

The Economic Impact of a Walmart Store in the Skyway Neighborhood of South Seattle

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Over the course of 2012 Puget Sound Sage will be releasing a series of briefs and reports examining the impact of service sector industries on the Puget Sound regional economy.

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Executive Summary

Recent analyses conducted in support of Walmart store development plans in the Pacific Northwest are irreparably flawed by their failure to address offsetting losses in employment and employment income that would be the result of new store development in the saturated retail environments for which these projects are proposed.

Following standard practice in regional analysis, we consider the redistribution in consumer sales that would occur if a new Walmart “neighborhood market” of approximately 40,000 square feet were to open at the site of a former grocery in the Skyway neighborhood of South Seattle.

Our analysis finds evidence of significant direct and indirect impacts on the local economy associated with Walmart’s potential entry into the Skyway neighborhood grocery market and within a broader study area extending out approximately five miles from the proposed site. Specifically:

- The new grocery would shift consumption patterns in the neighborhood, diverting \$25.38 million per year in sales from existing retailers based on 2010 levels of consumer spending on groceries.
- This shift translates into a drop in the total payroll value of \$655,000 per year or 1.2% percent of the total payroll for grocery store employment within our study area.
- When the direct and indirect effects of this change are considered the impact rises to \$898,000 in lost output, roughly 6.4 fulltime jobs and \$997,000 in lost labor income.

- Although the direct impacts resulting from the renovation of the site contribute a net positive effect of \$2.67 million in economic output and \$1.12 million in labor income during construction, this is not nearly enough to offset other changes over the twenty year life of the project.
- The net present value of all changes estimated in our Base scenario over a 20 year project lifespan is projected to be a net loss of \$13.07 million in economic output and a loss of \$14.51 million in labor income.
- These losses mitigate somewhat to \$11.61 million in economic output and \$12.89 million in labor income in our Opportunity Cost scenario, in which the impacts of a new Walmart are compared to those of a generic competitor, but deepen further to \$13.73 million in economic output and \$15.24 million in lost labor income in our Consumption Growth Cost scenario in which growing consumer demand out to 2015 is also accounted for.

Overall, by properly specifying our model we are able to demonstrate that Walmart would be expected to have a net negative impact on any local community where its average wage is less than the average wage paid by existing retail competitors. Based on these findings and broader impacts not covered in this analysis but reported by credible sources elsewhere we conclude that there is no basis for treating Walmart’s arrival in a neighborhood as anything but a net loss in terms of the public good.

I. Introduction

What are the likely effects of a Walmart locating in an urban community? Who gains from the arrival of a new store and how are the costs and benefits allocated among consumers, retailers, workers, and the region as a whole? There is a burgeoning literature on this subject covering issues as diverse as traffic, health care, consumer demand, and retail sales. Although it covers just a single location in a South Seattle neighborhood, this analysis contributes to this debate by looking closely at how a new grocery store, and a new Walmart in particular, can alter consumer behavior and how this alteration can then reverberate throughout the regional economy. While the specifics of this analysis pertain to the Skyway neighborhood, the results would likely hold true in any location where Walmart's average wage paid to its workforce is lower than that of its competitors. As we will demonstrate, this difference in wages has the potential to lower the total payroll value in the area; negatively impacting not only those workers who receive their wages from Walmart, but a broader class of individuals who supply goods and services to those workers.

A fundamental motivator for this project is to provide a quantitative response to the deeply flawed methodology applied in several studies commissioned by Walmart of the effect its new stores are likely to have on a community. In recent studies for Portland, Oregon, Tacoma, Washington and Bellevue Washington, Walmart's consultants purport to show sizeable benefits accruing to the region as a result of the entry of new stores. These analyses share a common, fundamental, error in that they treat all employment, all sales tax revenue, and all other development expenditures as benefits to the region without ever considering the costs. New grocery stores in an urban setting do not increase demand; they simply reallocate



Source: C.S. Fowler Consulting

demand among grocery sellers. Walmart's impact in this case is to redistribute existing consumer demand, redistribute the collection of sales tax, and redistribute the demand for labor in the grocery and general merchandise sectors. Although redistribution is not costly in terms of the public good in and of itself, it is also not the same as creating new demand and new income, as Walmart and its consultants would have one believe. The effects tallied by Walmart's consultants tell only half the story and need to be put in the context of consumer demand as it currently exists. While Walmart may be 'creating' jobs, its competitors will have to reduce jobs or grow more slowly. In a situation where no new demand is created, entering the market is a zero sum game and all Walmart 'benefits' have to come from somewhere. To ignore the existing structure of supply and demand is a misapplication of the Economic Impact Analysis methodology Walmart's consultants

purport to use and has no justification or meaningful precedent in economics or regional analysis.

A key contribution of this analysis is to show that when an appropriate counterfactual scenario is used for Economic Impact Analysis the purported benefits of Walmart disappear. It is possible to argue over some of the finer details as to who pays what wage and how far consumers will actually travel to buy discount goods. The fact remains, however, that any policy decision related to Walmart's development plans needs to be made with both the development and counterfactual scenarios accounted for. When this comparison is made appropriately, the sizeable benefits attributed to Walmart development in its recent studies are simply unattainable.

II. Study Framework

The purpose of this study is to consider the impacts of a new Walmart grocery store sited at the intersection of 68th Ave South and Renton Avenue South in the Skyway neighborhood of South Seattle. The site is presently unoccupied, but has served as a grocery store in the recent past.¹ This site was selected for analysis after communications between community leaders and local government officials indicated that Walmart might be taking the preliminary steps necessary to open a store here. More broadly, Walmart has made clear its intentions to expand in the urban areas throughout the Puget Sound region with recent announcements related to sites in Bellevue, Lynnwood, and Tacoma. This study is illustrative of an appropriate methodology for analyzing the impacts of Walmart and suggestive of the kinds of costs these new stores could be expected to impose on the region in any of its proposed new locations.



View from Skyway neighborhood looking east to Lake Washington.
Source: C.S. Fowler Consulting LLC

This Economic Impact Analysis compares conditions in which Walmart opens a grocery-only store on the Skyway site with a counterfactual condition in which no store is opened on the site. The mechanism by which these two possible conditions are compared is a gravity model that estimates food sales at each of the 375 grocery stores in a 10 mile radius extending out from the proposed site under the two different conditions. With the total consumer budget for food fixed we are thus able to see who the winners and losers are as a result of Walmart's entry, and to calculate broader impacts from these results.

The analysis presented here can be meaningfully understood in six parts:

- Collection and preparation of pertinent data, including consumer spending, competitor locations and employment, and wages in the study area;
- A gravity type model to estimate change in consumer behavior;
- A set of calculations to convert changed consumer behavior into an expected change in the total payroll value for grocery store employment;
- A further set of calculations using the Washington State Input Output model to estimate direct, indirect, and induced impacts of this change in the total payroll value;
- Calculation of construction effects

associated with the remodeling of the Skyway site immediately or in the near future; and

- A conversion of estimated direct, indirect, and induced impacts into Net Present Value based on an assumed twenty year project lifespan.

Each of these steps is presented in detail in the appendices of this analysis.

In addition to the basic steps listed above, this analysis offers several variations on the base ‘with Walmart/without Walmart’ scenario already described. These alternative scenarios explore two further considerations in order to clarify that it is Walmart’s lower wages that drive the negative effects modeled here, not its role as a new competitor. In the first of these scenarios, referred to hereafter as the “Opportunity Cost” scenario, we compare the impact of a Walmart locating in Skyway with the anticipated impact of a generic grocery competitor at the site. This scenario demonstrates that the costs to the region are almost entirely a function of Walmart’s wage differential as compared to other grocery stores. In our second alternative scenario, referred to as the “Consumption Growth” scenario we examine the argument that Walmart is just responding to growing demand for groceries in the region. Walmart’s consultants have accurately claimed this growth in consumer demand as a mitigating factor to offset some of the sales lost at competitor stores. Nevertheless, their additional assumption that Walmart jobs should be counted as regional benefits would have us believe that Walmart is the **reason** for increased demand; an entirely different and completely inappropriate claim. In this scenario we are careful not to attribute regional growth to Walmart’s entry, thus making it clear that future growth in consumer demand magnifies the impacts derived in the other scenarios rather than eliminating them.

This study is intended to offer an ‘apples to apples’ comparison with studies produced in support of Walmart’s activities in the region. These studies focused heavily on the assumed benefits of job creation and construction and so we do as well. That said, there are numerous other externalities associated with Walmart’s presence in a community. While these impacts extend beyond the scope and purpose of this study, they are still relevant to a regional conversation and we do discuss them in more general terms in the conclusion. From public health care costs to far-reaching changes in retail employment and wages, these issues would likely add considerably to the overall regional effect even if the difficulty inherent in measuring and modeling them exceeds the scope of this analysis.

In the following section we present some background on the Skyway neighborhood and the proposed site. In the fourth section we report the results of our analysis including several sensitivity analyses related to our assumptions about wages. The fifth and final section summarizes our conclusions including results from the literature that, while outside the scope of this analysis, are likely relevant to a complete assessment of the impacts of the proposed site. Detailed reporting on the data and methods employed in this analysis are provided in Appendices A and B.

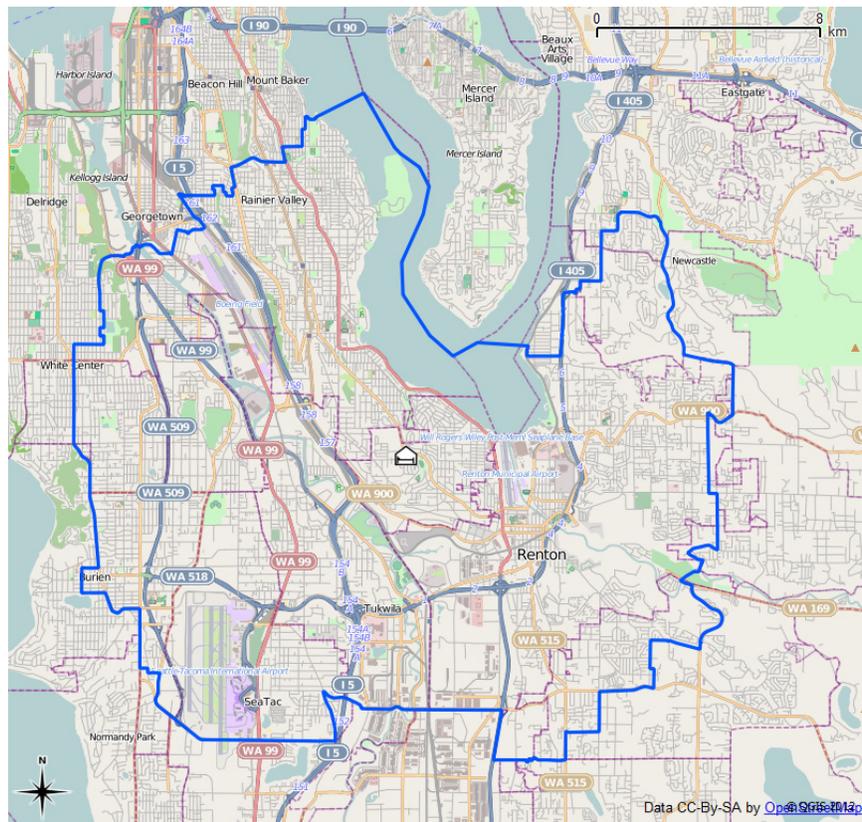
III. Background

The Skyway neighborhood in South Seattle lies perched on a hill just north of Renton and is defined by steep slopes leading down to Lake Washington to the east and I-5 to the west. It is a predominantly single family residential neighborhood with one main commercial thoroughfare along Renton Avenue South.

The Site

Located in the center of the Skyway neighborhood, the site of the Skyway Park Shopping Center at 11656 68th Ave South is currently being considered for re-development. As noted above, there is sufficient reason to believe that the next store to locate on this site may be a “neighborhood market” (grocery emphasis) Walmart store. Although the details of such a store are not yet known, this is a reasonable opportunity to test the economic impacts of such a store on patterns of consumption in the neighborhood and on the subsequent changes in employment, wages, and related direct and indirect effects that cascade from consumer choices about where to shop. Whether or not Walmart decides to pursue this site, our analysis should help to define the regional conversation about Walmart’s impact on the community in terms that more completely and accurately reflect economic realities and the public interest.

Figure 1. Study Area: Five mile radius from site using Census 2010 block group boundaries and OpenStreetMap (www.openstreetmap.org).



Study Area

Although its stark geographic boundaries give Skyway a unique character, for the purposes of this study we need to consider not only the residential and commercial center of the neighborhood, but the surrounding commercial areas that provide residents with jobs and retail opportunities. This broader study area, encompassing a region, extending out five miles from the proposed grocery

Table 1. Demographic Change in King County, Seattle, and Study Area (Source Census 2000 and 2010 Summary File 1).

	Total Population	Percent White	Percent Black	Percent Asian	Percent Hispanic	All Other	Median Age	Average Household Size
King County 2000	1,737,034	73%	5%	11%	5%	5%	30.0	1.9
King County 2010	1,931,249	65%	6%	14%	9%	6%	27.1	1.7
King County Change	194,215	-8%	1%	3%	4%	1%	-2.9	-0.2
Seattle 2000	563,374	68%	8%	13%	5%	6%	32.8	1.9
Seattle 2010	608,660	66%	8%	14%	7%	6%	29.6	1.7
Seattle Change	45,286	-2%	0%	1%	2%	0%	-3.2	-0.2
Study Area 2000	226,585	51%	13%	20%	9%	7%	35.80	2.64
Study Area 2010	250,949	40%	15%	23%	14%	7%	37.11	2.69
Study Area Change	24,364	-11%	2%	3%	5%	0%	1.31	0.05

site, represents the target market for a major grocery facility located in Skyway as well as the full markets of most of that grocery's competitors.² The study area captures the areas where we expect to see changes in consumption as a result of a new Skyway store. The study site, study area, and the surrounding region are shown in Figure 1.

Demographics

The community defined by our study area has seen substantial population growth in the last decade with a net increase of some 24,000 individuals; roughly 11%. Detailed information regarding the changing demographics of our study area is presented in Table 1.

Economic Impact Analysis

Economic Impact Analysis (EIA) is a tool for estimating the impacts that a proposed policy or development could be expected to have on a region. It functions by separating out a proposed action case and a counterfactual case and quantifying the difference between them. As a tool, Economic Impact Analysis has been in wide use for decades, and its basic analytic framework is well-established.³

One of the greatest challenges in conducting an economic impact analysis is establishing the basic parameters of comparison in a way that balances the complexity of changes taking place, uncertainty in the available data, and the simplicity necessary to make results interpretable. To achieve this balance in this analysis we pursue four scenarios and a number of sensitivity analyses. The four scenarios are:

- *Base scenario.* The most straightforward comparison is to simply conduct a what-if experiment comparing conditions as they are today with conditions as they would be if Walmart opened a store tomorrow. The pie (consumer demand) is a fixed size, how big is each grocery seller's piece today, how big would their pieces be if



Skyway Mart. Located in the commercial area of the neighborhood just south of the proposed site. Source: C.S. Fowler Consulting LLC.

Walmart was also taking a piece?

- *Opportunity Cost scenario.* A grocery store closer to the center of the Skyway neighborhood would be more convenient for residents, and one might well locate there in the next few years if Walmart goes elsewhere. However, if Walmart were to locate at the Skyway site it is unlikely that another retailer would try to open a grocery in the vicinity for some time. It is therefore reasonable to compare the effects of Walmart building on the site with an alternative case where a different grocery begins operations on the site. Assuming the pie is going to be divided into additional pieces, how does Walmart's presence compare to that of a generic competitor?
- *Consumption Growth scenario.* Given observed population growth in the Skyway neighborhood, it is unrealistic to assume that consumer demand remains unchanged. In the context of growing demand it may be the case that almost every grocery seller can grow, even with a new entrant like Walmart taking a significant portion of the increased sales. Nevertheless, we have to be careful not to treat the benefits of growing consumer demand as a function of Walmart's arrival, but as exogenous. As such we model future consumer behavior without

Walmart and compare it to conditions where Walmart is present. Functionally, this does not alter the distribution of consumer demand from our Base scenario in terms of share, but simply magnifies any effects.

- *Consumption Growth, Opportunity Cost scenario.* Given growth in consumer demand, it is even more likely that another grocery store would begin operations on the Skyway site if Walmart were not there. This scenario combines the assumptions made for the Opportunity Cost and Consumption Growth scenarios above.

In addition to these four basic scenarios, there are several areas where uncertainty in the available data suggests the need for more extensive testing. In particular, Walmart's capacity to capture sales from existing retailers and the appropriate values for wages paid to grocery store employees both need to accommodate some uncertainty. These areas and reasons for uncertainty are presented in Appendix A.

In contrast to the scenarios sketched out above, Walmart's own studies⁴ make the assumption that their new store will:

- Fill unmet demand (people would buy more groceries if only they could find a place that was selling them)
- Create new demand (people will want to spend more of their income on groceries once they see the products Walmart has to offer)
- Capture demand that is currently "leaking" out of the region (people are buying their groceries so far away that we should treat those sales as taking place in some competing region and as dollars leaving the local economy.

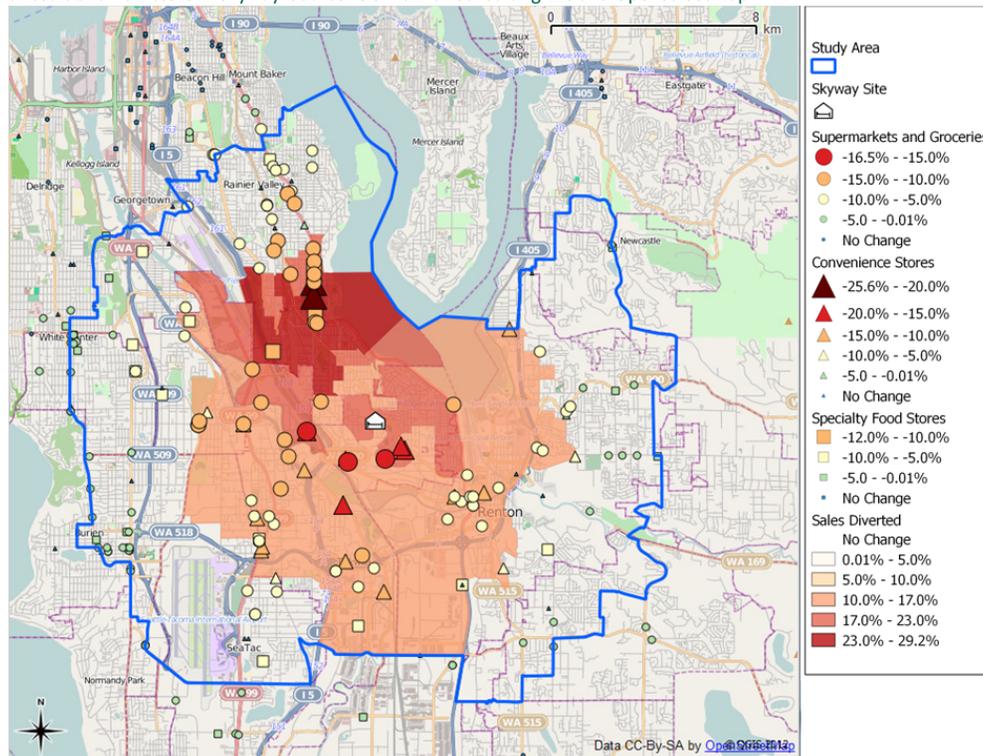
These assumptions are not valid. As to the first assumption, people need to eat and so

they will acquire groceries (in the case of this study area there are over 300 retailers offering groceries within a ten mile radius). As far as the second assumption is concerned, Walmart's business model is based on competition over price, not unique products, meaning that consumers already have the ability to buy everything Walmart sells from another retailer.

The third assumption listed above bears some additional comment because of its prominence in reports prepared for proposed Walmart developments in Bellevue and Tacoma. The assumption that retail sales are leaking out of a region is only meaningful if we define the region in terms of some sort of coherent unit that can be understood to be in competition with its neighbors. "Capture" in this context assumes that the public good in one region will be advanced by retaining economic activity within its boundaries and that the public good of the nearby region losing these sales is not of importance. Walmart's consultants make much of supposed "leakage" into and out of regions defined by zip codes. Zip code boundaries are defined in support of mail delivery and have absolutely no relevance with respect to economic regions. Within urban areas the arbitrary shapes and small size of zip codes compound this problem. We would absolutely expect to see people buying goods and services across zip code boundaries as people cross these boundaries constantly within the course of their daily movements within the city. Whether one zip code has higher sales of groceries than another is completely irrelevant from any sort of economic analysis of the public good.

While the assumptions of unfulfilled, created, or captured demand are arguably appropriate (and often used) for studies analyzing the impact of a new sports stadium where none has existed or a manufacturing facility that sells its product outside of the

Figure 2. Base, Opportunity Cost, and Consumption Growth scenario changes in consumer behavior and retail sales as a result of a new store in Skyway. Source: C.S. Fowler Consulting LLC and OpenStreetMap.



region, they have no place in an analysis of grocery or general merchandise stores. Instead, the appropriate model is to assume that consumer demand is fixed and that the addition or loss of competitors will result in a process of redistribution.

This study sets out to model the scenarios above using the standard toolkit of economic impact analysis. By identifying changes in consumer behavior from existing conditions we can quantify impacts at local retailers and calculate broader impacts that would result, primarily as a result of lower wages paid to Walmart employees. Compared to the studies produced by consultants in support of Walmart’s actions in Portland and in Tacoma, this analysis reveals significant costs associated with Walmart’s entry into the local grocery market.

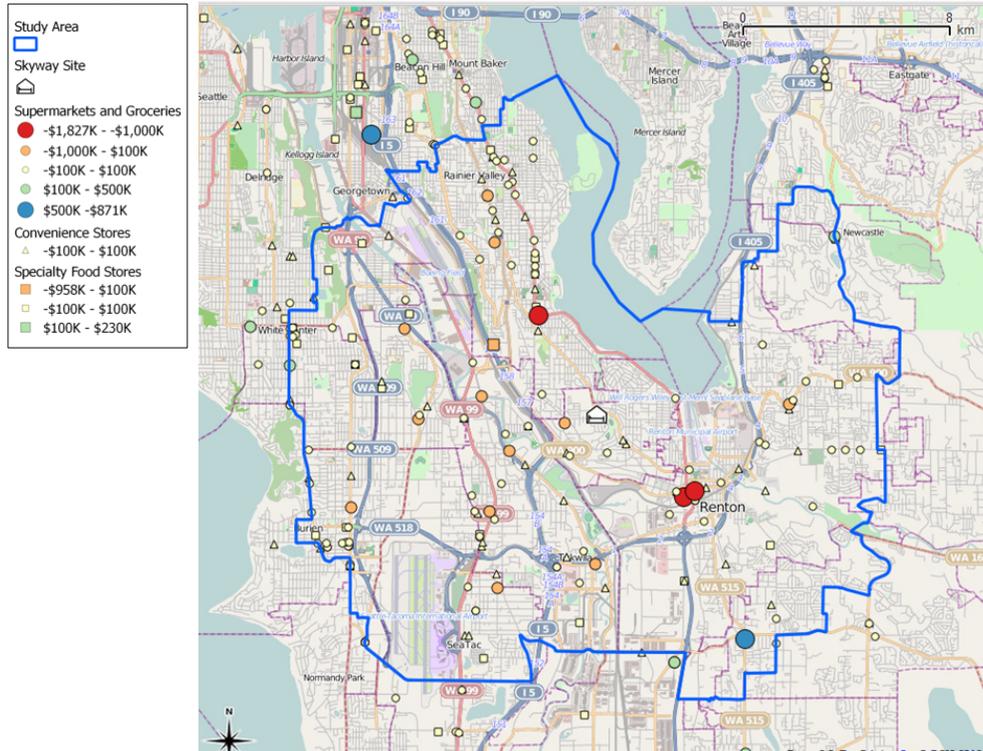
IV. Results

Our analysis finds evidence of significant

direct and indirect impacts on the local economy associated with Walmart’s entry into the Skyway grocery market. The new Walmart grocery shifts consumption, diverting \$25.38 million per year in sales from existing retailers in our base scenario. This translates into a drop in the total payroll value for all food sellers in the area of \$655,000 per year or 1.2% percent of the total payroll value for grocery store employment within our study area.

When the direct and indirect effects of this change are considered, the impact rises to \$898,000 in lost output, roughly 6.4 fulltime jobs and \$998,000 in lost labor income. Although the positive impacts associated with redevelopment of the physical site contribute a direct positive effect of \$2.67 million in economic output and \$1.12 million in labor income in the first year, this is not nearly enough to offset other changes over the twenty year life of the project. The total impact of all changes estimated in our Base

Figure 3. Consumption Growth scenario, change in sales by retail establishment 2015 with grocery at Skyway site minus 2010 base case (no grocery at Skyway site). Source: C.S. Fowler Consulting LLC and OpenStreetMap.



scenario over a twenty year project lifespan is projected to be a net loss of \$13.07 million in economic output and a similar loss of \$14.51 million in labor income. These losses mitigate somewhat to \$11.61 million and \$12.89 million respectively in our Opportunity Cost scenario, but deepen to \$13.73 million and \$15.24 million in our Consumption Growth scenario.

Changing Consumption Patterns

Our Base scenario comparing consumption patterns with and without Walmart present gives an indication of where consumers would be most affected and which existing grocers would see the greatest impact on their sales.

Figure 2 shows the share of consumption directed to the new Walmart facility by block group as well as the locations of the most affected retailers. As expected, the hardest hit locations are small convenience stores and grocers that do not have the size to attract consumers in the face of a major competitor. Many of these specialize in

serving specific minority communities and may do better than predicted due to the specialized nature of some of their goods. Conversely, if these stores cannot survive in the face of competition from Walmart their loss may have a disproportionate impact on the communities they currently serve. Also of interest in Figure 2 is the scale of the impact. The biggest changes are in sales are as high as 25.6% for convenience stores and 16.5% for supermarkets and groceries; a magnitude that is easily enough to jeopardize retailers operating on very fine profit margins as is common in the grocery business.⁵ Estimating closures or other major changes is beyond the scope of this study, and growth in consumption will mitigate some of these effects as we will see below, but the loss of several existing retailers is certainly a strong possibility given these changes.

In our Opportunity Cost scenario we assume, for comparability with our Base scenario, that the grocer operating at the Skyway site is of a size with the modeled Walmart store. This

means that, for the purposes of the gravity model, these two scenarios are identical up to this point. A Safeway, a Red Apple, an Uwajimaya, or any large grocery seller would all impose identical costs on competing retailers in terms of lost sales if they were to begin operations at the Skyway site. Demand is fixed and if more stores are serving customers that demand will be distributed differently. We make this observation to clarify that our modeling is not intended to assert that competition in the grocery industry is the problem, or that the impacts calculated below are a function of Walmart's ability to capture sales. The impacts below are a function of Walmart's low wages, and it is that difference that makes Walmart's presence a point of concern.

Our Consumer Growth scenario inflates consumer spending evenly for all block groups in our study area. As a result, the percent change values from the gravity model are identical to those modeled for the Base and Opportunity Cost scenarios and can be read off of Figure 2. What changes in the Consumer Growth scenario is the size in dollars of those changes.

Figure 3 shows the difference in sales by store between our Base scenario (without a grocer at Skyway) and our Consumer Growth scenario (with a grocer at Skyway). In this

Figure we can see that many retailers would be expected to recover their present day sales as demand increases, assuming that the affected retailers can last long enough to take advantage of this growth. There are, however, a notable number of groceries and supermarkets who fail to recover the sales modeled in the Base scenario; still showing negative values for change in sales between 2010 and 2015 in Figure 3. Their low performance is particularly notable because of its contrast with the retail location on the periphery of our study area where the impact of Walmart is significantly lower. Many of these border establishments show marked growth in this five year period based on predicted growth during this time period.

To be clear, the change shown in Figure 3 is the *economic impact of increased consumer demand*, it is not the economic impact of a new store arriving at the Skyway site. This distinction is important because the studies Walmart has commissioned assume that jobs created in response to increased consumer demand should be credited to Walmart as benefits when, in fact, Walmart is not the source of these jobs-- population growth is. Going forward, our Consumption Growth scenario correctly measures changes that are larger in absolute value but still proportionate to our Base and Opportunity Cost scenarios as shown in Figure 2.

Table 2. Wages, Employment Change, and Total Payroll Value Associated with Diversion of Sales to Walmart. (2010 Dollars)

	Average Hourly Wage	Estimated Employment Change (FTE)	Total Payroll Value Change (millions)
Walmart	\$12.08	94.92	\$2.39
Supermarket and Grocery	\$15.03	-86.30	-\$2.70
Convenience Store	\$13.43	-0.39	-\$0.01
Meat markets	\$19.31	-6.39	-\$0.26
Fish and seafood markets	\$22.61	-0.88	-\$0.04
Fruit and vegetable markets	\$16.98	-0.97	-\$0.03
Total		0.00	-\$0.66

The Direct Impacts of Lost Labor Income

The reallocation of retail sales resulting from the arrival of a new grocery store in the Skyway neighborhood is not, in and of itself, a bad thing from an aggregate impacts perspective. The changed competitive environment would negatively impact a number of local groceries and convenience stores with real human consequences.

Table 3. Direct Impacts to Total payroll value by scenario (2010 Dollars)

Scenario	Direct Wage Impact
Base	-\$655,000
Opportunity Cost	-\$582,000
Consumer Growth	-\$688,000
CG and OC	-\$611,000

Nevertheless, in strictly economic terms, these effects can no more be considered costs than the diverted sales at Walmart can be considered benefits. There are unmeasured benefits such as lowered costs in time spent traveling to get groceries for a significant portion of the population in the neighborhood, but on the whole diversion is appropriately treated as costless from an economic impact perspective.

Where the diversion of sales does become important is when we begin to consider the significant differences in wages paid to employees at Walmart as opposed to its competitors. The average hourly wage paid

To calculate the impact of the difference in hourly wages we first convert the change in sales at each of the stores within our model into Full Time Equivalent Positions. Using average sales per employee of \$267,405⁷ we develop the employment equivalencies shown in Table 2, Column 2. Note that the overall employment is assumed to remain constant, a natural result since consumer demand was fixed. Given the estimate for Walmart’s diversion of sales to the Skyway site we would expect to see an increase of roughly 95 Full Time Equivalent positions at the new store generating a total payroll value of about \$2.39 million on an annual basis.⁸ At the same time, we would expect to see a shift away from employment in existing groceries and supermarkets amounting to 86.3 Full Time Equivalent positions, reducing the total payroll value for these establishments by \$2.7 million, or about 5% of the total wages paid at grocery stores within the study area. Employment losses at other stores

would combine for an additional 8.7 employees and \$1,000,000 in lost wages bringing the total direct wage impact in our Base scenario to a loss of around \$660,000 per year for as many years as the

wage differential between Walmart and other grocery stores remains at its current levels.

Table 4. Aggregate Impacts (Direct, Indirect, and Induced) (in 2010 dollars)

	Output (millions)	Employment (jobs)	Labor Income (millions)
Base	-0.90	-6.43	-1.0
Opportunity Cost	-0.80	-5.71	-0.89
Consumer Growth	-0.94	-6.75	-1.05
CG and OC	-0.84	-5.99	-0.93

to a Walmart hourly employee (controlling for the share of the workforce that is full- and part-time) is \$12.08. In contrast, the average hourly wage paid to a union-represented grocery store associate (excluding premiums like overtime, holidays, etc for comparability) is \$15.03, just under \$3/hour more. If we were to add the value of wage premiums associated with paid leave and overtime (but still excluding health and retirement benefits) paid to the workforce the average hourly wage difference could easily go up by another \$2/hour, adding approximately 60% to the direct impacts calculated below.⁶

The results shown in Table 2 are highly dependent on the results of the gravity model. A ten percent increase or decrease in Walmart’s sales compared to that predicted in our Base scenario would alter the direct impacts on the total payroll value by \$66,000. More importantly from a public policy perspective is the clear connection between Walmart’s lower wages and a negative impact to the community. As long as this gap remains, Walmart’s operations will always

result in costs of some magnitude and can never result in benefits.

Our Opportunity Cost scenario further clarifies this relationship. The direct impact to wages when we compare a scenario with Walmart operating at the Skyway site with a scenario in which some generic competitor is operating a similarly sized store is -\$582,000. Slightly lower than the impact from our Base scenario, this result is driven by the fact that grocery stores have a lower average wage than any of the specialty food stores (see “Average Hourly Wage” in Table 2) and a grocery at Skyway paying the average wage would generate a small negative effect compared to no development. Any large grocery locating at the Skyway site is going to attract revenue from some of these stores and lower the total payroll value somewhat. Nevertheless, these employers are relatively small compared to grocery store employment (compare the change of 86.3 employees lost at groceries to the 0.88 lost at fish and seafood markets) and their aggregate effect is not large. This scenario clearly indicates that our measured impacts are not a function of increased competition in the retail grocery industry, but once again, a function of Walmart’s low wages.

The Consumption Growth and Consumption Growth with Opportunity Cost scenarios simply reinforce the findings discussed above, with projected growth in consumer demand perhaps mitigating some of the impacts to retailers, but ultimately also increasing the direct impacts by about \$30,000 per year over our Base and Opportunity Cost scenarios.

Other scenarios are possible. In particular, we have good data on wages at supermarkets operating under union contracts suggesting that those stores pay their workers a significant premium (again, not including off-the-check benefits such as health insurance and retirement) that is not accounted for in our wage numbers.⁹ If, as union data suggests would be reasonable, we selectively add \$2.22 to those store locations that are already operating under union contracts to reflect the value of premiums accruing to workers at these locations then the negative effects in our Base scenario deepen to -\$948,000. We retain the Base scenario for its comparability with estimates produced by Walmart, but this wage differential is just one area where reasonable, but slightly less conservative assumptions could significantly increase overall impacts.

Table 5. Net Present Value: One-time and Ongoing Effects (in millions of 2010 dollars)

	Direct Impacts	Aggregate Employment	Net Present Value	
			Output	Labor Income
Ongoing Impacts				
Base Scenario	-\$655,000	-6.43	-\$13.07	-\$14.51
Opportunity Cost	-\$582,000	-5.71	-\$11.61	-\$12.89
Consumption Growth	-\$687,000	-6.75	-\$13.73	-\$15.24
CG + OC	-\$611,000	-5.99	-\$12.19	-\$13.54
One time Impacts				
Construction Cost	\$2.67	31.61	\$4.21	\$1.71
Smaller Store Opens After Five Years	\$1.57	18.47	\$1.15	\$0.44
Difference in NPV based on different size and five year delay			\$3.06	\$1.27
Combined Net Present Value				
Base Scenario, plus Delayed Construction			-\$10.01	-\$13.24

Indirect and Induced Effects of Lowered Labor Income

Standard practice in economic impact analysis is to account for indirect and induced effects associated with the change being modeled. Specifically, when the wages paid to grocery workers are lowered in the aggregate, their reduced spending power lowers income for merchants and others who produce goods and services that they consume. Labor income has powerful multiplier effects within the Washington economy, accounting for an estimated 2/3rds of the overall multiplier effect in the Washington State Input Output Model.¹⁰ As such, when we introduce the \$660,000 drop in labor income the model indicates an aggregate economic impact of \$900,000 in lost output and \$1,000,000 in lost labor income, as well as a loss of roughly 6.4 full time jobs. These aggregate effects can be understood as the total yearly impact of Walmart's decision to site a store in the Skyway neighborhood.

Construction Effects

One-time investment in the renovation of the Skyway from its current size up to a 40,000 square foot facility is expected to add a one-time direct benefit of \$2.67 million in added output, \$1,120,000 in labor income, and 20 jobs into the regional economy rising to \$4.21 million in output, 31.6 jobs, and \$1.7 million in labor income when direct, indirect, and induced effects are compared with the no-action scenario.¹¹ While these effects are relatively large compared to the wage effects previously discussed they are one-time effects rather than annual effects. Moreover, it is reasonable to assume that some alternative renovation of the Skyway site is likely to occur in the near future if Walmart does not choose to develop there. In this case we make a conservative assumption that a different tenant would not expand the site to the extent that Walmart intends. Nevertheless, these direct benefits are largely canceled out

once we frame our results within the context of net present value.

Sales Tax Revenue

Previous analyses by Walmart have also included benefits accruing to the region as a result of sales taxes collected at Walmart stores. We mention this for completeness, as (with food exempt from sales tax in Washington state) sales tax revenues associated with a grocery store are likely to be small regardless, but as we assume that Walmart has no impact on total demand but only redirects existing demand it is clear that sales taxes would be identical under any of the scenarios created here.

Net Present Value

In order to fully account for the differences between one-time and ongoing effects it is necessary to calculate the complete value of these effects over the probable lifetime of the proposed project. For this study we employ a twenty year project lifetime with a 6% discount rate and 3% inflation assumption. These numbers are largely chosen for consistency with previous studies and are fairly conservative.

As indicated in Table 5, the Net Present Value of Walmart entering the retail market at the Skyway location is likely to be a net loss of roughly \$13.07 million in economic output and \$14.51 million in labor income when the direct, indirect, and induced effects are taken into consideration over the twenty year life of the project. When the one-time benefits of construction are factored into the analysis the negative impact is mitigated somewhat to \$10.01 in lost economic output and \$13.24 in lost labor income. Although a relatively small effect from the perspective of regional economic change, this negative effect unequivocally indicates that there is no net economic benefit to be had from Walmart's development efforts.

V. Concluding Remarks

This study has demonstrated that the impact of Walmart's decision to develop a grocery store at the Skyway site in South Seattle would be a net loss to the regional economy of \$10.01 million in economic output and \$13.24 million in labor income. These impacts stem from the low wages Walmart pays to its hourly associates compared to the wages earned by comparable employees of existing retail grocery stores. The difference in wages, which we estimate to be at least \$3 per hour, has the capacity to impact not only the workers themselves, but also the people from whom they purchase goods and services.

The findings of this study are in marked contrast to purportedly similar studies conducted on Walmart's behalf. Those studies erroneously claimed as benefits employment and output effects that were, in fact, the result of the redistribution of existing consumer demand. There is absolutely no basis for making such claims with respect to consumer demand for groceries, and a key goal of this analysis was to outline the appropriate metrics by which this reallocation of consumer demand could be judged with respect to regional economic change. While the details of neighborhood level consumer spending decisions and local wage differentials could be expected to vary from location to location, the larger message that, as long as Walmart's average wage is lower than its competitors it will have a negative net effect on a regional economy, is not likely to change.

In order to provide an 'apples to apples' comparison with Walmart's own economic impact studies, this analysis refrained from incorporating a number of additional costs that would probably increase the measured negative effects substantially. These additional costs range from impacts to the

local health care system to increased traffic impacts and are drawn from an increasingly sophisticated and peer reviewed literature that has grappled with the broader topic of Walmart's impact on the economy. We briefly address some of these issues below.

Employment Impacts: A key assumption of this analysis is that employment in the grocery industry is directly linked to sales at a given store. We assumed that labor productivity was constant across all retail locations and that the total number of jobs in the industry would be exactly the same before and after Walmart's arrival. In fact, this direct relationship is likely to be bumpy and uneven as stores vary their response to increased competition. Looking at employment change on a broader scale there is some evidence to suggest that employment may actually drop significantly at the county level in response to Walmart's entry into a market.¹² The best evidence to date suggests that each Walmart employee replaces 1.4 retail employees in the medium to long-term. If applicable in this context, the direct impacts from the Base scenario would jump from a loss of \$655,000 to a loss of \$1,340,000 with proportionate increases in indirect and induced costs as well.

Wage Differences: The difference between wages paid to Walmart employees and those paid to associates at competing grocery stores is the source of all of the negative impacts covered in this analysis. As mentioned previously, this analysis did not take into consideration differences in premiums such as health care, retirement, overtime, paid holidays and other benefits offered to workers under union contracts. Although the differences are likely substantial, it is impossible to quantify the extent to which these benefits are paid to Walmart employees. The extent to which these premiums increase the effective wage gap would, of course, significantly increase

the estimated impacts. On a related note, several studies examining wages of Walmart employees indicate that many Walmart employees earn far less than the \$12.08 average wage assumed for this study.¹³ Depending on the distribution of hiring and firing as established employees lose jobs and Walmart takes on new hires it is not unreasonable to expect that jobs from the higher end of the wage distribution might be replaced with jobs from the lower end of Walmart's distribution. Although difficult to quantify, this dynamic would substantially increase the total payroll value difference between our scenarios and increase overall negative effects.

Health Care and other Safety Net Programs:

Credible evidence from California indicates that the employees of Walmart and their families utilize taxpayer funded health services at a rate 40% higher than that for employees of other large retailers.¹⁴ This pattern seems likely to hold true in Washington state; the number of Wal-Mart employees (or their dependents) in the state receiving taxpayer-subsidized health coverage far exceeds that for any other company.¹⁵ It is not possible to translate this utilization rate in exact terms since it is unclear what percentage of retail workers currently use

taxpayer-funded health programs, but with an estimated transfer of 95 FTE employees from existing retailers to Walmart it seems reasonable to assume that at least a few additional individuals or their families would access safety net health care programs as a result of this transfer. Washington's Office of the Insurance Commissioner has extensively documented the costs to the public of covering individuals and families who do not have access to health insurance both in the form of tax expenditures and higher premiums on insurance plans.¹⁶

The impacts of Walmart's proposed development extend well beyond the measures covered in this analysis. Although difficult to quantify exactly, the bulleted items above point to the larger context in which the development proposal for a new Walmart store needs to be considered. From health care to policing, Walmart functions by gaining economies of scale where it can and externalizing as many costs as possible. This may be a good business strategy for Walmart, but a review of the literature and the new analysis presented here suggest that it is far from beneficial for the communities that play host to this expansion.

Appendix A: Data Sources and Validation

This appendix is intended to provide the interested reader with technical details related to the selection of data sources for this analysis. It is also intended to supply sufficient detail to permit replication of these findings. A summary of the sources described herein is presented in Table A-1 below.

Study Area

Our analysis begins by defining a study area extending out ten miles in every direction from our site. This is substantially larger than is necessary given the density of grocery stores in Seattle, but it allows us to start with the broadest possible region and calibrate our model inward without collecting additional data. Within this study area we have information on all of the grocery, convenience, and specialty food stores that could potentially compete with the proposed Walmart location for consumers. According to the Food Marketing Institute’s 2011 report, very few consumers patronize grocery stores more than five miles from their home and we suspect that this is especially true in urban markets like Seattle.¹⁸ As noted in Table A-1 our store location data comprises some 313 establishments including 174 supermarkets and grocery stores, 85 convenience stores, and 54 specialty food stores (mostly meat,

fish, and produce markets). The data also include employment at each of these locations. Although the scope of this report did not permit a thorough vetting of the completeness and accuracy of these data, cross-validation with union-provided data on grocery store locations as well as a site visit confirms the suitability of the data for these purposes.

Consumer Spending

Within our study area we also create a smaller region extending out roughly five miles from the proposed site (the blue outline delineated in Figure 1 on page 2). For this study area the true five mile boundary was modified to exclude several block groups on Mercer Island whose actual travel distance to the Skyway site exceeded five miles.¹⁹ This smaller radius defines the boundary for our consumer behavior data; these are the potential customers of a Walmart grocery whose spending decisions we will be modeling. Drawn from ESRI’s Business Analyst Online data set, our consumer spending data comprises some 185 Census block groups and estimates household expenditures on Food at Home for both 2010 and 2015. Once again, this five mile consumer area represents a reasonable maximum distance where we might expect to see some change in consumer behavior. In practice, our calibration of

Table A-1: Data Sources

Name	Observations	Year	Source
Locations and Employment for Food and Beverage Stores	313 locations		
Supermarkets and other grocery	174 locations	2010	ESRI Business Analyst Online
Convenience Stores	85 locations		
All other food and beverage stores	54 locations		
Consumer Spending on Food at Home	185 block groups	2010 and 2015	ESRI Business Analyst Online
List of stores under UFCW contract	313 locations	2012	
Hourly Wage Data for Grocery and Supermarkets		2009	
Store Square Footage and Annual Sales	52 locations	2010	Chain Store Guide ¹⁷
Construction Cost Per Square Ft.		2011	City of Lynwood Public Records Request
Hourly Wage Data for NAICS 445		2010	Employment Security Dept./Walmart

the gravity model (described in Appendix B) yields a much smaller effective area of impact, extending out from the site about 3 miles.

Gravity Model

The gravity model allocates consumer spending on Food At Home among the retail locations in our study area. The model operates roughly on the principles of gravity as put forward by Newton. Specifically, a grocery store will attract more spending the larger it is (equivalent to mass in Newton’s equation) and a grocery store will have a stronger attractive force the closer consumers live to it (distance in Newton’s equation). Based on these simple principles we can allocate consumer spending within our study area based on the retail choices available to consumers. This, in turn, tells us which consumer areas are most likely to change their behavior and which retail locations will see the greatest effects of a new store entering the retail market. The full details of this model are explained below in Appendix B.

Wages

Wage data comes from three sources, Walmart’s own reported average hourly wage (which includes hourly but not salaried managers), a custom tabulation of average hourly wages by the Washington State Employment Security Department²⁰, and calculations based on 2009 UFCW Local 21 contract data. The disparate sources and disparate calculations within values necessitate further explanation.

The grocery industry exhibits an astonishing range of staffing practices that make

Table A- 2 Estimated Average Hourly Wage (in 2010 dollars)

	NAICS	Average Hourly Wage
Employment Security Department	Supermarket and Grocery	\$17.91
	Convenience Store	\$13.43
	Meat markets	\$19.31
	Fish and seafood markets	\$22.61
	Fruit and vegetable markets	\$16.98
Walmart	Job class	
	Full-time (60% of workforce)	\$12.47
	Part-time (40% of workforce)	\$11.50
UFCW 21	Weighted average hourly wage (excluding premiums for consistency with other sources)	\$15.03

comparison of average wages challenging. First, there is a significant divide between the wage rate of full time and part time workers even before calculating differences related to “premiums” ranging from overtime and holiday pay to health care benefits. This requires differentiating between these classes of worker and making assumptions about the share of the workforce employed in each class. Second there is a significant portion of our Food Store data set made up of small family-run groceries reporting no employees where we expect that average wage is not a meaningful concept. Third, average wage is reported to the State of Washington by industry code rather than occupation so that store managers are grouped with cashiers.²¹

Walmart reports average wage for its part-time and full-time associates, including non-salaried managers and provides an estimate of the typical distribution of part-time to full-time employment (40%/60%) in their stores. In contrast, the Employment Security Department collects data on the number of hours worked by each employee, and was therefore able to calculate average hourly wage per Full Time Equivalent (FTE) position. Unfortunately, this data includes salaried managers and other personnel not included in Walmart’s calculations. While the effective difference is likely to be small for smaller



Saar's Market Place in Rainier Beach is one of the locally-owned groceries whose sales are heavily impacted Source: C.S. Fowler Consulting LLC

groceries and convenience stores where fewer salaried managers would be expected, the difference is potentially significant for large grocery stores. Finally, UFCW Local 21 was able to calculate an average hourly wage for all employees, including many hourly managerial positions, in unionized stores in the Puget Sound Area. Given the density of unionized groceries in this area and their likely effect on wages at their competitors, this is likely the most accurate representation of wages paid to workers in the stores within our study area. For our analysis we use Walmart's numbers for its employees, Employee Security Department estimates for convenience and specialty stores, and UFCW Local 21's numbers for groceries and supermarkets.

Estimate Effects on Employment and Wages

To estimate the effects of change in consumer spending we need to translate our results into employment, and from there into wages. Productivity data for the grocery industry suggests that annual sales per Full Time Equivalent is in the range \$232,000 to \$303,000 with a mean productivity of \$267,405.²² Much of the variation in these figures reflects differences by grocery store size and market.

The estimated value for sales per employee

provides a metric by which we can judge the effects of various scenarios tested with the gravity model described in Appendix B. By dividing the change in sales at a given location by \$267,405 we can estimate the effects on employment of the modeled change in terms of full time employees. With lowered sales, stores will require fewer employees; with increased sales more employees will be required. Note that we do not attempt to differentiate among employment patterns at the different establishments in our model. We assume that the number of hours worked per employee (2080), the productivity (in terms of sales) of each employee (\$267,405), and the presence or absence of a management structure are all constant for the purposes of this calculation.

Having established the changed number of employees in each establishment within our study we next seek to estimate the impact of these changes in terms of the total payroll value. This is simply a matter of calculating the total payroll value in the absence of Walmart with the total payroll value under the scenario where Walmart is present using the values presented in Table A-2.

Estimate Direct and Indirect Effects of Changes in the Total Payroll Value

When wages are lost in the retail sector those losses reverberate through the Washington economy with fewer goods and services purchased, lowered output and wages by those producing or offering those goods and services, and so on in an ever tightening spiral. The Washington State Input Output model quantifies the extent of the impact when wages or output changes in a specific sector of the economy. The Office of Financial Management provides a simple worksheet for exploring impacts with the 2002 Input Output model.²³ By inputting our value for the changed total payroll value in the retail sector this model can provide us with information

about the aggregate impact of that change across the entire Washington economy. These aggregate results are reported in terms of economic output (goods and services produced), Jobs created (or lost), and Labor Income (aggregate effect on the total payroll value). Although the Input Output model is more typically employed to estimate impacts stemming from changes in both economic output and wages, its calculations hold for this more limited impact estimation.

Estimate Construction Effects

Although we touch upon construction effects for consistency with other studies, construction effects are essentially a net-zero issue within the framework of this analysis. There is no basis to believe that groceries would not be supplied if Walmart elected not to locate at the Skyway site. As demand grows it is probable that some grocery retailer will locate at the Skyway site as it is the largest and most suitable in the vicinity. Given that some grocery will eventually operate on the site, there is some reason to suspect that construction and/or remodeling costs could be substantially different from those Walmart would incur. While Walmart's "neighborhood market" model is typically around 40,000 square feet, the existing footprint at the site is only 23,500 square feet. If we assume constant construction/remodeling costs per square foot, then the difference between a 40,000 square foot building and a 23,500 square foot building translates into roughly \$1.1 million in direct impact. To further complete our scenario we compare the impact of immediate construction of a 40,000 square foot store with the renovation of the store at its existing scale after five years. We feel that the five year delay and the assumption of no footprint increase is conservative but reasonable. For our cost estimates in this area we use data provided by Walmart for a recent permit application for a similar project in Lynnwood Washington.²⁴

For that redevelopment effort Walmart estimated the development cost per square foot at \$66.81 which we deflate to \$65.83 in 2010 dollars for consistency with other results presented here.

Estimated Net Present Value of Calculated Effects

Net present value (NPV) is a mechanism for recognizing that funds received in the present can be invested, and thus are worth more than the same funds received in the future. Given that the effects captured in this analysis are largely ongoing, it is appropriate to estimate their long term impact. For consistency with other estimates produced by Walmart, we employ a 6% discount rate and assume 3% annual inflation. Given the inherent uncertainty in estimating changes in consumer demand over an extended period of time we do not consider growth in demand over the twenty year lifetime of the project. Since any increase in consumer demand will necessarily increase the size of our measured effects, this decision represents the more conservative approach to costs.

Uncertainty

Although this study employs the best available data wherever possible there are several points of uncertainty that could potentially alter the results of this analysis significantly. Despite this uncertainty, the overall message of this study, that Walmart's actions should be treated in the context of reallocation of demand, is not in question. Whether Walmart's actions result in a larger net loss than we report here or a smaller one is largely inconsequential from the perspective of the regional economy. What does matter is that Walmart's actions should, in no way, be interpreted as benefitting the region on anything like the scale claimed by its consultants' reports. Walmart is not creating demand, nor is it creating jobs, it is simply competing for a share of the fixed

amount consumers choose to spend on groceries and other goods.

The principal points of uncertainty are:

Prices. Walmart does sell many items at lower prices than their competitors. There is not enough data on Walmart's relatively new "neighborhood market" model to know how much lower these prices are likely to be. While prices may, in fact be lower, this change could have several implications. First, lower prices could make Walmart more attractive than other stores in the gravity model drawing more sales than the model currently predicts. This would result in a greater loss in total payroll. Second, if consumers are able to purchase more groceries with each dollar, then some or all of this loss in payroll would be offset by customers being able to retain or reallocate spending on other goods. For example, a 1% reduction in the grocery bill for Walmart customers would offset \$250,000 in lowered wages (assuming sales at the store of \$25 million). Another issue related to prices is the potential for these lowered prices to keep prices lower at competing stores, thereby potentially extending the consumer benefits noted above to consumers even if they do

not shop at Walmart. This issue offers even less certainty. First, there is the difficulty in attributing benefits of this nature on a store by store basis. Second is the problem of accounting for the degree to which other retailers feel they need to compete with Walmart on prices. Third, there is considerable uncertainty in the measurement of this effect.²⁵

Wages. As mentioned previously, wages represent a major source of uncertainty in this analysis. This analysis is based on a wage difference between Walmart employees and employees at other groceries of around \$3 per hour. There is considerable reason to believe that this difference may be closer to \$5 per hour once paid sick and holiday leave and other benefits are included. If true, this would increase the direct impacts associated with the drop in total payroll by at least 60%, dramatically altering the scale of the impacts estimated here. In an attempt to inoculate this report against claims of inaccuracy we use the most conservative estimate of the hourly wage estimate, but much higher direct impacts are likely.

Appendix B: The Gravity Model and Changes in Consumer Behavior

Establishing baseline consumption patterns for our study area relies on an implementation of a gravity model that distributes consumer spending for a given block group based on the number of retail opportunities, their size (approximated by number of employees), and their distance from the block group's geographic center. The gravity model operates, as one might expect, on the principle that consumer behavior can be understood in terms similar to those devised by Newton to explain gravity. In short, the gravitational force between two objects (in this case a supermarket and a customer) is related to the size of the objects and the distance between them. When applied specifically to commercial retail, the larger the store, the more attractive it will be to consumers. The further away the store is from a group of consumers, the less attractive it will be to that group of consumers. By calculating the gravitational pull between consumers and every retail opportunity, the model establishes how likely it is that a consumer will spend a portion of their income at each store.

Due to the limitations of our data sources, we use employment as a proxy for size. More typically, we would expect to use floor area, but we were not able to locate reliable data on floor area for every grocery in our model. One problem with this approach is that we have to estimate the employment we would expect at the Walmart store. Based on employment figures for other stores in our study with comparable building footprints we elected to use 175 employees in our analysis. This is comparable with other large groceries in the study area. By using employment we are, in effect, substituting one imperfect measure for another. However, this measure does allow us to distinguish between the draw of a full service grocery store and a

smaller establishment.

At the core of the gravity model's function is an index defining the attractive relationship between a block group and a retail location:

$$Index_{ij} = \frac{\frac{aE_j}{d_{ij}^2}}{\sum_{j=1}^n \frac{aE_j}{d_{ij}^2}}$$

Where the $Index_{ij}$ defines the share of consumer spending of block group i at store j based on the ratio between a , the attractiveness factor applied to E_j employment at j and d_{ij} the distance between i and j . The index compares the ratio specific to i and j with the sum of all such ratios between a given block group and all stores. For more accurate calibration the index for a given block group and store pair is set to 0 based on two parameters that set the maximum attractive distance for a supermarket and for a convenience store.

Having defined the share of consumer spending attributed to a given store it is straightforward to specify

$$Spending_{ij} = C_i Index_{ij}$$

where C_i is the total amount spent on Food at Home by households in block group i . By summing this result for all values of i we can arrive at the total sales attributed to a given retail location j .

$$Sales_j = \sum_{i=1}^n Spending_{ij}$$

By changing the values for C to reflect changes in consumer spending we can estimate the effects of increased household spending over time. Similarly, by changing the number of retail establishments j or the number of employees E at those

establishments we can identify the effects of a changing competitive landscape including the total sales at a new establishment, and the lost sales at each of the pre-existing retail locations.

Calibration

The art of developing an appropriate gravity model lies in calibrating the rate at which distance becomes prohibitive to consumers and the level of attraction to associate with an additional unit of size for retail establishments. How much less likely are we to shop at a store that is one mile away compared to one that is two miles away? Assuming that a larger store offers efficiencies (we can do more of our shopping in one place, goods may be cheaper due to larger volume sold), how much more likely are we to shop at a store that is 10% larger given that it is the same distance from our house. Specific to this analysis we also need to differentiate between store types (convenience stores as opposed to supermarkets) that fill different niches within the grocery industry. A lengthy history of research on retail location reveals that these rates vary by location, by product, and by neighborhood, so it is established practice to calibrate the gravity model by testing a range of parameter values and benchmarking them against some known values.

The calibration technique employed here takes the subset of store locations for which we have annual sales data²⁶ and runs an optimization routine to minimize the total difference between model predictions in these locations and their actual value. Formally, the function to be minimized is:

$$\min \left(\sum_{i=1}^n |P_i - A_i| \right)$$

where P_i is the predicted annual sales at store i and A_i is the actual annual sales at that store for all stores where data is available.

The optimization routine for identifying this minimum is customized for this purpose and recognizes the likelihood that there are many local minima within the parameter space. To overcome this problem the routine randomly selects values for each of the four parameters: distance decay, size attraction, supermarket cutoff, and convenience store cutoff. From this random starting location the model searches for a local minimum by adjusting parameters up and down incrementally

Table A-3: Gravity Model Calibration Parameter Space and Results

Parameter	Min	Max	Calibration Result
Distance Decay (d)	0	5	0.0
Size Attraction (a)	0.1	5	4.2
Supermarket Cutoff	0.5	5	2.97 miles
Convenience Store Cutoff	0.1	5	0.51 miles

until no parameter improves model fit. The calibration process undertakes this random starting point followed by optimization at least one hundred times and picks the mix of optimum parameters from among these trials. The parameter space and calibration results are provided in Table A-3:

The results of the calibration make intuitive sense. The cutoff for any spending at a grocery store is just under three miles and about 0.5 miles for convenience stores. Within these rather tight boundaries distance does not matter very much, and the attractiveness of a store grows with size quickly.

Scenarios

Once a baseline is established through calibration, we can modify the competitive landscape to include a new Walmart store and re-run our gravity model to estimate changes in consumption patterns. Total sales broken out by store and the share of

consumption redirected to new locations broken out by block group are just two of the most interesting results to be had by comparing our two model runs. In the results section we report not only these basic difference measures, but also results based on more complex scenarios. The complete list of model runs and the scenarios for which they are relevant is:

- Consumption as of 2010. No retailer at Skyway site (Base)
- Consumption as of 2010. Walmart at Skyway site (Base, Opportunity Cost)
- Consumption as of 2010. Non-Walmart grocery operating at Skyway site (Opportunity Cost)
- Consumption as of 2015. No retailer at Skyway (Consumer Growth)
- Consumption as of 2015. Walmart at Skyway site (Consumer Growth, Consumer Growth/Opportunity Cost)
- Consumption as of 2015. Non-Walmart grocery operating at Skyway site (Consumer Growth/Opportunity Cost scenario)

Biography

Study author Christopher Fowler completed his PhD. in economic geography in 2007. His research focuses on the distribution of economic impacts associated with local policy decisions. In this context he has studied a broad range of topics from policy around payday lending to competition among container ports. He has extensive experience conducting economic impact analyses for clients including the U.S. Army Corps of Engineers, the Port of Portland, the City of Seattle Department of Film and Music, the U.S. Forest Service, and the U.S. Bureau of Land Management. Further details pertaining to his research and biography can be found at www.csfowler.com.

Endnotes

1. Although Walmart is said to be targeting “food deserts,” poor urban areas with low access to groceries, Skyway does not meet the test for such a site. [<http://www.ers.usda.gov/data/fooddesert/fooddesert.html>]
2. Note that the study boundary was modified somewhat to exclude block groups on Mercer Island and elsewhere on the periphery of the boundary with extremely limited connections to the study site.
3. See for example Davis, H.C. (2001) *Regional Economic Impact Analysis and Project Evaluation*. Vancouver: University of British Columbia Press.
4. E.D. Hovee & Company, LLC “Economic Impact Analysis For Portland Metro Walmart store expansion” April 2011 and Herbert Research Inc. “Walmart Case Study Tacoma, Pierce County” February 2012; Herbert Research Inc. “Walmart Case Study Bellevue, King County” March 2012.
5. The Food Marketing Institute estimates that the profit margin averages 0.68% for single stores and 1.16% for 2 to 10 store chains. Food Marketing Institute, (2011) “The Food Retailing Industry Speaks” p.82
6. Data provided by UFCW local 21 estimates the average hourly wage for hourly grocery associates to be \$17.25
7. Food Marketing Institute, (2011) “The Food Retailing Industry Speaks” p.40 see Appendix A for details.
8. Note that this \$2.39 million in payroll based on \$25.38 million in annual sales is consistent with reporting by the Food Marketing Institute (ibid) indicating that labor costs for stores average 10.5% of total sales. pp.59
9. Employment Security Department excludes premiums such as paid holidays, overtime, and other benefits from its wage calculations.
10. Personal communication with Professor William Beyers, author of the Washington State Input Output model.
11. Costs per square foot based on plan submission for a similar store in Lynwood, WA. Employment and Labor income based on values employed by E.D. Hovee & Company, LLC in their “Economic Impact Analysis For Portland Metro Walmart store expansion” April 2011. These values are presented for consistency; no independent attempt to validate results has been undertaken.
12. Neumark, D., J. Zhang, and S. Ciccarella (2007) IZA Discussion Paper No. 2545 but see Basker, E. (2005) “Job Creation or Destruction? Labor-Market Effects of Wal-Mart Expansion.” *Review of Economics and Statistics*, Vol. 87, No.1.
13. For example Drogin, R. (2003). “Statistical Analysis of Gender Patterns in Walmart Workforce.” Submitted as expert report in *Dukes v. Walmart Stores*, No. C 01-02252 MJJ (N.D. Calif.) cited in Jacobs, K, D. Graham-Squire, S. Luce (2011) “Living Wage Policies and Big-Box Retail” Center for Labor Research and Education Research Brief, University of California Berkeley
14. Dube, A. and K. Jacobs (2004). “Hidden Cost of Walmart Jobs: Use of Safety Net Programs by Wal-Mart Workers in California” U.C. Berkeley Labor Center Briefing Paper Series.
15. Mancuso, D. H. Lijian, and B. Felver (2011) “Employment Status of Medical Assistance Clients and Persons with Dependents with DSHS Medical Coverage; Statewide Data for CY 2009 By Firm Detail for January 2010 and April 2010” Washington State Dept of Social & Health Services, Research & Data Analysis Section; Washington State Dept. of Social & Health Services, Research & Data Analysis Section (2008) “2008 Report on the Employment Status of Basic Health Enrollees” Washington State Health Care Authority.
16. Washington State Office of the Insurance Commissioner. (2011) “State of the Uninsured: Health coverage in Washington State” accessed online at <http://www.insurance.wa.gov/legislative/reports/2011-uninsured-report.pdf> March 8, 2012. The study reports that the average family with insurance pays an additional \$1017 per year in added premiums to support the uninsured.
17. This source is not of the same quality as other resources used in this analysis. The data from this source was only used for calibration purposes in the gravity model where relative size of the stores was important. As long as the error in these values is consistent, then the quality of the data should not negatively affect other elements of the study.
18. Food Marketing Institute, (2011) “The Food Retailing Industry Speaks” p.16
19. In addition, three block groups along the eastern shore of Lake Washington were removed. These block groups consistently reported sales to the proposed grocery site far in excess of what was reasonable and therefore inflated the estimated effects of the proposed site significantly.
20. Walmart’s wage data and full-time/part-time distribution from May 2010 for consistency with other data resources and provided by Walmart to its consultant E.D. Hovee & Company, LLC in their “Economic Impact Analysis For Portland Metro Walmart store expansion” April 2011.
21. Wages by occupation are available, but reported at a level of specificity that groups all retail sales employees together making this form even less useful than wages reported by industry.
22. Food Marketing Institute, (2011) “The Food Retailing Industry Speaks” p.40
23. Available at <http://www.ofm.wa.gov/economy/io/2002/default.asp>
24. Plans submitted to City of Lynnwood and obtained through public records request December 9th, 2011
25. See Economic Policy Institute’s (2006) “Wrestling with Walmart” working paper, which offers an analysis of studies related to Walmart’s price effect. <http://www.epi.org/page/-/old/workingpapers/wp276.pdf>
26. Approximately 52 locations based on 2010 data from Chain Store Guide.



Puget Sound Sage works to promote good jobs, quality employment opportunities for disadvantaged adults, a cleaner environment, and affordable housing for low/moderate income families in the metro Seattle area. Our mission is to ensure that all families benefit from economic growth, and that local and regional policy decisions meet the social and environmental needs of our communities.