

Washington Metropolitan Area Transit Authority

Paper 3:

Long-Term Considerations

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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 pre-existing 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

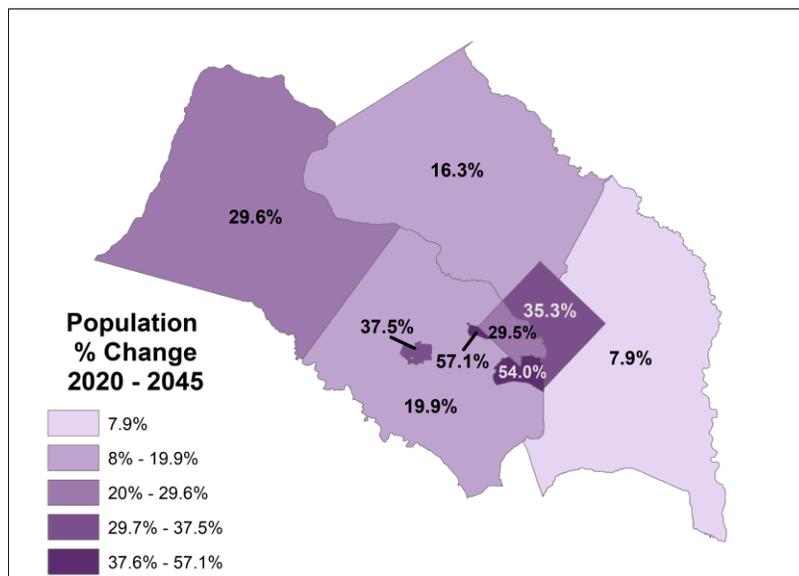
Despite the recent upheaval from COVID-19, the DC region’s population is forecast to continue to grow through at least 2045. Furthermore, the area is forecast to grow faster in core communities (DC, inside the beltway, close in suburbs), meaning that the region will densify and that the core will densify faster than more peripheral areas. The current Metropolitan Washington Council of Governments (MWCOC) 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.mwco.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.

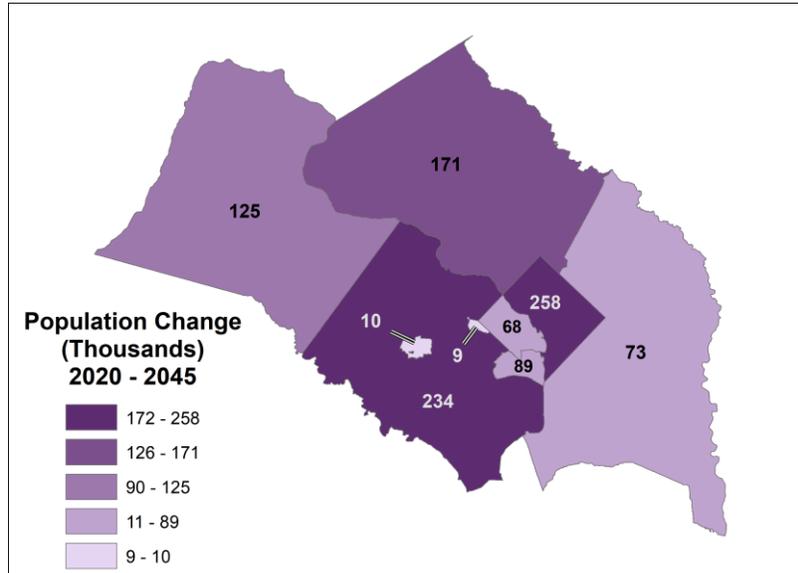
The WMATA Compact Area population is forecast to grow from 2020 to 2045, with the central regions growing the most (Figure 1, and Figure 2). Note that while growth is considered here, the largest jurisdictions in the region are Fairfax County, VA; Montgomery County, MD; Prince George’s County, MD; and the District of Columbia. While outer regions are forecast to grow faster in percentage terms, the most populous jurisdictions will remain substantially larger than 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 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.

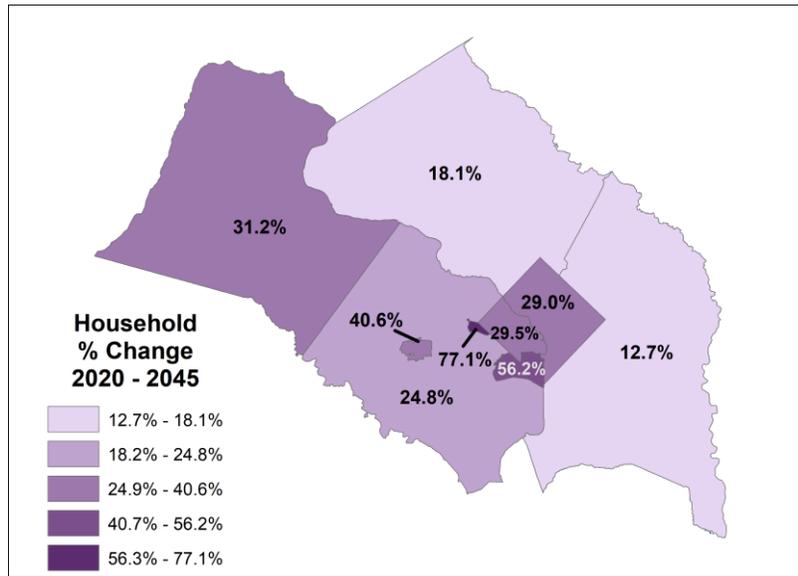
Figure 2. MWCOG Population Change Forecasts for WMATA Compact Area - 2020 to 2045



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).

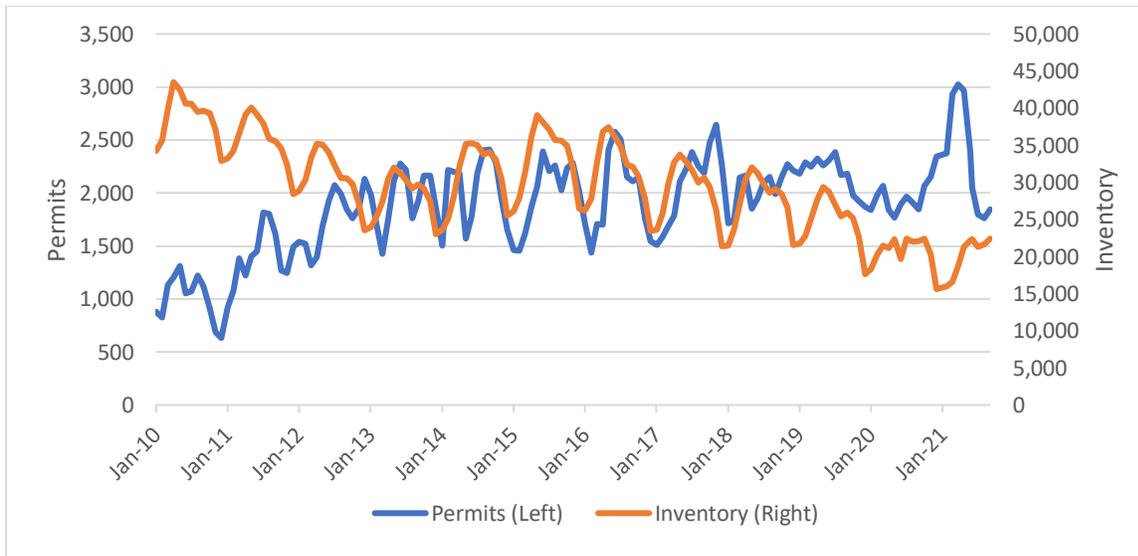
These trends imply that housing/population density cannot be achieved by building new traditional single-family dwelling units on relatively large lots. Given limited greenfield development space, adding new housing units will potentially include backfilling some older single family neighborhoods with 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

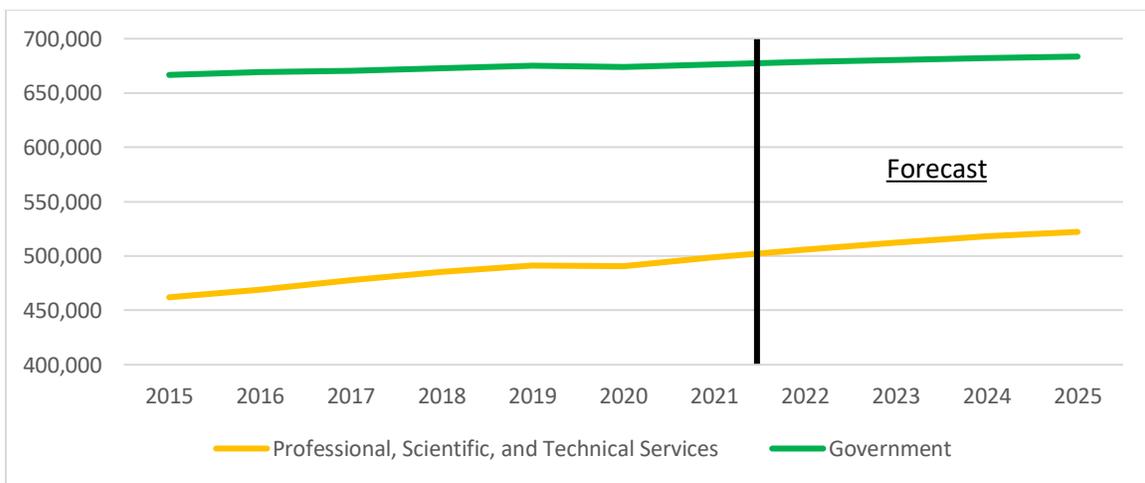
Section 2 - Business Trends

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.

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 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 support 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



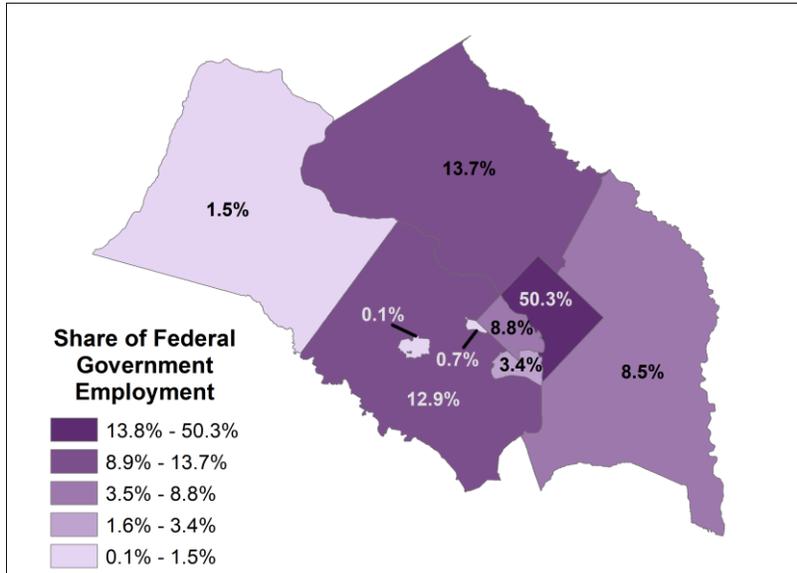
Source: EMSI

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

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.

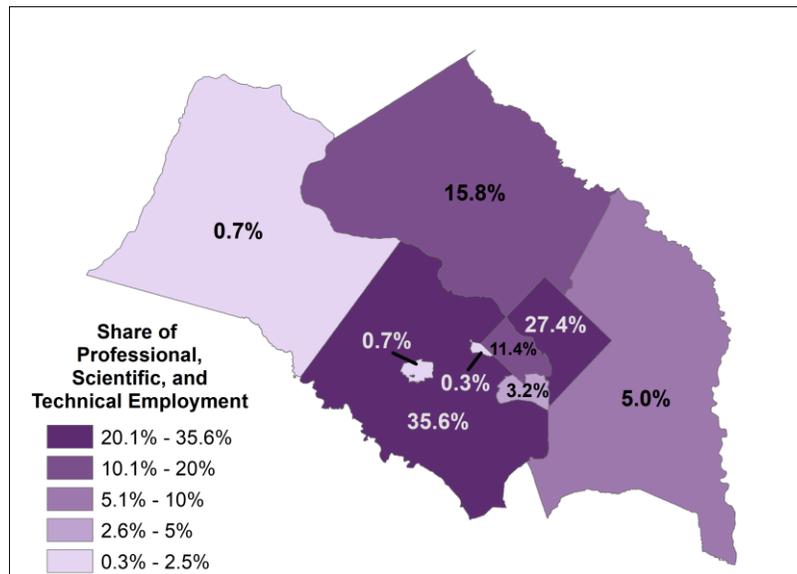
technical employment in the WMATA Compact Area is in Fairfax County, which accounts for 35.6% of employment in the sector. The next largest shares are in the District of Columbia (27.4%), Montgomery County (15.8%), and Arlington (11.4%).

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 out-commuting) 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.

Table 1. JLL Leasing Data - WMATA Station Area by Industry

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%	-

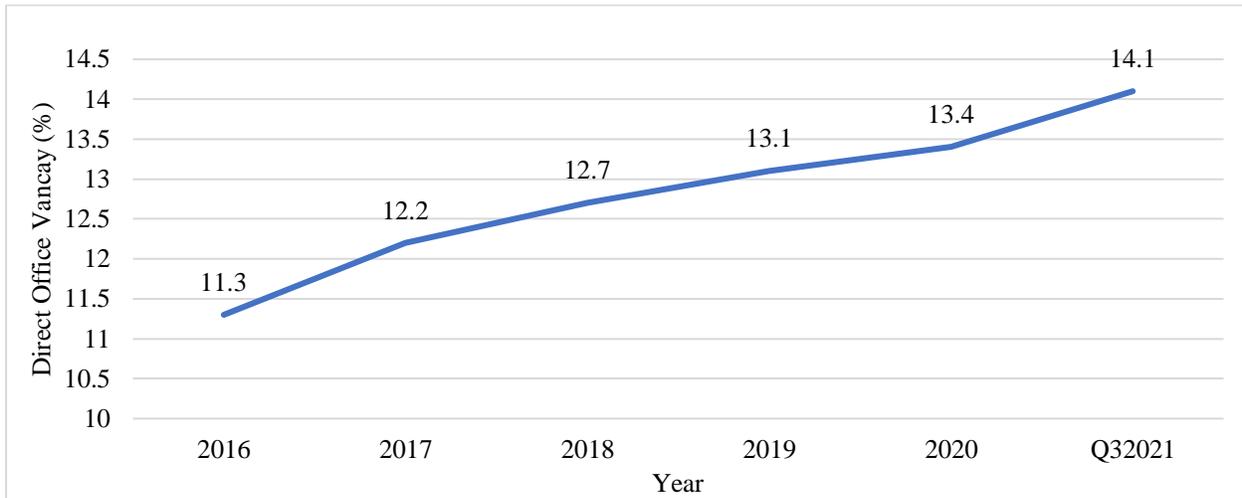
Source: JLL Research. Note that leasing data excludes buildings owned by the federal government.

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).

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

Occupation	Emp.	Emp. Growth	Total Job Postings	% of Job Postings Including:		
				“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%

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 at 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 work-life 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 out-migration 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: [Census Bureau Releases 2021 CPS ASEC Geographic Mobility Data](#)

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 long-range 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.

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

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)	

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 work-from-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.

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

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	-	-	-	-	-

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 and 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-from-home 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-to-come 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 hubs further out. Another alternative is the emergence of more live-work-play development 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 losses. 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.