STUDY SUMMARY

# The Chicago Local Food System: An Economic Assessment

September 2017


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Chicago Local Foods System: An Economic Assessment

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Study Summary

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**FUNDING**

Funding was provided by Food:Land:Opportunity, a collaboration between Kinship Foundation and The Chicago Community Trust and funded through the Searle Funds at The Chicago Community Trust



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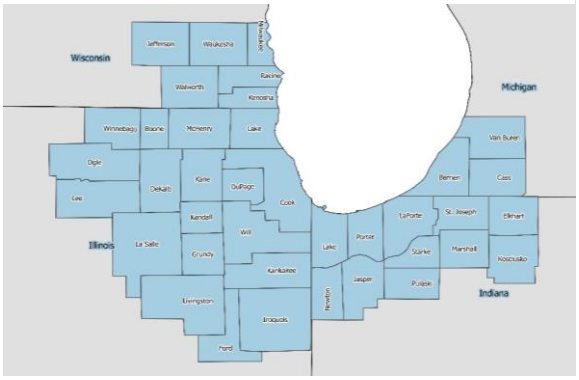
## OVERVIEW

This summary provides an overview of *The Chicago Local Food System Study: An Economic Assessment* and incorporates many of the key elements from the study text in an abridged form. Dr. Steven Miller and Dr. John Mann of Michigan State University's Product Center in the Center for Economic Analysis conducted a rigorous econometric analysis of current local food production and consumption in the 38-counties contiguous to the City of Chicago, the "Study Region." This economic analysis seeks to establish and understand the baseline capacity of the Chicago region to satisfy the demand for local food and to review the policies that support or inhibit the local food system. The study focuses on fruits, vegetables, and grains,[1] and notably excludes proteins such as meat, dairy, and eggs, as they are more complex to model.

This research aims to develop cost-effective, credible, and replicable economic measures of the Chicago region local food system; delineate the economic implications of production and consumption patterns of the region's local foods and the potential impacts of changes in the local food system; as well as identify policy that could help the local food system evolve. The model was designed to estimate economic impact by minimizing leakage-- that is, keeping dollars within the local economy.

## SCOPE

At its widest, the Study Region spans roughly 300 miles across a four-state area, with all points located within approximately 160 miles of the central city in Cook County. The 14 counties that make up the Chicago Core-Based Statistical Area host 9,928,312 residents, while the population of the 38-counties making up the Study Region is estimated at just over 13 million persons.[2] To get a perspective on total food-related expenditures in the Study Region, the USDA estimates that the average 2014 per-capita at-home and away-from-home food expenditures is $4,576. This suggests that residents in the Study Region were expected to spend more than $60 billion on food in 2016.[3]




*The Study Region*

Specific research objectives include:

a. Estimating the economic baseline values of local foods for the Study Region.

[1] While grains were included, data sources do not yet lend themselves to analyzing grains for local consumption. For example, the vast majority of the region's grain is likely exported outside the region and potentially used for non-food consumption. This, therefore, makes it difficult to quantify the Region's capacity with respect to grains.
[2] U.S. Census Bureau, Population Division. 2015. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2014 U.S. Census Bureau.
[3] USDA Economic Research Service (2015). Food Availability (Per Capita) Data System. Washington, DC, USDA.

b. Estimating the economic impacts of a hypothetical increase of 10% and 25% of the baseline capacity for production/consumer purchases of locally-sourced foods within the Study Region.
c. Determining the necessary changes in land use within the Chicago Region to support local food production should demand increase by 10 % and 25 %.

## METHODOLOGY

This study utilizes an Input/Output model (IO) to estimate the size of the Study Region's local food system. IMPLAN Pro 3.1 was the primary source of analytical data for modeling Study Region baselines.[4] Input/Output analysis is a quantitative technique intended to represent the interdependencies between different branches of an economy, in this case, the 38 counties of the Study Region. "The primary benefit of IO modeling is that it allows for a range of geographies (municipal/MSA, county, state, or a regional mix) while also making considerations for the net economic effect of the system in question. Further, IO models can be restricted to what a defined region can produce and include considerations for broader definitions such as the inclusion of intermediaries into the value chain. In short, IO models provide a means to a holistic economic approach to measuring local food systems."[5]

IO attempts to estimate the economy-wide effects that an initial change in economic activity has on a regional economy as represented through a matrix delineating inputs and corresponding output. Any initial input change spurs a change in final output.

This transactions matrix represents interaction between sectors in the process of generating goods and services for final consumption. An initial change in economic activity results in diminishing rounds of new spending as leakages occur through saving or spending outside the local economy. The size of both macroeconomic multipliers and regional IO multipliers is smaller when there are more leakages.

Leakage results when commerce occurs outside the economic model's scope. In this case, the study strives to estimate the economic effects on local food by minimizing leakage. That is, money that is spent on local produce is returned to the community, positively affecting the local economy rather than the economy of another agricultural region where non-local food is produced. In today's complex economy, however, the goal of minimizing leakage overlooks regional and comparative advantage—the fact that the local economy may benefit from its consumers' ability to buy cheaper goods from non-local sources more than the local economy may benefit from minimizing leakage. Accounting for opportunity cost is a key feature in IO analysis, differentiating it from other studies conducted on the local food systems that fail to take opportunity cost into account.

[4] In addition to IMPLAN Pro 3.1, the study also incorporates U.S. Census data, Department of Commerce County Business Patterns, USDA Cropscape raster data file, USDA Economic Research Service's Food Environment Atlas and Food Availability Data System, USDA Census of Agriculture County Profiles data, Farm Service Agency Crop Acreage Data, and others in its analysis.
[5] Miller, *Chicago Local Food System,* 9.

## RESULTS

The research team selected a representative basket of goods for analysis, which was informed by key data sources and interviews with local foods vendors in the Chicago region.

**Table 1: Representative Basket of Goods**[6]

| Food Item | Planted Acres | Ave. Yield (lbs./ac) | Per-capita avail. (lbs.) | Consumption (lbs.) | Proportion[a] |
|---|---|---|---|---|---|
| *Total Fruit* [b] | | | *17.0* | *246.2* | *6.9%* |
| Apples | 5481 | 21,492 | 9.1 | 52.4 | 17.4% |
| Blueberries[c] | 2246 | 4830 | 0.8 | 1.9 | 44.3% |
| Cherries[c] | 2868 | 5313 | 1.2 | 1.6 | 13.9% |
| Grapes | 7274 | 9408 | 5.3 | 17.7 | 29.9% |
| Peaches[c] | 1003 | 7148 | 0.6 | 6.7 | 6.5% |
| *Total Vegetables* | | | *41.2* | *274.9* | *15.0%* |
| Asparagus[c] | 1552 | 2120 | 0.3 | 1.6 | 15.9% |
| Beans[d] | 4525 | 5300 | 1.9 | 5.6 | 33.0% |
| Cabbage[c] | 2069 | 26,859 | 4.3 | 7.9 | 54.5% |
| Sweet Corn[e] | 3322 | 8811 | 2.3 | 18.1 | 12.5% |
| Cucumbers | 4617 | 19,200 | 6.9 | 3.7 | 187.7% |
| Peas | 7277 | 3860 | 2.2 | 6.6 | 32.8% |
| Potatoes | 6019 | 34,067 | 15.9 | 75.7 | 21.0% |
| Radishes[c] | 3023 | 6750 | 1.6 | 0.5 | 316.4% |
| Squash[c] | 1329 | 21,200 | 2.2 | 4.4 | 49.6% |
| Tomatoes | 2880 | 16,813 | 3.8 | 85.7 | 4.4% |
| *Grains* | | | *1760.2* | *94.2* | *1869.0%* |
| Corn | 3,945,128 | 5467 | 1725.4 | 9.8 | 17,662.6% |
| Wheat | 105,805 | 4110 | 34.8 | 68.7 | 50.7% |

*Note: food items presented represent about 93% of total fruits and vegetables produced in region.*
*a. Hypothetical value; considers if all production went to local consumption, shows what % is met.*
*b. About 65% of fruit consumed cannot be produced in the region, e.g., oranges and bananas.*
*c. Based on USDA ERS food availability data and may not accurately reflect actual consumption.*
*d. String beans are used for annual consumption data.*
*e. Does not include corn grain for human consumption.*
*Source: Lin, et al., (2016); USDA, ERS (2014); USDA, FSA (2016); USDA, NASS (2016)*

By tracing commodity sales across industries and households, the study finds an estimated $270.4 million in local food sales in 2013, contrasted with $3,973.3 million in total agricultural sales. "Based on estimated total consumer expenditures on agricultural crop products, this suggests that less than 1.5 % of the region's household expenditures were captured by local supply. . . On the other hand, well over half of the fruit and vegetable production in the region makes its way to local channels."[7] In terms of employment, the Study Region's local food system contributed $79.6 million in labor income from 1,414 jobs. Overall, the local food system "contributed about $119.9 million to gross regional product in 2013."[8]

[6] Miller, *Chicago Local Food System, 21.*
[7] Miller, Steven, and John Mann. 2017. "The Chicago Local Food System: An Economic Assessment." Product Center Food-Ag-Bio, Center for Economic Analysis, Michigan State University. 60.
[8] Miller, *Chicago Local Food System,* 61.

In comparison, 17% of household expenditures in the state of Michigan were captured by local food consumption, revealing important factors in local food systems research. First, population density in the Study Region is much higher. Second, fewer food-producing acres per capita in the Study Region result in diminished capacity to meet local demand. Finally, crop prevalence proves important: commodity crops, largely corn and soybeans, which have little presence in the local food sector, characterize the Study Region. "Michigan, like regions along the West Coast, has climatic and geographic conditions that favor the production of specialty crops and discourage large-scale specialization on high-volume commodity crops."[9] Regional specialization, with accompanying infrastructure investment, support services, and buyer relationships, increases the opportunity costs of shifting from commodities to produce for local markets. "Three important economic considerations that can impact definitions and are relevant for developing measures of local food include: 1) available physical resources including climate and soils that affect the ability of a region to self-supply; 2) the extent to which minimally-processed and processed foods are considered part of the local food system, and how this will define the size of the value chain; and 3) the regional policies in place that support (or detract from) the local food system. . ."[10]

Given this baseline, what is the best approach to building the local food economy in the Chicago Region? This study explores the potential economic impacts of three scenarios on the basket of goods: diversion of export sales to local purchases; shifting from export-oriented grains to local food-oriented grains, fruits and vegetables; and expansion of all crop output. The research team explores the potential for 10% and 25% increases in local food sales, as well as the Study Region's capacity to fulfill a 10% and 25% increase in local demand.

*a. Non-Local to Local*

This simulation explores the hypothetical impact on the Study Region economy when 10% ($16.97 million) and 25% ($42.4 million) increases in local produce production are allocated to local markets, rather than being sold outside the Study Region.[11] In simulating increases in local demand, each crop-farming sector's total export sales are decreased and taken up by local sectors in proportion to current purchases. That is, there is a one-to-one diversion of exported goods to local uses. This approach addresses a common critique of local foods impact estimates that fail to account for the losses in export sales often resulting from increases in local food sales.

When opportunity cost (in this case, in the form of lost export sales) is included, figures for employment and revenue are reduced in comparison with more optimistic projections that don't take these costs into account. The study thus shows that expanding local food sales by 10% and 25% without any increase in production results in relatively modest increases in total economic activity in the Study Region.[12]

[9] Miller, *Chicago Local Food System,* 61.
[10] Miller, *Chicago Local Food System,* 6.
[11] Miller, *Chicago Local Food System,* 52.
[12] Miller, *Chicago Local Food System,* 52.

**Table 2: Impacts of 10 and 25% Increase in Current Local Purchases from Exports[13]**

| | Growth Simulation | |
|---|---|---|
| | 10% | 25% |
| Employment (Persons) | 2 | 15 |
| Labor Earnings ($) | 94,294.0 | 591,482.8 |
| GRP ($) | 150,256.5 | 942,522.5 |
| Sales ($) | 530,163.6 | 3,325,679.8 |

To achieve 10% self-supply, demand for processed and unprocessed grains, fruits and vegetables must reach $507.14 million per year. This amounts to less than 10% of total grain production, but over 60% of fruit and vegetable output in the region. Without significant investment in new infrastructure and marketing chains, this is unlikely. An increase of 25% was deemed infeasible because it would require that 130% of current local food production be diverted from exports.

**Table 3: Direct Effects of 10 and 25% Self-Supply from Exports[14]**

| | Total Demand | 10% Local Supply ($Mills) | | 25% Local Supply ($Mills) | |
|---|---|---|---|---|---|
| | | Local Purchases | Export Purchases | Local Purchases | Export Purchases |
| Grains | 3489.07 | 348.91 | -348.91 | 872.27 | -872.27 |
| Vegetables | 864.94 | 86.49 | -86.49 | 216.24 | -216.24 |
| Fruit | 717.42 | 71.74 | -71.74 | 179.35 | -179.35 |
| Total | 5071.43 | 507.14 | -507.14 | 1267.86 | -1267.86 |

*b. Shift from Grains to Produce*

A second simulation evaluates the hypothetical impact of increasing local produce production by 10% and 25% by proportionally shifting from export grain production to local fruit and vegetable production, rather than diverting produce from the export economy to local markets. The proportional shift is in economic value, not acres. Total acres for all fruit and vegetable commodities necessary to increase output are allocated to acres currently in grain production. Grain output thus decreases by the value of yields per acre for the number of acres taken out of grain farming. By netting out grain acres in the analysis, this simulation accounts for the lost sales to grain production for increased local food production, again accounting for opportunity cost. The study also assumes that the increase in fruit and vegetable crop production is proportional to the current level of production, with a total aggregate of 10% and 25% increase, respectively.

[13] Miller, *Chicago Local Food System, 52.*
[14] Miller, *Chicago Local Food System, 53.*

**Table 4: Change and Impact of Fruit and Vegetable Yields**[15]

| Change in Fruit and Vegetable Yields | 10% | 25% |
|---|---|---|
| Corresponding net change in grain yields | -0.14% | -0.34% |
| Shifted land acres | 5548.5 | 13871.3 |
| Change in grain sales ($ millions) | -5.11 | -12.77 |
| Change in vegetables sales ($ millions) | 11.04 | 27.60 |
| Change in fruit sales ($ millions) | 5.93 | 14.82 |
| **Net gain ($ millions)** | **11.96** | **29.91** |
| Percent gain in sales | 4% | 11% |
| Change in employment (persons) | 208 | 520 |
| Percent change in employment | 15% | 37% |

This shows that shifting production focus from grains to produce could have a significant impact on the local economy. Although the actual net impacts derived through this analysis may be small, it is important to note that the Study Region begins with a small base of local produce yield. Because of the relative scarcity of produce production with respect to grain production in the Study Region, a 10% increase in fruit and vegetable production results in a 0.14% decrease in grain output. A 25% increase in produce output results in a proportional decrease of grain by only .34%.

Unfortunately, wide-scale diversion from commodity crops to produce is not realistic due to a deeply entrenched agricultural economy and federal policy that supports extensive commodity grain production in the Upper Midwest.[16]

### *c. Increasing Local Yield by Expanding All Crop Output*

The last scenario also proposes 10% and 25% increases in produce yield, though lost grain sales due to fewer acres are not accounted for in this model. Instead, fruit and vegetable crop production in the Study Region is assumed to increase due to either enrolling currently unproductive land into production or increasing yields of existing acres in fruit and vegetable production, perhaps resulting from changed technology such as controlled environment production. Growth in output is reached by increasing all fruit and vegetable production by 10% and 25% from their current levels of output. In this simulation, no netting out of lost sales is assumed and the analysis implicitly infers that land or untapped yields are accessible to reach projected growth. A 10% increase in produce output would create an estimated 1,507 new jobs in the Study Region, while a 25% increase would result in 3,767 jobs.[17]

[15] Data compiled from Miller, *Chicago Local Food System,* 55-6.
[16] Miller, *Chicago Local Food System,* 64.
[17] Miller, *Chicago Local Food System,* 57.

**Table 5: Change and Impact of 10% and 25% Increase in Current Local Purchases through Production Expansion[18]**

| CHANGE IN $ MILLIONS | 10% | 25% |
|---|---|---|
| Vegetables | 13.52 | 33.8 |
| Fruit | 10.76 | 26.9 |
| **Total** | **24.28** | **60.71** |
| Percent change | 9% | 22% |
| Change in employment (persons) | 1,507 | 3,767 |
| Percent change in employment | 107% | 266% |

The above demonstrate that much can be gained by beginning production on land not currently farmed, without disrupting the preexisting grain production economy. Much of the opportunity for increased agricultural expansion is clustered around developed acres, suggesting options for urban and peri-urban agriculture.[19]

## LIMITATIONS OF QUANTITATIVE ANALYSIS

All three scenarios explored make no assumptions on what specific commodities generate growth, but rather assume that growth occurs across all fruit and vegetable production. From a policy perspective, this may not be realistic as some crop products are more amenable to local food markets than others because of local demand, value chains, soils, climate and other considerations that make them better targets for profitable growth. The commodities targeted for growth are largely a market and policy consideration that require further investigation when setting forth a policy agenda. Likewise, the costs of infrastructure to produce such results are significant and outside the scope of this study.

The USDA National Agricultural Statistical Service, Economic Research Service, Rural Development Service, and other USDA agencies served as the study's primary data sources. USDA data, though internally consistent, do not always provide the breadth and definitions of data necessary for full precision of this research. One significant issue is that the USDA does not differentiate between food and feed grains. USDA crop data are also incomplete, omitting some crops like mushrooms for which there exists local demand. Another issue with the source data is that spatial granularity of USDA Cropscape is limited to just under one-fourth of an acre. Although this crop size is quite small, many urban agriculture plots are smaller and are thus excluded from analysis.

The use of IO analysis, though fruitful in many ways, also presented limitations. Production chains of local foods that are marketed as local generally follow different channels and command different values from those which secondary data captures. IO models rely on aggregate measures, which are weighted towards conventional channels and goods due to the relative scale of these items compared to local. This fails to account for the fact that grower prices can be higher for local markets (especially if vertically

[18] Table compiled from information in Miller, *Chicago Local Food System,* 57-8.
[19] Miller, *Chicago Local Food System,* 35.

integrated with the marketing effort) and that wholesale and retail margins tend to be much higher for local foods. In other words, local foods follow a different value chain of transactions than conventional food before reaching consumers and these differences are not fully captured in this analysis.

## RECOMMENDATIONS FOR MARKET BASED IMPLEMENTATION

The estimates of the local foods baseline and economic impacts of various strategies provide potential benchmarks for adopting regional policies to further support the local food system. This study, however, does not directly explore the feasibility of reaching these outcomes. "Several factors must be considered. First, increasing or shifting grower output is not sufficient in making a strategy viable. Value chains, distribution networks and support networks must also be considered. Specialty crops require very different inputs from those used in row crops, and growers and industry respond to incentives—whether those entail profits or public investment."[20]

The third scenario, increases in produce output, presents the best opportunity for peri-urban agriculture. With such proximity to urban households and services, transportation costs to markets dwindle with the growth of peri-urban agriculture. The opportunity costs of agricultural uses of land in the city, however, are higher than those at the urban fringe and beyond; therefore, low-cost access to markets should be capitalized at higher land prices in urban areas. This analysis posits that producing higher-value crops, which generate higher per-acre revenues, would be more appropriate in the inner city and peri-urban areas. The models utilized in this study also assume greater vertical integration of agricultural production in the inner city and peri-urban areas, where the grower also builds value-added activity--such as processed foods--that increases the total net revenue per productive acre. Current crop survey data support this: as production moves from the city center, more concentration is placed on grain production, where commodity-type production offers fewer options for adding value.

Stimulation of a market for peri-urban local produce can come from either supplier or consumer. "A demand-pull strategy would focus on consumer demand through marketing efforts and through consumer education. Interest in local foods and healthy foods, in general, are key drivers in changes in consumer purchasing habits. Aiding this, shifting consumer preferences toward eating locally-grown produce may be a low-cost option for effective transformation toward greater local reliance. Conversely, a supply-push strategy would entail creating more venues for consumers to have access to local foods. This strategy has greater risks than a demand-pull strategy in that growers will largely respond to intermediate demands for locally sourced goods. If demand and potential profits are significant, growers will be more prepared to experiment with alternative agricultural production to meet this new demand. If intermediaries cannot maintain profitability, however, long-term sustainability may be jeopardized. This means that the growth in the supply chain should not exceed the growth in consumer demand."[21]

More research is needed on the ways in which sustainable practices influence consumer preferences and food sales; investigation of current land use and the potential to build around clusters of like production to produce economies of scale; and an exploration of labor and immigration policy as a limiting factor in labor-intensive produce crops.

[20] Miller, *Chicago Local Food System,* 63-4.
[21] Miller, *Chicago Local Food System,* 64.