

The Economic and Fiscal Contribution that
Data Centers Make to Virginia



Acknowledgements

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EXECUTIVE SUMMARY

This report assesses the economic and fiscal contribution that data centers make to the Commonwealth of Virginia. The principal findings from that assessment are as follows:

- 1) **Data centers are a critical part of the infrastructure that supports the modern economy, not only in the technology sector, but in advanced manufacturing, entertainment, finance, healthcare, information, retail, telecommunications, and almost every other sector of the economy as well.**
- 2) **Although Virginia's data center industry is largely concentrated in Northern Virginia, this industry has broad geographic economic development potential:**
 - While 71 percent of statewide employment in this industry is located in Northern Virginia, 11 percent is in Central Virginia, 11 percent is in Hampton Roads, 4 percent is in Southern Virginia, 2 percent in Southwestern Virginia, and 1 percent in the Valley.
 - Southern Virginia, an area of the state that has been devastated by employment losses in manufacturing and the tobacco industry, is home to Microsoft's \$1.3 billion data center in Mecklenburg County, the east coast hub for Microsoft's online services, and soon to be expanded to a \$1.7 billion facility.
 - DP Facilities announced just this fall that it would be opening a 65,000 square foot data center in Wise County in Southwestern Virginia, an area of the state that has been hard hit by employment losses in the coal mining industry.
- 3) **Data centers are a high-performing industry:**
 - The data center industry insulated some Virginia localities from the "double dip" that the state experienced as a result, first of the "Great Recession" of 2007-09, and then the federal sequester in 2013.
 - In the last year, statewide employment in the data center industry grew 6.7 times faster than the norm across all industries.
 - In the last year, statewide wages in this sector, already 140 percent higher than the statewide average, grew 9.3 times faster than the norm across all industries.
 - The pool of highly skilled workers the data center industry employs also feeds the talent pipeline for other fast growing, high wage industries such as *Architectural, Engineering, and Related Services; Computer Systems Design and Related Services; Management, Scientific, and Technical Consulting; Scientific Research and Development Services; and Telecommunications.*
- 4) **Data centers generate significant tax revenue:**
 - The data center industry is very capital-intensive and that translates into a disproportionate amount of property tax revenue, by far the largest source of revenue for Virginia localities.
 - In 2014, the benefit/cost ratio for the data center industry was 9.5 in Loudoun County and 4.3 in Prince William County. This means that for every \$1.00 in county expenditures that the *Data Processing, Hosting, and Related Services* sector was responsible for generating in 2014, it provided approximately \$9.50 in tax revenue to Loudoun County, and approximately \$4.30 in tax revenue to Prince William County.
 - Because data centers pay high wages – \$105,942 per year on average in 2014 – they also have a disproportionate impact on state income tax revenue, by far the largest source of revenue for Virginia state government.
 - This disproportionate fiscal impact places downward pressure on Virginia tax rates, thereby improving the state's overall business climate, which has suffered in recent years causing Virginia to fall from its traditional top slot in most national business climate indexes.

5) Data centers have a big overall economic impact:

- In 2014, the total statewide economic impact attributable to the data center industry was approximately 36,043 jobs, \$2.7 billion in wages, \$8.6 billion in economic output, and \$298.9 million in state and local tax revenue.
- At a regional level, in 2014 the data center industry was responsible for generating approximately:
 - 21,995 jobs, \$2.0 billion in wages, and \$5.7 billion in economic output in Northern Virginia;
 - 3,974 jobs, \$225.2 million in wages, and \$885.9 million in economic output in Central Virginia;
 - 3,333 jobs, \$185.9 million in wages, and \$731.7 million in economic output in Hampton Roads; and
 - 1,002 jobs, \$40.8 million in wages, and \$196.0 million in economic output in Southern Virginia.

6) Data center industry investment decisions are increasingly sensitive to states' tax regimes:

- In 2009, in response to the loss of a \$1 billion Apple data center to North Carolina, Virginia enacted a sales and use tax exemption for data center purchases of computer equipment.
- Virginia's sales and use tax exemption for data center purchases of capital equipment is much like the exemption Virginia has extended to the similarly capital-intensive manufacturing sector for many years.
- The current sales and use tax exemption for data centers is scheduled to sunset in 2020.
- When Virginia enacted its data center sales and use tax exemption in 2009, only seven other states offered such incentives. Today, over half of all states offer incentives for data centers.
- Seven of those 27 data center incentives were enacted in 2015 alone and most states now offer incentives that are more competitive than Virginia's.
- Since 2012 when Virginia last revised its data center sales and use tax exemption, a third of the states offering such incentives have reduced their eligibility criteria to be more attractive to smaller data centers.
- If Virginia is to avoid the fate of Washington state, home of Microsoft, which has seen billions of dollars of data center investment migrate to neighboring Oregon because of the uncertainty generated by its "off again on again off again" approach to data center incentives, it will need to maintain its competitive position in the data center market.

INTRODUCTION

This report assesses the economic and fiscal contribution that data centers make to the Commonwealth of Virginia. Just as the industrial revolution of the late 18th century made the manufacturing sector the driving force for economic development at the time, the technological revolution of the late 20th century has made the technology sector the driving force for economic development in the modern economy. An important difference between the two, however, is that where the industrial revolution was largely confined to the manufacturing sector, the technological revolution has been ubiquitous and has driven and connected innovations in almost every sector of the economy, including advanced manufacturing. Data centers and fiber networks are the core infrastructure that facilitates those connections and makes them possible. As a result, it is not an exaggeration to say that they have become the backbone of the modern economy.



The remainder of the report is divided into four sections. The *Data Center Sector Profile* section provides a profile of the data center sector in Virginia and details recent trends in that sector. The *Contribution of Data Centers to Virginia's Economy* section identifies and quantifies some of the more salient contributions that the data center sector makes to Virginia's economy. The *Role of Incentives* section discusses the role that state tax incentives are playing in the deployment of data centers in Virginia and across the United States. Finally, the *Conclusion* section provides a brief conclusion and summary of our findings.

DATA CENTER SECTOR PROFILE

In this section, we provide a general profile of the data center sector in Virginia. The data used to create that profile were provided by the Virginia Economic Development Partnership (VEDP) and cover private sector employment in the *Data Processing, Hosting, and Related Services* sector as defined by the U.S. Bureau of Labor Statistics. The regional aggregations of those data used in this section are based on the six sub-state regions employed by VEDP and are geographically depicted in the Virginia state map shown in Figure 1.

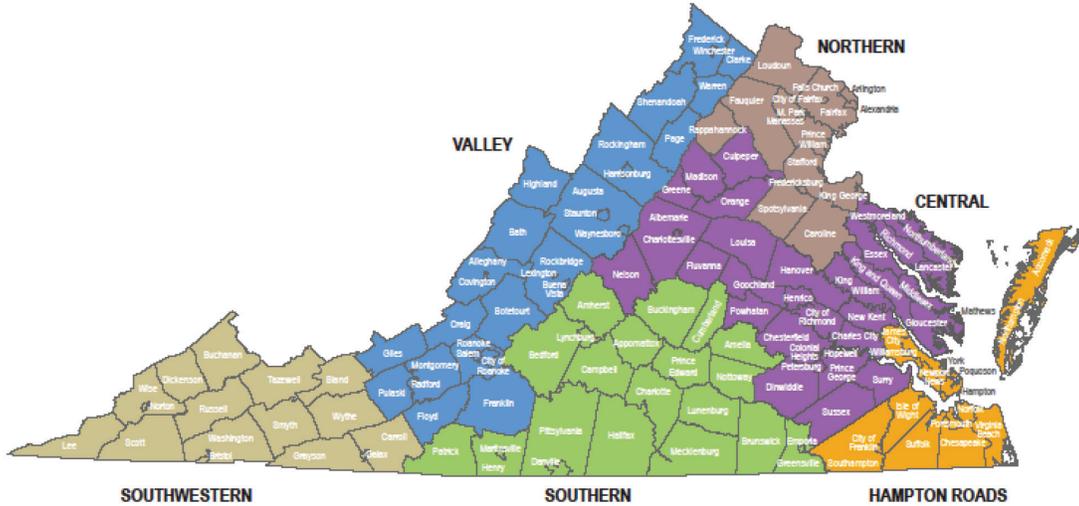


Figure 1: Virginia Economic Development Corporation Sub-state Regions

In 2014, private sector employment in *Data Processing, Hosting, and Related Services* accounted for 12,533 jobs statewide in Virginia. Figure 2, depicts the regional distribution of that employment. As these data indicate, the largest proportion of employment in this sector (71 percent) was located in Northern Virginia. However, it is important to realize that employment in this sector was also broadly distributed across other regions of the Commonwealth. Central Virginia and Hampton Roads accounted for 11 percent each of sector employment in 2014, while Southern Virginia (home to Microsoft’s Boydton data center campus, the east coast hub for Microsoft’s online services) accounted for 4 percent, Southwest Virginia 2 percent, and the Valley 1 percent.

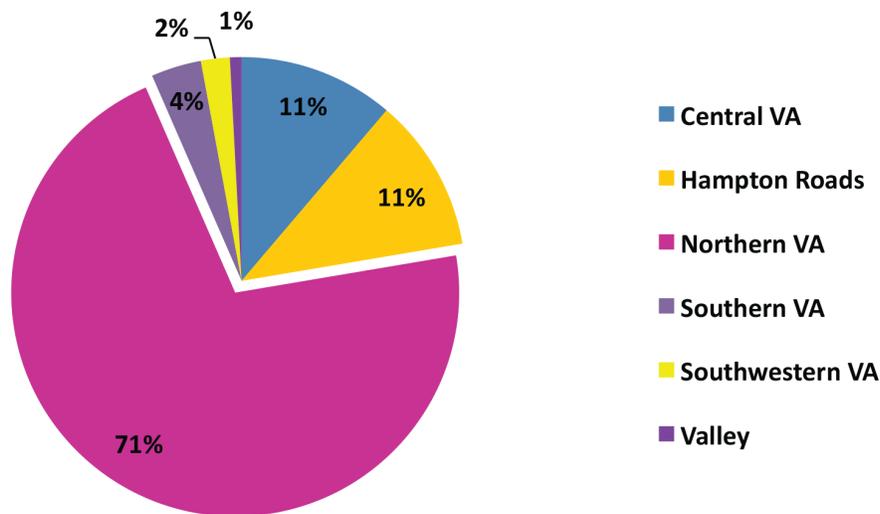


Figure 2: Regional Distribution of Private Sector Employment in *Data Processing, Hosting, and Related Services* in Virginia in 2014¹

¹ Data Source: Virginia Economic Development Partnership.



Figures 3 and 4 provide additional detail on private sector employment trends in *Data Processing, Hosting, and Related Services* from 1990 through 2014. As the data depicted in Figure 3 indicate, sector employment in Northern Virginia was relatively stable over this period. Employment peaked at just under 9,000 jobs between 1997 and 2004, then declined between 2004 and 2012, but has since escalated rapidly, coming in at 8,642 jobs in 2014.

Figure 4 provides similar data for the other sub-state regions within Virginia. As these data show, sector employment in Central Virginia peaked at 2,048 jobs in 2007 and has since declined, falling to 1,362 jobs in 2014. In Hampton Roads, employment grew rapidly until 2006 when it peaked at 2,042 jobs, but has since declined, falling to 1,352 jobs in 2014. In Southern Virginia, employment hovered around 500 jobs for most of the period and came in at 440 jobs in 2014. In Southwestern Virginia, employment was stable for most of the period but escalated sharply in 2011 and came in at 253 jobs in 2014. While in the Valley, employment peaked at 643 jobs in 1994 and has generally declined since, falling to 102 jobs in 2014.

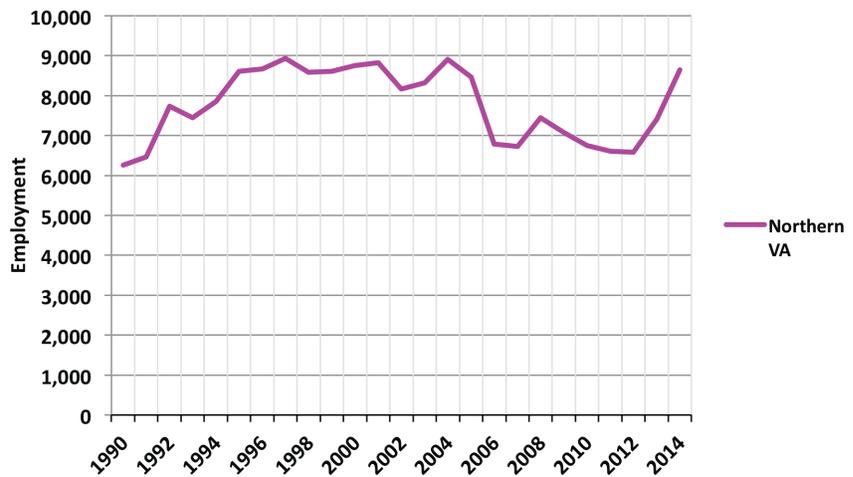


Figure 3: *Data Processing, Hosting, and Related Services* Private Sector Employment – 1990 to 2014²

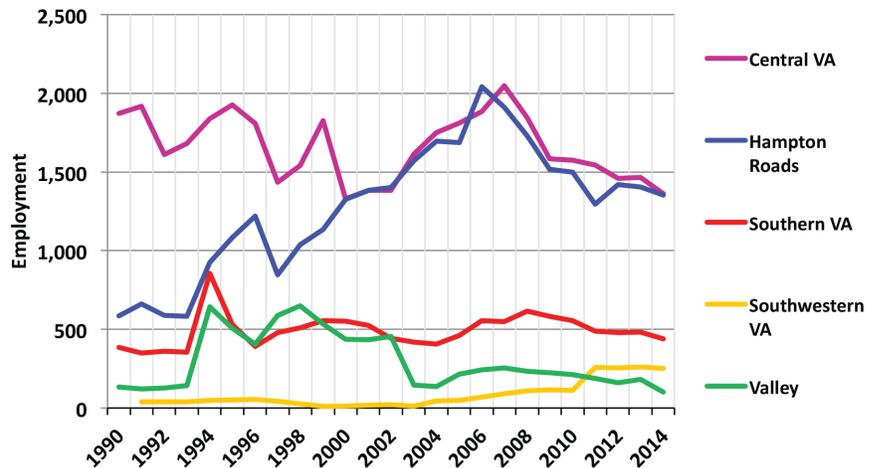


Figure 4: *Data Processing, Hosting, and Related Services* Private Sector Employment – 1990 to 2014³

One of the more defining characteristics of the *Data Processing, Hosting, and Related Services* sector is that it is an extremely capital-intensive industry that has become ever more capital-intensive over time. What that means is that it has a high capital to labor ratio and typically employs a relatively small group of highly skilled, and highly paid, individuals. As a result, in and of themselves, employment trends are not necessarily the best measure of this industry's economic footprint within Virginia. For that reason, Figures 5 through 8 take a look at trends in two other important metrics – number of locations and wages.

Figure 5 depicts the trend in number of private sector data center locations in Northern Virginia between 1990 and 2014. As these data indicate, that number showed consistent growth until 2009 when it peaked at 357. Growth has since leveled off and came in at 334 locations in 2014. Figure 6 provides a similar look at the other sub-state regions within Virginia. As this graph shows, growth in number of locations escalated rapidly in Central Virginia and, to a lesser extent, in Hampton Roads before peaking in 2008-2009, but has since declined, falling to 103 locations in Central Virginia and 55 in Hampton Roads in 2014. Growth in Southern Virginia, Southwestern Virginia and the Valley followed a similar, if less pronounced, trajectory. These regions were respectively home to 29, 12, and 24 locations in 2014.

Finally, Figures 7 and 8 turn to what is one of the most prominent characteristics of the *Data Processing, Hosting, and Related Services* sector, which is that it pays very high wages, and those wages have grown rapidly over time (as will be demonstrated in the next section, at a rate that far outstrips the average growth rate for wages across all industry sectors). As shown in Figure 7, between 1990 and 2014 the average annual wage in this sector in Northern Virginia grew from \$37,867 to \$121,688, a 221 percent, or more than three-fold, increase.



Figure 5: Data Processing, Hosting, and Related Services Private Sector Locations – 1990 to 2014⁴

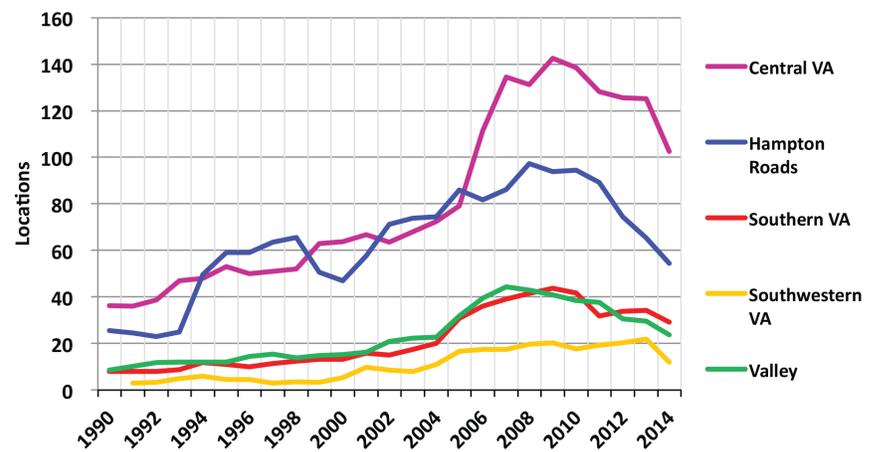


Figure 6: Data Processing, Hosting, and Related Services Private Sector Locations – 1990 to 2014⁵

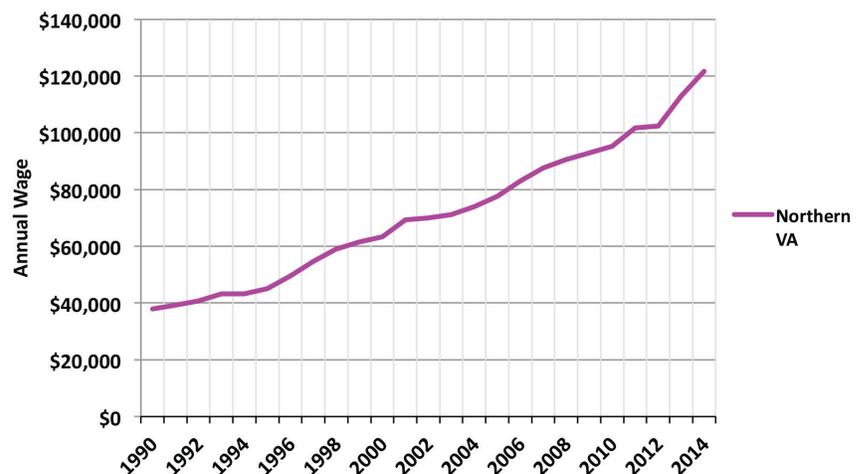


Figure 7: Data Processing, Hosting, and Related Services Private Sector Average Annual Wages – 1990 to 2014⁶

^{4 5 6} Data Source: Virginia Economic Development Partnership.

Figure 8 provides comparable data for the other sub-state regions within Virginia. As these data indicate, wage growth in these regions followed a similar, if in some cases less direct, path. Between 1990 and 2014, average annual wages in the *Data Processing, Hosting, and Related Services* sector increased by 258 percent in Central Virginia, 104 percent in Hampton Roads, 227 percent in Southern Virginia, 210 percent in Southwestern Virginia, and 285 percent in the Valley.

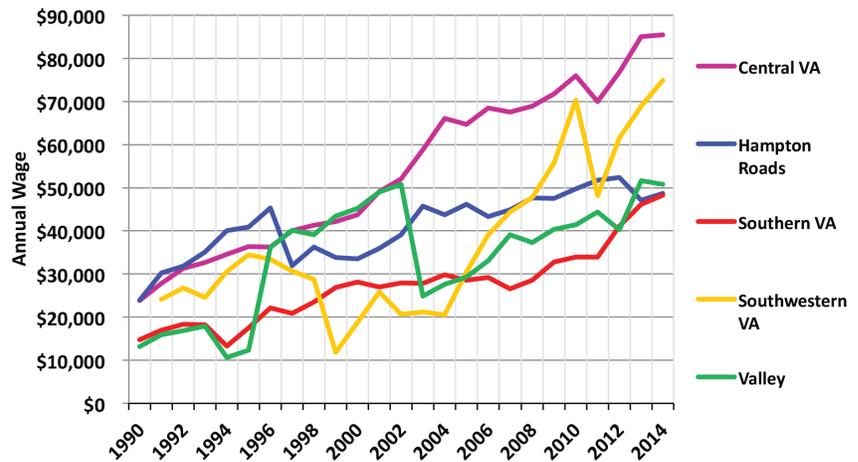


Figure 8: Data Processing, Hosting, and Related Services Private Sector Average Annual Wages – 1990 to 2014⁷

CONTRIBUTION OF DATA CENTERS TO VIRGINIA’S ECONOMY

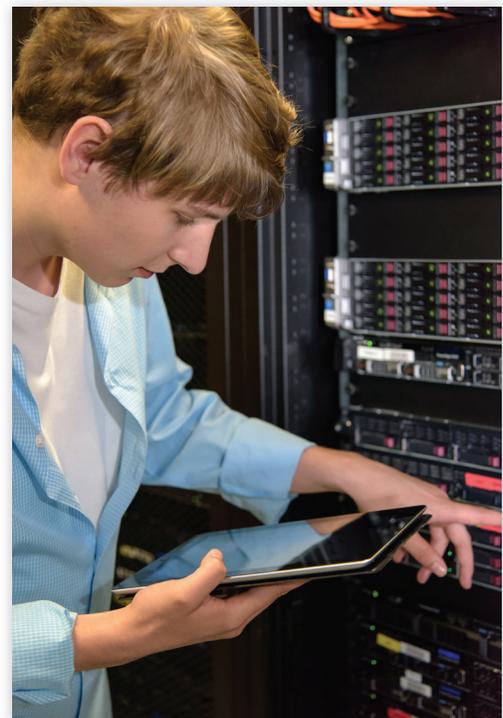
In this section, we identify and quantify some of the more salient contributions that the data center sector makes to Virginia’s economy.

Broad Geographic Economic Development Potential

In no small part because of its status as a major Internet hub, proximity to Washington D.C., and access to a highly skilled workforce, Northern Virginia is home to the largest concentration of private sector *Data Processing, Hosting, and Related Services* employment and locations in Virginia, and one of the largest in the U.S. However, as demonstrated in Figure 2 in the previous section, it is important to keep in mind that this sector is well represented in other regions of the Commonwealth as well.

Moreover, one of the trends that has manifested itself in recent years is that as Northern Virginia continues to become ever more congested, and that congestion continues to drive up the cost of land acquisition, there is a spillover effect that is leading to greater data center development in other localities within the state. One example of this trend is in Prince William County, which did not see its first data center project until 1999, but has since had 24 data center projects locate within the county. Those projects brought 706 high wage jobs to the county and resulted in \$4.3 billion in capital investment.⁸

Other examples notably include areas of the state that have been devastated by employment losses in traditional industries. For example, DP Facilities announced just this fall that it would be opening a 65,000 square foot data center in Wise County in Southwestern Virginia, an area of the state that has been hard hit by employment losses in the coal mining industry⁹. Another example is in Mecklenburg County, in Southern Virginia, an area of the state that has been devastated by employment losses in its manufacturing and tobacco industries, as well as the closure of the Mecklenburg Correctional Center in 2012. Mecklenburg County is now home to Microsoft’s \$1.3 billion Boydton data center campus, the east coast hub for Microsoft’s online services, and soon to be expanded to a \$1.7 billion facility.¹⁰



⁷Data Source: Virginia Economic Development Partnership.

⁸Data Source: Department of Economic Development, Prince William County.

⁹<http://www.timesnews.net/News/2015/11/06/DP-Facilities.html?ci=stream&lp=1&p=1>

¹⁰Data Source: Announcement, Office of Virginia Governor Terry McAuliffe, November 13, 2015.



More generally, Figure 9 depicts the top ten localities in Virginia in terms of cumulative VEDP job announcements in the *Data Processing, Hosting, and Related Services* sector for the period from January 1, 1990 through December 1, 2015, while Figure 10 provides comparable data for cumulative VEDP investment announcements. What these data clearly demonstrate is that, although Northern Virginia is well represented in these rankings, many other regions of Virginia are as well.

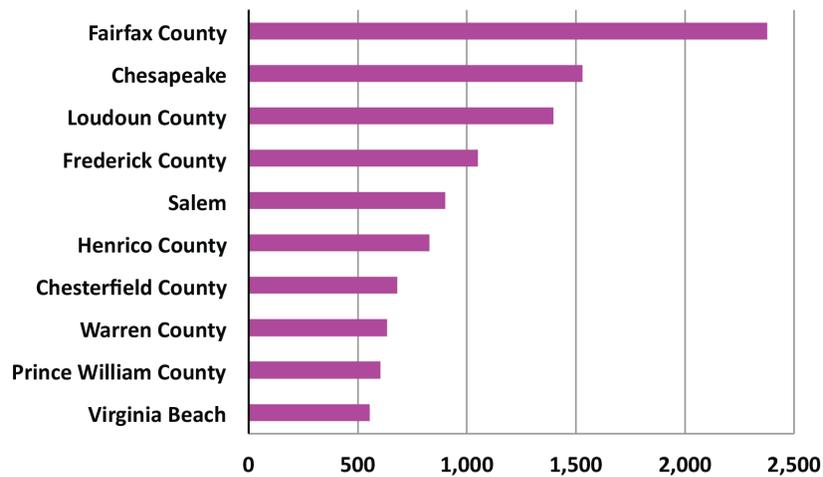


Figure 9: Top 10 Localities for Cummulative VEDP Job Announcements in *Data Processing, Hosting, and Related Services* – January 1, 1990 through December 1, 2015¹¹

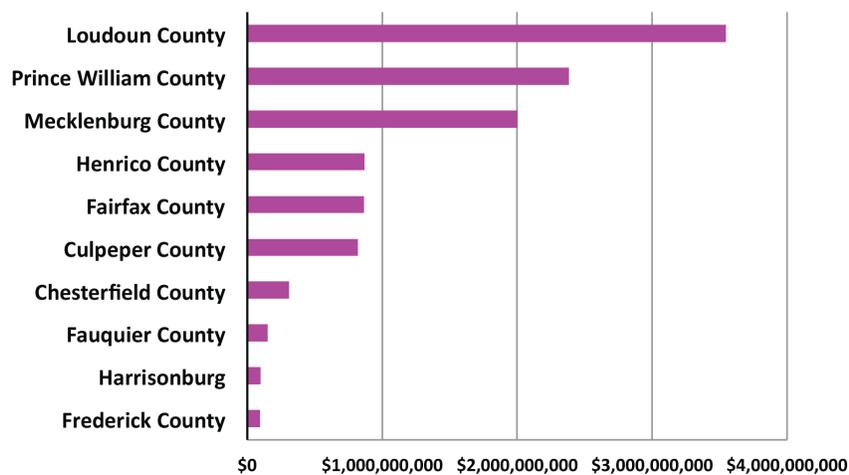


Figure 10: Top 10 Localities for Cummulative VEDP Investment Announcements in *Data Processing, Hosting, and Related Services* – January 1, 1990 through December 1, 2015¹²

^{11 12}Data Source: Virginia Economic Development Partnership.

High Performance Sector

Another key characteristic of the *Data Processing, Hosting, and Related Services* sector is that it is a high performance sector in terms of both employment and wage growth. Figure 11 presents the most recent one-year (first quarter of 2014 to first quarter of 2015) and five-year (first quarter of 2010 to first quarter of 2015) growth rates for statewide private sector employment in this industry and compares them to the comparable growth rates for total statewide employment across all industry sectors. As these data show, in terms of one-year growth rates, statewide employment in *Data Processing, Hosting, and Related Services* grew 6.7 times faster than the norm across all industries, while in terms of five-year growth rates, statewide employment in *Data Processing, Hosting, and Related Services* grew 2.5 times faster than the norm across all industries.

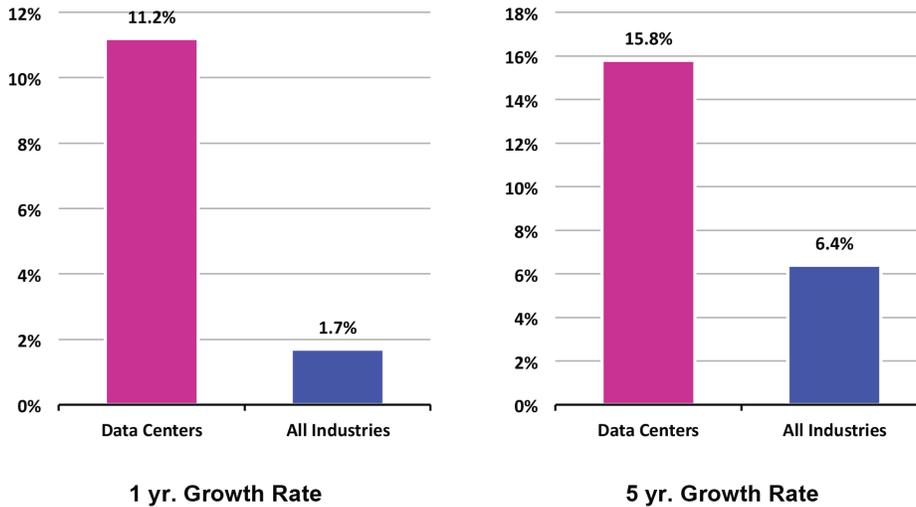


Figure 11: Statewide Growth in *Data Processing, Hosting, and Related Services* Private Sector Employment Relative to Total Private Employment across all Industries¹³

Figure 12 provides a similar comparison for one-year and five-year growth rates in average private sector weekly wages. In terms of one-year growth rates, the statewide average weekly wage in *Data Processing, Hosting, and Related Services* grew 9.3 times faster than the norm across all industries, while in terms of five-year growth rates, the statewide average weekly wage in *Data Processing, Hosting, and Related Services* grew 4.0 times faster than the norm across all industries. It also bears notice that in the first quarter of 2015, the statewide average private sector weekly wage in *Data Processing, Hosting, and Related Services* (\$2,569 per week) was 2.4 times greater than the average private sector weekly wage across all industries (\$1,067 per week).

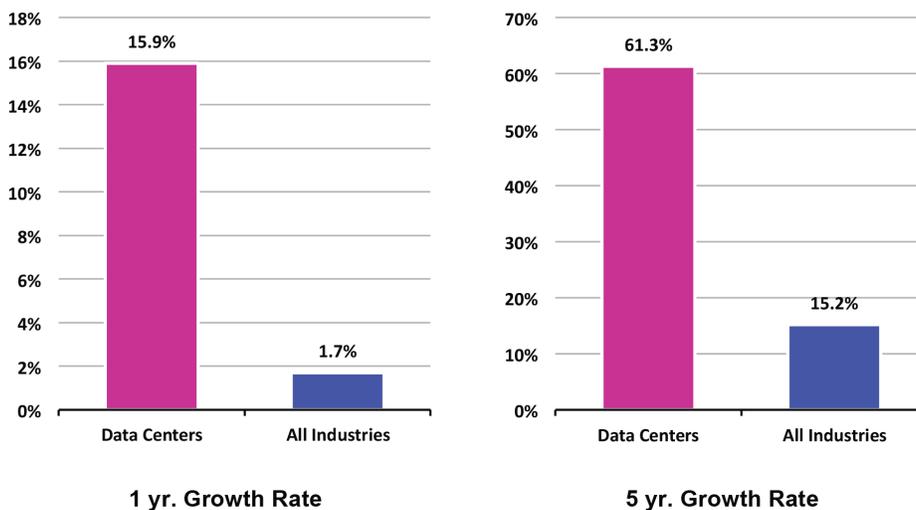


Figure 12: Statewide Growth in *Data Processing, Hosting, and Related Services* Private Sector Average Weekly Wages Relative to the Average Weekly Wage across all Industries¹⁴

¹³Data Source: Virginia Employment Commission. One year growth rates encompass the period from 2014:Q1 to 2015:Q1, while five year growth rates encompass the period from 2010:Q1 to 2015:Q1.

¹⁴Data Source: Virginia Department of Taxation and the National Association of State Budget Officers.

In short, Virginia's *Data Processing, Hosting, and Related Services* sector is a fast growing sector, that pays high wages, and those wages are rising at a rate that far outstrips the norm for Virginia's economy. The latter is an important point from the state's perspective, not only because it fosters broader economic prosperity, but because Virginia is much more dependent on individual income tax as a revenue source than most states. In 2014, Virginia derived 68 percent of its overall revenue collections from individual income tax, while the norm across all states was closer to 42 percent that year.¹⁵

In addition, Virginia's *Data Processing, Hosting, and Related Services* sector is generally a high performer even relative to other states' *Data Processing, Hosting, and Related Services* sectors. If we use the same metrics to compare Virginia's performance in this sector to that of other states and the District of Columbia, what we find is that Virginia ranks:

- 15th in terms of one-year sector employment growth (4th in terms of sector growth benchmarked against each states' total employment growth),
- 32nd in terms of five-year sector employment growth (33rd in terms of sector growth benchmarked against each states' total employment growth),
- 9th in terms of one-year sector average weekly wage growth (2nd in terms of sector growth benchmarked against each states' total wage growth), and
- 9th in terms of five-year sector average weekly wage growth (5th in terms of sector growth benchmarked against each states' total wage growth).¹⁶



Although, it bears notice that Virginia's relative performance in terms of recent one-year employment growth in this sector (15th among the states) was a significant improvement over its longer period five-year employment growth (32nd among the states).

Reduces Economic Risk

Traditionally, Virginia enters a recession later than the country as a whole, is less adversely affected than the country as a whole, and comes out of the recession sooner than the country as a whole. In that regard, the Great Recession of 2007 impacted the state about as one would expect. Where things went wrong, however, was during the "recovery."

Figure 13 compares the year-over-year change in total private sector employment in Virginia to that of the U.S. as a whole from January of 2008 through March of 2015. Any point above the zero line in this graph indicates positive year-over-year employment growth, while any point below the zero line indicates a decline in year-over-year employment. This graph clearly shows the impact of the "Great Recession of 2007" as employment growth moved into negative territory in early 2008, bottomed out in late 2009, and did not move back into positive territory until late 2010. Although, as these data indicate, throughout that period Virginia continued to do better than the nation as a whole.

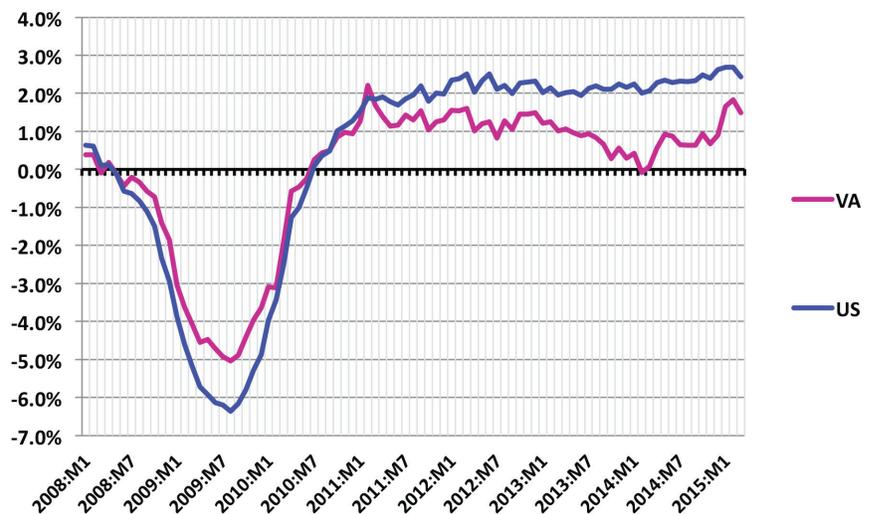


Figure 13: Year-over-Year Change in Private Sector Employment – January 2008 to January 2015¹⁷

¹⁵Data Source: Virginia Employment Commission. One year growth rates encompass the period from 2014:Q1 to 2015:Q1, while five year growth rates encompass the period from 2010:Q1 to 2015:Q1.

¹⁶Data Source: U.S. Bureau of Labor Statistics. One year growth rates encompass the period from 2013 to 2014, while five year growth rates encompass the period from 2009 to 2014.

¹⁷Data Source: U.S. Bureau of Economic Analysis.

However, starting in mid-2011 that situation changed and Virginia started under-performing the nation as a whole. Moreover, in 2013 that divergence in trend became much more acute. That shift has generally been attributed to the effect of the 2013 federal sequester, which had a disproportionately large negative impact on Department of Defense contracting expenditures, which in turn had a disproportionately large negative impact on Northern Virginia's *Professional and Business Services* sector (in 2013, federal government expenditures in national defense fell to 91 percent of their 2009 level, and have continued to fall since, dropping to 86 percent of their 2009 level in the third quarter of 2015).¹⁸ And because Northern Virginia accounts for more than a third of total employment in Virginia, as goes Northern Virginia, so goes the state.

The significant and unusual negative impact that this turn of events had on Virginia led many to realize that, to reduce its economic risk profile, the Commonwealth needed to rebalance its economic portfolio and reduce its dependence on federal government expenditures. Among those who came to this conclusion was Governor Terry McAuliffe, whose announced economic strategy in his *New Virginia Economy* plan made clear that, "Virginia must take action now to catalyze the growth of the private, nonpublic dependent components of its economy."

In this regard, it is instructive to note that not all of Northern Virginia was equally affected by the sequester. Figure 14 depicts the year-over-year change in total private sector employment in the Northern Virginia localities of the City of Alexandria, Arlington County, and Fairfax County from the first quarter of 2008 through the first quarter of 2015. The general characteristics of these trend lines are quite similar to the earlier trend line for Virginia as a whole. In both cases, they demonstrate the significant negative impact of both the "Great Recession of 2007" and the federal sequester of 2013.

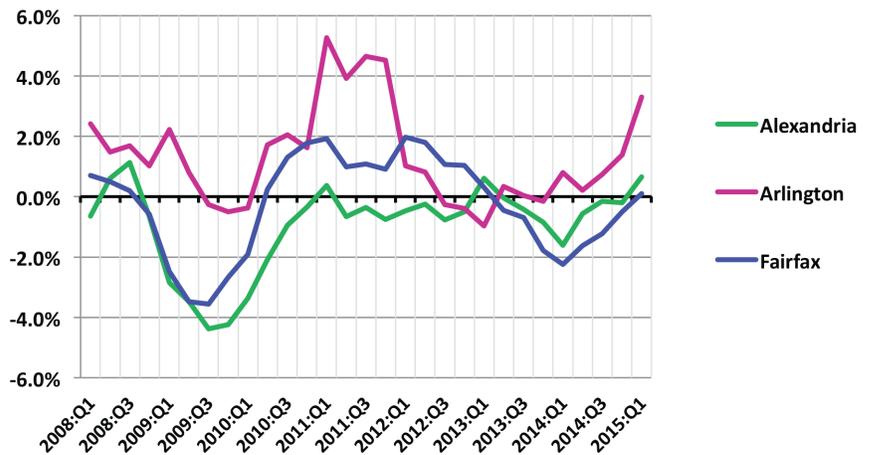


Figure 14: Year-over-Year Change in Private Sector Employment – First Quarter of 2008 to First Quarter of 2015¹⁹

Figure 15 presents comparable year-over-year change in total private sector employment data for the Northern Virginia localities of Loudoun County and Prince William County. Although these trend lines are similar to the others in regard to the impact of the "Great Recession of 2007," they are noticeably dissimilar when it comes to the federal sequester of 2013. Quite plainly – unlike the City of Alexandria, Arlington County, and Fairfax County – Loudoun County and Prince William County did not experience a contemporaneous decline in total private sector employment during the federal sequester of 2013.

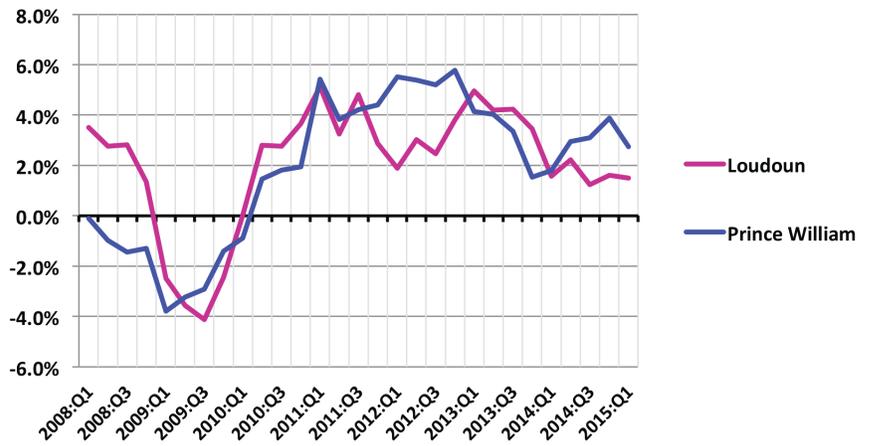


Figure 15: Year-over-Year Change in Private Sector Employment – First Quarter of 2008 to First Quarter of 2015²⁰

¹⁸Data Source: U.S. Bureau of Labor Statistics.

^{19,20}Data Source: Virginia Employment Commission.

Although it is beyond the scope of this report to comprehensively assess why Loudoun County and Prince William County were not adversely impacted by the 2013 federal sequester in the same way that other Northern Virginia localities were, one likely reason has to do with differences in the relative significance of their *Data Processing, Hosting, and Related Services* sectors. Figure 16 highlights one of those key differences by depicting each of these localities' five-year growth rates for private sector employment in *Data Processing, Hosting, and Related Services*.

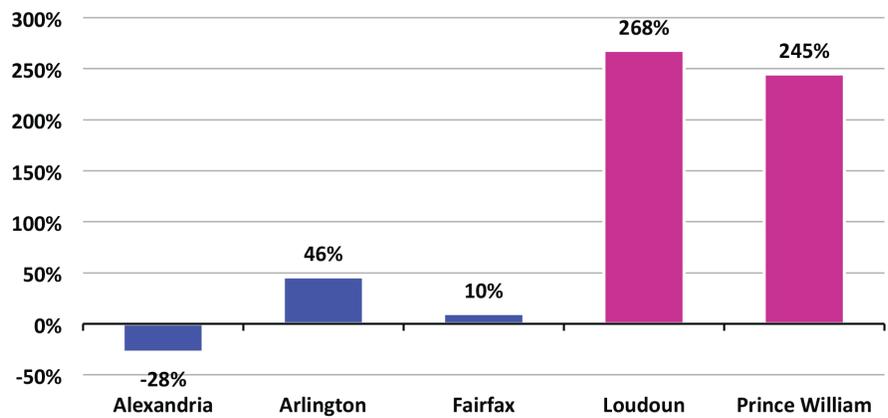


Figure 16: Five-Year Growth in *Data Processing, Hosting, and Related Services* Private Sector Employment²¹



Drives Technology Cluster Development

In the modern economy, one of the key resources that drives economic location decisions is access to a skilled workforce and this is particularly true of technology firms for which human capital is often their most critical resource need. As a result, technology industries with similar workforce requirements tend to cluster together to take advantage of a common workforce pool, in the same way that manufacturers often cluster together to take advantage of a common natural resource.

Table 1 lists ten key occupations in Virginia's *Data Processing, Hosting, and Related Services* sector that collectively account for almost half of all employment in that industry. These data are taken from an industry staffing matrix produced by the Virginia Employment Commission and reflect estimated statewide industry-level staffing patterns in 2014.

| Occupation | % of Industry Employment |
|---|--------------------------|
| Computer and Information Systems Managers | 2.8% |
| Computer Operators | 1.8% |
| Computer Programmers | 0.9% |
| Computer Systems Analysts | 10.8% |
| Computer User Support Specialists | 8.4% |
| Information Security Analysts | 2.7% |
| Management Analysts | 4.1% |
| Network and Computer Systems Administrators | 7.0% |
| Software Developers, Applications | 2.9% |
| Software Developers, Systems Software | 3.1% |
| TOTAL | 44.4% |

Table 1: Ten Key Occupations in Virginia's *Data Processing, Hosting, and Related Services* Sector²²

²¹Data Source: Virginia Employment Commission. These growth rates encompass the period from the first quarter of 2010 through the first quarter of 2015.

²²Data Source: Virginia Employment Commission.

Based on that same staffing matrix, Table 2 lists the top ten industries in Virginia, in addition to *Data Processing, Hosting, and Related Services*, that employ a large proportion of individuals in these ten specific occupations. Table 2 also lists the statewide average private sector weekly wage for each of these industries as of the first quarter of 2015, and then compares that wage to the average private sector weekly wage across all industries that quarter. What these data clearly indicate is that the industries that most heavily rely on the same workforce pool as *Data Processing, Hosting, and Related Services* are, like that sector, very high paying industries. More specifically, they pay wages that range from 159 percent to 275 percent above the prevailing statewide wage.

The question remains, however, whether there is anything other than theory to indicate that these industries actually do tend to cluster together to take advantage of a common workforce pool. Table 3 provides the answer to that question. Focusing on Northern Virginia, where the largest concentration of private sector employment in *Data Processing, Hosting, and Related Services* in Virginia is located, Table 3 lists the regional employment, and the regional employment location quotient, for the ten industries listed in Table 2, along with *Data Processing, Hosting, and Related Services*. A location quotient measures the size

| Industry | Average Weekly Wage | As % of Average Wage across All Industries |
|--|---------------------|--|
| Architectural, Engineering, and Related Services | \$1,845 | 173% |
| Computer Systems Design and Related Services | \$2,271 | 213% |
| Credit Intermediation and Related Activities | \$1,898 | 178% |
| Insurance Carriers and Related Activities | \$1,695 | 159% |
| Management of Companies and Enterprises | \$2,938 | 275% |
| Management, Scientific, and Technical Consult | \$2,009 | 188% |
| Other Information Services | \$2,864 | 268% |
| Scientific Research and Development Services | \$2,135 | 200% |
| Software Publishers | \$2,779 | 260% |
| Telecommunications | \$2,644 | 248% |

Table 2: Top Ten Industries Employing the Occupations Listed in Table 1 Statewide (exclusive of *Data Processing, Hosting, and Related Services*)²³

| Industry | Regional Employment in 2015:Q1 | Employment Location Quotient |
|---|--------------------------------|------------------------------|
| Architectural, Engineering, and Related Services | 26,995 | 1.6 |
| Computer Systems Design and Related Services | 105,246 | 2.2 |
| Credit Intermediation and Related Activities | 22,868 | 1.0 |
| Data Processing, Hosting, and Related Services | 8,781 | 2.2 |
| Insurance Carriers and Related Activities | 7,503 | 0.5 |
| Management of Companies and Enterprises | 25,056 | 1.0 |
| Management, Scientific, and Technical Consulting | 51,656 | 2.3 |
| Other Information Services | 2,315 | 1.9 |
| Scientific Research and Development Services | 13,582 | 1.8 |
| Software Publishers | 3,430 | 2.1 |
| Telecommunications | 14,968 | 1.8 |

Table 3: Employment Location Quotients for Top Ten Industries Listed in Table 2 and *Data Processing, Hosting, and Related Services* in Northern Virginia²⁴

²³Data Source: Virginia Employment Commission.

²⁴Data Source: Virginia Employment Commission. For purposes of this Table, Northern Virginia is defined as the combined workforce investment areas of Alexandria/Arlington and Northern Virginia. In combination, these workforce investment areas encompass the counties of Arlington, Fairfax, Loudoun, and Prince William, and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park.

of an industry's employment footprint in an area relative to what one would otherwise expect based on the statewide norm. If the location quotient is greater than 1.0, that indicates that the industry's employment footprint is larger than would be expected, and if it is less than 1.0 that indicates it is smaller than would be expected.

As the data presented in Table 3 indicate, seven of the ten industries listed in Table 2 have an employment footprint in Northern Virginia that is larger than one would expect based on the statewide norm – in most cases, twice the size of what one would expect. In addition, it is also important to note that in combination these seven industries and *Data Processing, Hosting, and Related Services* employ a very large number of people within the region – collectively they accounted for 226,973 jobs in Northern Virginia in the first quarter of 2015, or nearly a quarter of total private sector employment in the region. In short, these data are consistent with the hypothesis that *Data Processing, Hosting, and Related Services* sector is a high paying industry that makes a region more attractive to other high paying industries that must draw from the same highly skilled workforce pool.

Drives Large Capital Investment

One of the observations that was made earlier in this report is that *Data Processing, Hosting, and Related Services* is a very capital-intensive sector, and that high capital to labor ratio means that it typically employs a relatively small number of highly skilled and highly paid individuals. Another aspect of this sector's capital intensity, however, is that it is responsible for very large capital investments. Figure 17 depicts VEDP investment announcements in *Data Processing, Hosting, and Related Services* for the period from January 1, 1990 through December 1, 2015. As these data demonstrate, since 2009 those investment announcements have averaged \$1.3 billion per year and reached a high of \$2.0 billion in 2014.

Figure 18 provides an additional perspective on these *Data Processing, Hosting, and Related Services* investment data by presenting them as a percentage of total VEDP Investment announcements over the same period. As these data clearly demonstrate, particularly since 2009, that proportion is very high – ranging from 32 percent of total statewide investment announced in 2012 to 56 percent of total statewide investment announced in 2010. Moreover, just as the high wages paid by this sector have a large positive impact on the state's largest source of tax revenue (individual income tax), as will be shown in the next portion of this section, this disproportionately high level of capital investment has a large positive impact on localities' largest source of tax revenue (property tax).

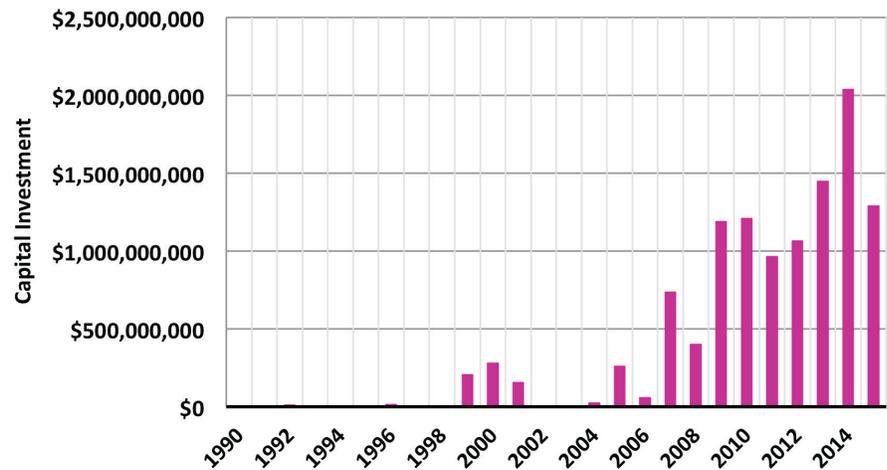


Figure 17: VEDP Investment Announcements for *Data Processing, Hosting, and Related Services* – January 1, 1990 through December 1, 2015²⁵

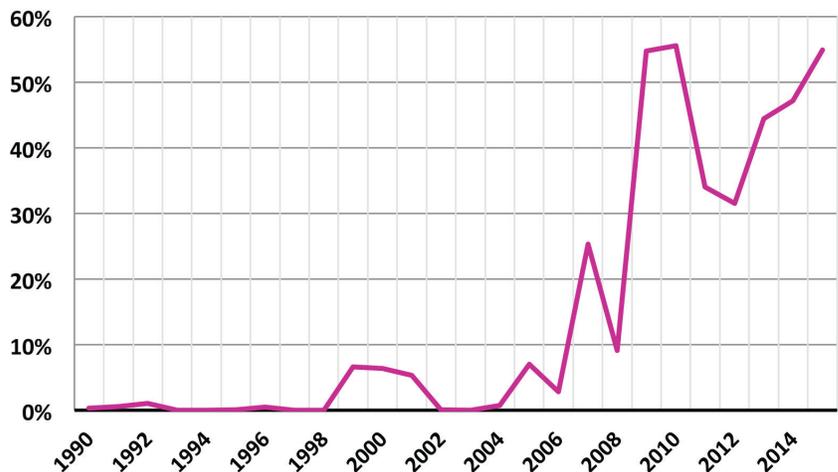


Figure 18: VEDP Investment Announcements for *Data Processing, Hosting, and Related Services* as a Proportion of Total Investment Announcements – January 1, 1990 through December 1, 2015²⁶

^{25, 26}Data Source: Virginia Economic Development Partnership.

Enhances Business Climate

As alluded to above, because *Data Processing, Hosting, and Related Services* is a very capital-intensive sector, it has a disproportionately positive impact on localities' largest source of tax revenue (property tax). But what might not be immediately obvious from that relationship is that this also places downward pressure on overall tax rates, thereby improving not only the locality's business climate and economic attractiveness, but the state of Virginia's as well.

BENEFIT/COST RATIO

In this portion of the section, we evaluate the benefit/cost ratio that the *Data Processing, Hosting, and Related Services* sector provides to localities. To accomplish that task we focus on Loudoun County and Prince William County, home of the most significant concentrations of *Data Processing, Hosting, and Related Services* activity in Northern Virginia. Another reason for using these counties as an example is that we are able to take advantage of fiscal impact data provided by county personnel to better quantify the local fiscal benefit associated with this sector. Importantly, those data include fiscal impact assessments for both enterprise data centers that are owned and occupied by a single entity, and co-location data centers that lease space to one or more tenants.²⁷ According to these data, the estimated fiscal impact of data center facilities in 2014 was approximately \$104.2 million in Loudoun County, and \$11.5 million in Prince William County.²⁸

On the other side of the ledger, to quantify the fiscal cost that the *Data Processing, Hosting, and Related Services* sector imposed on Loudoun County and Prince William County in 2014, we rely on data from the Virginia Department of Education on local elementary and secondary education expenditures per student, and data from the Virginia Auditor of Public Accounts on local non-education expenditures per county resident. Through this approach, we focus on the largest costs that any business imposes on a local government, which are the cost associated with providing primary and secondary education, and other county services, to the employees of that business.

Table 4 details the calculations used to produce our estimates of the primary fiscal cost that the *Data Processing, Hosting, and Related Services* sector imposed on Loudoun County and Prince William County in 2014. As shown in Table 4, we estimate those costs to have been approximately \$10.9 million in Loudoun County and \$2.7 million in Prince William County. As shown in Table 5, when we combine those estimates of fiscal cost with the respective \$104.2 million and \$11.5 million estimates of fiscal benefit,

| | Loudoun County | Prince William County |
|--|---------------------|-----------------------|
| County Employment in <i>Data Processing, Hosting, and Related Services</i> in 2014²⁹ | 1,558 | 348 |
| Students per Employee ³⁰ | 0.49 | 0.73 |
| Per Student County Education Expenditures ³¹ | \$8,616 | \$4,664 |
| Total Education Costs³² | \$6,638,061 | \$1,179,090 |
| County Residents per Employee ³³ | 2.28 | 3.59 |
| Per Resident Non-Education County Expenditures ³⁴ | \$1,202 | \$1,206 |
| Total Non-Education Costs³⁵ | \$4,273,771 | \$1,508,424 |
| TOTAL COSTS³⁶ | \$10,911,832 | \$2,687,514 |

Table 4: Estimate of Total Fiscal Cost Imposed by the *Data Processing, Hosting, and Related Services* Sector in 2014

²⁷The authors would like to express their profound gratitude to Buddy Rizer, Executive Director for Economic Development for Loudoun County, Robert S. Wertz, Jr., Commissioner of the Revenue for Loudoun County; Erin McLellan, Executive Director of the Department of Management and Budget Director for Loudoun County; Jeffrey Kaczmarek, Executive Director of the Department of Economic Development for Prince William County; and their staffs for their assistance in developing and providing data without which this portion of our analysis would not have been possible.

²⁸It is important to note that data for Prince William County do not include business personal property tax payments for leased equipment.

²⁹Data Source: Virginia Employment Commission.

³⁰Data Source: Virginia Department of Education and Virginia Employment Commission. Derived by dividing total county elementary and secondary school enrollment in 2014 by total county employment in 2014.

³¹Data Source: Virginia Department of Education.

³²Derived as county employment in *Data Processing, Hosting, and Related Services*, times students per employee, times per student county education expenditures.

³³Data Source: U.S. Census Bureau and Virginia Employment Commission. Derived by dividing total county population in 2014 by total county employment in 2014.

³⁴Data Source: Virginia Auditor of Public Accounts.

³⁵Derived as county employment in *Data Processing, Hosting, and Related Services*, times county residents per employee, times per resident county non-education expenditures.

³⁶Derived as total education costs and total non-education costs.

we are able to determine that the benefit/cost ratio associated with the *Data Processing, Hosting, and Related Services* sector was 9.5 in Loudoun County and 4.3 in Prince William County in 2014. This means that for every \$1.00 in county expenditures that the *Data Processing, Hosting, and Related Services* sector was responsible for generating in 2014, it provided approximately \$9.50 in tax revenue to Loudoun County, and approximately \$4.30 in tax revenue to Prince William County.

| Locality | Estimated Fiscal Benefit ³⁷ | Estimated Fiscal Cost | Benefit/Cost Ratio |
|-----------------------|--|-----------------------|--------------------|
| Loudoun County | \$104,200,000 | \$10,911,831 | 9.5 |
| Prince William County | \$11,500,000 | \$2,687,514 | 4.3 |

Table 5: Estimated Benefit/Cost Ratio Associated with the *Data Processing, Hosting, and Related Services* Sector in 2014

OPPORTUNITY COST

One of the most useful concepts in economics is the concept of opportunity cost – what is the cost of not doing something. Or in this case, what would have been the cost to these localities if their *Data Processing, Hosting, and Related Services* sectors had not existed in 2014. The obvious answer is that they would not have received the estimated \$115.7 million in county tax revenue that this sector provided in 2014 and that in order to maintain county expenditures at the same level, that revenue would have had to come from other sources. The two most likely sources would have been: 1) additional education funding from the state triggered by the negative impact that this loss in tax base would have had on the formula Virginia uses to allocate education funding to localities, and 2) an increase in each county’s real property tax rate.

On average, the state of Virginia funds 55 percent of primary and secondary education expenditures, and localities are required to locally fund the remaining 45 percent.³⁸ But, that local funding percentage is adjusted up or down based on each locality’s “ability to pay” as measured by a “composite index” formula that takes into account the locality’s property tax base, adjusted gross income, and taxable retail sales. Of these three factors, property tax base receives the highest weight (50 percent) and, therefore, has the largest influence on the final calculation.³⁹

The most recent composite index for Loudoun County was 0.5497 and for Prince William County 0.3848.⁴⁰ If we recalculate those indexes to take into account the loss of tax base implied by the \$115.7 million loss in tax revenue that would have occurred if the *Data Processing, Hosting, and Related Services* sector had not existed in these localities, those indexes fall to 0.5190 and 0.3817 respectively. As shown in Table 6, according to our estimates, this means that the state would have had to reallocate \$15.5 million in state education funding away from other Virginia localities to provide \$13.7 million in additional formula-driven funding to Loudoun County and \$1.8 million in additional funding to Prince William County. To put this number in perspective, \$15.5 million is larger than the state funded portion of 46 county school budgets in Virginia in 2014.

| Locality | Revenue Loss | State Education Funding Off-Set | Required Additional Revenue from Real Property Tax |
|-----------------------|---------------|---------------------------------|--|
| Loudoun County | \$104,200,000 | \$13,700,000 | \$90,500,000 |
| Prince William County | \$11,500,000 | \$1,800,000 | \$9,700,000 |

Table 6: Estimated Additional Revenue Required to Compensate for loss of *Data Processing, Hosting, and Related Services* Sector in 2014 by Source

³⁷Data Source: Loudoun County and Prince William County.

³⁸Data Source: In actuality, however, baseline local funding percentages are typically higher than 45 percent because of local initiatives.

³⁹Data Source: Virginia Department of Education. The actual formula weights each locality’s property tax base by 0.5, adjusted gross income by 0.4, and taxable retail sales by 0.1. Each metric is then divided by school population and total population and those per capita figures are divided by the average across all localities to determine ability to pay. The per capita figures are then themselves weighted with each per capita school population metric receiving a weight of 0.66 and each per capita population metric receiving a weight of 0.33.

⁴⁰Data Source: Virginia Department of Education.

The remaining \$100.2 million in lost tax revenue would likely have been made up through increased property taxes (by far the largest source of revenue for most localities). Figure 19 depicts our estimate of the increase in Loudoun County's and Prince William County's real property tax rates that would have been required to generate this \$100.2 million in lost tax revenue. As shown, Loudoun County's real property tax rate would have likely had to increase from \$1.135 per \$100 of assessed value to \$1.326 (a 17 percent increase) and Prince William County's would likely had to increase from \$1.122 per \$100 of assessed value to \$1.145 (a 2 percent increase).

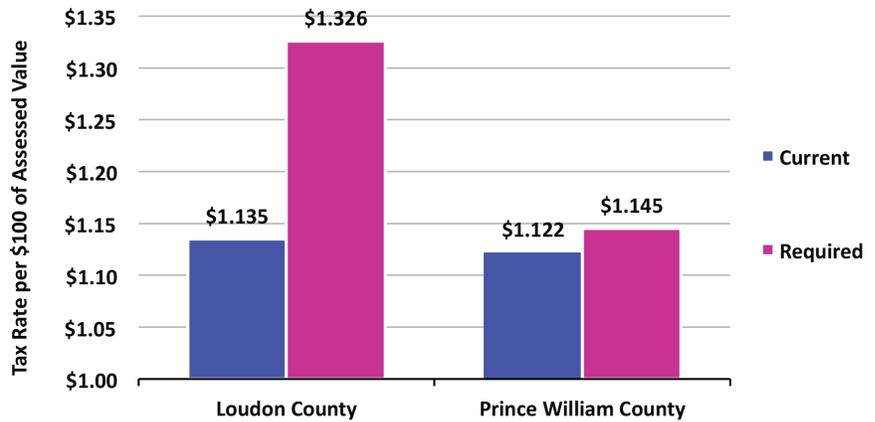


Figure 19: Estimated County Real Property Tax Rates with and without the *Data Processing, Hosting, and Related Services Sector*

EFFECT ON BUSINESS CLIMATE

In the not too distant past, Virginia typically scored at or near the top of most business climate rankings. In recent years, however, the state has lost significant ground relative to other states. Between 2010 and 2014, Virginia slipped from 2nd to 4th in Forbes' "Best States for Business" ranking, 2nd to 8th in CNBC's "America's Top States for Business" ranking, 2nd to 12th in the U.S. Chamber of Commerce's "Enterprising States" Ranking, 4th to 11th in Chief Executives' "Best and Worst States for Business" ranking, 4th to 10th in Site Selection Magazine's "Business Climate" ranking, and 2nd to 5th in Business Facilities' "Ranking Report." In most cases, these declines were largely driven by the Commonwealth's recent lackluster employment growth. But tax rates, and particularly property tax rates, have also played a role.



In the Tax Foundation's "2015 State Business Tax Climate Index," Virginia's overall state business tax climate was ranked 27th among the states, down from 23rd as recently as 2012.⁴¹ The primary reason for the Commonwealth's low ranking, was that it was ranked in the bottom half of the states with regard to individual income tax, unemployment insurance tax, and property tax rates.

In 2015, the Tax Foundation also published the "Location Matters" report that performed a more comprehensive assessment of state tax climate from the perspective of seven specific types of industries.⁴² Among those seven were capital-intensive manufacturing and labor-intensive manufacturing. According to the Tax Foundation's analysis, Virginia ranked:

- 20th among the states for mature capital-intensive manufacturers, and 49th among the states for new capital-intensive manufacturers (only Maryland was ranked worse than Virginia); and
- 2nd among the states for mature labor-intensive manufacturers, and 36th among the states for new labor-intensive manufacturers.

In explaining why Virginia was ranked so much more poorly for new firms as opposed to mature firms, and capital-intensive industries as opposed to labor-intensive industries, the Tax Foundation made clear that Virginia's, "high property taxes on equipment drive tax burdens on some firms, with a particularly dramatic effect on new operations." Later focusing more succinctly on new operations, they went on to say that new firms experience, "heavy property tax burdens due to the state's tax on equipment, which is more than double the national average."⁴³

⁴¹Scott Drenkard and Joseph Henchman, "2015 State Business Tax Climate Index," Tax Foundation, 2015.

⁴²Tax Foundation and KPMG, "Location Matters: The State Tax Costs of Doing Business," 2015.

⁴³Tax Foundation and KPMG, "Location Matters: The State Tax Costs of Doing Business," 2015, p.70.



These findings are of particular relevance to the capital-intensive *Data Processing, Hosting, and Related Services* sector in two ways. First, they point to the important role that property taxes play in general in business attraction and retention. As we have demonstrated, because the *Data Processing, Hosting, and Related Services* sector provides such a high benefit-cost ratio to localities it enables them to maintain lower overall property tax rates than would otherwise be the case. This fosters a more favorable business climate for all businesses.

Second, these findings make clear that Virginia is already at a significant competitive disadvantage relative to other states in regard to property taxes on equipment specifically. This is of particular significance to the *Data Processing, Hosting, and Related Services* sector, as these firms are not only extremely capital-intensive, but also must generally replace their capital equipment on an unusually short three to four year cycle. As a result, any further exacerbation of Virginia's already significant competitive disadvantage in regard to taxes on capital equipment could have a disproportionately negative impact on the *Data Processing, Hosting, and Related Services* sector specifically.

ECONOMIC AND FISCAL IMPACT

In this section, we quantify the economic and fiscal contribution that the *Data Processing, Hosting, and Related Services* sector makes to the Commonwealth of Virginia as a whole, and to the six sub-state regions employed by VEDP and identified earlier in this report individually.

Method

To empirically evaluate the statewide and regional economic and fiscal impact attributable to the *Data Processing, Hosting, and Related Services* sector, we employ a commonly used regional economic impact model called IMPLAN.⁴⁴ The IMPLAN model uses regional and national production and trade flow data to construct region- and industry-specific economic multipliers and uses these multipliers to quantify economic impact. For purposes of this analysis, we have further customized these internal IMPLAN assumptions based on proprietary data provided by a sub-set of Virginia data center firms to ensure that the specific model specifications we use reflect actual conditions within Virginia's *Data Processing, Hosting, and Related Services* sector as closely as possible.

Economic multipliers measure the ripple effects that an expenditure has as it makes its way through the economy. For example, as when data centers purchase goods and services – or when data center employees use their salaries and wages to make household purchases – thereby generating income for someone else, which is in turn spent, thereby becoming income for yet someone else, and so on, and so on. Through this process, one dollar in expenditures generates multiple dollars of income. The mathematical relationship between the initial expenditure and the total income generated is the economic multiplier. The economic result of these ripple effects is called indirect impact when it refers to business to business transactions, and induced impact when it refers to household (employee) to business transactions.

In the analysis that follows, we also provide estimates for four categories of impact. The first is employment, or the number of jobs that are created. The second is labor income, or the salaries and wages associated with those jobs. The third is economic output, or the total amount of economic activity that is created in the economy. The fourth is fiscal impact, or the total tax dollars that are generated by that economic activity.

⁴⁴IMPLAN v.3 is produced by Minnesota IMPLAN Group, Inc.



Results

VIRGINIA

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on the state of Virginia as a whole in 2014, we employ the following assumptions:

- Statewide employment in this sector was 12,533 in 2014.⁴⁵
- Employer expenditures for employee health and dental insurance were \$104,894,790 in 2014.⁴⁶

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 7. As these data indicate, in addition to directly providing 12,533 jobs, \$1.4 billion in associated wages and salaries, and \$4.3 billion in statewide economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within Virginia: 1) 23,510 additional full-time-equivalent jobs, 2) \$1.2 billion in additional associated labor income, and 3) \$4.3 billion in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on Virginia was: 1) 36,043 jobs, 2) \$2.7 billion in labor income, and 3) \$8.6 billion in economic output.⁴⁷ Finally, this economic activity was also responsible for generating a total of \$298.9 million in state and local tax revenue and \$644.1 million in federal tax revenue, for a total fiscal impact of \$943.0 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|----------------------|------------------------|------------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 12,533 | \$1,444,536,630 | \$4,297,692,492 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 22,118 | \$1,132,568,787 | \$4,140,597,851 |
| Health Services | 1,392 | \$106,781,405 | \$203,601,146 |
| Total Second Round Activity* | 23,510 | \$1,239,350,192 | \$4,344,198,997 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 36,043 | \$2,683,886,822 | \$8,641,891,489 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$298,897,212 | \$644,118,050 | \$943,015,262 |

*May not sum due to rounding.

Table 7: Estimated Economic and Fiscal Impact of the Data Processing, Hosting, and Related Services Sector on Virginia in 2014

⁴⁵Data Source: Virginia Employment Commission

⁴⁶Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁴⁷It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.

NORTHERN VIRGINIA

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on Northern Virginia in 2014, we employ the following assumptions:

- Regional employment in this sector was 8,642 in 2014.⁴⁸
- Employer expenditures for employee health and dental insurance were \$83,068,701 in 2014.⁴⁹

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 8. As shown, in addition to directly providing 8,642 jobs, \$1.2 billion in associated wages and salaries, and \$3.2 billion in regional economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within Northern Virginia: 1) 13,353 additional full-time-equivalent jobs, 2) \$814.0 million in additional associated labor income, and 3) \$2.6 billion in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on Northern Virginia was: 1) 21,995 jobs, 2) \$2.0 billion in labor income, and 3) \$5.7 billion in economic output.⁵⁰ Finally, this economic activity was also responsible for generating a total of \$180.2 million in state and local tax revenue and \$457.5 million in federal tax revenue, for a total fiscal impact of \$637.7 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|----------------------|------------------------|------------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 8,642 | \$1,168,494,947 | \$3,165,265,933 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 12,386 | \$730,504,291 | \$2,425,437,679 |
| Health Services | 967 | \$83,529,712 | \$149,707,907 |
| Total Second Round Activity* | 13,353 | \$814,034,003 | \$2,575,145,586 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 21,995 | \$1,982,528,950 | \$5,740,411,519 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$180,232,968 | \$457,499,264 | \$637,732,232 |

*May not sum due to rounding.

Table 8: Estimated Economic and Fiscal Impact of the Data Processing, Hosting, and Related Services Sector on Northern Virginia in 2014



⁴⁸Data Source: Virginia Employment Commission

⁴⁹Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁵⁰It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.



CENTRAL VIRGINIA

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on Central Virginia in 2014, we employ the following assumptions:

- Regional employment in this sector was 1,362 in 2014.⁵¹
- Employer expenditures for employee health and dental insurance were \$9,198,462 in 2014.⁵²

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 9. As these data demonstrate, in addition to directly providing 1,362 jobs, \$98.1 million in associated wages and salaries, and \$398.1 million in regional economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within Central Virginia: 1) 2,612 additional full-time-equivalent jobs, 2) \$127.1 million in additional associated labor income, and 3) \$487.7 million in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on Central Virginia was: 1) 3,974 jobs, 2) \$225.2 million in labor income, and 3) \$885.9 million in economic output.⁵³ Finally, this economic activity was also responsible for generating a total of \$31.7 million in state and local tax revenue and \$59.4 million in federal tax revenue, for a total fiscal impact of \$91.2 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|---------------------|----------------------|----------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 1,362 | \$98,095,334 | \$398,105,309 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 2,484 | \$117,432,816 | \$469,004,636 |
| Health Services | 128 | \$9,685,900 | \$18,741,321 |
| Total Second Round Activity* | 2,612 | \$127,118,716 | \$487,745,957 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 3,974 | \$225,214,050 | \$885,851,266 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$31,737,286 | \$59,432,219 | \$91,169,505 |

*May not sum due to rounding.

Table 9: Estimated Economic and Fiscal Impact of the *Data Processing, Hosting, and Related Services* Sector on Central Virginia in 2014

⁵¹Data Source: Virginia Employment Commission

⁵²Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁵³It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.

HAMPTON ROADS

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on Hampton Roads in 2014, we employ the following assumptions:

- Regional employment in this sector was 1,352 in 2014.⁵⁴
- Employer expenditures for employee health and dental insurance were \$5,194,995 in 2014.⁵⁵

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 10. As these data indicate, in addition to directly providing 1,352 jobs, \$101.1 million in associated wages and salaries, and \$399.5 million in regional economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within Hampton Roads: 1) 1,981 additional full-time-equivalent jobs, 2) \$84.8 million in additional associated labor income, and 3) \$332.2 million in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on Hampton Roads was: 1) 3,333 jobs, 2) \$185.9 million in labor income, and 3) \$731.7 million in economic output.⁵⁶ Finally, this economic activity was also responsible for generating a total of \$23.6 million in state and local tax revenue and \$44.3 million in federal tax revenue, for a total fiscal impact of \$68.0 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|----------------------|------------------------|------------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 8,642 | \$1,168,494,947 | \$3,165,265,933 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 12,386 | \$730,504,291 | \$2,425,437,679 |
| Health Services | 967 | \$83,529,712 | \$149,707,907 |
| Total Second Round Activity* | 13,353 | \$814,034,003 | \$2,575,145,586 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 21,995 | \$1,982,528,950 | \$5,740,411,519 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$180,232,968 | \$457,499,264 | \$637,732,232 |

*May not sum due to rounding.

Table 10: Estimated Economic and Fiscal Impact of the *Data Processing, Hosting, and Related Services* Sector on Hampton Roads in 2014



⁵⁴Data Source: Virginia Employment Commission

⁵⁵Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁵⁶It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.



SOUTHERN VIRGINIA

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on Southern Virginia in 2014, we employ the following assumptions:

- Regional employment in this sector was 440 in 2014.⁵⁷
- Employer expenditures for employee health and dental insurance were \$1,680,720 in 2014.⁵⁸

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 11. As shown, in addition to directly providing 440 jobs, \$20.2 million in associated wages and salaries, and \$115.4 million in regional economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within Southern Virginia: 1) 562 additional full-time-equivalent jobs, 2) \$20.6 million in additional associated labor income, and 3) \$80.7 million in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on Southern Virginia was: 1) 1,002 jobs, 2) \$40.8 million in labor income, and 3) \$196.0 million in economic output.⁵⁹ Finally, this economic activity was also responsible for generating a total of \$6.3 million in state and local tax revenue and \$10.3 million in federal tax revenue, for a total fiscal impact of \$16.6 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|--------------------|---------------------|----------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 440 | \$20,215,052 | \$115,350,433 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 540 | \$19,127,405 | \$77,956,548 |
| Health Services | 22 | \$1,441,001 | \$2,723,177 |
| Total Second Round Activity* | 562 | \$20,568,406 | \$80,679,725 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 1,002 | \$40,783,458 | \$196,030,158 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$6,299,908 | \$10,255,682 | \$16,555,590 |

*May not sum due to rounding.

Table 11: Estimated Economic and Fiscal Impact of the *Data Processing, Hosting, and Related Services* Sector on Southern Virginia in 2014

⁵⁷Data Source: Virginia Employment Commission

⁵⁸Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁵⁹It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.

SOUTHWESTERN VIRGINIA

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on Southwestern Virginia in 2014, we employ the following assumptions:

- Regional employment in this sector was 253 in 2014.⁶⁰
- Employer expenditures for employee health and dental insurance were \$1,496,028 in 2014.⁶¹

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 12. As shown, in addition to directly providing 253 jobs, \$7.9 million in associated wages and salaries, and \$62.0 million in regional economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within Southwestern Virginia: 1) 246 additional full-time-equivalent jobs, 2) \$9.4 million in additional associated labor income, and 3) \$35.0 million in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on Southwestern Virginia was: 1) 499 jobs, 2) \$17.3 million in labor income, and 3) \$96.9 million in economic output.⁶² Finally, this economic activity was also responsible for generating a total of \$2.8 million in state and local tax revenue and \$4.4 million in federal tax revenue, for a total fiscal impact of \$7.2 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|--------------------|---------------------|---------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 253 | \$7,928,073 | \$61,967,253 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 227 | \$8,180,814 | \$32,662,259 |
| Health Services | 19 | \$1,182,734 | \$2,288,656 |
| Total Second Round Activity* | 246 | \$9,363,548 | \$34,950,915 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 499 | \$17,291,621 | \$96,918,168 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$2,770,507 | \$4,388,600 | \$7,159,107 |

*May not sum due to rounding.

Table 12: Estimated Economic and Fiscal Impact of the *Data Processing, Hosting, and Related Services* Sector on Southwestern Virginia in 2014



⁶⁰Data Source: Virginia Employment Commission

⁶¹Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁶²It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.



VALLEY

In conducting our analysis of the annual economic and fiscal impact that the *Data Processing, Hosting, and Related Services* sector had on Valley in 2014, we employ the following assumptions:

- Regional employment in this sector was 102 in 2014.⁶³
- Employer expenditures for employee health and dental insurance were \$407,262 in 2014.⁶⁴

By feeding these assumptions into the IMPLAN model, we obtain the estimates of annual economic and fiscal impact shown in Table 13. As shown, in addition to directly providing 102 jobs, \$5.9 million in associated wages and salaries, and \$28.1 million in regional economic output in 2014, the *Data Processing, Hosting, and Related Services* sector was also responsible for generating the following second round indirect and induced economic activity within the Valley: 1) 150 additional full-time-equivalent jobs, 2) \$6.1 million in additional associated labor income, and 3) \$22.3 million in additional economic output. In combination, this means that the *Data Processing, Hosting, and Related Services* sector's total 2014 economic impact on the Valley was: 1) 252 jobs, 2) \$12.0 million in labor income, and 3) \$50.4 million in economic output.⁶⁵ Finally, this economic activity was also responsible for generating a total of \$1.6 million in state and local tax revenue and \$2.9 million in federal tax revenue, for a total fiscal impact of \$4.5 million in 2014.

| <i>First Round Direct Economic Activity</i> | | | |
|---|--------------------|---------------------|---------------------|
| | Employment | Labor Income | Output |
| Total First Round Activity | 102 | \$5,856,080 | \$28,070,838 |
| <i>Second Round Indirect and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| Operations | 145 | \$5,726,153 | \$21,561,532 |
| Health Services | 6 | \$380,623 | \$738,827 |
| Total Second Round Activity* | 150 | \$6,106,776 | \$22,300,359 |
| <i>Total, Direct, Indirect, and Induced Economic Activity</i> | | | |
| | Employment | Labor Income | Output |
| TOTAL Economic Activity* | 252 | \$11,962,856 | \$50,371,197 |
| <i>Total Fiscal Activity</i> | | | |
| | State and Local | Federal | Total |
| TOTAL Fiscal Impact | \$1,603,264 | \$2,873,715 | \$4,476,979 |

*May not sum due to rounding.

Table 13: Estimated Economic and Fiscal Impact of the *Data Processing, Hosting, and Related Services* Sector on the Valley in 2014

⁶³Data Source: Virginia Employment Commission

⁶⁴Estimated based on proprietary data provided by a sub-set of Virginia data centers.

⁶⁵It is important to note that this estimate of total economic impact is based on *Data Processing, Hosting, and Related Services* operations only. Due to a lack of data availability, it does not include expenditures for capital construction or capital equipment purchases. As demonstrated in Figure 16 of this report, those expenditures are in many years quite substantial. As a result, the economic and fiscal impact assessments presented in this report should be considered highly conservative.

ROLE OF INCENTIVES

Data center location choices generally depend on several main factors: electricity availability and price, fiber availability and capacity, real estate price, water availability, exposure to environmental risks (earthquake, hurricane, etc.), skilled labor availability, and taxes. In the short run, it is difficult for a location to change most of those factors. However, taxes are the easiest to affect, and the enactment and updating of state tax incentives often has a significant impact on data center location decisions.

The Virginia Data Center Incentive

In 2009, Apple decided to build a \$1 billion data center in Maiden, NC instead of Virginia.⁶⁶ Both states had vied for the facility.⁶⁷ But after Apple indicated that it was leaning toward a Virginia location⁶⁸, the North Carolina legislature enacted tax incentives to secure the Apple facility.⁶⁹ In response to that loss, the Virginia General Assembly voted unanimously to make data center facilities eligible for a sales and use tax exemption on computer equipment if they met certain criteria, which included \$150 million in new investment and 50 new jobs that paid wages that were 50 percent above the prevailing local wage (that job requirement was reduced to 25 in economically disadvantaged areas). Shortly after that incentive became effective, Microsoft announced its intention to build its Boydton data center campus, the east coast hub for Microsoft's online services, in Mecklenburg County.

In 2010, Virginia legislators expanded the definition of qualified equipment to include servers, routers, generators, chillers and other enabling hardware. Then in 2012, the incentive was amended again to allow co-location data center facilities to aggregate the capital investment and new job requirements of the data center owner and its tenants. These updates were enacted to keep Virginia competitive in the data center location market. However, these incentives are scheduled to expire on June 30, 2020.

Incentives Vary Among States and are Often Updated

Before Virginia enacted its data center incentive in 2009, only seven states had incentives. Today 27 states have incentives that are specifically targeted at attracting data centers. Figure 20 provides a map of the U.S. in which these states are shaded in red, while the intensity of the color indicates how recently each state took action relating to the incentive.

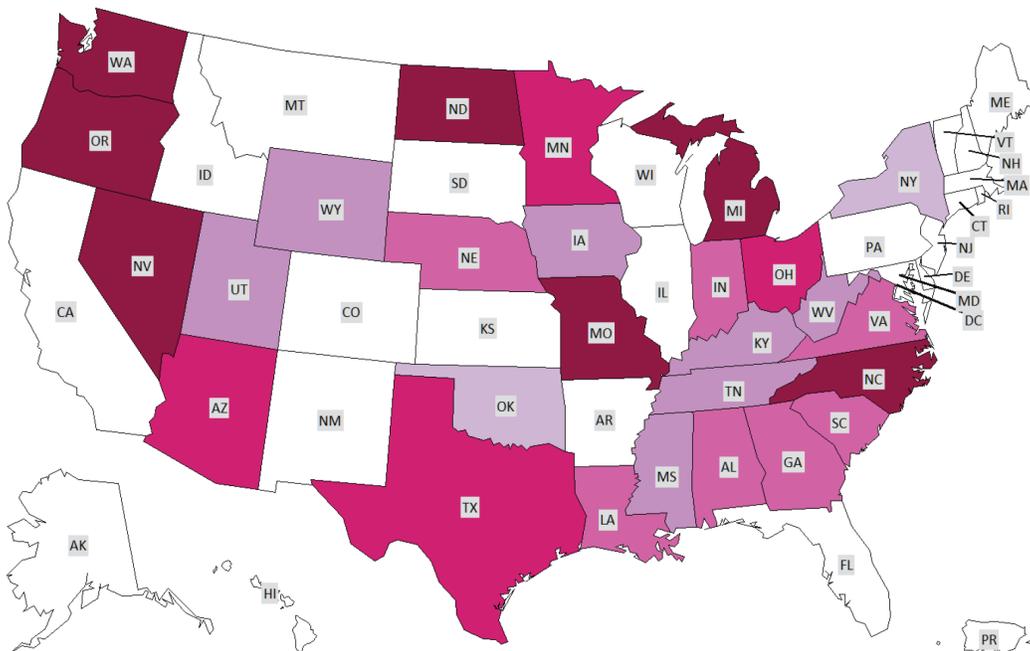


Figure 20: States Offering Data Center Incentives in December 2015
(darker shading indicates more recent adoption)

⁶⁶<http://www.datacenterknowledge.com/archives/2009/07/06/apple-confirms-maiden-site-for-idata-center/>

⁶⁷<http://www.datacenterknowledge.com/archives/2010/02/05/virginia-nc-battling-for-microsoft-data-center/>

⁶⁸<http://www.datacenterknowledge.com/archives/2009/07/07/how-apple-played-the-incentive-game/>

⁶⁹<http://www.datacenterknowledge.com/archives/2010/02/05/virginia-nc-battling-for-microsoft-data-center/>

Table 14 provides additional details on the data center incentives offered by each state.⁷⁰ This list is arranged chronologically by year of enactment or most recent revision. When one reviews this list, several things stand out:

- 2015 and 2012 were both significant years, as seven states enacted or revised their incentives in each of those years.
- Since 2012 when Virginia last revised its incentive, a third of the states offering incentives have reduced their eligibility criteria to be more attractive to smaller data centers.
- Since 2013, no state (except for Texas) has set the threshold investment for incentive eligibility higher than \$100 million.

Virginia's incentives are no longer as attractive as they were when they were last updated in 2012. Most states have established eligibility criteria for their incentives that are less restrictive than Virginia's \$150 million investment criteria to enable them to better target smaller facilities. In addition, as incentives have become more pervasive, the data center industry is becoming more sensitive to whether a state has incentives or not when making location, expansion, and equipment replacement decisions.

| State | Year Enacted or Revised | Latest Version of Incentive |
|------------------------------|-------------------------|--|
| Michigan ⁷² | 2015 | As a whole the data centers in Michigan must add 400 new jobs by 2022 and a total of 1,000 new jobs by 2026 |
| Missouri ⁷³ | 2015 | Sales tax exemption for \$25 million in investment in three years plus ten new jobs paying 150 percent of the average state wage |
| Nevada ⁷⁴ | 2015 | Partial sales and property tax reductions for ten years on \$25 million in investment, plus ten jobs paying average state wage, plus healthcare in five years, or for 20 years on \$100 million in investment plus 50 jobs paying average state wage plus health care |
| North Carolina ⁷⁵ | 2015 | Sales and use tax exemption for equipment and electricity for \$75 million in investment |
| North Dakota ⁷⁶ | 2015 | Sales tax exemption on equipment through 2020 for the first four data centers of 16,000 sq. ft. approved by the state |
| Oregon ⁷⁷ | 2015 | Data centers exempted from central tax assessment |
| Washington ⁷⁸ | 2015 | Sales and use tax exemption for 100K sq. ft. building in rural county |
| Arizona ⁷⁹ | 2013 | Sales and use tax exemption for up to 20 years for \$50 million in investment within five years in the two largest counties or for \$25 million in investment within five years outside of the two largest counties |
| Ohio ⁸⁰ | 2013 | Sales tax exemption on \$100 million in investment in three years plus \$1.5 million per year in payroll |
| Texas ⁸¹ | 2013 | Sales and use tax exemption for \$200 million in investment and 20 jobs paying 120 percent of average local wage |
| Alabama ⁸² | 2012 | Sales and use tax exemption for ten years for up to \$200 million in investment within ten years, for 20 years for \$200 million to \$400 million in investment within ten years, or for 30 years for over \$400 million in investment within 20 years plus 20 new jobs in each category |
| Indiana ⁸³ | 2012 | Property tax exemptions for \$10 million in investments in high-technology districts paying employees 125 percent of the average county wage |
| Louisiana ⁸⁴ | 2012 | Single sales factor permitted for up to 40 years for approved data centers with more than 50 percent of sales outside the state |
| Minnesota ⁸⁵ | 2012 | Sales tax exemption for 20 years for \$30 million in investment in four years on 25,000 sq. ft. |
| Nebraska ⁸⁶ | 2012 | Complex tiered scheme of incentives beginning with a partial sales tax refund and investment and compensation credits for \$3 million in investment plus 30 new jobs paying 60 percent of the average state wage |

Table 14: State Incentives Specifically for Data Centers⁷¹

⁷⁰States that only offer general business incentives for which data centers could qualify for are not included in this list.

⁷¹This table differs from a similar table circulated by the Associated Press.

⁷²http://www.mlive.com/lansing-news/index.ssf/2015/12/michigan_house_senate_approve.html

⁷³<http://www.missouripartnership.com/Portals/0/PDF/Data%20Center%20Sales%20Tax.pdf>

⁷⁴http://www.diversifynevada.com/documents/Summary_Data_Center_Tax_Abatement_FY2016.pdf

⁷⁵<http://www.ncga.state.nc.us/Sessions/2015/Bills/House/PDF/H117v7.pdf>

⁷⁶<http://www.nd.gov/Tax/genpubs/business-incentives.pdf?20151216184102>

⁷⁷<http://www.bendbulletin.com/localstate/3008035-151/data-center-bill-took-a-perilous-path-before#>

⁷⁸http://dor.wa.gov/docs/pubs/incentives/taxincentivesoverview_web.pdf

⁷⁹<http://www.azcommerce.com/incentives/computer-data-center-program>

⁸⁰http://archives.legislature.state.oh.us/BillText130/130_SB_243_EN_N.pdf

⁸¹http://comptroller.texas.gov/taxinfo/data_centers/

⁸²<http://revenue.alabama.gov/taxincentives/incentivesum.pdf>

⁸³<http://www.in.gov/legislative/bills/2012/SE/SE0302.1.html>

⁸⁴[http://revenue.louisiana.gov/Publications/ISIs\(2012\).pdf](http://revenue.louisiana.gov/Publications/ISIs(2012).pdf)

⁸⁵<http://mn.gov/deed/business/financing-business/tax-credits/data-center-credit/>

⁸⁶<http://www.revenue.nebraska.gov/incentiv/Summary.pdf>



| State | Year Enacted or Revised | Latest Version of Incentive |
|------------------------------|-------------------------|--|
| South Carolina ⁸⁷ | 2012 | Sales and electricity tax exemption for \$50 million in investment within five years and 25 jobs paying 150 percent of average |
| Virginia ⁸⁸ | 2012 | Sales and use tax exemption for \$150 million in investment and 50 jobs paying 150 percent of average local wage (or 25 jobs in rural or high unemployment areas) |
| Wyoming ⁸⁹ | 2011 | Sales and use tax exemption on infrastructure and computer equipment for \$5 million in investment with \$2 million in one year; sales and use tax exemption on cooling and power equipment for \$50 million in investment |
| Mississippi ⁹⁰ | 2010 | Sales tax exemption for \$50 million in investment plus 50 new jobs paying 150 percent of the average state wage |
| Utah ⁹¹ | 2010 | Sales and use tax exemption on equipment with at least 3 years of useful life used to operate a web search portal as described in NAICS 518112 |
| Kentucky ⁹² | 2009 | Refund of taxes paid on purchase and operation of \$100 million of equipment |
| West Virginia ⁹³ | 2009 | Sales and use tax exemption and 95 percent reduction in property tax -- no limit |
| Iowa ⁹⁴ | 2007 | Partial refund of sales taxes paid on power for \$1 million to \$10 million in investment in three years; partial refund of sales taxes paid on equipment and power for \$10 million to \$200 million in investment in six years; sales and property tax exemption on equipment and power for \$200 million in investment in six years |
| Tennessee ⁹⁵ | 2007 | Tax credit for construction materials for \$250 million in investment and 25 jobs paying 150 percent of average state wage and 79 percent electricity tax reduction |
| Georgia ⁹⁶ | 2005 | Sales and use tax exemption in any year with a \$15 million in investment in that year |
| New York ⁹⁷ | 2000 | Sales and compensating use tax exemption on equipment in high-security facilities providing uninterrupted access and continuous traffic management for customers' web pages |
| Oklahoma ⁹⁸ | 1993 | Sales tax refund on data processing equipment used by establishments with 80 percent annual gross revenue from outside of the state |

Table 14: State Incentives Specifically for Data Centers⁷¹

⁸⁷http://scommerce.com/sites/default/files/all/business_incentives_2012.pdf

⁸⁸<http://law.lis.virginia.gov/vacode/58.1-609.3/>

⁸⁹<http://wyomingbusiness.org/program/incentives/1241>

⁹⁰<https://www.mississippi.org/assets/incentives/sales-and-use-tax-exemption-data-centers.pdf>

⁹¹<https://trackbill.com/bill/ut-sb61-sales-and-use-tax-exemption-for-a-web-search-portal/378574/>

⁹²<http://revenue.ky.gov/NR/rdonlyres/5743DCF0-C96C-4806-9CFA-55BD3E1887F3/0/KYTaxAlertOctober2009.pdf>

⁹³http://www.wvcommerce.org/business/industries/data_centers/default.aspx

⁹⁴<http://iowascreativecorridor.com/files/Data%20Center%20Iowa%20Legislation%20Summary.pdf>

⁹⁵http://treasury.state.tn.us/ecd/BD_tax_incentives.html

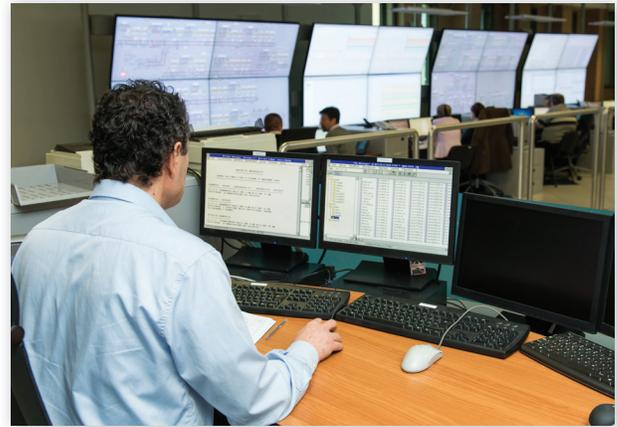
⁹⁶http://dor.georgia.gov/sites/dor.georgia.gov/files/related_files/document/LATP/Guide/2015%20EXEMPTION%20CHART.pdf

⁹⁷https://www.tax.ny.gov/pdf/memos/sales/m00_7s.pdf

⁹⁸http://okcommerce.gov/wp-content/uploads/2015/06/Oklahoma_Business_Incentives_and_Tax_Guide.pdf

Data Centers Follow Incentives

Tax incentives have become a critical component of the competition between states for data centers. Moreover, as Microsoft's Boydton campus illustrates, incentives can be particularly helpful in luring data centers to less developed rural communities. In Wyoming, the least populated state in the union, Randy Bruns, director of Cheyenne LEADS, has stated that without the state's data center incentives it would be at a 4 percent to 6 percent tax disadvantage relative to Colorado, Nebraska or Utah.⁹⁹ The Wyoming incentive was instrumental in securing a \$250 million expansion of Microsoft's Cheyenne data center campus in February of 2015, bringing the company's total investment in the facility to \$750 million.



South Carolina lawmakers have also attempted to position their state to more aggressively compete in the data center market. After losing a \$450 million Facebook data center to North Carolina, South Carolina revised their data center incentive in May 2015 to lower the required amount of investment and to exempt data centers from taxes on electricity as well as sales taxes on equipment. State Representative Phyllis Henderson (R-Greenville) stated,

The main piece of this legislation is because of North Carolina. We were just losing projects right and left to them.¹⁰⁰

In addition, the competition between Virginia and North Carolina did not end with North Carolina beating out Virginia for the Apple facility in 2009, and Virginia beating out North Carolina for the Microsoft facility in 2010. In September 2015, North Carolina lowered its investment criteria for its data center incentive and provided a tax exemption for data center purchases of electricity to better compete with Virginia, and to better target multi-tenant co-location facilities that typically provide a larger number of total jobs.¹⁰¹

Most recently, the state of Michigan enacted data center incentives on December 16, 2015. Those incentives enabled Michigan to beat out New York in a competition for a new \$5 billion Switch data center in Grand Rapids. The Switch facility is expected to provide 1,000 jobs and will be the largest data center in the eastern half of the U.S.¹⁰²

Washington state's experience with data center incentives is also illustrative, but in a different way. Washington is home to Microsoft's corporate headquarters in Redmond. In December 2007, Washington's Attorney General ruled the state's data center incentives invalid. Microsoft and Yahoo immediately halted construction on data center facilities in rural Quincy, Washington, and Microsoft subsequently chose to move its Windows Azure cloud computing service to another state.¹⁰³ Facebook and Amazon also cited state and local taxes as an important consideration in their decisions to construct new data center facilities in neighboring Oregon.¹⁰⁴

Washington's data center incentives were legislatively re-enacted in April 2010, sparking a construction boom and up to \$2 billion in new private investment in the state.¹⁰⁵ But, in June 2011 the incentives were allowed to lapse, which once again halted data center growth in Washington and drove a \$1 billion investment boom in nearby Oregon as Adobe, Apple,¹⁰⁶ Fortune Data Centers¹⁰⁷ and NetApp¹⁰⁸ all announced that they would be building data centers there rather than Washington. In May 2012, Washington again re-enacted their data center incentives¹⁰⁹, only to fail to reauthorize them during the 2014 legislative session¹¹⁰. Microsoft subsequently cited that lack of reauthorization as a motivating factor in its decision to build a new \$1.1 billion data center in West Des Moines, Iowa rather than Washington.¹¹¹ Washington then re-enacted its data center incentives yet again in July 2015.¹¹²

⁹⁹http://trib.com/news/local/putting-cheyenne-on-the-data-center-map/article_856c306f-9050-58a6-ad35-5cafb3b32e17.html

¹⁰⁰<http://www.thestate.com/news/politics-government/article14403305.html>

¹⁰¹<http://www.data-centerknowledge.com/archives/2015/10/01/north-carolina-makes-data-center-tax-breaks-easier-to-get/>

¹⁰²<http://www.freep.com/story/money/business/michigan/2015/11/16/data-center-switch-steelcase-grand-rapids-pyramid/75896236/>

¹⁰³<http://www.data-centerknowledge.com/archives/2010/02/01/group-pushes-for-change-in-washington-state/>

¹⁰⁴<http://www.greenbiz.com/news/2010/05/05/states-use-tax-incentives-lure-data-centers>

¹⁰⁵<http://washingtonstatewire.com/blog/data-center-fumble-costs-jobs-in-washington-state-and-maybe-big-money/>

¹⁰⁶<http://www.data-centerknowledge.com/archives/2012/02/21/apple-confirms-plans-for-oregon-data-center/>

¹⁰⁷<http://www.data-centerknowledge.com/archives/2011/10/21/fortune-expands-to-portland-oregon/>

¹⁰⁸<http://www.data-centerknowledge.com/archives/2011/10/17/digital-realty-to-build-netapp-facility-in-oregon/>

¹⁰⁹<http://washingtonstatewire.com/blog/data-center-fumble-costs-jobs-in-washington-state-and-maybe-big-money/>

¹¹⁰ ¹¹¹<http://blogs.seattletimes.com/opinionnw/2014/04/28/new-microsoft-data-center-in-iowa-offers-a-billion-dollar-lesson/>

¹¹²<http://wiredre.com/data-center-tax-incentives-extended-in-washington-state/>



Incentives Positively Impact Employment and Wages

As mentioned earlier, data center incentives do not just benefit the data center owners, operators and tenants. Incentives also benefit employees and the states and communities where the employees work and live. Compared to traditional manufacturing or large retail facilities, data center facilities do not directly employ large numbers of employees. However, when placed in the context of the general weakness of job growth in the U.S. economy in recent years, the data center industry has proven to be stronger at creating jobs than the rest of the U.S. economy. Between 2013 and 2014, total employment across all industries in the U.S. grew by 2.3 percent.¹¹³ In contrast, employment at data centers in the U.S. grew by 4.2 percent over the same period.¹¹⁴ In other words, between 2013 and 2014, the data center industry added jobs over 80 percent faster than the U.S. economy as a whole.

Moreover, incentives appear to be effective at encouraging employment and wage growth in states' data center sectors. As shown in Figure 21, between 2013 and 2014 data center employment in states with incentives grew at an annual rate of 5.3 percent, as compared to 3.1 percent in states without incentives – this means employment grew about 70 percent faster in states with incentives than in those without. Similarly, between 2013 and 2014 average wages in data centers in states with incentives grew at an annual rate of 6.1 percent, as compared to 4.0 percent in states without incentives – this means wages grew over 50 percent faster in states with incentives than in those without.



Figure 21: Employment and Wage Growth in the Data Center Sector between 2013 and 2014¹¹⁵

¹¹³ ¹¹⁴ ¹¹⁵ Data Source: U.S. Bureau of Labor Statistics.



CONCLUSION

Data centers are a critical part of the infrastructure that supports the modern economy, not only in the technology sector, but in advanced manufacturing, entertainment, finance, healthcare, information, retail, telecommunications, and almost every other sector of the economy as well. Although Virginia's Data Processing, Hosting, and Related Services sector is largely concentrated in Northern Virginia, it is important to realize that this sector is well represented in other areas of the Commonwealth as well. Among those other areas, is rural Mecklenburg County in Southern Virginia, home to Microsoft's \$1.3 billion data center in Mecklenburg County, the east coast hub for Microsoft's online services, and soon to be expanded to a \$1.7 billion facility.

The Data Processing, Hosting, and Related Services sector is also a very high performing sector that has insulated some Virginia localities from the "double dip" that the state experienced as a result of the "Great Recession of 2007" and the federal sequester in 2013. In the most recent four quarters, employment in this sector grew 6.7 times faster than the statewide norm across all industries, and wages, already 140 percent higher than the statewide average, grew 9.3 times faster than the statewide norm across all industries. Moreover, the pool of highly skilled workers that this industry employs also feeds the talent pipeline for other fast growing, high wage industries such as Architectural, Engineering, and Related Services; Computer Systems Design and Related Services; Management, Scientific, and Technical Consulting; Scientific Research and Development Services; and Telecommunications.

The Data Processing, Hosting, and Related Services sector is also a very capital-intensive industry, which makes it a high performer in terms of the tax revenue it provides as well. First, because that disproportionate investment in capital equipment translates into a disproportionate amount of property tax revenue, by far the largest source of revenue for Virginia localities. As an example, our analysis has shown that the benefit/cost ratio for this sector was 9.5 in Loudoun County in 2014, and 4.3 in Prince William County. This means that for every \$1.00 in county expenditures that the Data Processing, Hosting, and Related Services sector was responsible for generating in 2014, it provided approximately \$9.50 in tax revenue to Loudoun County, and approximately \$4.30 in tax revenue to Prince William County.

Second, because as a very capital-intensive industry the Data Processing, Hosting, and Related Services sector pays unusually high wages – \$105,942 a year on average in 2014 – and this has a disproportionate impact on state income tax revenue, by far the largest source of revenue for Virginia state government. Importantly, as we have also demonstrated, this disproportionate fiscal impact places downward pressure on Virginia tax rates, thereby improving the state's overall business climate, which has suffered in recent years causing Virginia to fall from its traditional top slot in most national business climate indexes.

Our analysis has also shown that the Data Processing, Hosting, and Related Services sector has a large overall economic impact. Statewide, we estimate that total economic impact was approximately 36,043 jobs, \$2.7 billion in wages, \$8.6 billion in economic output, and \$298.9 million in state and local tax revenue in 2014. At a regional level, in 2014 the Data Processing, Hosting, and Related Services sector was responsible for approximately: 1) 21,995 jobs, \$2.0 billion in wages, and \$5.7 billion in economic output in Northern Virginia; 2) 3,974 jobs, \$225.2 million in wages, and \$885.9 million in economic output in Central Virginia; 3) 3,333 jobs, \$185.9 million in wages, and \$731.7 million in economic output in Hampton Roads; and 4) 1,002 jobs, \$40.8 million in wages, and \$196.0 million in economic output in Southern Virginia.



Finally, our analysis has shown that investment decisions in the Data Processing, Hosting, and Related Services sector are increasingly sensitive to state tax regimes. In 2009, in response to the loss of a \$1 billion Apple data center to North Carolina, Virginia enacted a sales and use tax exemption for data center purchases of computer equipment. This exemption is much like the sales and use tax exemption Virginia has extended to the similarly capital-intensive manufacturing sector for many years. However, the exemption for data centers is scheduled to sunset in 2020.

When Virginia enacted its data center sales and use tax exemption in 2009, only seven other states offered such incentives, today over half of all states do. Moreover, seven of those 27 data center incentives were enacted in 2015 alone and most states now offer incentives that are more competitive than Virginia's. If Virginia is to avoid the fate of Washington state, home of Microsoft, which has seen billions of dollars of data center investment migrate to neighboring Oregon because of the uncertainty generated by its "off again on again off again" approach to data center incentives, it will need to maintain its competitive position in the data center market.



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