



**The Nexus of Agricultural Land Use  
Policy and Rural Employment  
Generation in the Northeast  
United States**

*by* Ed Tavernier et al.  
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**THE NEXUS OF AGRICULTURAL LAND USE POLICY AND RURAL  
EMPLOYMENT GENERATION IN THE NORTHEAST UNITED STATES**

**FINAL REPORT**

Prepared for

**THE NORTHEAST REGIONAL CENTER FOR RURAL DEVELOPMENT**

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## **Preface**

The contrast of land uses and demographics in the Northeast makes the region a unique laboratory for the study of land use issues. For example, Maine has the highest proportion of forestland; New Hampshire has one of the highest population growth rates; New Jersey is the most densely populated state; Delaware ranks among the top eight states in percentage of land area used as cropland; New York contains one of the world's largest metropolitan centers and, together with Vermont and Massachusetts, leads the nation in percentage of land area in state parks; Pennsylvania contains one of the nation's largest rural populations; Connecticut has one of the highest per capita incomes; and Maryland has one the world's most important estuaries, the Chesapeake Bay.

Despite the contrast, one commonality shared throughout the region is the significant demands on the natural resource base in general, and agricultural land in particular. Those demands hold serious implications not only for the environmental amenities, such as groundwater recharge, scenic amenities, wildlife habitats, and open space, that agricultural land provide, but the economic activities, such as rural and economy-wide employment and agricultural production, and the rural development that they encourage. While the benefits of the environmental amenities are often of concern to the suburban and urban residents, rural residents tend to focus on the economic activities of land use issues.

This report documents these economic activities. It is hoped that the findings help frame the issues of land use in the context of enhancing policy leadership, improving resource management capacity, and strengthening the planning process that will sustain the long-term viability of rural communities.

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# **Agricultural Land use Policy and Rural Employment Generation in the Northeast United States**

## **Executive Summary**

Some type of farmland preservation policy instrument can be found in all fifty states. The policy instruments include agricultural district laws, agricultural conservation easements, purchase of agricultural easements, right-to-farm laws, circuit breaker tax programs, differential assessment laws, agricultural protection zoning ordinances, and transfer of development rights programs among others. These instruments are motivated in part by the belief that the free market will not socially optimize the allocation of land between open space and environmental amenities and other uses such as agriculture. Thus owners of agricultural land who want to maximize economic welfare may be inclined to see that the land goes to the activity that pays the highest rent. This activity is often the conversion of agricultural land to development uses.

The conversion of agricultural land to such uses holds serious implications for rural communities because agriculture is often a rural activity. This activity is particularly important because rural areas have limited labor pools and low density that create liabilities in the new economy where firms often seek large pools of skilled labor. Moreover, the promise of new economy high tech jobs in the telecommunications sector has not materialized. Given those factors, land use policy and agriculture must play a prominent role in any strategy to enhance rural development.

Rural development aims to improve the quality of life for people living in rural areas by increasing their access to assets and resources, basic services, productive employment and income generating activities, and agriculture, as a major source of income is central to such development. Thus agricultural-related direct employment and agricultural generated indirect

employment provide one of the primary areas for the sustainability of rural areas. Such employment provides significant economic impact through its multiplier effects.

The economic impacts of agriculture in terms of output, value added and employment are examined for four northeast states using IMPLAN. The economic framework that provides the foundation for IMPLAN draws from economic base theory that posits there exists a relationship between export-generating (basic) and residentiary (non-basic) activities, and between export-generating employment and population. Thus any activity that leads or determines the growth of a local economy is viewed as basic, while the non-basic activities are spillover results or positive externalities from such growth. Exports are generally defined as any extra-regional activity that introduces “new revenues” into the local economy and helps the growth of that economy.

IMPLAN uses input-output techniques and has been used to estimate economic impacts in the forest industry, recreation and tourism, environmental issues, horticultural industry, and issues pertaining to rural development. This study uses the 1998 IMPLAN database to calculate the economic impacts of agriculture on the economies of Connecticut, New Jersey, New York and Pennsylvania. IMPLAN Professional Version 2 software is used to perform the econometric analysis.

IMPLAN is a demand-driven, backward-linkage program that generates multipliers to facilitate impact analysis. Type I and Type SAM (Social Accounting Matrix) multipliers are used in this analysis. Type I multipliers measure the direct and indirect effects of a change in economic activity. They capture the inter-industry or sector effects only; that is industries buying from local industries. In addition to capturing those two effects, SAM Type multipliers also include the incomes and expenditures of households. The income flows from industries to factors (employee compensation) and from factors to households with some factor income going

outside the region to commuters. The income going outside is not re-spent on goods and services in the region. However, for every one dollar change in final demand for a particular industry, increases occur in inter-industry economic activity (as in Type I), but increases also occur in the incomes of the people employed in producing the output of the particular industry. These people spend their income on personal consumption, which leads to demands from local industries.

The agricultural sector influences economic activity in three ways. First, the sector has a direct effect on the economy as businesses, households, real estate developers, and others buy agricultural products. The second influence is an indirect effect as the agricultural sector responds to increases for its products by purchasing inputs (e.g. labor from households, seed and materials from business) to satisfy increases from final demand. This round of economic activity does not go on indefinitely as certain inputs are purchased outside of the local economy and are considered demand leakages. The third influence is the induced consumption effect. This effect results from increased household spending as more labor is hired in response to agriculture-led economic activity. The paper assumes that the influences or multiplier effects respond proportionately to expenditures in the local economy.

The results show that the agriculture's economic contribution in all three areas is greatest in Pennsylvania. Total output in that state increased by 75% compared to 57%, 55%, and 52% for New York, Connecticut and New Jersey, respectively. The value added contribution for Pennsylvania increased by 138% compared to 100%, 58%, and 57% for New York, New Jersey and Connecticut, respectively. The employment contribution in Pennsylvania increased by 46% compared to 33%, 25%, and 24% for New York, New Jersey and Connecticut, respectively.

Specifically, the results suggest that the greatest economic linkages between the agricultural sector and the rest of the economy exist in Pennsylvania. In that state the direct agricultural output of \$6.7 billion contributed over \$11.7 billion in output throughout the economy. The agricultural sector alone contributed over \$7.5 billion in direct, indirect and induced output. The analysis indicates that the wholesale trade sector received the greatest impact from agriculture led activity. Industries in that sector are primarily engaged in selling goods to trading establishments, or to industrial, commercial, institutional, farm, construction contractors, or professional business users; and bringing buyer and seller together. The wholesale sector had total sales of \$624 million. Indirect sales accounted for about \$535 million of that amount, while induced sales accounted for over \$89 million.

The agricultural sector in Pennsylvania generated over \$2.4 billion in total value added activity. That economic activity increased indirect demand in the sector by over \$244 million, and induced households to spend an additional \$5.3 million. In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. The analysis again suggests that the wholesale trade sector received the greatest impact from agriculture-led activity. The wholesale sector had total sales of \$427 million. Indirect sales accounted for \$366 million of that amount, while induced sales accounted for over \$61 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate and owner-occupied dwellings (OCD) sectors. Total sales in the real estate and the OCD sectors amounted to \$321 million and \$121 million, respectively. The OCD sector captures the expenses of home ownership such as repair and maintenance construction, various closing costs and other expenditures related to the upkeep of the space in the same way expenses are captured for rental properties. The analysis also indicates that the service sectors are the primary

beneficiaries of agriculture-led economic activity. Finally, in addition to the \$2.1 billion direct value added impact, almost \$3 billion of value added economic activity were generated throughout the economy of Pennsylvania.

The agricultural sector contributed 124,623 jobs in Pennsylvania. Indirect and induced job creation in that sector amounted to 14,396 and 314 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. The wholesale trade sector received the greatest impact from agriculture-led activity. Employment in the wholesale and trade sector increased by almost 5,233 jobs. Indirect impacts accounted for 4,884 jobs while induced job creation accounted for 749 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and the maintenance and repair facilities eating and drinking sector. In the maintenance sector, 2,595 jobs were created. Significant economic linkages also exist between the agricultural sector and the eating and drinking sector and the real estate sector. Finally, in addition to the 124,623 jobs directly involved in agriculture, almost 58 thousand jobs were generated throughout the economy of Pennsylvania.

In the case of New York, the direct agricultural output of \$6.5 billion contributed over \$10.2 billion in output throughout the economy. The agricultural sector alone contributed over \$6.8 billion in direct, indirect and induced output. The analysis indicates that the wholesale trade sector received the greatest impact from agriculture led activity. The wholesale trade sector had total sales of over \$607 million. Indirect sales accounted for about \$524 million of that amount, while induced sales accounted for over \$83 million.

The agricultural sector in New York generated over \$2.4 billion in total value added activity. That economic activity increased indirect demand in the sector by over \$128 million,

and induced households to spend an additional \$1.9 million. The analysis suggests that the wholesale trade sector received the greatest impact from agriculture-led activity. The wholesale trade sector had total sales of \$415.5 million. Indirect sales accounted for \$358.7 million of that amount, while induced sales accounted for over \$56.8 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate sector. Total sales in the real estate sector amounted to \$271.2 million. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$2.3 billion direct value added impact, an additional \$2.3 billion of value added economic activity was generated throughout the economy of New York.

The agricultural sector contributed 110,456 jobs in New York. Indirect and induced job creation in that sector amounted to 6,173 and 91 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. The wholesale trade sector received the greatest impact from agriculture-led activity. Employment in the wholesale trade sector increased by 4,278 jobs. Indirect impacts accounted for 3,693 jobs while induced job creation accounted for 585 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and the maintenance and repair facilities sector. In the maintenance sector, 1,753 jobs were created. Significant economic linkages also exist between the agricultural sector and the real estate sector. Finally, in addition to the 110,456 jobs directly involved in agriculture, almost 36,178 jobs were generated throughout the economy of New York.

The direct agricultural output of \$1.1 billion contributed over \$1.7 billion in output throughout the economy of Connecticut. The agricultural sector alone contributed over \$1.2 billion in direct, indirect and induced output. The analysis indicates that the wholesale trade

sector received the greatest impact from agriculture led activity. The wholesale trade sector had total sales of over \$66.8 million. Indirect sales accounted for about \$48.9 million of that amount, while induced sales accounted for approximately \$18 million.

The agricultural sector in Connecticut generated over \$722 million in total value added activity. That economic activity increased indirect demand in the sector by approximately \$24 million, and induced households to spend an additional \$712 thousand. The analysis suggests that the wholesale trade sector received the greatest impact from agriculture-led activity. The wholesale trade sector had total sales of \$45.7 million. Indirect sales accounted for \$33.5 million of that amount, while induced sales accounted for over \$12.3 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate sector. Total sales in the real estate sector amounted to \$32.3 million. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the approximately \$697 million direct value added impact, an additional \$365 million of value added economic activity was generated throughout the economy of Connecticut.

The agricultural sector contributed 25,611 jobs in Connecticut. Indirect and induced job creation in that sector amounted to 878 and 27 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. Three hundred and ninety-eight jobs were created in the wholesale trade sector. Indirect impacts accounted for 291 jobs while induced job creation accounted for 54 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and the maintenance and repair facilities sector. In that sector, 178 jobs were created. Significant economic linkages also exist between the agricultural sector and the real estate sector.

Finally, in addition to the 25,611 jobs directly involved in agriculture, 6,040 jobs were generated throughout the economy of Connecticut.

The direct agricultural output of \$2.1 billion contributed over \$3.2 billion in output throughout the economy of New Jersey. The agricultural sector alone contributed over \$2.2 billion in direct, indirect and induced output. The analysis indicates that the wholesale trade sector received the greatest impact from agriculture led activity. The wholesale trade sector had total sales of over \$144.4 million. Indirect sales accounted for about \$110 million of that amount, while induced sales accounted for approximately \$34 million.

The agricultural sector in New Jersey generated over \$1.22 billion in total value added activity. That economic activity increased indirect demand in the sector by approximately \$37 million, and induced households to spend an additional \$1 million. The analysis suggests that the wholesale trade sector received the greatest impact from agriculture-led activity. The wholesale trade sector had total sales of \$98.8 million. Indirect sales accounted for \$75.3 million of that amount, while induced sales accounted for over \$23.5 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate sector. Total sales in the real estate sector amounted to \$63.2 million. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the approximately \$1.2 billion direct value added impact, an additional \$693 million of value added economic activity was generated throughout the economy of New Jersey.

The agricultural sector contributed 45,861 jobs in New Jersey. Indirect and induced job creation in that sector amounted to 1,427 and 40 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. Nine hundred and sixty-nine jobs were created in the wholesale trade sector. Indirect



impacts accounted for 738 jobs while induced job creation accounted for 231 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and the maintenance and repair facilities sector. In that sector, 370 jobs were created. Significant economic linkages also exist between the agricultural sector and the real estate sector. Finally, in addition to the 45,861 jobs directly involved in agriculture, 11,379 jobs were generated throughout the economy of New Jersey.

# **The Nexus of Agricultural Land Use Policy and Rural Employment Generation in the Northeast United States: Preliminary Findings**

## **1. Introduction**

### **1.1 Agricultural Policy Instruments**

The continued threat of erosion to the farmland base has prompted all states in the U.S. to develop policy instruments to direct land use decisions that slow or prevent the premature conversion of productive resource areas to urban land uses. The policy instruments include agricultural district laws, agricultural conservation easements, purchase of agricultural easements, right-to-farm laws, circuit breaker tax programs, differential assessment laws, agricultural protection zoning ordinances, transfer of development rights programs, among others. These policies have been extensively discussed elsewhere (see Tavernier, Li, and Temel, 1996; Nelson, 1992; [www.farmlandinfo.org/fic/tas/](http://www.farmlandinfo.org/fic/tas/)) and shall only be briefly discussed here for the northeast states of Connecticut, New Jersey, New York and Pennsylvania.

#### **1.1.1 Agricultural District Laws**

According to the American Farmland Trust<sup>1</sup>, agricultural district laws allow farmers to form special areas where commercial agriculture is encouraged and protected. The programs are authorized by state legislatures and implemented at the local level. Sixteen states have enacted agricultural district laws. Each law provides a unique set of incentives. Common benefits of enrollment in a district include automatic eligibility for differential assessment, protection from eminent domain and municipal annexation, enhanced right-to-farm protection, exemption from

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<sup>1</sup> The information on policy instruments is taken largely from the American Farmland Trust's website: [www.farmlandinfo.org/fic/tas/](http://www.farmlandinfo.org/fic/tas/).

special local tax assessments and eligibility for state purchase of agricultural conservation easement (PACE) programs. In New York State for example, the development of agricultural districts was designed to make agriculture a priority and promote the continuation of farming. Between 1972 and 1997, land in agricultural districts increased from 5,538 to 20,543 acres per district (Bills and Cosgrove, 1998).

### **1.1.2 Agricultural Conservation Easements**

Agricultural conservation easements are designed specifically to protect farmland. Grantors retain the right to use their land for farming, ranching and other purposes that do not interfere with or reduce agricultural viability. They hold title to their properties, and may restrict public access, sell, give or transfer their property, as they desire. Producers also remain eligible for any state or federal farm program for which they qualified before entering into the conservation agreement. Conservation easements limit land to specific uses and thus protect it from development. These voluntary legal agreements are created between private landowners (grantors) and qualified land trusts, conservation organizations or government agencies (grantees). Grantors can receive federal tax benefits as a result of donating easements. Grantees are responsible for monitoring the land and enforcing the terms of the easements.

### **1.1.3 Purchase of Agricultural Conservation Easement Programs**

Purchase of agricultural conservation easement programs pay farmers to protect their land from development. PACE is known by a variety of other terms, the most common being purchase of development rights. Landowners sell agricultural conservation easements to a government agency or private conservation organization. The agency or organization usually pays them the difference between the value of the land for agriculture and the value of the land

for its "highest and best use," which is generally residential or commercial development. Easement value is most often determined by professional appraisals, but may also be established through the use of a numerical scoring system that evaluates the suitability for agriculture of a piece of property. In Pennsylvania, for example, as of August 1998, 41 of the state's 67 had purchased easements for a total cost of \$240,143,371 (Kelsey and Lembeck, 1998).

#### **1.1.4 Right-to-Farm Laws**

State right-to-farm laws are intended to protect farmers and ranchers from nuisance lawsuits. Every state in the nation has at least one right-to-farm law. Some statutes protect farms and ranches from lawsuits filed by neighbors who moved in after the agricultural operation was established. Others protect farmers who use generally accepted agricultural and management practices and comply with federal and state laws. Twenty-three right-to-farm laws also prohibit local governments from enacting ordinances that would impose unreasonable restrictions on agriculture. Adelaja et al. (1996) suggest that seven components are needed for a successful right-to-farm law and program. The components include a (i) clear identification in the Act establishing the law of farm operations/activities to receive protection, (ii) precise description of protections provided for various farm operations and activities and the limitations on non-farmers and various government levels, (iii) specific description of the standards to be met to receive right-to-farm protection, (iv) well-defined institutional framework for efficient and effective right-to-farm information, assistance and enforcement (including staffing and funding), (v) clearly defined conflict resolution process, (vi) mechanism to allow changes and flexibility, and (vii) articulated conflict prevention process, including educational and public awareness programs.

### **1.1.5 Circuit Breaker Tax Relief Credits**

Circuit breaker tax programs offer tax credits to offset farmers' property tax bills. Four states have circuit breaker programs. In Michigan, Wisconsin and New York, farmers may receive state income tax credits based on the amount of their real property tax bill and their income.

### **1.1.6 Differential Assessment Laws**

Differential assessment laws direct local governments to assess agricultural land at its value for agriculture, instead of its full fair market value, which is generally higher. Differential assessment laws are enacted by states and implemented at the local level. These laws are also known as current use assessment, current use valuation, farm use valuation, use assessment and use value assessment and play an important role in enhancing the economic viability of agriculture. The laws lower real property taxes and ease the financial burdens that farmers face by assessing taxes on the farm's income potential of the land rather than the land's development or market value. Thus farmers realize significant tax savings from farmland-assessed property. Tremblay et al. (1987) indicate that major differential assessment programs were enacted Pennsylvania (1974), New Jersey (1964), Connecticut (1963), Maine and New York (1971), Rhode Island and Delaware (1968), Massachusetts and New Hampshire (1973), and Vermont (1980).

### **1.1.7 Agricultural Protection Zoning**

Agricultural protection zoning (APZ) is a form of local government land use control. Zoning ordinances segment counties, cities, townships and towns into areas devoted to specific land uses and establish standards and densities for development. These ordinances designate areas where farming is the primary land use and discourage other land uses in those areas. APZ

limits the activities that are permitted in agricultural zones. The most restrictive regulations prohibit any uses that might be incompatible with commercial farming.

### **1.1.8 Transfer of Development Rights**

Transfer of development rights (TDR) programs allows landowners to transfer the right to develop one parcel of land to a different parcel of land. Generally established through local zoning ordinances, TDR programs can protect farmland by shifting development from agricultural areas to areas planned for growth. When the development rights are transferred from a piece of property, the land is restricted with a permanent agricultural conservation easement. Buying development rights generally allows landowners to build at a higher density than ordinarily permitted by the base zoning. TDR is known as transfer of development credits in California and in some regions of New Jersey.

## **2. Background**

### **Farmland Preservation, Rural Development and Employment**

The northeast occupies 2% of the land and 6% of the farms in the US ([www.usda.gov/nass/graphics/fncht5.gif](http://www.usda.gov/nass/graphics/fncht5.gif)). Over the past few decades urbanization in that region has pushed into traditionally rural areas and has increasingly affected farmland values. These values have risen above their value in agricultural production as the land became valued for such nonfarm factors as proximity to urban centers and potential for recreation use. In 1994, for example, the average per acre value of agricultural land in the northeast was \$2,160 compared to \$798 nationally (Table 1). The disparity between land values in the northeast and at the national

level decreased in 1998 from 2.7 to 2.3 times the national average. Land values are highest in New Jersey, followed by Connecticut.

Given these values, real estate taxes in the region would be extremely high in the absence of differential taxation. In 1994, for example, the average per acre taxes for farmland and buildings in the US was \$5.86 compared to \$56.75 and \$43.67 for Rhode Island and New Jersey, respectively (Table 2). Only Delaware had average per acre taxes (2.17) below the national average.

All twelve states in the region have some form of farmland or open space assessment to address the issue of high land values. These assessments lower real property taxes and ease the financial burdens that farmers face by assessing taxes on the farm's income potential rather than the land's development or market value. However, eligibility requirements differ by state. For example, farmland, forestland and open space are eligible use value assessment in Connecticut but only productive agricultural land is eligible in New York (Table 3). In New Jersey the

Table 1. Farm Real Estate: Average Value Per Acre, by Region and State, January 1, 1994-98.

<u>State</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>
	Dollars				
<b>Northeast:</b>	2,160	2,200	2,220	2,240	2,280
CT	5,950	5,950	5,950	5,950	5,950
DE	2,350	2,440	2,550	2,580	2,660
ME	1,130	1,130	1,150	1,170	1,190
MD	3,050	3,100	3,110	3,150	3,180
MA	5,020	5,060	5,100	5,150	5,210
NH	2,250	2,250	2,250	2,250	2,250
NJ	6,950	7,000	7,100	7,100	7,000
NY	1,260	1,280	1,260	1,250	1,280
PA	2,150	2,200	2,270	2,300	2,390
RI	6,400	6,500	6,500	6,500	6,500
VT	1,400	1,450	1,490	1,500	1,520
<b>48 States</b>	798	844	887	926	974

<http://usda.mannlib.cornell.edu/reports/general/sb/b9570399.txt> viewed 2/6/2002



Table 2. Average Per Acre Taxes for Farmland and Buildings in the Northeast and the US, 1994.

State	Average Taxes Per Acre(\$)	Average Taxes per \$100 Value
<b>Northeast:</b>	23.84	0.89
CT	28.69	0.61
DE	2.17	0.08
ME	11.31	1.05
MD	11.59	0.40
MA	27.68	0.69
NH	24.99	1.05
NJ	43.67	0.90
NY	20.33	1.63
PA	18.49	0.97
RI	56.75	1.07
VT	16.56	1.31
<b>48 States</b>	5.86	0.75

Source: USDA/ERS. Agricultural Resources and Environmental Indicators, 1996-97, Agricultural Handbook Number 712.

Table 3. Comparison of Use Value Assessment in Four Northeast States

State	Types of Land Uses Covered	Eligibility Requirements			
		Minimum Acres	Minimum Sales		
			Past	Future	Per Added Acre
Connecticut	Farmland; forest land; open space land	25	Judgment of assessor	NA	NA
New Jersey	Agricultural; horticultural; woodland	5	\$500 per year for 2 years from 5 acres	\$500 per year	\$5.00per acre for cropland; \$0.50/acre for woodland
New York	On productive agricultural land only	10	\$10,000	NA	NA
Pennsylvania	Agr. reserve (recreational open space); agricultural use; forest reserve	10 or	\$2,000 gross income for agricultural land		NA

Tremblay, R. H., et al., 1987.

minimum number of acres needed to qualify for use value assessment is 5 acres while in Pennsylvania 10 acres or \$2,000 gross income for agricultural land is needed.

The assessments allow for a lower valuation of farmland and provide significant tax savings to farmers. Thus without some form of farmland assessment, taxes on farm real estate actively devoted to agricultural production would be prohibitively high and could jeopardize the viability of agriculture by encouraging conversion to alternative uses. Since 1950, New Jersey has lost almost two-thirds of its farms and more than half of its farmland base (NJDA, 1998). Pennsylvania has lost nearly half of its farmland during the same period. Between 1982 and 1997, for example, approximately 1.5 million acres of farmland was developed in Pennsylvania. These losses are crucial because they may negatively impact employment in rural communities and hinder the capacity of states to attract non-agricultural industries.

Goetz (2001) argues that rural counties seeking to attract High Tech industries as part of their economic development strategy need to offer a skilled workforce and a pleasant environment. Thus for example, in Pennsylvania, where farmland comprises 7.1 million acres or 24% of land, the continued conversion of farmland to development uses holds significant implications for the rural economy and rural development. Such development aims to improve the quality of life for people living in rural areas by increasing their access to assets and resources, basic services, productive employment and income generating activities, and that agriculture as a major source of income and employment is central to such development (Mullen 1999). However, the importance of agriculture in this development depends on a viable farm economy, a concentration of sector-supporting industries, and a relative scarcity of nonagricultural economic activity. New York and Pennsylvania lost workers involved in producing, assembling, and processing raw products and in industries that distribute those products to domestic and foreign consumers ([www.ers.usda.gov/epubs/pdf/rcat/rcat102](http://www.ers.usda.gov/epubs/pdf/rcat/rcat102)). These

activities comprise the US food and fiber system (FFS). Workers involved in that system increased by 3.3 percent and 2.6 percent in Connecticut and New Jersey, respectively (Table 4).

The concern over jobs and the role of agriculture in rural communities highlights the importance of farm preservation policy instruments. These instruments in combination with appropriate agricultural policies increase the likelihood that agriculture will continue to be a viable source of rural employment. Adelaja, Schilling and Menzo (1998) argue that farmland assessment is a pivotal economic development policy for agriculture and has contributed to the retention of farmland in New Jersey. Tavernier and Li (1995) show that policies that increase farm income directly or indirectly enhance the preservation of farmland. Thus farmland preservation is a major cornerstone of rural development and assumes great significance given the recognition that rural places face extreme difficulty in attracting non-agricultural employment. Goetz [1997(a), (b)] shows that high-tech firms avoid counties with predominantly rural populations and that rural areas have lost their edge in the electric-energy-intensive manufacturing sector. Those sectors provide high-wage jobs. Malecki and Boush (2000) find that rural counties fail to attract communications technology that provides quality rural jobs. The difficulty in attracting high-wage jobs is compounded by the high opportunity cost of keeping land in agriculture.

### **3. Econometric Framework**

The economic framework used to exam the issues of land use policy and employment generation draws from economic base theory. The primary thesis of the theory posits that there exists a relationship between export-generating (sometimes referred to as basic employment) and

Table 4. Food and Fiber System Employment in Four Northeast States, 1981-1997.

<u>State</u>	<u>1997</u> <u>Employment</u> <u>1,000 workers</u>	<u>1981</u> <u>Employment</u> <u>1,000 workers</u>	<u>% change</u> <u>1981-97</u>
Connecticut	259.4	251.0	3.3
New Jersey	647.4	630.7	2.6
New York	1,351.7	1,472.0	-8.2
<u>Pennsylvania</u>	<u>1,044.3</u>	<u>1,068.2</u>	<u>-2.2</u>

Source: Rural Conditions and Trends, Vol. 10, No.2.

residential (sometimes called non-basic employment) activities, and between export-generating employment and population (Hoover and Giarratani, 1984; Maki, 1991). Thus any activity that leads or determines the growth of a local economy is viewed as basic, while the non-basic activities are spillover results or positive externalities from such growth. Exports are generally defined as any extra-regional activity that introduces “new revenues” into the local economy and helps the growth of that economy. Under that definition, a service can be viewed as an export activity once it introduces new money into the local economy. The local economy may be a municipality, county, state, nation or region. Identifying the components and contributions of the economic base of the local economy should be a continuous process because the economic contributions of a sector are likely to change over time.

The input-output technique is used for the economic analysis in this paper. The technique is useful for such purposes because it allows for the identification of structural linkages within an economy. The technique has undergone significant intellectual development (Isard, 1951) and has been used in many empirical applications (Leontief, 1953, Chenery, 1953).

IMPLAN uses input-output techniques and was developed by the Forest Service of the US Department of Agriculture (US Forest, 1992). The greatest level of disaggregation is 528 sectors but the sectors can be aggregated as desired by the user. IMPLAN is nonsurvey-based, using national technical coefficients derived from the 1982 US input-output accounts (USDC, 1991), assumes a uniform national production technology and uses the regional purchase coefficient approach to regionalize the technical coefficients (Rickman and Schwer, 1995). Technical details about IMPLAN can be found in IMPLAN Professional Version 2. IMPLAN has been used to estimate economic impacts in the forest industry (Templeton and Goldman, 1996; Tavernier, 1987), recreation and tourism (Borden, Fletcher and Harris, 1996; Goldman, McWilliams, Pradhan and Brown, 1998), environmental issues (Bernow, Fulmer, Peters, Smith

and Ruth, 1996; Huebner, 1989), horticultural industry (Tavernier, Li and Thatch, 1995), and issues pertaining to rural development (Goldman, 1997; Robison, 1997). Leones, Schulter and Goldman (1994) identify 27 state-level studies completed between 1987 and 1994 that examine the role of agriculture in their state economies, not counting studies focusing on sub-sectors within agriculture, but none investigates the role of land preserved in agriculture. Approximately half of those studies used some type of input-output framework.

For this study, the 1998 IMPLAN database for the US is used to calculate the economic impacts of agriculture on the economies of Connecticut, New Jersey, New York and Pennsylvania.<sup>2</sup> IMPLAN Professional Version 2 software is used to perform the econometric analysis. IMPLAN is a demand-driven, backward-linkage program that generates multipliers to facilitate impact analysis. Type I and Type SAM (Social Accounting Matrix) multipliers are used in this analysis. Type I multipliers measure the direct and indirect effects of a change in economic activity. They capture the inter-industry or sector effects only; that is industries buying from local industries. In addition to capturing those two effects, SAM Type multipliers also include the incomes and expenditures of households. The income flows from industries to factors (employee compensation) and from factors to households with some factor income going outside the region to commuters. The income going outside is not re-spent on goods and services in the region. However, for every one dollar change in final demand for a particular industry, increases occur in inter-industry economic activity (as in Type I), but increases also occur in the incomes of the people employed in producing the output of the particular industry. These people spend their income on personal consumption, which leads to demands from local industries.

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<sup>2</sup> The employment, output, and value-added contributions of agricultural land benefiting from land use preservation policies would also be of interest. However, no database that delineates the value of agricultural production in farmland preserved areas exists. Moreover, the high cost of preservation programs probably means that farmland preserved acreages are likely to be small, for now, and their contributions are likely to be low.

The agricultural sector influences economic activity in three ways. First, the sector has a direct effect on the economy as businesses, households, real estate developers, and others buy agricultural products. The second influence is an indirect effect as the agricultural sector responds to increases for its products by purchasing inputs (e.g. labor from households, seed and materials from business) to satisfy increases from final demand. This round of economic activity does not go on indefinitely as certain inputs are purchased outside of the local economy and are considered demand leakages. Kraybill and Dorfman (1992) suggest that 50% of such activity is generated in the first year and decline to 0% by the sixth year. The third influence is the induced consumption effect. This effect results from increased household spending as more labor is hired in response to agriculture-led economic activity. The paper assumes that the influences or multiplier effects respond proportionately to expenditures in the local economy.

## **4. Results and Discussion**

### **4.1 Connecticut**

#### **4.1.1 Output**

Type SAM multipliers are used to arrive at the economic contributions of the agricultural sector in Connecticut. The contributions are analyzed in terms of total industry output, employment, and value added. Total industry output represents the value of total agricultural production; employment includes both full-time and part-time workers in the sector; and value-added includes employee compensation, proprietary income, other type of income, and indirect business taxes.



According to Table 5, in 1998, the agricultural sector<sup>3</sup> in Connecticut generated almost \$1.2 billion in total output activity. That economic activity increased indirect demand in that sector by almost \$39 million, and induced households to spend an additional \$1.2 million.

In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. Table 5 presents the output impacts of at least \$1.5 million on nonagricultural sectors from agriculture-led activity. According to Table 5, the wholesale sector received the greatest impact from agriculture led activity. Industries in that sector are primarily engaged in selling goods to trading establishments, or to industrial, commercial, institutional, farm, construction contractors, or professional business users; and bringing buyer and seller together (USOMB, 1987). The wholesale sector had total sales of \$66.8 million. Indirect sales accounted for almost \$49 million of that amount, while induced sales accounted for approximately \$18 million. The analysis suggests that significant economic linkages also exist between the agricultural sector and the real estate and owner-occupied dwellings (OCD) sectors. The OCD sector captures the expenses of home ownership such as repair and maintenance construction, various closing costs and other expenditures related to the upkeep of the space in the same way expenses are captured for rental properties (IMPLAN Pro). Total sales in the real estate and the OCD sectors amounted to \$46 million and \$34.7 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$1.1 billion direct sales over \$500 million were generated throughout the economy of Connecticut.

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<sup>3</sup> Agricultural sector includes aggregated IMPLAN sectors 1-27.

**Table 5. Output Impacts for the Agricultural Sector in Connecticut**

	Direct	Indirect	Induced	Total
Agriculture	1,133,805,056	38,855,680	1,156,295	1,173,817,088
Maintenance and Repair, Residential	0	691,732	2,024,494	2,716,226
Maintenance and Repair Other Facilit	0	12,616,497	3,227,439	15,843,936
Paperboard Containers and Boxes	0	3,638,753	592,991	4,231,744
Commercial Printing	0	701,949	913,803	1,615,753
Drugs	0	2,324,575	4,112,509	6,437,084
Lubricating Oils and Greases	0	3,601,248	256,421	3,857,669
Railroads and Related Services	0	1,426,053	220,468	1,646,521
Motor Freight Transport and Wareho	0	10,636,294	3,180,006	13,816,300
Water Transportation	0	1,097,802	637,381	1,735,184
Communications, Except Radio and	0	3,625,560	5,777,596	9,403,156
Electric Services	0	7,229,571	7,325,548	14,555,118
Gas Production and Distribution	0	1,261,339	2,401,815	3,663,154
Sanitary Services and Steam Supply	0	1,900,637	638,681	2,539,318
Wholesale Trade	0	48,916,700	17,917,168	66,833,868
Building Materials & Gardening	0	72,517	3,203,469	3,275,986
General Merchandise Stores	0	41,107	5,604,202	5,645,309
Food Stores	0	35,306	7,138,122	7,173,427
Automotive Dealers & Service Statio	0	93,473	9,183,795	9,277,268
Apparel & Accessory Stores	0	19,000	3,439,999	3,458,999
Furniture & Home Furnishings Store	0	26,735	3,557,429	3,584,164
Eating & Drinking	0	638,750	14,376,237	15,014,987
Miscellaneous Retail	0	133,211	11,005,830	11,139,041
Banking	0	2,459,730	8,069,164	10,528,894
Credit Agencies	0	5,422,402	3,267,792	8,690,194
Security and Commodity Brokers	0	633,963	2,184,741	2,818,704
Insurance Carriers	0	1,738,544	11,750,258	13,488,802
Owner-occupied Dwellings	0	0	34,656,696	34,656,696
Real Estate	0	31,624,668	14,437,782	46,062,448
Hotels and Lodging Places	0	681,667	2,404,753	3,086,421
Miscellaneous Personal Services	0	124,239	1,806,500	1,930,739
Advertising	0	745,624	940,023	1,685,647
Other Business Services	0	2,630,512	3,250,958	5,881,470
Services To Buildings	0	670,461	972,954	1,643,414
Equipment Rental and Leasing	0	1,020,839	524,423	1,545,261
Personnel Supply Services	0	1,628,756	1,689,454	3,318,209
Computer and Data Processing Servi	0	3,513,204	3,905,636	7,418,841
Automobile Rental and Leasing	0	1,274,516	484,808	1,759,324
Automobile Repair and Services	0	920,639	3,565,518	4,486,158
Miscellaneous Repair Shops	0	3,008,977	536,229	3,545,206
Amusement and Recreation Services,	0	12	3,724,376	3,724,388
Doctors and Dentists	0	0	21,027,136	21,027,136
Hospitals	0	4,854	19,249,082	19,253,936
Other Medical and Health Services	0	2,279,451	6,200,198	8,479,649
Legal Services	0	2,304,704	4,992,543	7,297,246
Elementary and Secondary Schools	0	0	2,199,903	2,199,903
Colleges, Universities, Schools	0	59,607	5,267,818	5,327,425
Other Educational Services	0	5,638	1,614,395	1,620,033
Child Day Care Services	0	0	1,903,744	1,903,744
Social Services, N.E.C.	0	0	3,602,888	3,602,888
Residential Care	0	0	1,767,717	1,767,717
Labor and Civic Organizations	0	3,424	1,566,045	1,569,468
Accounting, Auditing and Bookkeep	0	2,120,881	1,660,439	3,781,320
Management and Consulting Service	0	1,746,596	2,017,958	3,764,554
Other State and Local Govt Enterpris	0	1,320,293	3,137,271	4,457,564
U.S. Postal Service	0	786,617	1,694,615	2,481,233
Total	1,133,805,056	227,995,004	323,013,288	1,684,813,403

### **4.1.2 Value added**

Table 6 presents the total value added contributions of at least \$1.5 million from agriculture-led activity. According to Table 6, in 1998, the agricultural sector in Connecticut generated over \$722 million in total value added activity. That economic activity increased indirect demand in the sector by almost \$24 million, and induced households to spend an additional \$711 thousand. In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. The analysis again suggests that the wholesale sector received the greatest impact from agriculture-led activity. The wholesale sector had total sales of \$45.7 million. Indirect sales accounted for almost \$33.5 million of that amount, while induced sales accounted for over \$12 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate and owner-occupied dwellings (OCD) sectors. Total sales in the real estate and the OCD sectors amounted to \$32.3 million and \$26.5 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$697.8 million direct value added impact, over \$364 million of value added economic activity were generated throughout the economy of Connecticut.

### **4.1.3 Employment**

Table 7 presents the employment contributions of at least 20 jobs from agriculture-led activity. According to Table 7, in 1998, the agricultural sector contributed over 26 thousand jobs in Connecticut. Indirect and induced job creation in that sector amounted to 878 and 26 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. The wholesale trade sector again received the greatest impact from agriculture-led activity. Employment in the wholesale trade sector

increased by almost 400 jobs. Indirect impacts accounted for 290 jobs while induced job creation accounted for 106 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and the eating and drinking sector. That sector includes retail establishments selling prepared foods and drinks for consumption on the premises; and also lunch counters and refreshments stands selling prepared foods and drinks for immediate consumption (USOMB, 1987). In that sector, 377 jobs were created. The induced impacts accounted for most of those jobs. The real estate sector continued to benefit significantly from agriculture led activity. Finally, in addition to the 25,610 jobs directly involved in agriculture, over 6,000 jobs were generated throughout the economy of Connecticut.

## **4.2. New York**

### **4.2.1 Output**

Table 8 presents output impacts of the agricultural sector in New York in 1998. In that year, the sector generated over \$6.8 billion in total output activity. The output activity included over \$361 million in indirect demand in that sector, and induced household spending of over \$5.3 million. In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. Table 8 presents the output impacts of at least \$1.5 million on nonagricultural sectors from agriculture-led activity. According to Table 8, the wholesale sector received the greatest impact from agriculture led activity. The wholesale sector had total sales of over \$607 million. Indirect sales accounted for over \$524 million of that amount, while induced sales accounted for almost \$83 million. The analysis suggests that significant economic linkages

Table 6. Total Value Added Impacts for the Agricultural Sector in Connecticut

	Direct	Indirect	Induced	Total
Agriculture	697,770,752	23,912,714	711,611	722,395,072
Maintenance and Repair Other Facilit	0	8,374,353	2,142,252	10,516,605
Drugs	0	1,202,092	2,126,674	3,328,766
Motor Freight Transport and Wareho	0	4,894,163	1,463,241	6,357,404
Communications, Except Radio and	0	2,340,053	3,729,046	6,069,099
Electric Services	0	5,929,582	6,008,301	11,937,883
Sanitary Services and Steam Supply	0	1,271,612	427,306	1,698,918
Wholesale Trade	0	33,482,618	12,263,985	45,746,604
Building Materials & Gardening	0	63,931	2,824,188	2,888,119
General Merchandise Stores	0	33,083	4,510,201	4,543,284
Food Stores	0	33,073	6,686,765	6,719,838
Automotive Dealers & Service Statio	0	80,952	7,953,533	8,034,485
Apparel & Accessory Stores	0	14,105	2,553,887	2,567,993
Furniture & Home Furnishings Store	0	22,956	3,054,604	3,077,560
Eating & Drinking	0	369,658	8,319,835	8,689,493
Miscellaneous Retail	0	112,382	9,284,929	9,397,311
Banking	0	1,834,733	6,018,855	7,853,587
Credit Agencies	0	4,735,634	2,853,913	7,589,547
Security and Commodity Brokers	0	510,342	1,758,722	2,269,064
Insurance Carriers	0	1,089,352	7,362,578	8,451,929
Owner-occupied Dwellings	0	0	26,532,134	26,532,134
Real Estate	0	22,187,228	10,129,256	32,316,484
Hotels and Lodging Places	0	455,300	1,606,186	2,061,486
Other Business Services	0	1,668,222	2,061,697	3,729,919
Personnel Supply Services	0	1,500,291	1,556,202	3,056,493
Computer and Data Processing Servi	0	2,539,639	2,823,322	5,362,961
Automobile Repair and Services	0	539,649	2,089,990	2,629,639
Miscellaneous Repair Shops	0	1,615,613	287,918	1,903,531
Amusement and Recreation Services,	0	8	2,502,533	2,502,541
Doctors and Dentists	0	0	14,642,839	14,642,839
Hospitals	0	3,332	13,213,111	13,216,443
Other Medical and Health Services	0	1,346,290	3,661,963	5,008,253
Legal Services	0	1,809,177	3,919,113	5,728,290
Colleges, Universities, Schools	0	45,630	4,032,585	4,078,215
Social Services, N.E.C.	0	0	1,874,878	1,874,878
Accounting, Auditing and Bookkeep	0	1,911,785	1,496,738	3,408,524
Management and Consulting Service	0	1,162,523	1,343,140	2,505,663
Other State and Local Govt Enterpris	0	617,900	1,468,251	2,086,151
U.S. Postal Service	0	571,967	1,232,193	1,804,161
Total	697,770,752	144,628,460	220,190,012	1,062,589,220

**Table 7. Total Employment Impacts for the Agricultural Sector in Connecticut**

	Direct	Indirect	Induced	Total
Agriculture	25,610.8	877.7	26.1	26,514.6
Maintenance and Repair, Residential	0.0	7.8	22.9	30.8
Maintenance and Repair Other Facilit	0.0	169.9	43.5	213.3
Paperboard Containers and Boxes	0.0	17.4	2.8	20.3
Local, Interurban Passenger Transit	0.0	3.0	22.5	25.5
Motor Freight Transport and Wareho	0.0	93.4	27.9	121.3
Communications, Except Radio and	0.0	11.3	18.1	29.4
Electric Services	0.0	12.4	12.5	24.9
Wholesale Trade	0.0	290.6	106.5	397.1
Building Materials & Gardening	0.0	1.2	53.2	54.4
General Merchandise Stores	0.0	0.9	128.2	129.1
Food Stores	0.0	1.0	206.6	207.6
Automotive Dealers & Service Statio	0.0	1.3	128.6	129.9
Apparel & Accessory Stores	0.0	0.4	72.6	73.0
Furniture & Home Furnishings Store	0.0	0.5	62.9	63.3
Eating & Drinking	0.0	16.1	361.8	377.8
Miscellaneous Retail	0.0	2.8	231.5	234.3
Banking	0.0	12.9	42.5	55.4
Credit Agencies	0.0	59.1	35.6	94.7
Insurance Carriers	0.0	9.0	60.6	69.5
Insurance Agents and Brokers	0.0	2.8	18.9	21.7
Real Estate	0.0	178.6	81.5	260.1
Hotels and Lodging Places	0.0	11.2	39.5	50.7
Laundry, Cleaning and Shoe Repair	0.0	6.3	44.5	50.8
Beauty and Barber Shops	0.0	0.0	50.5	50.5
Miscellaneous Personal Services	0.0	1.5	22.5	24.0
Other Business Services	0.0	20.8	25.7	46.4
Services To Buildings	0.0	20.1	29.2	49.3
Personnel Supply Services	0.0	52.1	54.0	106.2
Computer and Data Processing Servi	0.0	24.1	26.8	50.9
Detective and Protective Services	0.0	5.8	14.4	20.2
Automobile Repair and Services	0.0	9.5	36.7	46.2
Miscellaneous Repair Shops	0.0	33.9	6.0	40.0
Amusement and Recreation Services,	0.0	0.0	72.9	72.9
Membership Sports and Recreation C	0.0	0.5	26.6	27.1
Doctors and Dentists	0.0	0.0	201.6	201.6
Nursing and Protective Care	0.0	0.0	30.6	30.6
Hospitals	0.0	0.1	262.9	262.9
Other Medical and Health Services	0.0	38.9	105.8	144.7
Legal Services	0.0	24.2	52.3	76.5
Elementary and Secondary Schools	0.0	0.0	58.8	58.8
Colleges, Universities, Schools	0.0	1.3	110.6	111.8
Other Educational Services	0.0	0.1	31.9	32.0
Child Day Care Services	0.0	0.0	49.3	49.3
Social Services, N.E.C.	0.0	0.0	69.4	69.4
Residential Care	0.0	0.0	48.3	48.3
Other Nonprofit Organizations	0.0	0.3	30.7	30.9
Labor and Civic Organizations	0.0	0.1	57.1	57.2
Accounting, Auditing and Bookkeep	0.0	32.8	25.7	58.4
Management and Consulting Service	0.0	16.4	19.0	35.4
Other State and Local Govt Enterpris	0.0	6.7	16.0	22.7
U.S. Postal Service	0.0	10.3	22.2	32.5
Domestic Services	0.0	0.0	64.1	64.1
Total	25,610.8	2,280.8	3,758.9	31,650.6

**Table 8. Output Impacts for the Agricultural Sector in New York**

	Direct	Indirect	Induced	Total
Agriculture	6,470,120,960	361,573,888	5,307,305	6,837,002,240
Natural Gas & Crude Petroleum	0	1,864,638	755,511	2,620,149
Maintenance and Repair, Residential	0	7,398,637	8,863,925	16,262,562
Maintenance and Repair Other Facilit	0	109,675,312	13,946,379	123,621,688
Sausages and Other Prepared Meats	0	70,972	1,636,564	1,707,537
Cheese, Natural and Processed	0	135,861	3,697,117	3,832,979
Fluid Milk	0	131,002	4,358,417	4,489,419
Prepared Feeds, N.E.C	0	36,310,944	66,271	36,377,216
Bread, Cake, and Related Products	0	158,978	5,352,324	5,511,302
Sugar	0	1,425,108	536,813	1,961,920
Animal and Marine Fats and Oils	0	2,398,202	16,583	2,414,786
Food Preparations, N.E.C	0	54,127	2,851,555	2,905,682
Cigarettes	0	12,761	6,924,943	6,937,703
Apparel Made From Purchased Mater	0	277,702	8,559,384	8,837,086
Textile Bags	0	1,708,853	57,595	1,766,448
Canvas Products	0	4,455,967	151,160	4,607,127
Sawmills and Planing Mills, General	0	1,599,839	326,577	1,926,416
Wood Containers	0	4,105,812	14,555	4,120,366
Wood Pallets and Skids	0	1,524,229	117,530	1,641,759
Wood Products, N.E.C	0	1,736,018	665,386	2,401,404
Wood Household Furniture	0	10,006	2,201,386	2,211,392
Paperboard Containers and Boxes	0	28,042,444	2,312,787	30,355,230
Newspapers	0	3,359,678	2,709,746	6,069,424
Periodicals	0	5,253,197	3,916,529	9,169,725
Book Publishing	0	225,265	1,976,844	2,202,109
Miscellaneous Publishing	0	1,026,229	821,611	1,847,840
Commercial Printing	0	4,156,697	2,281,255	6,437,952
Inorganic Chemicals Nec.	0	1,869,823	377,178	2,247,001
Cyclic Crudes, Interm. & Indus. Org	0	4,658,548	939,715	5,598,263
Drugs	0	25,493,384	17,033,666	42,527,048
Soap and Other Detergents	0	2,387,540	3,395,579	5,783,119
Polishes and Sanitation Goods	0	1,921,681	753,029	2,674,710
Toilet Preparations	0	1,141,847	5,973,854	7,115,701
Nitrogenous and Phosphatic Fertilize	0	1,728,851	7,040	1,735,891
Fertilizers, Mixing Only	0	7,285,575	27,690	7,313,265
Agricultural Chemicals, N.E.C	0	23,241,884	83,472	23,325,356
Chemical Preparations, N.E.C	0	3,844,674	489,682	4,334,357
Petroleum Refining	0	13,914,374	3,772,177	17,686,552
Lubricating Oils and Greases	0	14,213,382	422,807	14,636,189
Glass and Glass Products, Exc Conta	0	759,794	1,011,608	1,771,402
Farm Machinery and Equipment	0	12,607,649	29,364	12,637,013
Electronic Computers	0	1,404,400	1,855,363	3,259,763
Refrigeration and Heating Equipmen	0	1,274,815	845,922	2,120,737
Semiconductors and Related Devices	0	1,861,857	635,629	2,497,486
Electronic Components, N.E.C.	0	1,135,857	793,385	1,929,242
Storage Batteries	0	1,536,783	100,538	1,637,321
Engine Electrical Equipment	0	5,291,446	295,234	5,586,680
Motor Vehicles	0	14,725	2,922,104	2,936,829
Motor Vehicle Parts and Accessories	0	5,790,958	1,589,835	7,380,793
Photographic Equipment and Supplie	0	1,202,688	1,097,609	2,300,297
Railroads and Related Services	0	27,279,600	1,774,845	29,054,446
Local, Interurban Passenger Transit	0	1,227,664	3,024,959	4,252,622
Motor Freight Transport and Wareho	0	108,008,040	13,783,418	121,791,456
Water Transportation	0	11,253,748	2,751,315	14,005,062
Air Transportation	0	11,817,386	8,312,507	20,129,892
Arrangement Of Passenger Transport	0	1,221,980	1,571,761	2,793,740
Transportation Services	0	8,631,860	1,100,479	9,732,339
Communications, Except Radio and	0	43,116,312	29,060,814	72,177,128
Radio and TV Broadcasting	0	6,469,279	3,962,011	10,431,290
Electric Services	0	65,858,408	28,930,100	94,788,512
Gas Production and Distribution	0	8,656,845	6,965,049	15,621,894
Sanitary Services and Steam Supply	0	9,237,910	1,323,614	10,561,524
Wholesale Trade	0	524,094,080	82,925,632	607,019,712
Building Materials & Gardening	0	502,526	9,104,562	9,607,088
General Merchandise Stores	0	337,775	19,092,384	19,430,158
Food Stores	0	318,865	27,838,692	28,157,558
Automotive Dealers & Service Statio	0	565,254	23,611,086	24,176,340

**Table 8. Output Impacts for the Agricultural Sector in New York (cont'd)**

	Direct	Indirect	Induced	Total
Apparel & Accessory Stores	0	185,921	14,048,260	14,234,181
Furniture & Home Furnishings Store	0	202,255	11,134,699	11,336,954
Eating & Drinking	0	6,833,463	60,779,464	67,612,928
Miscellaneous Retail	0	1,301,446	45,517,620	46,819,064
Banking	0	38,613,516	52,847,500	91,461,016
Credit Agencies	0	48,877,460	15,682,828	64,560,288
Security and Commodity Brokers	0	10,993,008	15,928,273	26,921,280
Insurance Carriers	0	17,181,752	46,889,700	64,071,452
Insurance Agents and Brokers	0	3,046,055	8,312,807	11,358,862
Owner-occupied Dwellings	0	0	140,565,536	140,565,536
Real Estate	0	319,640,896	66,870,184	386,511,072
Hotels and Lodging Places	0	8,191,304	11,302,605	19,493,908
Laundry, Cleaning and Shoe Repair	0	1,709,794	4,875,819	6,585,612
Beauty and Barber Shops	0	0	5,681,333	5,681,333
Funeral Service and Crematories	0	0	1,819,921	1,819,921
Miscellaneous Personal Services	0	1,284,321	7,033,895	8,318,215
Advertising	0	10,529,615	5,671,431	16,201,046
Other Business Services	0	25,756,516	13,060,606	38,817,120
Photofinishing, Commercial Photogr	0	4,642,845	3,877,408	8,520,252
Services To Buildings	0	6,862,865	4,099,804	10,962,668
Equipment Rental and Leasing	0	11,035,255	2,363,269	13,398,524
Personnel Supply Services	0	16,939,432	7,262,499	24,201,930
Computer and Data Processing Servi	0	34,616,620	15,595,912	50,212,532
Detective and Protective Services	0	2,329,565	2,262,891	4,592,456
Automobile Rental and Leasing	0	12,453,189	1,995,218	14,448,406
Automobile Parking and Car Wash	0	417,142	2,133,694	2,550,836
Automobile Repair and Services	0	7,155,686	11,078,712	18,234,398
Electrical Repair Service	0	3,791,344	1,744,953	5,536,297
Miscellaneous Repair Shops	0	25,329,980	1,937,556	27,267,536
Motion Pictures	0	3,463,881	6,945,979	10,409,860
Theatrical Producers, Bands Etc.	0	1,369,125	4,278,538	5,647,663
Commercial Sports Except Racing	0	1,315,061	1,985,152	3,300,213
Racing and Track Operation	0	5,304,567	1,786,180	7,090,747
Amusement and Recreation Services,	0	63	9,693,370	9,693,433
Membership Sports and Recreation C	0	184,893	3,999,064	4,183,958
Doctors and Dentists	0	0	76,928,208	76,928,208
Nursing and Protective Care	0	0	7,884,770	7,884,770
Hospitals	0	68,934	70,585,080	70,654,016
Other Medical and Health Services	0	16,824,240	19,318,176	36,142,416
Legal Services	0	26,294,410	24,232,802	50,527,212
Elementary and Secondary Schools	0	0	7,325,794	7,325,794
Colleges, Universities, Schools	0	480,372	15,206,803	15,687,175
Other Educational Services	0	42,565	6,113,889	6,156,455
Job Trainings & Related Services	0	157,968	2,286,051	2,444,019
Child Day Care Services	0	0	7,495,770	7,495,770
Social Services, N.E.C.	0	0	14,291,610	14,291,610
Residential Care	0	0	7,014,157	7,014,157
Other Nonprofit Organizations	0	96,234	4,124,371	4,220,605
Business Associations	0	3,817,244	2,710,134	6,527,378
Labor and Civic Organizations	0	9,667	5,719,984	5,729,650
Religious Organizations	0	0	10,078,586	10,078,586
Engineering, Architectural Services	0	7,857,074	2,545,244	10,402,317
Accounting, Auditing and Bookkeep	0	24,706,232	8,177,298	32,883,530
Management and Consulting Service	0	17,696,498	8,284,212	25,980,710
Research, Development & Testing Se	0	6,464,077	3,259,169	9,723,245
Local Government Passenger Transit	0	446,279	1,526,141	1,972,420
State and Local Electric Utilities	0	5,478,649	2,421,774	7,900,422
Other State and Local Govt Enterpris	0	19,421,892	19,643,152	39,065,044
U.S. Postal Service	0	6,604,370	5,723,273	12,327,642
Domestic Services	0	0	4,047,788	4,047,788
Total	6,470,120,960	2,339,157,993	1,373,309,533	10,182,588,562



also exist between the agricultural sector and the real estate and OCD sectors. Total sales in the real estate and the OCD sectors amounted to over \$386 million and \$140 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$6.5 billion direct sales over \$3.7 billion were generated throughout the economy of New York.

#### **4.2.2 Value added**

Table 9 presents the total value added contributions of at least \$1.5 million from agriculture-led activity. According to Table 9, in 1998, the agricultural sector in New York generated over \$2.4 billion in total value added activity. That economic activity increased indirect demand in the sector by over \$128 million, and induced households to spend an additional \$1.9 million. In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. The analysis again suggests that the wholesale sector received the greatest impact from agriculture-led activity. The wholesale sector had total sales over \$415 million. Indirect sales accounted for almost \$359 million of that amount, while induced sales accounted for over \$56.7 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate and owner-occupied dwellings (OCD) sectors. Total sales in the real estate and the OCD sectors amounted to \$271 million and \$106 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the almost \$2.3 billion direct value added impact, over \$1.2 billion of value added economic activity were generated throughout the economy of New York.

### **4.2.3 Employment**

Table 10 presents the employment contributions of at least 20 jobs from agriculture-led activity. According to Table 10, in 1998, the agricultural sector contributed almost 117 thousand jobs in New York. Indirect and induced job creation in that sector amounted to 6,173 and 91 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. The wholesale trade sector again received the greatest impact from agriculture-led activity. Employment in that sector increased by 4,277 jobs. Indirect impacts accounted for 3,693 jobs while induced job creation accounted for 585 jobs. The analysis also suggests that significant economic linkages exist between the agricultural sector and the maintenance and repair facilities, real estate, and eating and drinking sector. In addition to the 110,456 jobs directly involved in agriculture, over 36,000 jobs were generated throughout the economy of New York.

## **4.3 Pennsylvania**

### **4.3.1 Output**

Table 11, presents output impacts of the agricultural sector in Pennsylvania in 1998. In that year, the sector generated approximately \$7.5 billion in total output activity. The output activity included over \$773 million in indirect demand in that sector, and induced household spending of almost \$17 million.

In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. Table 11 presents the output impacts of at least \$1.5 million on nonagricultural sectors from agriculture-led activity. According to Table 11, the wholesale sector received the greatest impact from agriculture led activity. The wholesale sector had total

**Table 9. Total Value Added Impacts for the Agricultural Sector in New York**

	Direct	Indirect	Induced	Total
Agriculture	2,296,224,512	128,321,376	1,883,545	2,426,429,440
Natural Gas & Crude Petroleum	0	1,302,300	527,664	1,829,964
Maintenance and Repair, Residential	0	3,278,418	3,927,703	7,206,121
Maintenance and Repair Other Facilit	0	70,522,240	8,967,651	79,489,888
Prepared Feeds, N.E.C	0	4,673,409	8,529	4,681,938
Bread, Cake, and Related Products	0	57,921	1,950,041	2,007,962
Cigarettes	0	6,921	3,755,849	3,762,770
Apparel Made From Purchased Mater	0	105,605	3,254,965	3,360,570
Canvas Products	0	2,288,706	77,640	2,366,346
Wood Containers	0	2,007,317	7,116	2,014,433
Paperboard Containers and Boxes	0	7,812,567	644,338	8,456,904
Newspapers	0	2,053,588	1,656,320	3,709,907
Periodicals	0	2,938,262	2,190,626	5,128,887
Commercial Printing	0	1,874,288	1,028,636	2,902,924
Cyclic Crudes, Inter. & Indus. Org	0	1,345,164	271,344	1,616,508
Drugs	0	13,321,485	8,900,887	22,222,372
Soap and Other Detergents	0	1,422,126	2,022,560	3,444,686
Toilet Preparations	0	572,230	2,993,766	3,565,997
Agricultural Chemicals, N.E.C	0	8,885,019	31,910	8,916,929
Petroleum Refining	0	3,469,262	940,515	4,409,777
Lubricating Oils and Greases	0	1,883,334	56,024	1,939,358
Farm Machinery and Equipment	0	4,546,779	10,590	4,557,369
Semiconductors and Related Devices	0	1,137,204	388,236	1,525,439
Engine Electrical Equipment	0	2,330,979	130,056	2,461,036
Motor Vehicle Parts and Accessories	0	2,217,413	608,763	2,826,177
Railroads and Related Services	0	16,682,961	1,085,415	17,768,376
Local, Interurban Passenger Transit	0	759,902	1,872,396	2,632,299
Motor Freight Transport and Wareho	0	46,065,092	5,878,585	51,943,676
Water Transportation	0	4,452,221	1,088,478	5,540,699
Air Transportation	0	7,865,317	5,532,569	13,397,886
Arrangement Of Passenger Transport	0	891,429	1,146,593	2,038,023
Transportation Services	0	5,844,621	745,133	6,589,754
Communications, Except Radio and	0	27,828,654	18,756,784	46,585,440
Radio and TV Broadcasting	0	3,819,481	2,339,183	6,158,665
Electric Services	0	54,016,044	23,728,018	77,744,064
Gas Production and Distribution	0	2,997,693	2,411,858	5,409,551
Sanitary Services and Steam Supply	0	6,180,578	885,557	7,066,135
Wholesale Trade	0	358,733,216	56,761,140	415,494,368
Building Materials & Gardening	0	443,029	8,026,611	8,469,639
General Merchandise Stores	0	271,838	15,365,344	15,637,182
Food Stores	0	298,703	26,078,400	26,377,102
Automotive Dealers & Service Statio	0	489,533	20,448,144	20,937,676
Apparel & Accessory Stores	0	138,030	10,429,558	10,567,588
Furniture & Home Furnishings Store	0	173,667	9,560,865	9,734,532
Eating & Drinking	0	3,974,448	35,350,284	39,324,732
Miscellaneous Retail	0	1,097,948	38,400,360	39,498,308
Banking	0	28,802,138	39,419,384	68,221,520
Credit Agencies	0	42,686,940	13,696,537	56,383,476
Security and Commodity Brokers	0	8,908,553	12,908,011	21,816,564
Insurance Carriers	0	10,579,487	28,871,850	39,451,336
Insurance Agents and Brokers	0	2,367,742	6,461,664	8,829,406
Owner-occupied Dwellings	0	0	107,612,784	107,612,784
Real Estate	0	224,253,600	46,914,772	271,168,384
Hotels and Lodging Places	0	5,541,837	7,646,792	13,188,629
Laundry, Cleaning and Shoe Repair	0	1,285,670	3,666,345	4,952,014
Beauty and Barber Shops	0	0	3,595,485	3,595,485
Miscellaneous Personal Services	0	456,536	2,500,329	2,956,865
Advertising	0	7,146,497	3,849,226	10,995,722
Other Business Services	0	15,947,556	8,086,682	24,034,238
Photofinishing, Commercial Photogr	0	2,783,151	2,324,310	5,107,461
Services To Buildings	0	4,619,003	2,759,344	7,378,347
Equipment Rental and Leasing	0	6,905,397	1,478,834	8,384,231
Personnel Supply Services	0	15,603,370	6,689,684	22,293,054
Computer and Data Processing Servi	0	24,491,604	11,034,264	35,525,868
Detective and Protective Services	0	1,721,982	1,672,698	3,394,680
Automobile Rental and Leasing	0	8,034,540	1,287,273	9,321,812
Automobile Parking and Car Wash	0	312,696	1,599,453	1,912,150

**Table 9. Total Value Added Impacts for the Agricultural Sector in New York (cont'd)**

	Direct	Indirect	Induced	Total
Automobile Repair and Services	0	3,916,807	6,064,153	9,980,960
Electrical Repair Service	0	1,754,744	807,615	2,562,359
Miscellaneous Repair Shops	0	12,302,878	941,079	13,243,957
Motion Pictures	0	1,829,013	3,667,644	5,496,656
Theatrical Producers, Bands Etc.	0	679,236	2,122,623	2,801,859
Commercial Sports Except Racing	0	846,918	1,278,467	2,125,385
Racing and Track Operation	0	2,949,131	993,046	3,942,177
Amusement and Recreation Services,	0	42	6,480,252	6,480,294
Membership Sports and Recreation C	0	110,629	2,392,795	2,503,423
Doctors and Dentists	0	0	51,802,604	51,802,604
Nursing and Protective Care	0	0	6,012,549	6,012,549
Hospitals	0	47,186	48,315,812	48,362,996
Other Medical and Health Services	0	9,494,482	10,901,894	20,396,376
Legal Services	0	20,640,938	19,022,588	39,663,528
Elementary and Secondary Schools	0	0	4,543,124	4,543,124
Colleges, Universities, Schools	0	352,557	11,160,654	11,513,211
Other Educational Services	0	20,094	2,886,160	2,906,254
Child Day Care Services	0	0	3,829,100	3,829,100
Social Services, N.E.C.	0	0	7,193,504	7,193,504
Residential Care	0	0	5,246,952	5,246,952
Other Nonprofit Organizations	0	56,370	2,415,906	2,472,277
Business Associations	0	3,045,225	2,162,023	5,207,248
Labor and Civic Organizations	0	8,658	5,123,336	5,131,995
Engineering, Architectural Services	0	3,925,535	1,271,649	5,197,184
Accounting, Auditing and Bookkeep	0	22,270,466	7,371,106	29,641,572
Management and Consulting Service	0	11,557,304	5,410,288	16,967,592
Research, Development & Testing Se	0	4,103,484	2,068,965	6,172,448
State and Local Electric Utilities	0	2,616,898	1,156,770	3,773,668
Other State and Local Govt Enterpris	0	9,096,378	9,200,007	18,296,384
U.S. Postal Service	0	4,757,873	4,123,119	8,880,992
Domestic Services	0	0	4,047,788	4,047,788
Total	2,296,224,512	1,363,253,117	911,286,738	4,570,764,393

**Table 10. Total Employment Impacts for the Agricultural Sector in New York**

	Direct	Indirect	Induced	Total
Agriculture	110,456.0	6,172.7	90.6	116,719.3
Natural Gas & Crude Petroleum	0.0	15.4	6.2	21.6
Maintenance and Repair, Residential	0.0	90.6	108.5	199.1
Maintenance and Repair Other Facilit	0.0	1,661.6	211.3	1,872.9
Prepared Feeds, N.E.C	0.0	78.5	0.1	78.7
Bread, Cake, and Related Products	0.0	1.0	34.0	35.0
Apparel Made From Purchased Mater	0.0	2.7	81.8	84.4
Textile Bags	0.0	19.8	0.7	20.5
Canvas Products	0.0	55.9	1.9	57.8
Wood Containers	0.0	57.5	0.2	57.7
Wood Pallets and Skids	0.0	22.3	1.7	24.0
Wood Products, N.E.C	0.0	21.6	8.3	29.8
Wood Household Furniture	0.0	0.1	24.8	24.9
Paperboard Containers and Boxes	0.0	141.2	11.6	152.8
Newspapers	0.0	28.7	23.1	51.8
Periodicals	0.0	22.1	16.5	38.7
Commercial Printing	0.0	33.9	18.6	52.5
Drugs	0.0	66.8	44.6	111.4
Agricultural Chemicals, N.E.C	0.0	54.4	0.2	54.6
Lubricating Oils and Greases	0.0	24.9	0.7	25.7
Farm Machinery and Equipment	0.0	55.7	0.1	55.9
Engine Electrical Equipment	0.0	46.6	2.6	49.2
Motor Vehicle Parts and Accessories	0.0	22.5	6.2	28.7
Railroads and Related Services	0.0	147.0	9.6	156.6
Local, Interurban Passenger Transit	0.0	27.0	66.5	93.5
Motor Freight Transport and Wareho	0.0	1,033.3	131.9	1,165.1
Water Transportation	0.0	52.3	12.8	65.0
Air Transportation	0.0	103.7	73.0	176.7
Arrangement Of Passenger Transport	0.0	19.4	24.9	44.2
Transportation Services	0.0	117.3	14.9	132.2
Communications, Except Radio and	0.0	118.0	79.6	197.6
Radio and TV Broadcasting	0.0	27.7	17.0	44.7
Electric Services	0.0	119.9	52.7	172.6
Gas Production and Distribution	0.0	12.9	10.3	23.2
Sanitary Services and Steam Supply	0.0	55.3	7.9	63.2
Wholesale Trade	0.0	3,692.9	584.3	4,277.2
Building Materials & Gardening	0.0	10.0	180.5	190.5
General Merchandise Stores	0.0	8.4	474.0	482.4
Food Stores	0.0	9.4	823.0	832.4
Automotive Dealers & Service Statio	0.0	9.2	383.5	392.7
Apparel & Accessory Stores	0.0	3.6	273.4	277.0
Furniture & Home Furnishings Store	0.0	4.3	236.1	240.4
Eating & Drinking	0.0	169.8	1,510.0	1,679.8
Miscellaneous Retail	0.0	26.8	937.2	964.0
Banking	0.0	107.7	147.5	255.2
Credit Agencies	0.0	417.1	133.8	550.9
Security and Commodity Brokers	0.0	32.3	46.8	79.1
Insurance Carriers	0.0	95.4	260.4	355.8
Insurance Agents and Brokers	0.0	37.0	101.1	138.1
Real Estate	0.0	1,407.2	294.4	1,701.6
Hotels and Lodging Places	0.0	107.1	147.8	254.8
Laundry, Cleaning and Shoe Repair	0.0	73.1	208.4	281.5
Portrait and Photographic Studios	0.0	4.6	25.0	29.6
Beauty and Barber Shops	0.0	0.0	258.1	258.1
Funeral Service and Crematories	0.0	0.0	34.3	34.3
Miscellaneous Personal Services	0.0	19.3	105.8	125.1
Advertising	0.0	67.8	36.5	104.3
Other Business Services	0.0	241.8	122.6	364.3
Photofinishing, Commercial Photogr	0.0	38.4	32.1	70.5
Services To Buildings	0.0	140.2	83.8	224.0
Equipment Rental and Leasing	0.0	94.2	20.2	114.4
Personnel Supply Services	0.0	485.7	208.2	694.0
Computer and Data Processing Servi	0.0	290.1	130.7	420.8
Detective and Protective Services	0.0	75.3	73.1	148.4
Automobile Rental and Leasing	0.0	78.6	12.6	91.1
Automobile Parking and Car Wash	0.0	7.8	39.9	47.7
Automobile Repair and Services	0.0	97.1	150.3	247.3

**Table 10. Total Employment Impacts for the Agricultural Sector in New York (cont'd)**

	Direct	Indirect	Induced	Total
Electrical Repair Service	0.0	53.4	24.6	77.9
Miscellaneous Repair Shops	0.0	347.1	26.5	373.6
Motion Pictures	0.0	30.7	61.6	92.3
Theatrical Producers, Bands Etc.	0.0	12.4	38.9	51.3
Bowling Alleys and Pool Halls	0.0	0.0	34.1	34.2
Commercial Sports Except Racing	0.0	8.1	12.3	20.4
Racing and Track Operation	0.0	78.7	26.5	105.2
Amusement and Recreation Services,	0.0	0.0	316.6	316.6
Membership Sports and Recreation C	0.0	5.4	117.2	122.6
Doctors and Dentists	0.0	0.0	843.3	843.3
Nursing and Protective Care	0.0	0.0	183.5	183.5
Hospitals	0.0	1.0	973.1	974.1
Other Medical and Health Services	0.0	316.6	363.5	680.2
Legal Services	0.0	205.3	189.2	394.4
Elementary and Secondary Schools	0.0	0.0	220.9	220.9
Colleges, Universities, Schools	0.0	11.6	367.1	378.7
Other Educational Services	0.0	0.8	119.1	119.9
Job Trainings & Related Services	0.0	3.4	49.4	52.8
Child Day Care Services	0.0	0.0	174.2	174.2
Social Services, N.E.C.	0.0	0.0	285.1	285.1
Residential Care	0.0	0.0	202.1	202.1
Other Nonprofit Organizations	0.0	2.4	104.2	106.6
Business Associations	0.0	54.3	38.6	92.9
Labor and Civic Organizations	0.0	0.4	226.7	227.1
Religious Organizations	0.0	0.0	78.5	78.5
Engineering, Architectural Services	0.0	83.0	26.9	109.9
Accounting, Auditing and Bookkeep	0.0	360.4	119.3	479.7
Management and Consulting Service	0.0	176.4	82.6	258.9
Research, Development & Testing Se	0.0	118.9	59.9	178.8
Local Government Passenger Transit	0.0	5.6	19.1	24.7
Other State and Local Govt Enterpris	0.0	98.9	100.0	198.9
U.S. Postal Service	0.0	89.1	77.2	166.3
Domestic Services	0.0	0.0	273.8	273.8
Total	110,456.0	20,762.4	15,415.2	146,633.7

**Table 11. Output Impacts for the Agricultural Sector in Pennsylvania**

	Direct	Indirect	Induced	Total
Agriculture	6,697,487,872	773,662,720	16,891,010	7,488,041,472
Coal Mining	0	2,014,628	925,475	2,940,104
Natural Gas & Crude Petroleum	0	8,606,613	2,826,525	11,433,138
Dimension Stone	0	2,583,029	56,349	2,639,378
Maintenance and Repair, Residential	0	11,141,647	13,254,236	24,395,884
Maintenance and Repair Other Facilit	0	149,020,336	19,305,442	168,325,776
Maintenance and Repair Oil and Gas	0	1,250,523	410,688	1,661,211
Meat Packing Plants	0	2,707,041	9,390,374	12,097,415
Sausages and Other Prepared Meats	0	277,247	6,700,772	6,978,020
Poultry Processing	0	2,579,106	4,526,061	7,105,167
Cheese, Natural and Processed	0	147,640	3,905,896	4,053,536
Fluid Milk	0	201,451	5,727,344	5,928,795
Prepared Feeds, N.E.C	0	42,261,652	139,914	42,401,564
Bread, Cake, and Related Products	0	233,177	6,861,557	7,094,734
Cookies and Crackers	0	38,758	3,330,278	3,369,036
Confectionery Products	0	46,588	1,566,585	1,613,173
Chocolate and Cocoa Products	0	31,142	1,802,338	1,833,480
Animal and Marine Fats and Oils	0	7,114,574	64,477	7,179,051
Bottled and Canned Soft Drinks & W	0	55,954	1,518,319	1,574,272
Potato Chips & Similar Snacks	0	119,965	2,845,064	2,965,029
Food Preparations, N.E.C	0	22,957	1,925,340	1,948,297
Broadwoven Fabric Mills and Finish	0	1,333,926	767,769	2,101,696
Apparel Made From Purchased Mater	0	249,567	9,011,693	9,261,260
Housefurnishings, N.E.C	0	130,319	1,886,355	2,016,675
Textile Bags	0	2,032,304	69,589	2,101,893
Canvas Products	0	5,417,492	195,032	5,612,524
Sawmills and Planing Mills, General	0	4,719,786	859,704	5,579,490
Wood Containers	0	8,876,984	43,124	8,920,108
Wood Pallets and Skids	0	3,031,332	219,276	3,250,608
Wood Products, N.E.C	0	1,189,141	463,339	1,652,481
Wood Household Furniture	0	5,667	2,161,008	2,166,675
Paperboard Containers and Boxes	0	41,998,172	4,180,331	46,178,504
Newspapers	0	7,275,375	5,077,999	12,353,374
Periodicals	0	3,197,430	2,655,374	5,852,804
Book Publishing	0	174,052	1,599,153	1,773,205
Miscellaneous Publishing	0	1,272,106	960,254	2,232,360
Commercial Printing	0	9,631,784	5,402,032	15,033,816
Industrial Gases	0	4,681,859	777,768	5,459,627
Inorganic Pigments	0	1,647,193	273,638	1,920,831
Inorganic Chemicals Nec.	0	3,356,619	557,615	3,914,234
Cyclic Crudes, Interm. & Indus. Org	0	7,761,869	1,289,431	9,051,300
Plastics Materials and Resins	0	5,933,997	703,592	6,637,589
Drugs	0	30,765,092	22,498,834	53,263,928
Polishes and Sanitation Goods	0	2,486,440	1,702,278	4,188,718
Surface Active Agents	0	3,080,515	433,844	3,514,359
Toilet Preparations	0	205,756	4,603,522	4,809,278
Nitrogenous and Phosphatic Fertilize	0	3,778,469	20,576	3,799,045
Fertilizers, Mixing Only	0	21,600,894	114,301	21,715,196
Agricultural Chemicals, N.E.C	0	53,455,540	282,192	53,737,732
Chemical Preparations, N.E.C	0	8,414,884	1,115,521	9,530,405
Petroleum Refining	0	86,174,200	23,879,448	110,053,648
Lubricating Oils and Greases	0	30,085,910	1,004,990	31,090,900
Petroleum and Coal Products, N.E.C.	0	6,675,490	145,978	6,821,469
Glass and Glass Products, Exc Conta	0	1,056,725	1,289,547	2,346,272
Hand and Edge Tools, N.E.C.	0	1,634,915	207,058	1,841,973
Miscellaneous Fabricated Wire Produ	0	2,239,332	192,067	2,431,399
Farm Machinery and Equipment	0	17,703,954	81,247	17,785,200
Power Driven Hand Tools	0	1,363,471	271,589	1,635,061
Electronic Computers	0	869,695	1,584,196	2,453,891
Refrigeration and Heating Equipmen	0	1,709,176	1,114,189	2,823,365
Radio and TV Receiving Sets	0	53,659	2,276,543	2,330,202
Semiconductors and Related Devices	0	3,519,594	1,322,841	4,842,435
Electronic Components, N.E.C.	0	1,810,788	1,457,792	3,268,580
Storage Batteries	0	11,301,849	812,925	12,114,774
Engine Electrical Equipment	0	9,053,377	559,221	9,612,598
Motor Vehicles	0	53,674	5,113,672	5,167,346
Motor Vehicle Parts and Accessories	0	4,938,946	1,605,921	6,544,867

**Table 11. Output Impacts for the Agricultural Sector in Pennsylvania (cont'd)**

	Direct	Indirect	Induced	Total
Railroads and Related Services	0	48,117,480	3,322,712	51,440,192
Local, Interurban Passenger Transit	0	1,272,982	3,940,804	5,213,786
Motor Freight Transport and Wareho	0	175,435,008	23,686,052	199,121,056
Water Transportation	0	7,615,318	1,856,616	9,471,933
Air Transportation	0	8,856,722	6,004,122	14,860,84
Pipe Lines, Except Natural Gas	0	3,301,559	806,396	4,107,955
Arrangement Of Passenger Transport	0	1,327,895	1,626,839	2,954,735
Transportation Services	0	7,184,137	829,143	8,013,280
Communications, Except Radio and	0	41,078,424	28,993,032	70,071,456
Radio and TV Broadcasting	0	7,110,301	4,333,423	11,443,724
Electric Services	0	81,628,472	37,913,844	119,542,320
Gas Production and Distribution	0	19,392,486	14,088,126	33,480,612
Water Supply and Sewerage Systems	0	1,981,075	2,402,235	4,383,311
Sanitary Services and Steam Supply	0	22,457,460	3,541,133	25,998,592
Wholesale Trade	0	534,741,440	89,271,360	624,012,800
Building Materials & Gardening	0	959,225	14,842,719	15,801,944
General Merchandise Stores	0	630,771	30,769,112	31,399,884
Food Stores	0	467,071	36,771,204	37,238,276
Automotive Dealers & Service Statio	0	1,184,410	44,022,024	45,206,432
Apparel & Accessory Stores	0	247,100	16,205,633	16,452,733
Furniture & Home Furnishings Store	0	299,258	14,188,272	14,487,530
Eating & Drinking	0	9,380,146	78,890,872	88,271,016
Miscellaneous Retail	0	1,758,876	54,423,980	56,182,856
Banking	0	39,901,668	55,904,324	95,805,992
Credit Agencies	0	48,926,320	15,855,702	64,782,024
Security and Commodity Brokers	0	8,975,089	13,433,414	22,408,504
Insurance Carriers	0	20,185,756	53,045,932	73,231,688
Insurance Agents and Brokers	0	3,840,447	10,092,265	13,932,712
Owner-occupied Dwellings	0	0	158,134,352	158,134,352
Real Estate	0	371,212,640	86,645,616	457,858,240
Hotels and Lodging Places	0	11,117,974	14,377,809	25,495,784
Laundry, Cleaning and Shoe Repair	0	1,802,831	4,894,295	6,697,126
Portrait and Photographic Studios	0	278,533	1,699,702	1,978,235
Beauty and Barber Shops	0	0	6,983,452	6,983,452
Funeral Service and Crematories	0	0	2,527,854	2,527,854
Miscellaneous Personal Services	0	1,213,250	7,403,652	8,616,902
Advertising	0	5,150,745	2,840,826	7,991,571
Other Business Services	0	30,429,032	16,296,071	46,725,104
Photofinishing, Commercial Photogr	0	4,525,382	4,089,169	8,614,551
Services To Buildings	0	7,905,346	4,978,442	12,883,788
Equipment Rental and Leasing	0	12,723,791	2,844,937	15,568,728
Personnel Supply Services	0	18,162,368	8,171,266	26,333,634
Computer and Data Processing Servi	0	41,930,980	19,922,166	61,853,144
Detective and Protective Services	0	2,847,227	2,756,948	5,604,175
Automobile Rental and Leasing	0	34,980,528	5,813,074	40,793,600
Automobile Parking and Car Wash	0	569,281	3,087,439	3,656,720
Automobile Repair and Services	0	12,639,192	17,553,194	30,192,386
Electrical Repair Service	0	4,239,480	1,978,743	6,218,223
Miscellaneous Repair Shops	0	34,201,400	2,779,387	36,980,788
Motion Pictures	0	2,271,198	4,766,941	7,038,139
Theatrical Producers, Bands Etc.	0	1,336,652	4,178,381	5,515,033
Commercial Sports Except Racing	0	1,587,507	2,189,426	3,776,933
Racing and Track Operation	0	5,612,794	1,818,399	7,431,193
Amusement and Recreation Services,	0	75	8,516,537	8,516,612
Membership Sports and Recreation C	0	221,792	4,462,975	4,684,767
Doctors and Dentists	0	0	100,998,216	100,998,216
Nursing and Protective Care	0	0	11,818,230	11,818,230
Hospitals	0	109,815	91,470,368	91,580,184
Other Medical and Health Services	0	15,845,432	18,949,810	34,795,240
Legal Services	0	31,317,664	30,128,930	61,446,592
Elementary and Secondary Schools	0	0	7,639,149	7,639,149
Colleges, Universities, Schools	0	668,562	17,835,738	18,504,300
Other Educational Services	0	66,001	6,997,991	7,063,992
Job Trainings & Related Services	0	244,942	2,691,914	2,936,856
Child Day Care Services	0	0	8,391,767	8,391,767
Social Services, N.E.C.	0	0	16,259,058	16,259,058
Residential Care	0	0	7,976,662	7,976,662



**Table 11. Output Impacts for the Agricultural Sector in Pennsylvania (cont'd)**

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Other Nonprofit Organizations	0	109,972	4,688,967	4,798,938
Business Associations	0	5,904,815	4,333,911	10,238,726
Labor and Civic Organizations	0	40,908	7,790,774	7,831,681
Religious Organizations	0	0	11,383,763	11,383,763
Engineering, Architectural Services	0	10,395,171	3,261,168	13,656,339
Accounting, Auditing and Bookkeep	0	28,356,562	9,875,647	38,232,208
Management and Consulting Service	0	20,731,030	10,507,539	31,238,568
Research, Development & Testing Se	0	7,196,691	3,914,442	11,111,132
Local Government Passenger Transit	0	355,122	1,268,887	1,624,008
Other State and Local Govt Enterpris	0	17,990,186	17,201,764	35,191,952
U.S. Postal Service	0	9,358,806	8,526,536	17,885,342
Domestic Services	0	0	2,761,600	2,761,600
Total	6,697,487,872	3,308,845,620	1,726,584,408	11,732,917,754

sales over \$624 million. Indirect sales accounted for over \$534 million of that amount, while induced sales accounted for over \$89 million. The analysis suggests that significant economic linkages also exist between the agricultural sector and the real estate and motor freight transportation and warehousing (MFTW) sectors. The MFTW sector includes establishments furnishing local or long-distance trucking or transfer services, or those engaged in the storage of farm products, furniture and other household goods, or commercial goods of any nature (USOMB, 1987). Total sales in the real estate and the MFTW sectors amounted to about \$458 million and over \$199 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$6.7 billion direct sales over \$5 billion were generated throughout the economy of Pennsylvania.

#### **4.3.2 Value added**

Table 12 presents the total value added contributions of at least \$1.5 million from agriculture-led activity. According to Table 12, in 1998, the agricultural sector in Pennsylvania generated over \$2.4 billion in total value added activity. That economic activity increased indirect demand in the sector by over \$244 million, and induced households to spend an additional \$5.3 million. In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. The analysis again suggests that the wholesale sector received the greatest impact from agriculture-led activity. The wholesale sector had total sales of \$427 million. Indirect sales accounted for \$366 million of that amount, while induced sales accounted for over \$61 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate and OCD sectors. Total sales in the real estate and the OCD sectors amounted to \$321 million and \$121 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led

economic activity. Finally, in addition to the \$2.1 billion direct value added impact, almost \$3 billion of value added economic activity were generated throughout the economy of Pennsylvania.

#### **4.3.2 Employment**

Table 13 presents the employment contributions of at least 20 jobs from agriculture-led activity. According to Table 13, in 1998, the agricultural sector contributed 124,623 jobs in Pennsylvania. Indirect and induced job creation in that sector amounted to 14,396 and 314 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. The wholesale trade sector again received the greatest impact from agriculture-led activity. Employment in that sector increased by almost 5,233 jobs. Indirect impacts accounted for 4,884 jobs while induced job creation accounted for 749 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and the maintenance and repair facilities eating and drinking sector. In the maintenance sector, 2,595 jobs were created. Significant economic linkages also exist between the agricultural sector and the eating and drinking sector and the real estate sector. Finally, in addition to the 124,623 jobs directly involved in agriculture, almost 58 thousand jobs were generated throughout the economy of Pennsylvania.

**Table 12. Value Added Impacts for the Agricultural Sector in Pennsylvania**

	Direct	Indirect	Induced	Total
Agriculture	2,115,379,456	244,358,832	5,334,970	2,365,073,408
Natural Gas & Crude Petroleum	0	6,011,031	1,974,102	7,985,133
Dimension Stone	0	1,727,664	37,689	1,765,354
Maintenance and Repair, Residential	0	4,883,317	5,809,251	10,692,568
Maintenance and Repair Other Facilit	0	95,337,144	12,350,836	107,687,984
Meat Packing Plants	0	355,435	1,232,959	1,588,394
Poultry Processing	0	633,172	1,111,151	1,744,323
Prepared Feeds, N.E.C	0	5,005,609	16,572	5,022,181
Bread, Cake, and Related Products	0	86,288	2,539,140	2,625,428
Animal and Marine Fats and Oils	0	1,800,750	16,320	1,817,070
Apparel Made From Purchased Mater	0	74,260	2,681,492	2,755,752
Canvas Products	0	2,622,986	94,429	2,717,414
Wood Containers	0	4,473,706	21,733	4,495,439
Paperboard Containers and Boxes	0	11,587,124	1,153,336	12,740,460
Newspapers	0	3,823,390	2,668,614	6,492,004
Periodicals	0	1,428,408	1,186,252	2,614,660
Commercial Printing	0	4,037,592	2,264,503	6,302,095
Industrial Gases	0	3,111,130	516,833	3,627,962
Inorganic Chemicals Nec.	0	1,403,792	233,203	1,636,995
Cyclic Crudes, Interm. & Indus. Org	0	2,569,426	426,843	2,996,269
Plastics Materials and Resins	0	1,751,746	207,704	1,959,450
Drugs	0	17,291,124	12,645,180	29,936,304
Polishes and Sanitation Goods	0	1,420,112	972,244	2,392,356
Toilet Preparations	0	76,698	1,716,009	1,792,707
Fertilizers, Mixing Only	0	4,464,078	23,622	4,487,699
Agricultural Chemicals, N.E.C	0	26,121,624	137,896	26,259,520
Chemical Preparations, N.E.C	0	3,436,810	455,601	3,892,411
Petroleum Refining	0	15,014,142	4,160,519	19,174,662
Lubricating Oils and Greases	0	4,022,107	134,354	4,156,462
Petroleum and Coal Products, N.E.C.	0	4,317,986	94,425	4,412,411
Farm Machinery and Equipment	0	6,298,897	28,907	6,327,804
Semiconductors and Related Devices	0	2,150,444	808,245	2,958,690
Storage Batteries	0	5,172,867	372,077	5,544,944
Engine Electrical Equipment	0	4,530,900	279,871	4,810,770
Motor Vehicle Parts and Accessories	0	1,457,836	474,022	1,931,858
Railroads and Related Services	0	29,187,474	2,015,517	31,202,990
Local, Interurban Passenger Transit	0	758,840	2,349,160	3,108,000
Motor Freight Transport and Wareho	0	77,896,448	10,517,053	88,413,504
Water Transportation	0	2,978,847	726,243	3,705,091
Air Transportation	0	5,921,569	4,014,332	9,935,900
Pipe Lines, Except Natural Gas	0	3,023,616	738,509	3,762,126
Arrangement Of Passenger Transport	0	968,694	1,186,773	2,155,467
Transportation Services	0	4,809,601	555,091	5,364,692
Communications, Except Radio and	0	26,513,336	18,713,036	45,226,372
Radio and TV Broadcasting	0	3,646,285	2,222,254	5,868,539
Electric Services	0	66,950,416	31,096,350	98,046,768
Gas Production and Distribution	0	5,720,921	4,156,097	9,877,018
Water Supply and Sewerage Systems	0	1,285,362	1,558,620	2,843,982
Sanitary Services and Steam Supply	0	15,025,051	2,369,177	17,394,228
Wholesale Trade	0	366,021,056	61,104,668	427,125,728
Building Materials & Gardening	0	845,656	13,085,386	13,931,042
General Merchandise Stores	0	507,638	24,762,644	25,270,282
Food Stores	0	437,538	34,446,092	34,883,628
Automotive Dealers & Service Statio	0	1,025,746	38,124,832	39,150,580
Apparel & Accessory Stores	0	183,449	12,031,212	12,214,661
Furniture & Home Furnishings Store	0	256,960	12,182,829	12,439,789
Eating & Drinking	0	5,123,171	43,087,964	48,211,136
Miscellaneous Retail	0	1,483,853	45,914,096	47,397,948
Banking	0	29,762,982	41,699,492	71,462,472
Credit Agencies	0	42,729,612	13,847,516	56,577,128
Security and Commodity Brokers	0	7,115,586	10,650,213	17,765,800
Insurance Carriers	0	11,851,228	31,143,714	42,994,944
Insurance Agents and Brokers	0	2,985,235	7,844,863	10,830,098
Owner-occupied Dwellings	0	0	121,062,936	121,062,936
Real Estate	0	260,435,296	60,788,816	321,224,128
Hotels and Lodging Places	0	7,318,257	9,464,000	16,782,256
Laundry, Cleaning and Shoe Repair	0	1,355,628	3,680,238	5,035,866

**Table 12. Value Added Impacts for the Agricultural Sector in Pennsylvania (cont'd)**

	Direct	Indirect	Induced	Total
Beauty and Barber Shops	0	0	4,418,258	4,418,258
Funeral Service and Crematories	0	0	1,741,809	1,741,809
Miscellaneous Personal Services	0	413,388	2,522,627	2,936,015
Advertising	0	3,153,726	1,739,396	4,893,122
Other Business Services	0	17,699,788	9,479,007	27,178,796
Photofinishing, Commercial Photogr	0	2,494,332	2,253,897	4,748,228
Services To Buildings	0	5,005,471	3,152,227	8,157,697
Equipment Rental and Leasing	0	7,855,668	1,756,464	9,612,131
Personnel Supply Services	0	16,729,851	7,526,775	24,256,626
Computer and Data Processing Servi	0	29,377,098	13,957,590	43,334,688
Detective and Protective Services	0	2,100,395	2,033,796	4,134,191
Automobile Rental and Leasing	0	22,568,712	3,750,475	26,319,186
Automobile Parking and Car Wash	0	426,743	2,314,397	2,741,139
Automobile Repair and Services	0	7,076,627	9,827,955	16,904,582
Electrical Repair Service	0	1,997,514	932,324	2,929,838
Miscellaneous Repair Shops	0	16,485,031	1,339,661	17,824,692
Motion Pictures	0	655,824	1,376,486	2,032,310
Theatrical Producers, Bands Etc.	0	431,703	1,349,507	1,781,211
Commercial Sports Except Racing	0	1,079,297	1,488,524	2,567,821
Racing and Track Operation	0	3,015,695	977,007	3,992,702
Amusement and Recreation Services,	0	50	5,659,191	5,659,241
Membership Sports and Recreation C	0	115,076	2,315,595	2,430,670
Doctors and Dentists	0	0	68,035,216	68,035,216
Nursing and Protective Care	0	0	8,751,305	8,751,305
Hospitals	0	71,871	59,864,608	59,936,480
Other Medical and Health Services	0	9,319,925	11,145,850	20,465,776
Legal Services	0	24,584,158	23,651,010	48,235,168
Elementary and Secondary Schools	0	0	4,639,446	4,639,446
Colleges, Universities, Schools	0	498,393	13,295,995	13,794,388
Other Educational Services	0	30,742	3,259,597	3,290,340
Child Day Care Services	0	0	3,631,131	3,631,131
Social Services, N.E.C.	0	0	8,082,203	8,082,203
Residential Care	0	0	5,817,297	5,817,297
Other Nonprofit Organizations	0	63,129	2,691,674	2,754,803
Business Associations	0	4,488,126	3,294,114	7,782,240
Labor and Civic Organizations	0	34,392	6,549,844	6,584,236
Engineering, Architectural Services	0	5,145,393	1,614,210	6,759,603
Accounting, Auditing and Bookkeep	0	25,560,922	8,902,019	34,462,940
Management and Consulting Service	0	12,640,112	6,406,651	19,046,764
Research, Development & Testing Se	0	4,630,720	2,518,753	7,149,472
Other State and Local Govt Enterpris	0	7,446,200	7,119,869	14,566,068
U.S. Postal Service	0	6,706,617	6,110,204	12,816,820
Domestic Services	0	0	2,761,600	2,761,600
Total	2,115,379,456	1,743,564,448	1,103,799,355	4,962,743,440

**Table 13. Total Employment Impacts for the Agricultural Sector in Pennsylvania**

	Direct	Indirect	Induced	Total
Agriculture	124,623.3	14,395.9	314.3	139,333.5
Natural Gas & Crude Petroleum	0.0	81.6	26.8	108.3
Maintenance and Repair, Residential	0.0	137.8	164.0	301.8
Maintenance and Repair Other Facilit	0.0	2,297.1	297.6	2,594.7
Meat Packing Plants	0.0	8.0	27.8	35.8
Sausages and Other Prepared Meats	0.0	1.2	27.8	29.0
Poultry Processing	0.0	17.9	31.5	49.4
Prepared Feeds, N.E.C	0.0	92.5	0.3	92.8
Bread, Cake, and Related Products	0.0	1.5	43.0	44.5
Animal and Marine Fats and Oils	0.0	25.0	0.2	25.3
Apparel Made From Purchased Mater	0.0	2.7	98.7	101.5
Textile Bags	0.0	19.9	0.7	20.6
Canvas Products	0.0	73.6	2.6	76.2
Sawmills and Planing Mills, General	0.0	29.8	5.4	35.2
Wood Containers	0.0	119.3	0.6	119.9
Wood Pallets and Skids	0.0	41.2	3.0	44.2
Wood Products, N.E.C	0.0	14.8	5.8	20.5
Wood Household Furniture	0.0	0.1	24.0	24.0
Paperboard Containers and Boxes	0.0	212.3	21.1	233.4
Newspapers	0.0	83.9	58.6	142.5
Periodicals	0.0	18.7	15.5	34.1
Commercial Printing	0.0	84.0	47.1	131.2
Industrial Gases	0.0	22.1	3.7	25.8
Drugs	0.0	64.0	46.8	110.7
Fertilizers, Mixing Only	0.0	49.0	0.3	49.2
Agricultural Chemicals, N.E.C	0.0	86.9	0.5	87.3
Chemical Preparations, N.E.C	0.0	21.5	2.8	24.3
Petroleum Refining	0.0	67.1	18.6	85.7
Lubricating Oils and Greases	0.0	52.7	1.8	54.5
Petroleum and Coal Products, N.E.C.	0.0	19.6	0.4	20.0
Miscellaneous Fabricated Wire Produ	0.0	20.6	1.8	22.4
Farm Machinery and Equipment	0.0	79.0	0.4	79.4
Storage Batteries	0.0	71.6	5.1	76.7
Engine Electrical Equipment	0.0	67.0	4.1	71.1
Motor Vehicle Parts and Accessories	0.0	22.4	7.3	29.6
Railroads and Related Services	0.0	266.3	18.4	284.7
Local, Interurban Passenger Transit	0.0	31.4	97.1	128.4
Motor Freight Transport and Wareho	0.0	1,606.3	216.9	1,823.2
Water Transportation	0.0	35.7	8.7	44.4
Air Transportation	0.0	74.9	50.8	125.6
Arrangement Of Passenger Transport	0.0	21.7	26.5	48.2
Transportation Services	0.0	105.1	12.1	117.2
Communications, Except Radio and	0.0	129.9	91.7	221.6
Radio and TV Broadcasting	0.0	42.2	25.7	67.9
Electric Services	0.0	170.3	79.1	249.4
Gas Production and Distribution	0.0	32.5	23.6	56.1
Water Supply and Sewerage Systems	0.0	11.4	13.8	25.3
Sanitary Services and Steam Supply	0.0	151.0	23.8	174.8
Wholesale Trade	0.0	4,483.8	748.5	5,232.4
Building Materials & Gardening	0.0	15.2	235.8	251.0
General Merchandise Stores	0.0	17.3	844.1	861.4
Food Stores	0.0	14.3	1,126.8	1,141.1
Automotive Dealers & Service Statio	0.0	21.1	784.8	805.9
Apparel & Accessory Stores	0.0	6.2	405.4	411.6
Furniture & Home Furnishings Store	0.0	6.8	320.2	327.0
Eating & Drinking	0.0	269.9	2,269.6	2,539.5
Miscellaneous Retail	0.0	47.8	1,478.3	1,526.1
Banking	0.0	239.5	335.6	575.1
Credit Agencies	0.0	880.0	285.2	1,165.2
Security and Commodity Brokers	0.0	67.8	101.5	169.4
Insurance Carriers	0.0	133.3	350.4	483.7
Insurance Agents and Brokers	0.0	70.2	184.4	254.5
Real Estate	0.0	1,929.6	450.4	2,380.0
Hotels and Lodging Places	0.0	224.1	289.9	514.0
Laundry, Cleaning and Shoe Repair	0.0	76.4	207.3	283.7
Portrait and Photographic Studios	0.0	6.3	38.6	44.9
Beauty and Barber Shops	0.0	0.0	318.0	318.0

**Table 13. Total Employment Impacts for the Agricultural Sector in Pennsylvania (cont'd)**

	Direct	Indirect	Induced	Total
Funeral Service and Crematories	0.0	0.0	54.3	54.3
Miscellaneous Personal Services	0.0	18.9	115.1	134.0
Advertising	0.0	54.6	30.1	84.7
Other Business Services	0.0	398.9	213.6	612.5
Photofinishing, Commercial Photogr	0.0	51.7	46.7	98.3
Services To Buildings	0.0	245.0	154.3	399.4
Equipment Rental and Leasing	0.0	124.9	27.9	152.8
Personnel Supply Services	0.0	774.8	348.6	1,123.4
Computer and Data Processing Servi	0.0	380.0	180.5	560.5
Detective and Protective Services	0.0	95.2	92.2	187.3
Automobile Rental and Leasing	0.0	272.2	45.2	317.4
Automobile Parking and Car Wash	0.0	14.2	77.1	91.4
Automobile Repair and Services	0.0	158.1	219.5	377.6
Electrical Repair Service	0.0	58.2	27.2	85.4
Watch, Clock, Jewelry and Furniture	0.0	0.3	16.3	16.6
Miscellaneous Repair Shops	0.0	474.6	38.6	513.2
Motion Pictures	0.0	32.8	68.9	101.8
Theatrical Producers, Bands Etc.	0.0	18.5	57.8	76.4
Bowling Alleys and Pool Halls	0.0	0.1	38.5	38.6
Racing and Track Operation	0.0	95.7	31.0	126.7
Amusement and Recreation Services,	0.0	0.0	388.9	388.9
Membership Sports and Recreation C	0.0	8.6	172.6	181.2
Doctors and Dentists	0.0	0.0	1,105.7	1,105.7
Nursing and Protective Care	0.0	0.0	333.4	333.4
Hospitals	0.0	1.7	1,446.4	1,448.1
Other Medical and Health Services	0.0	273.0	326.5	599.5
Legal Services	0.0	310.6	298.8	609.4
Elementary and Secondary Schools	0.0	0.0	238.5	238.5
Colleges, Universities, Schools	0.0	15.4	410.0	425.4
Other Educational Services	0.0	1.3	138.2	139.5
Job Trainings & Related Services	0.0	5.3	58.5	63.8
Child Day Care Services	0.0	0.0	229.4	229.4
Social Services, N.E.C.	0.0	0.0	328.6	328.6
Residential Care	0.0	0.0	248.4	248.4
Other Nonprofit Organizations	0.0	2.9	122.2	125.1
Business Associations	0.0	100.5	73.8	174.3
Labor and Civic Organizations	0.0	2.5	471.8	474.3
Religious Organizations	0.0	0.0	89.5	89.5
Engineering, Architectural Services	0.0	111.1	34.8	145.9
Accounting, Auditing and Bookkeep	0.0	565.8	197.0	762.8
Management and Consulting Service	0.0	246.7	125.0	371.7
Research, Development & Testing Se	0.0	128.0	69.6	197.6
Local Government Passenger Transit	0.0	5.2	18.5	23.7
Other State and Local Govt Enterpris	0.0	106.2	101.6	207.8
U.S. Postal Service	0.0	128.4	116.9	245.3
Domestic Services	0.0	0.0	270.1	270.1
Total	124,623.3	35,258.5	22,522.6	182,404.4

## **4.4 New Jersey**

### **4.4.1 Output**

Table 14 presents output impacts of the agricultural sector in New Jersey in 1998. In that year, the sector generated approximately \$2.2 billion in total output activity. The output activity included over \$65 million in indirect demand in that sector, and induced household spending of almost \$1.8 million.

In addition to its sector-specific contributions, the agricultural sector also impacts other sectors in the economy. Table 14 presents the output impacts of at least \$1.5 million on nonagricultural sectors from agriculture-led activity. According to Table 14, the wholesale sector received the greatest impact from agriculture led activity. The wholesale sector had total sales over \$144 million. Indirect sales accounted for over \$110 million of that amount, while induced sales accounted for over \$34 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate and OCD sectors. Total sales in the real estate and the OCD sectors were over \$90 million and \$59 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$2.1 billion direct output impact, over \$1 billion of output activity were generated throughout the economy of New Jersey.

### **4.4.2 Value added**

Table 15 presents the total value added contributions of at least \$1.5 million from agriculture-led activity. According to Table 15, in 1998, the agricultural sector in New Jersey generated over \$1.2 billion in total value added activity. That economic activity increased indirect demand in the sector by \$36.8 million, and induced households to spend an additional \$1 million. In addition to its sector-specific contributions, the agricultural sector also impacts other



sectors in the economy. The analysis suggests that the wholesale sector received the greatest impact from agriculture-led activity. The wholesale sector had total sales of \$98.8 million. Indirect sales accounted for \$75.3 million of that amount, while induced sales accounted for over \$23.5 million. The analysis also suggests that significant economic linkages exist between the agricultural sector and the real estate and OCD sectors. Total sales in the real estate and the OCD sectors amounted to \$63.1 million and \$45.7 million, respectively. The analysis also indicates that the service sectors are the primary beneficiaries of agriculture-led economic activity. Finally, in addition to the \$1.2 billion direct value added impact, almost \$400 million of value added economic activity were generated throughout the economy of New Jersey.

#### **4.4.3 Employment**

Table 16 presents the employment contributions of at least 20 jobs from agriculture-led activity. According to Table 16, in 1998, the agricultural sector contributed 47,327 jobs to the economy of New Jersey. Indirect and induced job creation in that sector amounted to 1,426 and 40 jobs, respectively. In addition to its sector-specific employment contributions, the agricultural sector also created jobs in other sectors of the economy. The wholesale trade sector received the greatest impact from agriculture-led activity. The sector created 968 jobs. Indirect impacts accounted for 738 jobs while induced job creation accounted for 230 jobs. The analysis also suggests that significant economic linkages also exist between the agricultural sector and eating and drinking and the real estate sectors. In the eating and drinking sector and the real estate sectors, 650 jobs and 554 jobs were created, respectively. Finally, in addition to the

Table 14. Output Impacts for the Agricultural Sector in New Jersey

	Direct	Indirect	Induced	Total
Agriculture	2,095,356,032	65,157,248	1,826,185	2,162,339,584
Maintenance and Repair, Residential	0	1,402,138	3,417,621	4,819,758
Maintenance and Repair Other Facilit	0	26,669,080	5,941,451	32,610,530
Fluid Milk	0	21,941	1,616,193	1,638,134
Prepared Feeds, N.E.C	0	4,531,181	14,701	4,545,882
Bread, Cake, and Related Products	0	26,541	1,745,858	1,772,399
Apparel Made From Purchased Mater	0	33,171	2,866,346	2,899,517
Paperboard Containers and Boxes	0	7,181,772	1,135,324	8,317,096
Newspapers	0	1,503,182	1,853,191	3,356,373
Commercial Printing	0	1,796,521	1,784,913	3,581,433
Cyclic Crudes, Intern. & Indus. Org	0	2,922,110	1,019,880	3,941,990
Drugs	0	5,406,521	7,281,997	12,688,517
Soap and Other Detergents	0	435,529	1,243,028	1,678,558
Toilet Preparations	0	143,203	2,191,382	2,334,585
Agricultural Chemicals, N.E.C	0	8,575,676	60,071	8,635,747
Chemical Preparations, N.E.C	0	1,211,146	311,921	1,523,068
Petroleum Refining	0	15,223,685	7,943,357	23,167,042
Lubricating Oils and Greases	0	6,147,553	349,607	6,497,159
Storage Batteries	0	1,753,061	225,922	1,978,983
Motor Vehicles	0	73,161	4,494,596	4,567,757
Railroads and Related Services	0	2,864,890	371,892	3,236,782
Local, Interurban Passenger Transit	0	326,459	2,058,382	2,384,841
Motor Freight Transport and Wareho	0	34,392,116	8,751,557	43,143,672
Water Transportation	0	2,788,530	1,343,325	4,131,855
Air Transportation	0	1,827,022	2,647,518	4,474,540
Transportation Services	0	2,108,311	539,869	2,648,180
Communications, Except Radio and	0	9,587,879	12,333,658	21,921,536
Electric Services	0	12,865,725	10,824,206	23,689,932
Gas Production and Distribution	0	2,207,503	3,031,862	5,239,364
Water Supply and Sewerage Systems	0	496,538	1,151,554	1,648,092
Sanitary Services and Steam Supply	0	3,352,026	941,608	4,293,634
Wholesale Trade	0	110,026,544	34,331,284	144,357,824
Building Materials & Gardening	0	125,731	4,313,202	4,438,932
General Merchandise Stores	0	84,796	8,986,612	9,071,408
Food Stores	0	79,317	12,520,677	12,599,994
Automotive Dealers & Service Statio	0	191,316	14,648,564	14,839,880
Apparel & Accessory Stores	0	42,676	6,010,911	6,053,588
Furniture & Home Furnishings Store	0	60,009	6,206,319	6,266,328
Eating & Drinking	0	1,387,562	24,143,910	25,531,472
Miscellaneous Retail	0	298,783	19,231,238	19,530,020
Banking	0	5,462,327	14,495,181	19,957,508
Credit Agencies	0	8,568,613	4,870,377	13,438,990
Security and Commodity Brokers	0	1,370,087	3,890,809	5,260,896
Insurance Carriers	0	3,718,332	20,597,036	24,315,368
Insurance Agents and Brokers	0	663,159	3,673,448	4,336,607
Owner-occupied Dwellings	0	0	59,682,176	59,682,176
Real Estate	0	65,064,804	24,996,614	90,061,416
Hotels and Lodging Places	0	2,062,418	5,259,819	7,322,237
Laundry, Cleaning and Shoe Repair	0	368,888	2,047,531	2,416,419
Beauty and Barber Shops	0	0	2,530,783	2,530,783
Miscellaneous Personal Services	0	214,873	2,448,971	2,663,844
Advertising	0	1,338,640	1,317,550	2,656,190
Other Business Services	0	5,990,226	5,831,782	11,822,008
Photofinishing, Commercial Photogr	0	948,655	1,553,967	2,502,623
Services To Buildings	0	1,420,429	1,700,784	3,121,213
Equipment Rental and Leasing	0	2,383,454	1,025,548	3,409,002
Personnel Supply Services	0	3,714,208	3,038,464	6,752,672
Computer and Data Processing Servi	0	7,915,096	6,827,835	14,742,930
Automobile Rental and Leasing	0	5,268,813	1,675,840	6,944,653
Automobile Repair and Services	0	2,125,526	6,065,495	8,191,021
Electrical Repair Service	0	844,689	778,042	1,622,730
Miscellaneous Repair Shops	0	6,386,603	978,948	7,365,551
Motion Pictures	0	387,229	1,945,773	2,333,002
Theatrical Producers, Bands Etc.	0	210,384	1,525,451	1,735,835
Amusement and Recreation Services,	0	6	4,104,248	4,104,254
Membership Sports and Recreation C	0	40,895	1,750,044	1,790,939
Doctors and Dentists	0	0	36,208,748	36,208,748

**Table 14. Output Impacts for the Agricultural Sector in New Jersey (cont'd)**

	Direct	Indirect	Induced	Total
Nursing and Protective Care	0	0	2,565,316	2,565,316
Hospitals	0	5,334	32,948,010	32,953,344
Other Medical and Health Services	0	4,561,269	10,414,653	14,975,922
Legal Services	0	5,657,379	9,986,917	15,644,296
Elementary and Secondary Schools	0	0	3,656,832	3,656,832
Colleges, Universities, Schools	0	56,385	3,866,862	3,923,247
Other Educational Services	0	8,140	2,770,235	2,778,375
Child Day Care Services	0	0	3,305,475	3,305,475
Social Services, N.E.C.	0	0	4,361,190	4,361,190
Residential Care	0	0	2,221,610	2,221,610
Business Associations	0	839,295	1,161,775	2,001,070
Labor and Civic Organizations	0	4,539	2,260,494	2,265,034
Religious Organizations	0	0	2,584,430	2,584,430
Engineering, Architectural Services	0	1,800,012	1,049,069	2,849,081
Accounting, Auditing and Bookkeep	0	5,153,137	3,216,810	8,369,947
Management and Consulting Service	0	3,934,949	3,584,551	7,519,500
Research, Development & Testing Se	0	1,429,746	1,381,362	2,811,108
Other State and Local Govt Enterpris	0	3,747,300	7,062,708	10,810,008
U.S. Postal Service	0	1,737,252	2,975,988	4,713,241
Total	2,095,356,032	512,686,958	578,711,695	3,186,754,799

**Table 15. Value Added Impacts for the Agricultural Sector in New Jersey**

	Direct	Indirect	Induced	Total
Agriculture	1,184,643,840	36,837,716	1,032,464	1,222,514,048
Maintenance and Repair, Residential	0	673,077	1,640,583	2,313,660
Maintenance and Repair Other Facilit	0	17,756,908	3,955,959	21,712,868
Paperboard Containers and Boxes	0	2,155,307	340,720	2,496,026
Newspapers	0	883,300	1,088,972	1,972,272
Commercial Printing	0	831,533	826,160	1,657,693
Drugs	0	2,919,894	3,932,781	6,852,675
Agricultural Chemicals, N.E.C	0	3,936,964	27,577	3,964,541
Petroleum Refining	0	3,069,902	1,601,802	4,671,704
Railroads and Related Services	0	1,806,736	234,533	2,041,269
Motor Freight Transport and Wareho	0	16,292,264	4,145,796	20,438,060
Water Transportation	0	1,166,227	561,809	1,728,036
Air Transportation	0	1,199,339	1,737,949	2,937,288
Transportation Services	0	1,444,157	369,801	1,813,958
Communications, Except Radio and	0	6,188,325	7,960,539	14,148,864
Electric Services	0	10,552,269	8,877,847	19,430,116
Gas Production and Distribution	0	817,831	1,123,238	1,941,069
Sanitary Services and Steam Supply	0	2,242,656	629,978	2,872,635
Wholesale Trade	0	75,311,224	23,499,158	98,810,384
Building Materials & Gardening	0	110,845	3,802,532	3,913,376
General Merchandise Stores	0	68,243	7,232,328	7,300,571
Food Stores	0	74,302	11,728,970	11,803,272
Automotive Dealers & Service Statio	0	165,687	12,686,242	12,851,929
Apparel & Accessory Stores	0	31,683	4,462,556	4,494,240
Furniture & Home Furnishings Store	0	51,527	5,329,087	5,380,614
Eating & Drinking	0	799,279	13,907,637	14,706,916
Miscellaneous Retail	0	252,064	16,224,188	16,476,252
Banking	0	4,074,394	10,812,074	14,886,468
Credit Agencies	0	7,483,364	4,253,524	11,736,888
Security and Commodity Brokers	0	1,090,909	3,097,990	4,188,899
Insurance Carriers	0	2,298,563	12,732,475	15,031,038
Insurance Agents and Brokers	0	515,483	2,855,424	3,370,907
Owner-occupied Dwellings	0	0	45,690,896	45,690,896
Real Estate	0	45,648,156	17,537,122	63,185,280
Hotels and Lodging Places	0	1,406,799	3,587,782	4,994,581
Laundry, Cleaning and Shoe Repair	0	277,383	1,539,629	1,817,013
Beauty and Barber Shops	0	0	1,612,462	1,612,462
Advertising	0	864,011	850,398	1,714,409
Other Business Services	0	3,647,320	3,550,846	7,198,166
Services To Buildings	0	916,660	1,097,584	2,014,244
Equipment Rental and Leasing	0	1,518,309	653,295	2,171,604
Personnel Supply Services	0	3,421,258	2,798,812	6,220,070
Computer and Data Processing Servi	0	5,712,885	4,928,131	10,641,016
Automobile Rental and Leasing	0	3,399,329	1,081,217	4,480,546
Automobile Repair and Services	0	1,236,002	3,527,110	4,763,113
Miscellaneous Repair Shops	0	3,411,456	522,913	3,934,369
Amusement and Recreation Services,	0	4	2,741,626	2,741,629
Doctors and Dentists	0	0	24,820,264	24,820,264
Nursing and Protective Care	0	0	1,932,531	1,932,531
Hospitals	0	3,604	22,261,428	22,265,032
Other Medical and Health Services	0	2,789,621	6,369,486	9,159,107
Legal Services	0	4,441,005	7,839,663	12,280,668
Elementary and Secondary Schools	0	0	2,272,789	2,272,789
Colleges, Universities, Schools	0	40,459	2,774,663	2,815,122
Child Day Care Services	0	0	1,554,727	1,554,727
Social Services, N.E.C.	0	0	2,174,932	2,174,932
Residential Care	0	0	1,624,122	1,624,122
Business Associations	0	630,278	872,448	1,502,727
Labor and Civic Organizations	0	3,980	1,981,903	1,985,883
Engineering, Architectural Services	0	973,223	567,207	1,540,430
Accounting, Auditing and Bookkeep	0	4,645,095	2,899,668	7,544,763
Management and Consulting Service	0	2,557,763	2,330,000	4,887,763
Research, Development & Testing Se	0	1,066,429	1,030,339	2,096,768
Other State and Local Govt Enterpris	0	1,753,803	3,305,473	5,059,276
U.S. Postal Service	0	1,259,660	2,157,852	3,417,512
Total	1,184,643,840	310,462,002	382,886,863	1,877,992,741

**Table 16. Total Employment Impacts for the Agricultural Sector in New Jersey**

	Direct	Indirect	Induced	Total
Agriculture	45,860.8	1,426.1	40.0	47,326.9
Maintenance and Repair, Residential	0.0	15.8	38.4	54.1
Maintenance and Repair Other Facilit	0.0	354.6	79.0	433.6
Apparel Made From Purchased Mater	0.0	0.3	29.5	29.9
Paperboard Containers and Boxes	0.0	35.0	5.5	40.5
Newspapers	0.0	14.1	17.3	31.4
Commercial Printing	0.0	14.3	14.2	28.5
Drugs	0.0	12.9	17.3	30.2
Local, Interurban Passenger Transit	0.0	7.2	45.5	52.7
Motor Freight Transport and Wareho	0.0	291.0	74.0	365.0
Air Transportation	0.0	17.8	25.8	43.7
Transportation Services	0.0	26.4	6.8	33.1
Communications, Except Radio and	0.0	20.7	26.6	47.3
Electric Services	0.0	18.0	15.1	33.1
Wholesale Trade	0.0	737.8	230.2	968.1
Building Materials & Gardening	0.0	2.2	76.1	78.3
General Merchandise Stores	0.0	2.2	231.2	233.4
Food Stores	0.0	2.0	309.0	311.0
Automotive Dealers & Service Statio	0.0	2.7	203.8	206.4
Apparel & Accessory Stores	0.0	0.9	120.1	120.9
Furniture & Home Furnishings Store	0.0	1.1	113.7	114.8
Eating & Drinking	0.0	35.3	614.8	650.1
Miscellaneous Retail	0.0	6.2	397.4	403.6
Banking	0.0	29.7	78.7	108.4
Credit Agencies	0.0	158.9	90.3	249.2
Security and Commodity Brokers	0.0	9.1	25.9	35.0
Insurance Carriers	0.0	20.3	112.5	132.8
Insurance Agents and Brokers	0.0	10.1	56.2	66.4
Real Estate	0.0	399.9	153.6	553.5
Hotels and Lodging Places	0.0	22.5	57.4	80.0
Laundry, Cleaning and Shoe Repair	0.0	13.3	74.1	87.4
Beauty and Barber Shops	0.0	0.0	108.8	108.8
Miscellaneous Personal Services	0.0	3.0	34.1	37.1
Advertising	0.0	11.4	11.2	22.6
Other Business Services	0.0	62.3	60.7	123.0
Photofinishing, Commercial Photogr	0.0	8.8	14.4	23.2
Services To Buildings	0.0	39.5	47.2	86.7
Equipment Rental and Leasing	0.0	16.2	7.0	23.2
Personnel Supply Services	0.0	126.2	103.2	229.5
Computer and Data Processing Servi	0.0	55.2	47.6	102.8
Detective and Protective Services	0.0	15.2	28.6	43.8
Automobile Rental and Leasing	0.0	33.7	10.7	44.5
Automobile Parking and Car Wash	0.0	1.9	19.5	21.3
Automobile Repair and Services	0.0	22.7	64.8	87.5
Miscellaneous Repair Shops	0.0	72.9	11.2	84.0
Motion Pictures	0.0	4.8	23.9	28.7
Theatrical Producers, Bands Etc.	0.0	2.5	17.8	20.3
Amusement and Recreation Services,	0.0	0.0	141.0	141.0
Membership Sports and Recreation C	0.0	1.2	52.4	53.7
Doctors and Dentists	0.0	0.0	370.7	370.7
Nursing and Protective Care	0.0	0.0	65.0	65.0
Hospitals	0.0	0.1	473.9	474.0
Other Medical and Health Services	0.0	71.5	163.2	234.6
Legal Services	0.0	59.0	104.1	163.1
Elementary and Secondary Schools	0.0	0.0	109.8	109.8
Colleges, Universities, Schools	0.0	1.5	99.7	101.1
Other Educational Services	0.0	0.2	52.9	53.0
Job Trainings & Related Services	0.0	0.3	10.2	10.5
Child Day Care Services	0.0	0.0	83.8	83.8
Social Services, N.E.C.	0.0	0.0	87.8	87.8
Residential Care	0.0	0.0	68.7	68.7
Other Nonprofit Organizations	0.0	0.5	45.9	46.4
Business Associations	0.0	14.9	20.6	35.4
Labor and Civic Organizations	0.0	0.2	105.9	106.1
Religious Organizations	0.0	0.0	20.2	20.2
Engineering, Architectural Services	0.0	17.1	10.0	27.1
Accounting, Auditing and Bookkeep	0.0	78.4	49.0	127.4

Table 16. Total Employment Impacts for the Agricultural Sector in New Jersey(cont'd)

	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
Management and Consulting Service	0.0	39.8	36.2	76.0
Research, Development & Testing Se	0.0	15.1	14.6	29.7
Other State and Local Govt Enterpris	0.0	19.1	36.0	55.1
U.S. Postal Service	0.0	23.0	39.3	62.3
Domestic Services	0.0	0.0	95.5	95.5
Total	45,860.8	4,773.9	6,604.7	57,239.4

45,861 jobs directly involved in agriculture, over 11 thousand jobs were generated throughout the economy of New Jersey.

## **5. Summary and Implications**

Input-output models, such as IMPLAN, are used extensively to conduct economic impact analysis. These models provide useful insights into the economic contributions of specific sectors because they allow for various levels of aggregation or disaggregation as needed. The current study uses the 1998 IMPLAN database and IMPLAN version 2, to aggregate IMPLAN sectors 1 to 27 into the agricultural sector to specifically examine the economic contributions of that sector in terms of output, value added and employment for four northeast states.

The results indicate that the greatest economic linkages between the agricultural sector and the rest of the economy exist in Pennsylvania. In that state the direct output of \$6.7 billion contributed over \$11.7 billion in output throughout the economy, a 75% increase in output. This output contribution compares to 57% (\$6.5b to \$10.2b), 55% (\$1.1b to \$1.7b), and 52% (\$2.1b to \$3.2b) for New York, Connecticut and New Jersey, respectively. The value added contribution for Pennsylvania increased by 138% (\$2.1b to \$5.0b) compared to 100% (\$2.3b to \$4.6b), 58% (\$1.2b to \$1.9b), and 57% (\$0.7b to \$1.1b) for New York, New Jersey and Connecticut, respectively. The employment contribution in Pennsylvania increased by 46% (124,623 jobs to 182,404 jobs) compared to 33% (110,456 jobs to 146,633 jobs), 25% (45,860 jobs to 57,239 jobs), and 24% (25,610 jobs to 31,650 jobs) for New York, New Jersey and Connecticut, respectively.

The implications for the growth of the sector and its economic contributions are clear. The analysis shows that the agricultural sector has significant linkages to the rest of the

economy. Understanding those linkages is critical to gaining important insights into the adjustment process that the agricultural sector might undergo as macroeconomic policies are instituted or as the economic base of rural communities become less depend on agriculture. For example, significant economic linkages exist between the agricultural sector and the services sector. Thus a diminished role for agriculture could significantly affect the services sector and agriculture's contribution in terms of output, value added and employment to a state's economy.



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