GREATER Washington MARKET ASSESSMENT

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The Brookings Institution recently selected Greater Washington, DC as one of twenty-nine cities participating in the Global Cities Initiative. As a result, partners throughout the Greater Washington region have been working together with the Brookings Institution to develop a regional export strategy to boost the local economy and create jobs. The region is seeing the emergence of a coordinated effort across the public sector (through the Metropolitan Washington Council of Governments), private sector (through the Greater Washington Board of Trade), and institutional partners (through the Consortium of Universities of the Washington Metropolitan Area) to reach consensus on specific economic goals.

To support the development of an export strategy, the authors led research on Greater Washington's export economy using three methods: a Market Scan, a Market Survey, and Local Intelligence Interviews. This research focused on uncovering the strengths and weaknesses of the Greater Washington export economy by combining macroeconomic research by Brookings with extensive input from local business leaders, representing both exporting and non-exporting organizations. The results of this effort were compiled into this document, the *Market Assessment*.

Historically, the economy of the metropolitan Washington region has been grounded in and driven by the U.S. federal government. Since the Federal economic stimulus ended in 2010, it has become clear that direct investment by the federal government will continue to shrink, forcing the region to focus its future on investing in and supporting industry clusters with growth potential, independent of federal direct investment. Consequently, there is a regional urgency in identifying core industry clusters and on building a strategic plan regarding their overall growth and potential in the global economy.

The Process

This study *Market Assessment* represents the first stage in stimulating the economy of the Greater Washington, DC region.

Backdrop Nationally

- Exports have been a driver of economic growth in the post-recession period. From 2009 to 2012, around 37.3 percent of U.S. GDP growth was attributed to exports, annually averaging 11.9 percent, while total GDP growth averaged only 2.2 percent.
- Eighty-three percent of global GDP growth is projected to occur outside the U.S. in the next five years.
- Ninety-eight percent of U.S. exports are from small and medium enterprises with fewer than 500 employees making up 33.6% of the total value of exports ($471B).
- For every one billion dollars of export activity, nearly 5,700 jobs are created.

Backdrop in the Greater Washington Region

- With a 2014 export value representing only 6% of its total GDP, the Greater Washington Region is ranked lowly 95th among the 100 largest US metro areas. (The size of exports in the region is $27 billion).
- In 1980 the Federal Government spent $4B on procurement in Greater Washington; in 2010 that number grew to $84B. Since 2010 that number has dropped to $71B.

Key Findings

Local Business people are saying that

- They support a regional economic development effort, particularly around the "innovation sectors" such as Bio-health, Cyber Security and Information Technology, adding that there are also significant advantages with the Education and Hospitality/tourism sectors.
- The switch from selling solely to U.S. Federal Government to rely, in part, on sales to foreign governments is complicated. Foreign governments' RFPs are not transparent and they are difficult to find.
- Any "regional export plan" should highlight strategies that would be helpful to Greater Washington's position as mainly a service-based economy.
- The Defense Base Closure and Realignment (BRAC) and sequestration remain critical issues for many service-based firms. The threat to area firms is real, making diversification into exporting services to global markets a plausible solution.
- The export support ecosystem struggles to identify and support threshold exporters. These are the firms, estimated at 3,500 companies, that are not exporting or are under exporting.

Conclusions & Next Steps

This report is not meant to be the end of the discussion. In fact, it is meant to be the beginning. The study confirmed that the Greater Washington metropolitan area is ready to embark on a collaborative discussion of regional priorities, areas of focus for economic development, and—in particular—on exports. There is consensus in the business community that the plans should be merged into one coherent master regional plan.

Over the next several months, this research will be used to inform the planning process for the Global Cities Initiative Steering Committee as it develops the regionally accepted strategic plan.

This report was made possible because of the support and help of our Steering Committee, the Brookings Institution and the many companies who gave us access to their knowledge about their past and future exporting plans. The authors wish to thank these contributors.

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Rationale for Exports

"We are manufacturing in Prince George's County and selling in the EU, Middle East and Japan. It has taken us a long time, but exports now have basically doubled our bottom line profits."

The Washington economy has largely been buffered from huge losses during economic downturns because of its heavy reliance on the federal government. However, given sequestration policy and budget reductions, federal contract awards to Washington area companies have declined. This has created an urgency among area government and business development officials to look at other ways to promote growth of the local economy. In *Benchmarking Greater Washington's Global Reach, The National Capital Region in the World Economy*, Brookings Institution staff note:

> *"Greater Washington is one of the largest and wealthiest regional economies in the world. Much of its current prosperity stems from its status as capital of the world's leading advanced economy. But the region's economic growth has slowed markedly in recent years, and the federal government is becoming a less reliable contributor to Greater Washington's current and future prosperity."*

There are fewer government resources available, so it is more important than ever that the public, private and nonprofit sectors work together to create and advance important economic development programs. This pivot away from reliance on the federal government needs to result in strategic planning focused on increasing the region's participation in the global economy.

Market Survey

The Market Survey produced key findings in the areas of export barriers and challenges, existing and future export markets, and export assistance. The survey also generated valuable insights into the structure of the export economy in the Washington, D.C. region.

Nearly two-thirds of survey respondents do not currently export. This represents potential opportunity for these firms. It is important to understand why they don't currently export—are there reasons that are unique to the Washington, D.C. economy? For instance, the dominance of federal contracting businesses; these firms may encounter compliance issues that prevent them from exporting.

In addition, the majority of the respondents that do not currently export state that their "Product/ service cannot be exported" (61%). Further investigation should be done to determine if this perception is accurate. Do these companies have a complete understanding of the export potential for their products and services? In fact, "Knowledge of foreign markets" was the top-listed response by current exporters, when asked about export challenges.

Only a small number of survey respondents indicate that they have taken advantage of export-related assistance from the government or nonprofit sector. This may present an educational opportunity in the export plan. Among all survey respondents, the top response to the question "How could federal/state/local government help your company begin exporting, increase exports, or export to new country markets" was "Events to introduce businesses to prospective foreign partners."

Small and medium sized companies (SMEs), those with 500 or fewer employees, comprise 85% of survey respondents. The Brookings report indicates that SMEs are the most in need of export assistance, so a strong representation of SMEs in the survey provides valuable information about the export growth potential for the firms most likely to benefit from greater engagement in global markets.

It is not surprising that regional exporting is dominated by service-providing companies, given that the Washington, D.C. regional economy is the seventh largest services economy in the world. Respondents were asked to identify their company in one of the seven targeted industry clusters from the 2030 Roadmap study. Though not included in these targeted clusters, Architectural and Engineering Services was identified as an industry sector with export potential and merits further investigation.

"Our family business could be located anywhere in the world. Most of our sales are not in the U.S. My father started this business here and we consider this home…this is actually a very 'export-friendly' community with all of the amenities that make it easier to do business overseas. I don't see us ever leaving."

Market Survey Analysis

An online survey was created and implemented to gather additional insight on the export economy in the Washington, D.C. metropolitan area. Questions were designed to collect information from businesses about current exporting activity, the export-related challenges they face, and the policy and measures that they think could encourage further export growth.

The survey opened on April 11, 2016, and closed on June 23, 2016. During this time period, 109 valid survey responses were collected.

Regional business groups promoted the survey to their membership and encouraged participation. These groups include the Greater Washington Board of Trade, Northern Virginia Technology Council, Tech Council of Maryland Montgomery County Chamber of Commerce, Northern Virginia Chamber of Commerce, and others. Analysis of survey results was limited to respondents within the study area: the Washington, D.C. Metropolitan Statistical Area.

It is important to note that the survey, though heavily publicized, was taken on a voluntary basis and no questions were required. Survey results are intended to validate export trends identified in the market scan and local intelligence interviews. Because no questions were required, many respondents did not complete the full survey.

Question 1

What is your office zip code?

The majority of respondents were Virginia-based companies (40%). The remaining respondents are equally split between the District of Columbia and Maryland.

Table 1. Market Survey Responses by Jurisdiction

Jurisdiction	Number	Percent*
Virginia	44	40%
Maryland	33	30%
District of Columbia	32	29%
	109	**100%**

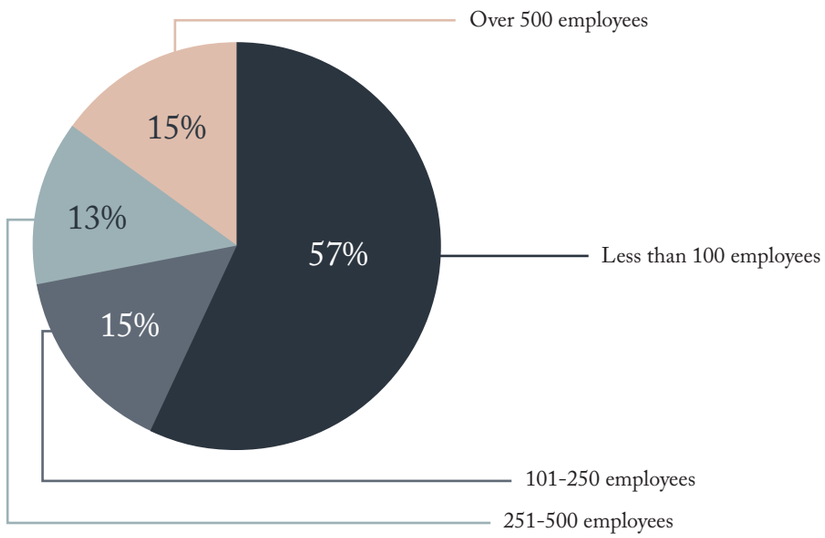
**Numbers may not add up due to rounding.*

Question 2

How many employees worked at this location in 2015?

Small and medium sized enterprises (SMEs), those with 500 or fewer employees, comprise 85% of survey respondents (93). The remaining 15% are large companies (16). A strong representation of SMEs is beneficial because it provides valuable information about the export growth potential for the firms that will be targeted in the export plan.

Figure 1. Market Survey Responses by Firm Size



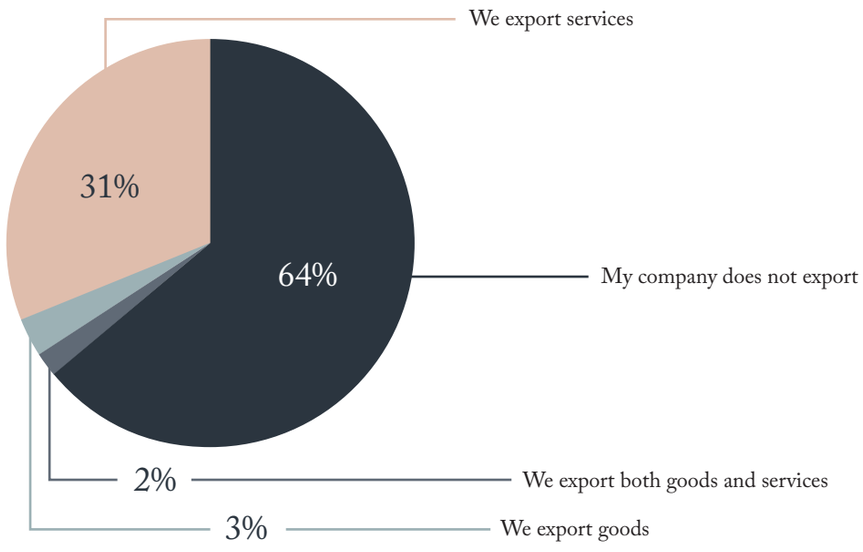
Question 3

Briefly describe your company's exporting activity

A high percentage of respondents (36%) indicate that they currently export goods, services or both. Due to the voluntary nature of the survey, companies already engaged in exporting may have taken a greater interest in participating in the survey.

The companies that currently export are dominated by pure service-providers, with 31% of the total (34). This is not unexpected, as the Washington, D.C. metro economy is heavily services-based, boasting the seventh largest service economy in the world (Table 1, Market Scan). Services account for 93% of the greater Washington GRP, compared to 33% nationally.

Figure 2. Market Survey Responses by Firm Export Activity



"Our company sells airplane parts for a specific model plane not in production any longer. We find the customer wherever they are in the world and then service their needs from our head quarters in Northern Virginia. My job is different everyday. I have to figure out a puzzle like a detective to be successful. It is very rewarding."

Barriers and Challenges

Question 5

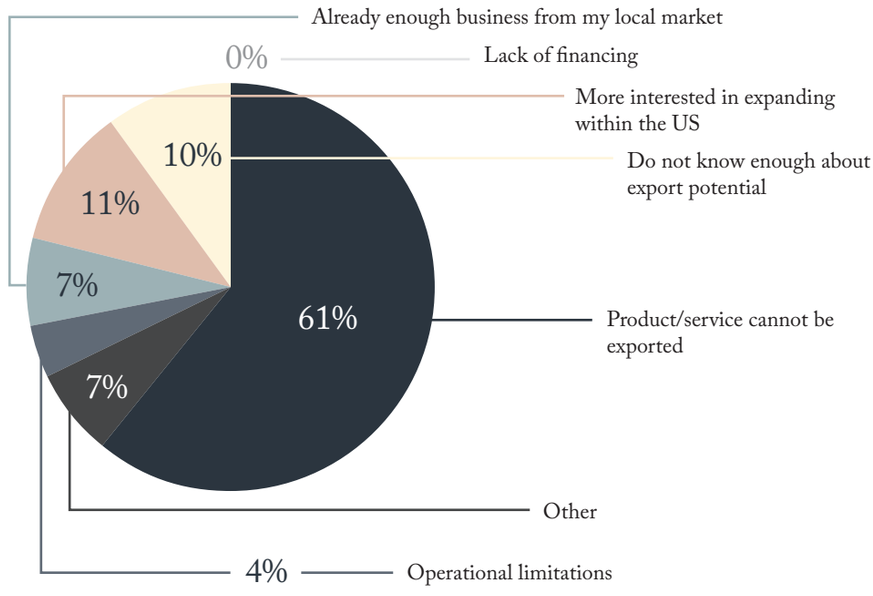
What are the reasons that your company does not export?

Among the 70 companies that do not export, the predominant reason cited is "Product/service cannot be exported" (61%). The high percentage of this response may be influenced by an inherent misunderstanding of services as an export.

A number of respondents are satisfied with their U.S. based business, citing "More interested in expanding within the U.S." (11%) or "Already enough business from my local market" (7%).

Only 11% say that they "Do not know enough about export potential." It is interesting to note that no respondents named "Lack of financing" as a reason for not exporting.

Figure 3. Market Survey, Companies That Do Not Export*



**Numbers may not add up due to rounding.*

Question 12

What are the most significant challenges faced by your company when exporting or considering new export markets?

Companies that currently export were asked about exporting challenges. When identifying these challenges, respondents were allowed to select multiple answers. The top response was "Knowledge of foreign markets" with ten responses.

Other top-mentioned exporting challenges were compliance (9), foreign government regulations/policies (9), protection of intellectual property rights (8), global sales contracts and contract negotiations (7), and foreign import control laws/regulatory compliance/ inspections/tariffs (6). "Export financing" was only identified by one of the respondents as an export challenge.

Because this question was only asked of current exporters, there is a potential bias in favor of exporters' reported perceptions.

Table 2. Market Survey, Exporting Challenges

Jurisdiction	Responses	Percent
Knowledge of foreign markets	10	14%
Compliance	9	13%
Foreign government regulations/policies	9	13%
Protection of intellectual property rights	8	11%
Global sales contracts, contract negotiations	7	10%
Foreign import control laws, regulatory compliance, inspections, tariffs	6	8%
Language and cultural barriers	4	6%
Working capital limitations	4	6%
Exchange rate fluctuations	3	4%
Global advertising, marketing, distribution	3	4%
Transportation costs	3	4%
Foreign government support programs	2	3%
Difficulty in obtaining US Entrance Visas for visitors	1	1%
Export financing	1	1%
Small-scale production limitations	0	0%
Other	2	3%
	72	**100%**

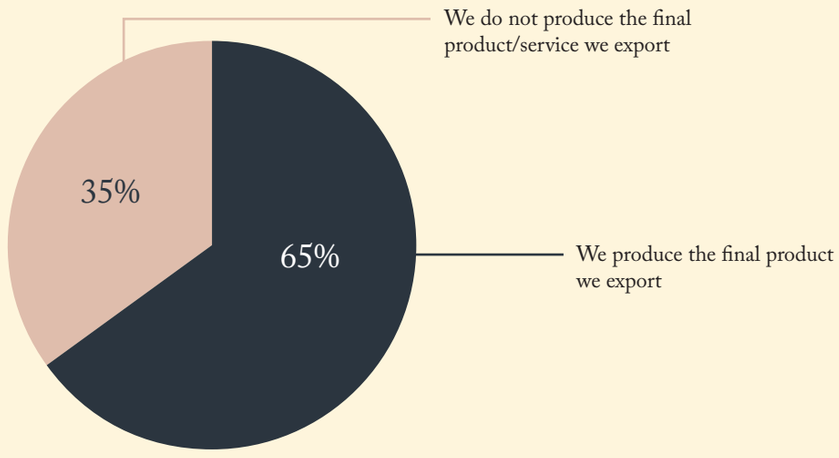
Existing Markets and Industries

Question 4

Does your company export a final product/ service that it produced (i.e. your company is not a distributor)?

There are 39 companies that export. The majority of these (65%) produce the final goods or services that they export. The other 35% do not export a final product or service that they produce themselves; they may be distributors.

Figure 4. Market Survey Responses by Firm Production



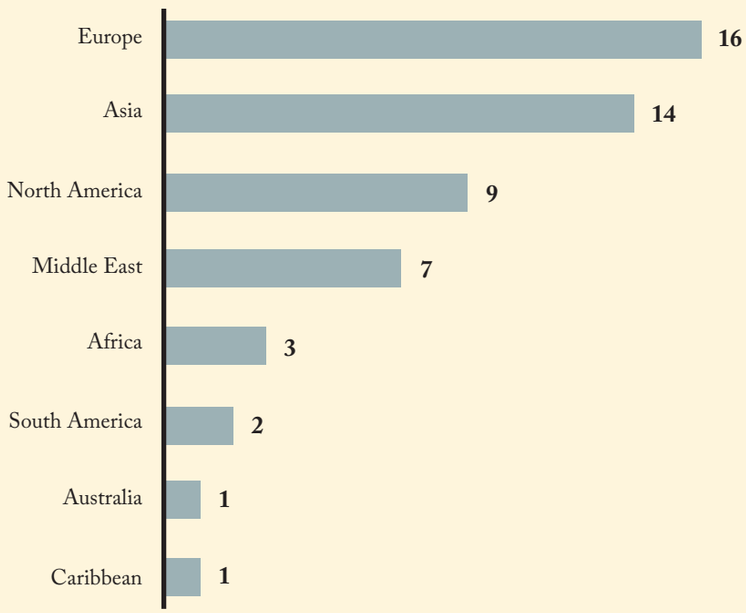
Question 6

Where are your top five export markets (by country)?

Among the 39 current exporters, Europe is the largest export market, named by 16 respondents. European markets were led by the United Kingdom (5) and Germany (5), and also include France, Brussels and Luxembourg.

Asian markets were the second highest export markets, led by China (5) and Korea (3), and also included India, Japan, Taiwan, Vietnam and the Philippines. Figure 5 indicates export markets by count of responses.

Figure 5. Market Survey, Export Markets

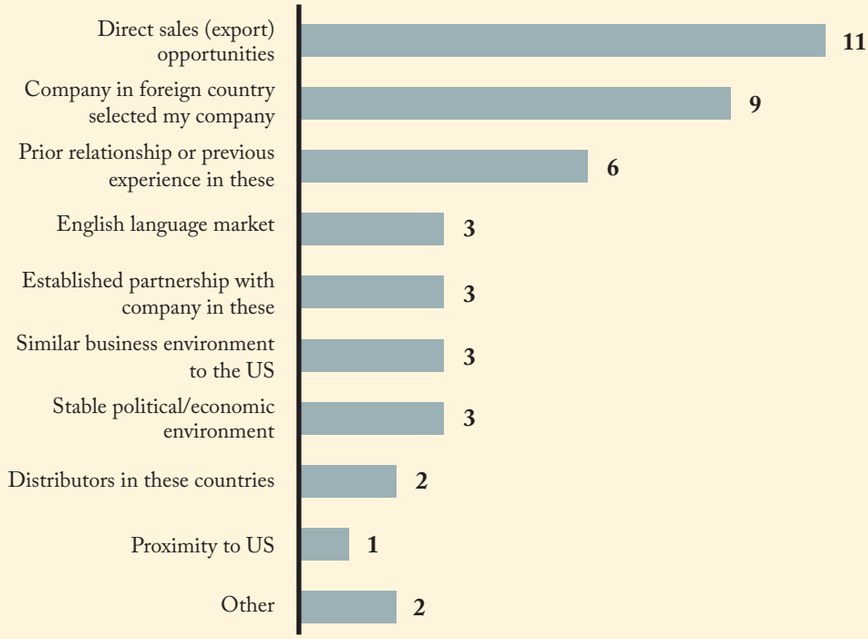


Question 7

What are the main reasons that your company exports to these countries?

When asked about the reasons that they export to these markets, the top response was "Direct sales (export) opportunities" (11), followed by "Company in foreign market selected my company" (9). "Prior relationship or previous experience in these countries" was also one of the top three reasons cited (6). Figure 6 indicates reasons for exporting by counts of responses.

Figure 6. Market Survey, Reasons for Exporting

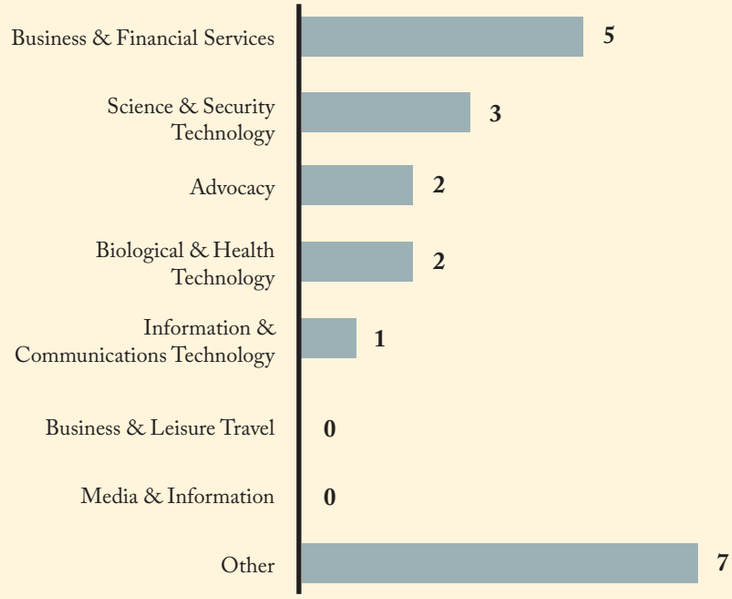


Question 8

Please specify the industries of your exported goods and/or services.

Current exporters were asked to identify their industry sector from the list of seven key industries identified in the 2030 Roadmap study (Figure X). Figure 7 indicates industry sector by counts of responses. A number of respondents skipped this question, which may indicate some lack of understanding of the industry definitions. Five companies were in the "Business and Financial Services" industry. The most favored response category was "Other." Among the seven respondents who indicated "Other," five identified as Architecture and Engineering Services, which is not included in the seven key sectors. This sector presents an additional export sector that should be explored. Also mentioned in the "Other" category were Education and Training, and Executive Recruiting.

Figure 7. Market Survey, Exporters by Industry

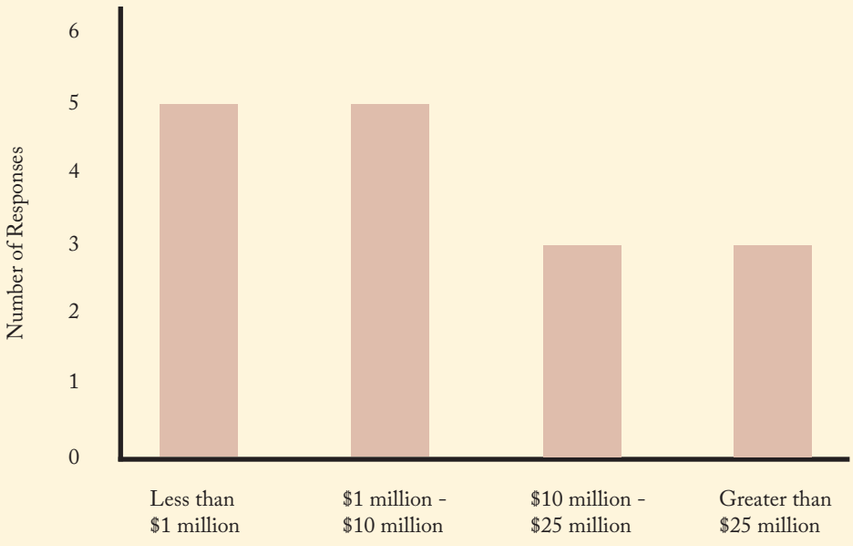


Question 9

What was the value of your company's exports in 2015?

The value of exports for those firms currently exporting was fairly evenly spread. Five respondents indicated their exports are valued at "Less than $1 million dollars" and five were between "$1 million and $10 million" in 2015. Six respondents reported export value of "Greater than $10 million."

Figure 8. Market Survey, Value of Exports



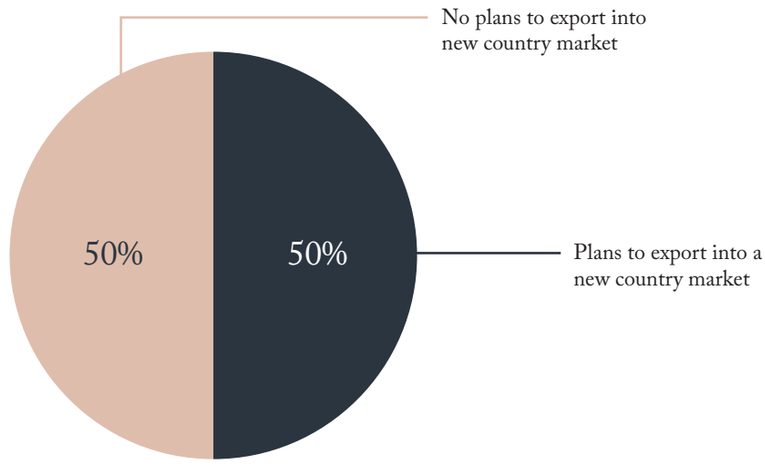
Future Markets

Question 10

Does your firm have plans to export into a new country market?

Among companies that are currently exporting, 50% (8 companies) indicate that they plan to expand their exporting to new country markets.

Figure 9. Market Survey, Exporters by Future Plans

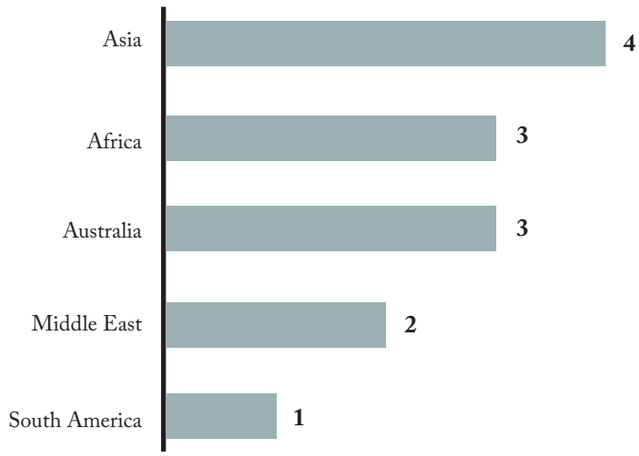


Question 11

Please list the new markets to which you plan to export.

Figure 10 indicates planned export markets by count of responses. Asia was the most cited market for planned expansion (4), followed by Africa and Australia. It is noteworthy that no European countries were mentioned by respondents to this question.

Figure 10. Market Survey, Export Markets



Export Assistance

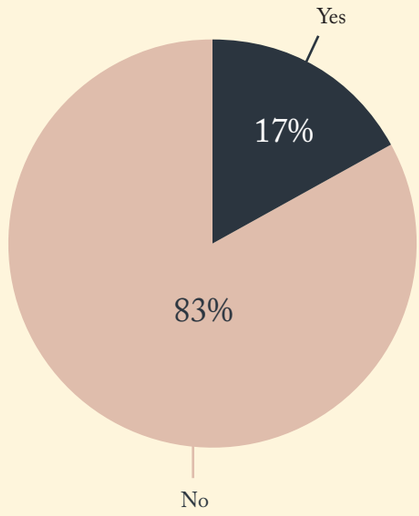
The survey asked about various types of export assistance that companies have used.

Only a small number of respondents stated that they have taken advantage of government or nonprofit export assistance (4), or received export financing from these institutions (3). A higher number, 32% (8), have used the assistance of private export service providers such as freight forwarders, law firms, banks, accountants and expeditors.

Respondents were also asked to rate the services received. The majority of ratings were "Excellent" or "Very good."

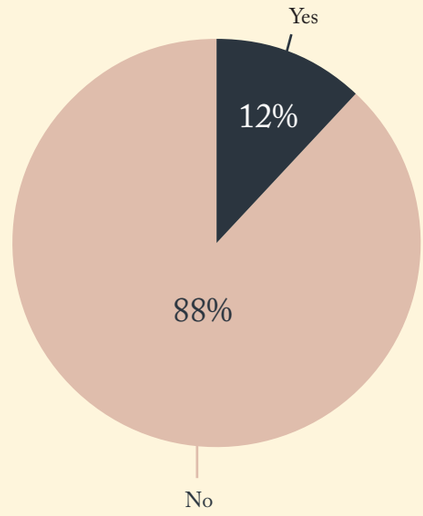
Question 13

Have you received any export-related assistance from government or nonprofit providers?



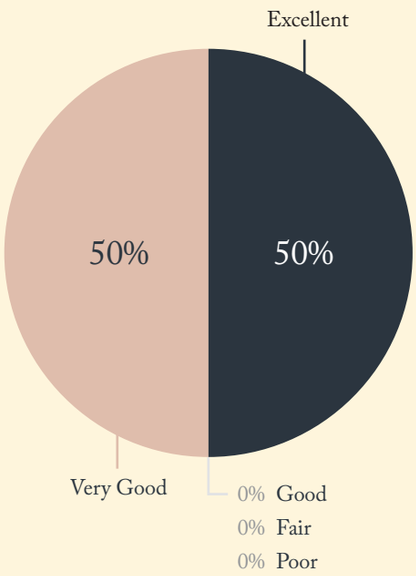
Question 15

Have you received any export financing from a government or nonprofit entity?



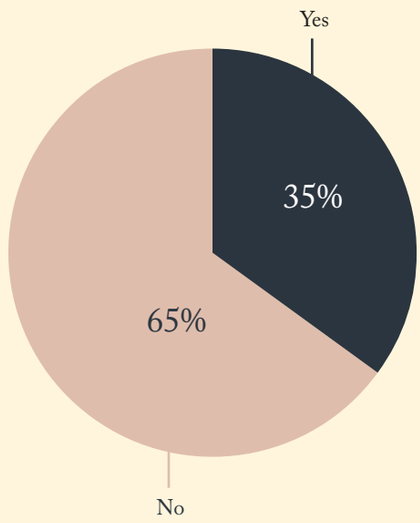
Question 16

Rate the export-related services you received from the government or nonprofit providers (Excellent, Very good, Good, Fair, Poor).



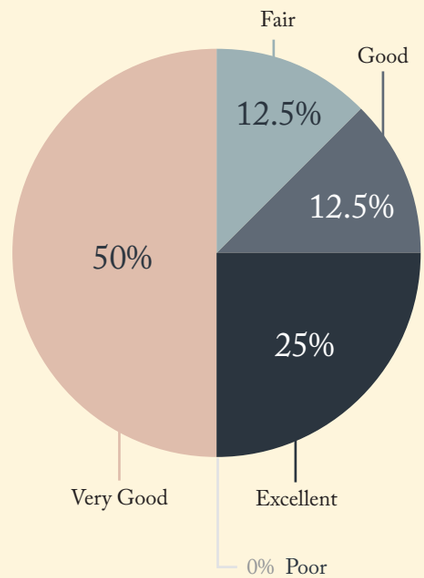
Question 17

Have you received export-related assistance from private (freight forwarders, law firms, banks, accountants, expeditors)?



Question 18

Rate the export-related assistance you received from the private (for profit) provider (Excellent, Very good, Good, Fair, Poor).



Question 14

Which organization(s) have you consulted?

Among those companies that have used government or nonprofit assistance, the Small Business Administration, state agencies, and the U.S. Commercial Service were each used by four companies. Figure 11 indicates organizations consulted by counts of responses.

Figure 11. Market Survey, Government/Nonprofit Organizations Consulted for Assistance

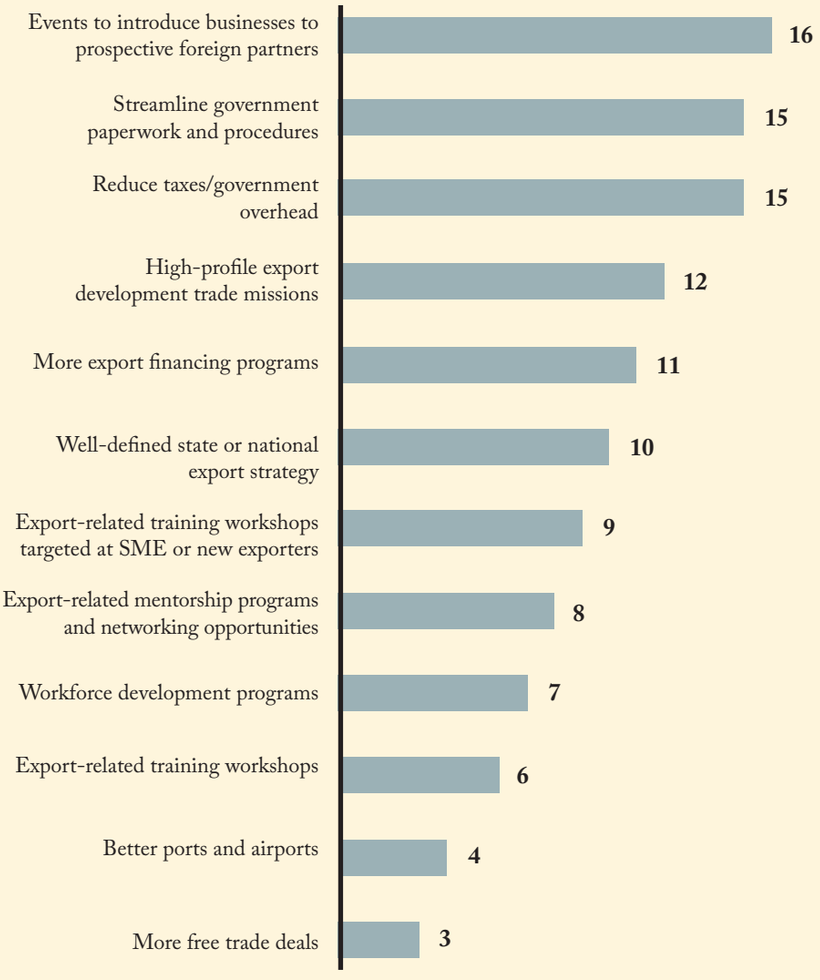
Question 19

How could federal/state/local government help your company begin exporting, increase exports, or export to new country markets?

All survey respondents were asked about how federal, state and local government can help their companies begin exporting, increase exports, or export to new country markets. A number of responses involved events and workshops, including the top response of "events to introduce businesses to prospective foreign partners" (16).

The second highest number of responses were "Streamline government paperwork and procedures" (15) and "Reduce taxes and government overhead" (15).

Figure 12. Market Survey, Government Assistance to Encourage Further Export Growth



Local Intelligence Interviews

Over the last three months our team conducted 26 interviews throughout Northern Virginia, Metro Maryland and in Washington, DC proper. We would like to recognize and thank the professional economic developers in the Department of Commerce for the State of Maryland, the Virginia Economic Development Partnership, the Montgomery County Chamber of Commerce, the Montgomery County Executive's Office, the Fairfax County Economic Development Authority, the Northern Virginia Technology Council and the Office of the Deputy Mayor for Planning and Economic Development for the District of Columbia without whose help identifying companies to interview we never would have finished this part of the report in a timely manner. The interviews each lasted approximately one hour and covered topics including company information, regional economic development perceptions, exports, and government programs.

Key findings include:

- Companies would like more support and incentives to help them offset the risk of start up in international business.
- Businesses stated they did not know what entities to approach, outside of their local bank, to help them get the capital needed to begin exporting or expand into new markets.
- Export resources are fragmented and hard for companies to find, thus resources are underutilized.
- Companies that are exporting see the value to their bottom line and plan to continue expanding.
- Businesses need to be better educated about the definition and rational for exporting.
- Financing, reliable overseas connections and cultural differences in business practices are the biggest challenges for exporters.
- China, the European Union, Canada, Japan and Mexico are the top export markets cited by companies.

Greater Washington firms that export improved their profitability by exporting. Increased sales and profits are benefits enjoyed by exporting organizations in all 22 interviews. As a result, every interviewee noted that their organization was preparing for expansion of production, sales, or operations within existing markets and new markets in the near future. The focus of planned expansion, in terms of target markets, generally paralleled the results of the Market Survey.

Interviewees mentioned numerous times that exports were "all gravy," "an unexpected windfall" and "helped get us through some rough domestic sales years," meaning they were not counting on big profits and that they were pleasantly surprised when they realized strong international sales.

For most, initial entry into exporting was either lucky or the result of strategic planning after experiencing stagnant or declining revenues from domestic markets. Five of the companies interviewed had a "chance" encounter with someone or someplace prior to exporting their products or services that influenced their decision-making to begin exporting.

While some firms grow into foreign markets over time, others are viable for international business from the beginning, as a characteristic of their initial business model. Acquiring the necessary knowledge, professional talent, and foreign partners requires extensive networking or support from export assistance providers. Interviewees cited their states (Virginia and Maryland) as the key source for export market information, often noting it was the state that encouraged them to exhibit at a trade show under the state flag—which is more cost effective than going it alone.

Export assistance providers offer services such as business development outreach and sales support, all targeted at reducing the risk, costs, and challenges of entering foreign markets. Interviewees praised the benefits of these services. However, many were unaware that such services exist for them, citing they are too small or they would not know/understand their business, consistent with the results of the Market Survey.

Interviewees offered suggestions to local leaders about the priorities for developing a Greater Washington regional export development plan. One interviewee suggested setting up a state fund for qualifying companies that would pay 100% for participation in a strategic trade show, then in year two it may drop to 66%, then 33% and then the company is on its own. Typically sales cycles are longer than a year and this way companies would have time to nurture sales.

Generally, local and state economic development was perceived to be very strong; however, multiple interviewees mentioned that a regional entity that can direct or support them with international trade is nonexistent. In fact, one interviewee went on to say "we first have to decide if we are even a seamless region at all." In any case, nearly all of the interviewees thought it would be very helpful to have an organization focused on exporting that could guide them to services such as financing, country expertise and legal services.

Over the past 60 days, while conducting local intelligence interviews and gathering and compiling the market survey data, conversations and feedback from Greater Washington companies and executives provided key insight for the formation of this market assessment. Selected quotes are listed below:

"Our company was crushed by sequestration. We had no idea where to start looking for help to branch away from total reliance on federal contracts; exporting wasn't even in our vocabulary."

"As a CEO, I did everything wrong, made the wrong decision at every turn…exporting is hard and non-intuitive. It wasn't until I literally fell into the VALET program with the state of Virginia that I finally learned how to grow my business internationally. Since graduating their program I have done over $25M per year in international commerce."

"Doing business in foreign countries is different in every market. It requires immense patience. We have been very fortunate to receive help in the form of business development support and grants from the state of Maryland."

"Education is the key. Any economic development plan needs to focus on access to information and guidance to the web of export service providers in the Greater Washington area."

"We are manufacturing in Prince George's County and selling in the EU, Middle East and Japan. It has taken us a long time, but exports now have basically doubled our bottom line profits."

"The most important thing for government officials to focus on is building the capacity of the international trade eco-system. Financial advisors, lawyers specializing in exports and market intelligence are crucial for businesses to succeed."

Market Scan

Metropolitan Washington is a prosperous region, but its economic growth has slowed. Its $400 billion economic footprint relies heavily on the service sector and the federal government. Through direct employment contracting, the federal government accounts for 38 percent of total regional economic output. The reliance on government poses a challenge for growth.

State of the Economy of the Greater Washington Region

(Excerpted from the Brookings Institution report, "Benchmarking Greater Washington's Global Reach, The National Capital Region in the Global Economy.")

Greater Washington is a large, productive, and prosperous economic center. The District of Columbia and its surrounding jurisdictions in Maryland, Northern Virginia, and West Virginia together constitute the sixth largest metropolitan economy in the United States, and the 14th largest in the world. In 2014, Greater Washington generated more than $400 billion in goods and services, and was home to 3.2 million jobs and 6 million residents.[i]

Industrially, Greater Washington boasts the seventh largest service economy globally, a super-sector that includes business, finance, research, education, healthcare, and governmental affairs. Greater Washington is also one of the most productive service economies in the world, with the average worker supporting $157,000 dollars of economic activity, ranking it behind only New York and Los Angeles among the world's ten largest services hubs.[ii]

Services dominate Greater Washington's economy, accounting for fully 93 percent of its GDP. Goods and commodities represent the remaining 7 percent (which consists of manufacturing, construction, mineral extraction, and agriculture), compared to 33 percent nationally. The largest service components are relatively high-skill services in science, consulting, media, real estate and finance (47 percent of GDP; 1.25 times the national average), followed by local, state, and federal government (25 percent; double the national average). These two mega-sectors also pay the highest average per worker compensation at $94,000 and $83,000 per year, respectively. The Greater Washington region's concentration in high-wage service sectors help explain its relative affluence. Globally, it ranks seventh on per-capita GDP, a common standard-of-living measure. Its typical household earns $91,200, more than 70 percent

Table 3. Ten Largest Service Economies

Metro	Business, Financial, Professional, and Local Services GDP, 2014 (b.n.)	Business, Financial, Professional, and Local Services Productivity per Worker, 2014
New York	1071.2	174,798
Tokyo	736.5	93,227
Los Angeles	591.9	172,284
London	500.4	89,604
Paris	484.2	118,053
Seoul-Incheon	370.0	69,632
Washington	367.4	156,957
Chicago	359.1	133,021
Beijing	307.0	41,424
Moscow	300.6	94,949

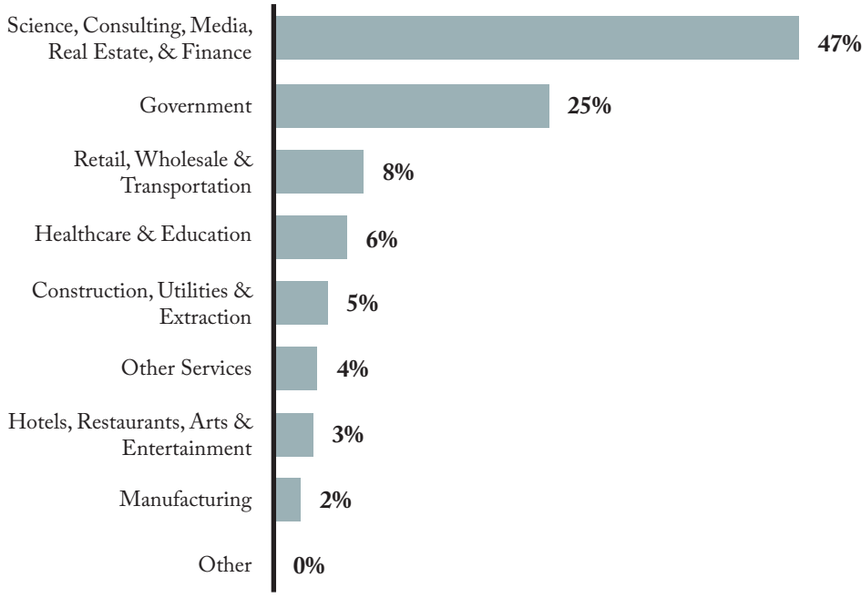
Source: Brookings Global Metro Monitor

above the nationwide level. About 8.7 percent of people in Greater Washington live below the federal poverty line, a little more than half the U.S. average. And the median value of owner-occupied housing units is $387,000, more than double the median U.S. value. While these statistics conceal significant variation within the region by place and sub-population, Greater Washington overall is a large and prosperous economy.

The Greater Washington region's concentration in high-wage service sectors help explain its relative affluence. Globally, it ranks seventh on per-capita GDP, a common standard-of-living measure. Its typical household earns $91,200, more than 70 percent above the nationwide level. About 8.7 percent of people in Greater Washington live below the federal poverty line, a little more than half the U.S. average. And the median value of owner-occupied housing units is $387,000, more than double the median U.S. value.[iii] While these statistics conceal significant variation within the region by place and sub-population, Greater Washington overall is a large and prosperous economy.

Greater Washington's economic growth has slowed. Since the global financial crisis and ensuing deep recession in 2008-09, economic growth in the Washington region has been relatively steady, averaging 0.7 percent per year between 2008 and 2014. During the Great Recession, the region's GDP growth barely slowed thanks to stable federal employment and stimulus spending. Starting in 2010, however, Greater Washington's growth began to lag national and large metropolitan averages as federally induced "recession-proofing" wore off and the effects of federal sequestration cuts began to kick in. Between 2010 and 2014, it ranked 94th among the 100 largest U.S. metro areas and 249th among the 300 largest globally with 2.2 percent annual GDP growth. Part of its sluggishness owes to the character of recent job growth, which has idled at 0.4 percent per year between 2008 and 2014. Health care, hotels, and food services accounted for 91 percent of net new jobs over that time. On average, occupations in these sectors pay 40 percent below the regional average wage. If current growth rates continue, by 2020 the region's economy will be 30 percent larger than its pre-recession peak, compared to 50 percent larger for the average U.S. metro area.[iv]

Figure 13. Greater Washington GDP Share by Sector, 2014 (one-digit NAICS)



The region's economic structure poses a central challenge to its current and future growth prospects. It is and will remain the epicenter of the U.S. government, itself a source of good jobs and billions of dollars in spending, employing 362,000 workers in Greater Washington (11 percent of the workforce) and generating $77 billion in GDP (19 percent of the economy). Yet the role of the federal government in the regional economy extends beyond direct operations to include the commerce that results from business with federal agencies. In 2014 the federal government awarded $76 billion in contracts and grants to firms and organizations operating within the Greater Washington area, amounting to another 19 percent of the regional economy devoted to federally supported activities.[v] Looming increases in federal entitlement costs mean that sequestration cuts may represent only the beginning of a longer-term squeeze on the federal domestic discretionary spending that supports more than one-third of Greater Washington's economy. Failure to diversify the regional economy and build new areas of competitive strength may threaten its long-run prosperity.

Greater Washington's economy could benefit from a more deliberate global orientation. In an increasing number of U.S. metropolitan areas, cross-sector groups of leaders are seizing new opportunities for local economic growth by accessing the global marketplace. International trade and investment represent increasingly critical sources of jobs and enhanced competitiveness for U.S. regions, and their workers and firms (see "Why Trade and Investment Matter"). Along these lines, Greater Washington's public, private, and civic leaders can strive to strengthen performance in three key areas that determine and reflect the region's global orientation: the vitality of trade-oriented advanced industries; export volume; and inbound foreign direct investment (FDI).

- **Advanced industries** are research- and technology-intensive manufacturing and service industries that embody the traded core of the economy. This sector is 3.2 times more export-intensive and 2.9 times more FDI-intensive than the U.S. industrial average. It also employs 80 percent of the nation's engineers; performs 90 percent of private-sector R&D; generates approximately 85 percent of all U.S. patents; and accounts for 60 percent of U.S. exports.[vi] An industry must satisfy two criteria to earn the "advanced" designation: it must be at the 80th percentile or higher in per-worker research and development (R&D) spending; and it must be above the national average in the share of workers whose occupations require a high degree of STEM (science, technology, engineering, and math) skills.
- **Exports** are sales of goods and services to foreign entities (people or companies). The foreign entities include foreign firms located abroad (but no affiliates of foreign companies located in the U.S.), subsidiaries of U.S. firms located abroad, foreign tourists and students in the U.S., and foreign passengers on U.S. air carriers.[vii]
- **Inbound foreign-direct investment (FDI)** arises when a foreign entity invests in a business enterprise in the U.S. To be considered FDI, the investment must give the foreign entity a majority stake in the management and operations of the enterprise. Having a majority stake gives the investor a greater incentive to establish a lasting presence in the firm and to transfer technology, best practices, and skills to reduce costs and enhance productivity of firms throughout the supply chain.[viii]

Harnessing each of these drivers of global-orientation is critical. As the next section shows, while Greater Washington possesses strengths in some of these drivers, its performance lags considerably in others. To reduce the regional economy's structural dependence on federal spending, public- and private-sector leaders should explore strategies to re-orient local advanced industries and other high-value service firms not only beyond government, but toward opportunities beyond the nation's borders.

Figure 14. Government and Federal Contractor Share of GDP, 2014

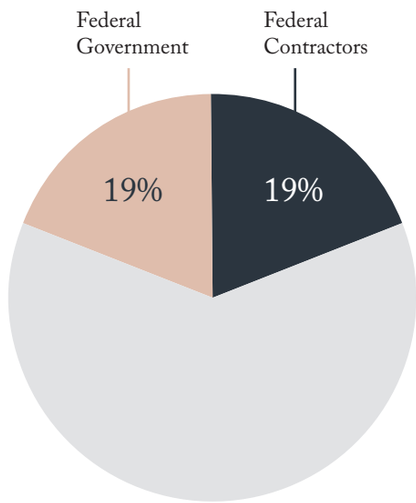
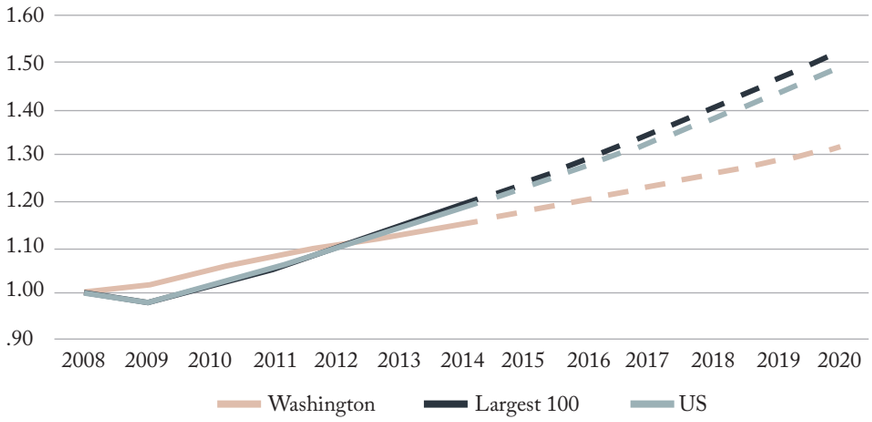


Figure 15. Output Growth Projections for Greater Washington



Global Trade and Investment: Advanced Industries

Advanced industries account for a significant share of Greater Washington's jobs. Advanced industries are characterized as R&D and STEM worker intensive manufacturing and high-tech services industries. For Greater Washington these are critical sectors of the economy and represent a source of high-paying jobs in the region. Jobs in these industries generated $113,000 in compensation per worker on average compared to $64,000 for workers in other industries in the Washington region in 2014. Among 10 peer regions, Greater Washington ranked third in the share of its jobs in advanced industries, behind only Seattle and San Francisco, and sixth overall among the 100 largest U.S. metro areas. However, a relatively smaller share of Greater Washington's GDP comes from these sectors—19 percent, ranking the region seventh among its peers.

Growth in Greater Washington's advanced industries lags its peers, reflecting variation in performance within the region. Between 2008 and 2014, advanced industry employment in the region grew at the same sluggish 0.4 percent annual rate as in other industries. That ranked Greater Washington seventh among its peer regions, above only San Diego, Philadelphia, and Sacramento. This aggregate performance reflected significant variation within the region, however. While Fairfax County and Falls Church account for 34 percent of Greater Washington's advanced industry jobs, employment in their advanced industries shrank at an annualized rate of 1.1 percent from 2008 to 2014. Losses also occurred in Prince George's and Frederick counties. By contrast, the District of Columbia and Arlington and Loudoun counties posted relatively strong growth in advanced industries during that period, though each started from a considerably smaller base than Fairfax/Falls Church.

Table 4. Peer Rankings of Advanced Industry Share of Metro Jobs

Metro	Share of Metro Jobs in Adv. Industries, 2014	Share of Metro GDP in Adv. Industries, 2014	Adv. Industry Jobs, 2014 (thou.)	Adv. Industry GDP, 2014 (billions)	Adv. Industries Annualized Job Growth Rate, 2008-2014
Seattle	15.9%	32.6%	302.0	82.6	1.8%
San Francisco	14.5%	25.3%	320.8	81.4	2.8%
Washington	13.5%	19.3%	431.9	77.9	0.4%
Boston	13.4%	23.0%	347.5	77.0	0.8%
Austin	12.8%	25.6%	119.5	26.7	2.9%
San Diego	12.4%	21.2%	181.0	40.3	0.3%
Raleigh	12.2%	24.2%	69.1	14.3	3.2%
Baltimore	9.0%	15.3%	123.9	24.4	0.8%
Philadelphia	8.7%	14.4%	244.9	46.5	-1.2%
Sacramento	6.4%	11.8%	58.0	12.9	-1.7%

Source: Brookings analysis of Moody's Analytics data

Advanced industries in Greater Washington are minimally diversified and rely heavily on federal spending. In Greater Washington, just five of the 50 industries Brookings identifies as advanced sectors of the U.S. economy account for 87 percent of the region's advanced industry jobs. Among the five, computer systems design leads the way followed by management and technical consulting, constituting 39 percent and 23 of advanced industry jobs, respectively. All five sectors post average compensation per worker of $100,000 or more.

Another shared characteristic of Greater Washington's advanced industries is the degree to which they rely on federal spending. U.S. Treasury Fiscal Service data reveal that in 2014 advanced industries in Greater Washington received $50 billion in federal government contracts and grants, up slightly from 2010. Accordingly, federal sources accounted for 64 percent of all advanced industry revenues in the region in 2014. While the ability of these advanced industry firms to win federal contracts and grants is a telling measure of their competitive strength, their considerable dependence on federal revenue poses risks in an era of increasingly constrained federal spending. Greater Washington's leaders might consider the example of San Diego, a region that has actively enabled the growth of advanced industries that helped the economy diversify away from dependence on federal spending (see sidebar, "Networks, Clusters, and Talent Further Advanced Industries in San Diego").

Figure 16. Sources of Revenue for Greater Washington's Advanced Industries

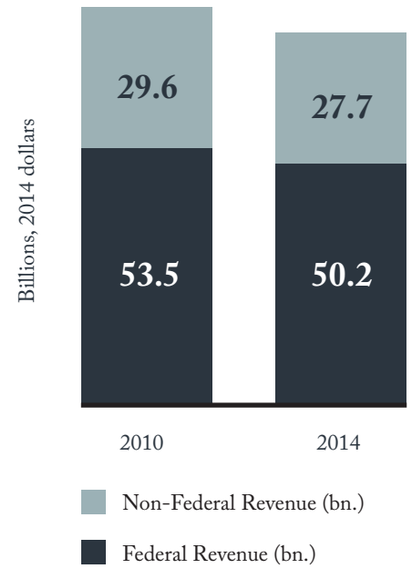


Figure 17. Greater Washington Top Counties in Advanced Industries: Employment Size and Growth

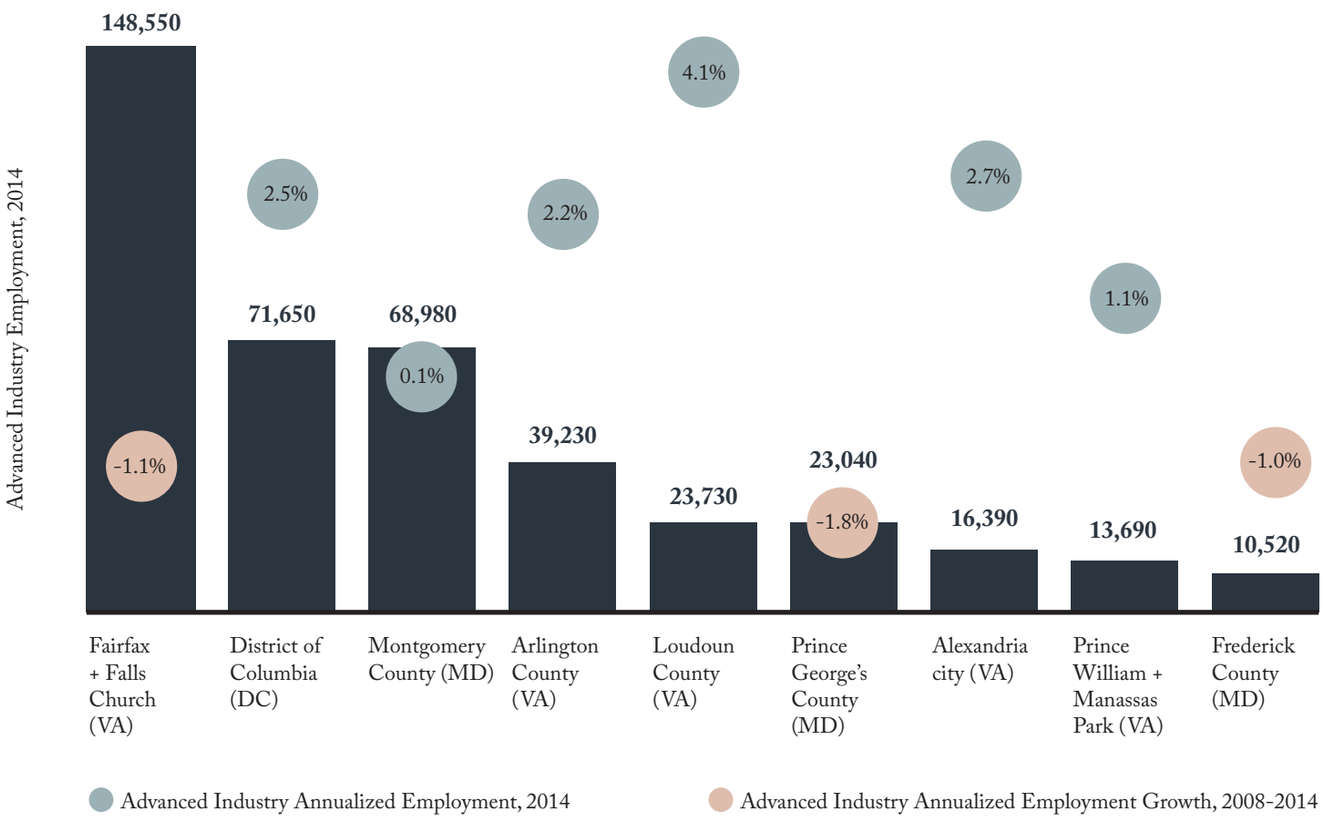


Figure 18. Greater Washington Advanced Industry Revenue Sources, 2014 (current dollars)

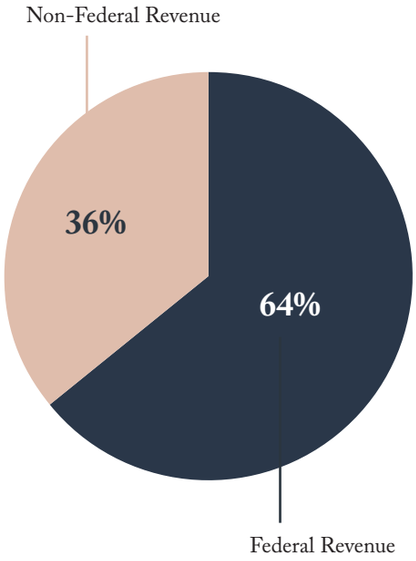


Table 5. Five Largest Advanced Industries in Greater Washington by Jobs

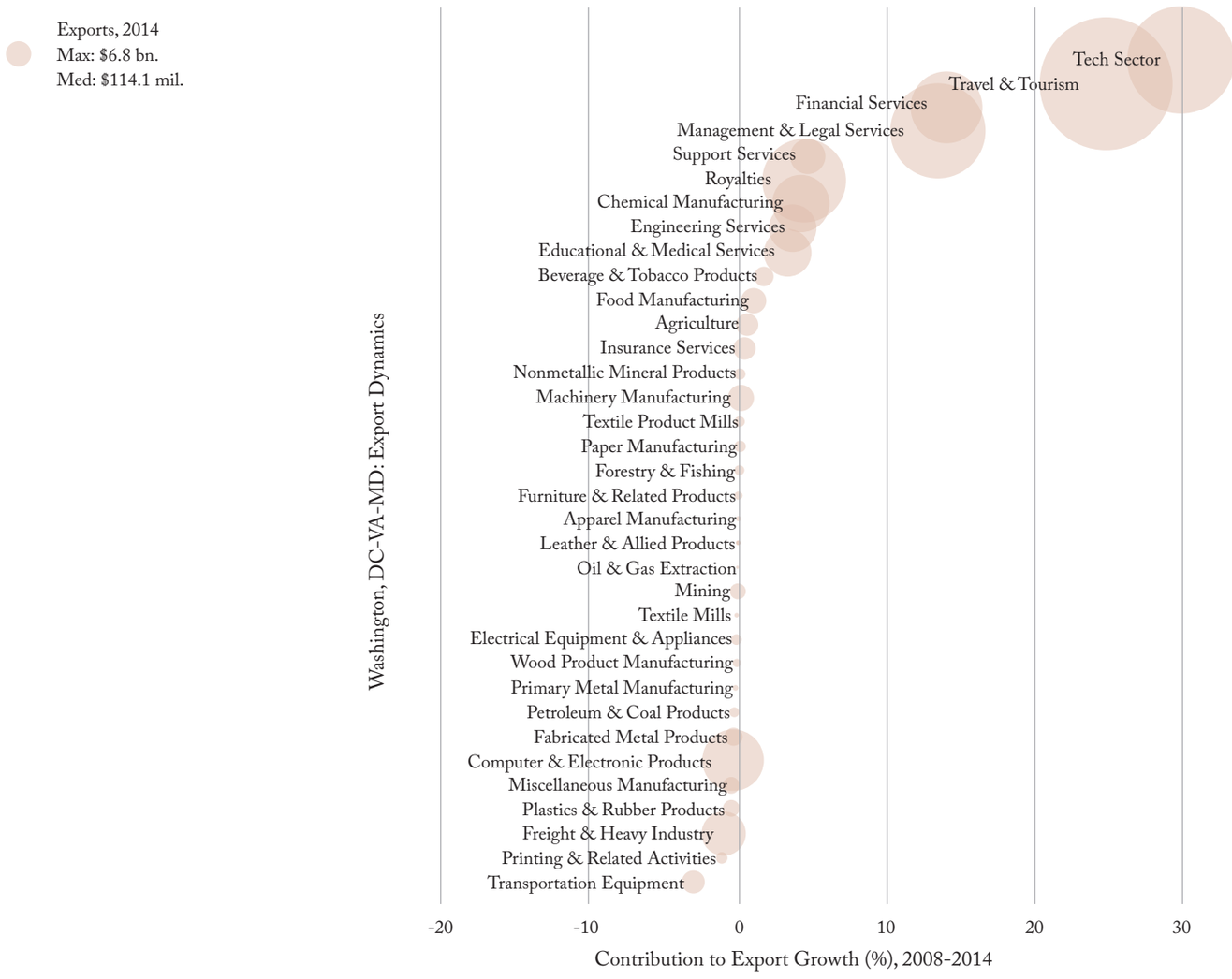
Rank	Advanced Industry	Jobs, 2014	Share of Metro Adv. Industry Jobs, 2014	Annualized Job Growth, 2010-2014	Compensation per Worker, 2014	Federal Revenue, 2014 (bn.)	GDP, 2014 (bn.)	Federal Share of Revenue, 2014
1	Computer Systems Design	167,800	38.9%	0.7%	118,999	20.9	28.4	73.6%
2	Management & Technical Consulting	98,100	22.7%	2.2%	103,293	8.3	14.4	57.7%
3	Architectural & Engineering	51,230	11.9%	-1.8%	99.369	6.5	6.9	93.8%
4	Research & Development Services	46,010	10.7%	-1.0%	132,951	5.5	8.8	62.8%
5	Data Processing & Hosting	10,470	2.4%	0.6%	104,134	0.8	1.7	44.9%

Source: Brookings analysis of Moody's Analytics data

Exports

Greater Washington's services industries generate exports that in turn support significant employment in the region. Given the region's relatively small manufacturing base, exports in Greater Washington are heavily services-oriented, with services industries accounting for 84 percent of export value compared to an average of 34 percent nationally. Tourism and technology represent the largest export sectors in the regional economy, accounting for $6.8 billion and $4.4 billion, respectively, in 2014 export value. They encompass several sub-sectors including R&D services ($2.4 billion), computer services ($1.3 billion), and telecommunication ($600 million) for technology; and restaurants and retailers ($2.9 billion), hotels ($2.0 billion), and air and ground transportation ($1.2 billion) for tourism. Technology and tourism were also the largest contributors to regional export growth from 2008 to 2014, generating an additional $2.3 billion and accounting for more than half of total export growth during that time. Greater Washington's financial, legal, and managerial services also constitute an important export strength, collectively exporting $5.3 billion in 2014. Royalties represent the other significant export sector for the regional economy, generating $2.5 billion in export value in 2014. Through direct employment related to these exports and the additional spending those jobs create (the so-called multiplier effect), Greater Washington's $27 billion in exports generated an estimated 220,000 jobs in 2014. The region's service sectors thus constitute an important platform from which to bolster international trade and investment.

Figure 19. Exports Volume and Contribution to Export Growth (2008-2014)



Greater Washington is a much less export-intensive region than its peers. A common measure of a region's export orientation is its export "intensity," or the share of total GDP that exports represent. On this count, Greater Washington's $27 billion in exports in 2014 represented just 6.1 percent of total GDP, the second-smallest share among its peer regions. Washington also lagged most of its peers, including Seattle, San Francisco, San Diego, Raleigh, and Philadelphia, in boosting its export intensity between 2003 and 2014. Since 2008, however, exports in Greater Washington have experienced somewhat faster growth and have made an outsized contribution to otherwise sluggish GDP growth.

While Washington ranks ninth among its peers in export share of GDP, it ranks sixth in the share of its jobs supported by exports, at 6.9 percent. This indicates that exports in Greater Washington produce relatively larger job impacts for each dollar received from exports. This is because the region's jobs multiplier is higher, a statistic that estimates how many jobs a billion dollars of export revenue supports after controlling for each metro's unique industrial structure. The disproportionate focus on travel and tourism primarily explains the large job multiplier in Greater Washington because those jobs are typically lower-wage and thus easier to support.

Table 6. Peer Rankings of Export Share of GDP

Metro	Real Exports (bn.), 2014	Export Share of GDP (%), 2014	Change in Export Share of GDP (%), 2003-2014	Annualized Export Growth, 2008-2014	Annualized GDP Growth, 2008-2014
Seattle	51.9	19.1%	7.9%	6.3%	2.0%
San Francisco	38.8	11.4%	3.7%	2.0%	1.1%
Boston	38.9	10.8%	1.4%	1.9%	1.7%
Raleigh	6.5	10.1%	2.5%	2.4%	2.0%
San Diego	20.7	10.0%	3.2%	3.5%	1.2%
Austin	10.0	9.2%	-0.7%	2.6%	3.7%
Philadelphia	31.7	9.1%	2.3%	0.1%	0.6%
Baltimore	12.0	6.9%	1.8%	2.7%	1.8%
Washington	26.7	6.1%	2.1%	2.9%	0.9%
Sacramento	6.9	5.7%	2.0%	1.8%	0.0%

Source: Brookings Export Monitor 2015

What's more, exports have made a larger contribution to recent GDP growth in Greater Washington, and that has resulted in new jobs. Between 2003 and 2014 export revenues created 85,000 additional jobs in the region, or 29 percent of all jobs created during that time. Along these lines, Greater Washington might look to other regions that are developing and implementing deliberate strategies to grow exports as a means for increasing jobs and competitiveness.

Greater Washington's largest exporting jurisdictions nevertheless exhibit below-average export intensity. In 2014, five jurisdictions accounted for 76 percent of Greater Washington's exports: District of Columbia, Montgomery, Fairfax/ Falls Church, Prince George's, and Loudoun. Nonetheless, each punches below its weight on export intensity, falling below the U.S. average of 11.6 percent in 2014. More rural areas of the region, which are more specialized in agriculture and goods production, tend to exhibit considerably higher export intensity.

Table 7. Peer Rankings of Export Jobs Share of Metro Jobs

Metro	Total Export Jobs, 2014	Total Export Jobs Share of Metro Jobs, 2014	Total Export Jobs Change, 2003-2014	Share of Jobs Created from Exports, 2003-2014	Total Export Jobs Created by a Billion Dollars of Exports, 2014
Seattle	317,226	16.7%	144,558	57.5%	6,110
San Francisco	271,533	12.4%	85,835	48.3%	6,993
Boston	276,509	10.6%	43,777	21.8%	7,110
San Diego	131,605	9.0%	35,694	42.6%	6,365
Raleigh	42,593	7.5%	14,825	12.1%	6,581
Philadelphia	200,707	7.2%	38,245	78.4%	6,337
Washington	219,771	6.9%	85,223	28.7%	8,218
Austin	62,113	6.8%	10,956	4.3%	6,182
Baltimore	79,653	5.8%	19,593	20.4%	6,657
Sacramento	47,232	5.2%	12,939	41.3%	6,822

Source: Brookings Export Monitor 2015

Figure 20. Real Exports (bn.), 2014

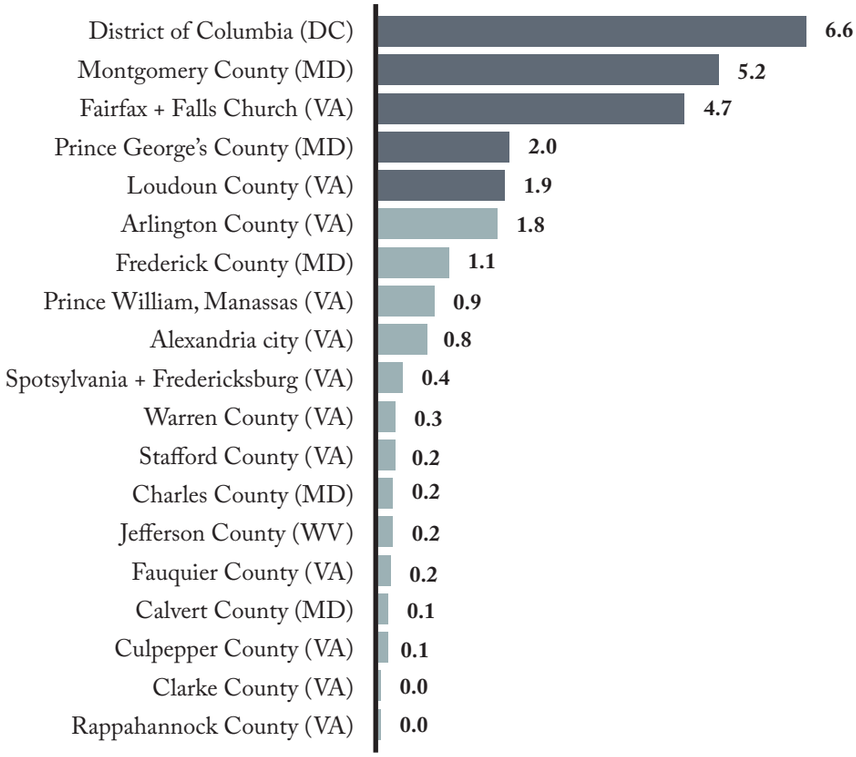
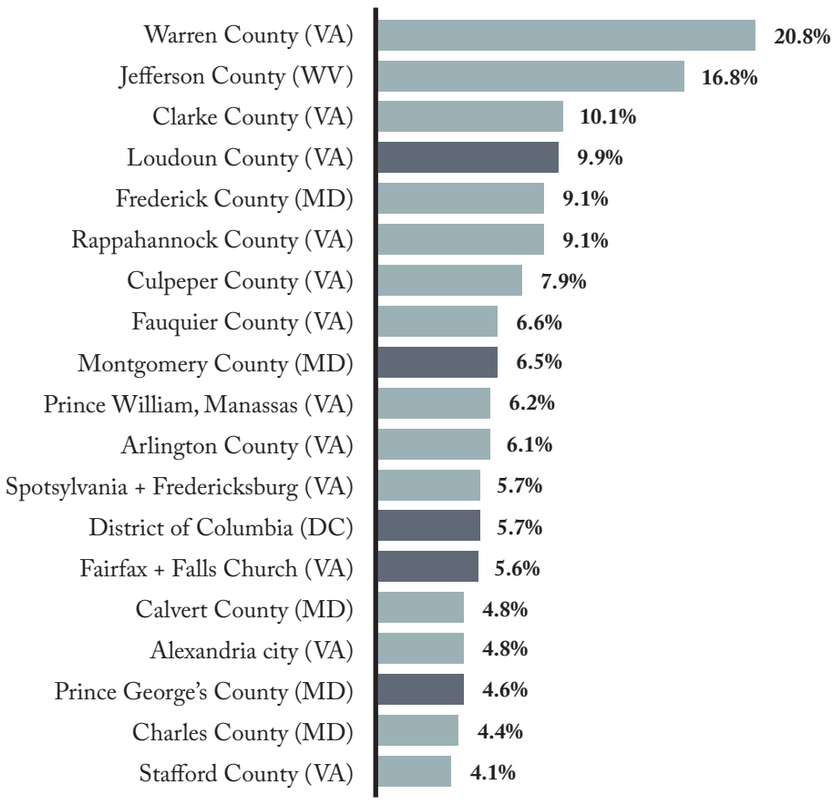


Figure 21. Export Share of GDP (%), 2014



Foreign Direct Investment

Foreign direct investment accounts for a slightly higher share of jobs in Greater Washington than in the United States overall. In 2011, the number of jobs in foreign-owned establishments (FOEs) in Greater Washington totaled 126,000 (5.4 percent of jobs), up from 112,000 in 2001 (5.2 percent of jobs) and 51,000 in 1991 (3.1 percent of jobs). This steady increase suggests that the regional economy may be increasingly attractive to global firms. Greater Washington was among only four of its peer regions to see an increase in FDI job intensity from 2001 to 2011. Still, it ranked just fifth among its peers in the share of its jobs in FOEs in 2011, behind Boston, Raleigh, Philadelphia, and San Francisco.

As is true with exports, regional averages on FDI intensity mask considerable variation among Greater Washington's jurisdictions. Fairfax/Falls Church and Frederick County had more than 6 percent of their private-sector jobs in FOEs in 2011, while percentages in the District of Columbia (2.9 percent) and Prince George's (3.5 percent) and Arlington (2.6 percent) counties were much lower. A collection of advanced services firms primarily account for the bulk of FDI jobs in Fairfax/Falls Church, such as the technology firm SI International Inc. (headquartered by Serco Plc in England), the tech consulting firm Accenture (headquartered in Ireland), and computer systems design firm BAE Systems (headquartered in England). Not surprisingly, all of these firms happen to be major federal contractors. In Loudoun, the top firms is Invensys Process Systems (headquartered in England) and specializes in automation and controls. In Frederick, the top employer is currently the pharmaceutical firm MedImmune, which is owned by AstraZeneca (headquartered in England). Research demonstrates that the presence of these sorts of globally engaged firms generates several positive effects on the regional economy (see sidebar, "Local Spillover Effects of Globally Engaged Firms").

Table 8. Peer Rankings of Share of Metro Jobs in Foreign-owned Establishments (FOEs)

Metro	Jobs in FOEs, 2011	Share of Jobs in FOEs, 2011	Change in Share of Jobs in FOEs, 2001-2011
Boston	142,815	6.7%	-0.8%
Raleigh	24,864	5.9%	-2.4%
Philadelphia	137,037	5.8%	0.7%
San Francisco	89,383	5.5%	-0.6%
Washington	126,211	5.4%	0.2%
San Diego	48,730	4.8%	-0.4%
Austin	29,180	4.6%	0.9%
Seattle	65,045	4.6%	0.3%
Baltimore	48,051	4.5%	-1.0%
Sacramento	15,244	2.6%	0.0%

Source: Brookings FDI in US Metros

A large share of Greater Washington's FDI came about through mergers and acquisitions (M&A). Data that track each firm's corporate ownership structure from 1991 to 2011 show that 38 percent of Greater Washington's jobs in FOEs (48,000 total) emerged through M&A, a higher share than in any of its peer regions. Notably, 37 percent of Greater Washington's jobs in FOEs arrived before 1991 (during which the data do not record mode of entry).

More than half of Greater Washington's jobs in FOEs have global partners in just three countries: England (26 percent), Netherlands (19 percent), and Japan (7 percent). While M&A over the past two decades was the most common mode of entry for FDI from England, most jobs in Netherlands-owned establishments were already present in the region in 1991. Over 80 percent of Dutch investment comes from Royal Ahold, which owns the regional chain Giant Food Stores, and accounts for more than 19,000 jobs in the region.

Relatively few of Greater Washington's jobs in foreign-owned establishments operate in advanced industries. As noted above, jobs in foreign-owned establishments nationwide are nearly three times as likely to be in advanced industries as U.S. jobs overall. In 2011, foreign advanced industry parent firms in the United States employed 1.4 million workers at 98,000 establishments. While 24 percent of jobs in Greater Washington's FOEs are in advanced industries, near the national average of 26 percent, the region ranks only seventh among its peers in this regard.

Table 9. County Jobs in Foreign-owned Establishments (FOEs)

County	Jobs in FOEs, 2011	Share of Metro Jobs in FOEs, 2011	Share of Jobs in FOEs, 2011
Fairfax, Falls Church (VA)	37,221	29.5%	6.0%
District of Columbia (DC)	21,610	17.1%	2.9%
Montgomery County (MD)	20,832	16.5%	4.3%
Prince George's County (MD)	11,724	9.3%	3.5%
Loudoun County (VA)	8,009	6.3%	5.2%
Frederick County (MD)	6.209	4.9%	6.2%
Arlington County (VA)	5.024	4.0%	2.6%
Prince William, Manassas (VA)	4,588	3.6%	3.5%
Alexandria city (VA)	3,048	2.4%	2.9%
Spotsylvania, Fredericksburg (VA)	2,054	1.6%	3.4%
Stafford County (VA)	1,666	1.3%	3.8%
Charles County (MD)	1,052	0.8%	2.3%
Warren County (VA)	917	0.7%	7.1%
Clarke County (VA)	767	0.6%	16.8%
Calvert County (MD)	572	0.5%	2.4%
Fauquier County (VA)	493	0.4%	2.0%
Jefferson County (WV)	426	0.3%	2.5%

Source: Brookings FDI in US Metros

A large share of Greater Washington's FDI concentrates in lower-value-added service sectors, including grocery stores, hotels, restaurants, security firms, and staffing agencies. Together, these sectors account for nearly one-third of jobs in FOEs in the region. Foreign-owned advanced industries firms in Greater Washington cluster in computer systems design and technical consulting, which together account for another 16 percent of regional jobs in FOEs.

These findings suggest not only that Greater Washington is less FDI-intensive than its peer regions, but also that its FDI may not contribute to the region's innovative capacity and global competitiveness to the degree it does in other places. Foreign investors may be choosing Greater Washington less based on its fundamental competitive assets, and more because it has a large and wealthy consumer base and enjoys greater access to federal spending.

Figure 22. Jobs in Foreign-Owned Establishments, by Mode of Entry

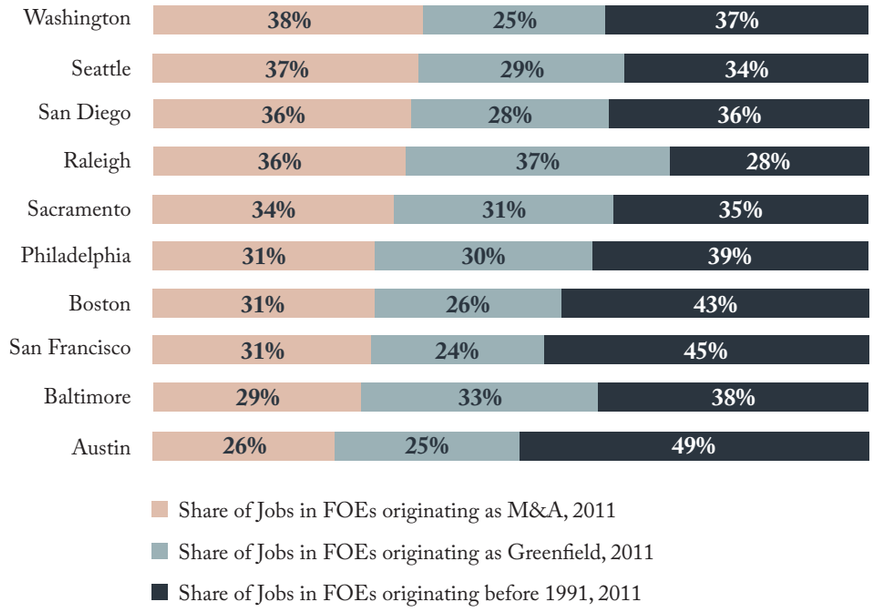


Figure 23. Share of Jobs in FOEs in Advanced Industries, 2011

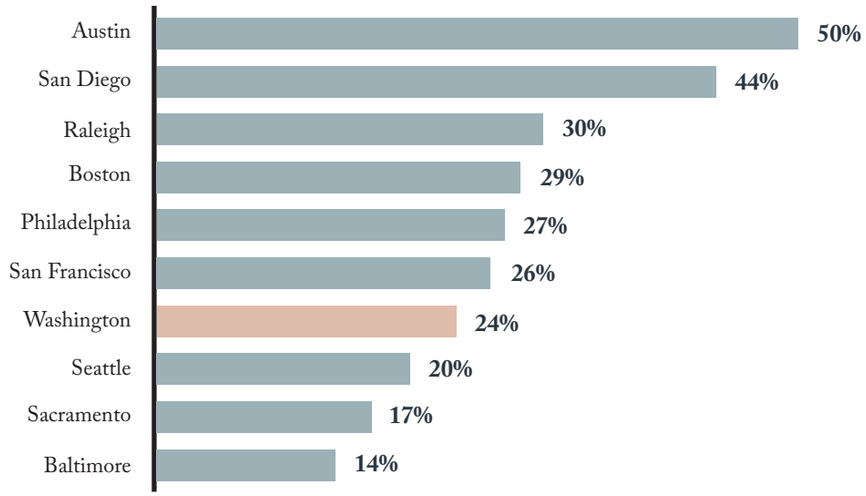


Figure 24. Jobs in FOEs by Industry, 2011

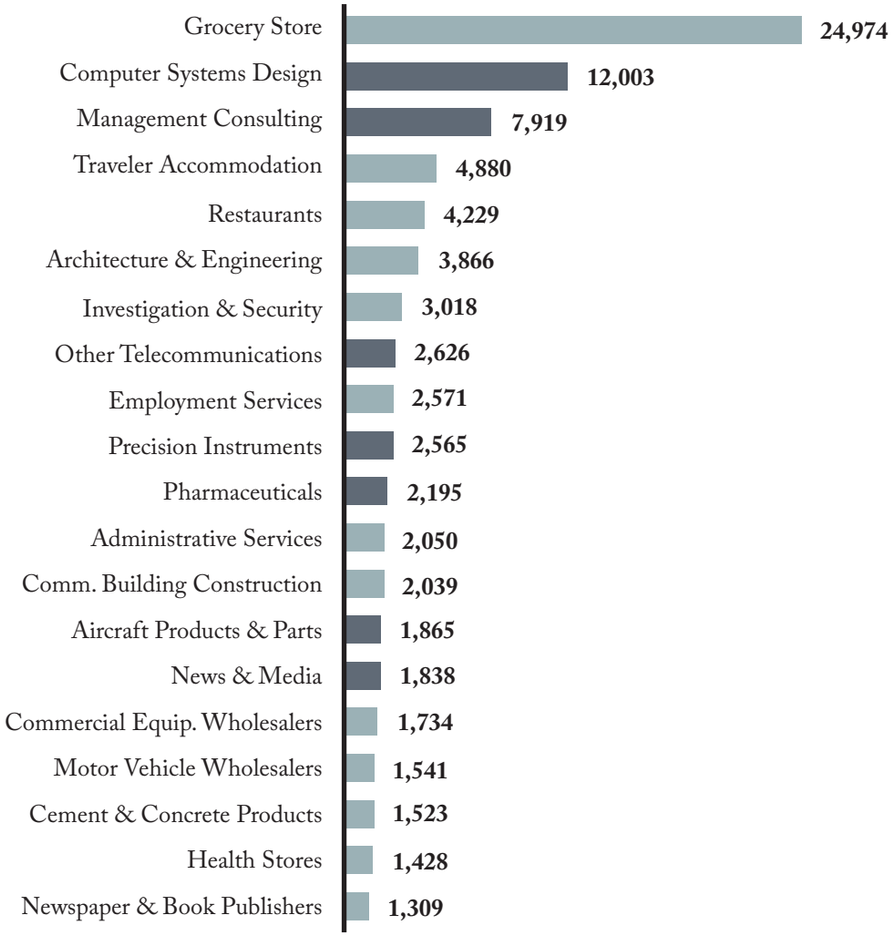
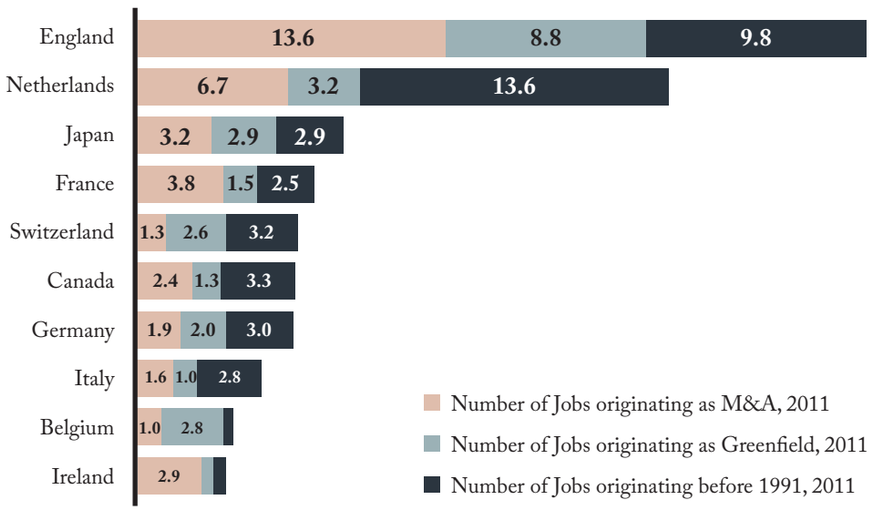


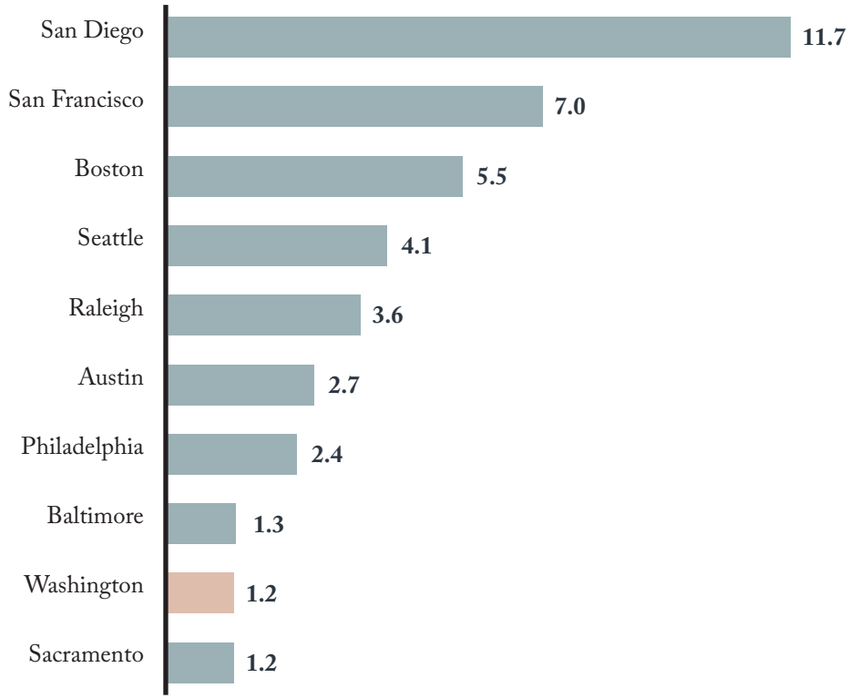
Figure 25. Top Investor Countries in Greater Washington (thousands)



Global Innovation Assets

Technology Patents

Figure 26. Number of Tech Patents Developed per Thousand Workers, 2008-2012

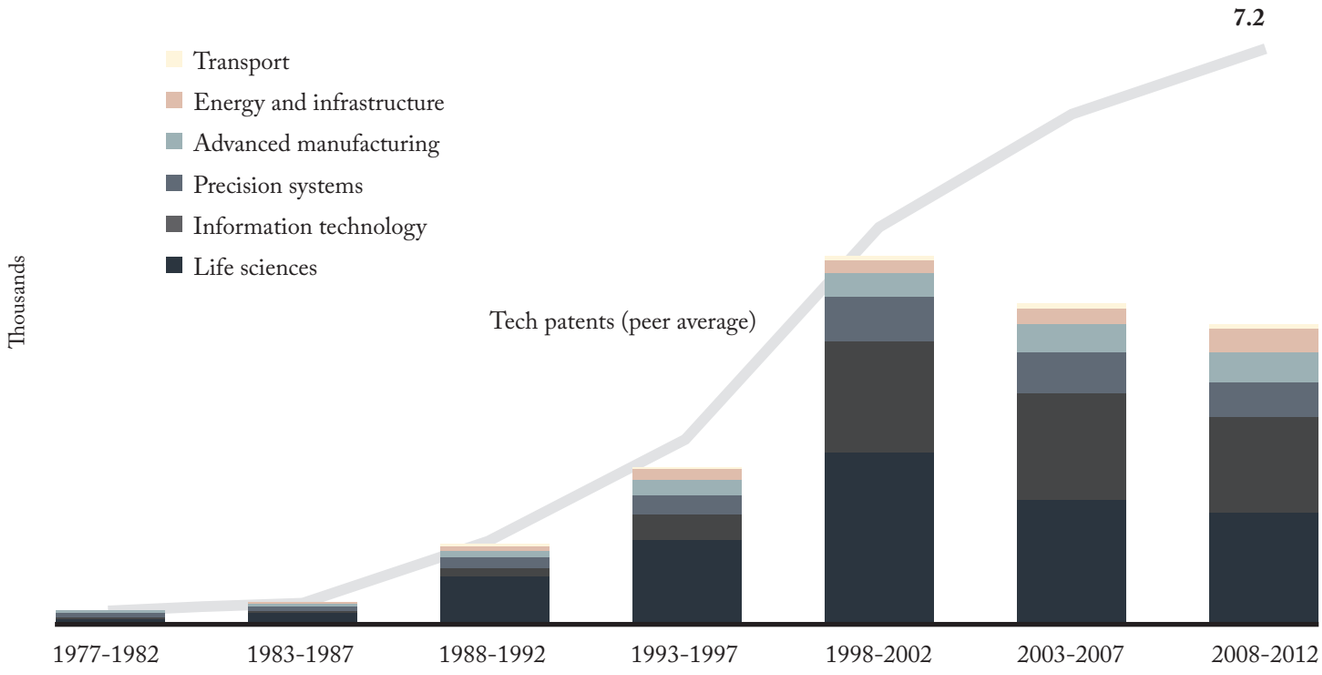


Greater Washington scores well below its peers in the patenting productivity of its workforce. Greater Washington possesses a world-renowned research cluster. In 2014, the region ranked behind only New York and Boston in total employment in scientific research and development (46,000). However, that research prowess may not be translating into valuable technological innovation. Greater Washington ranks far behind its peers at 1.2 technology patents per thousand workers.[ix] Some of this underperformance surely owes to the nature of research conducted in the region, such as the large presence of social science researchers whose work would not likely be the subject of a patent, and organizations developing sensitive technology that for national security reasons cannot be patented. Nonetheless, it raises legitimate concerns regarding the region's ability to innovate in technologies with global commercial value.

Greater Washington has a strong emphasis on life sciences and information technology patents, but patent stocks are decreasing. Greater Washington's main patent emphasis rests in life sciences and information technology. A little under one-third of the region's patents from 2008 to 2012 came in life sciences technologies including organic fine chemistry, biotechnology, and medical technology. But the volume of those patents dropped by 36 percent from a decade prior. Another 25 percent of recent patents came in information technologies such as computer technology, digital technology, and IT methods for management. Those patents, too, dropped off by 15 percent over the decade. Advanced manufacturing technology patents have risen from a relatively low base, but the broader trend suggests potential weakening in the capacity of Greater Washington's private sector to develop and commercialize new technologies, especially when set against the upward trend experienced in Greater Washington's peer metros.

The U.S. Government powers the bulk of the region's patenting activity. The main patent creator in Greater Washington is the U.S. Government, followed by ExxonMobil, Georgetown University, AVIcode, and Boeing. Government organizations such as the National Institute for Health in Bethesda and the Naval Research Laboratory in Anacostia account for significant shares of federal government patenting activity. While these research institutions develop important technology with clear public benefits and deserve strong support for their activities, this indicates that the role of the private sector in technology development is even lower than the top-line figures suggest. Moreover, the region's largest source of private-sector patents, ExxonMobil, decided in 2013 to relocate its Fairfax-based operations, including about 2,100 jobs, to Houston by the end of 2015.[x] Together, the patenting statistics strongly suggest that Greater Washington's private sector is not as well positioned as its peers to generate technological innovations that reach new global markets and attract inward investment.

Figure 27. Patenting in Greater Washington by Technology and Date of Invention



Source: Brookings analysis of REGPAT PCT

Table 10. Largest Patenting Organizations in Greater Washington

Rank	Organization	Primary Technology	Primary Location	Number of Tech Patents Invented, 2008-2012
1	U.S. Government	Biotechnology	Washington	538
2	ExxonMobil Research	Oil and Gas	New York	166
3	Georgetown University	Organic fine chemistry	Washington	92
4	AVIcode	Computer technology	Seattle	84
5	Boeing	Aerospace	Chicago	77
6	MedImmune	Biotechnology	Washington	72
7	Verisign	Computer technology	Washington	63
8	Amazon Tech	Computer technology	Reno	51
9	Henry M. Jackson Foundation	Organic fine chemistry	Washington	40
10	Canon U.S. Life Sciences	Biotechnology	Washington	40

Source: Brookings analysis of REGPAT PCT

University Research

Greater Washington's university system exhibits a relatively weak scientific impact compared to systems in peer regions. Notwithstanding the acknowledged high academic quality of Greater Washington's universities, the regional system underperforms on measures of scientific research impact. Publications from local universities are only 45 percent more likely to be cited than the world average, after normalizing for field differences and publication year, ranking Greater Washington just ninth among its peers. Local universities also trail their peers in publication quality; only 15 percent of their publications fall in the 10 percent most highly cited papers, also ninth in its peer cohort. Only 7 percent of those publications were co-authored with industry researchers, indicating a weaker private sector-orientation than universities in regions such as Baltimore and San Diego.[xi]

Among local research universities, University of Maryland, College Park produces both the largest scientific impact and highest quality publications. Between 2010 and 2013 local universities produced 9,100 publications in biomedical and health sciences, followed by 7,300 in physical sciences and engineering, and 5,200 in social sciences and the humanities. Local universities display diverse specializations. The physical science and engineering departments at University of Maryland, College Park accounted for 21 percent of total metro publications, while George Washington University's and Georgetown University's biomedical and health science research centers together accounted for 22 percent of the total. Leading the way in both citation impact and publication quality was the University of Maryland, College Park, with 50 percent more of its publications receiving citations than the world average and 17 percent of its publications ranking among the top 10 percent most cited. In terms of industry collaborations, George Mason University ranked the highest with 8 percent of its publications featuring an industry coauthor. Thus, the region possesses important university research assets from which to extend its global research impact.

Table 11. Peer Rankings of University Scientific Impact

Metro	Mean normalized citation score, 2010-2013	Number of pubs., 2010-2013	Pct. of pubs. in top 10% most cited, 2010-2013	Pct. of pubs. coauthored w/ Industry, 2010-2013
San Francisco	1.93	44,844	22.5%	7.0%
Boston	1.90	109,244	22.3%	7.1%
Seattle	1.75	28,514	19.5%	7.0%
San Diego	1.68	26,469	19.2%	8.1%
Baltimore	1.65	39,470	18.0%	7.8%
Philadelphia	1.54	44,417	16.8%	6.6%
Austin	1.52	15,245	16.5%	7.2%
Sacramento	1.45	20,505	15.8%	5.6%
Washington	1.45	27,252	15.4%	7.0%
Raleigh	1.16	9,767	12.2%	7.2%

Source: Brookings analysis of Centre for Science and Technology Studies, Leiden University and Thomson Reuters Web of Science data

Venture Capital Attraction

Over the past 10 years Greater Washington received more than $10 billion in venture capital investment. Venture capital (VC) provides funds for innovative enterprises positioned for high growth and the potential to create and capture entire new markets. [xii] Firms that receive venture capital can be particularly important stimulants to regional economies; VC recipients are three to four times more patent-intensive than other firms, and are much more likely to translate their R&D activities into high-growth ventures. [xiii] Despite trailing some of its peers on venture capital received per capita, the Greater Washington ranked third on per-capita venture capital growth over the past five years, behind only San Francisco and Sacramento.

The region also ranks second among peers in the share of venture capital invested in advanced industries, with 93 percent of the total, behind only San Diego. Five sectors concentrate more than 80 percent of all venture capital investments in Greater Washington: software (35 percent), commercial services (22 percent), pharmaceuticals and biotechnology (12 percent), communications and networking (7 percent), and IT services (5 percent). Nevertheless, the share of venture capital investment in the region's advanced industries declined from 98 percent in 2005 to the current level of 93 percent.

Table 12. Citation Impact Top Research Universities in Greater Washington

University	Mean normalized citation score, 2010-2013	Number of pubs., 2010-2013	Pct. of pubs. in top 10% most cited, 2010-2013	Pct. of pubs. coauthored w/ Industry, 2010-2013
University of Maryland, College Park	1.50	13,928	16.5%	7.3%
Georgetown University	1.45	4,470	15.7%	7.5%
George Washington University	1.39	5,398	14.1%	4.6%
George Mason University	1.29	3,456	12.8%	8.4%

Source: Brookings analysis of Centre for Science and Technology Studies, Leiden University and Thomson Reuters Web of Science data

Global Talent Assets

Workforce Skills

Greater Washington's residents are among the most highly educated in the country. One of Greater Washington's signature strengths is the high levels of educational attainment its residents possess. Fully 49 percent of its adults have at least a bachelor's degree, ranking Greater Washington first not only among its peer regions but also among the 100 largest metro areas nationwide.[xiv] This abundance of human capital is a major global asset for enticing foreign investment and enhancing the region's presence in advanced services.

Greater Washington's employers nevertheless face challenges in filling job vacancies, particularly for highly-specialized STEM occupations.[xv] Greater Washington's advanced services economy demands some of the most valuable skills in the country; as a result, it often takes employers longer to fill vacant positions than elsewhere. Among its peers, Greater Washington's online job postings in 2013 had the longest median duration (20 days) and the second-highest average market value of skills posted. Greater Washington employers also advertised the highest percentage of STEM occupations (55 percent), more than half of which were for computer and mathematical science occupations, and which were typically posted for 27 days.[xvi] Long search times are not necessarily a critical deficiency in the labor market, but rather a symptom of the highly specialized skills which Greater Washington's advanced services employers seek.

Figure 28. Education Attainment, 2014

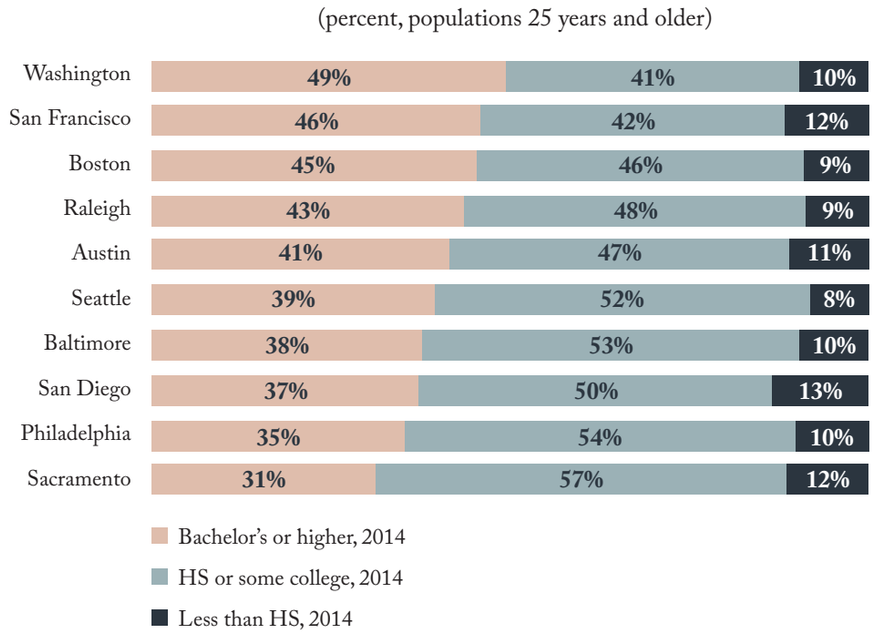
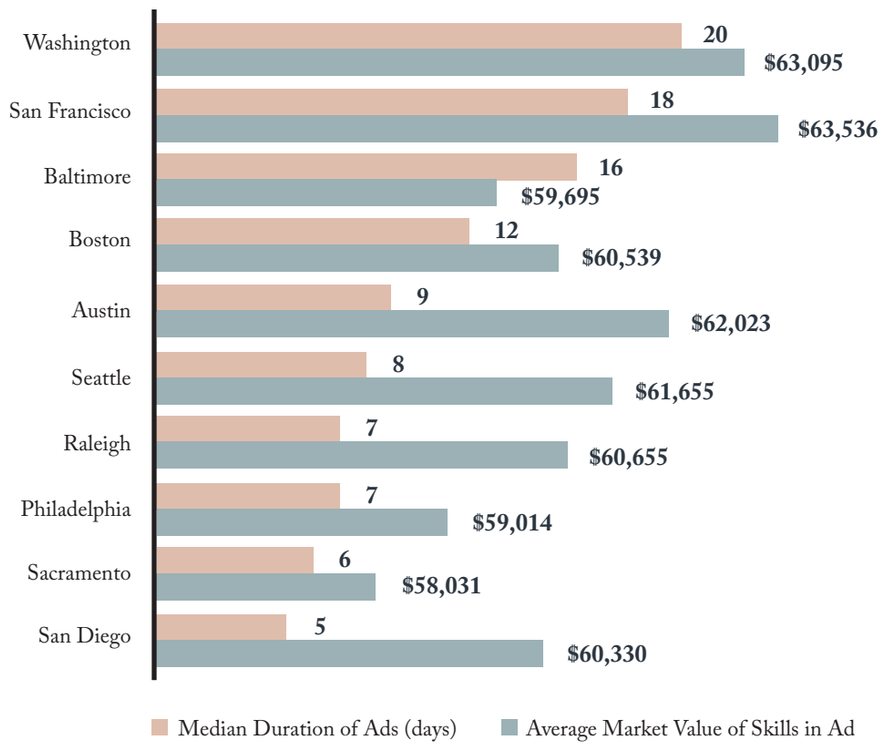


Figure 29. Labor Demand by Search Time and Market Value of Skills



Immigrants and Foreign Students

Nearly one-half million highly educated immigrants call Greater Washington home. Immigrants of all skill levels can further economic growth, but Greater Washington's abundance of highly-educated immigrants may confer a special advantage in helping the region expand its global networks.[xvii] In 2014, 491,000 immigrants (42 percent of the foreign-born population 25 years and older) held at least a bachelor's degree, more than in any peer metro area. Greater Washington also ranked third among its peers in the share of its immigrants with college degrees, behind only Baltimore and Raleigh, which have much smaller foreign-born populations.

Greater Washington's employers exhibit strong demand for highly-skilled foreign workers. Among a broader population of highly educated immigrants in the region are holders of H-1B visas, a program that allows employers to hire foreign workers for specialty occupations on a temporary basis.[xviii] Relative to the size of its labor market, Greater Washington ranked third among its peer regions with just under five H-1B visa approvals per 1,000 workers in 2010-11, behind only San Francisco and Seattle. Of the nearly 14,600 H-1B visas approved in Greater Washington during that time, 64 percent were for workers in STEM fields.[xix]

Figure 30. Education Attainment of Foreign-Born Population, 2014

(thousands, population 25 years and older)

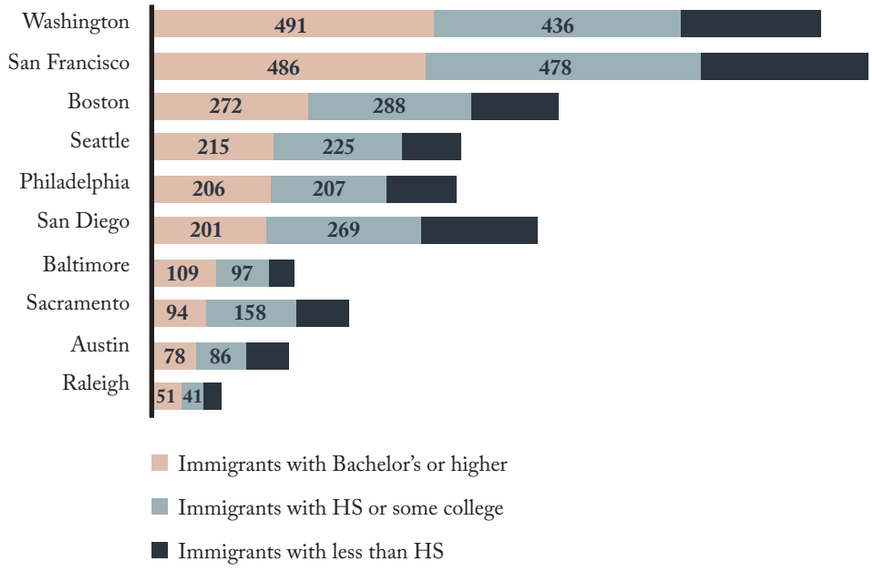
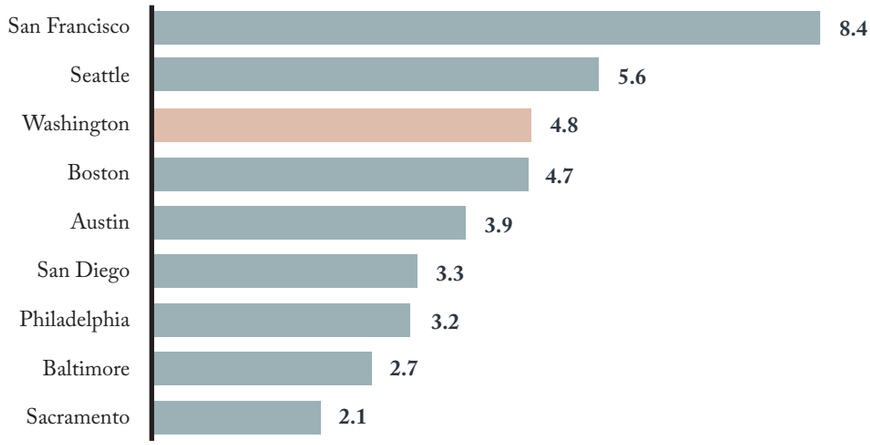


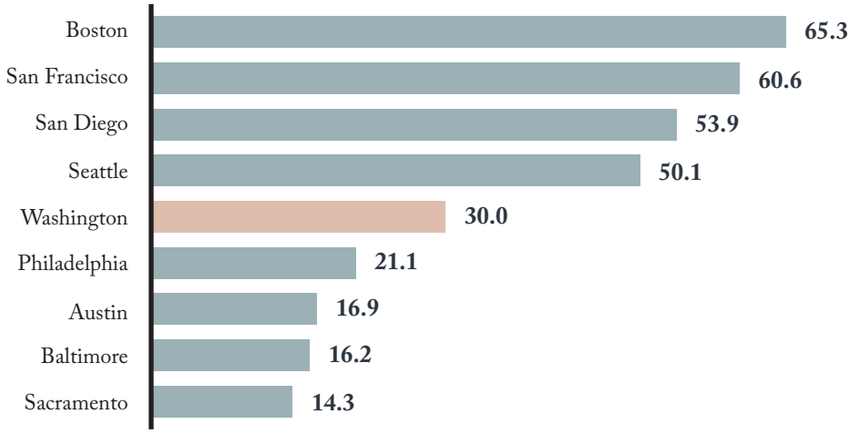
Figure 31. H-1B Visa Approvals Per 1,000 Workers, 2010-2011



Greater Washington has fewer foreign students at its colleges and universities than many of its peer regions. Foreign students can enhance a regional economy's global engagement in several ways. Most directly, foreign student expenditures count as exports; in 2014 they brought over $760 million into Greater Washington's economy, supporting an estimated 8,300 jobs. Foreign students can also enrich the workforce given their disproportionate representation in STEM and business fields, their familiarity with their home markets, and their tendency to settle in the same metro area as their university when they stay to work in the United States.[xx]

Between 2008 and 2012, about 35,000 foreign students were approved for F1 visas to attend colleges and universities in Greater Washington, or about 30 per 1,000 students in the area over that time. That ranked Greater Washington just fifth among its peers, and well behind Boston, San Francisco, San Diego, and Seattle. Nearly three-quarters of F1 approvals in Greater Washington were for graduate students, highest among peer regions. If strategically harnessed, this concentration of foreign expertise can help local firms enter new markets (see sidebar, "Foreign Students in Los Angeles Help Local Firms 'Go Global'"). These may include the most frequent home countries for Greater Washington's foreign students, such as India (9,400), China (5,400), South Korea (3,500), and Saudi Arabia (1,300).[xxi] At the same time, these figures also suggest untapped opportunities to expand international representation at the undergraduate level at the region's colleges and universities.

Figure 32. F1 Visa Approvals Per 1,000 Students, 2008-2012



Global Infrastructure Assets

Aviation

Greater Washington is one of the largest aviation centers in the country, serving over 56 million passengers in 2014. Roughly six in ten (58 percent) regional passengers traveled through Ronald Reagan National Airport, with the remainder using Dulles International Airport (42 percent). Among peer regions only the San Francisco metropolitan area moved more passengers (88 million) in 2014. Including flows through Baltimore/Washington International Airport, which is located in the Baltimore metropolitan area but services many Greater Washington residents and employers, boosts the mega-region's passenger total to 91 million. Greater Washington's most common final U.S. origins and destinations are Chicago (3.0 million passengers), Boston (2.9 million), Los Angeles (2.6 million), Miami (2.4 million), and San Francisco (2.1 million).

Greater Washington's passenger growth over the last decade has been slower than that in many peer regions. Aviation passenger totals in Greater Washington grew only 2.8 percent from 2004 to 2014, ranking the region below ever other peer region except Philadelphia and Sacramento. Peer regions such as San Francisco, Seattle, Boston, and San Diego all experienced double-digit growth during that time. One contributing factor may be costs to passengers, which on a per-kilometer basis are higher in Greater Washington than in most other markets. If average fares in Greater Washington had matched the national average of twelve cents per kilometer in 2014, passengers would have saved $2.2 billion. Notably, including Baltimore/Washington International Airport in regional totals would not change Greater Washington's recent air travel growth picture considerably.

Table 13. Peer Rankings of Aviation Passenger Flows

Rank	Metro Area	Passengers (millions), 2014	Share Domestic Passengers, 2014	Share International Passengers, 2014	Change in Passengers (millions), 2004-2014	Average Fare Per km, 2014
1	San Francisco	87.8	81.8%	18.2%	28.2%	$0.11
2	Washington	56.6	82.3%	17.7%	2.8%	$0.14
3	Seattle	55.0	91.8%	8.2%	27.7%	$0.10
4	Boston	54.3	82.5%	17.5%	19.8%	$0.12
5	Baltimore	34.7	94.5%	5.5%	3.2%	$0.12
6	San Diego	34.3	92.7%	7.3%	12.5%	$0.10
7	Philadelphia	33.3	89.0%	11.0%	-3.0%	$0.13
8	Austin	19.5	93.7%	6.3%	48.0%	$0.12
9	Raleigh	17.9	91.6%	8.4%	8.0%	$0.14
10	Sacramento	16.8	96.0%	4.0%	-7.3%	$0.12

Source: Brookings analysis of Sabre data

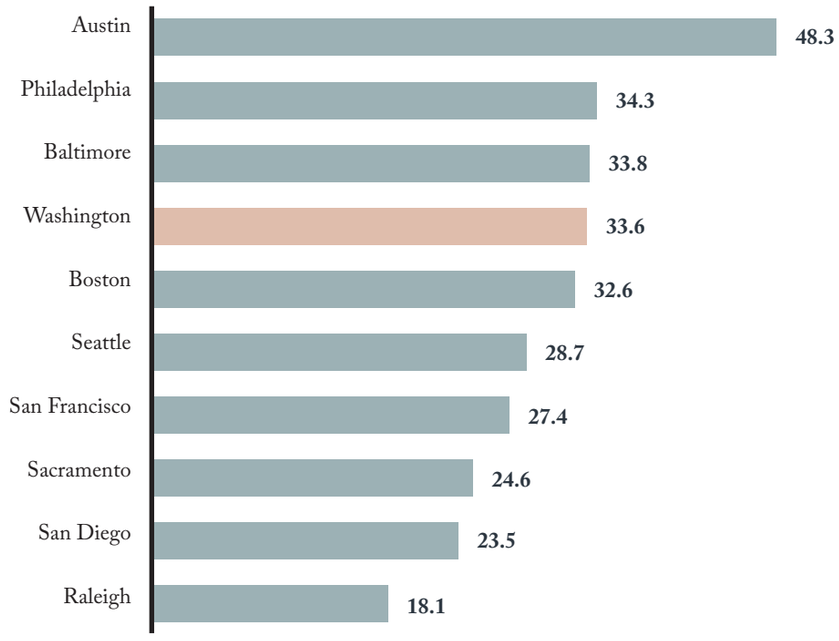
Greater Washington serviced 10 million international passengers in 2014, ranking it among the most internationally-oriented air hubs. Among peer regions, only San Francisco's air passengers travel to/from international destinations more frequently than Greater Washington's. Europe is by far Greater Washington's largest international market (37 percent of total international passengers), followed by the rest of North America (26 percent), Asia (24 percent), and South America (6 percent). Origin-destination flows are highest with the following countries (metropolitan destinations with more than 100,000 passengers included): United Kingdom (London), Canada (Toronto and Montreal), Germany (Frankfurt and Munich), France (Paris), Mexico (Mexico City), and China (Beijing). Among routes with more than 100,000 passengers in 2014, flows have grown fastest with Saudi Arabia (22 percent per year), United Arab Emirates (17 percent), Dominican Republic (13 percent), South Africa (11 percent), Turkey (10 percent), and China (10 percent). Several of these major emerging economies represent target markets for expanding local travel and tourism exports.

Figure 33. Greater Washington's Total International Passengers, by continent, 2014

Internet Connectivity

Residential customers in Greater Washington enjoy above-average internet download speeds. Research has shown that the quality of the internet infrastructure matters for regional economic development, and can be an especially important input to industries that rely heavily on information technology and large volumes of data processing.[xxii] In comparison to its peer group, the Greater Washington region exhibits above-average broadband speeds for its residential consumers. However, internet speed is not uniform throughout the region. Download speeds are highest in localities in Montgomery County, Fairfax County, and Prince William County. Speeds tend be lower in the District of Columbia and outlying areas of the metropolitan area.[xxiii]

Figure 34. Internet Download Speed (Mbps), 2015



Footnotes

[i] Brookings analysis of data from Oxford Economics, Moody's Analytics, and the U.S. Census Bureau. Parilla, Joseph, Jesus Leal Trujillo, and Alan Berube with Tao Ran. 2014. "Global Metro Monitor: An Uncertain Recovery." Brookings Institution.

[ii] Ibid. Brookings analysis of data from Oxford Economics, Moody's Analytics, and the U.S. Census Bureau. Parilla, Joseph, Jesus Leal Trujillo, and Alan Berube with Tao Ran. 2014. "Global Metro Monitor: An Uncertain Recovery." Brookings Institution.

[iii] Brookings analysis of Census ACS 2014 1 year estimates

[iv] Brookings analysis of data from Oxford Economics and Moody's Analytics. Projections derived by author.

[v] Brookings analysis of data from Moody's Analytics and Department of the Treasury's Bureau of the Fiscal Service data available on USASpending.gov

[vi] Muro, Mark, Jonathan Rothwell, Scott Andes, Kenan Fikri, and Siddharth Kulkarni. "America's Advanced Industries: What they are, where they are, and why they matter." Brookings Institution. February 2015.

[vii] Istrate, Emilia and Nicholas Marchio. 2012. "Export Nation 2012: How U.S. Metropolitan Areas are Driving National Growth." Brookings Institution. March 2012.

[viii] Perkins, Dwight; Steven Radelet; David Lindauer. (2006). "Economics of Development: Sixth Edition." Chapter 11 Investment, Productivity, and Growth. W.W. Norton & Company, Inc. New York.

[ix] Based on patent applications filed under the Patent Cooperation Treaty, which offers patent protection to organizations planning to do business in multiple countries.

[x] Jonathan O'Connell. "Exxon Mobil puts 117-acre campus in Fairfax County up for sale." Washington Post. November 17, 2013. http://www.washingtonpost.com/business/capitalbusiness/exxon-mobil-puts-117-acre-campus-in-fairfax-county-up-for-sale/2013/11/17/f15a7848-4e2e-11e3-9890-a1e0997fb0c0_story.html

[xi] Brookings analysis of Centre for Science and Technology Studies (CWTS) Leiden Rankings based on analysis of Thomson Reuters Web of Science

[xii] Florida, Richard and Kenney, Martin, "Venture Capital and High Technology Growth", Journal of Business Venturing, Vol. 3, No 4, 1989.

[xiii] Kortum, S., and J. Lerner, 2000, "Assessing the Contribution of Venture Capital to Innovation," Rand Journal of Economics 31, 674-92; Engel, Dirk and Keilbach, Max, "Firm Level Implications of EarlyStage Venture Capital Investment - An Empirical Investigation", Dicsussion Papers on Entrepreneurship, Growth and Public Policy, Max Planck Institute of Economics.

[xiv] Brookings Analysis of American Community Survey 2014 1-year estimates

[xv] Rothwell, Jonathan. 2014. "Still Searching: Job Vacancies and STEM Skills." Brookings Institution. July 2014. http://www.brookings.edu/research/interactives/2014/job-vacancies-and-stem-skills

[xvi] Brookings' analysis of data supplied by Burning Glass

[xvii] Hall, Matthew, Audrey Singer, Gordon De Jong, and Deborah Roempke Graefe. 2011. "The Geography of Immigrant Skills: Educational Profiles of Metropolitan Areas." Brookings Institution. June 2011. http://www.brookings.edu/~/media/Programs/metro/WashingtonDC.PDF

[xviii] Specialty occupations are defined as "requiring theoretical and practical application of a body of highly specialized knowledge and the attainment of a bachelor's degree or higher (or its equivalent) in the field of specialty." Ruiz, Neil, Jill Wilson, and Shyamali Choudhury. 2012. "The Search for Skills: Demand for H-1B Immigrant Workers in U.S. Metropolitan Areas." Brookings Institution. July 2012.

[xix] Brookings analysis of Labor Condition Application database, Department of Labor

[xx] Ruiz, Neil. 2014. "The Geography of Foreign Students in U.S. Higher Education: Origins and Destinations." Brookings Institution. August 29, 2014.

[xxi] Immigration and Customs Enforcement through Freedom of Information Act (FOIA) request

[xxii] Tranos (2013) finds that internet infrastructure can generate significant positive effects for the economic development of cities, primarily in knowledge-intensive and services industries, but must be complemented by other factors that allows for the true value of new information to be realized, assimilated and commercialized (e.g. sufficient human capital, complementary technologies, etc.). Kolko (2010) finds a positive relationship between broadband expansion and economic growth, which is strongest in industries that rely more on information technology and in areas with lower population densities. Finally, a study from Copenhagen Economics indicates that the greatest productivity gains from broadband speed increases occur at lower ends of the speed spectrum. For instance, an increase from 5 to 10 Mbps gives a gain of approximately 1.9 percent while an increase from 25 to 30 Mbps gives a gain of approximately 0.5 percent. Emmanouil Tranos, The Geography of the Internet: Cities, Regions and Internet Infrastructure in Europe (Cheltenham: Edward Elgar, 2013). Jed Kolko, "Does Broadband Boost Local Economic Development?" (San Francisco: Public Policy Institute of California, 2010). Copenhagen Economics, "The Socio-economic Value of Digital Infrastructures" (2010).

[xxiii] Brookings analysis of Ookla.net data.

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