



Internet Association



Examining The Economic Contributions Of The Cloud To The United States Economy

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Executive Summary

1.1 Overview

Examining The Economic Contributions Of The Cloud To The United States Economy estimates the size of the U.S. cloud economy for 2017. According to the estimates:

- The cloud added approximately \$214 billion in value-added to U.S. GDP in 2017.
- The cloud added approximately 2.15 million jobs in 2017.
- In approximately 15 years since 2002, the cloud economy has nearly tripled in size.

1.2 Motivation

The benefits of cloud technology to firms are clear (or at least minimally contested) despite the technology being a relatively new area of study. However, there is little documentation on the larger macroeconomic effects of cloud technology. This report seeks to measure those macroeconomic impacts and provide critical context to policymakers.

1.3 Method

The paper uses a NAICS-based approach to estimate the size of the U.S. cloud economy. Its findings fall in line with other estimates on the cloud’s economic and business contributions.

The paper makes a key contribution to moving cloud-measurement literature forward by providing a detailed methodology and robust estimates on the technology’s GDP, earnings, and employment contributions. The paper uses data for 2002, 2007, and 2012 and makes additional estimates for 2017 based on those data.

Summary Of Cloud’s Economic Footprint For 2012

NAICS Code	Total Flagged Receipts (\$1000)	Final-demand Output (\$1000)	Final-demand Earnings (\$1000)	Final-demand Employment	Final-demand Value-added (\$1000)	Direct-effect earnings (\$1000)	Direct-effect employment
Total	\$201,627,369	\$280,805,877	\$101,305,608	1,659,748	\$165,333,486	\$280,996,657	333,700

1.4 Conclusion

More work remains in measuring the economic benefits of cloud technology, but it is clear that cloud computing is already a major force in the economy. There is potential for growth, but policymakers and other stakeholders should recognize its already significant contributions.



1. Introduction

At the start of the decade, academia offered a range of speculation on the future state and role of computing. Researchers understood major change was underway, but were unsure of how and when that shift would materialize, turning to theory and modeling as means to understanding the assortment of potential futures. The process driving the discussion was the development of the opportunity to change from in-house physical information technology (IT) infrastructure and equipment (i.e. fixed, local data storage and computing), and toward remote computing services (i.e. cloud computing technology), thus providing increased flexibility and options for organizations. (Harms and Yamartino, 2010)

Approximately a decade into the cloud computing era, we are only now beginning to understand just how large and quickly the cloud has grown as a commercial enterprise. Recent research documents clear benefits from cloud technology for businesses, reducing operational costs and increasing flexibility in strategic decision-making. This has, in turn, bolstered the longevity and resilience of firms (Etro, 2011; Wang and McElheran, 2017). However, its footprint remains unmeasured.

In the current paper, the author offers perhaps the first estimate on the aggregate contribution of the cloud economy for the United States. Adapting a methodology utilized by Siwek (2015) for an estimation on the size of the U.S. internet sector, the author estimates that cloud computing in 2012 contributed approximately \$165 billion (1.04 percent) in *value-added* to U.S. gross domestic product (GDP). Cloud computing also supported approximately 1.7 million jobs in the U.S., with 80 percent of that employment residing outside of the cloud industry in indirect positions. The cloud economy produced \$281 billion in *gross output* and about the same amount in *direct-effect earnings*¹ that year. The author estimates these figures using official data from industry input-output tables from the U.S. Bureau of Economic Analysis (BEA). Based on growth rates from previous years through 2012,

the author estimates the cloud economy contributed approximately \$214 billion (1.1 percent) to U.S. GDP and 2.15 million jobs in 2017. In the approximate 15 years since 2002, the cloud economy has nearly tripled in size.

These figures provide the first systematic examination of the cloud's economic footprint in the U.S. through economic data. While measurement issues remain, which suggest the GDP estimates of this paper are likely low and which the author discusses later,² the figures presented here align and reinforce the estimates of others. For example, Mandel and Swanson (2017) and Mandel (2018) found that cloud technology would likely boost U.S. GDP by approximately \$2 trillion over the next 10 years. More work remains in refining how the cloud is captured in national input-output accounts, particularly related to how investment in cloud technology is treated and on potential adverse effects that may arise to stakeholders of legacy systems. However, the current paper still offers a vital and robust look at just how big of a cloud there is 'hanging' over us.

Section 2 reviews cloud technology, providing a brief overview for non-experts. Section 3 details the shift in the U.S. economy to cloud technology, beginning in the 1990s through today, and the limited literature on the economic benefits of cloud technology. Section 4 presents the author's methodology and results. Section 5 discusses and Section 6 concludes.

2. Understanding Cloud Technology

One of the most important aspects of the internet as a technology has been its merging of previously disparate markets for data, phone/voice, and media. The internet created a common architecture for digital information and communication and, once employed through broadband systems, it facilitated a new type of system built on remote access, cheap storage, and inexpensive, but increasingly powerful processors. This is the cloud. (Cowhey and Kleeman, 2011)

¹ Earnings of employees and the net earnings of sole proprietors and partnerships resulting directly from cloud computing technology services rather than indirect earnings which do not trace directly to cloud computing technology services. For example, the earnings of a cloud engineer at a cloud computing firm, but not the earnings of a security guard contracted to protect the cloud computing firm's building.

² Briefly, there is a belief among many economists that government input-output accounts are underestimating the economic activity of cloud computing. The shift away from in-house physical equipment toward remote-access services has also shifted capital expenditures onto operating expenditures in firms. Computing storage costs have also declined steadily. These factors suggest that multipliers used to calculate total economic impact may be low. Additionally, there is a belief that input-output accounts are not detailed to accurately measure all gross receipts related to cloud.



Mell and Grance (2011) at the National Institute of Standards and Technology define cloud computing as:

“...a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.”³

More concisely, Etro (2009) defined cloud computing as a “new general-purpose Internet-based technology through which information is stored in servers and provided as a service and on-demand to clients.” Cowhey and Kleeman (2011) added that cloud computing is a “scalable on-demand provision of remote computing and data storage.”

More broadly, server hardware, networking equipment, storage systems, and specialized software comprise cloud infrastructure (SDX Central, n.d.; Bayrak, Conley, and Wilkie, 2011). Companies then build remotely-accessible applications on top of that infrastructure through networking services (SDX Central, n.d.). Beyond a new system arrangement of information-communication technologies, cloud computing is also distinguished by how it has forced new capabilities and requirements into software options as a replacement to older software products (Alarcon and Pavlou, 2017).

This shift to cloud, which arose and spread quickly, has pushed *information-communication technologies* (ICT) into a fourth major epoch of development. Following mainframe development, personal computer development, and the internet, cloud computing technology is - along with other internet-based technologies - fundamentally

transforming how ICT systems operate and how users and firms utilize ICT systems for personal and commercial endeavors. Its impacts can be seen in everything from how users listen to music to business expectations for software and applications to debates on more intricate statistical mismeasurement issues around ICT prices in government datasets. Indeed, many see the significant drop in computing prices spurred by cloud technology as an important component in reaching the lofty goal of universal access to information and computing tools. (Talukder and Zimmerman, 2010; Bayrak, Conley, and Wilkie, 2011; Byrne and Corrado, 2017)

Future goals aside, cloud computing is already allowing many firms and individuals from the costly physical world of ICT. They have more options regarding their own ICT infrastructures and can now scale production and operations dynamically as demand for their services or products change. That utility advantage, as documented by Bloom and Pierrri (2018), is reflected in the rapid adoption of cloud computing across the United States among businesses. While still low overall, cloud computing adoption increased from less than 0.5 percent of firms in 2010 to approximately 7 percent in 2016 – an annualized increase of about 50 percent.

The shift away from investment and usage of older systems has likely dampened activity in those non-cloud businesses,⁴ but the cloud has simultaneously empowered firms to refocus on core functions where they have primary competitive advantages in markets. Rather than dealing with data centers, hosting, and other proprietary services, companies and individuals can simply pay as needed, creating greater business efficiency, reducing costs, reducing environmental footprint, and increasing reliability – claims documented in academic literature and seen anecdotally in individual company decisions.⁵ (Etro, 2010; Talukder and Zimmerman, 2010; Bayrak, Conley, and Wilkie, 2011; Kepes, 2011; Jin and McElheran, 2017)

³ See link in citation for full detail on characteristics and models.

⁴ This topic is beyond the scope of the current report, but undoubtedly merits further research.

⁵ See Fisher (2018) for an example on Etsy’s decision to shift to cloud.



3. Cloud In The Literature

3.1 Firm Benefits

The great promise of the cloud has been its potential to lengthen and bolster ICT-driven economic growth in both developed and developing countries (Iansiti and Richards, 2012; Serha, 2015). Researchers have already clearly documented the important role of ICT in U.S. productivity gains through the 1990s into the 2000s as well as the shift away from hardware to software and digital technologies during that period (Jorgenson, 2006). Furthermore, researchers have documented a clear and increasing linkage between U.S. productivity and digital technology components like data and processing power, which enable cloud systems (Hooton and Kaing, 2018).

Within these trends, cloud computing has established a pivotal role for both modern ICT systems and for ICT's economic contributions (Riley, 2017). The speculation, and particularly the cynicism of skeptics on the potential of cloud technology at the start of the decade discussed in the introduction, has largely dissolved and there is now widespread recognition of the technology's current and future importance in society (McCullagh, 2011; Riley, 2017). Experts now agree the cloud has largely been a positive transformative force in technology, business, and society. This does not negate the corresponding recognition of market disruption that has hit older firms and their supported jobs; rather, it reflects a broad acceptance of previously speculated efficiency gains and their benefits.

Kepes (2011) documented four primary aspects/advantages of cloud technology from a business perspective that more formally define these utility gains: 1) reducing the opportunity cost to running technology; 2) facilitating a shift from capital expenditure to operating expenditure; 3) lowering technology ownership costs; and 4) allowing businesses to refocus on core activities and increase the value of their services to clients.⁶

These characteristics have translated into clear benefits for businesses and government. Jin and McElheran (2017) tracked a large sample of firms from 2006-2014 and found that cloud technology

drove higher business survival and stronger growth among young firms. They also found that young firms, conditional on survival, were more productive because of cloud than older firms with traditional IT capital expenditures. Put more plainly, startups that have grown using cloud are more productive than comparable firms that still use traditional local data storage and computing.⁷ Alford and Morton (2009) have confirmed the U.S. government's expectations of significant cost savings by shifting ICT systems to the cloud, finding benefit-cost-ratios of between 5.7 to 15.4 based on different scenarios. Their analysis suggests that ICT cost savings may be as much as two-thirds over a 13-year investment life cycle. Deloitte (2018) found an average return for businesses of approximately \$2.5 for every \$1 invested in the use of public cloud services from a variety of providers. That is an average return of 250 percent with the upper range reaching nearly \$10 return per dollar spent. And Etro (2011) found that the payment-on-demand structure of many cloud services has allowed firms to shift some fixed costs into marginal production costs, thereby incentivizing new business creation and, thus, job creation.

3.2 Macroeconomic Studies

The benefits of cloud technology to firms are clear (or at least minimally contested) despite the technology being a relatively new area of study. However, there is little documentation on the larger macroeconomic effects of the cloud.

The research that exists focuses primarily on Europe or specific companies. McWilliams (2012) studied the cumulative economic benefits of the cloud for five European economies – France, Germany, Italy, Spain, and the UK – from 2010-2015. The author found that the cloud contributed a combined EUR 763 billion in value-added to the five economies' GDP and nearly 2.4 million jobs over that period. These benefits came primarily from existing business growth, new business creation, cost savings, and indirect effects. Deloitte (2017), under commission from The European Commission, found that broader cloud technology adoption across the European Union could add an additional EUR 499 billion to the region's GDP over the next five years with related increases in employment and business creation.

⁶ These benefits speak directly to when organizations go from their own privately-owned cloud systems to leased (public) cloud services. The list is not exhaustive of all public cloud benefits and certainly does not capture other benefits available to older firms.

⁷ This does not mean that all young firms are more productive than old firms, but rather that the flexibility afforded to young firms that have not already invested in in-house IT systems has fostered greater productivity for them. Furthermore, these benefits are not exclusive to young firms and are available to older firms as well.



The authors also estimated that cloud technology contributed approximately EUR 27.9 billion or 0.2 percent of the EU's GDP in 2013.⁸ In a separate study, Deloitte (2018) also found similar scale impacts from (only) Google's cloud services on productivity across 14 countries. These ranged from \$300 million to \$1.2 billion for large countries and \$100 million to \$600 million for medium countries.

The estimates cited above are in the same order of magnitude as those of Swanson and Mandel (2017) and Mandel (2018), who estimate that the cloud will boost U.S. GDP by approximately \$2 trillion over the next 10 years.

Furthermore, there is additional evidence of non-pecuniary benefits (both macro and micro), such as reduced energy consumption (Hardy, 2018).

4. Measuring The Cloud Economy

The optimism of the forecasts above are based on the lessons learned from the limited research on the cloud and realization of potential in cloud technology. Experts appear confident in the future direction of the cloud economy, but have only a limited appreciation of cloud's historic or current economic 'footprint.' The current research clearly demonstrates that the potential of cloud technology has already largely been realized. Even if the cloud computing industry still has room for growth, it is already a major economic contributor. The author argues, however, that without a firmer grasp on the cloud's current footprint, future expectations may miss the mark.

The current paper examines the role of the cloud in the U.S. economy from the period of 2002 to 2017. The author uses five-year economic census data estimates from the U.S. Census Bureau for the years 2002, 2007, and 2012 to develop estimates for the cloud in each of those years and then develops its own estimate for the size of the cloud economy in 2017.

The author utilizes product line statistics for different industries within the North American Industrial Classification System (NAICS) to identify specific receipts associated with the cloud. First, the author identifies specific industry codes (four to six digits) potentially related to cloud technology based on input from a set of cloud experts and by cross-referencing Standard Industrial Classification (SIC) and NAICS codes for publicly-traded cloud companies. The author identified an initial set of publicly-traded cloud companies by referencing the annual state of the cloud report by RightScale (Weins, 2018). The author reviewed the companies mentioned in the report and supplemented it with a general search using search engines and news articles. The author then reviewed a compiled list of companies with Internet Association's cloud policy director and other outside experts to develop a list of publicly-trade cloud companies. Then the author identified the SIC codes using the U.S. Securities and Exchange Commission-reported industry codes for each company.⁹

Next, the author downloaded and inspected product line data for each flagged industry to identify specific gross receipt lines related to cloud activity (versus something else), again, using input from cloud technology experts. Finally, the author applied RIMS II industry multipliers from the U.S. Bureau of Economic analysis to the flagged product lines, those related to the cloud, to develop estimates for: Output, Earnings, Employment, Value-added, Direct-effect earnings, and Direct-effect employment. The author used the average multiplier across all 50 states and the District of Columbia for each of the metrics above. Whenever an exact match between a NAICS code and multiplier code was not possible, the author used the multiplier for the next closest industry code aggregation. For example, if a six-digit NAICS code did not have a multiplier, the author would have used the multiplier for the five-digit if possible or, if not five-digit, the five-digit multiplier and so forth.

This methodology does not mean that all output from these 15 firms can be attributed exclusively to cloud. Rather, the author uses the list of companies

⁸ Note that the discrepancy between the McWilliams report and Deloitte report relate primarily to methodology and assumptions. The Deloitte report uses a variety of sensitivity analyses that incorporate the existence of barriers to cloud adoption. The report notes that if those barriers are removed their estimates on the cloud's economic contributions jump dramatically. Additionally, on a related item, the Deloitte report notes that two-thirds of employment gains in the coming years will occur in just six countries – the same five studied by McWilliams plus Poland. While a different metric, it provides some guidance for how future productivity growth compares with previous growth.

⁹ The author notes that the current methodology is almost certainly not exhaustive of all potential cloud companies or cloud-relevant NAICS codes. However, the approach used follows accepted practices for the identification of a subset of specialized companies or industries. Furthermore, IA does not provide the list of cloud companies here since they formed only a small element of the overall identification methodology. The core component of IA's methodology is the set of NAICS codes, which the report clearly documents.



only as an initial starting point to identify potential cloud industry codes, then confirmed those and other codes with input from industry experts and used only the relevant portion from each of those industry codes. For example, this means that the paper counts only the relevant portion of Amazon’s \$178 billion in 2017 revenue and 563,000 employees. The author also notes that it is impossible to distinguish the exact contributions of any specific company to the cloud economy’s U.S. output. The author utilizes industry codes rather than company reports and financial records, which ensures the paper captures other relevant companies not on its initial reference

list while also anonymizing the specific contributions of the companies on its starting reference list.¹⁰

Table 1 presents a list of the NAICS codes identified by the author as related to cloud, the multiplier used for each code, and the percent of product lines flagged as relevant within that industry code. Appendix A provides full product line tables for every NAICS code with flagged product lines. Table 2 presents the paper’s estimates for the U.S. cloud economy’s contributions to Output, Earnings, Employment, Value-added, Direct-effect earnings, and Direct-effect employment in 2012.

Table 1: List of Flagged Industry Codes

NAICS Code	Relevant Multiplier NAICS	Percent Of Product Lines Related To Cloud
443142	Industry: 44 Federal Reserve banks, credit intermediation, and related activities	0.04%
45411	Industry: 45 Securities, commodity contracts, and investments	2.33%
511210	Industry: 511200 Software publishers	7.00%
517311	Industry: 517A00 Satellite, telecommunications resellers, and all other telecommunications	No Flagged Product Lines
517312	Industry: 517A00 Satellite, telecommunications resellers, and all other telecommunications	No Flagged Product Lines
517919	Industry: 517A00 Satellite, telecommunications resellers, and all other telecommunications	No Flagged Product Lines
518210	Industry: 518200 Data processing, hosting, and related services	73.89%
519130	Industry: 519130 Internet publishing and broadcasting and Web search portals	No Flagged Product Lines
541511	Industry: 541511 Custom computer programming services	26.36%
541512	Industry: 541512 Computer systems design services	42.54%
541513	Industry: 54151A Other computer related services, including facilities management	13.26%
541519	Industry: 54151A Other computer related services, including facilities management	4.74%
541910	Industry: 5419A0 Marketing research and all other miscellaneous professional, scientific, and technical services	No Flagged Product Lines
561410	Industry: 561400 Business support services	No Flagged Product Lines

¹⁰ As an illustrative example: if Amazon’s industry code is 0000 and industry 0000 has a total output of \$100; this paper then identified the specific product line receipts under code 0000 that were relevant for cloud and found them to equal 50% of that industry code’s total contribution, or \$50; note that those specific product lines represent the output contributions to cloud of all U.S. companies classified under industry code 0000 (not just those of Amazon); the paper then calculates the specific metrics, such as GDP and employment, by multiplying the \$50 in output by multipliers; assume that industry 0000 had an average GDP multiplier across all states of 0.8 – this would mean that all cloud companies in industry 0000 produced \$40 in value-added to US GDP; if industry 0000 had an employment multiplier of 5.2, then all cloud companies in industry 0000 created 260 jobs.



Table 2: Summary Of Cloud's Economic Footprint – 2012

NAICS Code	Total Flagged Receipts (\$1000)	Final-demand Output (\$1000)	Final-demand Earnings (\$1000)	Final-Demand Employment	Final-demand Value-added (\$1000)	Direct-effect earnings (\$1000)	Direct-effect employment
443142	\$38,210	\$54,464	\$14,062	254,292	\$30,852	\$58,141	68,110
45411	\$7,531,910	\$11,539,211	\$3,780,310	108,824,314	\$5,285,363	\$11,076,323	10,410,207
511210	\$11,967,686	\$15,235,169	\$4,166,538	57,730,897	\$10,166,667	\$15,874,877	19,510,449
517311							
517312							
517919							
518210	\$79,795,821	\$117,624,829	\$30,243,712	560,696,758	\$61,707,986	\$128,414,006	155,781,783
519130							
541511	\$31,955,993	\$41,117,275	\$20,852,852	305,923,995	\$28,240,388	\$38,113,725	44,914,775
541512	\$64,955,047	\$87,806,360	\$38,995,826	572,598,735	\$54,937,578	\$80,732,755	95,132,143
541513	\$4,539,956	\$5,807,832	\$2,607,021	41,500,076	\$3,919,442	\$5,396,299	6,087,485
541519	\$842,746	\$1,620,736	\$645,287	12,219,424	\$1,045,212	\$1,330,531	1,795,041
541910							
561410							
Total	\$201,627,369	\$280,805,877	\$101,305,608	1,659,748	\$165,333,486	\$280,996,657	333,700

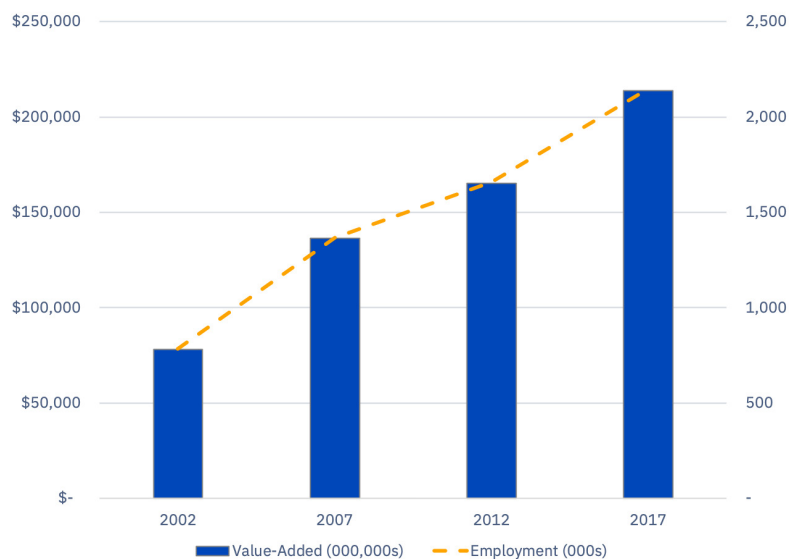
5. Discussion

According to the paper's analysis, cloud technology contributed approximately \$165 billion in value-added to U.S. GDP and approximately 1.7 million jobs, both part-time and full-time, in 2012. For that year, these equate to approximately 1.04 percent and 1.3 percent of the respective national totals. The cloud contributed \$281 billion in final-demand gross output and \$101.3 billion in final-demand earnings.

The cloud also contributed \$281 billion in direct-effect earnings and 333,700 direct-effect jobs.

Applying the same exercise to the years 2002 and 2007, the cloud economy added approximately \$78.1 billion and \$105.4 billion of value-added to US GDP respectively. The growth trends for the cloud from 2002 to 2017 imply that the cloud contributed approximately \$214 billion in value-added and 2.15 million jobs to the U.S. economy in 2017. Figure 1 shows this estimated growth over time.

Figure 1: Estimated Cloud Growth 2002-2017





The figures above rely on a subjective interpretation of which product lines and industries comprise cloud computing in the US economy; however, the use of an expert-based approach is standard among researchers examining high-technology industries and activity. Further refinement and input on the suitability of the flagged product lines and industries would be valuable as future extensions on this research. Additionally, the author recommends that his 2017 estimates be updated upon release of the 2017 economic census data to verify and improve them.

The aggregate output and value-added figures in the paper are not particularly surprising. Numerous financial and technology/cloud industry analysts have estimated annual revenues in the \$100-\$200 billion range (see McCullagh, 2011 for one such example), which would again put these estimates in the same ‘ballpark’ as these others. Indeed, the most recent estimates found by the author, which were conducted by the Synergy Research Group (2018), place total revenue for the cloud economy at approximately \$180 billion for 2017. Given their focus on only six key segments of the cloud market, rather than the more detailed product line by product line approach of the current paper, the slightly smaller, but rather close estimate provides encouragement and reinforcement of the author’s findings as well as that of Synergy Research Group.

Of course, the findings here do not erase broader issues around the potential mismeasurement of the cloud (and mobile) platforms in productivity figures. As discussed by Byrne and Corrado (2017) and Byrne, Corrado, and Sichel (2018), U.S. productivity growth has been slow since 2004 and the decline of U.S. labor productivity growth since then is likely due, in some part, to the shift to cloud technology specifically because of how the cloud is handled from an accounting perspective. The consensus is largely an accounting issue rather than a real reduction in productivity. As this shift has occurred, investment in traditional ICT equipment and software has fallen and, thus, the boost in productivity (based on accounting methods) gained from ICT equipment and software in the 1990s through early 2000s has also declined.¹¹ The author argues that this trend is misleading and that the current treatment

of cloud and other digital application expenditures in accounting should be updated to include cloud services as investment as opposed to purely operating expense. This would potentially correct any mismeasurement that may be occurring and raise total estimates on cloud’s contribution to the economy.

Finally, the author also recognizes there are other aspects to the cloud economy’s impacts. In particular, its large disruption of legacy software systems and the lag in transition for many organizations are major issues (Mircea, Ghilic-Micu, and Stoica, 2011; Alarcon and Pavlou, 2017). The disruption has two aspects. First, by incentivizing companies to leave their old data centers, server systems, and other capital equipment for cloud-based services and, second, by causing providers of those older systems to lose business. This disruption has undoubtedly had negative impacts on some firms and organizations as they have transitioned, forcing important questions to individuals and organizations about the benefits and costs of adopting new cloud technologies while increasing competition overall (Tak, Urgaonkar, and Sivasubramaniam, 2011; Alarcon and Pavlou, 2017). But the lag time also speaks to the cloud market still not being fully mature and future growth potential. Thus, the author expects continued growth and disruption well into the coming years as cloud technology continues to become adopted even more widely, but also further distribution of its benefits.

Better understanding of how the impacts of cloud materialize for old and new businesses deserves additional research, particularly regarding the net impacts of cloud. If we consider the cloud to offer efficiency benefits (which are documented in the literature), then the author speculates that robust quantitative analysis would show overall positive benefits for businesses and industries despite disruption. Unfortunately, a full examination of this issue is beyond the scope of the current report, but a ‘back of the envelope’ calculation does suggest that cloud systems may provide net gains in terms of employment and GDP contributions compared to older systems, though more investigation is certainly needed. This is clear when comparing the weighted average multipliers for employment and GDP for all of

¹¹ This relates to declining prices for cloud computing technology as well as the treatment of it, in company accounting, as operating expenditure rather than capital expenditure, as is the case for traditional servers, data centers, etc. The falling prices and shift in accounting treatment are potentially large skewing factors for productivity measurements. The issue is actively being debated and requires more nuance than can be communicated here. See the paper’s citations for more background information.



the cloud-relevant industries identified in the current paper with those of the individual industries.¹² The weighted average multipliers for cloud are 14.0603 for employment and 1.4164 for Value-Added (i.e. GDP). The aggregate (weighted average) multiplier for employment is higher than all of the individual industry multipliers (e.g. the employment multiplier of just 541413) except two industries, codes 45411 and 541519. The aggregate (weighted average) multiplier for GDP is higher than every one of the individual industry multipliers. This is hardly conclusive evidence, but it provides a small step forward over anecdotal evidence only.

6. Conclusion

How big is the cloud? It is a question that has been approached from an engineering standpoint and in a limited amount of research from an economics perspective. Somewhat surprisingly, however, it has not previously been directly addressed for the U.S. economy.

The current paper presents a NAICS-based approach to estimate the size of the U.S. cloud economy. Its findings fall in line with other tangential estimates

on the cloud's economic and business contributions, but move the literature forward by providing a detailed methodology and robust estimates on the technology's GDP, earnings, and employment contributions. The numbers are impressive, at approximately \$214 billion in value-added and 2.15 million jobs in 2017.

The author builds on an accepted methodology for the measurement of nascent industries and sub-industries to provide a foundation for future research on the economic contributions of the cloud. The details of that methodology, which are clearly presented in the paper, can guide future estimates, but should also be refined as our understanding of cloud technology continues to grow.

Perhaps the most important lesson from the report is that cloud computing has already become a force in the economy. Yes, there remains much potential for growth, but policymakers and other stakeholders should recognize its already significant contributions. Cloud computing is not a technology of the future; it is a very real and present boon to internet and economic systems today. Its expected future growth will only bolster its importance.

¹² i.e. Taking the respective multipliers of each specific industry line and weighting them according to the percentage of that industry code flagged as relevant to cloud.



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Appendix A – Product Line Receipt Detail

NAICS 443142 – Electronics Stores

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	86,428,845	0
Women's, juniors', & misses' wear, incl accessories	2012	185	0
Major household appliances	2012	2,395,121	0
Kitchen appliances, parts, & accessories	2012	1,348,792	0
Laundry appliances, parts, accessories, incl clothes washers & dryers	2012	652,145	0
Outdoor gas grills, parts, accessories	2012	7,138	0
Other major household appliances, parts & accessories	2012	387,046	0
Small household appliances & personal care appliances	2012	54,990	0
TVs, DVD/Blu-ray players & recorders, camcorders, portable video players, e-book readers, DVDs, Blu-ray Discs, etc.	2012	12,427,935	0
Televisions & related parts & accessories	2012	7,305,651	0
Video content downloads	2012	38,210	1
DVD/Blu-ray Disc players, recorders, camcorders, portable video players, e-book readers, & related parts & accessories	2012	2,624,290	0
Electronic game/DVD combination devices	2012	1,342,351	0
DVDs & Blu-ray Discs, prerecorded	2012	1,104,682	0
DVDs & Blu-ray Discs, recordable	2012	12,751	0
Audio equipment, musical instruments (new & used), radios, audio electronic components, CDs, records, tapes, audio books, sheet music, accessories	2012	6,958,355	0
Audio equipment, components, parts & accessories	2012	6,035,137	0
Audio books	2012	1,175	0
Pre-recorded compact discs, audio tapes, & records	2012	767,927	0
New & used musical instruments, sheet music, & related items	2012	116,247	0
Audio content downloads	2012	11,750	0
Recordable compact discs & audio tapes	2012	26,119	0
Furniture, sleep equipment & outdoor/patio furniture	2012	195,788	0
New & used computer hardware, software, & supplies, incl computer game software & tablet computers	2012	33,488,697	0
Computer & peripheral equipment	2012	25,619,788	0
Prepackaged (off-the-shelf) computer software, incl computer software downloads	2012	7,868,909	0
Kitchenware & home furnishings	2012	9,109	0
Jewelry, incl watches, watch attachments, novelty jewelry, estate/ antique jewelry, etc.	2012	6,691	0
Books, incl e-books	2012	152,668	0
Photographic equipment & supplies	2012	3,924,375	0
Toys, hobby goods, & games	2012	494,370	0
Optical goods, incl eyeglasses, contact lenses, sunglasses, etc.	2012	574	0
Sporting goods & recreational equipment	2012	57,472	0



NAICS 45411 - Electronic Shopping And Mail-Order Houses

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	322,958,117	0
Groceries & other food items for human consumption off the premises	2012	5,723,776	0
Produce, incl fresh & prepackaged fruits & vegetables	2012	397,716	0
Frozen foods, incl packaged foods sold in a frozen state	2012	1,156,919	0
Dairy products & related foods, incl milk, cheese, butter, yogurt, eggs, etc.	2012	208,218	0
Bakery products baked on premises	2012	29,195	0
Bakery products not baked on the premises, excl frozen	2012	165,033	0
Delicatessen items, incl deli meats & other service deli items	2012	75,766	0
Ice cream & other frozen dairy products	2012	14,104	0
Meat & poultry, incl prepackaged meats	2012	251,484	0
Fish & seafood, incl refrigerated prepackaged fish & seafood	2012	69,765	0
Candy, prepackaged cookies, & snack foods	2012	629,776	0
Bottled, canned, or packaged soft drinks & other nonalcoholic beverages	2012	176,831	0
All other groceries & food items	2012	2,547,272	0
Packaged liquor, wine, & beer	2012	910,745	0
Cigars, cigarettes, tobacco, & smokers' accessories, excl sales from vending machines operated by others	2012	474,164	0
Drugs, health aids, beauty aids, incl cosmetics	2012	99,382,762	0
Prescriptions	2012	79,923,621	0
Nonprescription medicines	2012	736,581	0
Vitamins, minerals, & other dietary supplements	2012	6,170,652	0
Cosmetics, incl face cream, make-up, perfumes & colognes, etc.	2012	5,645,531	0
Hearing aids & supplies	2012	42,219	0
Personal hygiene supplies	2012	2,990,031	0
Health aids & home healthcare equipment	2012	3,874,127	0
Household soaps, detergents, cleaners, & cleaning supplies	2012	270,014	0
Household cleaning supplies	2012	63,853	0
Household soaps, detergents, & cleaners	2012	206,161	0
Paper & related products, including paper towels, toilet tissue, wraps, bags, foils, etc.	2012	611,973	0
Paper & plastic tableware	2012	121,608	0
Gift wrap, gift bags, & tissue paper	2012	48,386	0
Paper towels, napkins, toilet & facial tissue, & food wraps, bags, foils & oth related products	2012	441,979	0
Men's wear, incl accessories	2012	8,063,254	0
Women's, juniors', & misses' wear, incl accessories	2012	19,014,200	0
Children's wear, incl boys', girls', & infants' & toddlers' clothing & accessories	2012	2,929,965	0
Costumes & unisex clothing	2012	863,053	0
Footwear, incl accessories	2012	7,506,985	0



Product Description	Year	Total Receipts (\$1000)	Flagged Product
Sewing, knitting, needlework goods, incl fabrics, patterns, sewing supplies, notions, yarns, laces, trimmings, needlework kits, etc.	2012	591,404	0
Curtains, draperies, blinds, slipcovers, bed & table coverings	2012	4,174,354	0
Major household appliances	2012	3,045,259	0
Small household appliances & personal care appliances	2012	3,265,241	0
TVs, DVD/Blu-ray players & recorders, camcorders, portable video players, e-book readers, DVDs, Blu-ray Discs, etc.	2012	8,093,506	0
Televisions & related parts & accessories	2012	3,232,380	0
Video content downloads	2012	522,161	1
DVD/Blu-ray Disc players, recorders, camcorders, portable video players, e-book readers, & related parts & accessories	2012	3,179,135	0
Electronic game/DVD combination devices	2012	169,101	0
DVDs & Blu-ray Discs, prerecorded	2012	690,881	0
DVDs & Blu-ray Discs, recordable	2012	299,848	0
Audio equipment, musical instruments (new & used), radios, audio electronic components, CDs, records, tapes, audio books, sheet music, accessories	2012	8,014,975	0
Audio equipment, components, parts & accessories	2012	3,946,658	0
Audio books	2012	940,203	1
Pre-recorded compact discs, audio tapes, & records	2012	1,206,490	0
New & used musical instruments, sheet music, & related items	2012	1,147,354	0
Audio content downloads	2012	657,785	1
Recordable compact discs & audio tapes	2012	116,485	0
Furniture, sleep equipment & outdoor/patio furniture	2012	12,229,287	0
Upholstered furniture	2012	1,343,160	0
Sleep sofas, daybeds, futons, & other dual-purpose pieces	2012	490,736	0
Mattresses, box springs & air mattresses	2012	1,548,633	0
Office furniture, incl computer-related furniture	2012	1,815,051	0
Outdoor/patio furniture	2012	2,043,445	0
Other living room, dining room, kitchen & bedroom furniture	2012	4,498,641	0
Infants' furniture	2012	489,621	0
Flooring & floor coverings	2012	949,444	0
New & used computer hardware, software, & supplies, incl computer game software & tablet computers	2012	37,249,573	0
Computer & peripheral equipment	2012	30,875,253	0
Prepackaged (off-the-shelf) computer software, incl computer software downloads	2012	6,374,320	0
Kitchenware & home furnishings	2012	9,332,236	0
Outdoor charcoal grills, parts, accessories	2012	41,689	0
Decorative accessories & home furnishings	2012	5,998,145	0
Kitchenware	2012	3,292,402	0
Jewelry, incl watches, watch attachments, novelty jewelry, estate/ antique jewelry, etc.	2012	7,110,705	0
Books, incl e-books	2012	5,411,761	1
Photographic equipment & supplies	2012	1,820,142	0



Product Description	Year	Total Receipts (\$1000)	Flagged Product
Toys, hobby goods, & games	2012	5,260,057	0
Toys, incl wheel goods	2012	2,555,947	0
Games, incl video & electronic games	2012	1,544,835	0
Hobby goods	2012	1,159,275	0
Optical goods, incl eyeglasses, contact lenses, sunglasses, etc.	2012	841,888	0
Sporting goods & recreational equipment	2012	9,702,770	0
Boats & other sport vehicles, parts & accessories	2012	1,115,763	0
New boats, canoes, kayaks, motors, parts & accessories	2012	510,351	0
Used boats, canoes, kayaks, motors, parts & accessories	2012	59,656	0
All-terrain vehicles (ATVs) & personal watercraft	2012	426,317	0
All other sports vehicles, parts & accessories	2012	119,439	0
Hardware, tools, & plumbing & electrical supplies	2012	3,954,696	0
Lawn, garden, & farm equipment & supplies	2012	4,665,276	0
Cut flowers	2012	1,757,140	0
Indoor potted plants & floral items	2012	347,531	0
Outdoor nursery stock	2012	474,707	0
Fertilizer, lime, chemicals, & other soil treatments	2012	18,367	0
Lawn & garden tools	2012	345,331	0
Lawn & garden machinery, equipment, & parts	2012	728,611	0
Farm machinery, equipment, & parts	2012	22,499	0
All other farm supplies, incl grain & animal feed	2012	32,422	0
All other lawn & garden supplies	2012	938,640	0
Dimensional lumber & other building/structural materials & supplies	2012	552,958	0
Paint & sundries	2012	3,450	0
Cars, trucks, motorcycles, & other powered transportation vehicles	2012	547,529	0
Automotive tires, tubes, batteries, audio equipment, parts, access	2012	8,222,683	0
Pets, pet foods, & pet supplies	2012	3,398,513	0
Baby goods not elsewhere classified, incl bottles, monitors, carriers, swings, etc.	2012	346,111	0
Used books, clothing, furniture, & other used items not elsewhere classified	2012	743,663	0
Used clothing, footwear, personal access, jewelry, & related products	2012	121,687	0
Used home furniture, household appliances, kitchenware, home furnishings, & home lawn & garden goods	2012	59,214	0
Used home entertainment, recreation, & culture products	2012	439,766	0
Used office furniture & exercise/fitness equipment	2012	7,765	0
Used hardware, tools, plumbing & electrical supplies, & building materials	2012	54,000	0
Used household & personal goods, not elsewhere classified	2012	61,231	0
All other merchandise	2012	30,160,741	0
Stationery products	2012	1,721,055	0
Office paper, incl computer printer, copier, fax, & typewriter cut sheet paper	2012	2,270,800	0
Office, school, & packaging supplies	2012	6,334,605	0



Product Description	Year	Total Receipts (\$1000)	Flagged Product
Office equipment	2012	3,919,219	0
Greeting cards, calendars, maps, road atlases	2012	319,091	0
Magazines & newspapers	2012	238,319	0
Luggage & leather goods	2012	636,991	0
Antiques, items over 100 years old	2012	633,496	0
Collectibles, incl items which are old, but less than 100 years old	2012	2,946,041	0
Art goods, incl original pictures & sculptures	2012	224,859	0
Telephones, cellular phones, phone batteries, answering machines, pagers, & navigation (GPS) equipment	2012	3,505,931	0
Souvenirs & novelty items	2012	2,077,402	0
Artificial/silk flowers, plants, & trees	2012	93,826	0
All other merchandise	2012	5,239,106	0
All other merchandise, excl lottery ticket sales/commissions	2012	1,015,001	0
All nonmerchandise receipts	2012	5,369,856	0
All other nonmerchandise receipts	2012	5,369,032	0
Flagged Receipts (\$1000)		\$7,531,910	2.33%
Total Receipts (\$1000)		\$322,958,117	



NAICS 511210 - Software Publishers

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	171,075,355	0
System software publishing	2012	37,993,209	1
Operating systems software publishing	2012	9,029,695	1
Network software publishing	2012	8,608,544	1
Database management software publishing	2012	11,275,377	1
Development tools and programming languages software publishing	2012	4,132,562	1
Other system software publishing	2012	4,947,031	1
Application software publishing	2012	74,165,779	1
General business productivity and home use applications publishing	2012	31,395,154	1
Game software publishing	2012	8,479,790	1
Cross-industry application software publishing	2012	16,348,214	1
Vertical market application software publishing	2012	7,334,799	1
Utilities software publishing	2012	3,797,935	1
Other application software publishing	2012	6,809,887	1
Information technology (IT) technical consulting services	2012	5,369,798	0
Application service provisioning, with or without integration of related services	2012	692,309	1
Business process management services, including financial, human resources, supply-chain, customer relations, and vertical markets management	2012	575,794	0
Licensing of rights to reproduce and distribute computer software	2012	1,922,188	1
Custom application design and development services	2012	3,364,982	1
Information technology (IT) technical support services	2012	9,153,018	0
Software related technical support services	2012	9,153,018	0
Information technology (IT) related training services	2012	5,335,903	0
Resale of merchandise	2012	17,361,560	0
Resale of merchandise - Computer hardware and software	2012	17,287,298	0
Resale of merchandise - Other merchandise, excluding computer hardware and software	2012	74,262	0
All other receipts	2012	15,140,815	0
All other receipts	2012	15,140,815	0
Flagged Receipts (\$1000)		\$11,967,686	7.00%
Total Receipts (\$1000)		\$171,075,355	



NAICS 518210 – Data Processing, Hosting, And Related Services

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	107,994,265	0
System software publishing	2012	158,621	1
Application software publishing	2012	1,125,758	1
Information technology (IT) technical consulting services	2012	2,393,472	0
Application service provisioning, with or without integration of related services	2012	24,294,678	1
Business process management services, including financial, human resources, supply-chain, customer relations, and vertical markets management	2012	18,385,487	0
Business process management services - Financial	2012	6,519,566	0
Business process management services - Human resources	2012	503,813	0
Business process management services - Supply-chain management	2012	1,211,304	0
Business process management services - Customer relations management	2012	1,156,564	0
Business process management services - Vertical markets	2012	1,909,486	0
Other business process management services	2012	7,061,972	0
Website hosting services, with or without integration of related services	2012	12,081,543	1
Website hosting - With integration of related services	2012	11,064,365	1
Website hosting - Without integration of related services	2012	1,012,518	1
Collocation services	2012	1,504,498	1
Data storage services	2012	1,592,108	1
Data management services	2012	15,240,362	1
Video and audio streaming services	2012	4,151,831	1
Other data processing or IT infrastructure provisioning services	2012	2,414,950	1
Internet access services - Broadband (i.e., always-on)	2012	159,692	0
Internet access services - Narrowband (i.e., dial-up)	2012	2,482	0
Information and document transformation services	2012	1,422,336	1
Imaging and other data capture services	2012	979,520	1
Data conversion and migration services	2012	442,604	1
Custom application design and development services	2012	2,985,342	1
Network design and development services	2012	266,523	1
Computer systems design, development, and integration services	2012	445,120	1
IT infrastructure and network management services	2012	2,152,597	1
Network management services	2012	1,261,498	1
Computer systems management	2012	886,068	1
Information technology (IT) technical support services	2012	10,062,127	0
Software related technical support services	2012	4,692,241	0
Hardware related technical support services	2012	268,813	0
Combined hardware and software technical support services	2012	2,105,697	0
Auditing and assessing computer operations	2012	4,275	0
Data recovery services	2012	20,408	1
Disaster recovery services (business continuity services)	2012	1,134,536	1
Computer forensics	2012	16,562	1



Product Description	Year	Total Receipts (\$1000)	Flagged Product
Domain name registration services	2012	107,031	0
Other IT technical support services	2012	1,695,685	0
Resale of merchandise	2012	1,428,498	0
Resale of merchandise - Computer hardware and software	2012	1,067,854	0
Resale of merchandise - Other merchandise, excluding computer hardware and software	2012	360,644	0
All other receipts	2012	5,726,240	0
All other receipts	2012	5,726,126	0
Flagged Receipts (\$1000)		\$79,795,821	73.89%
Total Receipts (\$1000)		\$107,994,265	



NAICS 541511 - Custom Computer Programming Services

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	121,231,992	0
Maintenance and repair - Computer hardware and peripheral equipment	2012	87,907	0
Temporary staffing services	2012	2,595,476	0
Temporary staffing - Information technology (IT) staff	2012	2,595,476	0
System software publishing	2012	65,817	1
Application software publishing	2012	497,601	1
Information technology (IT) technical consulting services	2012	3,898,599	0
Application service provisioning, with or without integration of related services	2012	1,934,817	1
Business process management services, including financial, human resources, supply-chain, customer relations, and vertical markets management	2012	1,198,517	1
Website hosting services, with or without integration of related services	2012	729,425	1
Data storage services	2012	213,197	1
Video and audio streaming services	2012	109,850	1
Internet access services - Broadband (i.e., always-on)	2012	40,354	0
Internet access services - Narrowband (i.e., dial-up)	2012	2,217	0
Custom application design and development services	2012	84,402,439	0
Website design and development services	2012	17,959,035	0
Database design and development services	2012	12,235,535	1
Other custom application design and development services	2012	31,220,275	0
Customization and integration of cross-industry application software	2012	8,827,671	0
Customization and integration of vertical market application software	2012	7,812,191	0
Customization and integration of other packaged software	2012	6,224,397	0
Network design and development services	2012	1,314,442	1
Network security design and development services	2012	756,636	1
Network design and development services, other than security	2012	531,617	1
Computer systems design, development, and integration services	2012	3,547,851	1
Computer systems design services	2012	805,901	1
Computer systems design and development services	2012	1,661,646	1
Computer systems integration services, including telephony	2012	1,069,668	1
IT infrastructure and network management services	2012	2,574,533	1
Network management services	2012	834,227	1
Computer systems management	2012	1,740,306	1
Information technology (IT) technical support services	2012	13,070,599	0
Software related technical support services	2012	10,357,523	0
Hardware related technical support services	2012	191,636	0
Combined hardware and software technical support services	2012	1,472,047	0
Disaster recovery services (business continuity services)	2012	60,058	1
Computer forensics	2012	56,557	1
Domain name registration services	2012	17,792	1
Other IT technical support services	2012	914,986	0



NAICS 541512 - Computer Systems Design Services

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	152,706,095	0
Maintenance and repair - Computer hardware and peripheral equipment	2012	1,401,765	0
Temporary staffing services	2012	464,688	0
Temporary staffing - Information technology (IT) staff	2012	464,688	0
System software publishing	2012	94,200	1
Application software publishing	2012	72,774	1
Information technology (IT) technical consulting services	2012	21,393,926	0
Application service provisioning, with or without integration of related services	2012	831,464	1
Business process management services, including financial, human resources, supply-chain, customer relations, and vertical markets management	2012	761,139	0
Website hosting services, with or without integration of related services	2012	160,560	1
Data storage services	2012	218,209	1
Video and audio streaming services	2012	50,364	1
Internet access services - Broadband (i.e., always-on)	2012	47,454	0
Internet access services - Narrowband (i.e., dial-up)	2012	2,151	0
Custom application design and development services	2012	24,489,829	0
Website design and development services	2012	2,088,636	0
Database design and development services	2012	4,053,548	1
Other custom application design and development services	2012	5,731,024	0
Customization and integration of cross-industry application software	2012	5,788,058	0
Customization and integration of vertical market application software	2012	3,504,691	0
Customization and integration of other packaged software	2012	3,323,872	0
Network design and development services	2012	2,278,186	1
Network security design and development services	2012	1,260,110	1
Network design and development services, other than security	2012	1,018,076	1
Computer systems design, development, and integration services	2012	73,633,251	1
Computer systems design services	2012	10,154,892	1
Computer systems design and development services	2012	6,398,288	1
Computer systems integration services, including telephony	2012	56,948,219	1
IT infrastructure and network management services	2012	1,774,741	1
Network management services	2012	985,156	1
Computer systems management	2012	789,585	1
Information technology (IT) technical support services	2012	13,685,206	0
Software related technical support services	2012	3,620,510	0
Hardware related technical support services	2012	899,026	0
Combined hardware and software technical support services	2012	8,293,183	0
Disaster recovery services (business continuity services)	2012	178,721	1
Computer forensics	2012	66,287	0
Domain name registration services	2012	21,493	0
Other IT technical support services	2012	605,986	0



NAICS 541513 - Computer Facilities Management Services

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	34,241,591	0
Maintenance and repair - Computer hardware and peripheral equipment	2012	138,934	0
Temporary staffing services	2012	80,637	0
Temporary staffing - Information technology (IT) staff	2012	80,637	0
Application software publishing	2012	3,807	0
Information technology (IT) technical consulting services	2012	409,810	0
Application service provisioning, with or without integration of related services	2012	1,143,896	0
Business process management services, including financial, human resources, supply-chain, customer relations, and vertical markets management	2012	3,028,982	0
Website hosting services, with or without integration of related services	2012	101,958	1
Data storage services	2012	130,849	1
Video and audio streaming services	2012	75,592	1
Internet access services - Broadband (i.e., always-on)	2012	25,729	0
Custom application design and development services	2012	4,423,225	0
Website design and development services	2012	106,156	0
Database design and development services	2012	4,163,935	1
Other custom application design and development services	2012	60,274	0
Customization and integration of cross-industry application software	2012	57,916	0
Customization and integration of vertical market application software	2012	21,399	0
Customization and integration of other packaged software	2012	13,545	0
Network design and development services	2012	502,883	0
Network security design and development services	2012	150,565	0
Network design and development services, other than security	2012	352,318	0
Computer systems design, development, and integration services	2012	5,023,457	0
Computer systems design services	2012	66,599	0
Computer systems design and development services	2012	104,718	0
Computer systems integration services, including telephony	2012	4,852,140	0
IT infrastructure and network management services	2012	12,880,648	0
Network management services	2012	1,988,049	0
Computer systems management	2012	10,892,599	0
Information technology (IT) technical support services	2012	3,654,650	0
Software related technical support services	2012	427,408	0
Hardware related technical support services	2012	1,290,290	0
Combined hardware and software technical support services	2012	1,167,268	0
Disaster recovery services (business continuity services)	2012	67,622	1
Computer forensics	2012	8,579	0
Domain name registration services	2012	6,187	0
Other IT technical support services	2012	687,296	0
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NAICS 541519 - Other Computer Related Services

Product Description	Year	Total Receipts (\$1000)	Flagged Product
Industry total	2012	17,851,607	0
Maintenance and repair - Computer hardware and peripheral equipment	2012	78,457	0
Temporary staffing services	2012	182,303	0
Temporary staffing - Information technology (IT) staff	2012	182,303	0
System software publishing	2012	1,342	0
Application software publishing	2012	47,838	0
Information technology (IT) technical consulting services	2012	7,093,912	0
Application service provisioning, with or without integration of related services	2012	74,887	0
Business process management services, including financial, human resources, supply-chain, customer relations, and vertical markets management	2012	100,166	0
Website hosting services, with or without integration of related services	2012	336,077	1
Data storage services	2012	280,141	1
Video and audio streaming services	2012	5,508	1
Internet access services - Broadband (i.e., always-on)	2012	28,318	0
Internet access services - Narrowband (i.e., dial-up)	2012	1,661	0
Custom application design and development services	2012	867,965	0
Website design and development services	2012	319,260	0
Database design and development services	2012	104,087	1
Other custom application design and development services	2012	74,310	0
Customization and integration of cross-industry application software	2012	277,624	0
Customization and integration of vertical market application software	2012	45,566	0
Customization and integration of other packaged software	2012	47,118	0
Network design and development services	2012	203,350	0
Network security design and development services	2012	103,826	0
Network design and development services, other than security	2012	99,524	0
Computer systems design, development, and integration services	2012	230,624	0
Computer systems design services	2012	83,709	0
Computer systems design and development services	2012	58,702	0
Computer systems integration services, including telephony	2012	88,213	0
IT infrastructure and network management services	2012	410,691	0
Network management services	2012	285,199	0
Computer systems management	2012	125,492	0
Information technology (IT) technical support services	2012	6,885,045	0
Software related technical support services	2012	924,871	0
Hardware related technical support services	2012	143,090	0
Combined hardware and software technical support services	2012	2,701,186	0
Disaster recovery services (business continuity services)	2012	116,933	1
Computer forensics	2012	131,331	0
Domain name registration services	2012	1,289,791	0
Other IT technical support services	2012	1,577,843	0



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