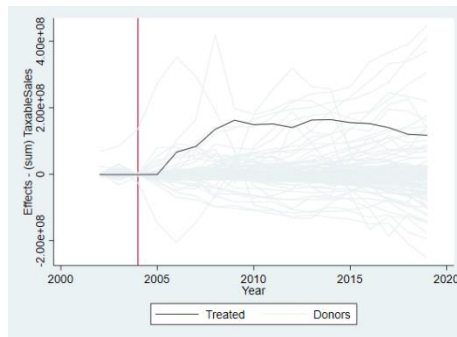


Figure 11: Treatment = Announcement

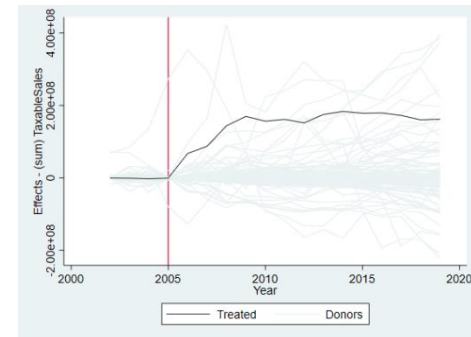


Figure 12: Treatment = Opening

¹¹ Note that these synthetic control weights do not add up to 100%. This is because the synthetic control algorithm chose to weight 100+ cities at a 3% weight or less. I omit them here, but they can be provided upon request.

West Bountiful Announcement Inference			West Bountiful Opening Inference		
Years from Announcement	Taxable Sales	P Values	Years From Opening	Taxable Sales	P Values
1	-814212	0.582888	1	6.75E+07	0.016043
2	6.63E+07	0.037433	2	8.73E+07	0.016043
3	8.34E+07	0.026738	3	1.44E+08	0.010695
4	1.35E+08	0.016043	4	1.70E+08	0.005348
5	1.62E+08	0.005348	5	1.57E+08	0.010695
6	1.49E+08	0.016043	6	1.62E+08	0.010695
7	1.51E+08	0.02139	7	1.52E+08	0.042781
8	1.41E+08	0.037433	8	1.75E+08	0.016043

Table 13

Table 14

Spanish Fork is the ideal identification case over Lehi or West Bountiful because there are only three or four years before treatment in those cases, giving the algorithm little time to craft an ideal synthetic control, giving reasonable assurance of parallel trends and identical levels. Between the two, neither clearly better captures the effect of Costco on taxable sales. West Bountiful's results show an immediate impact, which is more likely, given that Costco has a rather large effect. Lehi also has some clear divergence before either treatment, adding some concern for its results.

4.2 Property Values

To mitigate selection bias induced by Costco's decision as to where it placed its stores, I use a difference in differences method to better target the true, gradient effect as seen in Equation 2. The housing data used in this regression are limited to units found within eight miles of Costcos in Sacramento or Orange Counties, built from the late 1990's to mid 2010's. The interaction coefficients, those that capture the effect at various ranges (.5, 1, 2, 4, and 6 miles), after treatment (announcement or opening), are those of greatest interest. I kept the same generalization of the previous section, in that

announcement of a new Costco is one year, or four quarters, before the opening of the Costco.

I find no significant change to property values within the range considered. As can be seen in Figure 11, which compares the data to a linear model, generated from various covariates, including house characteristics, but not the ‘treatment’ variable. All the house price residuals at various distances all center around 0, with no discernable trend up or down, which could be explained by the treatment. Note that the residuals with the most variation are those with the fewest houses. In Figure 11, 0 represents opening, which means that -4 (quarters) represents the announcement of the Costco.

Variables	Sale Price	Sale Price	Sale Price
House Characteristics		X	X
Zip code Fixed Effects			X
.5 mile from Costco	-36,180	13,268	-8,553
	(-60,833)	(-28,004)	(-40,592)
2 miles from Costco	-17,371	1,438	-21,956
	(-49,679)	(-33,617)	(-45,225)
4 miles from Costco	-29,079	-15,006	-49,151
	(-59,703)	(-36,853)	(-52,475)
6 miles from Costco	-22,934	-5,591	-38,158
	(-23,459)	(-20,998)	(-43,865)
Post .5 mile	96,334*	-9,412	8,179
	(-38,286)	(-32,128)	(-27,724)
Post 1 mile	80,275	29,178**	17,794*
	(-47,059)	(-10,777)	(-6,962)
Post 2 miles	13,959	3,524	5,428
	(-15,997)	(-11,934)	(-5,155)
Post 4 miles	40,252	20,440	19,123
	(-25,671)	(-14,061)	(-10,119)
Post 6 miles	17,254	2,904	2,979
	(-13,598)	(-10,858)	(-15,962)
Constant	200,061***	224,200***	-26,586
	(-36,026)	(-31,950)	(-75,081)
Observations	84,392	66,129	66,129
R-squared	0.143	0.355	0.423

Table 15

Price Residuals of Houses at Various Distances to a Costco

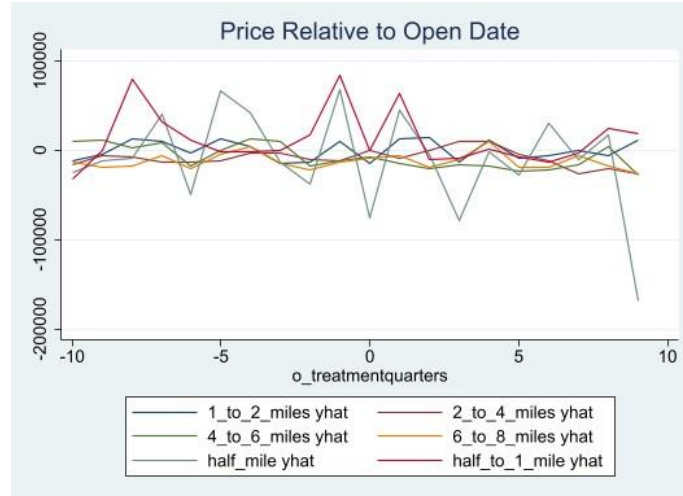
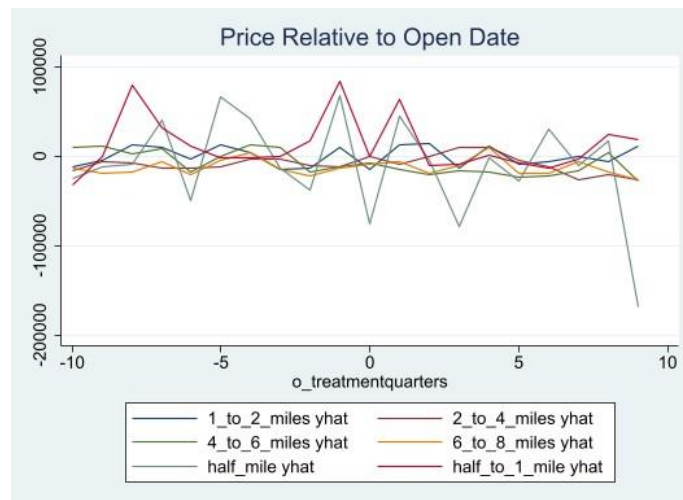


Figure 13

Figure 14¹²

¹² This graph is normalized to the opening of Costco, so 0 represents the quarters in which the 9 Costcos opened. This, by extension means that -4 represents about the announcement date of the Costco.

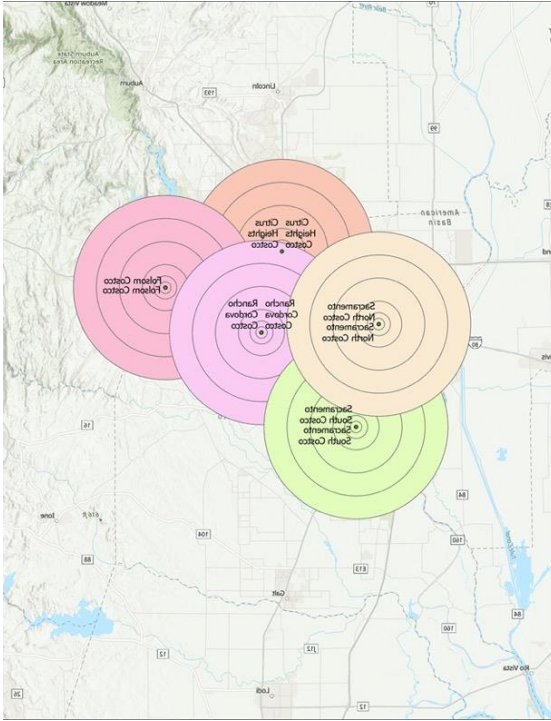
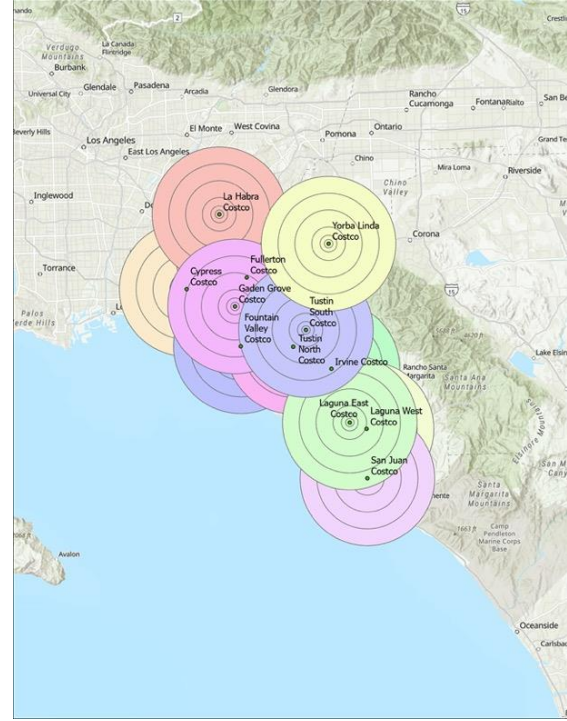
Figure 15¹³: Northern California Costcos

Figure 16: Southern California Costcos

¹³ The various rings around each Costco represent the distances of treatment and analysis.

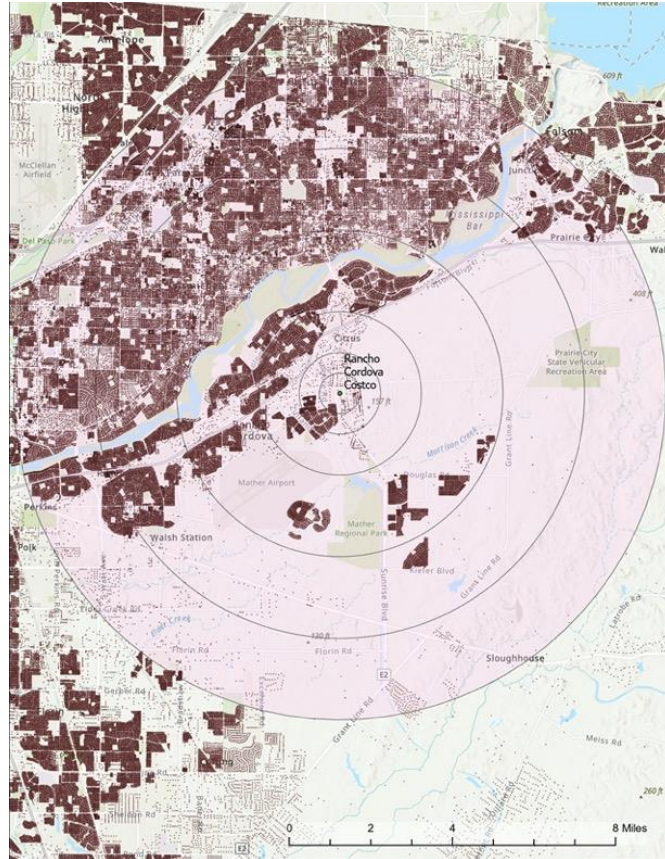


Figure 17¹⁴: Example of a Costco and all the houses within the considered treatment areas

When considering Pope and Pope (2015) Walmart paper, it is somewhat surprising that there is no significant difference in housing prices around a Costco. If anything, one might expect there to be a greater effect because of the type of consumer that Costco attracts. However, it is likely that the reason that Costco has such a large effect on taxable sales is the same reason that Costcos do not affect the surrounding property values. Costco is a destination store, so people are more than willing to drive to the store location. Costco members probably consider driving to a Costco as hidden cost

¹⁴ The pink rings represent the various distances of analysis and treatment. The red dots, which merge into red blobs, represent all the houses that were sold during the considered time.

of the membership fee. Since they are already prepared to drive to the store, then they do not value a home that is near a Costco all that much.

4.3 Return on Investment

With no significant change in housing prices, the increase in taxable sales is the only contributor I will consider here to pay off the original incentive. I will use Spanish Fork as the test case. Given a \$2.5 million incentive, and a 1% local tax (half of which goes to the county so the city only receives .5% of the sales price), a Costco must cause a \$500 million dollar increase in taxable sales in order for the city to directly compensate for the incentive. In the case of Spanish Fork, this happens within five years. So, a Costco pays itself off, essentially with sales tax revenue alone, within five years.

Given this fairly quick turnaround, why does Costco not ask for a larger incentive? The two largest inhibitors of asking for a larger incentive package from the cities are both practical in nature. The first is that these medium-sized cities likely do not have the capacity to easily raise more money for such a venture. The number of bonds or amount of money the city would have to save is already considerable. If it were greater, then these cities may not have the capacity to pay such a large amount. The second inhibitor comes from Costco. The company likely finds a market it would like to enter and starts to shop cities (Shrikant 2023). It could wait for these cities to sweeten their packages to the cities' absolute max, but each delay is a loss of income. Costco wants to build a store, knowing that it will be profitable. The incentive package is nothing more than a nice appetizer for the corporation. Furthermore, since Costco is interested in building a new warehouse in a particular area, there are probably only a handful of cities

that can compete for the new building. This limitation inherently diminishes competition that would drive up the price of incentivizing Costco. However, from the city's perspective, this 'appetizer' is the difference between receiving and not receiving millions of dollars in sales tax revenue for years to come.

5. Discussion: City Planning and Economic Development

It is important to note that both analyses presented in this thesis are from the Western United States. California has been known as an expensive state for years. Utah too has had a very successful economy for the past decade or so. These general overarching contexts may give ideal situations for Costco to thrive, perhaps overestimating the average effect of Costco on taxable sales. The synthetic control is designed to compensate for this, but, for example, a Costco may only be a catalyst of economic development if and only if there is a strong positive economic direction. Furthermore, Costco is expanding in other countries, particularly in China. The differences in foreign countries are likely at least somewhat different from those seen here.

External validity concerns also apply to the type of big box store. Walmart attracts a different population from Target which attracts a different population from Costco. The Pope and Pope (2015) analysis on Walmart found an increase in surrounding property values. They also found a similar though slightly different result for Target. I therefore imagine that if the analysis were re-run using a direct competitor of Costco, such as Sam's Club, one might find similar results. However, other less-direct competitors like Walmart will have different results because of the different types of goods and services they provide.

Despite these overarching situations and the exact brand of big box store, at least from a financial perspective, big box stores likely boost nearly all economies. These companies have developed powerful strategies to identify ideal locations for their brands. Importantly, though, their addition improves the health of the city's economy as a whole as well.

From this analysis it appears that Costcos and the stores that agglomerate around them, benefit cities directly through sales tax revenue, while at the same time do not seem to harm property values. Many cities, however, are attempting to increase walkability and enact environmentally friendly legislation. Walkability and green legislation increase property values (Choi, Park, and Dewald) and public health (Jiaqi Zhu et al. 1-9).

Are these two development options mutually exclusive? Does a city need to choose either huge brands and big box stores to grow or develop smaller, denser networks? To some extent yes, but that does not mean that there is a 'right choice' for all cities. Neither do these results mean that a big box store will help every city in the long run. The different results between West Bountiful and Lehi illustrate this point.

As shown in the previous section, West Bountiful's Costco, while impactful, could be considered to be not as effective as Lehi's. One interpretation is that while Costco can do much good, its effects (including that of the agglomerating businesses) increase taxable sales at a decreasing rate every year. This is because Costco has a limited capacity and those businesses that follow it only have so much space to crowd around Costco before there is none left. Cities then have to use the capital gained from this investment to invest in another opportunity, if that city wants to expand

economically. Lehi likely used the taxes from Costco to grow its tech start-up sector. Today, Lehi is known as the silicon slopes. West Bountiful, on the other hand, continues to be a suburb.

This difference may have been the goal. Cities are run by the people that live there. Often a city's development goals are reflected in its general plan, whether that be pro-growth or bucolic. Furthermore, general plans are extensive documents, often being updated only every decade. Current city sentiments about growth, or the current city council could feel very differently and adopt strategies reflected in the general plan.

Not every city has a large enough population to justify a densified urban core. Costcos and other big box stores can and do cater to large pockets of these communities in addition to city populations. However, there are few things that say "non-walkable" more than 2 acres of parking lot in front of a Costco. Cities with the population and desire to focus and improve walkability should therefore not use economic growth strategies involving Costco or other big box stores. As can be seen in cities across the country, the cost to redevelop car centered cities into walkable cities can be inhibitive.

On the other hand, cities are making drastic changes to make their growth types more sustainable. Cities can use big box stores to become economically valid and then transition to a different strategy. Further research may explore the transition between a city expanding wide to a city expanding tall and how big box stores, like Costco, help or hinder that process.

6. Conclusion

In conclusion, cities around the world are looking for strategies to grow and compete for population and businesses. Many cities attempt to attract larger corporations

and brands by offering tax breaks, financial backing for construction, and other incentives to entice larger populations and faster agglomerations of businesses, hoping that in the long run, these investments will pay for themselves. However, the decision to incentivize businesses needs to be carefully considered by cities as it can have significant impacts on the city's economic and social well-being.

In my analysis, I find a significant increase in sales tax revenue but no evidence of change in property values when a Costco enters a city. Given these results, I estimate that a Costco pays off its incentive package in about five years, extrapolating from Spanish Fork's experience. However, there are potential negative externalities of a Costco, such as increased traffic, trash, and noise that can affect the community's well-being.

Therefore, further research could be done to better capture these potentially underrepresented externalities inherent in big box stores, such as Costco.

Further research could also be done to disentangle the effects of the agglomeration effect and the individual effect of Costco. This analysis could be extended to measure which agglomerating stores have better externalities than others. Such research would help cities gear their economic development strategies towards those businesses that are most likely to be interested in entering the city and would best improve the city.

While these results could be interpreted as promising for the economic development of a community that is attractive to a store like Costco, a big-box-store-centered economy is not a city's only option to grow. It can choose to promote walkability and smaller businesses which could potentially increase the demand for housing as well. A city can also use a combination of these strategies, which although

difficult during transitional phases, provides many more options for city councilors and planners to ideally shape their cities to the needs of their communities.

Some concern does arise due to slight deviations between the pre-treated cities and their synthetic counterparts for Lehi. Although the Lehi and West Bountiful Costcos were built within a year of each other, they had surprisingly different results. In the case of Lehi, I do not see a significant difference between treatment and control until 2007 to 2008 at which point the control stalls and Lehi continues to climb. I do not see a significant difference from treatment of Lehi, which may indicate that those cities which were used to create the control group used strategies other than introducing Costco into their economy to increase their own taxable sales. One interpretation of the separation in Lehi in 2008 is the momentum of an agglomeration effect during an economic downturn. Perhaps the control cities' methods of growing taxable sales were not as stable as building a Costco. The stability that Costco brought to Lehi seems to have been enough to attract other businesses and steady the economy. Lehi today is known as the Silicon Slopes due to the many large tech firms located in the area.

West Bountiful tells a very different story. Like Lehi, the difference in taxable sales does not become significant until 2007 to 2008. The difference is far more drastic than that seen in Lehi. However, while Lehi seems to be an exponential relationship, West Bountiful seems to be closer to a logarithmic relationship (Figures 6 and 7). This may indicate that while Costco can do much good, its effects (including that of the agglomerating businesses) increase taxable sales at a decreasing rate every year. Like any business, Costco has a limited capacity and those businesses that follow it only have so much space to crowd around Costco before there is none left.

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