Washington Metropolitan Area Transit Authority

Paper 1:

Regional Economic Scenarios

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Dr. Terry Clower, Dr. Brian Hollar, Dr. Keith Waters Center for Regional Analysis George Mason University

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Introduction

This paper is the first in a series of three white papers that introduce and examine key issues regarding demand for transit service in the Washington Metropolitan Area Transportation Authority's (Metro) Compact Area. The data and information in the paper series will provide information and insight for Metro's planners and leaders as the Authority responds to short and long-term effects of the COVID-19 pandemic. The papers are sequential and build on the following themes:

- 1. Anticipated macroeconomic activity within the DC Region and the Metro Compact Area;
- 2. Sector-by-sector assessment of recovery strength likelihoods and timeframes; and
- 3. Potential regional changes that will take place both before and after the COVID-19 pandemic ends.

This paper summarizes the research team's preliminary perspectives regarding recent and near future macroeconomic activity in the Washington, D.C. region and the Metro Compact Area.

- First, an overall assessment of economic trends in aggregate as well as consideration of performance differences among major industrial sectors for the nation, the DC region, and the Metro Compact Area is provided.
- Issues and trends regarding work-from-home are then analyzed.
- Industries that experienced substantial business interruptions caused by the pandemic are then examined in more detail.

• Finally, a preliminary market outlook through 2025 is provided. The outlook will highlight selected industry trends in the Metro Compact area as well as the core central business areas of the District of Columbia.

This paper series relies on the support from and interaction with key Metro staff members who have provided data, information, and feedback during the preparation of these papers.

Overall Picture

While the huge presence of the federal workforce and regionally based government contractors typically provides the DC metropolitan a degree of insulation from cyclical economic downturns, in recent years this region has become more tied to overall US macroeconomic trends. As recently as 2010 it has been estimated that 40 percent of all regional economic activity was directly tied to the federal government. By 2019 that proportion had dropped to about 33 percent – still heavily reliant on federal spending, but more like the rest of the nation than perhaps at any time in modern history. The advent of Amazon HQ2 has the potential to be this region's watershed moment that forever changes the structure of the economy in the National Capital Region.

Before work from home was forced by the pandemic, there were already signs of significant shifts in the nature of work and the location of work beginning to take shape over the past few years. Employers, in a bid to remain competitive for young talented workers, were "loosening up" control of work location and allowing more flexible schedules and work-from-home options. In addition, other changes in employment structure emerged with increasing shares retail sales through ecommerce channels and a rapid rise in gig work for local transportation (Uber/Lyft), dining (Doordash/Uber Eats), and other personal and business services. These changes impacted demand for transit services even before the pandemic.

The reader is encouraged to view the content of this and subsequent papers in this series not so much as describing a sea change in direction of the economy caused by a pandemic, but more of a massive, short-term acceleration of existing trends that has occurred so rapidly that the normal economic and labor market feedback systems have been overwhelmed. Included in this accelerated effect is also a widening of existing gaps between economic haves and have-nots. Some have described the economic recovery since the pandemic-sparked business closures, temporary and permanent, as K-shaped. The data are starting to tell us that the pandemic-sparked recession itself was K-shaped, meaning that many in the upper tiers of the economy did not experience any meaningful economic disruptions beyond a few weeks of increased uncertainty, while laborers and households of more modest means have seen their livelihoods disappear, been forced to make choices between pay and personal safety, and the looming specter of eviction from their homes. Importantly for this analysis, while transit system demand has dropped across income cohorts, the economic impacts of the pandemic has fallen mostly on households who rely on public transportation the most.

United States Employment

In the lead up to the current pandemic, job growth in the United States was incredibly consistent. The net month-over-month change (MOTMC) in the number of jobs in the U.S. averaged 202,000 from 2014 through the end of 2019 (Figure 1). Furthermore, the variation in month-over-month net

job growth was low, with a standard deviation of 79,000. The onset of the pandemic resulted in a dramatic swing in net job changes. From February 2020 to March 2020, the U.S. recorded a decline of 1.68 million jobs. From March 2020 to April of 2020, the height of the pandemic, the U.S. lost 20.68 million jobs. In April 2020, the U.S. recorded 130.16 million jobs, 22.36 million fewer jobs than the peak of 152.52 million jobs recorded just two months prior in February 2020. In June 2020, the U.S. economy swung back to growth by adding 2.83 million jobs over April. From June to July 2020, the U.S. recovery gained further steam by adding 4.85 million jobs. Following this surge in recovered jobs, however, the recovery began to slow. From July to August, the U.S. gained 1.72 million net jobs, and 1.58 million in September. The monthly gains in jobs continued to slow until turning negative in December 2020 (-306k). Despite the slow winter, the U.S. employment situation began improving again in 2021 with consistent job growth. So far, 2021 monthly job growth has averaged more than 540,000, boost by a strong June jobs number of 850,000 jobs tied in part to a resurgence in leisure travel activity.



Figure 1. U.S. Payroll jobs

While overall the U.S. employment situation is improving, the various sectors of the economy were not all impacted equally. Service jobs, such as leisure and hospitality, were hit the hardest as people avoided unnecessary social interactions. In general, the U.S. leisure and hospitality sector reflects the overall trend of U.S. employment, with severe declines followed by record gains (Figure 2). In the first half of 2021, the U.S. leisure and hospitality sector proved to be robust, gaining 306,000 jobs from May to June 2021 and 343,000 jobs from June to July 2021. Despite the strong recovery, the leisure and hospitality sector remains well below the pre-pandemic peak. In June 2021, there were 14.7 million leisure and hospitality sector jobs in the U.S., 2.18 million fewer jobs than the peak of 16.9 million in February 2020. Media reports suggest that hiring by leisure and hospitality firms would be even higher but many displaced workers in this sector have not re-entered the labor market.

Figure 2. U.S. Payroll jobs in Leisure and Hospitality



As with leisure and hospitality, the economic recovery is positive in nearly every sector of the economy (Figure 3). Given that leisure and hospitality was the sector that recorded the largest declines in employment, the month-over-year change in employment is the largest (+2.576 million) as the economy recovers. A bright spot in the economy is the professional and business services sector, which added 1.27 million jobs from June 2020 to June 2021. The professional and business services sector is the sector that is most easily performed from home and is the largest employment sector for the DC MSA.



Figure 3. Month-Over-Year Change in U.S. Payroll Jobs by Industry – June 2020 to June 2021

DC MSA Employment

Similar to the overall U.S. employment situation, employment growth in the DC Metropolitan Statistical Area (MSA) was incredibly consistent from 2014 until the pandemic (Figure 4). In January 2014, the DC MSA had 3.04 million payroll jobs. From 2015 to 2019, the annual average

job growth in the DC MSA ranged from 40,200 to 58,800. As with the US, the DC MSA recorded a substantial decline at the outset of the pandemic. The DC MSA lost almost 388,000 jobs in March and April of 2020. Following these severe declines, however, the DC MSA recorded strong month-over-month job growth for most of 2020. The strongest month-over-month job growth was from May 2020 to June 2020 when the DC MSA added 58,400 jobs. While the region lost jobs in December 2020 and January 2021, month-over-month job growth in the region has been positive from February 2021 through June 2021. Despite the string of monthly job gains, however, the region had just 3.21 million jobs in June 2021, 146,000 fewer jobs than in February 2020. The number of jobs in June 2021 is roughly comparable to the number of June jobs in 2016.





The impact of the pandemic on payroll employment varied dramatically by industry. The hardest hit industry was the leisure and hospitality industry. After reaching 326,400 jobs in February 2020, the leisure and hospitality sector declined to just 158,800 jobs in April 2020, a decline of 167,700 jobs, or over half of total employment in the sector. Since the low in April 2020, leisure and hospitality employment in the DC MSA has recorded notable gains. By August 2020, leisure and hospitality employment increased to 229,700 before job gains slowed over the winter months, declining in December 2020 and January 2021. However, job gains resumed, and leisure and hospitality employment stood at 261,000 in June 2021. The number of leisure and hospitality jobs in the DC MSA increased 63,900 from June 2020 to June 2021, the largest gain among industry sectors (Figure 5). In addition to leisure and hospitality, retail trade, professional and business services, and education and health services have also made notable gains month-over-year.



Figure 5. Month-Over-Year Change in U.S. Payroll Jobs by Industry – June 2020 to June 2021

While leisure and hospitality was the most negatively impacted sector during the pandemic, the professional and business services (PBS) sector is the largest contributor to gross regional product and provides about one-fourth of all regional jobs. In some respect, the PBS sector was minimally impacted by the pandemic. From February 2020 to April 2020, employment in the PBS sector declined 29,500 (Figure 6). While this decline may at first appear severe, the decline was almost entirely limited to the administrative support & waste management services subsector, which includes building services and administrative functions directly affected by lockdowns and remote work protocols. From April 2020 to July 2020, there were 20,300 to 25,700 fewer administrative support & waste management service jobs in the DC MSA than the same month in 2019 (Figure 6) In contrast, the professional, scientific, and technical services subsector simply paused. Note that figure 6 displays month-over-year job change, to clearly show the two responses. Job growth in the professional, scientific, and technical services subsector had been consistently robust since the federal spending reductions sparked by the Budget Control Act had sparked a small regional recession in 2014. As the pandemic-induced business disruptions took hold in the spring of 2020, month-over-year job growth in this subsector slowed dramatically, gaining just 300,000 jobs. However, from April 2020 through March 2021, the number of jobs in the subsector only declined month-over-year in four months, with the largest decline being just 2,500 jobs. Job growth in the professional, scientific, and technical services subsector rebounded in April 2021 and has shown notable growth in subsequent months. The data suggest that while the workers in professional, scientific, and technical services subsector shifted to work-from-home, they kept their jobs. In contrast, workers supporting the work-from-home employees, such as clerical and custodial staff, took nearly all of the employment losses in the PBS sector. Despite employment gains in the administrative support and waste management sub-sector from pandemic lows, there are still approximately 9,000 fewer payroll jobs in that sub-sector than February 2020.



Figure 6. Professional & Business Service Employment in the DC MSA

Metro Compact Area

Narrowing in to focus on the Metro Compact Area reveals that the sub-region of the DC MSA is following the same trend as the DC MSA. This is unsurprising given that the Metro Compact Area accounts for the vast majority of employment in the DC MSA. The Metro Compact Area is comprised of DC; Montgomery County, MD; Prince George's County, MD; Arlington County, VA; the City of Alexandria, VA; Fairfax County, VA; the City of Fairfax, VA; Falls Church, VA; and Loudoun County, VA. Given that the Metro Compact Area is a narrower geography, timely estimates are only available quarterly. Quarterly estimates from JobsEQ by Chmura Economics reveal that employment in the Metro Compact Area declined 309,000 from the second quarter of 2019 to the second quarter of 2020. Since the pandemic low of just 2.45 million jobs in the Metro Compact Area in Q2 2020, employment in the sub-region increased to 2.67 million by the first quarter of 2021. However, job gains slowed following the rapid recovery immediately after the stay-at-home orders in April 2020. Jobs in the Metro Compact Area remain below the peak of 2.877 million jobs in the fourth Quarter of 2019.





Focusing on the PBS sector within the Metro Compact Area reveals a similar trend to the overall region (Figure 8). While professional, scientific, and technical services subsector employment growth stalled in the DC MSA, it declined mildly in the Metro Compact Area. Professional, scientific, and technical services subsector employment declined between 2,965 and 5,128 in the Metro Compact Area quarter-over-year for the first three quarters of 2020. While employment in the sub-sector declined, the losses were relatively small. In comparison, employment in the administrative support & waste management services subsector declined between 21,607 and 16,702 in the first three quarters of 2020 in addition to declining 12,418 quarter-over-year in the fourth quarter of 2020. As with the metro area, professional workers retained their jobs while support workers took the bulk of the employment losses.



Figure 8. Professional & Business Service Employment in the Metro Compact Area

The initial job losses from the onset of the pandemic turned into strong job growth in the months following the stay-at-home orders. However, initial job growth weakened and is now relatively modest. As with the metropolitan area overall, the jurisdictions in the Metro Compact Area saw large employment disruptions in the administrative support and waste management services subsectors. Interestingly, these jurisdictions saw job losses in professional, scientific, and technical services that were not experienced in the broader metropolitan region. A detailed look at sub-regional data shows these losses in professional, scientific, and technical services were apparently concentrated in the Maryland suburbs.

Work-From-Home Trends

The future of the central business district relies in large part on numerous factors. First and foremost is the path of the current pandemic. Next is the response of the labor market to the pandemic. Some jobs are easy to perform from home while others simply cannot be performed remotely. Additionally, the overall labor market will dictate the ability of employers to pull workers into the office. If the labor market is loose, workers can switch to remote jobs if they feel unsafe going into the office. Finally, government support for unemployment will play a role in

how quickly the unemployed return to the labor force. (An assessment of office focused industry performance in downtown DC is provided later in this paper.)

At the onset of the pandemic, there was a spike in the number of paid employees working from home. In May of 2020, 35.4 percent of employed people in the US worked from home over the previous four weeks due to the coronavirus (Figure 9). This amounted to 48.7 million paid employees. Since then, there has been a general decline in work from home. While the number and percent of employed people working from home increased when COVID-19 cases spiked in the winter, it resumed declining following the peak in the spread of the coronavirus. In June 2021, the number of employed people that worked form home in the previous four weeks due to the coronavirus declined to just 14.4 percent, accounting for 22.0 million employed people showing workers are willing or can be incentivized to return to the office. It is not clear how the rapid emergence of the Delta variant will impact this statistic in the coming months.



Figure 9. Paid Employees Who Worked at Home in the Last 4 Weeks Due to the Coronavirus Pandemic in the US

While the national data is illustrative, MSAs vary dramatically in both their willingness and need to return to the office. MSAs that are reliant on in-person work will return more quickly than those whose occupation or industry structure is more conducive to working from home. Kastle security systems releases a weekly "Back to Work Barometer" that succinctly shows where the DC MSA fits in with its peers (Figure 10). The DC MSA is below Top 10 MSA average for return to work. In early August 2021, Kastle data showed that occupancy in DC was at 26.8 percent, 5.3 percentage points below the average of the top ten cities of 32.1 percent (Appendix). The leading MSA for return to work at the end of July was Austin at 45.9 percent. Despite lagging the Top 10 MSA average, the DC MSA is trending towards returning to the office. DC office occupancy increased for the majority of 2020 before pausing in winter as the virus surged. In late February and March 2021, DC MSA office occupancy began to increase again.



Perhaps the most critical aspect of MSAs that dictate indices such as the Kastle Return to Work Barometer is the structure of the regional economy. Regions that are dominated by occupations that can be performed at home will not feel the need to return to the office and thus remain at home longer. The DC MSA surely has low office occupancy rates relative to peers because of the structure of the regional economy. As noted, the DC MSA economy is founded on professional and busines services. This sector can, with the exception of support staff, be performed well at home. In fact, recent work published in the Journal of Public Economics estimated that 80 percent of the jobs in the PBS sector could be performed at home, which is second only to Education Services (Figure 11).

Figure 11. Share of DC MSA Jobs That Can Be at Home - By Industry



Figure 10. Kastle Systems - Kastle Back to Work Barometer

While industry sectors are an illustrative way to aggregate data, occupational aggregations can often be more instructive. Analyzing the share of jobs that can be performed at home by occupation, using the same methodology as industry, reveals that many jobs that the DC MSA has high concentrations of can be performed from home. The occupations with the highest share of jobs that can be performed at home include "Computer and Mathematical", "Education, Training, and Library", and "Legal". Nearly 100 percent of all jobs in these three occupations can be performed at home. MSAs with high concentrations of such occupations are thus the least likely to return to office as the risks may outweigh the benefits.

It is worth noting the occupations at the low end of the spectrum. For example, zero percent of "Building and Grounds Cleaning and Maintenance" jobs can be performed at home. Given that such jobs must be performed away from home, it is unsurprising that the DC MSA and Metro Compact Area experience a bifurcation within the PBS sector in which professional jobs recorded nearly no job losses but support and waste management positions recorded heavy job losses (Figure 6 and Figure 8).



Figure 12. Share of DC MSA Jobs That Can Be at Home - By Occupation

The assessment of the potential for work-from-home is explicitly tied to occupations and the nature of work for given occupations. However, forecasting overall employment demand is often better understood when based on industry trends. Therefore, examining differential work-from-home across occupations and industries, and related impacts on labor demand in certain industries tied explicitly to employment centers, it is important to tie the potential shift in workplace for occupations to their representative industries. In the table below, the industry sectors that have the

highest exposure to occupations where at least half of the workers could perform their job duties away from the establishment location are identified. This should be treated as "potential" impacts as the CRA does not expect public sentiment to support permanent shifts to school-from-home within the forecast period for this analysis.

Occupation (% Able to Work from Home)	Industry 1 (% of occupation in this industry)	Industry 2 (% of occupation in this industry)	Industry 3 (% of occupation in this industry)	Industry 4 (% of occupation in this industry)
<u>Computer and</u> <u>Mathematical (100%)</u>	Computer Systems Design and Related Services (5415): 47.7%	Management, Scientific, and Technical Consulting Services (5416): 6.3%	Scientific Research and Development Services (5417): 3.2%	Data Processing, Hosting, and Related Services (5182): 3.2%
Education, Training, and Library (98%)	Elementary and Secondary Schools (6111): 57.3%	Colleges, Universities, and Professional Schools (6113): 16.5%	Other Schools and Instruction (6116): 5.5%	Child Day Care Services (6244): 4.3%
Legal (97%)	Legal Services (5411): 50.7%	Justice, Public Order, and Safety Activities (9221): 7.7%	Executive, Legislative, and Other General Government Support (9211): 7.3%	Administration of Economic Program (9261): 7.0%
Business and Financial Operations (88%)	Management, Scientific, and Technical Consulting Services (5416): 14.0%	Computer Systems Design and Related Services (5415): 7.0%	Administration of Economic Program (9261): 6.3%	National Security and International Affairs (9281): 6.1%
Management (87%)	Computer Systems Design and Related Services (5415): 8.4%	Management, Scientific, and Technical Consulting Services (5416): 7.5%	Business, Professional, Labor, Political, and Similar Organizations (8139): 4.0%	Executive, Legislative, and Other General Government Support (9211): 3.8%
Arts, Design, Entertainment, Sports, and Media (76%)	Business, Professional, Labor, Political, and Similar Organizations (8139): 9.5%	Advertising, Public Relations, and Related Services (5418): 6.7%	Independent Artists, Writers, and Performers (7115): 6.7%	Radio and Television Broadcasting (5151): 6.4%
Office and Administrative Support (65%)	Management, Scientific, and Technical Consulting Services (5416): 4.8%	Computer Systems Design and Related Services (5415): 3.5%	Offices of Physicians (6211): 3.4%	Postal Service (4911): 3.4%
Architecture and Engineering (61%)	Architectural, Engineering, and Related Services (5413): 38.5%	Scientific Research and Development Services (5417): 7.3%	Computer Systems Design and Related Services (5415): 5.8%	National Security and International Affairs (9281): 5.2%
Life, Physical, and Social Science (54%)	Scientific Research and Development Services (5417): 24.7%	Management, Scientific, and Technical Consulting Services (5416): 8.8%	Administration of Economic Program (9261): 8.6%	National Security and International Affairs (9281): 8.1%

Table 1. Top Industries Employing Occupations That Can Be at Home - Metro Compact Area

Source: CRA, JobsEQ. Metro Compact Area, Journal of Public Economics

A forward-looking indicator for return to work very may well be direct office vacancy rates. If companies do not feel that they will be returning to work in the capacity that they were prior to the pandemic, then it is likely that vacancy rates in the DC region would rise. Despite the prospect of enduring work from home policies, there has only been a modest uptick in direct office vacancy rates across the DC MSA, with decline in office vacancy rates in Suburban Maryland (Figure 13). While direct office vacancy rates have been increasing in DC, those increases predate the pandemic. As shown in Figure 13, direct office vacancy rates have been increasing in DC since at least 2016. In contrast, Virginia and Maryland suburbs office markets have been stable. Anecdotally, the so-far muted effects of the pandemic on office vacancy rates may reflect the impact of existing leases and tenant unwillingness to give up space, on average, until more is known about the shape of office demand in a post-COVID labor market. Commercial real estate advisory firm Delta Associates forecasts that office demand will be flat in Northern Virginia and Suburban Maryland and negative in DC in the near terms with little change in rental rates.





Potential Trajectories for the Retail and Restaurant Industries

<u>Retail Trade</u>

Overall retail trade employment in the DC MSA and Metro Compact Area has been declining for several years (Figure 14 and Figure 15). Retail trade employment in the DC MSA declined an average of 1,700 per month from the same month a year prior from January 2016 through December 2019. From the seasonal high of 282,300 in December 2019, retail trade employment declined 68,000 to just 214,300 in April 2020 as lockdowns shuttered may retail locations. While employment increased from the April low through December 2020, the longstanding trend of declining retail trade employment was exacerbated, with retail trade employment in the DC MSA at 256,700 in June 2020. At the more local Metro Compact Area, the decline in retail trade employment is similarly visible, even with quarterly data. From the first quarter of 2019 to the first quarter of 2020, retail trade declined in the Metro

Compact Area by 38,855. While retail trade employment increased from pandemic induced lows, the long-running decline was exacerbated and is unlikely to return to even pre-pandemic lows. Some of this trend is not necessarily a reduction in total employment but a shifting of jobs into other employment sectors as retail trade is increasingly online. This shift in industry employment is difficult to track but the data overview suggests that some of these jobs may now appear as wholesale trade, transportation/warehousing, or even some computer services.





Figure 15. Retail Trade Employment Metro Compact Area



Food and Drinking Establishments

In contrast with retail trade, employment in food services and drinking employment was increasing steadily in the years prior to the pandemic. Food services and drinking employment in the DC MSA increased an average of 4.500 month-over-year per month from January 2016 through December 2019. Despite the steady increase in employment prior to the pandemic, food services and drinking employment was severely negatively impacted by stay-at-home orders and hesitancy to be in public. Employment in the food service and drinking sector sank to 125,400 jobs from 243,900 in April 2019 in the DC MSA to just 118,500 in April 2020. From the April low, employment in the food services and drinking sector has been increasing steadily, even after a brief pause in December 2020 and January 2021. Unlike employment overall, employment in the food services and drinking sector has not dramatically slowed down as the recovery has continued. From February 2021 through June 2021, month-over-month job growth in the sector averaged 5,600 jobs. Examining quarterly data for the Metro Compact Area reveals a similar trend for the DC MSA. Employment in the Metro Compact Area declined by 93,100 from 197,859 in the second quarter of 2019 to 104,763 in the second quarter of 2020. While quarter-over-quarter growth was negative from the first quarter of 2020 to the first quarter of 2021, this includes the monthly decline in January. As second quarter data become available, the Metro Compact Area will likely reflect the data from the DC MSA.







Figure 17. Food Services and Drinking Employment Metro Compact Area

Three underlying forces that will drive local food service and drinking employment are spending at food services and drinking establishments, the comfort of the public to return to bars and restaurants, and the supply of labor willing to work at food services and drinking establishments. While sales at food services had been trending higher over the past several years nationally, it declined markedly during the pandemic. Prior to the pandemic, national spending at food services and drinking establishments peaked at \$68.47 billion in August 2019. This sank to just \$30.0 billion in April 2020. While the recovery in sales bounced back before stabilizing between \$50 billion and \$60 billion, recent data indicate that spending at food services and drinking establishments is above the pre-pandemic peak. These figures are not adjusted for inflation.





While sales at food services and drinking establishments may be higher, the comfort of the public to return to bars and restaurants appears to be lagging. Data from the reservation company OpenTable for

August 2021

the DC MSA reveals that reservations are still approximately 40 percent below 2019 levels (Figure 19). While reservations are still down relative to 2019, the trend is rising, which seems to be helped by increasing vaccination rates among the local population as well as changes to restaurants such as outdoor dining options.





A final aspect that will determine employment in the food services and drinking sector is the supply of labor willing to work in the industry. Anecdotally, labor supply issues are becoming a notable issue, particularly for food services and drinking establishments. There is certainly demand for occupations that work in the food services and drinking (Table 2. Total Job Ads for Food Services and Drinking Occupations (SOC 35) Table 2). There were 1,830 ads in the DC MSA for servers for the year ending July 20, 2021. Additionally, there were over 1,511 ads for dishwashers, 1,339 ads for cooks and 1,205 ads for bartenders. Regarding the location of these ads, 1,695 were advertised for jobs in Washington, DC, with another 666 in Fairfax County (see the Appendix for more details). By employer, the largest number were for chain restaurants such as McDonald's and Starbucks (appendix).

Job Title	Total Ads – DC MSA		
Server	1,830		
Dishwasher	1,511		
Cook	1,339		
Line Cook	1,205		
Bartender	1,201		
Team Member	1,015		
Prep Cook	709		
Assistant Manager	705		
Crew Member	642		
Host	629		

Table 2. Total Job Ads for Food Services and Drinking Occupations (SOC 35) by Job Title

Source: GMU CRA, JobsEQ RTI. 365-day period ending 7/20 in Washington DC, MSA, in NAICS 35-000

Strengths and Challenges in Hospitality Sector

Overall, the hospitality sector was growing prior to the pandemic, declined dramatically during the pandemic and has been recording slow but steady growth towards pre-pandemic levels. For the US as a whole employment in the accommodation sector grew from around 2 million per year in 2016 to 2.1 million in 2019. This declined to barely over 1 million in May 2020, before slowing gaining ground for the remainder of 2020. Starting in January 2021, accommodation employment started making quicker gains, increasing to 1.75 million in June 2021. The DC MSA recorded a similar trend. Accommodation employment in the DC MSA increased from 40,700 in January 2016 to a peak of 47,400 in June and July of 2019. Following the natural slowdown after the seasonal peak, accommodation employment in the DC MSA sank to just 18,900 in May 2020. While there was only modest growth for the remainder of 2020, and the first quarters of 2021, employment growth in the sector began to increase in April 2021, standing at 27,100 in June 2021. Quarterly data for the Metro Compact Area reveals similar trends as the DC MSA, though the data do not yet reflect the increase in employment growth in the second quarter of 2021.





Figure 21. Accommodation Employment in the DC MSA



Figure 22. Accommodation Employment Metro Compact Area



Preliminary Market Outlook 2025

The overall assessment of employment growth in the Metro Compact Area through 2025 shows steady recovery, when plotted as annual data. This forecast is based on trend lines and assumes that the economic effects of the pandemic continue to wane. The emergence of the Delta strain of the COVID-19 virus is creating uncertainty, but as of the time of the preparation of this paper, no new restrictions have been placed on business operations. If such restrictions are re-imposed, the projected timeline of the recovery (jobs and economy activity), will be delayed. Importantly, the projections indicate that while there will be economic recovery, total employment in 2025 will remain about 1.2% below 2019 levels (see Figure 24). The timing of subsequent papers in this series means that as more information on the business impacts of the delta variant becomes available, this forecast can be modified if needed.

Forecasting near-term employment by sector inserts additional variability. Based on the current uncertainty regarding potential business disruptions, the total rate of vaccination, and the apparent ability of the delta variant to infect individuals who have received vaccinations, confidence in forecasting employment trends for industries especially susceptible to pandemic induced business disruptions must be judged as moderate. To clearly show patterns of change, Figures 25 and 26 separate the two largest industry sectors, government and professional, scientific, and technical services, from comparably smaller industries. Figure 25 shows that long term growth patterns for professional and technical services and government jobs were barely affected by the pandemic when aggregated into yearly totals. These two sectors of the economy are expected to continue growing, though these are sectors with relatively high potential for continuing work-from-home.



Figure 24: Total Employment Metro Compact Area 2001-2025

Figure 26, which examines other major sectors of the economy included combined education and health services, administration and building services (including waste management), combined wholesale trade and transportation, construction, retail trade, and leisure and hospitality. The forecasts suggest that both retail trade and leisure and hospitality employment will remain substantially below pre-pandemic levels through 2025. This forecast does not explicitly consider how persistent work-from-home labor conditions may impact total demand to retail and restaurant workers in large employment centers. That will be addressed in subsequent papers in this series.



Figure 25: Total Employment for Government and Professional and Technical Services Industries, Metro Compact Area 2001-2025

Figure 26: Total Employment for Selected Industries, Metro Compact Area 2001-2025



Downtown DC

The downtown area of the District of Columbia is especially important in assessing demand for services on the Metro system. This section of the paper focuses on industries that are primarily office based located in core employment centers in "downtown" DC. For gathering data on employment trends downtown, this subregion is defined by a collection of zip code areas. Figure 27 shows the zip codes areas used for this analysis. A list of specific zip codes included in the downtown area can be found in the appendix to this paper.

Figure 27: Downtown DC (shaded)



Source: Economic Modeling Specialists, Inc., Center for Regional Analysis

For purposes of this assessment, industries characterized as office based include Professional and Technical Services; Information; the industry cluster including Finance, Insurance, and Real Estate; Management of Companies grouped with Administrative and Waste Management Services (incudes services to buildings); and Government. Figures 28 and 29 show past and expected employment trends through 2025 by sector/group. As in the previous example, there are two figures to enhance readability because of the differences in magnitude of employment for government and professional and technical services versus other included industries. Employment in these sectors showed little impact from the pandemic. However, these also represent jobs that mostly continued but as work-from-home. Subsequent papers will address the issue of the potential impacts of fully in-office, hybrid, or fully remote workers employed in these industry sectors.



Figure 28: Total Employment for Selected Industries, Downtown DC 2001-2025



Figure 29: Total Employment for Government and Professional Services, Downtown DC 2001-2025

A data issue also needs to be considered. Government employment data resources do not offer zip code level datasets for recent time periods. The Department of Commerce County Business Patterns will eventually release zip code level data (18 month to 24-month lag), but the data will show number of establishments, not employment by sector. Therefore, this analysis uses third party data estimates from Chmura Economics and Economic Modeling Specialists. Both entities offer estimates of data that are not provided publicly by federal agencies. However, their analytical baselines are still Bureau of Labor Statistics or Census data. When comparing total employment for the District of Columbia versus the downtown core, the CRA finds little difference in the pattern of employment trends, which may suggest that the zip code level estimates use a control total approach that may not reflect specific small area reality (see Figure 30). Therefore, while the CRA is reasonably confident in the overall finding that total employment trends for office sectors are reasonable, planners should use caution against making planning decisions based wholly on the estimates of employment by industry in the downtown core.



Figure 30: Total Employment District of Columbia and Downtown DC 2001-2025

Source: Economic Modeling Specialists, Inc., Center for Regional Analysis

Conclusions

The Washington, DC region overall, and the communities that are members of the Metro Compact Area, experienced substantial negative impacts in key industries, especially those related to leisure and hospitality services. The long-term decline in retail trade employment accelerated during the pandemic and consumers readily shifted to online purchases. However, due to the presence of the federal government and government contractors, the regional economy proved to be relatively resilient. However, this initial assessment does not illustrate the disproportionate impacts the pandemic has had on jobs and economic wellbeing of lower income workers and communities – many of whom rely on public transportation as a primary mode for their journey to work. In addition, research has shown that the structure of the regional economy emphasizes employment sectors that can most easily shift to full or partial work from home schedules. While this potential shift on workplace characteristic is not widely indicated in office market statistics, there is widespread expectation that the days of 5-day, in-office work assignments may not become the "norm" again anytime soon - if ever. This will have direct effects on total demand for transit services and on the timing of transit service demand. There will also potentially be indirect effects as demand for restaurant, retail and personal services shifts away from employment centers as workers commute fewer days in the work week. Subsequent papers in this series will more closely assess the direct and indirect effects of the work-from-home and shop-from-home phenomena.

Appendix

Supplemental data and information.

Kastle Back to Work Barometer

	Wed 7/21	Wed 7/28	Wed 8/4	Wed 8/11	% Change
Washington, DC metro	29.7%	29.2%	28.0%	26.8%	-1.2%
New York metro	24.5%	24.2%	23.4%	22.9%	-0.5%
Chicago metro	31.8%	31.9%	30.1%	29.5%	-0.6%
Houston metro	51.6%	50.7%	49.3%	46.8%	-2.5%
Philadelphia metro	32.8%	33.1%	32.2%	32.5%	0.3%
San Francisco metro	21.2%	21.0%	19.6%	19.2%	-0.4%
Los Angeles metro	29.7%	28.8%	28.6%	28.2%	-0.4%
Dallas metro	50.1%	49.6%	47.9%	46.0%	-1.9%
San Jose metro	23.6%	23.0%	23.3%	22.9%	-0.4%
Austin metro	53.5%	51.4%	47.0%	45.9%	-1.1%
Average of 10	34.8%	34.3%	32.9%	32.1%	-0.8%

Source: Kastle Systems

Data on Job Ads in the Restaurant Industry

Location	Total Ads - DC MSA
Washington, District of Columbia	1,695
Fairfax, Virginia	666
Arlington, Virginia	530
Alexandria, Virginia	517
Fredericksburg, VA 22401	514
Frederick, Maryland	461
Fredericksburg, Virginia	428
Manassas, Virginia	427
Bethesda, Maryland	392
Bowie, MD 20716	382

Source: GMU CRA, JobsEQ RTI. 365-day period ending 7/20 in Washington DC, MSA, in NAICS 35-000

Employer Name	Total Ads – DC MSA	
McDonald's	930	
BJ'S Restaurant & Brewhouse	836	
Carrols Corporation	788	
Delhaize America Food Lion	730	
Starbucks	712	
Noodles & Company	632	
Whole Foods	598	
Blooming Brands Inc	591	
Panera Bread	588	
Wegmans Food Markets	549	

Source: GMU CRA, JobsEQ RTI. 365-day period ending 7/20 in Washington DC, MSA, in NAICS 35-000



Downtown DC Zip Codes

ZCTA 20001	ZCTA 20053	ZCTA 20506
ZCTA 20002	ZCTA 20202	ZCTA 20510
ZCTA 20003	ZCTA 20204	ZCTA 20520
ZCTA 20004	ZCTA 20228	ZCTA 20540
ZCTA 20005	ZCTA 20230	ZCTA 20551
ZCTA 20006	ZCTA 20240	ZCTA 20553
ZCTA 20024	ZCTA 20245	ZCTA 20560
ZCTA 20036	ZCTA 20260	ZCTA 20565
ZCTA 20037	ZCTA 20405	ZCTA 20566
ZCTA 20045	ZCTA 20418	

Washington Metropolitan Area Transit Authority

Paper 2:

WMATA Compact Area Sector-By-Sector Travel Typologies, Recovery Strengths and Likelihoods

PRN ID: CPLAN21010 SOW ICE ID: SOW0008471

Dr. Terry Clower, Dr. Brian Hollar, Dr. Keith Waters Center for Regional Analysis George Mason University

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Introduction

This paper is the second in a series of three papers that examines economic and labor market factors that could impact transit ridership through 2025 by developing travel generation typologies by industry sector and forecasting job growth on a sector-by-sector basis. First, this analysis examines data on commuting behavior by workers characterized by their industry and occupation of employment, which creates a baseline for assessing changes in likely ridership as the regional economy emerges from the direct effects of the Covid-19 pandemic. Second, this paper expands on the findings of Paper One regarding work-from-home tendencies across industries and occupations and further explores office access data from Kastle Systems, a provider of commercial building security services, on the pace of returning to the pre-pandemic work environment. This section also provides a preliminary typology of post-Covid commuters that will improve future analyses of the impacts of regional employment change on demand for bus and rail transit services. The third element of this paper is a sector-by-sector jobs forecasts that will provide WMATA staff with data to support planning.

Key findings of this paper include:

- Prior to the pandemic, commuting trips via rail transit and bus in the WMATA Compact Area are made by individuals employed largely in just a few key industry sectors
- Over half of commuters traveling by rail transit were in just two sectors, Public Administration and Professional, Scientific, and Management services.

- Kastle Systems data, derived from office security systems, reveal that the pace at which office workers are returning to work is slow. Office workers are not simply avoiding public transit, they appear to be still largely working from home.
- Sectors that account for large shares of commuter trips on rail transit and bus were largely resilient to the pandemic and are forecast to continue to grow in the WMATA Compact Area though 2025, though work-from-home will impact total ridership.

The remainder of this paper is organized as follows. In section one, travel by industry sector and occupation is examined. This includes data from the U.S. Census Bureau's American Community Survey, Kastle Systems office security data, and a review of academic work on the possibility to work from home across differing industry sectors. In section two, sector-by-sector forecasts are provided for the WMATA Compact Area, with recovery likelihoods and strengths provided. Conclusions are then drawn in the final section.

Section 1: Means of Transportation to Work for Industry and Occupations

A significant question over the next five years is how the work-from-home employment paradigm will evolve? Will commuting patterns return to pre-pandemic levels? Will those who are able to work from home be able to do so as much as they have during the pandemic? Will a hybrid approach evolve with workers commuting to the office for some part of the workweek, perhaps on off-peak hours, and work from home for the remainder? While the exact characteristics of regional employment in a post-pandemic economy remain uncertain, this section uses pre-pandemic commuting patterns in the WMATA Compact Area using Census data from 2019 to establish a baseline of potential commuting behavior across industry sectors and occupations.

ACS PUMS Data

This analysis uses data from the 2019 American Community Survey by the Census Bureau as a baseline of commuting patterns that existed prior to the pandemic. Commuting travels modes are assessed by industry and by occupation.¹ Industry classifications are used to describe the sector that an employee's employer operates in, such as finance and insurance. Occupation classifications are used to describe an employee's job, such as architect or truck driver. Such distinctions are important as the share of occupations within an industry can vary among cities. For example, while the finance industry may be primarily comprised of bankers in one city another may operate as back office operations that primarily employ computer programmers and database administrators. The analysis identifies which industries and occupation, appear to be more reliant on transit services for their journey to work. While these data represent pre-pandemic conditions, they provide key insights into how journey to work ridership may recover in a post pandemic economy that will be shaped by work-from-home patterns and the degree to which industries disrupted most by the pandemic recover in the coming years. Complete commuting tables by industry and occupation

¹ Specifically, the means of transportation to work was used. A list of WMATA Compact Area PUMAs is provided in the appendix of this document.

are provided in the appendix to this report. It is important to note that the analyses presented in this paper focus on commuting trips (journey to work) and thus does not directly assess post-pandemic economic impacts on other travel types (personal trips). It is possible that some industry outlooks, such as for restaurants, entertainment, and retail could have implications for transit trips for personal reasons.²

The percentage of workers in various industries who commuted by bus and rail in 2019 in the WMATA Compact Area indicate significant differences in ridership exist across industries (Figure 1). Public administration by far has the highest percentage of commuters riding rail (22%), followed by professional, scientific, and technical services $(13\%)^3$, information (13%), and other services (13%). Arts, entertainment, recreation, accommodation, and food services have the highest rate of workers riding buses (12%), followed by administrative and waste management services (8.2%), and retail trade (7.8%). No industry has a majority of workers collectively commuting by public transportation. Additionally, apart from public administration, no industry has more than 13% of their workforce using any particular form of transit. Despite this, the variation between industries reveals the extent to which employees across different industries rely on public transit services.

² If employment in restaurants, entertainment venues, and retail stores lag, this could mean that these entities have more limited operations and thus there could be a related reduction in ridership tied to customers making personal trips to these places of business.

³ In the first paper in this series, the differential recovery trajectories within the profession business service sector was highlighted. While professional scientific and technical sector jobs continued to grow, administrative support and waste management jobs declined. For this reason, these two sectors are disaggregated in the majority of the analysis in this paper. In this paper, NAICS 54 (Professional, Scientific, and Technical Services) and 55 (Management of Companies and Enterprises) are combined, while NAICS 56 (Administrative and Support and Waste Management Services) are reported separately.

Figure 1. Percent of Industry Commuting by Transit



As industries differed in their reliance on modes of transportation for commuting in 2019, the impacts on transit commuting also varied by the size of these industries in the regional economy. While some industries may have a high portion of workers commuting by a particular mode, if the industry is relatively small in the transit system service area, it may not contribute much to overall mode use (Figure 2). examines the share of total commuters for bus and rail by industry. Examining the total number of workers commuting by public transportation indicates that over half of rail commuting is comprised of employees from just two industry sectors — public administration (27%) and professional, scientific, and management (24%). These two sectors are two of the largest industry sectors in the WMATA Compact Area and both sectors have relatively high shares of its employees commuting by rail. Likewise, nearly 40% of bus commuters come from two key industries — arts, entertainment, recreation, accommodation, and food services (19%) and educational services, health care, and social assistance (19%). The variance in contributions to ridership by mode (bus/rail) across industries is striking. These differences between bus and rail commute ridership are likely due to a combination of factors including wages within each industry, the geographic concentration of the industry, and the proximity of housing that is affordable for industry workers.

Figure 2. Percent of Total Commuters by Industry



Focusing only on rail commuters and ordering them by industry contribution of commuters makes clear that rail commuters are comprised of workers in just a few key industry sectors (Figure 3). The top two industry sectors, public administration and professional, scientific and management accounted for 52% of total rail commuters in 2019. The top 5 industry sectors accounted for 79% of commuters for that travel mode. The bottom 10 industries account for only 21% of rail commuters, less than either of the top two industries alone.

Figure 3. Percent of Rail Commuters by Industry



Bus commuters, like rail commuters, are primarily concentrated in a few key industries, and, industries contribute to bus commuters at varying rates (Figure 4). The top two industries educational and health services, and entertainment and accommodation, account for 38% of bus commuters. The top five industries accounted for 72% of bus commuters in the WMATA Compact Area in 2019. The bottom ten industries, in contrast, only accounted for 28% of bus commuters in the WMATA Compact Area in 2019.





Commute Mode by Occupation

In addition to industry variation, bus and rail commuting also varies by occupation (Figure 5). The largest contributor to bus and rail commuting are the management occupations, with 53,693 people in 2019 in the WMATA Compact Area. Among the management occupation, 12,276 commuted by bus while 41,417 commuted by rail. There were 51,464 commuters in business and financial operations occupations with 9,639 commuting by bus and 41,825 commuting by rail. Not all occupations commuting by bus had more people commuting by rail than bus. In 2019, food preparation and serving related occupations tended to rely more on bus, with 14,537 workers commuting by bus and 9,009 commuting by rail. The complete table of occupations by commute to work is provided in the appendix. While commuting by bus and rail varies widely by occupation, the overall picture suggests that people working in higher paid occupations tend to use transit rail services more than riding a bus.



Figure 5. WMATA Compact Area - Commute to Work by Occupation

Examining the contributions of occupation groups to commuters by mode in percentage terms provides a basis for analyzing future ridership trends in coming years when combined with occupational forecasts and the likelihood of persistent work-from-home characteristics of each occupation (Figure 6). Management occupations accounted for slightly more than 16% of all commutes to work by rail in the 2019 ACS PUMS data. Combined, Management, Business and Financial Operations, and Computer and Mathematical occupations accounted for 44% of people who commuted by rail in 2019. Two occupation categories that tended to favor commuting by bus, Food Preparation and Serving Related, and Sales and Related⁴ accounted for 21% of all people who commuted by bus 2019. The complete table of occupations contribution to -commuting modes is provided in the appendix. Overall, examining the contribution of commuting shares by

⁴ Sales and related occupations include occupations such as "First-line Supervisors of Retail Sales Workers", "Cashiers",

[&]quot;Insurance Sales Agents", "Travel Agents", "Sales Representatives, Wholesale and Manufacturing", and "Telemarketers".

occupation reveals the importance of three occupation groups for rail in the WMATA Compact Area.



Figure 6. WMATA Compact Area – Occupational Contribution to Commute Mode

To get directly at the issue of reliance on transit by industry, Table 1 provides 2019 ACS estimates of commuters using transit and those working from home. Importantly, not all industries that had high transit usage in 2019 could be classified as reliant on transit. For example, while professional, technical and management industry relied on transit nearly as much as the arts, entertainment, accommodation and restaurants sector, the later had a much lower percent of workers working from home. This is obviously the result of the need of entertainment and accommodation workers needing to be onsite at their jobs, with very limited ability to do effectively work remotely.

Table 1. Comm	uting by Indus	stry - Reliance	on Transit
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Industry	Transit Level*	Transit Percent*	Work From Home Level	Work From Home Percent	Other Commute
Education and health services	52,689	11%	23,525	5%	84%
Professional, Technical, Management	79,248	17%	61,132	13%	70%
Public administration	84,871	27%	9,466	3%	71%
Arts, Entertain., Restaurants & Accomm.	43,020	20%	5,079	2%	78%
Other Services (Except Public Admin.)	31,608	18%	10,975	6%	76%
Retail trade	21,338	13%	8,941	5%	82%
Finance and insurance	19,026	12%	12,741	8%	79%
Construction	8,717	6%	5,840	4%	91%
Administration and Waste Management	16,609	16%	7,653	7%	77%
Total	387,881	15%	163,677	6%	78%
Source: ACS 2019 PUMS. * Does not include commuter train. Includes bus and rail using Census terminology.

Similar to variance across industries, the degree to which employees across occupations rely on transit service also varies, though not as widely (see Table 2). In understanding how future transit commuters could be affected across occupation categories, we can observe that while similar proportions of workers in food preparation services and business and financial operations use transit services, work from home opportunities are much more likely (11% versus 2%) for business and financial operations workers. This should be considered from two perspectives, the relative employment trends for each of these occupations in the coming years and related impacts on total commuters, and the degree to which workers in a given occupation *rely* on the transit system to access a job. This latter issue is magnified by considerations of relative labor earnings across occupation groups. Food services workers are more reliant on public transportation due in part to their ability to afford other travel options.

Occupation (SOC 2 Digit)	Transit*	WFH	Other
Educational Instruction and Library	11%	5%	84%
Sales and Related	13%	9%	77%
Food Preparation and Serving Related	20%	2%	78%
Office and Administrative Support	17%	5%	79%
Computer and Mathematical	17%	9%	74%
Business and Financial Operations	20%	11%	69%
Management	15%	8%	77%
Total	15%	6%	78%

Table 2. Commuting by Occupation - Reliance on Transit

Source: ACS 2019 PUMS. * Does not include commuter train. Includes bus and rail (Census terminology).

Section 2: Work-From-Home and Return-to-Office

While travel behaviors prior to the onset of the pandemic are illustrative in determining what a return to normal may look like, the current state of affairs is highly influenced by the ability and comfort of being able to go into an office, or some other on-site setting. This section analyzes nearly real-time data on return-to-office trends from the building security services provider Kastle Systems. Furthermore, industry data from the previous section is used to develop a set of travel typologies by industry that can inform WMATA planning efforts.

Back to the Office Barometer

Given the importance of office jobs to total employment and transit system ridership in the WMATA Compact Area, the availability of data that are as close to real-time as possible are important to examine in establishing trends over the coming months and years. The return to office also had spillover impacts on important service sectors like retail, restaurants, and personal

services located in regional employment centers. Fortunately, the building security services company, Kastle Systems, is tracking the degree to which workers are returning to offices using their systems and making that information publicly available in aggregate fashion.

The Kastle Systems Back-to-Work Barometer is an index that compares in-person office checkins using keycard, fob, and app security data. In addition to data for the DC Metropolitan Area, Kastle Systems has developed sub-regional indices for the District of Columbia, as well as an index focusing on offices of lawyers. The indexes are updated weekly and provide data that reasonably represent return-to-office trends since the start of the pandemic.

To begin, the DC Kastle Back-To-Work Index is plotted with indices of Metro Bus and Rail Riders showing changes in office visits reported by Kastle Systems and ridership by WMATA for both bus and rail from March 2020 to August 2021 (See Figure 7.). The results are scaled for comparability with WMATA ridership indices, with both bus and rail tracking closely with office access. The initial dramatic decline in all three at the outset of the pandemic was followed by a long-stabilization period, before slowly rising. Bus ridership has recovered more quickly, which follows the higher use of bus services among industries and occupations less associated with work in office buildings



Figure 7. Kastle Back to Work Barometer vs WMATA Bus and Rail Ridership

Plotting weekly data on a scatter plot reveals the strengths of the correlation between rail ridership and office visits (Figure 8). The correlation coefficient between the two datasets is 0.96. If the three outliers (where the Kastle data is greater than 0.4) are excluded, this correlation coefficient drops to a value of 0.91, but still shows that the Kastle System data provides valuable information in understanding how return-to-office settings is affecting transit ridership

Figure 8. Kastle Back to Work Barometer vs WMATA Rail Ridership Index



While the overall Kastle Back-to-Work barometer points to a gradual return to the office, the propensity to return to the office does vary by sub-region within the DC MSA (Figure 9). The variation in the first two months is the result of notable work from home on Fridays that existed in the DC Metro Statistical Area (MSA) prior to the pandemic. Suburban Maryland and Northern Virginia are distinctly different from the downtown DC BID and DC as a whole. Office visits in Suburban Maryland and Northern Virginia declined less than in DC in the early days of the pandemic. Additionally, office visits in Suburban Maryland and Northern Virginia have been consistently higher than in DC. However, the office visit index from increased faster September 1st, 2021, through September 15th, 2021, in DC than the suburban portions of the DC MSA, which may indicate workers are beginning to return to the offices that are more likely to use public transit to commute to work. We can also speculate the work location policies for federal workers may be driving some of the differentials seen between the District and suburban areas.

Figure 9. Kastle Back to Work Barometer - DC Metro Sub-Regions



Providing an even closer match to the professional services that drive the DC economy, Kastle Systems produces a DC Law Back to Work Barometer (Figure 10). This index provides evidence that workers in law offices are going back into the office at a higher rate than the overall office population. While the rate is higher, the difference between the DC Law index and the overall DC index has been relatively stable from May 2020 through present.

Figure 10. Kastle Back to Work Barometer - DC Law Index vs Total Index



Overall, the Kastle data matches closely to the Metro indices for both bus and rail. The rail data matches the office barometer more closely, and both the current gauge of these indices and their

recent slopes suggest that it will be some time before office visits and ridership return to prepandemic levels.

Work From Home Propensity

Finally, to provide additional detail on the propensity to work from home and how it may evolve over the coming months and years, the analysis turned to recently published academic and professional papers that assess the ability to perform job duties remotely (at home) across industries and occupations, which are based in no small part to work trends that were emerging before the pandemic.⁵ These estimates examine the share of work that could be done at home, which differs from the data analyzed previously explicating the share of workers that were actually working from home in 2019. The data analyzed here, are theoretical estimates while the previously reported data were survey data of people in the WMATA Compact Area. The top industries that could work from home include education services; professional, scientific, and technical services; and management of companies. These three industry sectors are important contributors to total transit rail commute ridership as previously discussed. Industries that require physical work or direct engagement with customers must clearly be performed in person. Combining these data with the earlier Census data on transit mode choices, the relative resilience of bus commuters compared to rail commuters is, perhaps, unsurprising. Note that while Education Services and some other services *can* be delivered by employees working from remote locations (home or elsewhere), there are societal and political pressures that dictate that these services be provided in a traditional, inperson setting.



Figure 11. Work from Home Propensity by Industry

⁵ "How many jobs can be done at home?" by Jonathan I. Dingel and Brent Neiman Journal of Public Economics September 2020

The professional literature also looks at the ability to perform work remotely by occupation (see Figure 12). The occupations with the greatest share of jobs that can be performed at home include Computer and Mathematical; Legal; and Education, Training, and Library jobs. Occupations with the fewest share of jobs that can be performed remotely fit within the same patterns as jobs by industry including Food Preparation and Service Related occupations; Installation, Maintenance, and Repair; and Building and Ground Cleaning and Maintenance. As noted in the first paper in this series, there was a notable difference in year-over-year job change within the professional and business service sector, with the professional jobs continuing to grow throughout the pandemic while support jobs such as building and grounds maintenance declined sharply.





Dingel and Neiman find that in the Washington-Arlington-Alexandria area, a total of 50% of jobs can be performed remotely and these jobs collectively account for 64% of all area wage and salary earnings. This indicates that any ridership decline driven service reductions would, on average, have a greater impact on lower wage earners who may not be able to afford alternative modes of transportation for their journey to work.

Travel Typologies

Combining the data previously described, travel typologies can be created to help assess opportunities and identify threats regarding transit system ridership in the coming months and years of recovery from the COVID-19 pandemic. In Figure 13, industry travel typologies are provided based on the percent of workers who commuted using either bus or metro rail and the percent of workers that worked from home in 2019. The size of the bubble represents the number of workers in the industry in the WMATA Compact Area in 2019. Sectors with higher propensities to use transit services represent opportunities for commuter ridership recovery and the economy returns to more normal economic conditions. However, those industries where remote work is likely to be more persistent and potentially become a permanent characteristic for a least part of the work week will limit commuter ridership recovery – all else being equal. For example, while professional, scientific, technical, and management industry workers have a higher propensity to ride transit, they are also more likely to continue to work from home for at least part of their workweek based on pre-pandemic work characteristics. Given this is one of the region's largest employment sectors, this is a high risk sector for transit commuter ridership. Conversely, while Education and Health Services in also a large contributor of jobs, there is relatively low risk of permanently losing these riders to work-from-home. To be clear, there is one important sector that could be shifted in the chart based on emerging employment policies. Public sector workers are among the highest contributors to commuter ridership, especially transit rail. If the Biden Administration allows most federal workers to "permanently" shift to full or hybrid work from home, that bubble will shift to the high risk/high impact quadrant.



Figure 13. Travel Typologies

Part 3: Sector Forecast Assessments

In the first paper in this series, an overall forecast was provided. In this section, sector-by-sector forecasts are discussed. Sector level forecast focus primarily on the largest and most important industries, with a full table provided in the appendix.

Sector Assessments – Primary

The two largest sectors of the WMATA Compact Area (Professional, Scientific, and Technical Services, and Government), were growing before the pandemic, held steady through the pandemic, and are forecast to grow in the years to come (Figure 14). From 2015 to 2019, jobs in the Professional, Scientific, and Technical Services sector increased from 462,024 to 491,036 while Government jobs increased from 666,695 to 675,328. From 2019 to 2020, neither sector experienced a notable decline, and from 2020 to 2021, both sectors recorded gains. From 2021 through 2025, both sectors are forecast to continue growing. Professional, Scientific, and Technical Services from 499,043 in 2021 to 522,211 in 2025. Government jobs are forecast to increase from 676,598 to 683,577. The two largest sectors in the WMATA Compact Area by number of jobs were resilient to the pandemic and are forecast to continue growing in the coming years.



Figure 14. Job Growth in the Two Largest Sectors in the WMATA Compact Area

In addition to the largest sectors of the economy, there are other noteworthy sectors. The complete jobs forecast is located in the appendix. First, Other Services (Except Public Administration) is the third largest sector by jobs in the WMATA Compact Area. This sector recorded a 6.1% decline in the number of jobs during the pandemic from 224,583 in 2019 to 210,810 in 2020 and is forecast to grow to just 218,154 jobs by 2025. The number of jobs in Retail Trade declined 9.2% from 203,313 in 2019 to 184,066 in 2020. Despite the anticipated recovery of other sectors, Retail Trade had been declining since at least 2017 and is not anticipated to recovery to pre-pandemic levels. While the Educational Services sector recorded a 6.4% decrease in jobs from 101,478 jobs in 2019 to 95,027 jobs in 2020, the sector grew to 96,516 in 2021 and is forecast to recover to pre-pandemic levels in 2025. Finally, among the hardest hit sectors was the Arts, Entertainment, and Recreation sector. The number of jobs in the WMATA Compact Area in this sector declined 27.7% from

47,295 in 2019 to 34,572 in 2020. Total job growth from 2020 to 2021 was relatively weak in the WMATA Compact Area and is forecast to remain below pre-pandemic levels through 2025.



Figure 15. Job Growth in Select Sectors: WMATA Compact Area

For illustrative purposes, employment sectors with more than 10,000 area jobs are categorized as *Resilient* or *Non-Resilient* based on their performance in recovering from the pandemic. Resilient industries are those that are forecast to have more jobs in 2025 than 2015 while non-resilient industries are forecast to have fewer jobs in 2025 than 2015. Among the seventeen industries with more than 10,000 jobs, nine are forecast to have more jobs in 2025 than in 2015 (Figure 16). Among the resilient industries, four recorded job losses during the height of the pandemic disruptions including Health Care and Social Assistance; Professional, Scientific, and Technical Services; Manufacturing; Finance and Insurance; Construction; and Educational Services. Despite the jobs losses attributable to pandemic related disruptions, each of these industries are forecast to have more jobs in the WMATA Compact Area in 2025 than 2015. From 2015 to 2025, the sectors with the largest employment gains are forecast to be Transportation and Warehousing (+44%), Management of Companies and Enterprises (+21%), and Health Care and Social Assistance (+14%). Resilient sectors of the economy either grew throughout the pandemic or are only temporarily impacted and anticipated to recovery in the coming year.

Figure 16. Resilient Industries in the WMATA Compact Area



The remaining eight industry sectors in the WMATA Compact Area with more than 10,000 jobs are forecast to either continue to decline or grow more slowly than resilient sectors. From 2015 to 2025, the most adversely impacted sectors are Retail Trade (-32%), Arts, Entertainment, and Recreation (-22%), and Accommodation and Food Services (-17%). Among these three industries, only Retail Trade was declining prior to the pandemic reflecting the long term shift to e-commerce sales. Among the other Non-Resilient sectors, job change (either growth or decline) was either relatively modest during the pandemic or will see longer term challenges. Most notably, retail trade's shift to more online sales will be persistent with some of these jobs appearing in other industry sectors such as transportation and distribution. Accommodation and food services will see prolonged impacts as business travel recovery lags and restaurants, especially in DC, will be challenged by total reduction in demand as many workers maintain hybrid schedules. Arts, entertainment, recreation employment will also be impacted by slow business travel recovery and perhaps some spillover effects of relatively fewer workers being in the office that impacts afterwork entertainment options.

Figure 17. Non-Resilient Industries in the WMATA Compact Area



The final way that the forecasts are analyzed here are by grouping industries with high and low transit use (Figure 18). High transit use industries are those with a greater portion of workers reporting commuting by either bus or metro rail than all workers in the WMATA Compact Area. From 2015 through 2025, industries with higher than average transit use are anticipated to grow by 4.7%. In contrast, industries with lower than average transit use are anticipated to decline by 1.2%. These forecasts are intuitive following the analysis in Part 1 and Part 2 that finds that government and professional, scientific, and technical services sectors both use more public transit than the overall population. Overall, while the industry mix of jobs in the WMATA Compact Area is forecast to be favorable to public transit (bus and rail), work from home among these industries is a notable uncertainty moving forward.



Figure 18. Jobs Change by Industries with High and Low Transit Use

Sector Assessments - Alternative

A particularly difficult aspect of forecasting is in both the ability to control the coronavirus as well as the population's comfort level in engaging with public life. Undoubtably, the three most negatively impacted industries in the wake of the pandemic have been retail trade, arts, entertainment and recreation, and accommodation and food services. The provided estimates for these industries are conservative, if not somewhat pessimistic. However, there is upside potential for these the leisure and hospitality sectors if business travel recovers more quickly and if the arts see a surge in activity based on pent-up consumer demand as more of the population is vaccinated and no other problematic variations of the coronavirus emerge. For this reason, we have provided a secondary forecast that reflects this possibility. In particular, accommodation and food services as well as arts entertainment and recreation are noted as possibly rebounding to approximately prepandemic levels by 2025. Retail trade employment will likely remain flat in the coming years. A full alternative forecast is provided in the appendix.



Figure 19. Secondary Forecasts - Key Industries

Employment Forecast - Recovery strength likelihoods and Timeframes Discussion

At the time this report is prepared, the U.S. is seeing a resurgence in COVID-19 cases tied primarily to the Delta variant. The worst cases seem to be concentrated among the population that has not been vaccinated with one of the three widely available vaccines. There is on-going debate about the need and timing of booster shots for those who have previously been vaccinated. In either case, where breakthrough infections do occur, the prognosis for a relatively quick recovery is quite promising. However, the spread of breakthrough cases, where a vaccinated person becomes infected, and the spread of the disease in school settings has caused concerns about the pace of job

recovery. On the national level, August 2021 job creation numbers fell substantially below expectations. We will not have later summer jobs numbers to see how the national trend in playing out in the DC area for a couple of months. However, there are two issues that persistently elevated COVID-19 cases with have on regional economic recovery: 1) some workers will not be willing to return to high-contact jobs (retail, leisure and hospitality, health services); and 2) there are many parents who cannot return to work because of a lack of daycare services or because of repeated disruptions for school age children as they become infected or exposed to COVID-19 in school settings. We roughly estimate that a lack of available childcare may be reducing the effective labor force participation rate by one to two percent.

The good news is that some of the stresses caused by the resurging COVID-19 caseload may be at least partially ameliorated by soon having the vaccine approved for some children. Recently reported clinical trials suggest that there may be approval for at least one of the vaccines for children aged 5 to 11 this fall. However, for now the late summer surge in cases has substantially slowed the economic recovery and previous forecasts should be extended by at least one quarter throughout the recovery.

In addition to local effects, the persistence of COVID-19 around the world is still playing havoc with some supply chains. The highly publicized case of supply disruptions for computer chips used in automobiles is widely visible by driving by auto dealership lots. These retailers cannot sell what they do not have, in most cases. Many retailers are warning that supply chain problems and transportation bottlenecks at ports across the globe may mean that some holiday shopping items may not be available for prime time shopping this year. Overall, Wall Street analysts and companies are starting to issue warnings that corporate earnings may disappoint managers and investors, which could cause some businesses to slow hiring. Finally, the end of special unemployment benefits means that some households will have to curtail spending, which will impact retail sector recovery. It is unclear if the end of these benefit programs will induce more individuals back into jobs, which could result in effective job growth in the closing months of 2021.

Looking further out, there are some notable patterns in the forecast data used in this analysis. Key sectors, such as Professional and Technical Services, Transportation and Warehousing (think home deliveries of everything), and Finance and Insurance barely moved downward during the early stages of the pandemic. Construction did slow somewhat, but has stabilized with about a one percent drop, which is not a large amount considering the disruptions in construction material supply chains and related materials cost increases that has delayed some projects. However, major employment sectors including Retail Trade, Accommodations and Food Services, Administrative Support, Private Education, and Other Services lost about 105,000 jobs from 2019-2020 across the WMATA service area. Oddly enough, during a health crisis Health Care and Social Assistance services dropped by 14,000 jobs for 2020, which reflects disruption in social services and many medical procedures that could be delayed or are considered elective.

For the years 2021 through 2025, the forecasts presented here expect that Professional and Technical Services, Corporate Headquarters, Transportation and Warehousing, Finance and Insurance, Healthcare and Social Assistance, and Other Services will add over 56,000 jobs. Total Government employment (all levels) will increase almost 7,000 jobs. However, the trend lines are not as favorable for Retail Trade, Accommodation and Food Services, and Arts and Entertainment

which will continue to decline or stay relatively flat throughout the forecast period. Retail Trade and Accommodation and Food Services are expected to lose an additional 21,500 jobs over the next four years. In some respects, this dismal finding actually reflects shifting job duties and categorizations. Retail trade will continue to shift to online sales, with some brick and mortar locations becoming viewing centers or even fulfillment/pickup locations. Are those workers in retail or logistics jobs? Restaurants may recover in terms of nighttime bookings and sales, but if work-from-home persists for office workers, then total demand for lunch time food services will drop dramatically. Finally, worker scarcity is driving up wages, with many fast food jobs now paying \$12-\$15/per hour. While this will help those workers in jobs, this is likely to increase the use of automation in this sector of the economy for basic customer interactions (ordering on kiosks) that will slow job growth compared to overall trade sales. The net effect is that total employment in the WMATA Compact Area will remain about 3.4 percent, or 101,000 jobs below 2019 levels by 2025. To be clear, this does not include the potential regional impacts of the proposed federal stimulus package spending, nor does it include any assumption about local economic disruptions if Congress allows a federal budget default.

In addition to looking at sectoral employment, this analysis also considers how the employment outlook differs among occupations with related earnings characteristics. There will be comparatively strong growth in Management, Business Operations, Computer Occupations that all average annual earnings in excess of \$100,000 per year. There will also be good growth for other high to middle income occupations in Education, Healthcare, and Community and Social Services. Notable growth will also be seen in good moderate income jobs such as Healthcare Support, Construction, and Transportation/Distribution jobs. However, the forecasts show continuing downward slide in opportunities for workers in Food Preparation and Services, Building Services, Personal Care, Sales and Related jobs, and Office and Administrative support occupations, which are also some of the lowest paying jobs in our region and more likely represent individuals who are public transportation commuters.

Part 4: Conclusion

This paper analyzed travel typologies by sector and provided sector-by-sector forecasts. Data prior to the pandemic was used to identify key industries contributing to public transit commuting. Sector-by-sector forecasts were then provided for planning purposes moving forward.

In section one, several data sources examining commuting travel behavior by industry and occupation were examined. Census data from prior to the pandemic revealed that over half of commuters whose journey to work used rail were accounted for by just two professional industries. While bus commuters were similarly isolated to a few industries, the concentration was not quite so high. Occupational contribution to commuters who used rail was similarly concentrated in just a few professional occupations. Examining Kastle office security data, reveals that professionals have not simply been avoiding public transportation, they have also not been quickly returning to the office. Given the concentration of, particularly rail commuter ridership, in a few professional services industries and the slow return to office, travel typologies identifying key industries based on industry share relying on transit, percent of industry working from home prior to the pandemic, and size were developed. The most notable issue moving forward is the return of the professional, scientific, and the public administration sectors to the office, which is the source of a bulk of rail commuters.

In the section two, sector-by-sector forecasts were discussed. Overall, the key sectors that Metro rail relies on experience minimal disruption during the pandemic and are forecast to grow. In contrast, some sectors that Metro bus relies on, such as arts, entertainment, and recreation, are forecast to decline. Despite the decline in key sectors, there remain notable upside potential in inperson industries such as accommodation moving forward, with a secondary forecast provided to highlight this.

Journey to work data from before the pandemic reveal that commute-related Metro ridership is generally concentrated, comprised of commuters from just a few industries or occupations. Rail commuters, in particular, was concentrated in a few professional sectors, and these workers have been slow to return to the office, thus necessitating a commute. Despite the slow return to the office, the industries that provide the bulk of commutes by transit are forecast to continue to grow in the coming years.

Appendix

Forecast Description and Data

The data presented in this paper offer our first assessment of potential job recovery through 2025 for the WMATA Compact Area. The data used for this forecasting exercise is sourced from Economic Modeling Specialists, Incorporated (EMSI), a labor market data analytics firm, who has recently announced they are merging with labor market analytics firm Burning Glass. Employment estimates from EMSI has two advantages over publicly available employment data from the U.S. Bureau of Labor Statistics. The first advantage is that some local employment data from the BLS is masked – it cannot be disclosed under business privacy guidelines. Economic Modeling Specialists employ proprietary algorithms to estimate local employment data and as a private enterprise are not under non-disclosure rules. Not having gaps in the data improves the forecasts. Secondly, EMSI offers estimates of total employment, including workers not traditionally covered by unemployment insurance. This means that the EMSI data provides times series data that includes contractors and gig workers (non-covered jobs). While these are modeled estimates, using this more complete definition of workers should improve the forecast's ability to effectively assess demand characteristics for transit services.

In this paper, we primarily use modeled forecasts of total employment by major industry sector (2-digit NAICS) provided by EMSI through 2025. The EMSI forecasts are based on trend analysis supplemented by broad market (national) data. The EMSI forecast appear to be appropriately conservative – meaning that they are more likely to understate total job growth than overstate future growth, but not by a lot. Review and assessment of the forecasts will continue through the third paper in this research series.

Table 3. DC MSA - Means of Transportation to Work by Industry

Industry	<u>Total</u>	<u>Car, truck,</u> <u>or van-</u> <u>drove</u> <u>alone:</u>	<u>Car, truck,</u> <u>or van-</u> carpooled:	Public transportation (excluding taxicab):	Walked:	<u>Taxicab,</u> <u>motorcycle,</u> <u>bicycle, or</u> <u>other means:</u>	<u>Worked</u> <u>from</u> <u>home:</u>
Agriculture, forestry, fishing and hunting, and mining	11,517	6,726	876	456	1,234	234	1,991
Construction	235,131	163,421	43,307	10,311	2,858	4,680	10,554
Manufacturing	93,441	70,611	8,488	5,537	1,181	1,177	6,447
Wholesale trade	33,935	24,851	3,422	2,012	295	372	2,983
Retail trade	257,616	187,850	21,273	23,264	7,769	6,552	10,908
Transportation and warehousing, and utilities	133,211	102,352	10,004	11,582	1,445	3,300	4,528
Information	74,175	44,784	3,733	12,532	2,979	1,968	8,179
Finance and insurance, and real estate and rental and leasing	195,818	126,213	14,363	21,128	9,935	4,294	19,885
Professional, scientific, and management, and administrative and waste management services	720,201	429,413	55,668	108,304	23,859	19,852	83,105
Educational services, and healthcare and social assistance	651,532	467,996	59,362	57,813	20,556	12,922	32,883
Arts, entertainment, and recreation, and accommodation and food services	292,158	179,237	32,724	47,205	14,695	11,649	6,648
Other services (except public administration)	217,649	135,625	18,239	34,491	9,303	6,979	13,012
Public administration	413,072	240,918	35,945	100,491	11,470	12,172	12,076
Armed forces	45,523	30,494	4,137	5,846	3,566	611	869
Total	3,374,979	2,210,491	311,541	440,972	111,145	86,762	214,068

Source: ACS 2019 1-Year Estimates. TableB08126.

Note: Public administration and Professional, scientific, and management, and administrative and waste management services comprise 208,795 of the 440,972 (47.3%) people who take public transportation. Arts, entertainment, and recreation, and accommodation and food services comprise another 10.7%.

Industry	<u>Car, truck,</u> <u>or van</u>	<u>Bus</u>	<u>Rail transit</u> or elevated <u>rail</u>	<u>Long-distance</u> <u>train or</u> <u>commuter train</u>	<u>Lightrail,</u> streetcar, or trolley	<u>Taxicab</u>	Motorcycle	<u>Bicycle</u>	<u>Walked</u>	<u>Worked</u> <u>from</u> <u>home</u>	<u>Other</u> <u>method</u>	<u>Total</u>
Administrative and waste management services	74,519	8,615	7,994	888	157	443	213	285	2,585	7,653	1,833	105,185
Agriculture, forestry, fishing and hunting, and mining	3,673	2	353	0	0	0	27	138	1,091	631	61	5,976
Armed forces	24,622	1,608	2,244	275	113	0	0	503	956	640	175	31,136
Arts, entertainment, and recreation, and accommodation and food services	149,645	25,422	17,598	346	0	2,191	1,000	931	12,559	5,079	2,990	217,761
Construction	133,657	5,375	3,342	604	0	94	98	165	1,531	5,840	2,624	153,330
Educational services, and healthcare and social assistance	377,177	25,442	27,247	2,403	100	3,332	634	4,107	20,178	23,525	4,954	489,099
Finance and insurance, and real estate and rental and leasing	107,258	5,171	13,855	740	187	1,166	75	1,328	9,759	12,741	1,671	153,951
Information	39,449	3,005	8,416	223	118	215	0	1,197	2,840	6,926	351	62,740
Manufacturing	50,808	2,170	2,781	102	145	216	139	185	919	5,238	297	63,000
Other services (except public administration)	119,035	8,646	22,962	1,614	287	1,026	295	3,152	7,911	10,975	3,038	178,941
Professional, scientific, and management	290,791	17,430	61,818	3,979	365	1,932	882	5,382	19,938	61,132	3,517	467,166
Public administration	197,419	15,693	69,178	6,153	866	1,620	491	5,385	11,175	9,466	2,365	319,811
Retail trade	128,171	13,318	8,020	89	210	1,772	0	1,058	6,171	8,941	2,112	169,862
Transportation and warehousing, and utilities	71,461	2,709	5,733	927	95	1,089	0	222	1,186	2,776	1,854	88,052
Wholesale trade	14,697	403	1,331	90	0	0	0	28	95	2,114	225	18,983
Total	1,782,382	135,009	252,872	18,433	2,643	15,096	3,854	24,066	98,894	163,677	28,067	2,524,993
Source: ACS 2019 PUMS Data F	- 	s less than 1	6 vears old and t	he unemployed								

Note: Public administration; Professional, scientific, and management; Administrative and waste management services comprise 180,728 of the 387,881 (46.6%) people who take either bus or rail transit in the WMATA Compact Area. Arts, entertainment, and recreation, and accommodation and food services comprise another 11.1%.

Table 5. DC MSA - Means o	f Transportation to \	Work by Industry (Concis	e Version)
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Industry	Car, truck, or	Bus	Rail transit or	Long-distance/ Commuter	Other method	Total
	<u>van</u>		elevated rail	train		
Admin. And mgmt. svcs	74,519	8,615	7,994	888	13,169	105,185
Agri., forestry, and mining	3,673	2	353	-	1,948	5,976
Armed forces	24,622	1,608	2,244	275	2,387	31,136
Arts, entertainment, and	149,645	25,422	17,598	346	24,750	217,761
rec., and accommodation						
Construction	133,657	5,375	3,342	604	10,352	153,330
Edu. svcs, and health care	377,177	25,442	27,247	2,403	56 <i>,</i> 830	489,099
and social assistance						
Finance and insurance	107,258	5,171	13,855	740	26,927	153,951
Information	39,449	3,005	8,416	223	11,647	62,740
Manufacturing	50,808	2,170	2,781	102	7,139	63,000
Other Services, Except	119,035	8,646	22,962	1,614	26,684	178,941
Public Administration						
Professional, scientific, and	290,791	17,430	61,818	3,979	93,148	467,166
management						
Public administration	197,419	15,693	69,178	6,153	31,368	319,811
Retail trade	128,171	13,318	8,020	89	20,264	169,862
Transportation and	71,461	2,709	5,733	927	7,222	88,052
warehousing, and utilities						
Wholesale trade	14,697	403	1,331	90	2,462	18,983
Total	1,782,382	135,009	252,872	18,433	336,297	2,524,993

Note: WMATA Compact Area consists of all of the District of Columbia and the following PUMAs in Maryland and Virginia. MD PUMAs:

• 2401106, 2401107, 2401104, 2401103, 2401101, 2401007, 2401004, 2401001, 2401005, 2401003, 2401002, 2401105, 2401102, 2401006.

VA PUMAs:

• 5159307, 5159305, 5159306, 5159309, 5159301, 5159303, 5110703, 5110702, 5110701, 5159308, 5101301, 5101302, 5151255, 5159302, 5159304.

Table 6. WMATA Compact Area - Commute to Work by Occupation

Occupation (SOC 2 Digit)	Car	Bus	Rail transit	Other	Work From Home	Total	Bus + Rail transit
Management	243,570	12,276	41,417	31,460	27,160	355,883	53,693
Business and Financial Operations	155,813	9,639	41,825	18,471	27,134	252,882	51,464
Computer and Mathematical	154,833	10,350	28,426	15,406	19,791	228,806	38,776
Office and Administrative Support	145,188	12,084	21,282	13,408	9,206	201,168	33,366
Legal	46,834	2,749	23,555	11,250	6,367	90,755	26,304
Food Preparation and Serving Related	78,294	14,537	9,009	12,041	1,755	115,636	23,546
Sales and Related	124,899	12,884	10,423	10,011	16,084	174,301	23,307
Arts, Design, Entertainment, Sports, and Media	37,549	4,164	13,756	9,253	12,643	77,365	17,920
Educational Instruction and Library	120,192	6,970	10,268	11,565	7,438	156,433	17,238
Life, Physical, and Social Science	37,730	4,673	12,003	8,414	3,213	66,033	16,676
Other	637,480	44,683	40,908	49,774	32,886	805,731	85,591
Total	1,782,382	135,009	252,872	191,053	163,677	2,524,993	387,881
Source: ACS PUMS 2019 1-Year Sample							

Table 7. WMATA Compact Area – Occupational Contribution to Commute Mode

Occupation (SOC 2 Digit)	Car	Bus	Rail transit	Other	Work From Home	Total	Bus + Rail transit
Management	14%	9%	16%	16%	17%	14%	14%
Business and Financial Operations	9%	7%	17%	10%	17%	10%	13%
Computer and Mathematical	9%	8%	11%	8%	12%	9%	10%
Office and Administrative Support	8%	9%	8%	7%	6%	8%	9%
Legal	3%	2%	9%	6%	4%	4%	7%
Food Preparation and Serving Related	4%	11%	4%	6%	1%	5%	6%
Sales and Related	7%	10%	4%	5%	10%	7%	6%
Arts, Design, Entertainment, Sports, and Media	2%	3%	5%	5%	8%	3%	5%
Educational Instruction and Library	7%	5%	4%	6%	5%	6%	4%
Life, Physical, and Social Science	2%	3%	5%	4%	2%	3%	4%
Other	36%	33%	16%	26%	20%	32%	22%
Total	100%	100%	100%	100%	100%	100%	100%
Source: ACS PUMS 2019 1-Year Sample. Example: Managem	ent Occupations	s account for .	16% of Rail tra	ansit Commute	2S		

Part 3: Complete sector forecasts

Table 8. Industry Sector Forecasts – WMATA Compact Area

				Re	ported Data	<u>1</u>				Foreca	st Data	
NAICS	Description	2015 Jobs	2016 Jobs	2017 Jobs	2018 Jobs	2019 Jobs	2020 Jobs	2021 Jobs	2022 Jobs	2023 Jobs	2024 Jobs	2025 Jobs
11	Agriculture, Forestry, Fishing and Hunting	1,953	1,859	1,925	2,001	2,961	3,077	3,318	3,526	3,709	3,857	3,991
21	Mining, Quarrying, and Oil and Gas Extraction	518	504	540	522	626	391	388	386	384	383	383
22	Utilities	5,205	5,304	5,453	5,448	5,502	5,502	5,612	5,692	5,750	5,791	5,790
23	Construction	126,278	128,431	130,991	132,733	135,526	132,325	132,801	133,193	133,524	133,802	133,985
31	Manufacturing	37,237	37,894	39,359	39,649	40,405	39,101	39,820	40,353	40,754	41,026	41,084
42	Wholesale Trade	42,719	43,428	43,919	43,511	43,395	41,957	42,059	42,188	42,337	42,498	42,703
44	Retail Trade	209,153	209,755	210,057	208,106	203,313	184,066	180,614	177,891	175,676	173,820	173,029
48	Transportation and Warehousing	55,103	57,363	61,470	64,283	70,566	69,741	72,280	74,324	76,018	77,284	78,175
51	Information	72,766	70,512	69,693	69,896	70,750	68,926	68,654	68,409	68,181	67,976	67,794
52	Finance and Insurance	80,044	81,652	83,217	83,884	84,338	83,815	84,813	85,609	86,262	86,738	87,063
53	Real Estate and Rental and Leasing	53,400	53,700	55,400	56,421	57,099	53,813	53,724	53,631	53,534	53,412	53,321
54	Professional, Scientific, and Technical Services	462,024	468,931	477,521	485,657	491,036	490,776	499,043	506,149	512,445	518,151	522,211
55	Management of Companies and Enterprises	34,120	34,481	34,446	34,968	38,207	38,318	39,268	40,038	40,682	41,234	41,536
56	Administrative and Support and Waste Management and Remediation Services	173,749	176,199	177,771	177,920	178,215	164,957	164,614	164,417	164,321	164,326	164,505
61	Educational Services	98,019	95,647	96,298	98,131	101,478	95,027	96,516	97,949	99,340	100,622	101,970
62	Health Care and Social Assistance	256,652	266,203	271,026	278,538	282,615	268,589	273,864	278,615	283,001	287,093	290,500
71	Arts, Entertainment, and Recreation	42,710	44,342	45,195	46,752	47,295	34,572	33,863	33,404	33,119	32,951	33,160
72	Accommodation and Food Services	215,768	221,989	230,508	233,239	235,133	163,576	156,522	151,211	147,119	143,917	143,232
81	Other Services (except Public Administration)	228,178	224,859	217,492	219,550	224,583	210,810	211,900	213,211	214,679	216,226	218,154
90	Government	666,695	669,524	670,697	673,048	675,328	673,981	676,598	678,804	680,709	682,401	683,577
99	Unclassified Industry	4,797	5,281	4,471	3,017	2,799	3,311	3,502	3,658	3,789	3,902	3,970
	Total	2,867,088	2,897,859	2,927,447	2,957,275	2,991,168	2,826,632	2,839,774	2,852,658	2,865,332	2,877,409	2,890,132
Source: C	GMU Center for Regional Analysis, EM	SI. Note: Foreca	sts used data	from 2001 to	present, 201	5 forward sho	own for conci	seness				

Table 9. Alternative Industry Sector Forecasts – WMATA Compact Area

Description	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	2022	<u>2023</u>	2024	2025
Agriculture, Forestry, Fishing and Hunting	1,953	1,859	1,925	2,001	2,961	3,077	3,318	3,526	3,709	3,857	3,991
Mining, Quarrying, and Oil and Gas Extraction	518	504	540	522	626	391	388	386	384	383	383
Utilities	5,205	5,304	5,453	5,448	5,502	5,502	5,612	5,692	5,750	5,791	5,790
Construction	126,278	128,431	130,991	132,733	135,526	132,325	132,801	133,193	133,524	133,802	133,985
Manufacturing	37,237	37,894	39,359	39,649	40,405	39,101	39,820	40,353	40,754	41,026	41,084
Wholesale Trade	42,719	43,428	43,919	43,511	43,395	41,957	42,059	42,188	42,337	42,498	42,703
Retail Trade	209,153	209,755	210,057	208,106	203,313	184,066	180,614	177,891	177,337	180,023	184,608
Transportation and Warehousing	55,103	57,363	61,470	64,283	70,566	69,741	72,280	74,324	76,018	77,284	78,175
Information	72,766	70,512	69,693	69,896	70,750	68,926	68,654	68,409	68,181	68,179	68,794
Finance and Insurance	80,044	81,652	83,217	83,884	84,338	83,815	84,813	85,609	86,262	86,738	87,063
Real Estate and Rental and Leasing	53,400	53,700	55,400	56,421	57,099	53,813	53,724	53,631	53,534	53,412	53,321
Professional, Scientific, and Technical Services	462,024	468,931	477,521	485,657	491,036	490,776	499,043	506,149	512,445	518,151	522,211
Management of Companies and Enterprises	34,120	34,481	34,446	34,968	38,207	38,318	39,268	40,038	40,682	41,234	41,536
Administrative and Support and Waste Management and Remediation Services	173,749	176,199	177,771	177,920	178,215	164,957	164,614	164,417	164,321	164,326	164,505
Educational Services	98,019	95,647	96,298	98,131	101,478	95,027	96,516	97,949	99,340	100,622	101,970
Health Care and Social Assistance	256,652	266,203	271,026	278,538	282,615	268,589	273,864	278,615	283,001	287,093	290,500
Arts, Entertainment, and Recreation	42,710	44,342	45,195	46,752	47,295	34,572	33,863	33,404	33,119	32,951	44,930
Accommodation and Food Services	215,768	221,989	230,508	233,239	235,133	163,576	156,522	151,541	156,519	189,948	223,376
Other Services (except Public Administration)	228,178	224,859	217,492	219,550	224,583	210,810	211,900	213,211	214,679	216,226	218,154
Government	666,695	669,524	670,697	673,048	675,328	673,981	676,598	678,804	680,709	682,401	683,577
Unclassified Industry	4,797	5,281	4,471	3,017	2,799	3,311	3,502	3,658	3,789	3,902	3,970
Total	2,867,088	2,897,859	2,927,447	2,957,275	2,991,168	2,826,632	2,839,774	2,852,989	2,876,393	2,929,845	2,994,625
Source: GMU Center for Regional Analysis, EMSI.	Note: Foreca	sts used data	from 2001 to	present, 2013	5 forward sho	wn for concis	seness				

Washington Metropolitan Area Transit Authority

Paper 3:

Long-Term Considerations

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Dr. Terry Clower, Dr. Brian Hollar, Dr. Keith Waters Center for Regional Analysis George Mason University

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Introduction

This is the third and final paper in a series analyzing the Washington region's economy and outlook in the wake of the COVID-19 pandemic. The first paper analyzed the regional economic situation and provided a preliminary forecast of overall regional job growth as the effects of the COVID-19 pandemic diminish. The second paper provided industry level forecasts, paired with pre-pandemic commuting patterns, and the relative propensity of work-from-home and remote work arrangements by occupation and industry, to develop a risk assessment framework for transit ridership based on near-term industry trends. This third and final paper takes a more long-term view, examining population, household, and employment forecasts to 2045 to understand the role of public transportation in supporting future economic growth and development. Overall, the analyses reported in this series of papers concludes that the region's economy weathered the worst of the pandemic and is well positioned for future growth. However, the pandemic accelerated preexisting trends in work-site flexibility across a range of professional occupations. The likely persistence in work-from-home options for many DC region jobs will negatively impact transit ridership for the foreseeable future.

This paper is laid out in four sections. The first section examines long-term population and household forecasts in the WMATA Compact Area. The second section focuses on long-run employment forecasts in the WMATA Compact Area, reviews the continued decline in direct dependence on federal government employment in the region, and examines intra-regional business location dynamics and office leasing trends. The third section refines the risk assessment presented in Paper #2 based on a recent review of job advertisements to understand current work-from-home opportunities for regional workers. Finally, the fourth section examines what-if

scenarios for transit ridership primarily focusing on population growth dynamics and the persistence of work-from-home labor models. Some key findings include:

- Population and households are forecast to continue to grow in the WMATA Compact Area, with population forecasts implying a densification of the traditional core of the DC region.
- Employment is forecast to continue to both grow and diversify away from direct reliance on federal government hiring and spending. While federal government employment is forecast to grow, it will grow slower than private sector employment. Furthermore, employment growth will accelerate in outer jurisdictions, which could increase the incidence of reverse commuting. Specifically, the anticipated growth in professional, scientific, and technical employment will result in a shift to more commuting to regional employment centers outside of the District of Columbia.
- Examining job postings in the region's largest industry sector professional, scientific, and technical services—suggests that remote work, especially hybrid working schemes, will likely become the norm. However, it is not yet clear where the balance of in-office and work-from-home will settle in the long term. For now, work-from-home will likely average between one and two days per work week for those workers participating in hybrid work schemes.
- In examining several what-if scenarios, the balance of in-office versus work-from-home in hybrid employment arrangements is the most consequential factor affecting long-run ridership trends for WMATA operations.

Overall, the region's economic forecast remains positive. Additionally, long-run forecasts are favorable to public transit as the region densifies within the existing core with the potential for non-work trips to represent a larger share of transit usage. However, the persistent nature of hybrid work-from-home arrangements and the use of remote workers in meeting labor demands for some industry/occupation groupings suggests that WMATA will need to adapt service and marketing models in the years immediately post-COVID-19 and for the foreseeable future.

Section 1 - Residential Population and Household Trends

Despite the recent upheaval from COVID-19, the DC region's population is forecast to continue to grow through at least 2045. Furthermore, the area is forecast to grow faster in core communities (DC, inside the beltway, close in suburbs), meaning that the region will densify and that the core will densify faster than more peripheral areas. The current Metropolitan Washington Council of Governments (MWCOG) cooperative forecast reflects participating communities' expectations for population and employment growth through 2045.¹ While jurisdictions apply somewhat different approaches in estimating future growth, the processes are thorough and account for future land use plans. The forecasts analyzed were produced in March of 2021, and therefore should account for at least some of the anticipated impacts of the pandemic. In this section, the population and housing

¹ https://www.mwcog.org/documents/2021/12/02/cooperative-forecasts-employment-population-and-household-forecasts-by-transportation-analysis-zone-cooperative-forecast-demographics-housing-population/

forecasts produced by the MWCOG are summarized. The next section will discuss the employment forecasts produced by the MWCOG cooperative process. These forecasts are analyzed here as they are notably more long-term than those produced in the first two papers in this series. The goal of this section is to consider the region's long term economic prospects.

The WMATA Compact Area population is forecast to grow from 2020 to 2045, with the central regions growing the most (Figure 1, and Figure 2). Note that while growth is considered here, the largest jurisdictions in the region are Fairfax County, VA; Montgomery County, MD; Prince George's County, MD; and the District of Columbia. While outer regions are forecast to grow faster in percentage terms, the most populous jurisdictions will remain substantially larger that outer jurisdictions. The MWCOG forecasts that the jurisdictions in the WMATA Compact Area will add 1.0 million people, growing from 4.7 million in 2020 to over 5.7 million in 2045, a 21.9% increase. The jurisdictions within the WMATA Compact Area forecast to increase the most in percentage terms are the City of Falls Church and the City of Alexandria, forecast to grow by 57.1% and 54.0%, respectively. Prince George's County is forecast to grow the least, just 7.9% from 2020 to 2045. Of importance to public transit is that the core, defined here as DC, Arlington, Alexandria, are forecast to grow 36.9% from 2020 to 2045 compared to just 17.2% for the larger more suburban counties and the City of Fairfax. Overall, the WMATA Compact Area is forecast to grow, with the location of growth being favorable to public transportation due to implied densification and the relative cost and public opposition to substantially expanding existing road networks in these communities. MWCOG's travel demand model forecasts that regional growth in jobs and population will increase transit ridership 38% by 2045, from 1.12 million daily trips to 1.55 million. Transit's share of work commutes will grow from to 24% to 27%. The travel demand model also indicates that Metrorail ridership will grow nearly 68% by 2040, increasing from 626,000 weekday trips to 1,035,000 trips. When the model's forecasts are factored using a more reasonable baseline set by Metro's Short-Term Ridership Forecasts, it predicts Metrorail ridership will grow 37%, from 626,000 weekday trips in 2019 to 855,000 in 2040.



Figure 1. MWCOG Population % Change Forecasts for WMATA Compact Area - 2020 to 2045

Source: Washington Metropolitan Council of Governments.



Figure 2. MWCOG Population Change Forecasts for WMATA Compact Area - 2020 to 2045

Source: Washington Metropolitan Council of Governments.

In general, the MWCOG's forecast of household growth from 2020 to 2045 mirrors population growth (Figure 3). Total households are forecast to grow from 1.8 million in 2020 to 2.2 million in 2045, a 24.2% increase. The largest percentage increases in households are expected in Falls Church and the City of Alexandria, forecast to increase 77.1% and 56.2%, respectively. Note that the much larger increase in households than population in Falls Church implies that the household size of those added will be, on average, much smaller than is currently the case, which will likely be a result of both an increase in aging households (aging in place) and new, younger households occupying smaller housing units (multi-family, townhomes, accessory dwelling units). The smallest percentage increase in the number of households is in Prince George's County, with a gain of 12.7%. The forecast growth in households for these areas implies that the region will continue to grow over the next 25 years, with the urban core growing at a faster rate than the peripheral counties.



Figure 3. MWCOG Household Forecasts for WMATA Compact Area - 2020 to 2045

Source: Washington Metropolitan Council of Governments.

Population Growth and Housing Constraints

There are notable assumptions underlying the findings of the cooperative forecast. With rental housing vacancy rates at low levels, the inventory of for-sale homes at historic lows, and announced plans for new housing units being modest, the growth in population in core regions of the metropolitan area suggests that local planners expect to allow the construction of new housing units at an accelerated rate in coming decades. Data from Delta Associates shows that stabilized vacancy for Class A apartments declined from 5.2% in the third quarter of 2020 to 2.5% in the third quarter of 2021 in Northern Virginia;² 4.2% to 2.4% in Suburban Maryland; and, from 7.8% to 4.1% in the District of Columbia. Furthermore, the longstanding trends of declining for sale housing inventory and relatively stagnant levels of new construction permits continues (Figure 4).

These trends imply that housing/population density cannot be achieved by building new traditional single-family dwelling units on relatively large lots. Given limited greenfield development space, adding new housing units will potentially include backfilling some older single family neighborhoods with townhome units, converting some obsolete office and commercial structures into mixed-use housing, supporting the addition of accessory dwelling units to the region's housing inventory, and continuing to renew the urban landscape with apartment/condominium towers close to and within major employment districts including National Landing, Tyson's, Reston, and other areas.

Each of these strategies will increase relative housing density in the Compact Area. More households will be able to reside in live/work/play communities, but the overall result of densifying housing will be the continued emergence of high-density development nodes with

² Mid-Atlantic Class A Apartment Market Report. Delta Associates. Q3 2021.

substantial inter-nodal transportation needs for work, entertainment, and schooling. Given current stresses on existing road infrastructure, the relative lack of greenfield space for expanding roadways that connect development nodes, and even allowing for the deployment of technologies that may effectively enhance existing roadway capacity (such as connected vehicles), the most cost-effective way to provide intra-regional mobility under conditions of higher density will be multi-modal public transportation services.



Figure 4. Washington DC MSA Housing Construction Permits and For-Sale Inventory

Source: Real Estate Business Intelligence (RBI) SmartCharts (using Bright MLS data); U.S. Census Bureau

Section 2 - Business Trends

In addition to general population and household growth in the WMATA Compact Area, employment is forecast to both continue to grow and economically diversify. It has been estimated that combined federal employment and contract spending accounted for almost 40 percent of all regional economic activity in 2010. Prior to the business disruptions caused by COVID-19, this percentage had declined to about 33 percent – a rapid structural change for a major metropolitan area.

The region will continue to reduce its dependence on direct federal employment as a share of total employment and recent economic development success stories, such as attracting Amazon HQ2, is a part of an important trend of commercializing the regional economy – meaning that we are seeing rising growth among businesses that are not dependent on federal contracts for growth. Further out, the region will continue to grow its non-federal industrial base while continuing to enjoy the stabilizing effect of federal government contracting and a base of federal workers. However, employment forecasts show edge jurisdictions growing at a faster rate compared to core jurisdictions, which will have significant impacts on regional commuting patterns.

Employment Forecasts by Jurisdiction

In contrast with the population and household forecasts, employment forecasts for the MWCOG indicate that while the entire WMATA Compact Area is forecast to see substantial employment growth, employment is forecast to grow the fastest in percentage terms in the peripheral areas. It is important to again note that while peripheral regions may grow faster, they are far outweighed in job counts by Fairfax County, Montgomery County, and DC. From 2020 to 2045, MWCOG forecasts indicate that employment in the Compact Area will increase 24.6% from 3.0 million in 2020 to 3.7 million in 2045. Loudoun County is forecast to record the largest employment increase (36.8%) among the larger jurisdictions. Employment in Prince George's County is forecast to increase just 12.7% from 2020 to 2045. The core counties, (defined here as DC, Arlington, and Alexandria), are forecast to increase employment at nearly the same rate as the outer counties, 24.1% and 25.0%, respectively. In contrast to the large population and household growth forecast for the core portion of the WMATA Compact Area, employment growth is more balanced, with outer counties growing slightly faster than core counties. Growth in population in the core counties combined with employment growth in the outer counties may mean that reverse commuting, where workers live in DC and close-in suburbs commute outward for jobs, is likely to increase over the period analyzed.





Source: Washington Metropolitan Council of Governments.

Reduction in Federal Dependency

Two of the dominant industry employment categories: 1) professional, scientific, and technical; and 2) government, have been shifting and continue to shift in importance — a change that will have notable importance for planning (Figure 6). From 2015 through 2019, employment in professional, scientific, and technical services, which included government contractors, increased

from 468,931 to 491,036 (+6.3%), while employment in government increased from 666,695 to just 675,328 (+1.3%). From 2019 to 2020, in professional, scientific, and technical services employment decreased just 0.1 percent to 490,776 while government decreased 0.2% to 673,981.³ From 2020 through 2025, pre-pandemic trends are forecast to continue with in professional, scientific, and technical services increasing 6.4% to 522,211 while government is forecast to increase just 1.4% to 683,577. Overall, while government remains larger in terms of total employment, professional, scientific, and technical services has been growing while government employment has remained relatively stable. The second paper in this series of papers found that public administration and the broader professional, scientific and management accounted for accounted for 52% of total rail commuters in 2019. Given that these two industries account for substantial shares of Metrorail commuters these employment forecasts imply Metrorail will grow less dependent on government commuters and increasingly support private sector professional employment commuters. The most important takeaways are the reduction of importance of federal workers for ridership and that the location of employment could increasingly be outside DC proper, especially as commercial professional business services become a larger share of regional economic activity.



Figure 6. Employment - Professional, Scientific, and Technical Services and Government: 2015 - 2025

Examining the current location of federal employment and professional, scientific, and technical employment reveals that federal employment is concentrated in the core while professional, scientific, and technical is more distributed throughout the WMATA Compact Area (Figure 7 and Figure 8). In 2021, 50.3% of federal employment is located in the District of Columbia. Montgomery County and Fairfax County account for the next largest share of federal employment at 13.7% and 12.9%, respectively. In contrast, the largest share of professional, scientific, and

Source: EMSI

³ Some of the decrease in government employment is related to reduced local government activities during the height of the pandemic, while federal employment data for this period is affected by temporary hiring for the decennial census.

technical employment in the WMATA Compact Area is in Fairfax County, which accounts for 35.6% of employment in the sector. The next largest shares are in the District of Columbia (27.4%), Montgomery County (15.8%), and Arlington (11.4%).



Figure 7. Share of WMATA Compact Area Total Federal Government Employment

Source: Washington Metropolitan Council of Governments.

Figure 8. Share of WMATA Compact Area Total Professional, Scientific, and Technical Employment



Source: Washington Metropolitan Council of Governments.

If the current location of federal employment, compared with professional, scientific, and technical employment, remains relatively constant moving forward, there are implications for public transit. Specifically, the anticipated growth in professional, scientific, and technical employment will result in a shift to more commuting to regional employment centers outside of the District of Columbia. This stands in contrast to the concentration of federal employment in the District of Columbia, which is forecast to remain relatively stable through 2025. These two trends, in concert with faster population growth in DC, Arlington, and Alexandria than in more suburban regions, suggest that commuting will become more geographically balanced (in-commuting versus outcommuting) throughout the region.

Intra-regional business location dynamics

Thus far, this section has demonstrated that two of the largest forces driving the economy are the growing importance of professional, scientific, and technical services and the relatively stagnant size of government, both federal as well as state and local. The second report in this series highlighted that these two sectors have a higher propensity to take Metrorail than commuters at large. As was shown in the second paper of this series, government (public administration) accounted for 27.4% of rail commuters and professional, scientific, and management⁴ account for another 24.4% of rail commuters. To examine current intra-regional business dynamics from the employer's perspective, JLL office leasing data and office vacancy data from Delta Associates are examined below.

The share of office leases by industry around Metro stations are presented in

⁴ Professional, scientific, and management sector includes the narrower professional, scientific, and technical services sector.

Table 1. While the Industries listed in the JLL data do not reflect the definitional hierarchy of the North American Industry Classification System (NAICS) used for employment data elsewhere in this paper series, it clearly shows patterns of industrial specialization by sub-regional area. Overall, the share of leasing activity near metro stations is high within the professional, scientific, and technical services sector, with the notable exception of the Life Sciences subsector, which has no leasing activity near metro stations. Life Sciences, which is NAICS subsector 54-1715 (Research and Development in the Physical, Engineering, and Life Sciences), comprised 23,980 jobs or about 0.8% of total regional employment. Overall, firms providing professional, scientific, and technical services are still leasing office space in the areas near metro stations.

Industry	% of Leases in Station Areas	Top 3 Stations by Leased Space
Federal Government	74%	King St-Old Town, Eisenhower Ave, Union Station
Gov. Contractor	44%	Ballston-MU, Rosslyn, Crystal City
Professional and Business	56%	Tysons Corner, Rosslyn, Ballston-MU
Tech	93%	Crystal City, Gallery PL-Chinatown, McPherson Sq
Law Firm	76%	McPherson Sq, Gallery PL-Chinatown, Farragut West
Non-Profit	90%	Crystal City, Ballston-MU, Courthouse
Healthcare	36%	Ballston-MU, Virginia Square-GMU, Rosslyn
Life Sciences	0%	-

Table 1. J	LL Leasing	Data -	WMATA	Station	Area k	ov Indus	strv
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Source: JLL Research. Note that leasing data excludes buildings owned by the federal government.

Apart from location decisions, it is worth highlighting the fact that the overall office sector, measured by direct vacancy, did not deteriorate dramatically during the pandemic. Data from Delta Associates shows that office vacancy in the Washington DC Area increased 130 basis points from the 3rd quarter of 2020 to the 3rd quarter of 2021. In comparison, office vacancy increased 300 basis points in San Francisco, 290 basis points in Seattle, and 160 basis points in New York over the same period. However, regional planners have cautiously been watching vacancy rates rise over the past few years for several reasons including continuing delivery of new office space, federal government employment patterns during the Trump Administration⁵, and even some one-off effects of the market melt-down of WeWork.⁶ Under current market structures, the shift in regional employment towards the private sector will result in comparatively higher demand for suburban office markets. Any change in this emerging pattern of employment would require DC to compete more effectively against suburban jurisdictions for private sector site locations.

⁵ Under the Trump Administration, there was an effort to relocate federal jobs to markets that were closer to federal agency constituents. Examples include agencies within the Department of Agriculture and Department of the Interior moving offices to midwestern or western states. The Biden Administration has said these changes will be reversed, though it is unclear what will be the net effect on DC located federal jobs.

⁶ For a brief period, WeWork was one of the largest private sector holders of office space in the District of Columbia. The financial collapse of WeWork contributed to rising office vacancy rates.



Figure 9. Direct Office Vacancy Washington DC Area

Source: Delta Associates

While direct office vacancy has increased, a recent survey by the Greater Washington Partnership shows that three-quarters of surveyed employers noted they have no plans to change their physical space over the next year is evidence that the office sector will remain reasonably strong in the short term.⁷ This suggests that while net absorption may remain negative as new offices come on-line with companies not expanding their physical footprint, companies are not yet, on average, abandoning office space in response to hybrid and remote work arrangements.⁸

Section 3 - Refine Risk Assessment

In the second paper in this series, several transit ridership risk assessments by industry were made regarding the potential for permanent work-from-home shifts across industry sectors. The analysis considered the percentage of workers by industry working from home prior to the pandemic, the percentage of industry workers who could potentially work from home (based on occupational requirements), as well as the current pace at which workers are returning to the office, including a breakout of law office workers.

Section 2 of this report highlighted the fact that the professional, scientific, and technical (PST) services industry is growing in the region while government employment is remaining relatively stable. These simultaneous trends will work to continue to lessen the region's dependency of direct

⁷ September 2021 of 164 companies, representing over 230,000 employees

https://greaterwashingtonpartnership.com/capital-covid-snapshot-2021/

⁸ There is anecdotal evidence of some companies are substantially lowering their total lease space under recent renewals and/or intra-regional relocations. Companies with existing leases are not likely to break current leases or enter the sub-lease market until the dynamics of hybrid work arrangements stabilize over the next year or two. Thus, any significant effects of work-from-home on total area office vacancy rates has not yet been realized. Other market factors, such as the delivery of National Landing office projects (HQ2) and opening of the Silver Line extension to Dulles Airport, will complicate the analysis of causal effects for office market dynamics over the next several years.

government employment and shift towards a more private sector oriented economy. Furthermore, previous data analysis highlights that PST services workers commute via metro rail at much higher rates than other industries, excluding government.

The employment shift towards PST services should thus be a long-term benefit to public transit in the region, particularly metro rail. However, the PST services sector also has higher potential for work-from-home, which could cause a net drop in metro-rail ridership moving forward. To gauge current trends in the role that remote and hybrid working arrangements are having in recruiting workers, the research team scanned job postings data for occupations within PST sectors. The job ads are a part of the RTI data available from Chmura Economics. This analysis focused of PST sectors with at least 10,000 regional job postings in the WMATA Compare Area. The ads are filtered for keywords indicating support for remote work using the following terms: "remote," "flexible location," and "work from home." Anecdotally, we believe this analysis presents a lower bound of possible remote work since a) some companies that would prefer fully on-site work are having to alter expectations (large financial institutions for example), and b) this may not fully reflect hybrid work for firms and industries who had begun offering this perquisite prior to the onset of the pandemic. (Table 2).

Occupation	Emp.	Emp. Growth	Total Job Postings	<u>% of Job Postings Including:</u>		
				"Remote"	"Flexible Location"	"Work From Home"
Software Developers and Software Quality Assurance Analysts and Testers	44,526	1,060	17,853	11.7%	3.4%	2.7%
Management Analysts	28,431	322	9,472	6.1%	4.3%	1.7%
Lawyers	24,969	-51	1,630	0.9%	0.7%	0.3%
Accountants and Auditors	18,241	16	4,997	5.8%	4.0%	1.9%
Project Management Specialists and Business Operations Specialists, All Other	16,166	177	7,357	9.1%	6.9%	3.1%
General and Operations Managers	15,188	164	1,337	1.3%	1.7%	0.6%
Computer Systems Analysts	14,674	197	1,213	2.0%	0.7%	0.4%
Personal Service Managers, All Other; Entertainment & Recreation Managers, Except Gambling; Managers, All Other	14,091	-61	1,097	1.2%	1.5%	1.1%
Market Research Analysts and Specialists	11,536	213	1,819	4.8%	1.9%	1.8%
Computer User Support Specialists	11,436	217	9,089	20.3%	8.2%	4.4%
Services Sales Representatives, Except Advertising, Insurance, Financial, Travel	10,528	152	5,053	14.7%	6.5%	7.2%
Average of Occupations Analyzed				7.1%	3.6%	2.3%

Table 2. WMATA Service Area NAICS 54 Occupations with Greater than 10,000 Employment (6-digit SOC)

Source: JobsEQ® 10/25/2021. Data as of 2021Q2 except wages which are as of 2020. Note that occupation-by-industry wages represent adjusted national data and may not be consistent with regional, all-industry occupation wages shown elsewhere in JobsEQ. Note: Figures may not sum due to rounding. ¹ Includes SOCs 15-1252 and 15-1253
The largest occupation within the PST services sector is "Software Developers and Software Quality Assurance Analysts and Testers", with more than 44,000 people employed in this occupation in the sector. In late October 2021, there were 17,853 job postings for this occupation. Of these job postings, 11.7% mentioned "Remote", 3.5% mentioned "Flexible Location", and 2.7% mentioned "Work from Home". Among the occupations analyzed, the choice of words is highly correlated. The occupation within this sector that mentioned "Remote" at the highest rate is "Computer User Support Specialist" at 20.3% while the lowest is "Lawyer" at just 0.9%. The lower share of lawyer job postings mentioning remote work supports the finding in the second paper that the return-to-work barometer from Kastle Systems indicates that lawyers are returning to the office are a faster rate than office workers more broadly.

Among the 11 occupations within the professional, scientific, and technical services sector with more than 10,000 workers, the average number of job postings for the occupations mentioning "Remote" is 7.1%. The average share of occupations citing "Flexible Location" is 3.6% and the average share of job postings citing "Work from Home" is just 2.3%. These upper and lower bounds can be applied to the 2025 forecast of employment in the professional, scientific, and technical services sector to give a sense of magnitude. In 2025, there are forecast to be 522,211 workers in the WMATA Compact Area in the professional, scientific, and technical services sector. Assuming the upper bound of 7.1% implies that 37,077 workers would work remotely and 485,134 would be expected to come to the office (Table 3). If 485,134 were expected to come to the office, that implies that the number of workers in this sector commuting would be roughly equivalent to the number commuting in 2018 (sector employment in 2018 was 485,657). The lower bound of 2.3% implies that just 12,011 would be allowed to work remotely while 510,200 would be required to go into the office, that is 19,164 more workers than the sector employed in 2019, prior to the pandemic.

Table 3. Professional, Scientific, and Technical Services Sector Employment by In-Person and Remote

	Professional, Scientific, and Technical services sector				
Share of Workers Remote	Remote Employment 2025	In-Person Employment 2025	Total Forecast Employment 2025		
Upper Bound - 7.1%	37,077	485,134	522,211		
Lower Bound -2.3%	12,011	510,200	522,211		

Source: JobsEQ®, Authors' estimates.

The analysis of job posting data is generally supported by the survey of employers by the Greater Washington Partnership previously discussed.⁹ The survey found that respondents anticipate that 68% of employees would, on a typical workday, be in the office by the summer of 2022. While over half of respondents noted they would be open to hiring employees who primarily work remotely, it is clear that employers prefer for workers being primarily in-office. While the data from job postings indicate that remote work is possible, it is likely the case that even remote work will not be entirely remote. That is, workers may be able to work remotely for a few days each

⁹ https://greaterwashingtonpartnership.com/capital-covid-snapshot-2021/

week but are anticipated to work primarily in the office. We will explore the potential impacts of hybrid work arrangements on transit ridership in the next section of this paper.

Section 4 – What-If's

This section covers several "What-If" scenarios. Given the uncertainty of the structure of worklife balance and specifically how it is related to the need or want for employees and companies to have workers in the office, the what-if scenarios are meant to be metrics to consider moving forward. There are two primary what-if scenarios discussed here.

- First, what-if population estimates are lower than those forecast by the Metropolitan Washington Council of Governments?
- Second, what if work-from-home becomes a more central aspect of work?

Both what-if scenarios have ramifications for public transit in the WMATA Compact Area. In addition, there is a short discussion of what-if scenarios on rider variability and reverse commuting.

Population Estimates

The first "what-if" scenario examined here considers population forecasts. The Metropolitan Washington Council of Governments uses the planning documents of member jurisdictions to determine anticipated growth. However, such planning documents are developed independently of each other and do not necessarily capture nuances of population and demographic change. For example, the Washington DC Metropolitan Area has seen persistent net domestic out-migration for at least twenty years, with the general exception of years in which the nation is in economic recession. Population growth for this region is largely determined by net international migration, which can vary based on political priorities. We do not yet have regional data to assess the degree to which the COVID-19 pandemic has affected domestic migration patterns and if those effects will be persistent.¹⁰ It does seem reasonable to assume that if there is a lingering effect of the pandemic on domestic migration, it will tend towards people leaving large urban areas. Therefore, the risk of error in the population projections for the WMATA Compact Area are likely to be downside risks. There are also other downside risks. It is generally believed, though to our knowledge there has been no formal proof, that high housing costs are a driver of domestic outmigration in the DC region. The rising costs of materials and reluctance by some area localities in approving new or higher density housing construction, could exacerbate the challenge of providing affordable workforce housing options to Compact Area residents and thus lower population and transit ridership growth.

Using another perspective suggests how the downside risk could emerge. Examining U.S. national population trends provides a check of the plausibility of regional growth. In other words, taking a top down view that regions effectively compete for a share of total US population growth allows

¹⁰ Recently release data from the U.S. Census Bureau shows that the U.S. population changed residences at the lowest rate in more than 70 years. See link: <u>Census Bureau Releases 2021 CPS ASEC Geographic Mobility Data</u>

us to consider what happens if the DC region does not continue its historical pattern of outperforming national averages in population growth. The U.S. Census Bureau provides national population forecasts through 2060.¹¹ The forecasts are provided for each decade, here the 5-year intervals between the decades are interpolated as the average of population the decade prior and the decade following. From 2020 to 2045, the U.S. Census Bureau forecasts that the U.S. population will grow 14.6% from 332.6 million in 2020 to 381.2 million in 2045. Using the provided Census forecast for 2050, the U.S. population is forecast to grow 16.9% from 332.6 million in 2020 to 388.9 million in 2050. Both the interpolated 2045 forecast and the more longrange forecast of 2050 are lower than MWCOG forecasts and suggest the WMATA Compact Area will grow 21.9% from 4.74 million in 2020 to 5.77 million in 2045.

Applying the U.S. growth forecasts from the Census to the WMATA Compact Area implies population growth could be notably slower (Table 4). If the WMATA Compact Area were to grow only 14.6% (the same that is forecast for the U.S. by the Census Bureau) from 2020 to 2045, this would imply growth from 4.74 million people in 2020 to 5.43 million in 2045, an estimate of 334,000 fewer people than forecast by the Metropolitan Washington Council of Governments. Applying census population growth estimates to employment implies approximately 300,000 fewer employees in 2045. Despite notably lower growth, on a larger scale, both imply continued growth with the region adding between 690,000 people and 1.04 million from 2020 to 2045.

WMATA Compact Area Forecast	2020	2045	% Change 2020 - 2045
COG Population Forecasts for WMATA Compact Area	4,736,800	5,772,800	21.9%
US Growth Rates Applied to WMATA Compact Area	4,736,800	5,428,948	14.6%
COG Forecast vs Census Implied Growth		(343,852)	

Table 4. Census U.S. Growth Forecast Applied to WMATA Compact Area

Source: Washington Metropolitan Council of Governments, U.S. Census Bureau.

There is a counter-balancing set of market influences that will likely affect regional population growth. Anecdotally, the pandemic's impact of long-term urbanization trends is expected to be temporary. On average, there will continue to be shifts in the population to urban areas. However, the competition among major cities in attracting talented workers has become the economic development story of the 21st century. The study team's work providing technical assistance to local and regional economic development agencies provides insights into the marketing tactics being used to attract workers. The inherent dominance of major cities is reflected, in part, by the growing number of smaller urban areas who are offering cash bounties and other incentives for young, talented workers to move to their communities. Important for this analysis, a review of the talent attraction marketing materials for the DC region's largest competitors all have specific reference to the availability of public transportation services, especially rail transit services. In our professional judgment, based on decades of economic development experience, the availability of a modern, efficient transit rail system is a necessary condition for economic competitiveness and growth. If the DC region maintains and efficiently operates the WMATA system, the DC region will be able to compete with other major metropolitan areas for workforce and business

¹¹ https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf

investment. If there are persistent service reductions impacting the convenience of commuters or riders using transit for non-work trips, an important inherent advantage the DC region has enjoyed in attracting young professionals could be lost to other regions with existing or emerging comprehensive public transit services.

Work From Home

The second, and likely more impactful, "what-if" scenario analyzed here is the impact of workfrom-home on potential transit commuters. As discussed, the Greater Washington Partnership survey revealed that 68% of workers would be in the office on a typical workday. This implies that either all workers would be working from home approximately 1.5 days a week, on average, or a mix of workers working from home or at the office, perhaps dependent on seniority or ability. These findings, in addition to the current job postings from Chmura Economics, suggest that some level of work-from-home is here to stay. A straightforward way of examining "what-if" scenarios regarding the impacts of work-from-home on transit use is to apply various levels of work-from home scenarios on commuting patterns.

To examine the possible impact of work-from-home on commuting in the long-term, employment forecasts from the MWCOG are adjusted by the share of commuters who either commuted via bus or metro rail from the second paper in this series. As found in the second paper in this series, approximately 15% of commuters used bus or metro rail in the WMATA Compact Area in 2019. There are two noteworthy aspects of this analysis. First, the most recent actual data provided in the Metropolitan Washington Council of Governments is 2020. These data are used as a starting point for consistency with the forecasts. Second, and more importantly, the potential transit commuters estimated are simply a fraction of total employees and do not account for changes in housing patterns. As discussed, if density increases around transit hubs, this may lead to a greater share of commuters taking transit than prior to densification. For this analysis, the share of all commuters is held at constant, pre-pandemic levels.

Applying this share to the employment forecasts provides an estimate of an upper bound of potential transit users if all employees were to go into work every single day (Table 5). That is, if there were zero work-from-home days, an estimate of an upper bound of potential transit users is the share of employees who were taking metro prior to the pandemic. With zero work-from-home days, the number of potential transit commuters grows from 461,418 in 2020 to 575,141 in 2045.

Assuming some level of hybrid work environment is here indefinitely, the number of potential transit commuters should be reduced to accommodate for this reality. If all employees work from home one day per week, the share of potential transit commuters declines by 20 percent. If employees work from home one day per week, the number of potential transit commuters increases from 390,948 in 2025 to 460,113 by 2045. If employees work an average of 2 days per week from home, the number of potential transit commuters is reduced by 40 percent from the upper bound, growing from 293,211 in 2025 to 345,084 in 2045. Increasing work-from-home to 3 or 4 days per week further reduces the potential transit commuters per day. A full 5 days working from home per week would result in no potential transit commuters.

As of the third quarter of 2021, the most plausible number of days workers will be able to work from home is likely between 1 and 2 days per week. This is likely contingent on both the job and position. However, the typical worker working between 1 or 2 days per week from home would imply between approximately 293,211 and 390,948 potential transit commuters per day in 2025. Ridership data from WMATA show that there were approximately 445,000 daily entries during peak weekday hours in 2019. Assuming that these account for commuters suggests that with employment growth and the most likely work from home scenario, transit commuters will be approximately 54,000 to 152,000 below pre-pandemic levels in 2025. Under this scenario, potential transit riders would recover to approximately pre-pandemic levels in 2040, if employees work from home 1 day per week and would still be approximately 100,000 potential commuters below in 2045 if workers work from home 2 days per week.

Work From Home # Days Per Week	2025	2030	2035	2040	2045
0	488,685	514,769	537,966	558,274	575,141
1	390,948	411,816	430,372	446,619	460,113
2	293,211	308,862	322,779	334,964	345,084
3	195,474	205,908	215,186	223,309	230,056
4	97,737	102,954	107,593	111,655	115,028
5	-	-	-	-	-

Table 5. Potential Transit Users by Work-From-Home Days: 2020 – 2045

Source: Metropolitan Washington Council of Governments, Census Bureau, and GMU Center for Regional Analysis

The estimates provided in Table 5 do not account for variability across industry or occupation. As noted in the second paper in this series, there was substantial variation in working from home by industry and occupation prior to the pandemic and there was also substantial variation in the *potential* ability to work from home by industry and occupation. As the economy shifts from fully in the office to a hybrid environment, it is likely that such shifts will be highly contingent on both industry and occupation. Additionally, there are cultural considerations that will influence the ability of jobs to be performed at home, such as education services. Finally, we make no attempt here to estimate the nature of work over the long term. The emergence of new technologies (artificial intelligence, machine learning) in business and government administrative practices, as well as distributed computing power facilitated by advanced communication networks (cloud systems over 5+G networks) will potentially have profound impacts on the nature of work location.

A major consideration is how the hybrid work environment will develop alongside possible growth paths. For example, if regional population growth is lower than forecast by the Metropolitan Washington Council of Governments and workers work from home 2 days per week, potential transit commuters would be forecast to recover slower than either of these factors alone. Comparatively, the more impactful factor moving forward is the average number of days per week that workers work from home. Every day that workers work from home is a 20% reduction in potential transit commuters for the average 5-day workweek at the individual level. In contrast, forecasting slower population growth in line with the Census would implies an 8.1% decline in employment, and potential transit commuters, by 2045.

Additional Considerations

There are three additional "what-if" scenarios that are important to mention including rider schedule variability, labor substitution, and reverse commuting. Work-from-home may reduce rider variability and simultaneously increase it. Work-from-home could reduce rider variability by evening out when people go into the office. For example, one major regional employer announced that there would be enterprise wide consistency on days in office versus work from home days. While this plan was subsequently retracted, it points to the possibility of scheduling of in-office work forming a pattern of large swings in commuters across the work week. At the other extreme, if work-from-home options are not whole day choices, then workers can be more selective in choosing hours for in-office work, such as avoiding peak commuting hours, and thus reducing the magnitude of peaks and valleys in commuter ridership. Of course, off-peak commuting could also reduce overall transit ridership if commuters return to their cars under moderate traffic conditions. Overall, the impact of work from home on ridership variability will depend on whether work-fromhome rules are extremely consistent or are allowed to vary by worker and team. The other rider variability issue will be the relative balance between commuter trips versus "other" personal trips. As housing density increases, the role of public transit providing essential transportation services for household shopping and leisure activities becomes a larger contributor to overall ridership though it will likely require extending total service hours to support this population cohort.

The second "what-if" is to consider how employment shifts due to technological change may impact transit demand. For several months, even after special pandemic unemployment benefits expired, leisure and hospitality employers have had difficulty filling available positions. There are many former restaurant, retail and other similar workers who remain hesitant to return to work because of health-related concerns, are challenged by childcare availability, or have shifted or started to shift to higher wage opportunities in other growth sectors. The inability to recruit former or new workers, combined with increases in minimum wage levels, may accelerate a shift to robotics, use of kiosks for customer interface, and similar capital-for-labor substitutions. The data presented in Paper #2 clearly showed that bus ridership is more heavily influenced by employment trends among leisure, hospitality, and retail trade workers. It is unclear which industries these workers will shift to as their old jobs become automated, and what that would mean for transit ridership overall and transit mode choice. However, this could result in transit demand shifts among what has proven to be the most reliable WMATA customers - bus riders commuting to high-public-interface jobs. Similarly, over the long term, it is generally expected that we will see increasing use of artificial intelligence systems to handle routine administrative processes. If we manage this labor transition reasonably well, there will not be notable employment level disruptions, but there may be occupational shifts resulting in more remote work options and shifts in work locales. If the region does not manage labor transitions well, there could be notable employment disruptions among core transit rider groups (federal employees, office workers).

The final factor regarding transit ridership examined here is reverse commuting. As the Washington DC metropolitan area has grown and matured, numerous employment centers have resulted. The core of the DC metropolitan area employment remains Downtown Washington DC, generally centered around the federal buildings. However, additional major employment centers including Bethesda, Silver Spring, Tysons, Rosslyn, and Alexandria are well-established with each home to numerous major employers. Beyond the more established employment centers include

new growth areas including North Bethesda, Gaithersburg, Reston, Herndon, Sterling and Ashburn. Each of these more recently developing employment centers, with current or soon-tocome access to metro rail are likely to change commuting patterns as the region continues to mature. As noted in the MWCOG population and employment forecasts, more central jurisdictions, such as DC, are planning on adding more population than jobs. In contrast, farther out jurisdictions, notably Loudoun County are planning for more employment growth than population. As these plans come to fruition, the calculus on where people live and work is likely to change. Assuming the pandemic resides, there may be a continued movement to the city (gentrification), with people preferring to live in the District of Columbia for cultural and social reasons. However, if jobs begin to move into the outer jurisdictions, this will likely result in more reverse commuting. Such a scenario may induce increased transit use, as people living in DC are perhaps less likely to have a car and would be more inclined to take public transit. Furthermore, this would result in greater utilization of trains and busses leaving the core area after dropping off commuters commuting from the outer areas to the core. Overall, this may even out the direction of commuting and enhance equipment utilization efficiencies.

Conclusion

This paper is the third and final in the series of regional economic scenarios produced planning purposes of WMATA. The first paper in this series assessed economic trends overall and more narrowly on industries that experienced substantial business disruption during the COVID-19 pandemic and providing a preliminary market forecast through 2025. The second paper in this series closely examined commuting patterns prior to the pandemic and tied these commuting patterns to industry level forecasts for the WMATA Compact Area to create risk assessments for WMATA services. The analysis in this paper examines longer term forces affecting future demand for transit services.

The longer term vision of the WMATA Compact Area, and the DC region more holistically, is continued growth. Population, household, and employment are all forecast to continue to rise. Furthermore, population growth is forecast to be faster in the existing core and employment growth somewhat faster in the outer areas. This suggests that the region will continue to densify, likely increasing the propensity of residents to use public transit services. Furthermore, the faster employment growth in the outer areas may lead to a rise in reverse commuting, where workers live in the urban core and commute to employment nodes that will require high levels of transportation services (public transit and traditional surface transportation) interconnections to succeed. Overall, the longer term outlook for the region remains strong and favorable to the continued use of WMATA transit services.

While the forecast remains strong, there are potential developments highlighted here that could be headwinds for WMATA. First, very long run population forecasts are more aggressive than national estimates. This suggests that the region would have to outcompete other regions to meet these forecasts. If the region slips competitively, population and employment forecasts could come up short, resulting in fewer potential transit commuters. Second and more consequently is the impact of work-from-home employment arrangements. Every day the average transit user works

from home is lost trips for WMATA. As of the writing of this report, it seems most likely that some form of hybrid work environments will become the norm, especially for professional and technical services that dominate the region's economy. While there are many unknowns, it seems most likely that 1 or 2 days of working from home will be the norm. Even with many riders being in occupations that will remain fully at-work, hybrid work could easily reduce total system ridership by 20% with disproportionate impacts on rail ridership. Despite the threat from work-from-home, it is plausible that general employment growth in the region will eventually replace many of these missing workers, resulting in a stable user base for WMATA services.

Other shifts in employment demand due to technological change may have been accelerated by the pandemic. Capital substitution for labor, including the use of robotics and artificial intelligence, will likely cause both temporary and enduring changes in the level of transit demand and modal choice, though the timing and magnitude of these changes are not currently knowable.

The general regional economic outlook is positive. The region is forecast to continue to grow, and more importantly, will likely grow in a manner favorable to WMATA transit services as the urban core densifies and employment locations mature into hub-and-spoke nodes. Threats from other regions, work-from-home, and technological change notwithstanding, it appears that WMATA has the capacity to adapt to these changes with relatively modest shifts in services. However, near term ridership effects will require a reconsideration of current revenue models. One cannot run a competitive public transportation system without sufficient operating revenues and capital improvement resources. The success of the Greater Washington Region will depend on its ability to accommodate population and employment growth - both of which still rely on efficient and effective transportation networks - including modern, convenient public transit services with a variety of modal options to best suit the needs and desires of the population. The region has enjoyed a long term competitive advantage in attracting young, talented individuals in part because of the availability of a highly competitive and effective regional public transportation system. The market changes being brought about or accelerated by the COVID-19 pandemic will continue to have dramatic impacts of ridership and revenue in the short term. Longer term economic and market prospects remain very favorable to a public transportation system. However, the short term challenges require the policy actions to counter near-term revenues loses. The failure to adequately maintain public transportation facilities, equipment, and service levels will impair regional economic competitiveness and the region will lose workers and eventually businesses to competitor regions.