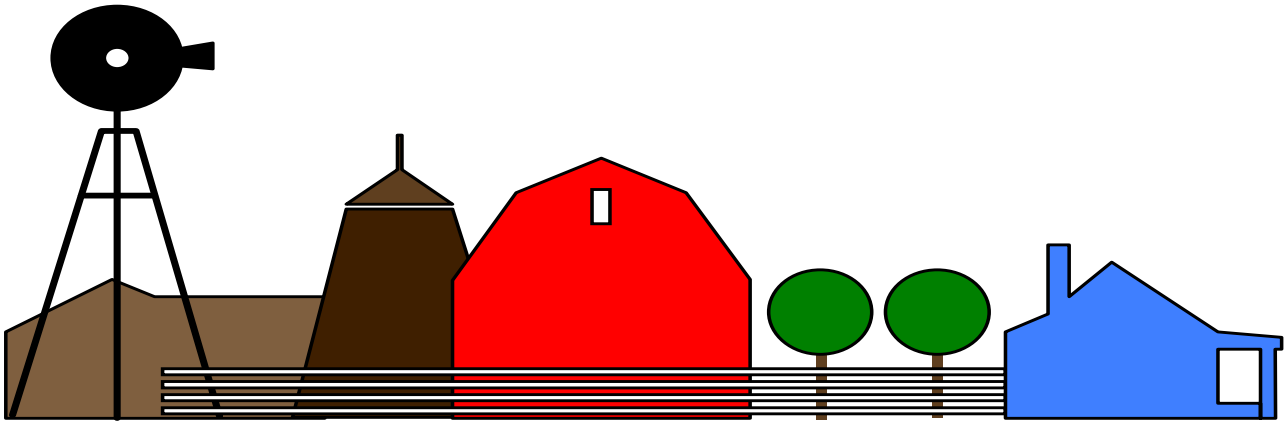
The Economic Impact of the Agriculture Sector In Clarke County, Virginia 2005



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Department of Agricultural and Applied Econmics
Research Reports
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Clarke County Advisory Committee

The following people were responsible for providing invaluable local insights during the preparation of the original report that was provided in 1996.

Brian Conrad - Board Member, Clarke County Farm Bureau

Gary Konkel - Clarke County Supervisor and Chairman, Clarke County Economic Development Committee

Wingate Mackay-Smith - Past President and Current Board Member, Clarke County Farm Bureau and Current Member, Clarke County Economic Development Committee

Justin Mackay-Smith - Past President and Current Board Member, Clarke County Farm Bureau

Beverly McKay - President, Clarke County Farm Bureau and Member, Clarke County Planning Commission

Philip Shenk - Clarke County Supervisor and Vice President, Clarke County Farm Bureau

Executive Summary

This study was commissioned to provide an update to a nearly-decade old study conducted by Dr. R. David Lamie for the Clarke County Farm Bureau. This study not only updates the figures but is greatly improved by the addition of an historical overview of the structure of the agricultural industry, provided by Matt Benson.

The study begins with an historical overview of the agricultural industry for the county that indicates the growing importance of smaller-scale (up to 49 acre) farms and a robust equine industry. Given Clarke County's proximity to Northern Virginia, this pattern is likely to continue.

Though agriculture is not the dominant industry in the county accounting for only approximately 5 percent of the total dollar value of output and 6 percent of value-added for the county, it represents approximately 31 percent in terms of employment.

When considering the ripple (multiplier) effects on the county economy, agriculture's importance as an economic sector in the local economy becomes evident. When considering this more complete picture, agriculture leads the local economy in terms of total output and is in the top three industries in terms of employment and value-added.

What this study does not capture is the important role a vibrant agricultural sector plays in preserving the pastoral setting that helps to attract investment and people to the county. Though this is beyond the scope of the study, it would be prudent for those setting policy that effects the agricultural sector in Clarke County to keep this in mind.

Introduction

Clarke County agriculture has deep roots extending back to the first settlers, and agriculture still plays a very important part in defining the cultural and economic fabric of Clarke County. Clarke County agriculture is more than the farms that produce crops and livestock. The effects of agriculture are felt not only in the farming community, but also in those industries that supply inputs to farms as well as those who add value to the raw farm products through further processing and marketing. Like many other counties in Virginia, Clarke County boasts a sizable horse industry that attracts investment from more urban areas and contributes to the economy through local expenditures. In addition, those who earn income from any and all of these agriculturally-related enterprises add to the economy of the county by making local purchases and paying local taxes.

Like many traditional industries, agriculture is constantly changing in response to a host of factors including changes in the market conditions for agricultural products and competing demands for key production inputs like land, labor, and energy. Therefore, periodic reassessments of the economic impact of the agricultural industry are necessary to provide reasonably accurate estimates for local decision-making. It was the purpose of this study to provide an update to the original (1996) estimate of the economic impact of the agricultural industry in Clarke County. Specifically, this study was made in an effort to better understand:

1. the scope and scale of the current agricultural industry in Clarke County
2. the linkages between the agricultural sector and other sectors in the Clarke County economy, and
3. the economic impact of the agricultural sector in comparison to other sectors of Clarke County.

The remainder of this report is dedicated to providing an overview of the trends in agricultural production in Clarke County followed by an estimate of the economic impact of the agricultural sector.

A Contemporary Historical Overview of Agriculture in Clarke County

Before estimating the economic impact agriculture has to Clarke County's economy, it is helpful to examine agriculture in its recent historical context. The following section provides an overview of how agriculture is evolving since 1987 in Clarke County. From 1987 to 2002, there was a 49.8% increase in the number of farms in Clarke County. There was also an increase of 41.4% of farms with cropland, and a 34.1% increase in farms that take harvest from these croplands. A relatively large increase (42.9%) occurred in farms with land in orchards, from 14 farms to 20 farms. (See Chart 1)

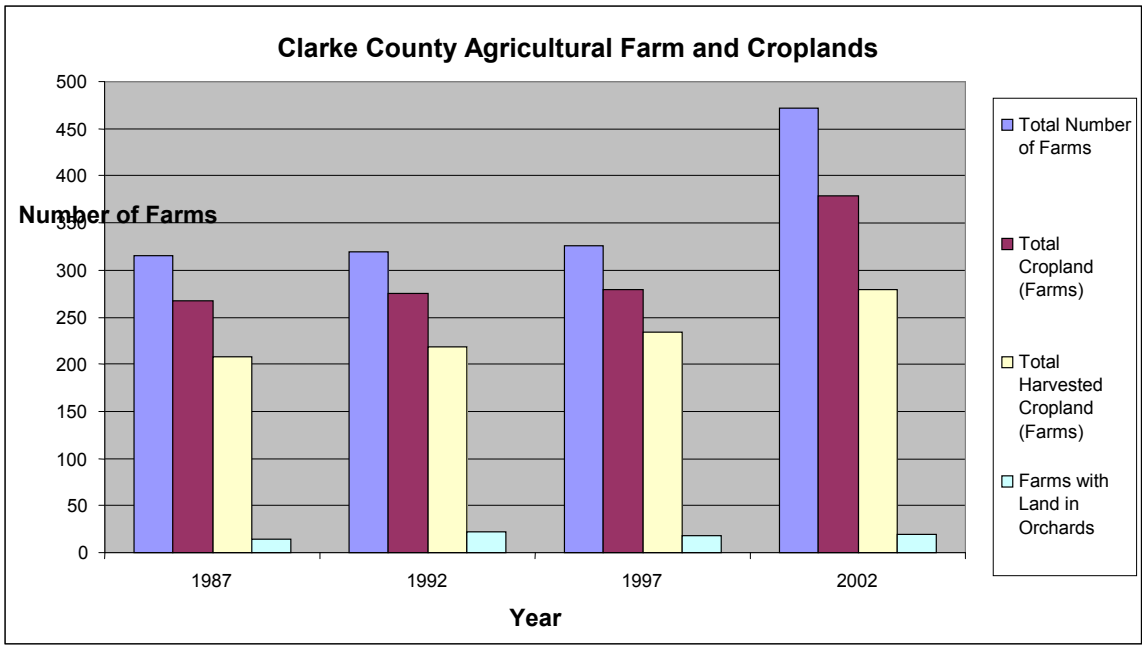


Chart 1.Clarke County Agricultural Farm and Croplands.

Comparing sales by categories between 1987 and 2002 for farms in Clarke County, farms with less than $2,500 saw the greatest increase in start-ups, a 172% increase. Some of this large increase may be attributable to the recent phenomena of hobby farming and additional outlets for direct marketing (*e.g.* farmers' markets). Farms with sales between $2,500 and $4,999 saw a 36.6% increase, while farms with sales between $5,000 and $9,999 saw a 7.7% decrease. Farms with sales between $10,000 and $24,999 saw a 17.2% increase, while farms with sales between $25,000 and $49,999 saw a 15.4% decrease. Lastly, farms with sales between $50,000 and $100,000 saw a 23.1% increase, while farms with sales greater than $100,000 saw a 9.1% decrease. Overall, recent years have seen a decline in the number of larger farms and large increases in the number of smaller farms that are unlikely to support a family. However, Clarke County's proximity to non-agricultural employment opportunities allows for many to participate in farming as a part-time occupation. (See Chart 2)

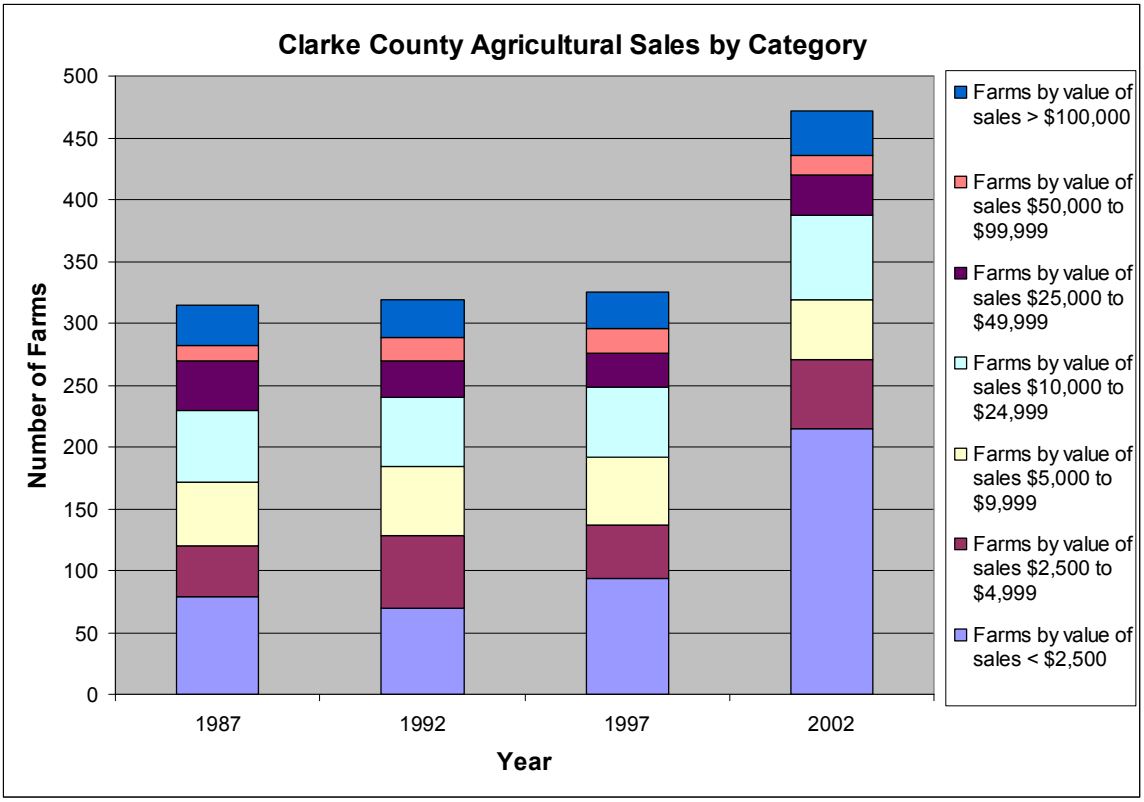


Chart 2. Clarke County Agricultural Sales by Category.

According to the 2001 Virginia Equine Survey Report, Clarke County had approximately 4,400 horses, for a total value of $70.3 million. The average value per animal in 2001 was approximately $15,975. In 2006, the Virginia Equine Report lists Clarke County as having 6,000 equine for a total value of $73.4 million and an average value of $12,228 per animal. This translates to an increase of 36.4% from 2001 to 2006 (in number of equine). From 2001 to 2006, total value increased 4.4% while average value decreased 30.6%. Comparing 2006 results for Clarke County to adjacent counties, Loudoun County reported15,500 equine for a total value of $294.7 million, while Fauquier County reported14,800 equine for a total value of $226.1 million. Additionally, Warren County is listed as having 1,700 equine for a total value of $11.6 million. In Virginia (2007), Clarke County is tied with Washington County and Augusta County ranking fifth out of 67 individual reporting counties in the number of equine.

Examining farms by size (acres) between 1987 and 2002, Clarke County experienced a large growth (107%) in the number of small farms with 1 to 9 acres. Clarke County saw an even larger growth in the number of farms with 10 to 49 acres (114%). The number of farms with 50 to 179 acres grew 59.4% between 1987 and 2002. These large increases in small farming activities are the result of more individuals getting into small acreage agriculture and the growing trend in Northern Virginia of hobby farming. The number of farms with 180 to 999 acres decreased by 16 farms or 15.1%. However, farms with more than 1,000 acres increased between 1987 and 2002 (27.3%). (See Chart 3) With

Clarke County having a strong commitment to land protection and agriculture preservation, development pressure from the growth in Northern Virginia (Washington DC) has been largely kept at bay.

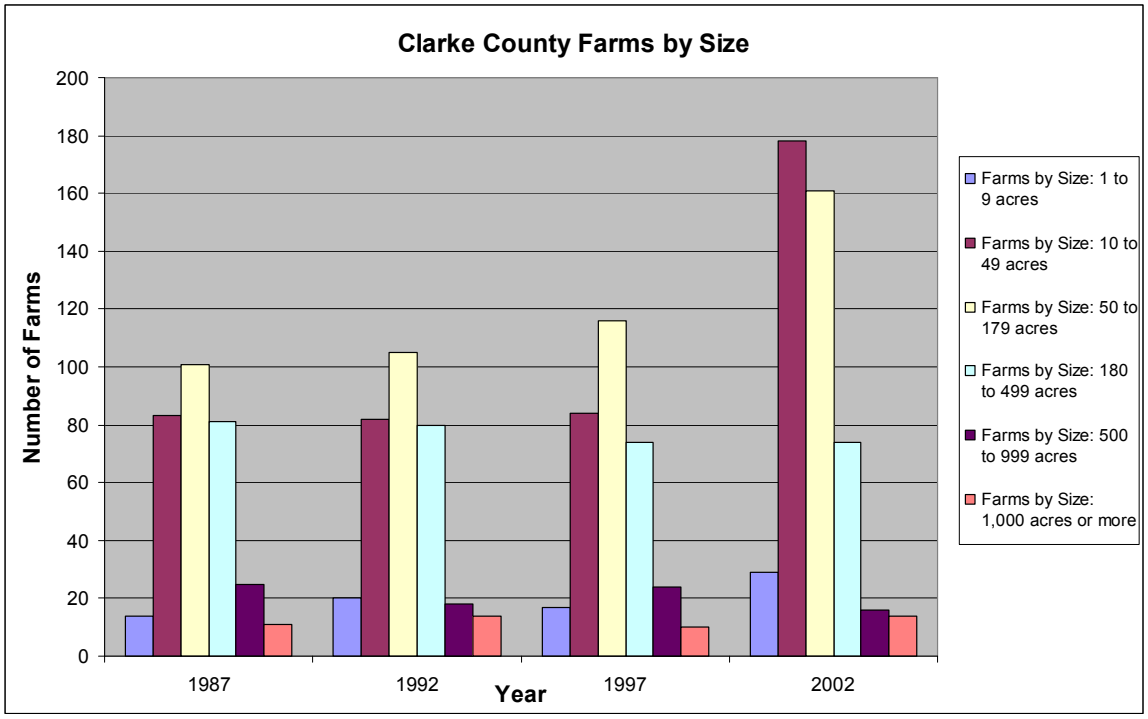


Chart 3. Clarke County Farms by Size.

In 2004, Clarke County produced approximately 26.27 million pounds of apples. This equates to roughly 626 bushels. Comparing these statistics to total apple production in Virginia (300 million pounds and 7,143 bushels), Clarke County produces about 8.8% of Virginia's apples. During 2004, Frederick County led Virginia in apple production with approximately 132.43 million pounds of apples. Clarke County ranks third (behind Frederick and Shenandoah Counties) out of 47 reporting counties in Virginia for apple production.

In Clarke County, there has been little change in the use of farmland between 1987 and 2002. Comparing 1987 to 2002, only 1,668 more acres were used for farming. This equates to a small (2.3%) increase. However, there was a small decrease in cropland (500 acres) used for farming practices from 1987 to 2002, approximately 1%. Harvested croplands fluctuated between 1987 and 2002, but averaged 25,576 acres. Lastly, 452 fewer acres were used for orchards in Clarke County between 1987 and 2002 (a 17.8% decrease). It should be noted that the acreage in harvested fruit has decreased, and other information suggests that the decline has accelerated since 2002. (See Chart 4)

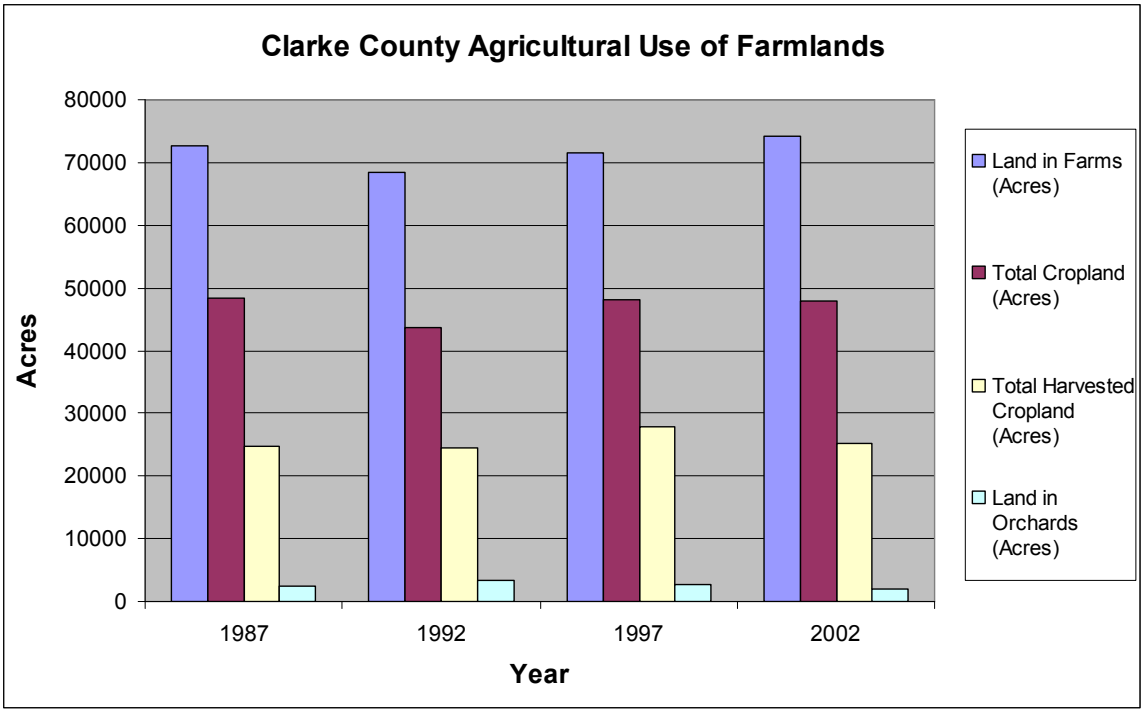


Chart 4. Clarke County Agriculture Use of Farmlands.

Examining farming operators in Clarke County, individuals with farming as their principal occupation increased between 1987 and 2002, from 148 operators to 250 operators, a 68.9% increase. Farmers with "other principal occupations" also increased between 1987 and 2002, from 167 individuals to 222 individuals, a 32.9% increase. However, operators spending days off the farm also increased. Between 1987 and 2002, 69 additional operators spent days off the farm, a 34.8% increase. Additionally, 53 more farm operators spent more than 200 days off the farm between 1987 and 2002, a 38.7% increase. However, these increases of time spent off the farm may be the direct result of having additional operators farming in Clarke County. From the data presented by National Agricultural Statistics Service, one cannot tell which farmers (new or experienced) are spending time off the farm. (See Chart 5)

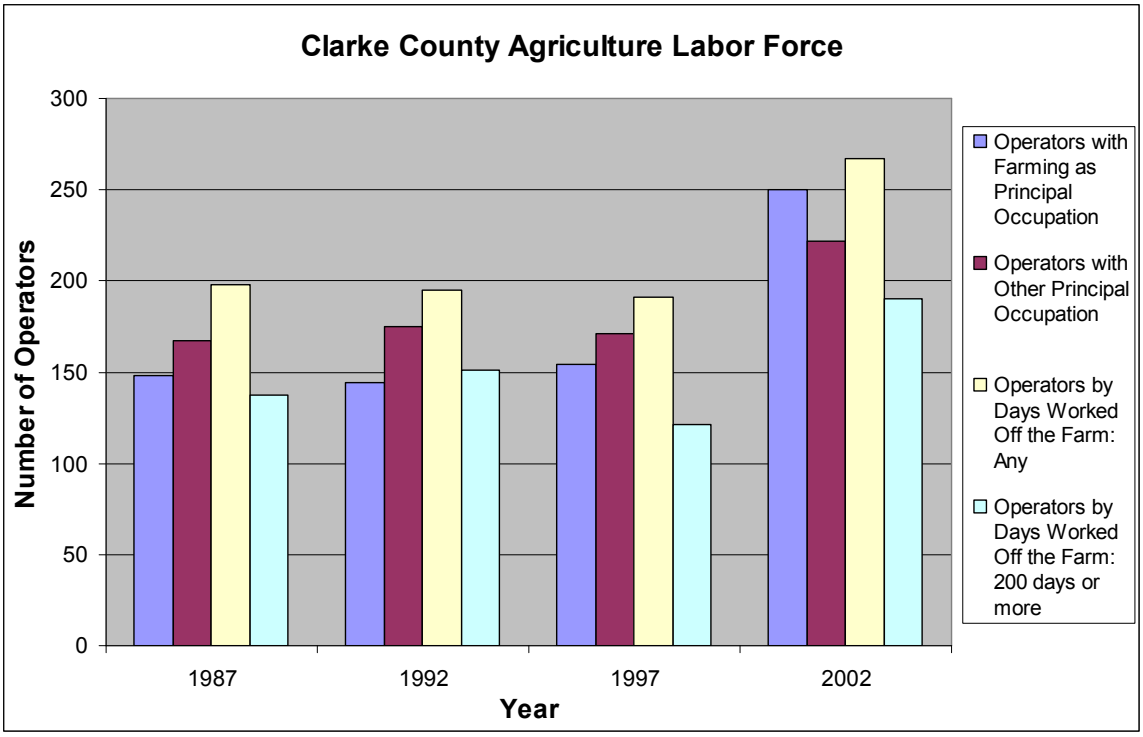


Chart 5. Clarke County Agriculture Labor force.

In 2007, Clarke County operated its thirteenth season of having a summer farmers' market, which was located in downtown Berryville. For the 2007-2008 winter season, Clarke County will operate for the first time a winter farmers' market. This outlet continues to give area farmers direct marketing opportunities, as well as opportunities for individuals to buy locally produced foods and food products.

For specific crop and product graphs, see pages 9 and 10 of the appendix for charts 6, 7 and 8.

Appendix

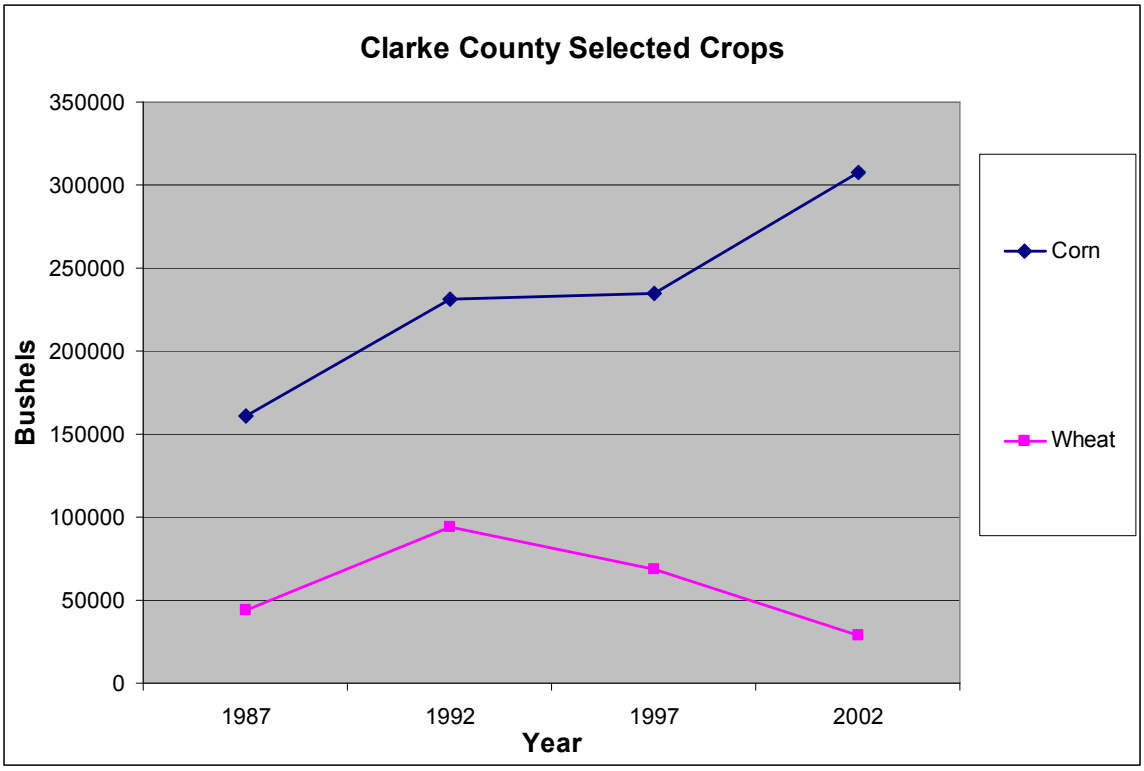


Chart 6. Clarke County Corn and Wheat Production.

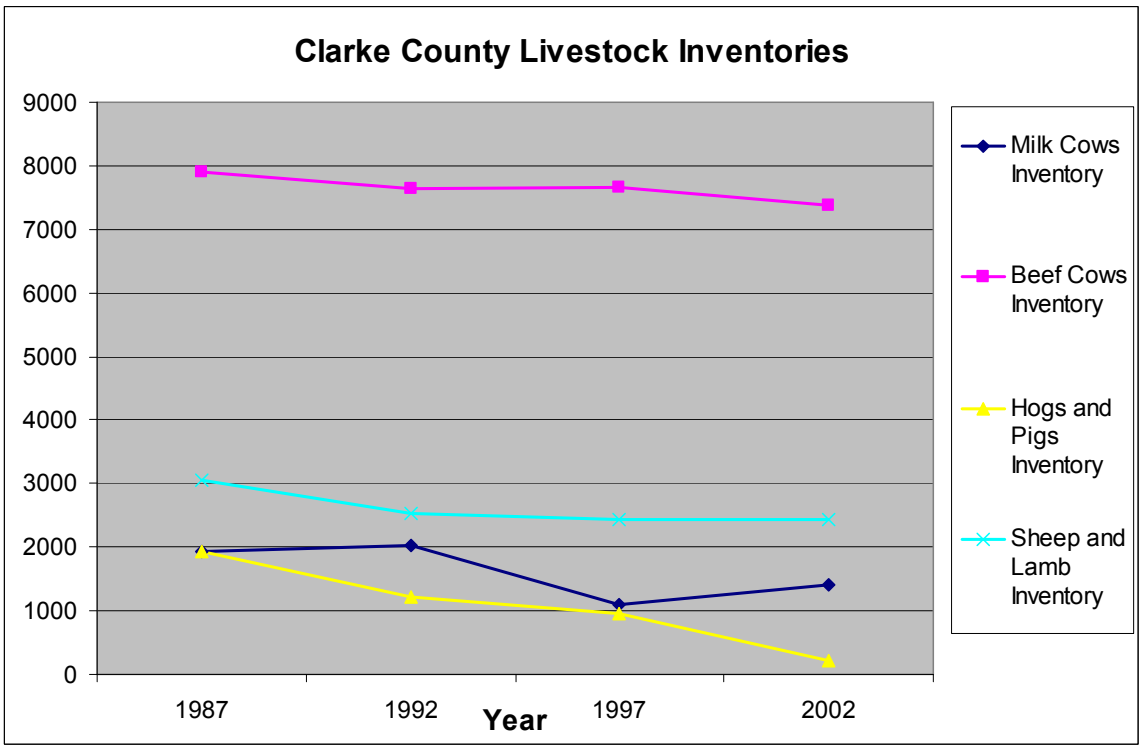


Chart 7. Clarke County Livestock Inventories.

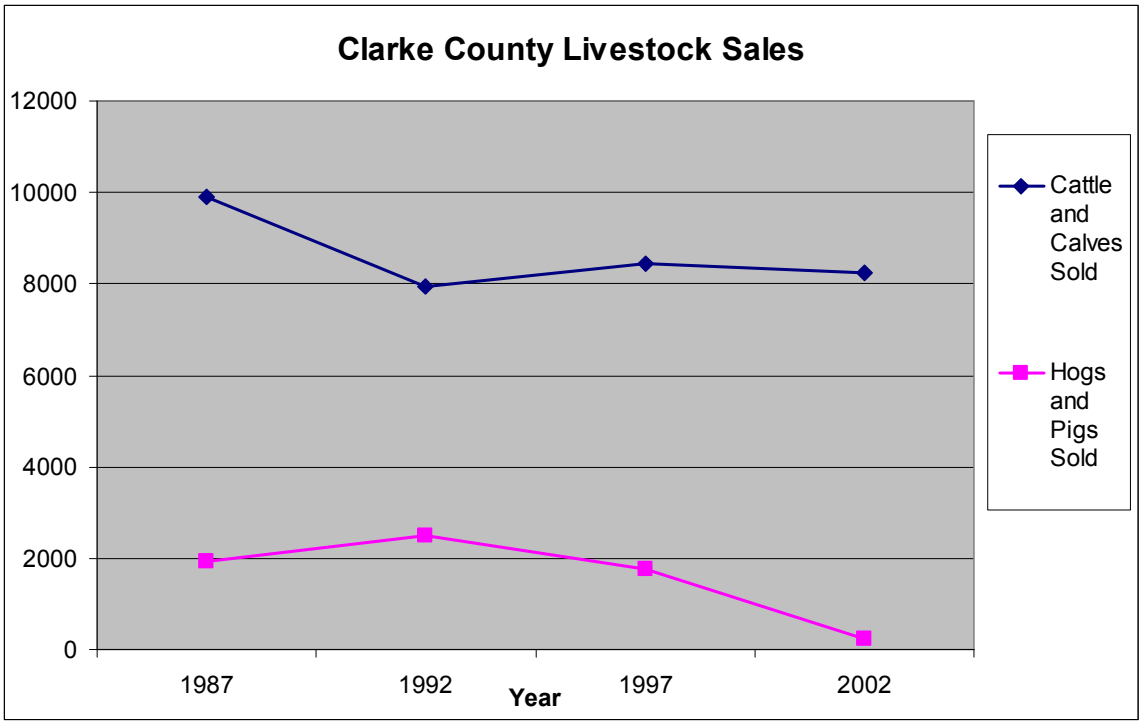


Chart 8. Clarke County Livestock Sales. [1]

In order to measure the economic contributions of agricultural production, agricultural processing, and other non-agricultural industries in Clarke County Virginia an annual input-output model was developed using IMPlan[2]. This model was developed assuming that (1) the input-output coefficients captured the production technology of Clarke County farms and manufacturers, (2) Clarke county farms and manufacturers purchase according to the purchase coefficients estimated by IMPlan, and (3) that household's purchase according to the household consumption coefficients.

[1] "Cattle and calves sold" includes dairy cows. Sheep sales were not reported.
[2] IMPlan is an input-output analysis software package developed by the US Forest Service. See www implan.com for further information.

Measuring the Direct Effects of Agriculture and Other Sectors

Measuring the output and levels of employment of the agriculture industry is not a straight-forward matter. Labor data is not as well reported on farms as in other economic sectors. Much of the farming sector is composed of sole proprietors, some with family workers, off-farm workers, contract laborers, and seasonal labor. Additionally, some of the output is either consumed at home (*e.g.* a steer for family consumption) or reinvested in the farm (a heifer kept as a replacement). Therefore, measures of output may be biased and much of the employment in agriculture is not reported. It follows that estimation methods must be used to produce these figures. The methods used in this study to estimate employment and output in the agricultural industry in Clarke County are described in the following section.

Table 1 provides a summary of production and value of production figures used in this analysis. Estimates of crop output were obtained by obtaining estimates of 2002-2006 agricultural production from the Virginia Department of Agricultural Statistics and 2002-2006 average prices from the Virginia Crop Reporting Service to derive average dollar values of output for crops in Clarke County. Estimates of vegetable production and greenhouse and nursery production were obtained by adjusting 2004 levels of output, as reported in IMPlan, by the Consumer Price Index (CPI) to reflect 2005 price levels.[3]

In a similar fashion, the dollar value of livestock output was estimated by adjusting the 2002 Census of Agriculture dollar value of outputs by the CPI to reflect 2005 price levels. In the original study, estimates of the economic value of the horse industry were obtained by modifying the estimated budget of expenditures for horses obtained in a 1995 study of the Virginia horse industry[4]. These budgeted expenditures were adjusted to reflect the estimated proportion of these expenditures made in the county.[5] The Virginia Agricultural Statistical Service (VASS) has subsequently conducted a 2001 study of the Virginia equine industry that indicated a substantially lower population of horses for Clarke County. A second subsequent study has just been released by VASS and the results indicated a horse population of 6,000 and expenditures per horse of $3,642.[6] These estimates, deflated to 2005 values, were used in this analysis. Estimates of total crop output, total livestock output, greenhouse and nursery output, vegetable output, and horse industry output are reported in Table 1.[7]

[3] The most recently available IMPLAN data is for 2004.
[4] "1995 Virginia Horse Industry Profile", prepared for the Virginia Equine Educational Foundation, Inc. by The Wessex Group, Ltd., Williamsburg, Virginia, January 1996.
[5] It should be noted that no adjustments were made from the horse industry study to reflect the apparent higher proportion of higher-than-average valued horses in Clarke County. There was not data available to make such an estimate. Thus, the estimates produced in this report are most likely under-reported.
[6] 2006 Virginia Equine Survey Report, Virginia Agricultural Statistics Service, December 15, 2006.
[7] This study differs from others in that the economic impact of the input suppliers and the agricultural processing industry were not estimated since reasonably accurate data was not available at the county level. However, one can obtain some notion of the extent of these sectors in the remainder of this report by observing the amount of indirect effects produced by the agricultural industry. Nonetheless, the estimates produced in this report are under-reported to the extent that agricultural input suppliers exist in the county.

Estimates of the direct effects of the non-agricultural sectors were generated using employment estimates from the Virginia Employment Commission (VEC). IMPLAN output-employment and value added-employment ratios were then used to estimate the output and value added[8] for these industries. These estimates are reported in Table 2.[9]

Measuring the Indirect and Induced Effects of Agriculture and Other Sectors

In order to capture the economic effects that the agriculture industry (and other sectors) has on other sectors of the local economy, indirect and induced effects must be taken into consideration.

Indirect effects are created by the agricultural industry's purchases of *all* inputs required to produce its output. Typical inputs such as seed, fertilizer, equipment, and feed products are included as well as less commonly-thought-of inputs such as physician services. These indirect effects vary by sector since every sector's mix of inputs differs and some inputs are more readily-available within the county than other inputs. For instance, the agricultural industry typically produces larger county-level multipliers than manufacturing because agriculture tends to purchase a higher proportion of inputs within the county. Table 1 reports the sum of the direct and indirect effects of individual agricultural sectors while Table 2 reports the sum of the direct and indirect effects of agriculture as a whole along with other Clarke County industry groups[10].

Induced Effects are those that occur as a result of the spending of income earned by those employed in the agriculture industry and all other related industries. For instance, in measuring the induced effects of agriculture, the spending of farm laborers as well as the spending of employees of local machinery dealers are included in this measure.[11] Table 2 reports the sum of the direct, indirect, and induced effects of individual agricultural sectors and Table 3 reports the sum of the direct, indirect, and induced effects of agriculture as a whole along with other Clarke County industry groups[12].

[8] Value-added is the difference between the value of the sales and the value of all input purchases of a particular industry. Thus, it is, in a sense, a measure of the contribution of the particular industry to the gross regional product.

[9] Total Industry Output for the agriculture industry was derived from the total estimated in Table 1 since the VEC data only reflect employment by those covered by unemployment insurance.

[10] If one is interested in obtaining a measure of only the indirect effects, one must simply subtract the Direct Effects from these sums.

[11] The sum of the direct, indirect, and induced effects is often termed the "multiplier effect".

[12] Similarly, if one is interested in obtaining a measure of only the induced effects, one must simply subtract the Direct and Indirect Effects from these sums.

Results

All sectors of a local economy are important in that they all contribute by providing employment and income, by paying local taxes that finance local infrastructure, schools, and other public services, and by supporting other sectors of the local economy by making purchases, adding value, and providing inputs.

The overall dollar value of output of an industry is an interesting measure in that it indicates the total flow of dollars received by the industry. Figure 1 provides the breakdown of output for all the represented sectors of the Clarke County economy for 2005. In terms of dollar value of output, the manufacturing sector is the largest single sector representing approximately 31 percent of total output. This is followed by the Finance and Insurance sector (13%), Construction (12%), Government Services (12%), and Agriculture, Forestry, and Fishing (6%).

Value added is, perhaps, a more useful measure of the importance of an industry as it represents the total amount of additional value that is created within the county. It is the measure of each sector's contribution to gross regional product. Each dollar of additional value added implies that income and employment are generated within the county. Figure 2 provides the breakdown of value added for all the represented sectors of the Clarke County economy for 1995. Once again, manufacturing leads all other sectors with 28 percent of total value added in the county. This is followed by Government Services (16%), Construction (10%), Agriculture, Forestry, and Fishing (5%), and Healthcare and Social Assistance (5%).

Total employment is an important measure of the importance of any sector within a regional economy. However, it should be remembered that this measure of the total amount of jobs attributable to each sector does not take into account the quality of these jobs. Agriculture leads the way with respect to the highest percentage of jobs in the county with 31 percent. This is followed by Manufacturing (17%), Government Services (11%), and Educational Services (10%),

However, the total amount of output, value added, and employment by any individual sector does not fully tell the story of the importance of any individual sector. Local purchases by individual sectors of the local economy (from other sectors) create indirect multiplier effects. These purchases generate additional output, value added, and employment in the backward-linked sectors. These multiplier effects are displayed in Table 2 as the difference between the first two major headings (Direct Effects & Direct and Indirect Effects) and in Figure 4 as the middle portion of the bar associated with each sector.

It is not possible to compare by sector the magnitude of the total direct, indirect, and induced effects because this would involve double-counting. The addition of all direct, indirect, and induced effects would add up to more economic activity than the local

economy actually generates. However, it is useful to compare the sectoral distribution of direct, indirect, and induced effects, expressed as a percentage of the total economic impact of each sector. This comparison allows one to compare across sectors how the multiplier effect plays out. Figures 4-6 provide such estimates.

For instance, in Figure 4, the Agriculture industry accounts for 5.3 % of the total output of the Clarke County economy. In addition, the Agriculture industry is also responsible for 11.5% of the output produced in all other sectors in support of the agriculture industry. This 11.5% of the Clarke County economy represents the additional output from all other sectors in support of the agricultural industry[13]. The top portion of the graph, the induced effect as a percentage of total direct effect, represents the total output generated from the household income paid to employees in both the agricultural industry and its input industries. Thus, an additional 4.3% of the total direct output of the Clarke County economy can be attributed to employment in the agricultural sector and its backward-linked sectors. Similar interpretations can be made of the other sectors in Figure 4.

In a similar fashion, figures 5 and 6 report the amounts of value added and employment generated by direct, indirect, and induced effects by each of the industries. For instance, in Figure 5, the Construction industry accounts for 5.6 % of the total value added for the Clarke County economy. Additionally, the Construction industry is also responsible for 6.8 % of the value added produced in all other sectors in support of the Construction industry. An additional 5.8% of value added is attributable to the spending of wages from the Construction sector and all backward-linked sectors. In Figure 6, one can see that Retail Trade accounts for 5.71 % of total employment in the Clarke County economy. Another 4.2 % of total employment in Clarke County is attributable to those sectors that support the Agricultural industry. Finally, an additional 4.6 % of total Clarke County employment is due to the spending of wages earned in the Agricultural sector and its backward-linked sectors.

[13] This differs from what is traditionally thought of as the "agricultural input" industry in that this notion refers to all inputs, including such things as input from medical doctors, necessary to produce agricultural output.

Table 1: Economic Effects of Agricultural Sectors in Clarke County, Virginia, 2005

	Direct Effects			Direct and Indirect Effects			Direct, Indirect, and Induced Effects		
	Output ($MM)	Value Added ($MM)	Employment	Output ($MM)	Value Added ($MM)	Employment	Output ($MM)	Value Added ($MM)	Employment
Corn (Grain and Silage)	2.12	1.13	47	2.66	1.53	61	3.58	2.38	70
Soybeans	0.33	0.19	9	0.39	0.27	11	0.54	0.43	11
Wheat	0.08	0.05	0	0.10	0.06	0	0.14	0.10	0
Hay	0.92	0.34	21	1.15	0.47	25	1.57	0.75	32
Total All Crops	***1.34***	***1.71***	***79***	***1.64***	***2.34***	***99***	***5.83***	***3.66***	***115***
Livestock	11.37	3.37	442	14.23	4.81	512	23.27	10.72	668
Nursery and Greenhouse	1.54	1.46	26	2.21	2.55	63	2.86	4.42	28
Vegetables	0.16	0.15	2	0.23	0.22	3	0.25	0.33	4
Fruits (incl. apples and wine grapes)	3.86	3.67	95	4.53	4.35	111	4.95	4.80	117
Horses	21.20	9.85	1390	23.84	11.14	1528	38.90	17.40	1962
Total All Agriculture	**41.59**	**20.22**	**2034**	**49.34**	**25.42**	**2316**	**76.06**	**41.34**	**2894**

Table 2: Economic Effects of Agriculture and Other Sectors in Clarke County, Virginia, 2005

	Direct Effects			Direct and Indirect Effects			Direct, Indirect, and Induced Effects		
	Output ($MM)	Value Added ($MM)	Employment	Output ($MM)	VA ($MM)	Employment	Output ($MM)	VA ($MM)	Employment
Construction	85.01	39.89	454	113.66	56.21	640	139.74	73.17	833
Manufacturing	214.54	113.53	1,159	276.50	147.51	1506	283.28	181.31	1851
Transportation and Warehousing	5.56	2.68	52	6.94	3.67	71	8.51	4.77	93
Wholesale Trade	18.46	12.62	94	20.08	14.69	109	26.62	17.84	133
Retail Trade	23.79	15.30	296	28.45	18.10	350	40.28	21.85	423
Finance and Insurance	86.85	64.88	214	99.65	74.92	247	124.88	85.26	281
Accommodation and Food Service	9.27	4.95	187	12.09	6.56	248	14.68	8.24	311
Arts, Entertainment, Recreation	6.60	4.30	100	8.22	5.28	123	9.98	6.42	149
Professional, Scientific, and Technical Services	18.04	10.73	140	22.72	13.43	175	30.69	18.61	243
Healthcare and Social Assistance	30.41	20.28	220	36.95	24.07	261	47.77	31.10	337
Information	7.38	3.73	20	9.30	4.82	26	10.79	5.79	31
Other Services	26.48	15.12	159	33.89	19.41	204	41.15	24.13	254
Government Services	79.61	67.75	747	88.08	72.79	803	107.04	85.12	939
Administrative and Waste Services	17.37	7.85	64	23.60	11.36	93	28.78	14.73	120
Educational Services	13.43	8.73	683	16.68	10.68	836	23.50	15.11	1183
Agriculture, Forestry, Fishing	41.59	20.22	2034	61.85	34.13	3434	70.81	41.49	4175
TOTALS	682	413	6623	859	518	9126	1008	635	11355

Figure 1: Sectoral Distribution of Output for Clarke County, Virginia, 2005

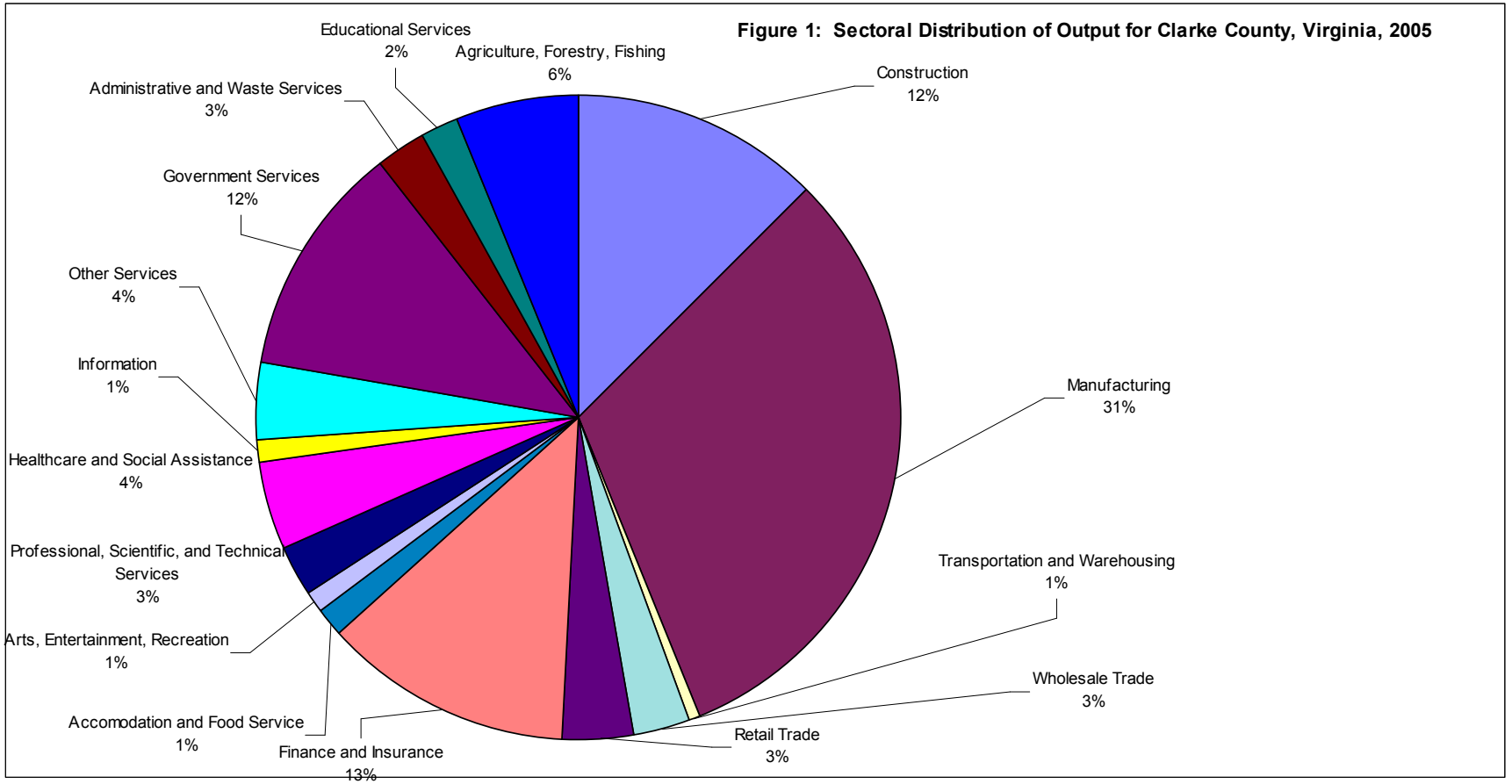


Figure 2: Sectoral Distribution of Value Added for Clarke County, Virginia, 2005

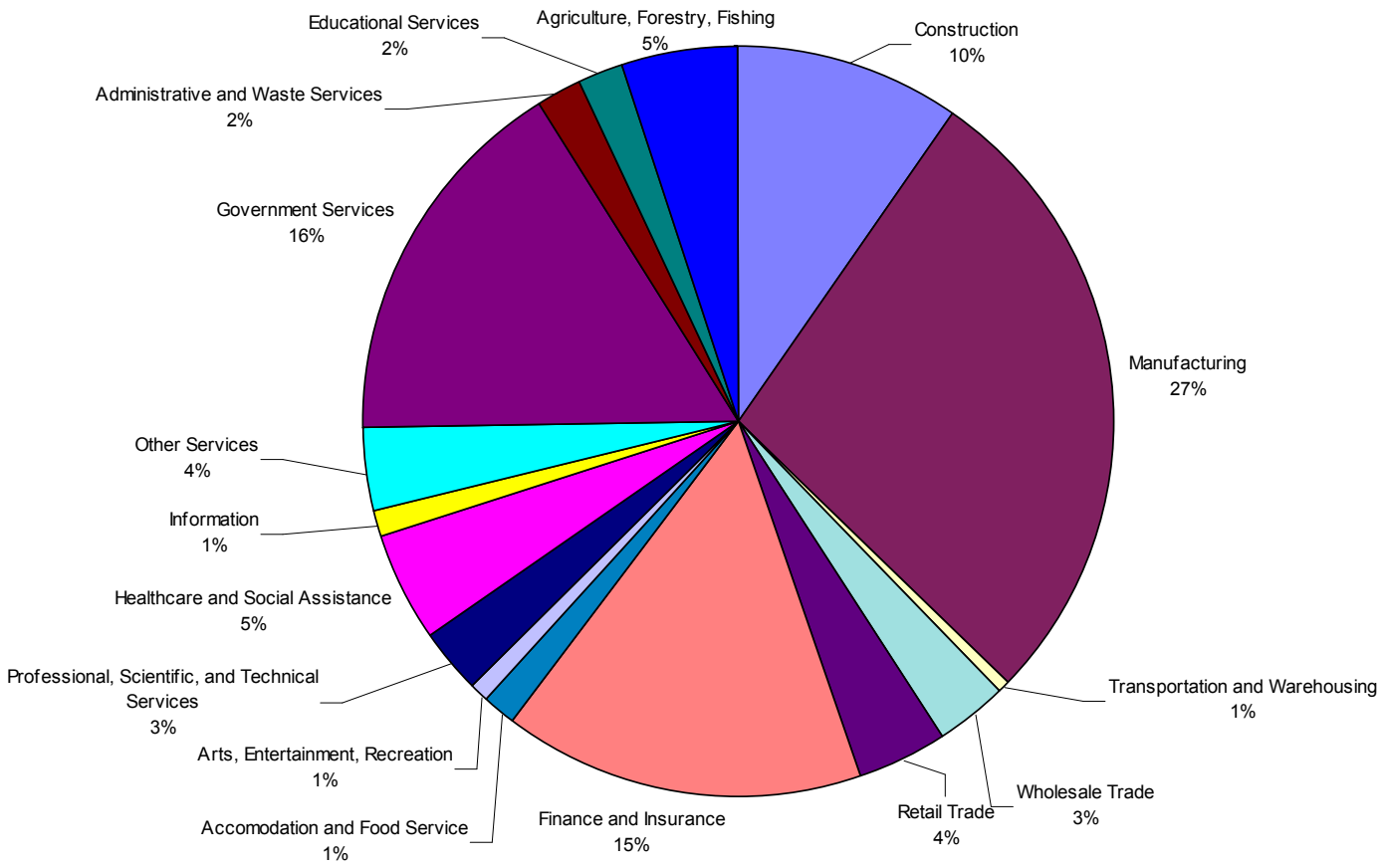


Figure 3: Sectoral Distribution of Employment for Clarke County, Virginia, 2005

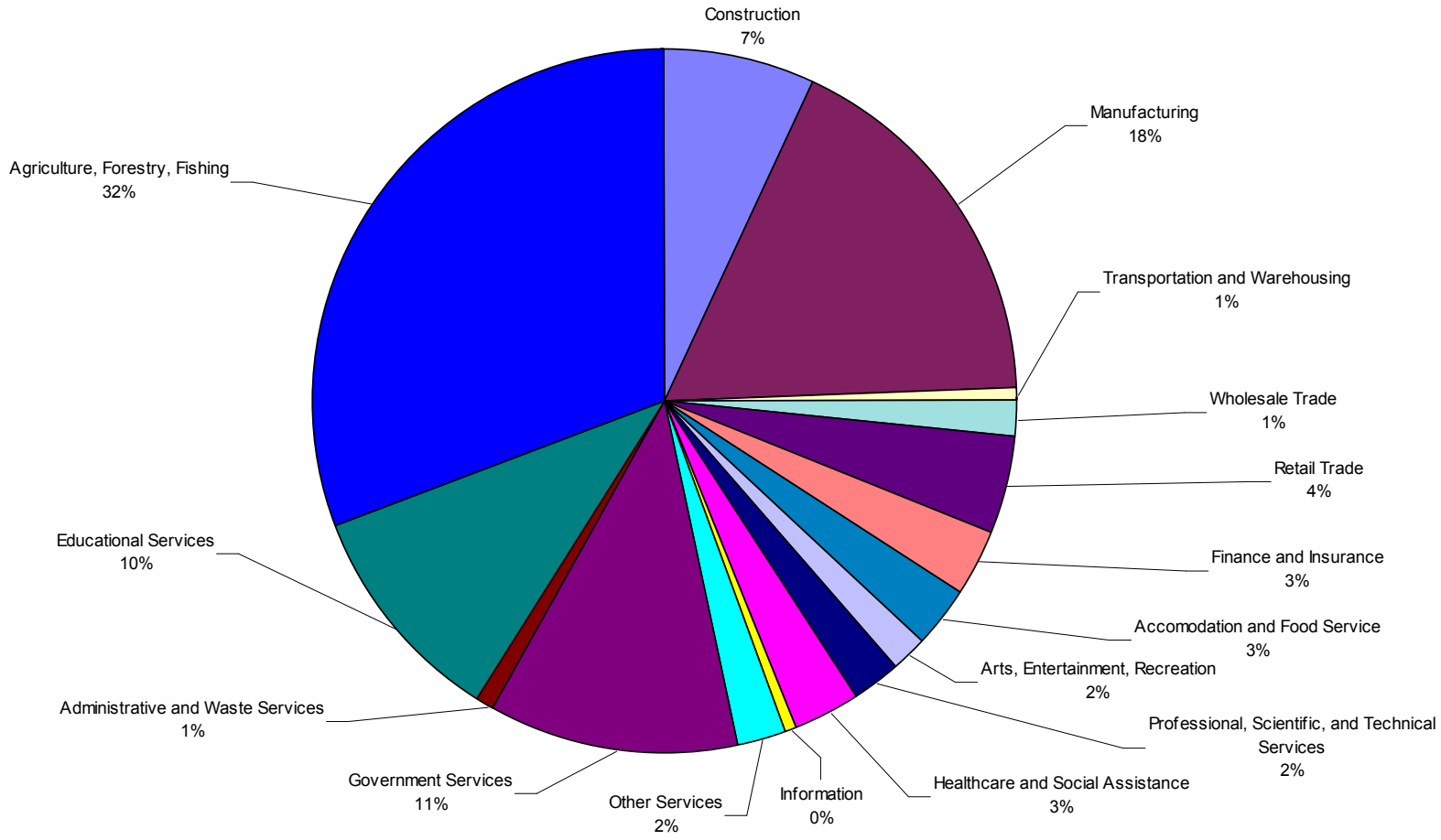
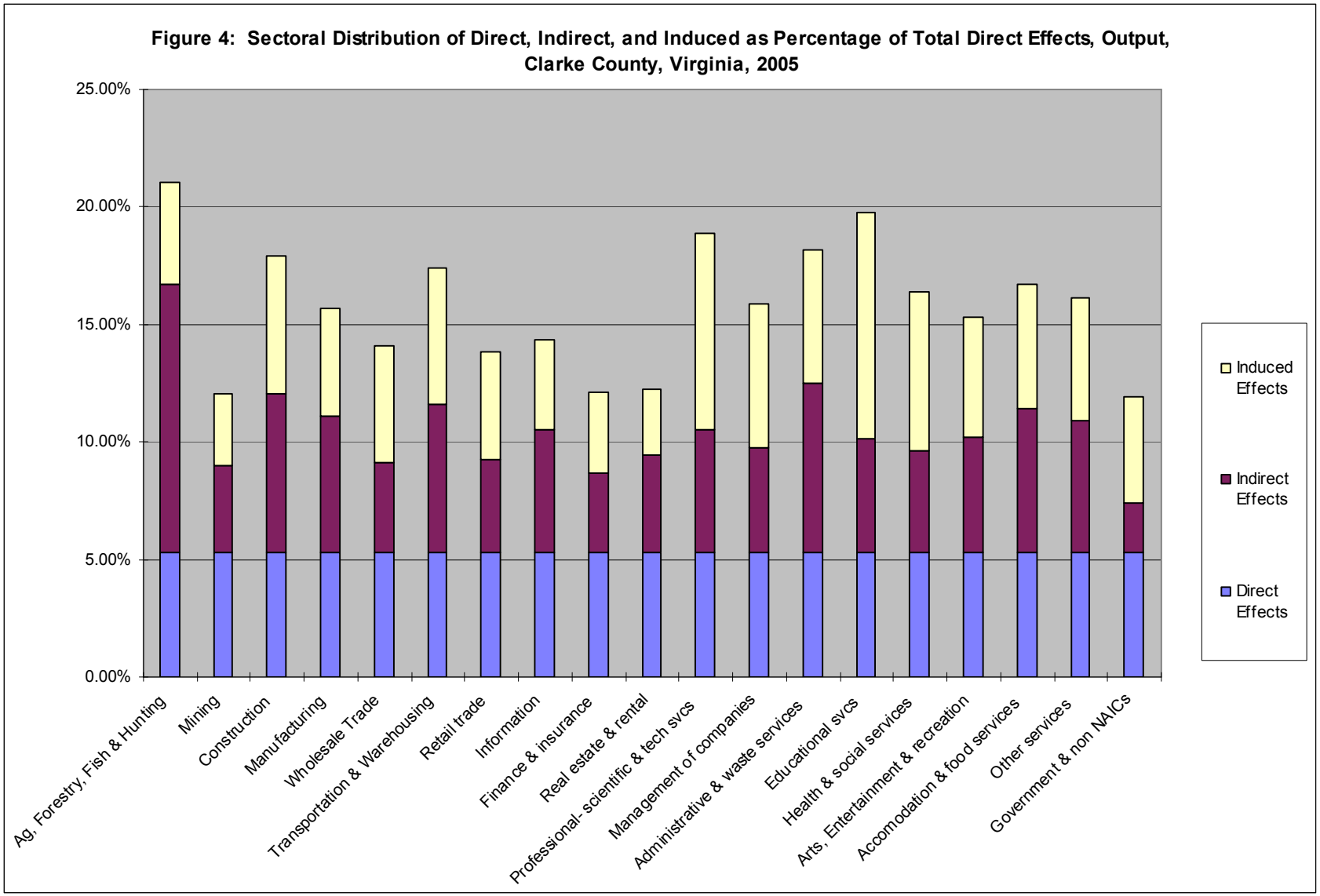


Figure 4: Sectoral Distribution of Direct, Indirect, and Induced as Percentage of Total Direct Effects, Output, Clarke County, Virginia, 2005



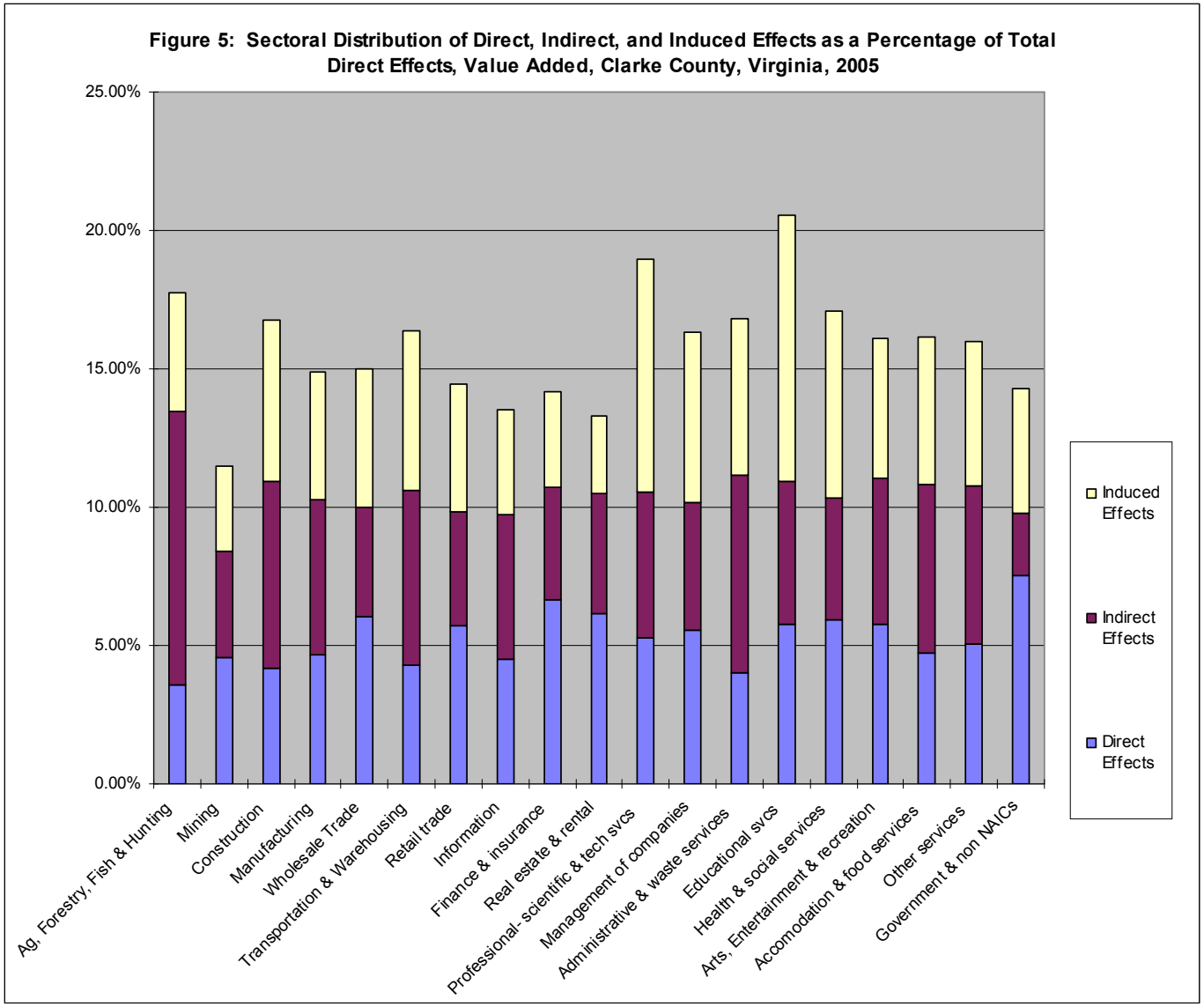


Figure 5: Sectoral Distribution of Direct, Indirect, and Induced Effects as a Percentage of Total Direct Effects, Value Added, Clarke County, Virginia, 2005
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Induced Effects
Indirect Effects
Direct Effects
Ag, Forestry, Fish & Hunting
Mining
Construction
Manufacturing
Wholesale Trade
Transportation & Warehousing
Retail trade
Information
Finance & insurance
Real estate & rental
Professional- scientific & tech svcs
Management of companies
Administrative & waste services
Educational svcs
Health & social services
Arts, Entertainment & recreation
Accomodation & food services
Other services
Government & non NAICs

Figure 6: Sectoral Distribution of Direct, Indirect, and Induced Effects as a Percentage of Total Direct Effects, Employment, Clarke County, Virginia, 2005