Direct Selling by Urban Farmers: Constraints in Value Creation

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DIRECT SELLING BY URBAN FARMERS:
CONSTRAINTS IN VALUE CREATION

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science

By

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Albert C. Manyengawana ENTITLED Direct Selling by Urban Farmers: Constraints in Value Creation BE ACCEPTED IN PARTIAL FULFILLMENT FOR THE DEGREE OF Master of Science.

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Abstract

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According to Heimlich (1989), one of the leading development economists who has published several articles on small and urban farming, there are two major forms of urban farms namely backyard gardens and community gardens. These may, further be classified into recreational, adaptive, and traditional farms. Urban farms emerged as a direct response to beautify the landscape, provide food security and serve as an additional income source. Over time, changes in the farming sector allowed farmers to adopt direct marketing initiatives, circumventing the intermediaries in the distribution chain. These tactics of selling directly to consumers included farmers’ markets, road-side sales, and U-pick farms to name a few. In selling directly to consumers, urban farmers benefit by retaining more of the value created from selling their produce by minimizing various transactions costs. Adopting an econometric methodology that has rarely been used in past studies; the results show that location of the urban farm in the ‘Northern’ States and the extent that farmers’ principal profession is farming are important to creating value from directly selling agricultural produce to consumers. This study, also, reveals that hugely populated urban areas with residents enjoying higher disposable incomes positively influenced value created from direct sales. Nevertheless, a high concentration
of small farms is adversely related to the value of produce sold directly for human consumption. Consequently, policy makers may suggest reforms that discourage formation of new sole proprietorships and provide more incentive schemes to urban farms in the South if they are to be equally successful.
Table of Contents

I. Overview......................................................................................................................... 1
II. Introduction .................................................................................................................... 3
III. Literature Review ....................................................................................................... 9
   Methodology Adopted ................................................................................................. 9
   Major Influences on Urban Farming ......................................................................... 13
   Benefits of Urban Farming ......................................................................................... 17
IV. Theoretical Model ...................................................................................................... 19
   Dependent Variable ................................................................................................. 21
   Independent Variables ............................................................................................. 22
   Number of Small Farms ............................................................................................ 22
   Central City ............................................................................................................... 23
   Population per County ............................................................................................. 24
   Acres of Farmland Farmed by Sole Proprietors ..................................................... 25
   Operators by Principal Occupation ....................................................................... 25
   Income Level per County ........................................................................................ 26
   Total Market Value of Produce Sold ...................................................................... 27
   Total Government Payments ................................................................................. 28
   Distance to Highway ................................................................................................. 29
   Rain ............................................................................................................................ 29
   Growing Season ........................................................................................................ 30
   Region ......................................................................................................................... 30
V. Empirical Strategy: Data and Methodology ............................................................ 32
VI. Empirical Results ....................................................................................................... 36
VII. The Regression Model .............................................................................................. 43
    Discussion of Regression Results ........................................................................... 47
    Number of Small Farms .......................................................................................... 47
    Central City .............................................................................................................. 47
    Income Level per County ....................................................................................... 48
    Region ......................................................................................................................... 49
    Operators by Principal Occupation ...................................................................... 49
VIII Policy Implications ................................................................................................ 51
XI Conclusion .................................................................................................................. 53
X. Bibliography ................................................................................................................ 56
   Appendix 1: Level Form (vshe97t) Regression Model ........................................... 59
   Appendix 2: Log Form (lvshe97t) Regression Model ............................................. 60
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Number of Small Farms per County</td>
<td>36</td>
</tr>
<tr>
<td>2.</td>
<td>Population per County</td>
<td>38</td>
</tr>
<tr>
<td>3.</td>
<td>Acres of Farmland Farmed by Sole Proprietors</td>
<td>39</td>
</tr>
<tr>
<td>4.</td>
<td>Total Government Payments to Urban Farmers</td>
<td>40</td>
</tr>
<tr>
<td>5.</td>
<td>Acreage Farmed by Principal Farmers</td>
<td>41</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table                                                                 Page
1. Regression Model Estimates with Depended Variable:
   a. *Value of Agricultural Produce Sold Directly to Individuals* ..........45
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I. Overview

Does the environment in which urban farmers operate affect their ability to market directly to consumers? This is the hypothesis under investigation which states that economic, demographic and organization factors determine the extent that urban farmers rely on direct sales. The paper, however, initially highlights the transition to urban farming and introducing the related definitions of urban farming systems. In the literature review, this paper reviews past urban farming studies, methods adopted and their findings on the major influences of direct selling and the benefits of urban farming. For example, that it is more beneficial to conduct urban farming in ‘Northern States’ than in the South. Under the theoretical model - the hypothesis under investigation is presented and supported by the underlying economic rationale. A logical analysis of the likely causal relationship that exists between the dependent and independent variables used is presented next.

The empirical strategy, together with the data and methodology section, presents the theoretical regression model that encompasses all the variables initially used in the analysis. This is followed by a description of the data – variables, observations and sources. In addition, the approach adopted is highlighted together with the regression model estimation assumptions before the results and recommendations are presented. The results will cover both, trend and econometric analyses. Possible recommendations,
policy considerations and related conclusions will therefore rely on statistical results from both methods.
II. Introduction

This paper explores the ability of urban farmers to sell produce directly to consumers. This is an important topic because sales by farmers directly to consumers benefit many stakeholders on both sides of the market. Consumers benefit from the availability of better quality, fresher and lower priced food whereas farmers gain access to an important and lucrative market. Additionally, the maintenance of urban farms provides important external and environmental benefits that are cost-effective in the long run to the society.

More specifically, the paper seeks to investigate factors that support urban farmers in the U.S selling their produce directly to consumers. Direct sales is a new development since, traditionally, farmers have distributed their produce by use of middlemen such as wholesale and retail chains. Hence, the paper will develop an econometric model that encompasses various factors influencing the ability of farmers to sell produce directly to consumers avoiding such middlemen. Further, it will also touch on the role that urban farming is playing in meeting the agricultural food needs of the growing urban population through direct sales. Direct urban farming, for purposes of this study, refers to an industry that produces; processes and directly markets agricultural produce grown largely in response to the daily demands of urban consumers (adapted from Soonya Quon, 1999: p2.)
Before delving into the subject, it is important to appreciate how urban farming has gradually become such a major issue. Traditionally, the bulk of agricultural produce consumed in urban areas was grown on mid-sized to large commercial farms far-away from urban communities. Transport and logistic companies would then be contracted to distribute the produce to urban supermarkets from where urban consumers would purchase their share. More often, the final product would be of lesser quality after having been shipped over extensive ‘food miles’ – the distance that produce has to travel to reach its target markets. Another downside would be the exorbitant price charged to recover high transport, packaging and handling costs incurred. Consumer watchdogs and nutrition advocates highlighted the beneficial effects of unprocessed plant-based foods and encouraged urban residents to grow household crops in their own backyards (Brown, 2002: p7). The freshness and improved quality of the harvested produce resulted in changed preference, thus encouraging increased numbers of urban residents into backyard gardening. The more daring urban residents went a step further by taking over abandoned sites and turning them into community gardens. This resulted in the price of agricultural produce falling as quantity produced increased while competition intensified.

Seeing this social trend, political organizations such as the state and the federal governments seized the idea of promoting urban farming as a way of ensuring food security at the same time alleviating poverty. It was felt urban consumers would be less reliant on unhealthy and costly food they buy from supermarkets. Employment creation and income generation were also highlighted as immediate benefits of urban farming. These political institutions also took advantage of this direct marketing initiative where
urban farmers are selling directly to each other and to their customers. For instance, the federal government passed the Farmer-to-Consumer Direct Marketing Act of 1976 (Brown, 2001: p7) that outlawed existing restrictions on the ability of farmers to sell their produce directly to consumers. State governments, on the other hand, sanctioned and funded the construction of farmer's markets. Thus reducing the prospect that an urban farmer would fail to sell her/his produce because of logistical constraints. Following these governmental actions, Blair et al. (1997: p1), notes that "an estimated one million households are involved annually in community gardening in the U.S" while, "the 1980 U.S. census found that urban metropolitan areas produced 30% of the dollar value of U.S agricultural production. By 1990, this figure had increased to 40%," (Deelstra and Girardet, 2001: p46).

Urban farmers in the U.S can, however, practice urban farming under any of the five urban farming systems described thereon. As already mentioned, there are backyard gardens and community gardens on one-hand. On the other, there are recreational, adaptive, and traditional farms. The former classification relies on the site and size of the garden while the latter sub-division of urban farms into recreational, adaptive and traditional farms is more academic depending on such factors, as purpose of farming; annual sales achieved, and farm size.

Often, backyard gardening is performed on unused backyard land and is largely very small scale with produce mainly earmarked for personal household consumption and residue, perhaps, sold directly to neighbors and local restaurants. Community gardens are
of a larger scale and are formed when neighbors or community residents come together and rent an unused piece of land from a neighboring commercial farm or take-over vacant and unused city open spaces or abandoned sites. Community development corporations often organize community gardens but each tenant cultivates a portion of the land and his/her operations are usually independent of the other(s).

Recreational farms, also called hobby farms, are generally carried out with the intention of beautifying the homestead while passing idle time. These closely resemble backyard gardens. Since recreational farms generally manage annual sales within $10,000, they “have little viability as economic enterprises and are essentially a consumption activity that will become increasingly expensive for their owners as development continues,” (Economic Research Service (ERS), 2001: p40). It is in this category that many urban farms belong; hence, many are quick to sell their properties to urban development firms.

Adaptive farming is also carried-out on a small-scale, approximately 8-10 acres though generally bigger than recreational farming. Unlike recreational farming, their main purpose is to achieve profitability. ‘Adaptive’ farms retained this description because their practitioners are kept abreast of and hence adjust to economic, climatic and political changes that might interfere with farming operations. In addition, adaptive farms are better managed and, also, control a sizeable share of assets and sales. Hence, they stand a better chance of withering urbanization against competition for space (land) with urban developments, such as housing and recreational projects. Most adaptive farms tend to operate as ‘collective’ community gardens specializing in a few varieties of crops and
generating sales higher than $10,000 per annum (Brown, 2002: p7). They are ‘collective’ in the sense that unlike in most community gardens in which farmers operate independently, in this case farmers pool their resources, share ideas and work together.

Lastly, traditional farming is carried-out because the farm is a property of the family and together with farming has been part of the family’s heritage. Often, traditional farms have withstood time while controlling significant acreage and assets but generating barely profitable returns. This indicates that an overlap may exist where a backyard farm may operate as either a recreational or an adaptive farm. In some cases, the chosen modus operandi may result in a similar backyard farm operating as a traditional farm. Hence, urban agriculture constitutes a variety of farming systems that range from household crop farming to mid-sized commercialized farming.

Given the importance of urban agriculture, urban farmers, city planners and other stakeholders would, therefore, be interested in identifying the major factors determining the volume of direct agricultural sales. Gale (1991: p20) notes that “by selling directly to consumers, farmers retain the value added to their products through various transportation and marketing activities that are usually performed by urban-based wholesale and retail establishments.” Thus, direct selling eliminates transaction costs, which are the major culprits for higher market prices. In this paper, the focus will be on agricultural value retained by 270 urban counties in 30 of the largest Consolidated Metropolitan Statistical Areas (CMSA) in the U.S.
To explain fully the factors determining agricultural value created from direct sales, trend analyses of certain key variables believed to influence this value will be undertaken. Possible strategies for urban farms to improve stakeholder benefits derived from direct selling of agricultural produce will also be suggested. In short, the trend analysis, over the 10 year period from 1987 to 1997, found out that the number of small farms and farmland farmed by sole proprietors decreased whereas population increased. This suggests that the number of small farms and population size in a county do have opposing effects on value of agricultural produce created from direct sales.

Econometric techniques then will be employed to quantify the influence on direct sales of agricultural products to households as a function of several factors, such as, number of small farms per county, its location and the average income per capita of county residents, among others. Inclusion of these factors should culminate in the estimation of a multiple regression model. As a result of the analysis, policy proposals to help policymakers create an enabling environment for urban farming to succeed and to help current and future urban farmers make informed decisions regarding when to farm, what to farm and how to farm are discussed. Briefly, however, the regression findings suggest that urban farms located in counties where the central city is located create more value from direct sales than urban farms far from central cities.
III. Review of Literature

Despite urban farming being studied extensively, there is little consensus regarding the factors that influence value creation, whether from direct sales or selling via middlemen. In this section, several key variables influencing value created from direct sales by urban farms are highlighted, for instance, net cash returns, income level, farming as a principal occupation and farm location. In addition, the purpose of this section is also to highlight the past methodology adopted in studying urban farming and describe some of the benefits of urban farming.

Methodology adopted:

Prominent economists highlighted the lack of proper methods and/or modeling conventions in economics adequate to the task of describing the complex interactions between businesses (including farms) and their surrounding regions (Brown, 2002: p168). This lack of methodology explains why many studies on urban agriculture have focused on qualitative analysis of emerging land-use patterns and how agriculture is adapting to the demands of the metropolitan environment. Many reports from the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA) have been on the forefront of urban farm research and analysis. These studies “focused on the structure of farm ownership in metropolitan areas of varying size,” (Heimlich, 1989: p1). Some studies by Amanor-Boadu (2004) and Lockeretz (1989) focused on intensiveness in use of farmland
between small urban farming and small rural farming. They concluded that small urban farming was in constant conflict with land developers because of the increasing demand for residential land.

Lockeretz (1989: p1) concurred with the above conclusion stating that urban farmers “fail to expand their operations to generate enough income in the face of low net returns per unit of production and from taking advantage of newer technologies that require more land to achieve full economies of scale.” Intensiveness, which refers to the full utilization of a farm, is seen as a function of the high cost of urban land. The high land value, in turn, forces farmers to effectively plow their farming lands to yield higher returns per acre. If this fails, the majority end up selling the properties to urban developers. While competition for land sometimes tends to increase the yield per acre, there is also pressure to disinvest in agriculture.

Often, identification of factors determining value created from direct sales to consumers and urban farming in general relied on non-econometric methods. This trend has continued with researchers describing changes in chosen factors as a way of explaining that variable’s impact on urban farming. For instance, Heimlich (1998: p2) and an ERS Paper (AER-2000: p1) separately presented a comparison of recreational, adaptive and traditional farms based on absolute changes of certain factors between 1991 and 1997. These factors included acres of farmland owned, acres operated and number of farms among others. Lockeretz (1989: p209-210), however, deviated from qualitative analysis and used mathematical and econometric techniques to explain underlying causal effects
of farm-related variables on land-use intensiveness; that is, identifying the variables that influence the amount of farm-land farmed. Using data from 1969 to 1982, Lockeretz (1989: p211) observed, "Demographic pressures bore only a weak relationship either to the amount of land leaving farming or to changes in the intensiveness with which the farmland was used."

While secondary agricultural data is available on Censuses of Agriculture websites, "often data on the quantities of agricultural produce produced within the city boundaries are lacking or not very accurate, the prices obtained for the produce sold are not known, amounts of inputs used, and their prices are not accurately quantified" (City Farmer, 2002: p2). This may have led many researchers to rely on their own data collected by means of stratified random sampling methods. Perhaps, the reason for this data collection technique is that most of these studies were led by behavioral scientists interested in the social effects and human responses of urban agriculture. In developing their own questionnaires which they would distribute to a target area for responses, researchers have been able to collect primary qualitative data specific to their needs. Specifically, Kremen et al, (ERS paper: p2), La Trobe (2001: p184), Tubene and Hanson (2002: p19) and Muhammad et al (2004: p2) used this strategy. Others, such as Heimlich (1989: p460), Lockeretz (1989: p209) and Brown (2002: p168) used data from Censuses of Agriculture and Population. However, Perry and Johnson (1999) collected data from the Agricultural Resource Management Survey (ARMS) and concluded that farmer experience, access to cash and credit finance and cost control measures were important in determining success (Muhammad, et al, 2004: p2).
Differing circumstances explain why users may opt for a certain type of data over another. For instance, users with little technical training and researchers with small budgets may opt for low cost secondary data, since it is easily available. This can, further, allow for easy tracking of changes in developmental variables at county or state level (Beaulieu, 1992: p2). With primary data, users have to incur huge costs in data collection which may not be justified by the outcomes. However, primary data allows for the ability to gain continual clarification of ideas and information (Carter and Beaulieu, 1992: p2). Primary data can be collected by community volunteers, thereby building citizen involvement and awareness, something that is alien with secondary data which excludes local participation. Collection of primary data is highly flexible since it can be tailored to meet specific data needs and, in some cases, costs may be shared when data collection for several issues (topics) is combined in one survey. However, personal bias is a major problem with primary data, when respondents provide responses that put them in good standing instead of highlighting the truth whereas sampling errors appear rampant with secondary data since it is not usually consistent with research needs (Carter and Beaulieu, 1992: p3). Primary data is usually current whereas secondary data may be old and no longer representative of the urban farming issues under investigation (Beaulieu, 1992: p3).

Interpretation and comparison of findings from past studies should, therefore, be critically analyzed. In addition to different data types, most studies on city farming have used different definitions of urban farms. For instance, Perry and Johnson (1999) cited by Muhammad, et al, (2004: p1) used the definition of an urban farm suggested by the
National Commission on Small Farms which is based on gross annual sales achieved being lower than $250,000. However, as discussed earlier, generally, over 60% of researchers described an urban farm as small and achieving up to $10,000 in annual sales (Lockeretz, 1989: p208-209 and Heimlich, 1989: p2). Such a difference may lead to inconsistent findings as data used for analysis will be different. Largely, this may explain why past studies on urban farming and value created from agricultural sales have produced varying results. As discussed on page 8, in this paper, the definition of urban farming is not restricted by a ‘set’ sales figure.

**Major Influences on Urban Farming:**

Several good and bad factors have been highlighted as influencing the amount of crop yields achieved by urban farming. Chief among them was/is the need to provide urban residents with a ready supply of fresh, nutritious and affordable vegetable produce. This would allow urban residents to supplement meager family incomes (Lockeretz, 1989: p214; Tubene and Hanson, 2002: p1 and Brown, 2002: p7). Not surprising, this social trend received wide acclaim from health campaigners who praised the growth of food crops for personal consumption as being healthy and nutritious, in addition to alleviating poverty.

Heimlich (1989: p463), Brown (2002: p169) and Tubene and Hanson (2002: p20) discussed new direct marketing initiatives such as farmers’ markets, roadside stands, and U-pick farms as inexpensive outlets for product distribution that urban farmers can take advantage of when selling directly to households. Further, in separate studies, Lockeretz
(1989: p215) and Brown (2002: p173) indicate that fair pricing, freshness, organic and high quality crops and social interaction with farmers contributed to the major reasons for frequenting a farmers' market – a designated market place where buyers and sellers of agricultural produce meet to trade and interact.

Some landowners were interested in neat and beautiful surroundings that they turned to both backyard and community gardening by growing flowers and filling up abandoned dumpsites (Schukoske, 2000: p353). Isaacs (2003: p4) identifies residents of Rochester in New-York as using abandoned lots under the Greater Rochester Urban Bounty (GRUB). Seeing these social changes, the federal government got involved positively by enacting legislation such as 'Farmer-to-Consumer Direct Marketing Act of 1976.' Such acts were meant to remove existing barriers that were making it difficult for urban farmers to maximize return on investment. Local governments, too, joined the effort by providing at little or low cost several sites for the implementation of farmers' markets (described above) and community gardens. Hence, we have farmers' markets located within a 40-mile zip-code radius of urban farmer's residences such that no farmer fails to participate at a market because of high transport costs. These factors among others may have contributed to the initial frenzy towards urban farming by city residents.

Yet, upon seeing infrastructural developments such as shopping malls within their vicinity, some farmers may have abandoned farming thus falling into a state of 'impermanence syndrome,' Heimlich (1989: p459). Impermanence syndrome is defined as 'a lack of confidence in the stability and long-run profitability of farming in urbanizing
areas, leading to disinvestment of human and capital resources,’ (Conklin and Lesher, 1977). Once such a condition prevails, planning of farming operations suffers and intensive use of farmland may drop decreasing the total value of agricultural produce. In the Thematic Paper 7, de Zeeuw et al (2001: p162) agree adding that “fear of eviction leads people to plant short-duration seasonal crops and prevents them from making investments to improve soil quality, introduce tree and shrub components, and undertake erosion prevention and water-harvesting measures.” To avert output limitations due to small farm sizes, Lockeretz (1989) suggests that farmers can alter the kinds of crops they grow and livestock kept. For instance, focusing on high-value crops requires smaller pieces of land. This has the advantage of achieving labor and capital efficiencies thus boosting crop yields per acre.

Another area believed to promote urban farming was the growth of government payments directly to farmers. Firstly, government payments were meant to compensate for loss of profitability in the highly regulated farming sector and boost household income (Hopkins, 2000: p1). Secondly, through the Environmental Quality Incentives Program (EQIP) payments were meant to discourage farmers from using ‘non-green,’ environmentally unfriendly farming practices, (OECD paper, 2003). However, Tweeten (1983: p1037) observed that “federal government programs have hastened the demise of small (and urban) farms,” because the majority of urban farmers placed greater reliance on these payments as sources of income and profitability. The EQIP payments represented 75% of cost of resources earmarked directly to projects supporting environmental issues (OECD, 2003).
Often, environmental concerns arose from the use of agricultural chemicals and pesticides. Scientific evidence show that these agro-chemicals can be toxic thereby creating negative externalities and generating unintended consequences such as downstream river pollution which may destroy wildlife and certain plant species. This subject received wide attention in studies by Heimlich (1989: p462) and Brown (2002: p21) who proposed the use of organic fertilizers as a substitute. Hopkins (2001: p2) and Muhammad et al (2004: p3) also studied the impact of similar government policies and concluded, separately, that government payments affected performance and profitability of very successful large farmers but had no impact on profitability of small and less successful farmers.

Another study from ERS (AER-803, p41) countered that “population growth in nearby urban areas creates increased demand for farm products. Implying that there is an economic advantage for production located close to concentrations of consumers.”

Lockevertz’s measure of intensiveness was based on agricultural (dollar) sales achieved per acre. The sales figure used combined both crop-related and livestock-related incomes. In this study, however, the agricultural value being measured is based on crop-based returns. Interestingly though, Lockevertz (1989: p215) found inconclusive evidence regarding whether metropolitan expansion has an adverse effect on urban farmland farmed. While expansion of metropolitan areas may limit the number of community gardens, that of backyard gardens in turn may increase because those once involved in the community project will focus attention to their own backyard farms.
Benefits of Urban Farming:

Direct marketing of produce has generated both social and economic benefits for producers and consumers alike, such as, fostering collaboration among nearby residents and across generational and racial segregation through increased interactions. Besides, by having access to nutritious and unprocessed foods at lower costs, inner-city residents have managed to live healthy and fulfilling lives (Heimlich, 1989: p462; Brown, 2002: p16 and Amanor-Boadu, 2004: p10). In some areas, food security may have been realized by the urban poor who are now able to grow their own supplies or buy cheaply from neighboring urban farmers, thus, reducing poverty. Growing crops for own consumption has reduced dependence on retail food. Prices of food crops, therefore, have dropped as a result of increases in harvested quantities. Direct selling has, also, alleviated other social ills, such as, joblessness and crime since residents are kept occupied and have something to do (Amanor-Boadu, 2004: p4). If such programs grow, governments can then devote fewer resources to poverty alleviation and crime prevention programs, freeing up income for other important projects, such as financing the current high budget deficits. There are political benefits, as well, that are experienced by legislators. For example, when passing laws in favor of direct selling by farmers, for example, reduction of income tax paid on total sales may guarantee votes and re-election in local elections.

Direct marketing also has resulted in environmental benefits. For instance, through increased consumer interactions, consumer preference of organic crops has led urban farmers to diversify into ‘green cropping’ – the growing of organic crops using natural methods that are in harmony with nature. Since urban farmers rely less on transportation,
effects on air quality from gasoline emissions are reduced when produce is taken to consumers on foot and on less polluting vehicles, such as battery-powered carts. Indirectly, benefits achieved by those already practicing urban farming and direct selling has lured some organizers into converting dumpsites into farmland, thereby averting environmental degradation (Bourque, 2001: p120). In addition, urban farmers gain valuable information from customer interactions, for instance, whether consumers prefer processed and/or packaged produce. If so, then downstream industries that are producing, processing and/or packaging equipment and material may benefit, hence stimulating economic development within the community.

Last, direct sales to consumers benefit urban farms and local governments by ensuring that a larger share of financial resources in a county are spent in that community by increasing local multipliers. In some instances, farmers can directly sell to consumers in neighboring counties and states generating ‘foreign’ currency for the local government. Direct marketing has also boosted growth of farmers’ markets across the U.S, thus improving farmer-consumer interactions, bringing communities together and breaking social barriers caused by income and racial differentials (Kremen et al, 2002: p8). More opportunities related to direct marketing may include options such as crop diversification, value-addition through quality packaging, mail-order and Internet marketing. Also, “preservation of urban farms is essential to economic competition because it avoids concentration of production on a few large farms which would practice monopoly pricing and raise food costs” (Tweeten, 1983: p1037).
IV. Theoretical Model

This section discusses how the causal relationships being estimated on the value of agricultural produce sold directly to consumers were formulated. It is important because it presents the economic rationale behind the major influences on value created from direct sales.

Before discussing each variable, it is necessary to present the underlying reasoning behind the envisaged relationship discussed in this paper. Theory suggests that buyers are rational and will buy fresher and cheaper produce from urban farmers from whom they have purchased on several occasions. In the U.S, direct selling has developed courtesy of the Farmer-to-Consumer Direct Marketing Act of 1976 (Brown, 2001: p167) that has seen the proliferation of farmers’ markets, roadside stands and house-to-house selling. “The purpose of this act is to promote, through appropriate means and on an economically sustainable basis, the development and expansion of direct marketing of agricultural commodities from farmers to consumers,” (Public Law 94-463: p20-3). This goal would be achieved through the provision of funds to States for use in hosting conferences aimed at promoting dialogue and information sharing between farmers and consumers, compilation of legislation necessary for the development of direct marketing vehicles and providing technical assistance to individuals and groups involved in the establishment of farmers’ direct marketing initiatives. The impact this act had is noted by
Brown (2002: p16) who cites a USDA article that “the number of farmers markets has increased almost 50 percent since 1994 to 2002.”

Farmers’ markets promote alternative agriculture by allowing farmers to meet the demand for specialized products and establish new businesses. Urban farmers sell at farmers’ markets for economic, social and personal reasons that encompass the potential for increased sales and direct interactions with buyers. Since farmers’ markets are closer, generally set within a 40-mile radius of urban farms have helped farmers sell higher quantities, and therefore can increase crop output. These markets require little investment on the part of the farmer as government authorities usually do not charge for renting market stalls. Thus, buyers may benefit from lower prices while farmers benefit from increased sales. Hence, the development of farmers’ markets has created an avenue for urban farms to boost profitability.

In addition to farmers’ markets, urban farmers are able to out-compete commercial farmers in the vegetable market by engaging in roadside sales, selling directly to local restaurants and some smaller supermarkets and selling to schools and colleges. In some New-York and California counties, urban farmers reap good returns by directly selling to huge foreign populations. Urban farmers are able to meet immigrant families’ food needs because most of the immigrants rely on their traditional meals and unprocessed foods, thus creating a ready market for urban farmers who sell raw produce (Brown, 2002: p168).
Therefore, like any other business, economic value creation in urban farms is influenced by several factors. Value is a function of input factors, such as price, relative to other factors such as customer base, product quality and quantity (to satisfy customer needs and demand) and distribution channels. While farmers are price-takers, economic logic suggests that the market price should be sufficient to cover variable costs if urban farmers are to continue farming. Coupled with a bigger customer base (population in a county) relative to the number of other urban farms (competition), volume sales at the equilibrium price may be achieved, thus enjoying higher value prospects than a farmer in a small customer base relative to competing farms. Further, access to distribution channels such as roadside sales, house-to-house vehicle selling and farmers’ markets enable farmers to capture a market niche that is not targeted by traditional farmers and large supermarkets. The freshness of their produce, also, appeal to this market base that is not so concerned with price but product quality, hence sales are bound to increase, in turn delivering better value per acre to urban farmers.

A. The Dependent Variable

The value of agricultural produce sold directly for human consumption is chosen as the dependent variable because it represents an important development in the U.S where farmers become profitable when they by-passing middlemen and utilize direct marketing methods in order to increase the amount of produce they sell. Selecting this hypothesis enables us to quantify the relative strength of various factors affecting value created from direct sales and also assesses the direction of benefits being accrued. Further, to effectively benefit from direct marketing initiatives, the urban farmer should have access
to a lucrative target market, should sell huge volumes of an undifferentiated product and
should not rely strongly on transport as a distribution strategy.

B. The Independent Variables

Number of small farms per county

This variable represents the number of small farms operating in each county. A bigger
number, while subject to the number of households and size of a county relative to the
number of large farms, implies extensive competition for consumers. This induces
intensive land-use patterns to improve quality and increase quantity of crop yields. Like
any business, urban farmers experience similar constraints in production and distribution,
here small urban farmers can only out-compete the larger farms by intensive farm-use,
producing better quality products and improving customer interactions. Economic theory,
however, suggests that with a high incidence of small urban farms, commodity price
volatility is less common due to minimal supply shocks. To a larger extent product
supply to the market is constant since farmers grow crops year round by using green-
house methods, in addition to standard methods. Given this platform, small urban farmers
are able to plan ahead, produce according to schedule and sell as much as possible. Thus,
the overall value of produce sold directly to consumers for human consumption will
increase as the number of small farms increases. Hence, the small farm variable should
result in a positive relationship as small farmers serving a county are producing ‘to
order.’ That is, not too little and not too much.
Considering, also, that the U.S is a market dominated by commercial farmers who enjoy economies of scale production techniques, one would not expect small farmers to survive, yet the opposite is very true. In fact, the number of farms in urban areas may have increased from the outward spread of residential developments into former rural areas promoting use of direct marketing by reducing the physical distance between farms and consumers (Gale, 1993: p19). This suggests the majority of small farms have been profitable by adding value to their produce. Value addition occurs when small farmers eliminate wholesalers and retailers in the supply chain by increasing contact with consumers. Eliminating intermediaries should enable them to sell directly to consumers at higher prices that are still substantially lower than supermarket (retail) prices for a given quality.

Central city (ccity)

Since this variable reflects whether the central city is in a county, the location of a farm, say close to a city centre, should positively affect value of produce sold directly by farms in that county. Consumers do not have to travel long distances to purchase their food needs. City farming brings the product close to the market hence urban farmers do not have to transport their produce to distant selling points such as supermarkets. The time required to do so may lower the product freshness and quality. Thus, farmers in central cities should be more anxious to sell directly to consumers who in turn wish to maximize their share of the consumer’s dollar. Besides, central city farmers can arrive earlier at the market-place and choose strategic selling points (tables) that are easily accessible by consumers. In central city limits, farmers sell their produce at higher prices to offset the
high standard of living and high premiums they pay for city land. Heimlich (1989: p457) while citing Isard (1956); von Thunen (1966) and Brooks (1987), concurs that "neoclassical spatial economic theory treats the location of agricultural land uses as a trade-off between attraction to urban markets and competition from urban land users.” Urban markets are attractive because of their huge potential for volume sales enabling farmers to offset any losses due to constricted farmland (which limits crop acreage), in the process garnering favorable returns. Further, “inner city residents may have difficulty obtaining fresh vegetables due to the exodus of supermarkets” (Heimlich, 1989: p463) and are, therefore, inclined to pay the high prices that quality demands. Based on these ideas above, there is likely to be a positive relationship between value of agricultural produce sold directly to consumers and the presence of a central city in the county.

Population per county (pop97)

The level of population is really a point estimate and shows the number of consumers in a county or the potential market size. Therefore, a positive effect is expected between value of agricultural produce sold directly to consumers and the level of population in a county because a huge market base represents potential for volume sales. As a result of this relationship, there is a high probability for multi-collinearity with the central city (ccity) variable. Even if quantity supplied increases because of more suppliers, urban farmers would respond by adopting effective farming methods, intensifying direct marketing efforts and becoming quality conscious in order to increase the returns per unit sold. Despite the competition adversely impacting on total sales, value created per unit sold is likely to increase because the new retail price is higher though less than supermarket
price. Thus, a positive response between value of agricultural produce sold directly for household consumption and the population size of the county is anticipated.

**Acres of farmland farmed by sole proprietors (solpr97A)**

Sole proprietors are those that farm pieces of land on their own and do not include community gardeners that involve more than two farmers who combine operations. Sole proprietors may suffer in terms of resource provision and as such are less likely to meet the quality needs of consumers, which will tend to affect negatively the value of produce sold directly to consumers as consumers purchase from more established farmers. This situation is exacerbated if the sole proprietor(s) has a primary occupation other than farming. In such scenarios, farming is taken as recreational and any positive returns are viewed as a plus. There is also a concentration of effort within one person, meaning sole proprietors are unable to compete with their neighbors who may have invested in additional expertise. Further, sole proprietors may be unable to take advantage of changing market conditions such as new customer needs because of limited financial resources, farming expertise and time to study relevant trade journals. Implying that the value of agricultural produce sold directly for human consumption is negatively influenced by an increase in acreage farmed by sole proprietors.

**Operators by principal occupation (obpof97)**

Farmers whose principal occupation is farming are more likely to devote ample time to their farming, thus ensuring that quality products and maximum possible use of the farmland is achieved, hence the effect on the value of produce is expected to be positive.
Farmers who devote their full attention to farming clearly signal their intentions to lenders and therefore improve their chances of accessing credit finance, which they use to purchase modern farming equipment and relevant agricultural training. Attention to industry activities and regional trends imply farmers are kept abreast of developments in the agricultural markets. Thus, farmers learn and focus more on high-value crops that produce higher returns per acre. Last, while a direct marketing initiative of house-to-house vehicular selling is the 'new trend,' it takes time, patience and commitment suggesting that, at most, principal farmers will be more likely to benefit from its adoption. Hobby farmers are not likely to devote time for such an activity, thus limiting their income generating potential.

**Income level per county (Inc97)**

The higher the income level in a county, the larger the price consumers are willing-to-pay to obtain fresh produce. Hence, the bigger the consumer surplus that producers and suppliers are able to squeeze from consumers by further pushing up prices. Also, Nelson (1990: p155) states "United States consumers apparently substitute away from physical quantity and toward quality with increases in income." These explain why in high-income counties, prices are generally higher. Despite the prevalence of intensive competition for these lucrative markets, the higher prices should result in a lower break-even quantity per farmer and therefore impacting positively on value of agricultural produce sold. Although many advocates have emphasized the advantages of low produce prices, shopping at farmers' markets, roadside stands and 'pick-your-own' farms, for instance, is likely to be a 'superior good' in terms of time. These shopping activities take
time yet consumers are willing to invest in it to acquire better, fresher and lower-priced vegetables and fruits. Further, farmers located in high-income counties enjoy more flexibility and are able to diversify their offering by growing and selling exotic crops and engaging in greenhouse farming, thus generating even bigger returns. Accordingly, we anticipate the value of agricultural produce sold directly to consumers to vary positively with changing disposable incomes per-capita.

Total market value of produce sold (tmvps97T)

Total produce sold encompasses the sum of output from harvestable agriculture, animal husbandry, fruit farming and other forms of agriculture that urban farmers may engage. The total market value achieved, therefore, is the aggregate sum of individual product values realized from selling to any customer segment by any marketing means.

On one hand, if farmers achieve high annual total market value of produce sold irrespective of the distribution method, then it follows that market value of produce sold directly to consumers may be large as well. With roughly 15-20 percent of total sales coming from selling directly to consumers, we can conclude that on average as the total sales increase so will the sales driven solely by direct selling methods. Hence, a positive relationship is anticipated.

On the other, the urban farmer may be generating good returns despite using traditional selling methods. In such a scenario, attempts to directly market produce whilst not trained
or skilled in that function may adversely affect total sales achieved. Thus, a negative relationship may be realized.

Total government payments to farmers (tgovp97)

The U.S government reimburses farmers for possible losses that may be incurred when selling produce below cost. This is because the U.S agriculture industry is highly regulated and controlled to keep food prices low. These payments reflect the difference of the market price from cost of production per unit multiplied by the quantity produced. This allows farmers to be cushioned for possible losses as the payments are based on output farmed, whether sold or not. Further, state and local authorities make additional payments to farmers who engage in environmental awareness activities such as clearing dump sites for agricultural land and using organic manure instead of chemical fertilizers that are associated with severe externalities such as polluted rivers.

Since these payments are additional income, urban farmers may be motivated to increase the acreage farmed, in the process, the quantity produced and sold will increase. Government payments may as a result act as an indirect incentive to increase crop yields, thus, positively affecting total value of agricultural produce sold directly. According to Brown (2002: p17), "many inner-city urban agriculture projects require some form of subsidy-grants or non-profit status to be commercially viable, at least in their initial stages." Hence, it would appear government payments are a necessary ‘evil’ if farmers are to be profitable.
However, a countervailing argument can, also be put forth. That is, government payments may increase the value of land, thus, raising the opportunity cost of holding-on to the farm versus selling it. If the immediate returns from selling are favorable, urban farmers may be tempted to participate and exercise their option in the real estate market. The effect is a reduction in the number of urban farms and subsequently value created from direct agricultural sales.

**Distance to the Highway (hyw88)**

On average, the shorter the distance to the highway, the more likely transport costs are bound to be less. Hence, produce can be sold directly to consumers at nearby markets at lower than retail prices and still sell more volume. Even selling at retail price, while adversely affecting quantity sold, the value created from the few quantities purchased should increase value created from direct sales. This is because the profit margin is huge since the costs incurred are less due to lower transport costs. Apparently, a negative relationship should be realized since as the distance to the highway increases transaction costs will increase as well forcing farmers to charge uncompetitive higher prices hence adversely affecting quantity purchased and therefore value retained.

**Rain**

Generally, increases in rain are related to increases in harvested crop output because water is essential for plant life. This would suggest that areas that receive higher rainfall than others, all things being equal, should generate larger yields per acre, thus a positive sign would emerge.
On the other hand, excessive rain may have detrimental effects of certain crops that cannot withstand a lot of water. This would damage the crop reducing the output quantity expected implying the amount supplied and sold to the market would be less. Thus, the value created would be negatively affected.

Growing Season (gsea)

Growing of crops during the seasons in which they thrive is the hallmark of good farming. Such farming practices ensure the farmer takes advantage of the existing favorable climatic and weather conditions that will promote maximum possible yields to be realized. Hence, a positive sign is expected.

However, the outcome could produce mixed results because of the prevalence of low cost green-house technology that has necessitated, for instance, year-round planting and harvesting of tomatoes. In such cases, the effect of the growing season on output will be irrelevant since farmers are no longer constrained by poor environmental conditions to meet their farming objectives. Rather, the farmer’s expertise in operating the green-house might prove to be the catalyst for high or low yields being farmed, thus the resulting sign could be either.

Region

This variable is a proxy indicating that the location of the urban farm is in ‘Northern’ States of the country. Since, according to data from the Census of Population, Northern States are more populous than Southern states, the assumption is that there are more
households per square mile in the North. In addition, Northern States, led by New York, receive more immigrants per year than their Southern counterparts. The bigger number of households imply that there are more people engaged in urban farming, thus the crop output produced is higher as well. In addition, the bigger population means that the output consumed will be higher leading to a positive sign being generated between value of agricultural produce sold direct to consumers and the ‘region’ variable.
V. Empirical Strategy: Data and Methodology

The discussion outlined in the conceptual framework examined the economic significance of the identified factors on the value of agricultural produce sold directly to individuals for human consumption. To analyze the determinants of value created from direct sales, all the independent variables are regressed in the same model to observe their econometric significance. A multiple linear regression model in the form depicted below is then developed capturing respective causal effects while keeping other variables constant. Hence, the hypotheses under investigation states that each of the stated factors independently influence the value of agricultural produce sold directly for human consumption:

\[ V_{shc97T} = F_x(sfm97, obpof97, tgovp97, hyw88, Inc97, ccity, pop97, solpr97A, tmvps97T, rain, gsea, Region) \]

where, \( V_{shc97T} \): value of agricultural produce sold directly to individuals as a function of:

- \( sfm97 \): number of small urban farms in a county
- \( obpof97 \): principal occupation of farmer
- \( tgovp97 \): total government and state payments to small farms in 1997
- \( hyw88 \): total distance, in miles, from small farm to highway road
- \( inc97 \): average level of county income in 1997
**ccity**: - a dummy variable representing location of county if central city or not

**pop97**: level of county population in 1997 in ‘000s’

**solpr97A**: represent acreage farmed by sole proprietors

**tmvps97T**: total market value of produce sold in 1997 in ‘000s’

**rain**: - inches of rainfall received per county per growing season

**gsea**: - represents the growing season

**region**: - represents urban farm location in any of the Northern States.

In formulating the econometric relationship, the backwards elimination method combined with the F-statistic for testing the overall significance of the model will be used with insignificant variables removed from the model at each estimation step. Because “it is possible for a set of variables to have considerable predictive capability even though any subset of them may not,” (Dallal, 2004: p2) the backwards elimination method which starts with all variables in the initial model is able to identify any correlative effects among a set/subset of variables. The advantage in combining the two methods mentioned above is that the F-statistic is only appropriate for validating joint exclusion of all the independent variables. In addition, appropriate transformations of variables and statistical tests will be used in order to improve model adequacy and efficiency of parameter estimates. Log-transformations imply that elasticity estimates may be obtained directly from the variable estimates.

To identify and explain the factors affecting value created from direct sales, relevant farming data (as discussed above) for urban counties across the US are obtained from the
1987 and 1997 Censuses for Agriculture. The data are for 270 urban farms, 45 (or 16.6%) of which lie in central counties. There are 65 variables giving a total of 17550 observations. Additional data obtained from the Census of Population and Bureau of Labor Statistics includes immigration statistics per county. Income data came from the Sales and Marketing department of USDA.

Prior to estimating the regression model, graphical presentations showing absolute performances of some major factors included in the model between 1987 and 1997 are presented. In addition, possible explanations of resulting trend variances are presented - that is, positing potential and possible reasons as to the upward or downward changes noted. This should indirectly explain changes in intensiveness of farm-use based on how each factor shifts over the 10 year period. Such an examination should complement the results obtained from multiple regression analysis using the 1997 data. A decision regarding the best functional form specification and unbiased regression model will depend on the model giving the most significant F-statistic ($F_L$) for overall model adequacy (Wooldridge, 2004: p100).

For some variables, mathematical transformations are necessary in order to improve the model variation explained and statistical significance of estimated parameters. Log-transformations, however, narrows the range of a variable and has the advantage of making estimates less sensitive to extreme observations (Wooldridge, 2004: p168). In some cases, taking logarithms may eliminate underlying skewed and heteroskedastic distributions within some variables. Once significance is established, it will be possible to
show the relative percentage changes expected on value created (or lost) should there be a change in an explanatory factor while keeping all other factors constant. Multicollinearity and heteroskedasticity tests together with autocorrelation corrective measures will then be applied so as to determine adequacy of the model. However, with non-time series data, presence of serial correlation is often ignored as it has been shown not to be a problem.
VI. Empirical Results

In this section, a trend analysis of variables used is presented first followed by the econometrics and final discussion of the regression results. Specifically, the relationships that exist between values of agricultural produce sold directly to consumers and various other factors considered under \textit{ceteris paribus}. While the results emerging from the model estimation rely on the available data, they are representative of the entire U.S. urban farming system as regards selling agricultural produce directly for household consumption.

**Figure 1: Number of small farms per county**

From 1987 to 1997, the number of small urban farms decreased by 16 percent, from 183,257 to 153,515 farms. This shows an overall decrease in concentration of small urban farms in urban counties either due to consolidation of operations by two or more small farmers or abandonment of operations by some farmers. Given that urban farmers face extensive pressure from land developers, cessation of operations appear more plausible.
Therefore, on average, total quantity sold directly to consumers by small urban farmers dropped because of decreases in farmland farmed. In the short term, this supply shift along the demand curve will result in commodity price increases and, therefore, higher value addition per acre. This may happen because urban residents appear less sensitive to changes in prices of agricultural produce implying that price increases arising from supply shocks will not cause demand to go down. Hence, with small outputs, farmers may still increase total sales.

Farmers in Mathews County in New York, Strafford in Massachusetts, James and Kings Counties in New York had the highest increases in small urban farms while Queens in New York, Fairfax and King Geo in Vermont suffered the largest decreases. The mixed outcome for New York counties is consistent with the idea that on the one hand farmers are attracted by the huge consumer base while on the other ‘impermanence syndrome’ may be more prevalent. Apart from residential and commercial developments around major cities, the decrease in small farms can also be attributed to the fact that most urban farmers take farming as a hobby and are less inclined to continue with operations should they experience bottlenecks.
Only 36 of the 270 counties had a population decrease, for example Marin county in California and Hamilton county in Ohio. Overall, population rose by about 9.9 percent in the counties under study which is above the entire U.S population increase of 7% over the 10 year period. Hence, the level of consumer concentration rose in urban areas, implying that urban farmers had a bigger market base to sell their produce to than in year 1987. Further, analysis of per-consumption data (from USDA) of fresh vegetables, between 1987 and 1997, shows that consumption rose from 162.4 pounds to 185.6 pounds. The difference noted of the population growth rates in the urban counties to the national figure might be attributed to a higher number of immigrants who settle in cities compared to those settling in rural areas, thus, resulting in increased consumption per pound of fresh vegetables.
Two hundred and thirty-eight (238) counties (or 88%) experienced a decrease in sole proprietor farms. However, Ramsey in Minneapolis and Passaic counties in New-York had the highest increases of 158% and 72% respectively. This decrease in farmland may be attributed to increases in land values in urban areas that required intensive use of smaller farmland. Further, since sole proprietors retain full responsibility and accountability over the farming operations, they may be unlikely to have enough financial resources to support their operations since they represent a huge risk, thus resulting in the decrease in farmland utilized. Besides, sole proprietors are more attuned to change states from principal to hobby farmers depending on prevailing market conditions.
Fifty-three (or 20%) of the 270 counties received higher state and federal government payments expressed in constant 1987 dollars. De Kalb in Georgia, Jefferson in Colorado and Atlantic county in Pennsylvania received the highest percentage increase of payments, with increases above 700% over the 10-year period. Overall, in deflated dollars, the government paid less to urban farmers by about 27%, which suggest that crop yields may have actually gone down or that farmers channeled fewer resources to environmental projects. Further, payments show greater variability with a standard deviation of 1266 greater than the mean value of 808. This implies that there is intensive crop production in some counties and that environmental pressure groups in those counties may have forced legislators to enact laws in favor of environmentally effective land-use management practices.
Over the 10 year period, 56 (or 21%) counties had increases in farm acreage utilized by operators reporting farming as their main occupation. Suffolk County in Massachusetts and Kings in New York reported the highest percentage increases of 200 and 100 percent respectively. Overall, there was an acreage decrease of 15.5% suggesting an increase in recreational farming. The decrease may be that farmers saw no value created from taking farming seriously and therefore may have relegated farming as a principal occupation and obtained other jobs as main income generating activities. This implies constraint efforts in performing value-adding activities, hence having a negative effect on agricultural value created by selling direct to consumers. The decrease may also point out that urban farmers are not informed about the benefits of farming and so neglect it. Second, it might be to keep up with the Jones and so shun backyard farming simply because none of his/her neighbors are engaging in such an activity.

Overall, the trend analysis has shown that counties in New-York dominate urban agriculture and that it has the largest number of small gardens operating. This is not
surprising given that data from Census of Population indicate that New York has the highest concentration of people per square mile. Also, New York is among the states with the highest standards of living and income per household, factors that have been seen to influence agricultural value from direct sales. Finally, in recent years, data indicate that New York is second only to California in immigration statistics.
VII. The Regression Model

This section presents the final regression model and discusses the best-unbiased and efficient estimates. Additionally, since the initial model estimation encompassed several variables, explanations behind inconsistent and unexpected outcomes are explored with a detailed analysis of each significant variable’s effects.

Initially, two multiple regression models (Appendix 1 and 2) were estimated. One had the dependent variable, value of agricultural produce sold direct to consumers (vshc97t) in its level form, while the second model had the dependent variable in logarithmic form. As can be seen, before statistical correction for misspecification and multi-collinearity, the level form model only managed to explain 27% of the variability ($R^2$) with a lower $F$-value of 11.98 when compared to the log-transformed second model shown in Appendix 2 that explained 56% variability and had a higher $F$-value of 39.74. However, the $R^2$-measure and $F$-statistic reported automatically by SAS cannot be used to compare models with different dependent variables, although they can indicate the possible outcomes, hence the $F_L$-statistic for overall significance of the model is used.

Upon arriving at the best models using the level form and the log-form respectively, the $F_L$-statistic, for the level form was equal to 14.05 which is lower than 48.34 for the log-form, favors the log-transformed model. Since both models contained dummy variables,
the dummy variable trap was avoided by using fewer ‘dummy’ variables as opposed to the actual regressors. Also, the variable containing urban farms in the ‘South’ was excluded from the model. This ensured there was no perfect multi-collinearity which could render the model un-estimable. Although both models supported the significance of the independent variables remaining in the models, the log-form did so more strongly. In addition, under the Breusch-Pagan F-test for heteroskedasticity, both models supported the absence of heteroskedasticity at 5 percent level.

Subsequently, only the model in Appendix 2 was subjected to further statistical correction, thus explaining more variability at 78% with a very significant F-value of 111 (Table 1). One obvious disadvantage with the log-form, however, is that factor elasticity and partial elasticity estimates are constant at any level they can assume. “Such an implication might be too restrictive if the variation in the causal factors is large,” (Chang, 1977: p355.) The end result would be inconsistent and inefficient estimates. Log-transformations have limited use because they are only appropriate when all the variables have positive observations, whereas level forms are applicable in any case. Despite these disadvantages, the calculation of logarithms tends to neutralize the impact, on the model variability explained, of the variables with very large observations.

Since incorrect functional forms can lead to biased and inefficient estimates, the Hausman Specification Error Test was used to select the best linear unbiased estimate (BLUE) model. This resulted in the log-model being preferred over the level form model. It was more statistically significant at the 10% level and also allowed direct
estimation of elasticity (causal) effects. In the log-form, heteroskedasticity was not a problem but multi-collinearity with condition index of 156 was corrected down to 16 by transforming all variables using a factor of the most collinear variable, that is, number of small farms per county. Each observation was divided by the corresponding square root of the small farm observation before re-estimating the model with the new observations. Lastly, since the data is not in time-series mode, the model was not tested for serial correlation.

Table 1: Regression Model Estimates with Depended Variable: Value of Agricultural Produce Sold Directly to Individuals

| VARIABLE                      | PARAMETER ESTIMATE | STANDARD ERROR | T VALUE | PR > |T|
|-------------------------------|--------------------|----------------|---------|------|
| Number of Small farms         | -0.00550           | 0.00200        | -2.75   | 0.0065 |
| Central city                  | 0.71342            | 0.23183        | 3.08    | 0.0024 |
| Principal occupation          | 0.00391            | 0.00080512     | 4.86    | <.0001 |
| County population             | 0.16083            | 0.07075        | 2.27    | 0.0240 |
| Sole-proprietor (per 1000)    | -0.00389           | 0.00150        | -2.59   | 0.0103 |
| County income                 | 0.13042            | 0.03061        | 4.26    | 0.0002 |
| Farm region                   | 1.42799            | 0.15383        | 9.28    | <.0001 |

The estimates shown in Table 1 are for the log-transformed model. At this stage all of the factors included in the model estimation are significant at the 5% level. Surprisingly, government payments to farmers, distance from a farm to a highway and amount of rainfall received turned out to be insignificant and where, therefore, omitted.
(2001: p2) and Muhammad et al (2004: p6), observed, too, that state and federal government payments to farmers had no effect on the agricultural value of produce sold directly to consumers. However, unlike in this study, Hopkins (2001: p2) further concluded that population had no effect as well. The differences may be a result of the nature of data used, the sampling method adopted in data collection and human errors emerging from data capturing.

In this study, the population factor yield expected results since population figures actually rose 9.9 percent over the 10 year period. Increases in ‘more mouths to feed’ result in increased quantities sold implying the market base for agricultural products is rising. The distance to the highway, however, was inconsistent in all the models tested implying that urban farmers do not rely on the highway to market their produce. Total market value of produce sold emerged insignificant, too, and this is not surprising since there is no guarantee that a farmer who performs well in cattle ranching will do well in crop farming. Thus, we are able to accept the hypothesis at the 5% level of significance that economic, demographic and organization factors affect direct sales realized since county income, population and whether the farm is located in a central city all turned-out statistically significant.

In a nutshell, though, ingredients for boosting agricultural value by selling directly to consumers are dominated by farm location. For best results, urban farm location should be in the ‘North’ and should be in a county surrounded by or in proximity to a major city whose residents enjoy higher standards of living, such as New York.
Discussion of Regression Results

Number of small farms: Surprisingly, an increase in the number of small farms per county has a negative influence on total agricultural value sold directly to consumers. This finding is inconsistent with the original theory which argues for an increase in value-addition when small farms increase since total product supply to the market was anticipated to increase. Perhaps, an increase in small farm concentration stems from residential development of nearby larger urban farms, thus causing a reduction in total farmland harvested. Hence, product supply (and sold) to the market will drop, adversely impacting on total value of produce sold directly to consumers.

The significant p-value of 0.0065 confirms importance of the factor to the model and the coefficient estimate indicates that for every 10 percent increase in number of small farms, the total value created will decrease by 0.55 percent. The results suggest that either the U.S. market is saturated by small farms and/or that there is over-supply of products from small urban farms. It may, also, be that small farms are hobby farms and therefore owners don’t take the time to invest in the farming business. Hence, there is no room for new small urban farm entrants into the urban farming sector, as some of the current farms are failing to cover, at least, all variable costs.

Central city: Cities are normally associated with high concentrations of consumers; hence, it is not surprising that a positive response emerged with a p-value of 0.0001, which is consistent with my expectations. City residents travel shorter distances for their
agricultural purchases, have higher disposable incomes and are prepared to pay higher prices for quality products. Thus, urban farmers can extract more consumer surplus since the willingness to pay higher prices in order to have produces brought to their door-steps is higher for urban consumers. Hence, central county residents are more encouraged to take up urban farming, as they will realize good returns from that venture. Also, assuming inner cities are served by urban farmers, the results indicate that there is still an unmet demand for fresh agricultural produce. This demand may well be satisfied by more inner city backyard gardening start-ups that will add to the current output levels. This is supported by evidence highlighted elsewhere “that one-fifth of all land in American cities is classified as vacant,” Schukoske (2000: p351). Finally, while some economists and behavioral scientists have highlighted the presence of the impermanence syndrome, these statistics suggest that it has no effect on value sold directly for human consumption. In fact, where it occurs, it is insignificant to warrant any sizeable losses of value created. Hence, on the whole, metropolitan expansion tends to be in favor of better urban farming returns than previously thought.

**Income per county:** Income levels per county also had a positive effect confirming that consumers with higher disposable incomes are willing and likely to spend more than their counterparts with less income. The positive elasticity shows that urban farmers take value-creation seriously (farming is not inferior) as opposed to recreational purposes. In a nutshell, the results indicate that a 10 percent increase in income level per county will result in a 12.9 percent increase in value realized from direct sales. Hence, intending urban farmers are encouraged to set up operations in high income counties. The outcome
appear consistent to findings in this paper regarding the importance of taking farming as a full-time profession.

Region: This variable represents whether the urban farming operation is located to the ‘North’ or to the ‘South’ of U.S. and is a proxy of the growing season variable. The rationale is that these two geographical regions have contrasting climates, soils and rainfall patterns. While the North is mainly cold, temperatures during the short planting seasons are favorable. The South on the other hand is generally hot and dry, receiving little rainfall such that animal husbandry, cotton and tobacco planting are preferred. Hence, the variable ‘region’ produced expected results that small-scale crop farming in the North is more profitable than in the South. This explains why large scale farming operations, such as ranches are located in the South and growing commodity crops like tobacco in addition to cattle ranching. Thus, residents intending urban farming are more encouraged to consider home-ownership in the Northern states than in the South.

Operators by principal occupation: The t-value of 4.3 is very strong and consistent with theory that as farmers devote and spend full-time on farming, they sell more produce directly to consumers. While direct selling may appear simple, the amount of effort required to successfully sell produce and build a loyal consumer base for continued future purchases is surmountable. Hence, urban farmers who have invested time and effort to direct selling have reaped positive benefits by abandoning recreational farming because buyers are willing to reward such value-adding additional efforts and commitment. Lastly, results from the econometrics show that as the acreage farmed by full-time urban
farmers increased by 10 percentage points, the response on value created is a positive 5 percent. Therefore, it is in the best interests of all stakeholders to make available additional farmland to farmers taking farming as a principal occupation since they have proved to be capable of transforming the urban farms into productive use.
VIII. Policy Implications

In this part of the study, policy proposals based on the model outcomes are extended to help urban farmers boost value created from directly selling their harvests. Since value of agricultural produce sold from direct selling to consumers represents 20 percent of the total market value of produce sold by urban farmers, policy makers should provide an enabling environment that encourages farmers to learn and acquire knowledge concerning such product distribution methods. Instead of providing additional payments to farmers, which have no effect on the ability of the urban farmer to increase direct sales to consumers, the government is better advised to channel those resources towards training of small-scale farming and marketing education. Education and training may also be provided to raise awareness of the adverse effects of rainfall on crops and failure to anticipate and prepare for the coming growing season. Such measures should help urban farmers improve yields per acre.

As a result of constrained supply due to the small number of urban farms in some counties, where possible, legislation may be put in place to encourage more urban farm start-ups. For instance, either land rent discounts can be extended to those taking up urban farming or the state may impose a production quota that farmers must grow and harvest before they can receive any form of federal government support including state government payments that are discussed in this paper. Apart from increasing supply and
improving the value created, this response will ensure that more people participate in local and economic developments. In addition, there may be a reduction in crime and poverty levels. In counties with small numbers of urban farms, the acreage harvested may grow and in turn, the quantity supplied may increase. In counties with a sizeable number of urban farms, the legislation may ensure prices remain constant for the better part of the harvesting cycle.

Another policy consideration is that state and federal government officials may formulate input assistance schemes to urban farmers taking farming as their principal occupation. As shown from the analysis, those doing so are being rewarded for their efforts. Such input assistance may encourage many small scale farmers to abandon multiple occupations and be more focused on urban agriculture. Input assistance programs minimize the level of initial capital outlay required, the business risks that farmers face should market, and climatic constraints prove unfavorable.

The success of urban farming in delivering value to its practitioners calls for its integration into urban land-use planning systems. Land developers should include a portion of land in their large-scale housing plans that future homeowners can utilize for farming purposes. Developmental plans may address the positioning of, say, farmers’ markets and roadside stalls closer to households that have sizeable backyard lands already included in their plans. This integration may also ensure that curriculum and training of urban farmers as far as soil erosion and water (river) pollution are concerned is addressed at a higher level where new policy considerations are suggested and debated.
IX. Conclusion

Since we failed to reject the null hypothesis under the 95% confidence level, we can conclude that value created from selling produce directly to consumers is influenced by economic, demographic and organizational factors.

Whatever an urban farmer does, to create value from direct sales, direct marketing should be a part of her/his strategies. How well she/he performs this task will be one key to boosting direct sales from urban consumers. Since it requires time and commitment, principal farmers located within central cities in the Northern states are more likely to receive higher income from direct sales to consumers. This is because such cities are more densely populated than their counterparts in the South. More opportunities related to direct marketing may include options such as crop diversification, value-addition through quality packaging, mail-order and internet marketing. The prevalence of these opportunities means that value creation from direct sales can only grow if they are successfully implemented. Also, direct sales not only benefit urban growers that are located within population centers but those operating in city peripherals as well.

Of those factors that were economically significant and considered in the model estimation; surprisingly government payments and population, produced either inconsistent or statistically insignificant results. However, value of produce sold was
strongly related to the principal occupation of farmer suggesting day-to-day farm management is relevant to successful performance. Further, results from the trend analysis (of factors used) compared to those of the econometric analysis produced close results except for the population factor. Trend analysis suggested in favor of value addition as a result of population growth which was negated by regression results. The outcome of government payments proved consistent with results by other researchers. This is because farmers view this type of income as transitory with no guarantee of receipt in the future (Hopkins, 2001: p2).

As noted, the location of an urban farm is crucial to its success. Presence of high consumer concentrations, better standards of living and less reliance on transportation favor urban farms located within city limits. Also, a look at the correlation analysis of the model variables showed that little association existed between population and income. Conclusively, the presence of the income factor showed that to a large extent, urban farming is not a recreational business and that most of its practitioners are looking for a positive return. Those that practice ‘hobby’ farming are probably few and associated with insignificant net performances.

Finally, the government may play a more supporting role in order to help urban farmers be more successful and contribute effectively to national well-being. This could be achieved by imposing financial and input assistance schemes that urban farmers can draw from. Also, the government could implement legislation such as the ‘Farmer-to-
Consumer Direct Marketing Act of 1976’ that accords certain market advantages to urban farmers when it comes to selling and distributing their produce.
X. Bibliography:


   http://www.cityfarmer.org/rees.html


**Appendix 1: vshc97T regression model (before statistical correction):**

Dependent Variable: \( vshc97T \)

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Root MSE: 1175.24883  
Dependent Mean: 738.33766  
Adj R-Sq: 0.2505  
Coeff Var: 159.17498

Parameter Estimates

| Variable | DF | Parameter Estimate | Standard Error | t Value | Pr > |t| |
|----------|----|-------------------|----------------|---------|------|---|
| Intercept| 1  | -8545.30903       | 3996.34918     | -2.14   | 0.0336 |
| sfm97    | 1  | 0.18774           | 0.47298        | 0.40    | 0.6918 |
| ccity    | 1  | 603.49383         | 227.20155      | 2.66    | 0.0085 |
| solpr97A | 1  | -0.00239          | 0.00112        | -2.12   | 0.0348 |
| obpof97  | 1  | 2.19794           | 0.62259        | 3.53    | 0.0005 |
| lpop     | 1  | 89.63843          | 75.74438       | 1.18    | 0.2379 |
| linc97   | 1  | 754.32803         | 388.92123      | 1.94    | 0.0537 |
| region   | 1  | 327.51853         | 180.59315      | 1.81    | 0.0711 |
Appendix 2: log (vshc97t) regression model (*before correction*):

Dependent Variable: \( \text{lvshc97t} \)

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Root MSE: 1.05627

Dependent Mean: 5.63565

Adj R-Sq: 0.5465

Coeff Var: 18.74257

| Variable | DF | Parameter Estimate | Standard Error | t Value | Pr > |t| |
|----------|----|--------------------|----------------|---------|------|
| Intercept| 1  | -8.26676           | 3.76142        | -2.20   | 0.0290 |
| sfm97    | 1  | -0.00115           | 0.00042533     | -2.70   | 0.0076 |
| ccity    | 1  | 0.50918            | 0.21112        | 2.41    | 0.0167 |
| solpr97A | 1  | -0.00000268        | 0.000000101    | -2.65   | 0.0087 |
| obpof97  | 1  | 0.00404            | 0.00056353     | 7.17    | <.0001 |
| lpop     | 1  | 0.42491            | 0.07394        | 5.75    | <.0001 |
| linc97   | 1  | 0.93672            | 0.36887        | 2.54    | 0.0118 |
| region   | 1  | 1.14593            | 0.16521        | 6.94    | <.0001 |