CITY OF SEATTLE FOOD ACCESS SPENDING FARM ECONOMY ANALYSIS

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MELISSA KNOX, PHD, LINA PINERO WALKINSHAW, MPH

EXECUTIVE SUMMARY

The City of Seattle's Food Access Programming is designed to increase access to healthy and affordable food for the City's residents. While the purpose of these programs is to increase the welfare of consumers, these programs additionally benefit the local farmers who grow the food that is sold into the programs, as well as those who do business with participating farmers.

The purpose of this report is to measure the economic impact of City of Seattle spending on food access programs on local farmers, and on the local farm economy. This is accomplished in two ways: (1) through estimating the total economic impact of this spending using input/output modeling, and (2) through farmer surveys and interviews that allow food access program suppliers to share their own experiences selling to the programs and their own beliefs as to the advantages and disadvantages of their participation.

From October 2018 to January 2019, we gathered background information and data through interviews with representatives of the food access programs, spending data obtained from the City of Seattle, and surveys and interviews with farmers selling to the food access programs. We used a theory of input/output modeling and software (named Impact Analysis for PLANning, or IMPLAN) to create our economic model. We combined City purchasing data with standard models of farm expenditure patterns in the software to produce estimates of the economic multiplier. An economic multiplier is a quantity that reflects the extent to which direct spending on an economic activity gets multiplied through the economy as additional spending. We additionally customize the economic model for King County using farmer-provided expenditure data, and answer key research questions around the benefit and challenges of participation for farmers via interview data.

Key findings: We found a net positive range of economic activity in the State of Washington and in King County as a result of City of Seattle spending on food access programs. We additionally found that farmers felt positively about these programs, and reported many benefits of participation, as well as opportunities for program improvement.

Every dollar received by Washington farmers via sales to food access programs created at least $1.70 in economic activity in the State of Washington, or at least **$763,160 total Washington economic impact**.

Confining our analysis to King County economic impacts, we found that every dollar in purchases from King County farmers resulted in **at least $1.40 in economic activity in King County**, and may produce **up to $1.80** in economic activity in the county, for **a total King County economic impact range of $272,618 to $373,049**.

Food access program investments resulted in **a gain of at least 7.40 jobs in Washington**, **4 of these in King County.**

Key themes that emerged from farmer interviews indicated that farmers who sold products to the food access programs **benefited from increased market access**, **predictability in sales that enhanced their crop planning activities**, and **supplementary services such as transportation provided by food access program organizations**.

These results can be viewed in conjunction with other economic impact studies of local food initiatives, including Farm to School and farmers markets. Like previous studies, we found that the benefit of government spending on local foods extends beyond the consumers who receive healthy, local foods at a reduced price and the farmers who sell those foods, to the broader economy. We add to this body of work with our farmer interviews, which demonstrated that food access program spending has the potential effect of strengthening the local food system by increasing the sustainability and profitability of the farmers in this system. We suggest that further impact studies should go beyond investigating contemporaneous economic benefits to considering the ways in which these benefits persist in the long run by strengthening local food systems.

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SECTION 1 | STUDY BACKGROUND AND METHODS

STUDY BACKGROUND

In 2013 the City of Seattle adopted a Food Action Plan with the explicit goals of Healthy Food for All, to Grow Local, and to Strengthen the Local Economy.[1] Within these goals, the City of Seattle sought to ensure all Seattle residents had enough to eat, and had access to affordable, local, healthy, culturally appropriate food, as well as strengthen the regional food economy through the promotion of farmers markets and supporting local and regional farmers. To do this, the City of Seattle invests in 'food access programs.' For the purposes of this report, food access programs are defined as programs operated by a mix of governmental, non-profit, and for-profit organizations that purchase fresh fruit and vegetables from regional farmers and distribute this produce to children, families, and individuals who may otherwise have limited access to food.

When the Seattle City Council passed the June 2017 Seattle Sweetened Beverage Tax (SBT) Ordinance #125324,[2] the Ordinance set out that a portion of the revenue generated by the tax would be used to "expand access to healthy and affordable food, closing the food security gap, and promoting healthy food choices, through programs..." The SBT Ordinance specifies that SBT revenue will be used to implement the Seattle Food Action Plan, specifically identifying two food access programs, the Fresh Bucks and the Fresh Bucks to Go programs, as two programs to fund in order to expand access to healthy, affordable food. The SBT went into effect January 1, 2018. In January 2018, under the guidance of the SBT Community Advisory Board, the City of Seattle began identifying and directing SBT revenue to food access programs. These food access programs distribute food produced by local and regional farmers throughout the Seattle community.

The goal of this study is to estimate and understand **the economic impact of the City of Seattle's purchases of local foods via food access programs,** examining the specific effect of SBT revenue investments. The food access programs of interest in this study are the Farm to Table program, the Fresh Bucks to Go program, and the Fresh Bucks at farmers markets program. In 2018, all three of these programs received a majority of their funding from SBT revenue. All three of these programs are described in more detail below.

STUDY GOALS

This study estimates and describes the economic impact to Washington State and King County farmers of the City of Seattle's spending on food access programming. This study uses secondary economic data and an input/output model to estimate the direct, indirect, and induced economic effects of the City of Seattle's investments in these programs both statewide across Washington State as well as county-wide within King County. This study additionally uses primary data collected via a survey of King County farmers to customize the input/output model for King County by replacing the modeling software's pre-determined parameters with information provided by local farmers (e.g., the percent of expenses spent on labor, utilities, land, etc.). Finally, this study relies on in-person and phone interviews with farmers selling products to or through the food access programs, as well as written survey responses from King County farmers, to understand farmers' perceptions of how these food access programs affect them.

[1] https://www.seattle.gov/environment/sustainable-communities/food-access/food-action-plan
[2] https://www.seattle.gov/business-licenses-and-taxes/business-license-taxes/other-seattle-taxes/sweetened-beverage-tax

Specifically, this study:

1. Uses secondary data to measure State and King County-wide economic impacts due to food purchases for food access programs by the City of Seattle using an input/output model framework.
2. Uses primary data from a survey of King County farmers to customize the input/output models for King County to more accurately reflect the expenditure patterns and local linkages of King County farms.
3. Estimates an economic multiplier that can be used to predict both State and County-level economic impacts of potential future increases in food access spending by the City through Sweetened Beverage Tax dollars.
4. Uses primary data to describe farmers' overall perceptions of food access programming on their business and personal well-being.

The rest of the report is structured as follows. First, we describe the operations of the food access programs studied and summarize the results of previous studies that have used input/output modeling to produce economic multipliers for these programs. Next, we describe our research methodology for both the input/output models and for the qualitative portion of the study. Third, we present the estimated total economic impact of the food access programs as well as the multipliers for both Washington and King County, as estimated by our input/output model, and the results of our interviews and surveys of local farmers. Finally, we discuss our results in the context of previous work in this area and the limitations of the current study, as well as directions for future research.

BACKGROUND ON THE CITY OF SEATTLE'S FOOD ACCESS PROGRAMS

The City of Seattle-funded food access programs studied here include the Fresh Bucks at farmers markets program, the Fresh Bucks to Go program, and the Farm to Table program.

The Fresh Bucks program is operated by the City of Seattle Office of Sustainability and Environment (OSE). The Fresh Bucks program "matches SNAP/EBT benefits (food stamps) dollar-for-dollar at all participating farmers markets and neighborhood grocers in Seattle and King County."[3] In this study we examine only Fresh Bucks at farmers markets, given that the goal of this study is to estimate and understand the effect of these programs to farmers. All farmers that sell at participating farmers markets are able to accept Fresh Bucks. When an individual farmers market shopper uses Fresh Bucks, they receive tokens with a cash value, and spend the tokens by purchasing fresh produce directly from an individual farmer at the farmers market. Farmers then return the tokens to the farmers market management and are paid for the total value of tokens.

The Fresh Bucks to Go program in 2018 was operated by three contracted organizations. The Fresh Bucks to Go program provides "fresh, local fruits and vegetables delivered every other week to families participating in Seattle's subsidized preschool programs."[1] Farmers sell products to the Fresh Bucks to Go program by selling their fruit or vegetables to one of the organizations that operates the program; the organization is then responsible for preparing bags or boxes of produce for distribution to the preschool sites. Families who have children at the participating preschools are able to pick up their produce directly from the preschool.

Food procurement and management for the Farm to Table program was operated by one contracted organization in 2018. The Farm to Table program "brings healthy, local food to meals at City-supported childcares and preschools. To create healthy environments, Farm to Table provides gardening education to kids, and kitchen staff training on seasonal menu development and scratch cooking."[1] To 'bring healthy, local food to childcares,' participating childcares and kids programs receive a stipend that they can use to purchase fresh produce from regional farmers

[3] https://www.seattle.gov/environment/sustainable-communities/food-access/fresh-bucks

through the implementing organizations. The implementing organizations serves as a platform for farmers to sell their produce to many customers, the Farm to Table program childcares being one such customer.

In 2018 both the Fresh Bucks to Go and the Farm to Table programs were implemented by a mix of non-profit and for-profit organizations; the Fresh Bucks at farmers markets program was implemented by OSE, a City of Seattle department. In all of these cases, each organization had a contract and received a grant from the City of Seattle to implement the program. Each organization used this grant to purchase produce directly from farmers in order to distribute through the programs. For this study we conducted informational interviews with the food access program managers of each of these implementing organizations and obtained data on their food spending (i.e. their direct purchases of produce from farmers) and organization operations. We also obtained food spending data from the budgets these organizations had filed from the City. The total dollars these organizations spent purchasing fresh produce from farmers to distribute through these food access programs is the key data point of interest in this study.

STUDY METHODS

RESEARCH QUESTION

This study estimates the economic impact of the City of Seattle's spending on food access programs in the state of Washington and in King County. We do this in two ways: First, by creating an input/output model of the farm economy in Washington State. These models estimate the additional spending that results from an original direct impact on an industry, and combine both forms of spending together with any opportunity costs, in order to generate an estimate of the total economic activity created within a region due to that original direct spend. Second, we incorporate survey data from King County farmers with the results of qualitative interviews with regional farmers who sell produce to food access programs.

MODELLING ECONOMIC IMPACTS

The City of Seattle spends food access programming dollars in two primary ways. About 40% (or $226,000) of the spending on the Fresh Bucks to Go and Farm to Table programs is spent on the purchase of fresh produce by the contracted organizations retained by the City to implement the programs. A similar amount (approximately $228,000) is spent by the City on Fresh Bucks incentives that are paid directly to farmers at farmers markets. The City also allocates money to its contractors to be spent on food access program operations (this totals about $335,000), and dedicates some portion of its budget to directly operating the Fresh Bucks program. In keeping with the focus of the rest of this report on the benefits and challenges experienced by farmers participating in food access programs, the economic impacts we model are limited to an analysis of the direct, indirect, and induced spending that occurs as a result of City spending on food purchases directly from farmers.

INPUT/OUTPUT MODELLING SOFTWARE

To model the flows of economic activity that make up indirect and induced spending, as well as leakages, we rely on the software called Impact Analysis for PLANning (IMPLAN).[4] IMPLAN is widely used to analyze the impacts of agricultural programs and food systems.[5] It calculates multipliers and production functions in a partial equilibrium framework, using data from the U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, U.S. Census

[4] Minnesota IMPLAN Group, Inc. (www.implan.com)

[5] Dawn Thilmany McFadden and others, *The Economics of Local Food Systems: A Toolkit to Guide Community Discussions, Assessments and Choices*, 2016.

Bureau, and other U.S. government agencies.[6] The economic linkages between industries that are incorporated in IMPLAN's production functions are based on regional and national averages calculated from those data sources.[7] IMPLAN was chosen for this project because it allows the researcher to estimate economic impacts while incorporating opportunity costs and modified production functions. Additionally, it was chosen in order to produce estimates that are comparable with other food systems multipliers found in previous studies. The version of the software used in this research is IMPLAN Pro version 3.1 with 2016 data for Washington State and King County.

MODEL CONSTRUCTION

Figure 1 shows the pathway through which City of Seattle food access spending is allocated to program operations and food purchases. It also shows how food purchase spending is additionally propagated through the Washington economy as direct, indirect, and induced spending. The impact of this spending is modelled using input/output modelling techniques as described below.

DIRECT SPENDING. In our model of economic impacts, the spending that goes directly to farmers as revenue is called **direct spending**. It is the economic activity that drives the rest of the results.

INDIRECT SPENDING. The recipients of direct spending (here, the farms) must spend a portion of their revenues on the inputs needed for production. This spending is called **indirect spending**. Typical farm outlays include labor, land and property, raw materials such a fertilizer and seeds, expenses such as storage, transport, and fuel, and business operation expenses including accounting, legal services, banking services, marketing and advertising. The exact set of industries that receive these funds, as well as the proportion of all funds received, is referred to as a production function. For example, if the average farm spends equal shares of their revenue on land, transportation, and fertilizer, then these three industries as well as the proportion of 33% attached to each of them, would be the production function for the farm industry. It is important to note that employee compensation, proprietor compensation, and corporate profits do not appear in the production function at this stage. They will appear in the next step of the model. The only payment to labor that appears at this stage of the model is compensation paid to non-employee workers (e.g. contract labor).

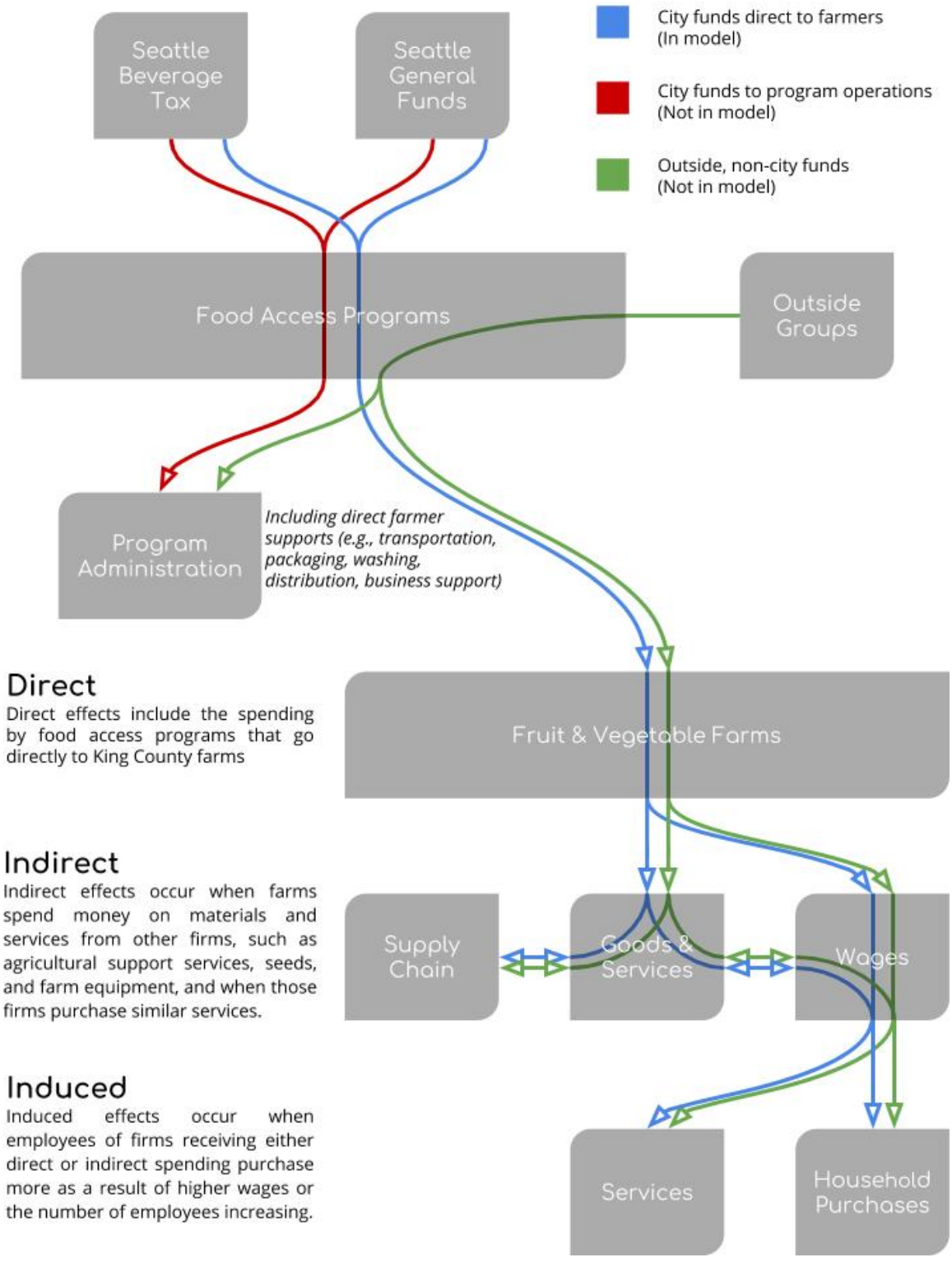
INDUCED SPENDING. The third and final stage of spending in this model is referred to as **induced spending**. Induced spending is spending by workers who received payments in the first two stages. These include workers employed by the farm (including proprietors), and workers who work for in the industries that are part of the original industry's production function. In our case, it would include spending by farm workers, truck drivers, fertilizer sellers, bankers who receive interest payments, etc. While indirect spending is a reflection of the production process of the original industry, induced spending is a reflection of general consumer spending patterns in the regions studied. For example, induced spending may be at restaurants, grocery stores, hospitals, travel agents, etc.

The blue lines in Figure 1 show the structure of the input/output model and demonstrate how direct spending propagates through the economy, first by way of farms and their suppliers, and ultimately out into the broader economy through the household spending of their employees.

[6] www.implan.com/data

[7] Libby O Christensen and others, *Economic Impacts of Farm to School Case Studies and Assessment Tools Economic Impacts of Farm to School: Case Studies and Assessment Tools Acknowledgments*, 2017.

FIGURE 1. FLOW CHART FOR FLOW OF ECONOMIC ACTIVITY FROM FOOD ACCESS PROGRAM SPENDING



TOTAL OUTPUT

Finally, the total economic activity that results from the original direct spending is calculated by adding the direct, indirect, and induced spending that result, and is referred to as **total output**. An **economic multiplier** is calculated by dividing the total economic activity by the amount of direct spending that created it. This multiplier should be larger than one, and can be interpreted as the total dollars of economic activity created from $1.00 of additional spending in the industry studied.

The total economic impact of the increase in direct spending can then be calculated from the following:

$$total\ output = direct\ spending + indirect\ spending + induced\ spending$$

And the economic multiplier is calculated by:

$$economic\ multiplier = \frac{direct\ spending + indirect\ spending + induced\ spending}{direct\ spending}$$

OTHER CONSIDERATIONS

The following factors affect the calculation of indirect and induced spending in the input/output model and therefore affect the calculation of total economic activity as well as the size of the multiplier. They must be decided upon by the researcher when the model is designed.

LEAKAGE

At every level of spending in the model, there is potential for money to "leak" out of the region being studied when firms or consumers purchase imported goods. Input/output models account for this leakage by measuring the overall proportion of spending in each industry that occurs within the study region. They apply this local purchase percentage as they propagate spending through the model. In the IMPLAN software, for example, the default, local purchase percentage of 61% is applied to fruit and vegetable purchases, meaning that 61% of the amount spent on these purchases is assumed to stay within the local economy and appear in the next level of the model, while the other 39% leaves the model through leakage. If these default values are lower than the actual values, then total economic activity will be underestimated, as will multipliers.

The programs studied here make nearly all[8] of their produce purchases from Washington farmers. Therefore, we modified the model so that 100% of City spending is assumed to remain within the local area at the direct level. For indirect and induced spending, we maintained the default local purchase percentages that are pre-set within IMPLAN and based on average industry spending within the region. There is a possibility that we are overestimating the leakage out of the local economy at these levels, given that some studies have found that farmers have more local spending than the average industry within a state, and that the types of farms that sell at farmers markets or to food

[8] King County and Seattle farmers markets host Washington-based farmers almost exclusively, and two of the four contracted organizations only make purchases from Washington farmers. The other two organizations do purchase from outside of Washington State, especially in the winter, but exact spending was not made available to us. Relatedly, all reported spending on produce from King County farmers was reported to us by the organizations directly.

hubs are even more likely to keep their purchases local.[9] If this is the case, we will underestimate total economic activity in the model.

GEOGRAPHIC SCOPE OF MODELLING

As outlined above, the amount of economic activity that gets multiplied through the model depends on the researcher's chosen definition of local. The larger the region studied, the greater the indirect and induced impacts, and therefore multiplier, due to less leakage in the model. For this study, we chose to calculate the economic impacts and multiplier at two geographic levels: the entire state of Washington, and King County alone. The King County results can be interpreted as the impact of the City's food access programming in the hyper-local region surrounding Seattle. The direct spending used as an input to this model is the sum of reported purchases from farmers whose farms are located in King County, as shown in Table 1. Washington State results are produced using all reported purchases from farmers throughout the state, as shown in Table 1. These results can be used to understand the broader regional implications of the City's programs.

OPPORTUNITY COSTS

A final consideration in building the model is whether and how to account for the ways in which increased spending in one sector of the economy might affect economic activity in other sectors. In the current study, the purchase and free distribution of produce to program recipients has the potential to change the overall household spending patterns of the recipients.[10] If we do not account for the spending pattern changes that result from the City's programs, we risk overstating the economic impacts of the spending that does occur.

To determine the potential opportunity costs our primary question is whether program recipients continue to purchase the same amount of produce as they purchased before receiving food assistance. If they do, they would be increasing their overall purchases of produce by the amount of the incentive, and there would be no opportunity cost to farmers associated with program spending. If they purchase less after the incentive, then we must estimate their reduction in spending and model how this reduction is multiplied through the economy. Since we are only analyzing the impact of food access spending through the pathway of local farm revenues, we confine our analysis of opportunity costs to costs accruing to farmers through reduced revenues.[11]

Although there are many studies that show an association between food access programs and greater consumption of fruits and vegetables, there is little evidence regarding the impact of food access program participation on grocery spending. One study of a Philadelphia program similar to Fresh Bucks found that program participants spent more on fruits and vegetables than non-participants, by a margin that was greater than the size of the incentive.[12] Another

[9] William F Lazarus and others, *'IMPLAN 's Weakest Link: Production Functions or Regional Purchase Coefficients ?'*, 2014.

[10] We could potentially also consider economic costs associated with resource constraints in the agricultural sector. However, we find no evidence that participating farmers face these constraints in our survey or interview data and so here we adopt the common assumption that there are no economic impacts due to resource constraints.

[11] A fuller study of all economic impacts of food access programs would include both the benefits and opportunity costs that accrue to the organizations that manage the programs as well as potentially affected retailers and wholesalers.

[12] Susan Bartlett and others, *Evaluation of the Healthy Incentives Of, Pilot (HIP): Final Report*, 2014.

study of participants in Seattle's programs (Fresh Bucks and Good Food Bags) found that participants consume more fruits and vegetables than non-participants, but not by the full amount of the incentive.[13]

Given this wide range of potential effects, we present a range of potential economic impacts in the results that follow. At the lower bound, the opportunity cost of food access program spending on farmer revenue is zero if participants do not substitute. Without primary data of our own or previous studies of the impact of food access programs on beneficiary spending, our estimate of the potential upper bound of the opportunity cost relies on a number of assumptions, which are explained in more detail in Appendix I. The result of those calculations is that we assume that, at maximum, food access program participants reduce their spending by 60% of the value of food received. In order to translate this into costs to local farmers, we additionally apply the assumption that only 33% of food purchased at grocery retailers in Washington is sourced from local farms,[14] and that revenues to food retailers and wholesalers will not change due to recipients changing their pattern of grocery spending, but not their level. Applying the retail and wholesale margins extracted from the IMPLAN software,[15] we conclude that an upper bound of the opportunity cost to farmers of selling to food access programs is 11.8% of those sales in lost revenues from wholesalers that would have passed their produce on to retail outlets.

With these opportunity costs, the multiplier becomes:[16]

$$economic\ multiplier = \frac{direct\ spending\ to\ farmers - opportunity\ cost\ of\ farmers' lost\ sales\ to\ retailers + indirect\ spending + induced\ spending}{direct\ spending}$$

PREVIOUS RESEARCH INTO ECONOMIC IMPACTS OF LOCAL FOOD SYSTEMS AND FOOD ACCESS PROGRAMS

There is a wide array of studies that calculate multipliers for local food systems and food access programs using input/output models. As noted above, the size of the multiplier produced by an analyst will depend greatly on the size of the region being studied, assumptions made about the percent of purchases that are made locally, and whether the analysis accounts for opportunity costs of program spending (when applicable). To a lesser extent, multiplier size also depends on how the model incorporates linkages between industries (also known as the production function).[17]

In this analysis, we are specifically estimating multipliers for spending in one city as they propagate through the economy at both the state and individual county level. We assume that all direct spending is local to the study area, we incorporate opportunity costs, and we use both the production functions built by IMPLAN and a customized production function built using primary data collected from King County farmers.

[13] Authors' calculations based on results presented in cited paper.
[14] This is a conservative estimate based on promotional materials reported by Safeway, Inc. See for example: Diane Welland, *The Complete Idiot's Guide to Eating Local: Enjoy Fresher, Healthier Foods* (New York, NY: Alpha Books, 2011).
[15] 27.9% and 18.3%, respectively.
[16] Dawn Thilmany McFadden and others, *The Economics of Local Food Systems: A Toolkit to Guide Community Discussions, Assessments and Choices*, 2017
[17] Christensen and others, *Economic Impacts of Farm to School Case Studies and Assessment Tools Economic Impacts of Farm to School: Case Studies and Assessment Tools Acknowledgments*, 2017.

Below, we list several previous studies that are comparable to our study in that they analyze a program directed at shifting food purchasing behavior toward local farmers. For each entry, we briefly describe the program, study area, and treatment of opportunity costs, as well as the multiplier or range of multipliers produced. While no one study is directly comparable to the current analysis, we anticipate that this review of the literature can produce a reasonable range of multipliers against which our findings can be compared.

1. Christensen et al. 2017: Impact of direct farm to school sales in the Minneapolis, Minnesota school district, and all districts in the state of Georgia. Both case studies incorporated opportunity costs into their analysis. Final multipliers were 1.93 (MPLS) and 2.11 (GA). [18]
2. Sonntag 2008: Calculated multipliers for various local food industries in the Central Puget Sound region (Pierce, King, and Snohomish Counties). Found a multiplier range of 1.75 to 1.93 for purchases from farms and ranches (including CSAs) in this region. This study is not an impact study, however, and did not consider opportunity costs. [19]
3. Hardesty et al. 2016: Calculated multiplier for food producers that engage in direct marketing to consumers in the four-county region surrounding Sacramento, California. Without considering opportunity costs, they found a multiplier of 1.86. [20]
4. Kane et al. n.d.: Examined the impact of farm to school sales in the Portland, Oregon school district on the economy of the State of Oregon. Without considering opportunity costs, they found a multiplier of 1.86.[21]

KEY TAKEAWAYS FROM THE LITERATURE:

- Among the studies that do account for opportunity cost of increased demand from local farmers due to more direct farm to consumer sales, the most common way is to model a proportional decrease in demand from other food sellers as the opportunity cost. We follow this procedure in our study as data allow.
- Some studies that incorporate opportunity cost find little to no net economic impact of the programs studied (multiplier ~ 1.0), however these studies investigate situations where overall consumption of local food is unlikely to have increased, and are not directly comparable to our analysis.[22]
- The current study is unique in that it studies the impact of a program that provides food to food insecure households. As such, the food purchased for these programs has the potential to increase total food demand by the total amount of the purchase. For this reason, we consider a scenario where there are no opportunity costs as a realistic potential outcome.

QUALITATIVE PERCEPTIONS OF FOOD ACCESS PROGRAMS

The second portion of the study included an analysis of farmer perceptions of and experiences with the food access programs. The qualitative data for this portion of the study included: (1) survey data gathered via an online and paper survey distributed to all King County farmers, and (2) in-person and phone interviews with a convenience sample of farmers who sell products to the food access programs.

Survey data from King County were shared with researchers for this analysis through a collaboration with the University of Washington Center for Public Health Nutrition (UW CPHN)'s direct marketing strategic initiative project

[18] Libby Christensen and others, *Economic Impacts of Farm to School Case Studies and Assessment Tools*, 2017.
[19] Viki Sonntag, *Why Local Linkages Matter*, *Sustainable Seattle*, 2008.
[20] Shermain Hardesty and others, *Economic Impact of Local Food Producers in the Sacramento Region*, 2016.
[21] Deborah Kane and others, *The Impact of Seven Cents, Ecotrust,* 2011.
[22] David W. Hughes and others, *Evaluating the Economic Impact of Farmers' Markets Using an Opportunity Cost Framework*, 2015.

funded by King Conservation District. The UW CPHN as part of this strategic initiative distributed a survey to all King County farmers in the winter of 2018. Together with OSE we included ten questions on this survey around the benefits and challenges of selling products to food access programs. We also included one question for farmers asking the percent of total expenditures per expenditure category (e.g., percent of all spending spent on labor, utilities); these responses from King County allowed us to customize the IMPLAN model so that it is most relevant to local King County farmers. Note that because we did not capture survey data from farmers outside of King County in this survey, the customized King County model may not be applicable outside of King County.

In December 2018 and January 2019, we conducted interviews with a convenience sample of farmers who sold products to the Fresh Bucks to Go and Farm to Table programs. Interviews lasted between 30 and 60 minutes. The goal of these interviews was to understand and capture the experience of farmers selling to these programs, and the effects to farmers of selling to these programs. In these interviews we asked farmers to describe their farms, what the experience is like for them to sell products to these programs, and the benefits and challenges of selling to these programs. Farmers additionally made suggestions and identified opportunities for program improvements.

We analyzed all qualitative data using thematic content analysis—an iterative process of reading, identifying, and organizing the narrative text by the key themes that emerge in interviewee's responses. We summarized the quantitative survey responses using descriptive statistics. The direct quotes presented include both written survey responses, and verbal interview responses.

SECTION 2 | ECONOMIC MODEL RESULTS

CITY OF SEATTLE SPENDING ON FOOD ACCESS PROGRAMS

Table 1 shows 2018 spending on Fresh Bucks and the other food access programs. For Fresh Bucks, we only include spending on incentives, which are then paid directly to farmers. For the other programs (Fresh Bucks to Go and Farm to Table), we include all payments by the City to the organizations running the programs as well as the portion of those payments that goes directly to farmers to purchase produce. Additionally, we include the portion of those dollars that are funded by SBT revenues as well as the portion that goes to farmers whose farms are located in King County. The amounts in the column titled City of Seattle-funded Food Spending are used as the estimate of direct spending in our input/output model. The total direct spending in the Washington State input/output model is $454,961. In the King County analysis, total direct spending is $190,185.77.

TABLE 1. ESTIMATED FOOD ACCESS PROGRAM SPENDING BY THE CITY OF SEATTLE AND SBT REVENUES

Program	# of Farmers	# KC Farmers	Total dollars from City	City funded food spending	SBT funded food spending	City funded King County food spending
Fresh Bucks	128	28	N/A	$228,399.00	$228,399.00	$60,453.48
Fresh Bucks to Go and Farm to Table	27	13	$562,414.00	$226,562.00	$223,947.00	$129,732.29
Total				$454,961.00	$452,346.00	$190,185.77

Note: Fresh Bucks data was gathered from the City's Office of Sustainability and Environment (OSE). Payments to King County farmers estimated using assumption that proportion of city dollars paid to King County farmers is the same as proportion of overall food purchases that are made from King County farmers (37%). Other Food Access spending was gathered from personal interviews with managers of each program and program budgets obtained from City. Number of farmers for this group is the average of the numbers reported by the four organizations. All other values are sums of reported numbers.

ECONOMIC IMPACTS FROM INPUT/OUTPUT MODEL FOR: (1) THE STATE OF WASHINGTON AND (2) KING COUNTY

1. STATE OF WASHINGTON

Using data from Table 1, the economic impact assessment was conducted using the IMPLAN software. Two models were estimated – one with no opportunity costs and one with the opportunity costs as discussed above. Both sets of results are given in Table 2.

In the model without opportunity costs, $454,961 of increased revenue to food access farmers produces $154,155 in indirect spending and $254,448 in induced spending, for a total of $863,564 in economic activity. As shown in the top panel of Table 2, we show that for every $1 paid to farmers by the City for food access food, a total of $1.90 in economic activity is created, implying a multiplier of 1.9. The model also predicts that 5.3 jobs would be created among farmers selling to food access programs, with another 1.5 jobs produced due to indirect spending by farmers and 1.6 jobs created via induced spending. The job multiplier here is 1.6, implying that for every job created by food access purchases, a total of 1.6 jobs is created in the Washington economy. Other spending modeled by the input/output model are labor income and value added. The jobs added result in $249,607 being paid to workers on food access farms, and an additional $153,493 of payments in induced and indirect sectors. The final set of payments

are those that go directly to the proprietor of the farm through their own income as well as corporate profits. These payments appear in the value added column, which also includes tax payments. The total value added attributed to direct payments to farms is $289,444, with an additional $248,127 of value added in the indirect and induced sectors.

In the model with opportunity costs, we take a slightly different approach. Since the opportunity costs are actually occurring in the same sector as the benefits (albeit likely among different groups of farmers), we have to reduce the direct spending of $454,961 to farmers who supply food access programs by the $52,870 in lost sales to other Washington farmers through lack of sales through retail outlets. In other words, while the city is still paying the same amount for produce for the food access programs, there is less indirect and induced spending as a result of these payments because the net result is that other farmers are receiving less than they would have if the food access programs did not exist. In the bottom panel of Table 2, we see that indirect spending by farms is now $136,241 and induced spending is $224,828. Total economic activity is then $763,160, implying an economic multiplier of 1.7. The job multiplier is similarly reduced. Although 5.3 jobs will still be created on farms supplying food access programs, we estimate that 0.6 jobs will be lost on farms that supply the retail sector. Additionally, fewer jobs will be created relative to the first model, due to reduced indirect and induced spending (1.3 and 1.4, respectively). Altogether, we estimate a total production of 7.4 jobs in the Washington economy, implying a multiplier of 1.4 jobs created for every one job created on food access farms. Similarly, labor payments are reduced in this model, with $220,536 in labor income in the farm sector, and $135,639 due to indirect and induced spending, for a total of $356,175 in labor payments. Finally, we see that total value added is $255,733 due to direct payments to the farm sector, with an additional $219,261 in value added from indirect and induced spending, for a total of $474,955.

TABLE 2. TOTAL EMPLOYMENT, LABOR INCOME, VALUE ADDED, AND OUTPUT IMPACTS OF CITY FOOD ACCESS SPENDING ON WASHINGTON STATE ECONOMY, WITH AND WITHOUT OPPORTUNITY COSTS

No Opportunity Costs				
	Employment	Labor Income	Total Value Added	Output
Direct Effect	5.3	$249,607	$289,444	$454,961
Indirect Effect	1.5	$70,602	$95,153	$154,155
Induced Effect	1.6	$82,891	$152,974	$254,448
Total Effect	8.4	$403,100	$537,571	$863,564
Multiplier	1.6			1.9
with Opportunity Costs				
	Employment	Labor Income	Total Value Added	Output
Direct Effect	4.7	$220,536	$255,733	$402,091
Indirect Effect	1.3	$62,397	$84,095	$136,241
Induced Effect	1.4	$73,242	$135,166	$224,828
Total Effect	7.4	$356,175	$474,995	$763,160
Multiplier	1.4			1.7

Note: Values estimated in 2018 dollars using IMPLAN Pro version 3.1 using 2016 data. Geographic region is Washington State, Local Purchase Percentage of food access spending is 100%. Direct purchases modeled in aggregated fruit farming and vegetable and melon farming sectors (IMPLAN sectors 3 and 4).

FIGURE 2. TOTAL IMPACTS OF CITY FOOD ACCESS SPENDING ON WASHINGTON STATE ECONOMY, WITH AND WITHOUT OPPORTUNITY COSTS

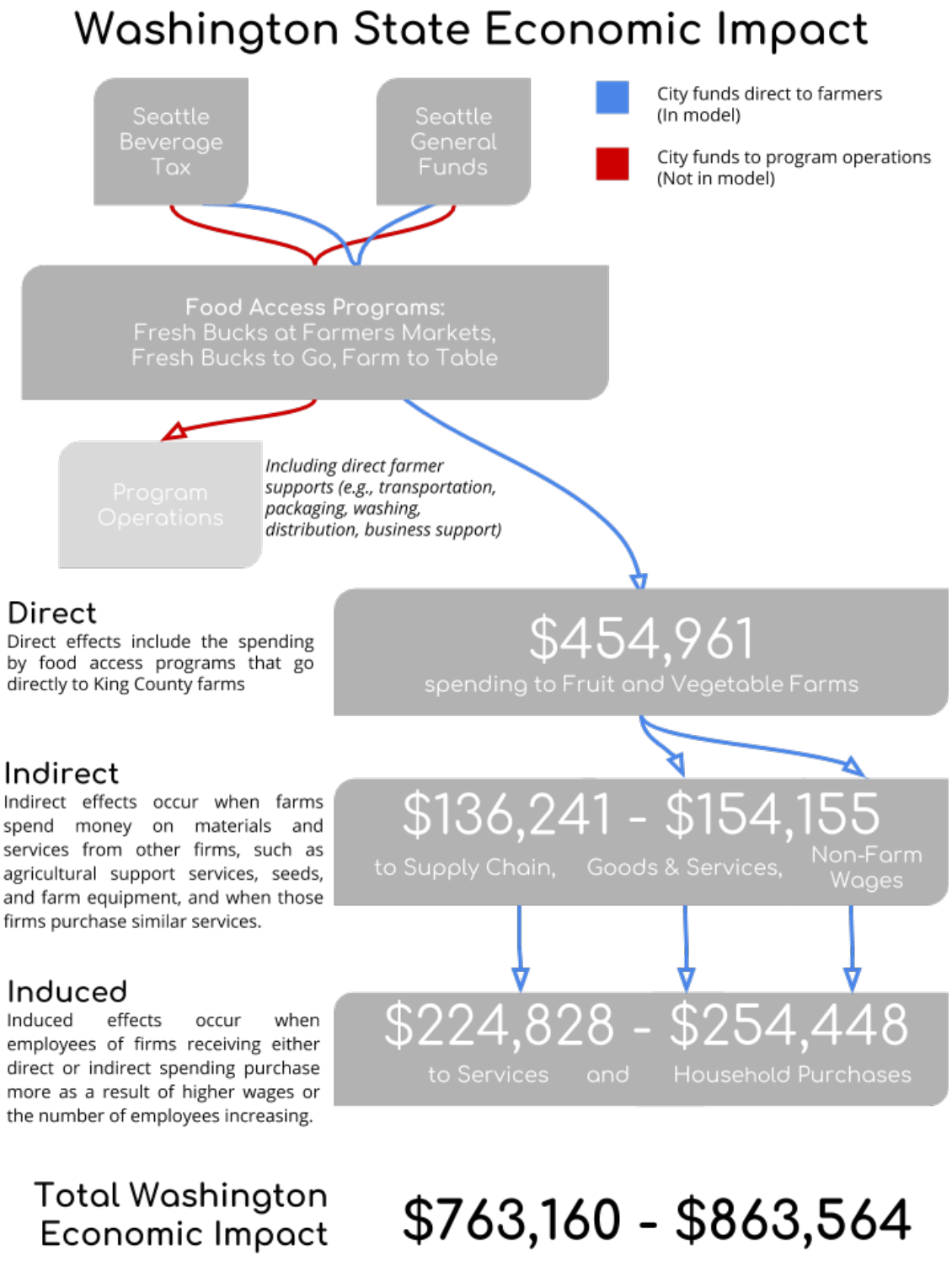


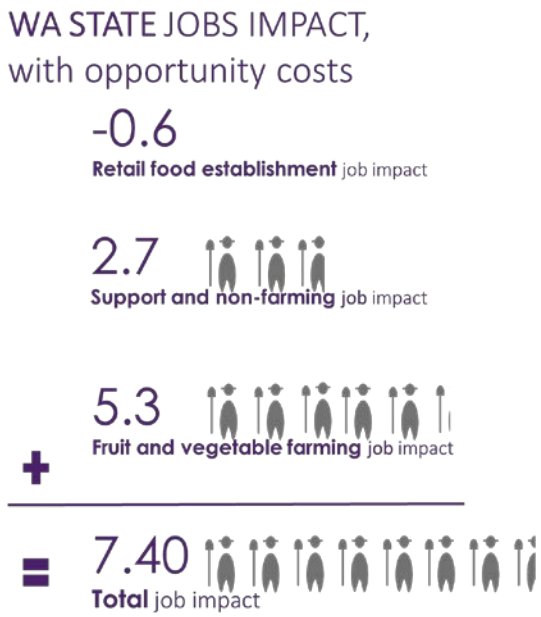
TABLE 3. TOTAL ECONOMIC IMPACT OF CITY FOOD ACCESS SPENDING ON WASHINGTON STATE ECONOMY BY INDUSTRY SECTOR, WITH AND WITHOUT OPPORTUNITY COSTS

	No Opportunity Costs			
	Direct	Indirect	Induced	Total
Total	**$454,961**	**$154,155**	**$254,448**	**$863,564**
Agriculture	$454,961	$64,772	$1,318	$521,052
Mining	$0	$698	$211	$909
Construction	$0	$5,784	$3,217	$9,002
Manufacturing	$0	$20,488	$13,114	$33,601
Transportation, Information, Utilities	$0	$10,321	$25,558	$35,879
Trade	$0	$14,100	$37,085	$51,184
Service	$0	$30,963	$164,994	$195,957
Government	$0	$7,029	$8,951	$15,980

	with Opportunity Costs			
	Direct	Indirect	Induced	Total
Total	**$402,091**	**$136,241**	**$224,828**	**$763,160**
Agriculture	$402,091	$57,245	$1,165	$460,501
Mining	$0	$617	$186	$803
Construction	$0	$5,112	$2,843	$7,955
Manufacturing	$0	$18,107	$11,587	$29,694
Transportation, Information, Utilities	$0	$9,121	$22,583	$31,704
Trade	$0	$12,461	$32,768	$45,229
Service	$0	$27,365	$145,787	$173,153
Government	$0	$6,212	$7,909	$14,121

Note: Industries aggregated by sector. Breakdown of spending by industry given in Table A1 for 40 most affected industries.

FIGURE 3. IMPACT OF CITY FOOD ACCESS SPENDING ON JOBS IN WASHINGTON STATE (WITH OPPORTUNITY COSTS)



2. KING COUNTY

In this section, we present the economic impacts of food access spending by the City of Seattle for the study region of King County. We shrink our study region for two reasons. The first is to obtain an estimate of the impact of City of Seattle spending only in the hyper-local region around the City itself. The second is to explore whether we can detect meaningful differences between the multipliers produced from the standard farm production function in IMPLAN and the multipliers produced from expenditure data collected directly from King County farms that participate in food access programs. We do this by first estimating the economic impacts and multipliers for the King County region using the King County spending in Table 1 and the standard production function.

Table 4 shows the results of this analysis for King County both with and without opportunity costs. We apply the same opportunity cost as for the State of Washington – 11.6% of purchases. This is likely an over estimate of opportunity costs, given that a lower proportion of retail produce sales in Seattle are produced in King County than in the entire State. However, this estimate still remains useful as a lower bound on the economic multiplier estimate.

TABLE 4. TOTAL EMPLOYMENT, LABOR INCOME, VALUE ADDED, AND OUTPUT IMPACTS OF CITY FOOD ACCESS SPENDING ON KING COUNTY ECONOMY, WITH AND WITHOUT OPPORTUNITY COSTS

	No Opportunity Costs			
	Employment	Labor Income	Total Value Added	Output
Direct Effect	3.8	107,873.9	118,950.0	190,185.8
Indirect Effect	0.4	26,163.2	34,110.8	46,579.2
Induced Effect	0.4	26,048.2	46,759.4	71,626.6
Total Effect	4.6	160,085.2	199,820.2	308,391.6
Multiplier	1.2			1.6
	with Opportunity Costs			
	Employment	Labor Income	Total Value Added	Output
Direct Effect	3.3	95,360.5	105,151.8	168,124.2
Indirect Effect	0.3	23,128.2	30,153.9	41,176.0
Induced Effect	0.4	23,026.5	41,335.2	63,317.7
Total Effect	4.0	141,515.3	176,640.9	272,618.0
Multiplier	1.1			1.4

Note: Values estimated in 2018 dollars using IMPLAN Pro version 3.1 using 2016 data. Geographic region is King County, WA, Local Purchase Percentage of food access spending is 100%. Direct purchases modeled in aggregated fruit farming and vegetable and melon farming sectors (IMPLAN sectors 3 and 4).

TABLE 5. TOTAL ECONOMIC IMPACT OF CITY FOOD ACCESS SPENDING ON KING COUNTY ECONOMY BY INDUSTRY SECTOR, WITH AND WITHOUT OPPORTUNITY COSTS

	No Opportunity Costs			
	Direct	Indirect	Induced	Total
Total	**$190,185.77**	**$46,579.21**	**$71,626.58**	**$308,391.57**
Agriculture	$190,185.77	$21,607.62	$22.51	$211,815.91
Mining	$0.00	$168.53	$29.14	$197.67
Construction	$0.00	$2,434.11	$907.97	$3,342.08
Manufacturing	$0.00	$1,548.21	$1,374.79	$2,923.00
Transportation, Information, Utilities	$0.00	$2,940.15	$6,381.43	$9,321.58
Trade	$0.00	$4,672.51	$10,736.01	$15,408.53
Service	$0.00	$11,158.38	$50,479.44	$61,637.82
Government	$0.00	$2,049.70	$1,695.28	$3,744.98

	with Opportunity Costs			
	Direct	Indirect	Induced	Total
Total	**$168,124.22**	**$41,176.03**	**$63,317.75**	**$272,618.00**
Agriculture	$168,124.22	$19,101.14	$19.90	$187,245.26
Mining	$0.00	$148.98	$25.76	$174.74
Construction	$0.00	$2,151.75	$802.65	$2,954.40
Manufacturing	$0.00	$1,368.62	$1,215.31	$2,583.93
Transportation, Information, Utilities	$0.00	$2,599.09	$5,641.17	$8,240.26
Trade	$0.00	$4,130.50	$9,490.61	$13,621.11
Service	$0.00	$9,864.01	$44,623.72	$54,487.73
Government	$0.00	$1,811.93	$1,498.62	$3,310.56

Note: Industries aggregated by sector. Breakdown of spending by industry given in Appendix II Table A2 for 40 most affected industries.

KING COUNTY FARMER SURVEY AND CUSTOM PRODUCTION FUNCTIONS

Next, we adapt the production function in IMPLAN to reflect the expenditure patterns reported in the fall 2018 survey of King County farmers conducted by the UW's CPHN. To customize IMPLAN's default production function for food access farms, farmers were asked to estimate the proportion of their farm spending to each of the following categories: Labor (with separate categories for Full Time, Part Time, Self, and Contract), property and maintenance, raw materials (e.g. fertilizer and seeds), utilities, operational expenses (e.g. storage, fuel, and transportation), accounting/legal/insurance/interest services, and marketing and advertising. Of the total sample of 51 respondents, 17 sold to one of the food access programs or accepted Fresh Bucks. We use the responses from these 17 in what follows, in order to better understand the characteristics, purchasing behavior, and local linkages of food access farms.

We present their answers, along with the default IMPLAN production function, in Table 6. The value for Corporate Taxes, Profits, and other Value Added is calculated as the difference between reported spending in these categories, and all revenue for a farm. These results show that among survey respondents, the average responses are quite different between the (a) total sample of 34 farmers and (b) the sample of 17 farmers who reported food access program sales. There is high variability in farmers' responses, demonstrated by the median value being either zero

or significantly lower than the mean in almost all cases. This is due to a high proportion of zero responses in every category.

There are a few noticeable differences in expenditures between these two groups of farmers, most notably the food access sample appears to spend less on employees but pay a larger share to themselves as proprietor income. Additionally, the two groups of King County survey respondents are more similar to each other than to the default IMPLAN farm. Since the survey samples are so small, we don't analyze these differences statistically, but we do believe that they show what others have found, that farms participating in food hubs, farmers to school programs, and other similar programs have a different production function than the average farm used to create the IMPLAN model.[23] Most notably, the farms in this survey sample spend much less on labor that is not supplied by the proprietor, and much more on materials and operations.

TABLE 6. PROPORTION OF FARM (NON-LABOR) SPENDING BY CATEGORY FOR SURVEYED FARMS AND IMPLAN MODEL

	Total Sample (N=34)		FA Sample (N=17)		IMPLAN Model, King County
	Median	Average	Median	Average	Average
Value Added					
Full Time	0	12.0	0	6.6	40.2
Part Time	0	6.2	0	5.9	*
Proprietor Income	0	11.8	0	18.7	17.0
Additional Value Added (Taxes, Corporate Profits)	*	2.2	*	3.3	5.9
Total Value Added		32.2		34.6	63.1
Expenditures					
Contract	0	3.8	0	2.6	13.5
Property and Maintenance	0	17.3	10	16.5	2.4
Raw Materials (Fertilizers, Seeds)	10	26.1	30	23.2	11.4
Utilities	5	5.6	5	6.1	1.7
Operational Expenses (Storage, Transportation, Fuel)	5	6.2	5	4.4	2.7
Accounting/Legal/Insurance/Interest	0	6.2	0	9.4	0.0
Marketing and Advertising	0	2.5	0	3.2	2.2
Other	*	*	*	*	3.0
Total Expenditure		67.8		65.4	36.9

Note: Sample modes and averages calculated from survey responses. Answers in percent of non-labor and non-value added spending. IMPLAN Production Function aggregated from IMPLAN multipliers for produce producers in King County (based on IMPLAN Version 3.1 with 2016 data).

Additionally, we note that the food access farmers represent a wide range of farm sizes. The average farm had $62,353 in sales, but reported sales ranged from $5,000 to $240,000. Similarly, the average number of workers employed (including full and part time employees, both permanent and seasonal, but not counting the proprietor) was 2.4, but most farmers reported zero employees and a few reported as many as 13.

[23] Christensen and others, *Economic Impacts of Farm to School Case Studies and Assessment Tools Economic Impacts of Farm to School: Case Studies and Assessment Tools Acknowledgments*, 2017; Becca Jablonski and others, *Assessing the Economic Impacts of Food Hubs to Regional Economies: A Framework Including Opportunity Cost*, 2015; William Lazarus and others, *'IMPLAN's Weakest Link: Production Functions or Regional Purchase Coefficients*, 2002.

The customized IMPLAN model was built using the data in Table 6. We created a sector for food access farmers following the procedures outlined in "A Practitioner's Guide to Conducting an Economic Impact Assessment of Regional Food Hubs using IMPLAN: a step-by-step approach" by Todd M. Schmit and co-authors.[24] In this sector, the production function, employment, proprietor income, and labor payments are designed to follow the patterns in Table 6, while the standard fruit and vegetable sector followed the distribution of spending ascribed to the IMPLAN model in the last column of Table 6. Additionally, while the opportunity costs are assumed to be of the same magnitude as those in Table 5, in this case they affect only the main fruit and vegetable farming sector, not the food access farming sector. The resulting estimates of total output, employment, labor income and value added are shown in Table 7, along with their multipliers.

We see in Table 7 that the economic multipliers are much larger than those produced by the default IMPLAN model in Table 5. This is likely because of the greater proportion of farm spending that goes to expenditures among the survey respondents relative to the default model. Meanwhile, the employment multipliers are identical to Table 5, although the number of jobs created is larger.

TABLE 7. SURVEY-BASED ESTIMATES OF TOTAL EMPLOYMENT, LABOR INCOME, VALUE ADDED, AND OUTPUT IMPACTS OF CITY FOOD ACCESS SPENDING ON KING COUNTY ECONOMY, WITH AND WITHOUT OPPORTUNITY COSTS

			No Opportunity Costs	
	Employment	Labor Income	Total Value Added	Output
Direct Effect	4.6	23,773.0	41,972.0	190,186.0
Indirect Effect	0.6	43,417.1	86,101.0	127,623.1
Induced Effect	0.4	21,691.8	36,245.6	55,239.7
Total Effect	5.5	88,881.8	164,318.6	373,048.8
Multiplier	1.2			2.0
			with Opportunity Costs	
	Employment	Labor Income	Total Value Added	Output
Direct Effect	4.6	23,773.0	41,972.0	190,186.0
Indirect Effect	0.1	27,621.3	67,478.5	99,038.7
Induced Effect	0.3	18,374.2	30,704.0	46,791.0
Total Effect	5.0	69,768.5	140,154.5	336,015.6
Multiplier	1.1			1.8

Note: Values estimated in 2018 dollars using IMPLAN Pro version 3.1 using 2016 data. Geographic region is King County, WA, Local Purchase Percentage of food access spending is 100%. Direct purchases modeled in custom built food access farm sectors, aggregated with categories given in Table 6 following Schmit et al. Opportunity costs modeled as occurring in the aggregated fruit farming and vegetable and melon farming sectors (IMPLAN sectors 3 and 4).

In Table 8, we break the total output portion of this spending down by aggregated sector. Most of the impacts occur in the agriculture, construction, and service sectors. This is different from the results using the default IMPLAN model, most notably in the construction sector, which saw much lower effects in that model. This is likely due to the survey respondents reporting much more of their farm expenditures going to property maintenance and raw

[24] Todd M Schmit and others, *A Practitioner's Guide to Conducting an Economic Impact Assessment of Regional Food Hubs Using IMPLAN: A Step-by-Step Approach*, 2013.

materials than those in the default model. The disaggregated results are available in Table A3 in Appendix II for the 40 industries that experience the highest total impacts.

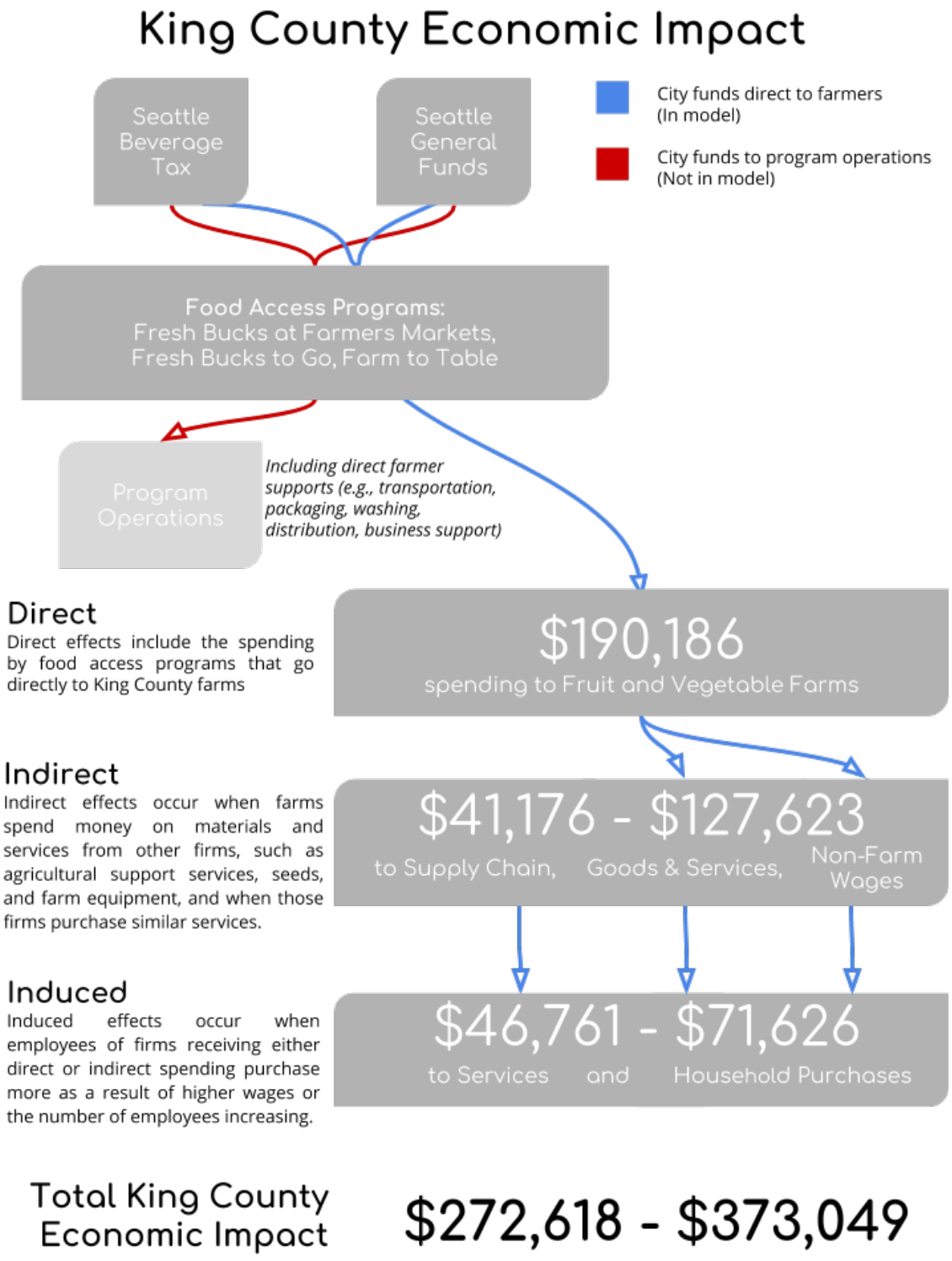
TABLE 8. SURVEY-BASED ESTIMATES OF TOTAL ECONOMIC IMPACT OF CITY FOOD ACCESS SPENDING ON KING COUNTY ECONOMY BY INDUSTRY SECTOR, WITH AND WITHOUT OPPORTUNITY COSTS

No Opportunity Costs				
	Direct	Indirect	Induced	Total
Total	**$190,186.00**	**$127,623.06**	**$55,239.71**	**$373,048.77**
Agriculture	$190,186.00	$41,527.95	$3,003.23	$234,717.17
Mining	$0.00	$79.87	$24.75	$104.62
Construction	$0.00	$36,593.74	$12,793.81	$49,387.55
Manufacturing	$0.00	$5,307.78	$2,460.59	$7,768.36
Transportation, Information, Utilities	$0.00	$14,618.25	$4,674.77	$19,293.02
Trade	$0.00	$511.25	$5,358.61	$5,869.86
Service	$0.00	$28,474.78	$26,626.11	$55,100.89
Government	$0.00	$509.46	$297.85	$807.31
with Opportunity Costs				
	Direct	Indirect	Induced	Total
Total	**$190,186.00**	**$99,038.66**	**$46,790.97**	**$336,015.63**
Agriculture	$190,186.00	$15,498.92	$2,543.80	$208,228.71
Mining	$0.00	$63.91	$20.97	$84.88
Construction	$0.00	$35,862.68	$10,841.11	$46,703.78
Manufacturing	$0.00	$4,944.53	$2,084.71	$7,029.25
Transportation, Information, Utilities	$0.00	$14,211.02	$3,957.58	$18,168.60
Trade	$0.00	$495.67	$4,539.86	$5,035.53
Service	$0.00	$27,475.03	$22,550.63	$50,025.65
Government	$0.00	$486.91	$252.31	$739.22

Note: Industries aggregated by sector. Breakdown of spending by industry given in Table A2 for 40 most affected industries.

The spending and potential range of impacts for both the default and custom model are shown in Figure 4 below.

FIGURE 4. TOTAL IMPACTS OF CITY FOOD ACCESS SPENDING ON WASHINGTON STATE ECONOMY, WITH AND WITHOUT OPPORTUNITY COSTS



DISCUSSION OF INPUT/OUTPUT MODEL RESULTS

The preceding analysis shows us that the City of Seattle's purchases of produce for food access programs have far reaching economic impacts through many sectors of the economy, beyond just the agricultural sector. This is true for hyper-local impacts within just King County, as well as for state-wide impacts. We estimate economic multipliers ranging from 1.7 to 1.9 in Washington State (implying that $1 in food access produce purchases results in $1.70 to $1.90 in total economic activity in the state), and from 1.4 to 2.0 in King County. The wider range of multiplier values in King County results from two factors: 1) The study area is smaller, and therefore fewer of the expenditures by farmers are assumed to stay within the study area, resulting in less economic activity; and 2) We applied data from a small survey of King County farmers to attempt to more accurately portray their expenditure patterns, which appear to be quite different (and more focused on local purchases) than the default IMPLAN model.

We consider potential opportunity costs of this spending, which we believe will result in a reduction of total farmer revenue of approximately 0% to 12% of total City purchases. We account for these impacts in our estimates, which can be considered net economic impacts of the City's spending. The City's spending also affects employment. We estimate that the total number of jobs created in Washington State from this spending ranges from 7.4 to 8.4, with King County jobs created totaling between 4 and 5.5.

Overall, these results are comparable to previous studies of programs that increase spending on local food. Much of the existing literature focuses on estimating impacts of farmers markets and farm to school programs. Farmers markets themselves do not represent a new source of demand in the way that programs that fund farm to school sales do. Since the current study also investigates the impact of a new source of demand for local foods, we confine ourselves to comparisons with Farm to Table impact analyses. In these studies, the typical study area encompasses an entire state or a multi-county region around the spending source, and the multipliers range from about 1.75 to 2. Many multiplier calculations do not take opportunity costs into consideration, however, and may be considered gross, rather than net, impacts of these programs.

LIMITATIONS OF INPUT/OUTPUT MODELLING

Aside from the challenges in correctly setting up and estimating the input/output models outlined in the Methodology section of this report, the main limitation of the model presented here is that there are a number of pathways through which benefits may occur, but for which we do not have sufficient data to accurately include in the model.

The largest potential set of benefits that is omitted from our analysis are the benefits (and potential costs) due to spending of program administration dollars. A significant portion (60%) of City spending on (non-Fresh Bucks) food access programs goes to support operations at the programs themselves. Program operations include the day to day operations of the organization, as well as operations that directly support farmers in getting their produce to consumers, most notably transportation of produce to the consumer. These operations appear to be valued by the farmers (see discussion of farmer interviews below), and do represent a portion of the operational budget that a farmer not participating in a food access program would have to pay out of his or her own pocket. Other studies have incorporated these benefits building custom IMPLAN sectors for these organizations using organizational budgets and other sources of primary data.[25] While that was beyond the scope of the current study, it will be important to continue to remember that there are potential impacts of program spending, since program support makes up such a large portion of spending on food access programs.

[25] Becca Jablonski and others, *Assessing the Economic Impacts of Regional Food Hubs*, 2013.

There are also sources of costs and benefits of food access program spending that are outside of the scope of input/output models altogether. These include the health benefits to program recipients, environmental benefits of agricultural use of open land in urban regions, and the benefits mentioned, but not quantified, in the farmer interviews including benefits to the farmers' households from increased income stability.

Finally, we note that although we have attempted to accurately estimate the opportunity costs associated with food access purchases of produce, our study (as well as future studies) would benefit from a source of primary data on the effects of food access program participation on household purchases of produce and other foods. Without this data, it is difficult to tell how accurately our estimates reflect actual consumer behavior.

SECTION 3 | FARMER SURVEY AND INTERVIEW RESULTS

To understand farmers' overall perceptions of food access programming on their business and personal well-being, we interviewed and analyzed survey data from farmers who currently sold produce through and to the food access programs. We interviewed seven farmers who sold products to either the Fresh Bucks to Go or the Farm to Table program. In the King County farmer survey shared by UW CPHN, 17 of the 51 respondents (33%) either accepted Fresh Bucks at farmers markets or sold to one of the food access programs; seven (14%) of all survey respondents sold to one of the food access programs. Small, large, new, and long-time farmers, all sold to these programs and accepted Fresh Bucks.

SURVEY RESPONSES ON BENEFITS OF PROGRAM PARTICIPATION BY FARMERS

Thirteen farmers who accepted Fresh Bucks or sold to these programs responded to questions about the programs' economic benefits. The majority of these farmers described a strong economic benefit as a result of selling to these programs. As a result of accepting Fresh Bucks or selling to these food access programs, of these 13 survey respondents:

- 100% agreed that they made more money,
- 85% agreed that they sold more products,
- 100% agreed that they had more repeat customers,
- 85% agreed that they had more new customers, and
- 77% agreed that their customers were more diverse as a result of selling to these programs.

However, few survey respondents (<10%) felt that these programs caused them to hire more employees, increase their acres in production, or grow new foods. This was also true for interviewees; few reported that these food access programs directly caused them to hire more workers or increase their number of acres in production. Several interviewees did report adjusting their crops with the food access programs in mind.

INTERVIEW RESPONSES ON BENEFITS OF SELLING TO THE FOOD ACCESS PROGRAMS

Because the Fresh Bucks program is a considerably different operating model from the Fresh Bucks to Go (i.e. Good Food Bag) program and the Farm to Table program, we sought to interview farmers who sold to these latter two programs. In what follows, we discuss the experience of farmers accepting Fresh Bucks separately from the experience of farmers selling products to either the Fresh Bucks to Go or Farm to Table program. Operationally, selling products to the Fresh Bucks to Go and Farm to Table program is similar for farmers. Below, we present the benefits and challenges for farmers in selling products to the Fresh Bucks to Go and Farm to Table program.

Among the farmers we spoke to in interviews (N=7) and heard from through the survey (N=7), the Fresh Bucks to Go and Farm to Table programs made up a notable amount of their business, provided them with a reliable, consistent, and valuable retail outlet, and allowed them to develop and implement business models that shifted their time away from administration and towards production. While the percent of sales that farmers generated from these programs varied from only 5% up to 90% of sales, all farmers agreed that these programs were an important part of their business plans, and allowed them to leverage their capacity to plan and grow crops and sell products locally:

> *"It has allowed my business to exist and grow, it feels like a really good cause—I like selling to a program that allows low-income communities to buy produce at a lower cost."*

> *"So long as [these organizations] continue, they maintain us, and we can look forward to another year of growing... their existence and support is very important."*

For many farmers, the experience of selling to the Fresh Bucks to Go and the Farm to Table programs was indistinguishable from the experience of selling to the organizations that ran the programs. While all farmers knew how much of the products that they sold to the organizations were going specifically to food access programs, for most farmers, the food access programs were synonymous with the organizations running them. Several organizations operating the food access programs sell and distribute products through multiple venues and in multiple ways, in addition to the food access programs, through either their own full-priced CSA boxes, or to restaurants, retailers, and other purchasers.

Selling to these organizations—and subsequently the food access programs—provided many benefits for farmers. The organizations were for farmers a reliable, consistent venue to sell their products. Selling to these organizations provided farmers with security and economic benefits. The food access programs allowed these organizations to increase their purchasing power from farmers, an important component of how these programs and organizations operate to the benefit of farmers.

The specific benefits of selling to the food access programs through these organizations included:

LARGE VOLUME SALES. These organizations, filling orders for and using funds for the Fresh Bucks to Go and Farm to Table programs, bought a much larger volume of product than many of the other local sales venues available to farmers. This large purchasing power allowed farmers to sell a large volume of one item in one sale.

"GUARANTEED" AND PLANNED SALES. Because the Fresh Bucks to Go and Farm to Table programs purchased a consistently large volume of products, farmers were able to anticipate these sales, and plan, plant, and grow crops knowing that there would be a venue to sell them. With the Farm to Table program in particular, childcares are interested in reliably similar products, such as fruit that are easy to serve children, and vegetables that are simple and quick to prepare. This known market outlet allows farmers to plan crops with the childcares in mind. Several of the organizations additionally worked with farmers to intentionally plan crops, and help farmers specialize or diversify crops depending on what other farmers selling to the organization planned to grow. Many farmers valued this opportunity to work together to plan their crops. Farmers valued the partnership with these organization to plan both long-term and short-term what to grow, when to harvest, etc.

BUSINESS AND ADMINISTRATIVE SUPPORT. These organizations served as a one-stop-sell outlet for farmers. Most farmers we spoke to found this all-in-one service invaluable. For farmers who either didn't have the capacity, interest or skills, the business and administrative support these organizations provided, such as marketing, invoicing, transportation and distribution, and network and relationship development, allowed them to have a successful business and business model. For several farmers we spoke to, these organizations served as their "front office," or a sales hub, where they know they could sell their products and get paid—no chasing invoices, and no losing customers if one month all your basil dies. Furthermore, the organizations running the food access program worked together and networked across one another, further increasing purchasing power from farmers. Farmers liked that they could sell to multiple customers through one venue—in selling to these organizations, farmers can make just one sale, and get their products out to the Fresh Bucks to Go program and the Farm to Table program, as well as other wholesale customers, restaurants, and other individual consumers purchasing these organizations' CSA-style produce boxes.

BUSINESS GROWTH. Many farmers reported that their businesses grew as a direct result of selling to these food access programs. Some farmers directly hired more staff and planted more crops because they knew that the programs would buy more if they had it to sell. As a result of increased sales through these organizations, some farmers reported making new connections and relationships that allowed them to sell more to their other markets (e.g., restaurants), and some new farmers described getting their farms off the ground because these programs provided an easy-access entry point to direct market sales. The farmers who did not explicitly state that they grew as a result of these programs all felt that these programs make up a meaningful portion of their sales, and they rely on them as a piece of the pie, and as one of many ways they're able to market and sell their products.

MISSION, VALUES, AND THE FEEL-GOOD. Many farmers described the tremendous non-economic value of knowing their food was reaching consumers who needed it most: low-income shoppers who wouldn't otherwise be able to afford their product, and kids in childcare programs who may for the first time have the opportunity to be exposed to quality, local produce. Many farmers talked about the missions of their farms, and wanting to sell nutritious, local food into their local food system. Farmers felt that these food access programs helped them meet their mission and goals. Most farmers both in interviews and in the survey shared how these programs help them sell their food to communities most in need and meet their farms' mission and goals of providing local communities with fresh, nutritious food. This "feel good" value was one of the main reasons of participating particularly for farmers who only had a small percentage of their sales coming from these programs:

"It's important to me to make my food and products available to all members of my community. It has directly increased the accessibility of my products and connected folks in my community to fresh produce."

"Although it is a small percentage of sales, every little bit helps! And I feel good about supplying healthy fresh products to people who want them."

While the "feel good" value was an important benefit for the farmers who receive a larger percentage of their sales from these programs, it was not the primary or sole reason farmers sell to these programs. The top reasons farmers sold to these food access programs were economic and business-model related. The business benefits farmers described, as result of these programs, include the volume of products they were able to move at one time, the 'guaranteed sale' of selling to these programs that farmers know will purchasing large quantities of produce on a regular basis, the ability to treat the organizations running these programs as a front office—someone to make purchase requests, distribute products, invoice, and market products, the opportunity to plan crops and time harvests depending on the organization's anticipated demand, and the overall benefit of a reliable market place which allows for business growth and development.

CHALLENGES OF SELLING TO THE FOOD ACCESS PROGRAMS.

Despite the many benefits farmers described experiencing as a result of selling to the food access programs, farmers also highlighted challenges in selling to the programs, and barriers to increasing their sales to the programs. Many of the reoccurring challenges across interviewees and survey respondents included similar themes to the benefits: concerns over funding security, difficulties with transportation and distribution, mismatches in the desired volume of sales versus what the programs are able to purchase, and additional administrative support needed to get started with and maintain selling to the programs.

SUSTAINABILITY AND LONGEVITY. Although many farmers described the "guaranteed sale" opportunity through these food access programs as a strong benefit, uncertainty around the sustainability and longevity of these programs was one of the primary concerns for farmers, particularly among those for whom these programs made up a sizeable percentage of their sales:

"[I'm] unsure that the Fresh Bucks to Go program will be there long-term. I'm not even sure if the program will be there next year, let alone in the longer term. It's a risk to rely on it."

Farmers described having had previous rocky experiences with grant-funded programs, and the repercussions that came from missed payments or cancelled funding. Interviewees and survey respondents expressed concern about relying too heavily on the programs and the organizations running the food access programs, wanting to maintain diversified sales streams.

TRANSPORTATION AND DISTRIBUTION LOGISTICS. For survey respondents who both reported *currently selling and not selling* to the programs, transportation and distribution logistics, as well as the operating cost of adding an additional market outlet were common challenges:

"Logistics is a challenge--getting the program set up and produce out to partner programs that buy my produce. Having to manage multiple accounts and cash flows can be difficult."

"Another challenge is being able to afford to haul my low volume of produce such a long way to drop off in South Seattle. I am currently co-hauling with another farmer, if we did not do this, I would not be able to sell to the program."

Few interviewees reported this as a barrier, though this could potentially be the result of sample bias. Transportation and distribution posed a larger challenge for farmers who did not already have a driving route or distribution route set up prior to beginning to sell to the programs. Challenges with transportation and distribution additionally varied by farm location, and farm size.

VOLUME. While the opportunity to sell in large volumes to the food access programs was a benefit for many farmers, several smaller farmers reported that it was difficult for them to access these markets because the volume they had to sell was too small.

PRICING. Most farmers felt that the organizations purchasing on behalf of the food access programs offered them a fair price for their products. However, for several farmers, depending on how valuable the distribution and invoicing offered by the organization was to them, felt that the share of profits taken by some of the organization was too large, and that they would prefer to sell their products either directly to consumers or restaurants, or through other food hubs.

SEASONAL CONSTRAINTS AND FOOD PREPARATION IN KIDS PROGRAMMING. For most local farmers, peak harvest season does not coincide with the academic calendar. Because these food access programs distribute a large portion of their fresh produce through childcares and after school programming, farmers described it as a challenge to plan crops that will harvest and sell during this time. This misalignment in calendars is a challenge for farmers, and limits the quantity and variety of fresh, local produce that is available to the childcares and kids programming. Additionally, many farmers described food preparation time and skills and childcares and after school programs as a limiting factor in the variety and quantity of purchases childcares

and kids programs were able to make from them. Particularly when many of the shoulder season and over-winter crops that farmers have to sell during the academic school year require more time and labor to prepare, such as winter squash or potatoes.

INSUFFICIENT INFORMATION. Among survey respondents, one of the main challenges to selling products to the food access programs was simply insufficient information about the programs. Many farmer survey respondents reported not knowing about either the Farm to Table or Fresh Bucks to Go program, not knowing how to start selling to or through the programs, and not knowing where to being in getting more information about the food access programs: *"Most of these food access programs I'm unaware of."*

While these challenges were present for many farmers, most farmers felt that the benefits outweighed the challenges in selling to these programs. Most farmers felt these programs were a strong benefit to the local community, the local food system, and local farmers. Many farmers additionally described wanting to see a more prominent public conversation about the use of Sugary Beverage Tax revenue being used in this way to support farmers, and to get healthy, local, fresh food to children in the community; many felt that there could be broader public support for the Sugary Beverage Tax if the impact of its revenue to the community could be shared.

FARMER SUGGESTIONS FOR PROGRAM IMPROVEMENTS

Farmers in both the survey and interviews made several suggestions for ongoing improvement and sustainability of the food access programs:

- The City and other stakeholders should stablish funding, policies, and processes for the programs to continue and grow.
- Identify permanent, long-term funding; establish program funding streams so that farmers can anticipate demand and depend on these programs to make sales.
- Consider and explore potential opportunities to improve seasonal coordination so that farms have a way to sell produce to kids' programming during peak harvest season (summer to early fall).
- Consider additional ways to support the childcares and kids' programs participating in Farm to Table with food preparation trainings or education.
- Identify ways to increase the diversity of products farms can sell to the childcares and kids' programming participating in the Farm to Table program, including ways to support childcares to be able to more easily use shoulder season and winter crops (e.g., winter squash).
- Continue to collaborate and grow collaboration across the organizations implementing the food access programs. Consider:
    - A central cooling system for farmers to drop-off products, and cross-organization drop sites.
    - Support organizations to continue coordinated purchases from farmers so that farmers can plan crops, and plan which organization and which program will purchase what quantity of products.
    - Coordinate drop-off days for farmers driving in to the City of Seattle to make deliveries – one day to drop off to multiple organizations is preferred.
- Grow community and public education about these food access programs, such that:
    - Seattle residents understand that the Sugary Beverage Tax revenue is supporting purchases from local farmers and providing nutritious, local food to children and families in the community.
    - Local residents learn more about the regional farmers providing food for King County and the Pacific Northwest.

DISCUSSION OF SURVEY AND INTERVIEW RESULTS

Together, the organizations that operate these food access programs provided a reliable, high-volume market for small farmers that didn't exist previously. While there were opportunities for improvements, the food access programs have allowed these organizations to increase their purchasing power, and thus their benefit to farmers. Though there were differences in the programs, these differences didn't matter much to farmers; together the organizations and the food access programs offered a reliable and viable way to plan crops and sell large volumes of local food in the community.

- Selling to these organizations was centered on what works for farmers, and it was an easy model to sell to: farmers get the order, they deliver, and then there's money in the bank. It has been good for business to develop relationships with these organizations, and it has been satisfying that the food is going to people who need it.

- All farmer interviewees hope the programs continue. Furthermore, farmers felt that it was positive to use tax dollars that gathered from unhealthy food, to pay for good food. To farmers, these purchases mean money directly in the farmer's pocket, and healthy nutritious food on people's plates—a win-win. Farmers appreciated seeing local dollars going to both farmers and community members who need healthy food.

- For the newer farmers, selling to these programs has been a good experience, and the only way they could have started farming, given how these programs function as a guaranteed marketplace to sell products – these programs provide farmers with consistency and some security. The addition of the training programs, connection to resources, and networking opportunities are tremendous added benefits of these organizations.

- Many farmers felt it was important for the public to know that their local tax dollars were going towards both fueling the local farm economy, as well as feeding children in the community. Since the SBT was the primary funding stream for the food access programs, farmers felt that the greater community should know that those dollars are being used to support this kind of a program. Farmers felt that if people understood where the dollars from the SBT were going, they would be supportive of the tax.

- Uncertainty of long-term funding makes it hard for farmers to know if these programs are something they can count on – farmers need to know that this funding will be there in the future. When people stop drinking soda, where will the funding for this come from in the future? This is a concern for farmers.

INTERVIEW LIMITATIONS

This interview sample was a convenience sample, and the farmers we interviewed may not be representative of all King County or Puget Sound farmers. Additionally, the farmers we interviewed may be more favorably inclined towards the programs compared to other King County or Puget Sound farmers given that we were initially introduced to do them through the organizations operating the food access programs. This analysis includes primarily the experiences of farmers already selling to these food access programs, and thus already benefiting from them, and includes few comments and experiences from farmers who do *not* sell to these programs. Because our goal was to understand farmers' overall perceptions of food access programming on their business and personal well-being, we focused on speaking with and analyzing data from farmers currently selling to these food access programs or accepting Fresh Bucks. Additionally, both the interview and survey samples are small (including 14 farmers selling to food access programs, and a handful of farmers who accepted Fresh Bucks). These findings are not generalizable but are rather a deep-dive into farmers' experiences with these specific food access programs and the organizations that run them.

WORKS CITED

Bartlett, Susan, Jacob Klerman, Lauren Olsho, et al. (2014). *Evaluation of the Healthy Incentives Pilot (HIP): Final Report*. US Department of Agriculture. Retrieved from https://www.fns.usda.gov/snap/healthy-incentives-pilot-final-evaluation-report.

Bradford, V., Quinn, E., Walkinshaw, L., Rocha, A., Chan, N., Saelens, B., & Johnson, D. (2018). F*ruit and Vegetable Access Programs and Consumption in Low-Income Communities*. Journal of Hunger and Environmental Nutrition. https://doi.org/10.1080/19320248.2018.1498819

Christensen, L. O., Jablonski, B. B. R., Stephens, L., & Joshi, A. (2017). *Economic Impacts of Farm to School Case Studies and Assessment Tools Economic Impacts of Farm to School: Case Studies and Assessment Tools*. Retrieved from http://www.farmtoschool.org/Resources/EconomicImpactReport.pdf

Hardesty, S., Christensen, L. O., Mcguire, E., Feenstra, G., Ingels, C., Muck, J., … Oneto, S. (2016). Economic Impact of Local Food Producers in the Sacramento Region Spring 2016. Retrieved from http://sfp.ucdavis.edu/files/238053.pdf

Hughes, David W., Cheryl Brown, Stacy Miller, and Tom McConnell (2008). *Evaluating the Economic Impact of Farmers' Markets Using an Opportunity Cost Framework.* Journal of Agricultural and Applied Economics. 40; 253–65 <https://doi.org/10.1017/S1074070800028091>

Hughes, David W., and Olga Isengildina-Massa (2015). *The Economic Impact of Farmers' Markets and a State Level Locally Grown Campaign*, Food Policy, 54;78–84 <https://doi.org/10.1016/j.foodpol.2015.05.001>

Jablonski, B B R, T M Schmit, and D Kay (2015). *Assessing the Economic Impacts of Food Hubs to Regional Economies: A Framework Including Opportunity Cost*, 1;1–30 <https://doi.org/10.1017/age.2016.9>

Kane, Deborah, Sarah Kruse, Michelle Markesteyn Ratcliffe, Stacey Ananda Sobell, and Nell Tessman (2011). *The Impact of Seven Cents*. Ecotrust. <https://ecotrust.org/media/7-Cents-Report_FINAL_110630.pdf>

Lazarus, William F, Diego E Platas, and George W Morse (2002). *IMPLAN's Weakest Link: Production Functions or Regional Purchase Coefficients?*, Journal of Regional Analysis & Policy, 32;33–48.

Schmit, Todd M, B Jablonski, and Y Mansury (2004). *Impacts of Local Food System Activities by Small Direct-to-Consumer Producers in a Regional Economy: A Case Study from Upstate New York - Working Paper.* 25. <https://doi.org/10.1523/JNEUROSCI.4424-08.2009>

Schmit, Todd M, Becca B R Jablonski, David Kay, Allison Gunter Bauman, and Florence Becot (2013). *A Practitioner's Guide to Conducting an Economic Impact Assessment of Regional Food Hubs Using IMPLAN: A Step-by-Step Approach.* <https://doi.org/10.9752/MS145.09-2013>

Sonntag, Viki (2008). *Why Local Linkages Matter*. Sustainable Seattle.

Thilmany McFadden, Dawn, David Conner, Steven Deller, David Hughes, Ken Meter, Alfonso Morales, and others (2016). *The Economics of Local Food Systems: A Toolkit to Guide Community Discussions, Assessments and Choices*. 118. <https://localfoodeconomics.com/wp-content/uploads/2017/03/Toolkit-Designed-FINAL-UPDATED-03-7-2017.pdf>

Welland, Diane (2011). The Complete Idiot's Guide to Eating Local: Enjoy Fresher, Healthier Foods (New York, NY: Alpha Books)

Young, C. R., Aquilante, J. L., Solomon, S., Colby, L., Kawinzi, M. A., Uy, N., & Mallya, G. (2013). *Improving Fruit and Vegetable Consumption Among Low-Income Customers at Farmers Markets: Philly Food Bucks, Philadelphia, Pennsylvania, 2011*. Preventing Chronic Disease, 10, 120356. https://doi.org/10.5888/pcd10.120356

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APPENDIX I. EXPLANATION OF OPPORTUNITY COST CALCULATIONS

To understand the impact of increased spending on produce for food access programs, we should consider the opportunity cost of such spending when we model our direct and indirect impacts in the input/output model. Without such considerations, the results we present here are better considered as gross, rather than net, impacts. The main opportunity cost we have identified is on the demand side of the market. Consumers who receive free or reduced cost produce through food access programs may substitute this for food they would have previously purchased on their own. Our concern is that after this substitution, the net impact on farmer income will be less than total spending on these programs.

Bradford et al (2018) find that participants in Seattle's own food access programs (Fresh Bucks and Good Food Bags) do report consuming approximately 10% more fresh fruit and vegetables than non-participants. In another study of a Philadelphia program similar to Fresh Bucks, Young and co-authors (2013) find that participants increased their fruit and vegetable consumption relative to non-participants. At the same time, participants in the Seattle study reported saving money on produce purchases when they used food access programs (Bradford et al.). These findings combined suggest buyers are substituting subsidized produce for some, but not all, of their previous purchases. Additionally, participants in another incentive program were found to increase not only their consumption of fruits and vegetables (by 26%), but also to increase their total spending on produce as well as the portion of their SNAP benefits used on produce. In fact, participants spent $6 more per month on fruits and vegetables than non-participants, but only received $3.65/month in incentives. These results suggest no substitution, as consumers are likely shifting some of their SNAP purchases toward fruits and vegetables and away from other foods.

Ultimately, we can't know the extent to which substitution of food access food is reducing produce purchases from other sources without further study of participant behavior. We can estimate an upper bound on the amount of substitution that is happening. In Bradford's paper, if we assume that consumers buy half of their produce at the farmer's market (60% of study participants reported purchasing at least half of their produce this way), then access to a program that cuts the price of produce in half should result in a 25% decline in the price faced by these consumers. In the face of this decline, participants increased their purchases by 10%. This suggests that participants are substituting about 60% of their previous food purchases for food obtained from food access programs.

Another consideration is how much of this now unpurchased food was coming from Washington farmers. If these previous purchases were coming from supermarket chains (an assumption which seems reasonable given that most studies find that consumers participating in fresh bucks-like programs increase their farmer's market participation after receiving access), then we need to account for the fact that much less than 100% of the produce available in chain supermarkets is sourced from WA farmers. Data on the actual proportion sourced locally is scarce, but one national supermarket chain with many stores in the Seattle metropolitan area, Safeway[26], claims that one third of the produce supplied by the firm is locally sourced. If we assume that this is an upper bound on how much local produce may be found in Seattle-area grocery stores, then we can estimate that one third of the 60% of produce that is not purchased due to substitution is from Washington State. These calculations lead us to conclude that for $1.00 of food purchased from Washington farmers via food access programs, there is a simultaneous reduction of $0.20 in purchases of local produce from grocery stores.

[26] Diane Welland, *The Complete Idiot's Guide to Eating Local: Enjoy Fresher, Healthier Foods* (New York, NY: Alpha Books, 2011).

Finally, we add the retail and wholesale margins from the IMPLAN software to conclude that Washington produce growers would receive 58% of these revenues, for a total opportunity cost of 11.6% of whatever purchases are made via food access programs. Again, this is an upper bound on the effect. If it is correct, we would need to deflate our estimates of the economic impacts of these programs by 11.6%. On the other hand, if the estimates from the incentives program are closer to the truth, then we can expect consumers to increase their consumption by more than the amount of the subsidy, leading our estimates to be understatements of the true economic impact of food access programs on food purchases in Washington.

APPENDIX II. DISAGGREGATED ECONOMIC IMPACTS BY SECTOR AND TYPE OF SPENDING

TABLE A1. INDIRECT, INDUCED AND TOTAL SPENDING IN WASHINGTON BY INDUSTRY (TOP 40 INDUSTRIES)

	No opportunity cost			With opportunity cost		
Description	Indirect	Induced	Total	Indirect	Induced	Total
Total	154,155.20	254,447.70	863,563.90	136,241.17	224,827.82	763,159.99
Food Access Produce	5,567.55	440.31	460,968.87	4,920.56	389.05	407,400.62
Support activities for agriculture and forestry	57,224.52	118.56	57,343.09	50,574.59	104.76	50,679.35
Owner-occupied dwellings	0.00	32,668.58	32,668.58	0.00	28,865.66	28,865.66
Real estate	7,141.83	18,303.99	25,445.83	6,311.90	16,173.26	22,485.16
Wholesale trade	13,557.18	11,695.89	25,253.08	11,981.73	10,334.39	22,316.12
Hospitals	0.00	11,173.92	11,173.92	0.00	9,873.19	9,873.19
Insurance carriers	3,824.43	6,151.87	9,976.31	3,380.00	5,435.74	8,815.75
Petroleum refineries	6,562.86	2,768.60	9,331.45	5,800.20	2,446.31	8,246.51
Other local government enterprises	4,176.63	4,888.04	9,064.67	3,691.28	4,319.03	8,010.31
Limited-service restaurants	351.06	7,672.44	8,023.50	310.27	6,779.30	7,089.57
Monetary authorities and depository credit intermediation	2,304.19	5,420.27	7,724.46	2,036.43	4,789.31	6,825.74
Wireless telecommunications carriers	703.94	6,763.41	7,467.35	622.13	5,976.10	6,598.23
Maintenance and repair construction of nonresidential structures	5,630.59	1,574.24	7,204.84	4,976.28	1,390.99	6,367.26
Offices of physicians	0.00	7,079.73	7,079.73	0.00	6,255.59	6,255.59
Full-service restaurants	142.84	4,751.03	4,893.87	126.24	4,197.97	4,324.21
Insurance agencies, brokerages, and related activities	1,917.73	2,911.50	4,829.24	1,694.88	2,572.58	4,267.46
Retail - Nonstore retailers	66.48	4,576.95	4,643.42	58.75	4,044.15	4,102.90
Other financial investment activities	500.93	4,140.66	4,641.59	442.72	3,658.66	4,101.38
Retail - General merchandise stores	20.39	4,334.05	4,354.44	18.02	3,829.53	3,847.55
Legal services	1,080.26	3,093.32	4,173.58	954.72	2,733.23	3,687.95
Truck transportation	1,950.90	2,066.74	4,017.64	1,724.19	1,826.15	3,550.35
Pesticide and other agricultural chemical manufacturing	3,906.25	36.92	3,943.17	3,452.31	32.62	3,484.93
Electric power transmission and distribution	1,870.01	2,041.39	3,911.40	1,652.70	1,803.75	3,456.46
Retail - Food and beverage stores	5.51	3,780.90	3,786.41	4.87	3,340.77	3,345.64
Management of companies and enterprises	1,168.01	2,416.79	3,584.80	1,032.28	2,135.45	3,167.74
Outpatient care centers	0.00	3,325.17	3,325.17	0.00	2,938.09	2,938.09
Retail - Motor vehicle and parts dealers	36.86	3,122.92	3,159.78	32.58	2,759.38	2,791.96
Internet publishing and broadcasting and web search portals	591.86	2,478.41	3,070.27	523.08	2,189.90	2,712.98
Local government electric utilities	1,446.97	1,579.57	3,026.54	1,278.82	1,395.70	2,674.52
Automotive repair and maintenance	189.54	2,784.93	2,974.47	167.51	2,460.74	2,628.26
Air transportation	455.62	2,257.46	2,713.08	402.67	1,994.67	2,397.34
Accounting, tax preparation, bookkeeping, and payroll services	1,387.12	1,279.79	2,666.90	1,225.92	1,130.81	2,356.73
Offices of dentists	0.00	2,666.18	2,666.18	0.00	2,355.82	2,355.82
Offices of other health practitioners	0.00	2,478.58	2,478.58	0.00	2,190.05	2,190.05
Retail - Building material and garden equipment and supplies stores	95.99	2,293.59	2,389.58	84.83	2,026.59	2,111.43
Architectural, engineering, and related	1,110.96	1,260.96	2,371.92	981.86	1,114.17	2,096.03
Nitrogenous fertilizer manufacturing	2,288.36	18.06	2,306.42	2,022.43	15.96	2,038.39
Employment services	500.27	1,741.66	2,241.93	442.14	1,538.91	1,981.05
Commercial and industrial machinery and equipment rental and leasing	1,825.90	412.18	2,238.08	1,613.71	364.20	1,977.91
Wired telecommunications carriers	184.38	2,045.14	2,229.51	162.95	1,807.07	1,970.02

TABLE A2. INDIRECT, INDUCED AND TOTAL SPENDING IN KING COUNTY DEFAULT BY INDUSTRY (TOP 40 INDUSTRIES)

	No opportunity costs			With opportunity costs		
Description	Indirect	Induced	Total	Indirect	Induced	Total
Total	46,579.21	71,626.58	308,391.57	41,176.03	63,317.75	272,618.00
Food Access Produce	49.18	0.23	190,235.18	43.47	0.20	168,167.90
Support activities for agriculture and forestry	21,183.52	2.98	21,186.50	18,726.23	2.63	18,728.87
Owner-occupied dwellings	0.00	10,508.21	10,508.21	0.00	9,289.24	9,289.24
Real estate	2,876.26	5,181.81	8,058.07	2,542.62	4,580.71	7,123.32
Wholesale trade	4,472.96	2,949.85	7,422.82	3,954.10	2,607.66	6,561.77
Hospitals	0.00	3,480.75	3,480.75	0.00	3,076.98	3,076.98
Other local government enterprises	1,651.44	1,219.03	2,870.48	1,459.88	1,077.62	2,537.50
Maintenance and repair construction of nonresidential structures	2,376.46	369.43	2,745.89	2,100.79	326.58	2,427.37
Limited-service restaurants	136.51	2,474.65	2,611.16	120.67	2,187.59	2,308.26
Insurance carriers	1,145.66	1,355.21	2,500.87	1,012.77	1,198.00	2,210.77
Offices of physicians	0.00	2,416.52	2,416.52	0.00	2,136.20	2,136.20
Monetary authorities and depository credit	884.41	1,492.84	2,377.25	781.82	1,319.67	2,101.49
Wireless telecommunications carriers	207.20	1,653.68	1,860.88	183.17	1,461.85	1,645.01
Full-service restaurants	46.31	1,584.85	1,631.16	40.94	1,401.01	1,441.94
Legal services	449.45	1,144.17	1,593.61	397.31	1,011.44	1,408.75
Insurance agencies, brokerages, and related	704.47	746.30	1,450.77	622.75	659.73	1,282.48
Retail - Nonstore retailers	24.12	1,365.28	1,389.40	21.32	1,206.91	1,228.23
Other financial investment activities	169.94	1,185.35	1,355.29	150.23	1,047.85	1,198.08
Retail - General merchandise stores	6.29	1,322.81	1,329.10	5.56	1,169.36	1,174.92
Retail - Food and beverage stores	1.43	1,218.60	1,220.03	1.27	1,077.24	1,078.50
Electric power transmission and distribution	687.25	515.14	1,202.39	607.52	455.38	1,062.91
Internet publishing and broadcasting	232.95	863.62	1,096.57	205.93	763.44	969.37
Outpatient care centers	0.00	1,039.06	1,039.06	0.00	918.52	918.52
Accounting, tax prep., bookkeeping, payroll	614.62	421.67	1,036.30	543.33	372.76	916.09
Management of companies and enterprises	227.84	686.48	914.32	201.41	606.85	808.25
Air transportation	159.89	748.25	908.14	141.34	661.45	802.80
Commercial and industrial machinery rental	724.73	111.72	836.44	640.66	98.76	739.42
Automotive repair and maintenance	61.92	754.73	816.66	54.74	667.18	721.92
Retail - Motor vehicle and parts dealers	6.98	803.32	810.30	6.17	710.13	716.30
Offices of dentists	0.00	801.16	801.16	0.00	708.22	708.22
Truck transportation	436.60	362.71	799.32	385.96	320.64	706.59
Offices of other health practitioners	0.00	792.26	792.26	0.00	700.35	700.35
Architectural, engineering, and related	351.62	378.54	730.16	310.83	334.63	645.46
Retail - Building material and garden equip.	34.54	682.82	717.36	30.53	603.61	634.14
Funds, trusts, and other financial vehicles	10.80	704.63	715.44	9.55	622.90	632.45
Employment services	174.17	534.45	708.63	153.97	472.46	626.42
Automotive equipment rental and leasing	390.47	300.74	691.22	345.18	265.86	611.03
All other food and drinking places	32.11	657.85	689.96	28.38	581.54	609.92
Nursing and community care facilities	0.00	666.27	666.27	0.00	588.98	588.98
Retail - Clothing and clothing accessories	25.70	625.07	650.76	22.72	552.56	575.27

TABLE A3. INDIRECT, INDUCED AND TOTAL SPENDING IN KING COUNTY CUSTOM BY INDUSTRY (TOP 40 INDUSTRIES)

	No opportunity costs			With opportunity costs		
Description	Indirect	Induced	Total	Indirect	Induced	Total
Total	127,623	55,239	373,048	0.08	0.31	190,186
Food Access Farms	0.00	0.00	190,186	0.00	0.00	190,186
Property	36,593.74	12,793	49,387.55	0.10	0.03	0.13
Raw Materials	33,983.61	2,987.25	36,970.85	0.12	0.01	0.13
Accounting/Legal/Insurance	19,509.65	5,019.55	24,529.20	0.08	0.02	0.09
Utilities	6,857.62	1,100.69	7,958.31	0.01	0.00	0.01
Operations	4,780.94	1,403.17	6,184.12	0.01	0.00	0.02
Internet publishing and broadcasting	4,876.02	695.56	5,571.59	0.01	0.00	0.01
Produce	3,996.09	0.18	3,996.27	-0.36	0.00	-0.36
Marketing and Advertising	3,170.91	368.31	3,539.22	0.02	0.00	0.02
Support activities for agriculture and forestry	3,503.76	2.60	3,506.36	0.02	0.00	0.02
Hospitals	0.00	2,695.92	2,695.92	0.00	0.01	0.01
Limited-service restaurants	147.76	1,937.79	2,085.54	0.00	0.01	0.02
Offices of physicians	0.00	1,881.55	1,881.55	0.00	0.01	0.01
Wireless telecommunications carriers	470.74	1,308.90	1,779.63	0.00	0.00	0.00
Full-service restaurants	190.41	1,242.96	1,433.37	0.00	0.02	0.02
Employment services	963.84	463.41	1,427.25	0.01	0.00	0.01
Other financial investment activities	335.59	846.17	1,181.76	0.00	0.00	0.01
Retail - Nonstore retailers	78.74	1,064.12	1,142.86	0.00	0.00	0.00
Retail - General merchandise stores	27.01	1,030.17	1,057.19	0.00	0.01	0.01
Retail - Food and beverage stores	8.66	949.95	958.61	0.00	0.01	0.01
Outpatient care centers	0.00	809.75	809.75	0.00	0.00	0.00
Scenic and sightseeing transportation	570.77	202.44	773.21	0.00	0.00	0.00
Automotive repair and maintenance	92.63	588.78	681.41	0.00	0.00	0.00
Nondepository credit intermediation	446.92	217.27	664.18	0.00	0.00	0.00
Retail - Motor vehicle and parts dealers	25.27	624.43	649.70	0.00	0.00	0.00
Offices of dentists	0.00	622.34	622.34	0.00	0.00	0.00
Offices of other health practitioners	0.00	619.71	619.71	0.00	0.01	0.01
Funds, trusts, and other financial vehicles	30.97	539.67	570.63	0.00	0.00	0.00
Retail - Clothing and clothing accessories stores	81.11	487.13	568.24	0.00	0.00	0.01
All other food and drinking places	53.02	511.26	564.28	0.00	0.01	0.01
Software publishers	173.17	371.29	544.46	0.00	0.00	0.00
Couriers and messengers	414.74	107.29	522.03	0.00	0.00	0.00
Radio and television broadcasting	452.63	65.67	518.30	0.00	0.00	0.00
Nursing and community care facilities	0.00	516.34	516.34	0.00	0.01	0.01
Services to buildings	330.36	165.73	496.09	0.01	0.00	0.01
Retail - Health and personal care stores	90.56	394.67	485.23	0.00	0.00	0.00
Individual and family services	0.00	461.68	461.68	0.00	0.01	0.01
Other computer related services	291.30	106.04	397.34	0.00	0.00	0.00
Lessors of nonfinancial intangible assets	261.05	108.59	369.64	0.00	0.00	0.00
Data processing, hosting, and related	230.32	127.33	357.65	0.00	0.00	0.00
Landscape and horticultural services	215.64	138.38	354.02	0.00	0.00	0.00