

Round 10 Cooperative Forecast Technical Assistance

COG Cooperative Forecasting and Data Subcommittee



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Agenda

- **Introduction to the ICF team**
 - Walker Freer, ICF
 - Dan Hardy, RPG
- **Study Overview**
 - Objectives
 - Economic factors + trends
- **Approach**
 - Literature review
 - Interviews
 - Independent analysis
 - Other considerations
- **Implications**

Objectives

- Provide informational background to underpin development of COG's Round 10 Cooperative Forecast
- Better understand the impact of the COVID-19 pandemic on utilization, density, and development of commercial office space in the region
- Summarize variables creating economic forecast uncertainties and develop long-term regional economic model forecasts
- Assess emerging trends in regional housing location and choice
- Increase understanding of future regional household size trends

Economic Recovery Indicators

37.3%

Regionwide office activity rate (6/1/2022)

~99% in February 2020

228,200

Average daily Metrorail boardings (April 2022)

638,790 average daily Metrorail boardings in February 2020

17.5%

Office vacancy rate in downtown D.C. (March 2022)

11.1% in 2019

91%

Regional traffic levels compared to 2019 levels (March 2022)

Scenario Planning Principles

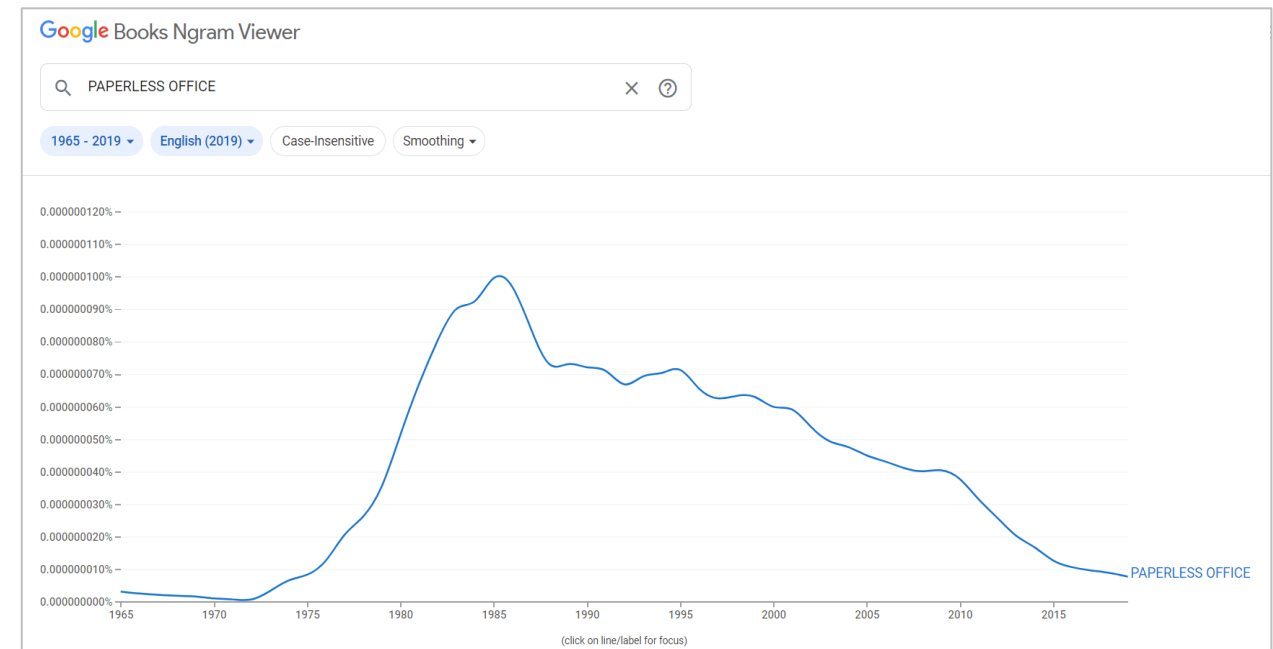
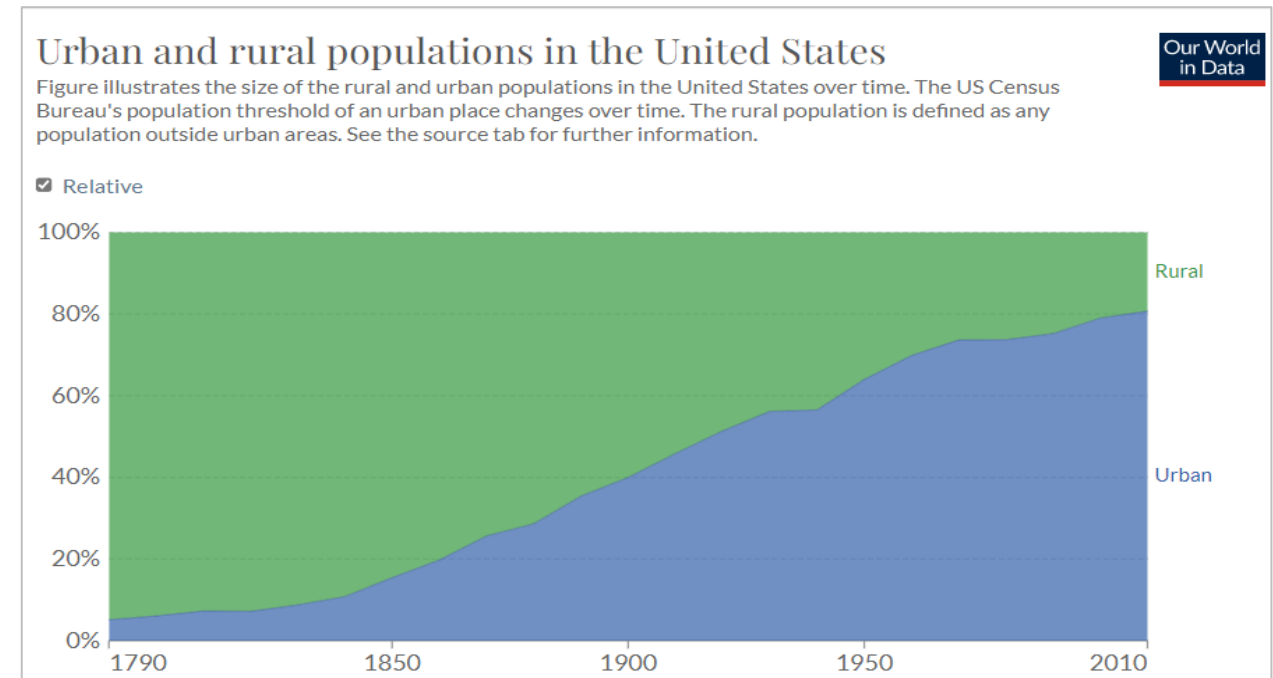
- Typical approaches synch economic growth and social/technology factors
- Growth = exogenous variables like migration
- Social/Tech = exogenous variables such as those to the right
- A key finding is that COVID-19 appears to have limited independent effect over the long term, but is linked to accelerating trends in virtual connectivity

| Element | Acceleration of Element Would Affect MWCOG Growth: | |
|--|---|--|
| | Pace | Pattern |
| Immigration (job producers) | More jobs/population, attracted from emigrant locale | No notable effect |
| Regional competitiveness: "one-company town" versus new markets (i.e., creative media) | More jobs/population associated with subject industry | Dependent on subject industry (i.e., Amazon HQ versus ecotourism) |
| Connected/Autonomous Vehicles (CAV) | None | Slight increase in sprawl |
| Virtual communications | None | Slight increase in sprawl |
| Mobility as a Service (MaaS) | None | Slight increase in compactness |
| COVID | Fewer jobs/population | Slight increase in sprawl |
| Inflation | Risk of boom/bust | Dependent on segments affected (i.e., real estate versus mobility costs) |
| Transit system unreliability | Fewer jobs/population | Slight increase in sprawl |

Way back-casting

There are some lessons learned from the 1918 Flu Pandemic:

- 675K deaths in US - about twice the rate of COVID (so far)
- Other societal issues:
 - The Great War
 - Birth / adolescence of zoning
 - New “travel” modes (streetcars, bikes, autos, telephones)
- Yet, urbanity continued – the key societal changes were related to “public health”
- With most upheavals, the SWOT at year zero changes by year 20+



Tasks

2

Estimated changes to commercial space use

3A

Developed a “range” of regional economic model forecasts

3B

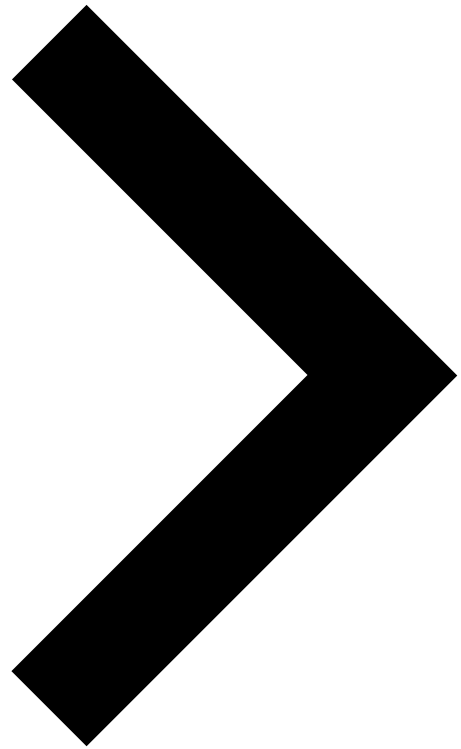
Assessed potential changes to future housing in the region

4

Projecting changes to future average household size

Process





Commercial Space Use

Research Findings

- Office space per worker (by square footage) will continue to decline in COG's Central Jurisdictions, and will likely accelerate due to remote work trends, which will decrease demand, need, and space requirements for offices
- If remote work trends continue, economic activity could shift towards mixed-use and university-based neighborhoods, and away from central business districts, which are imperiled due to high office vacancy rates, low office activity rates, and excess capacity of Class B and Class C office space
- The COVID-19 pandemic accelerated pre-existing retail and e-commerce shifts, such as divestment in brick-and-mortar locations, increases in home delivery, and smaller retail footprints
- Investments in resilient industries such as biotechnology and life sciences centers in suburban Maryland and data centers in Northern Virginia were reinforced throughout the pandemic.

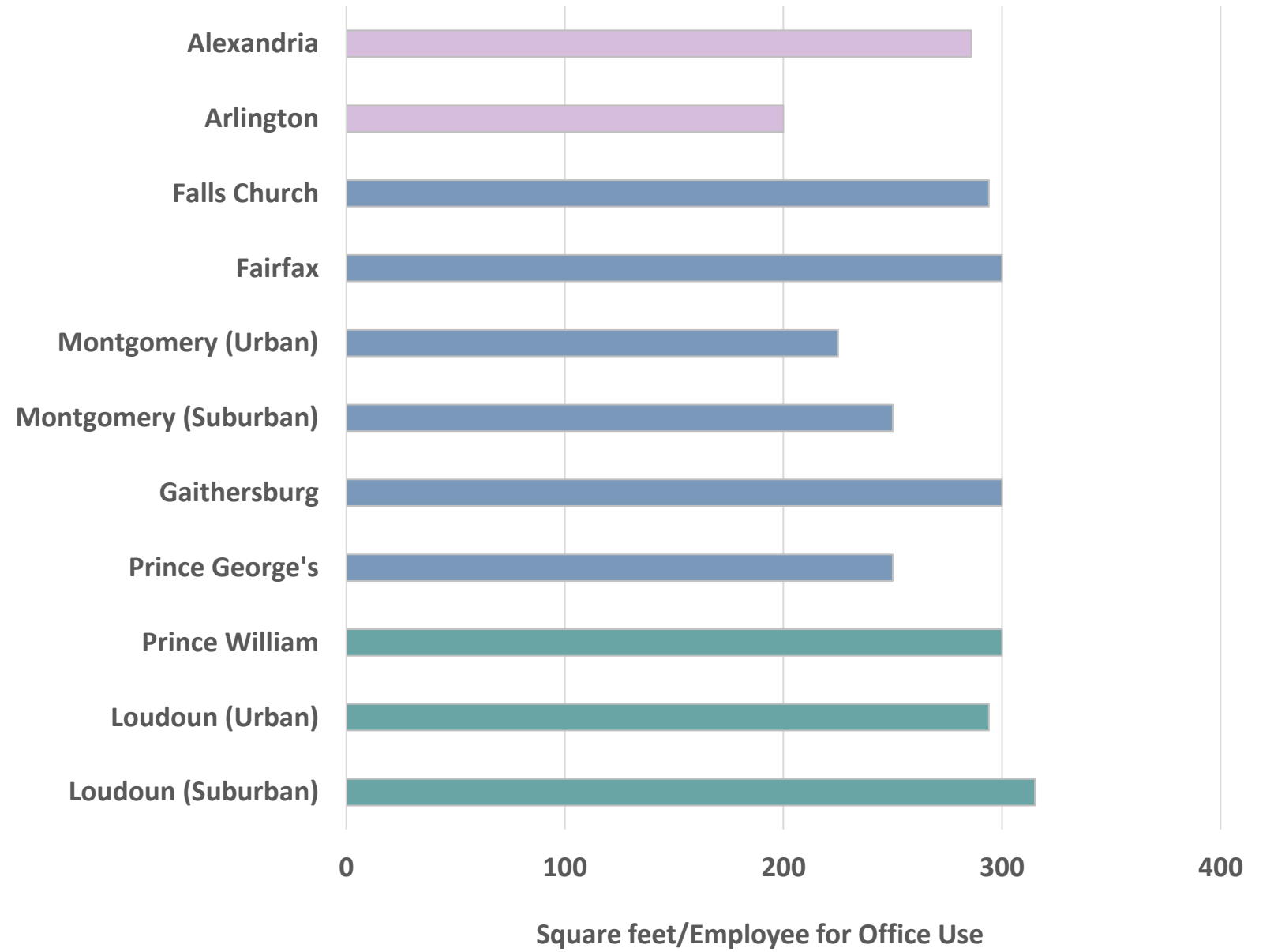
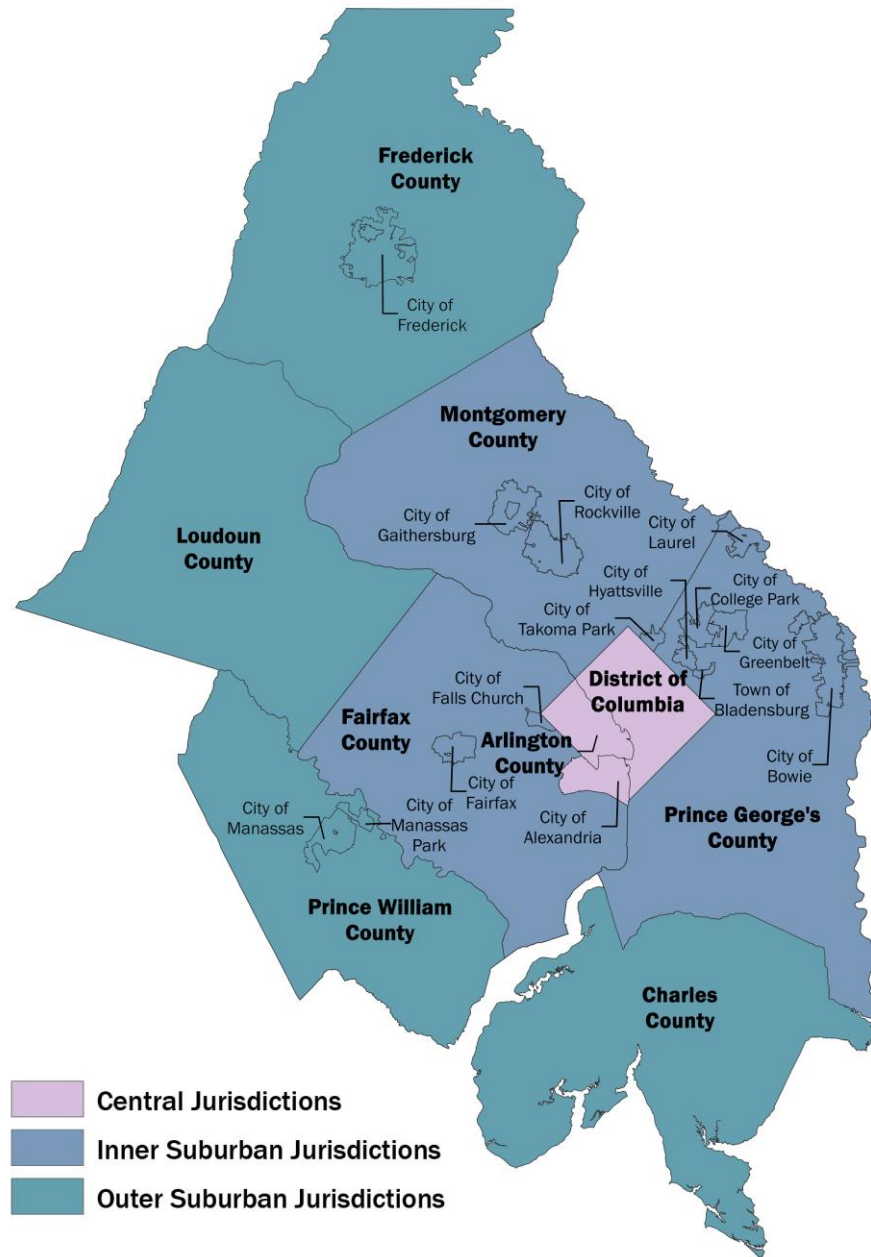
Interviews with Regional Experts

- Dr. Terry Clower, George Mason University Center for Regional Analysis
- Mina Wright and Eliza Voigt, U.S. General Services Administration
- Joe McAndrew, Greater Washington Partnership
- Deborah Kerson Bilek, Urban Land Institute - Washington

Interview Findings

- Hybrid/remote work policies are being adopted regionwide, representing the “new normal” and a permanent change to the workplace
- Office space will continue to decrease, but physical and programmatic uses of space will vary by sector and industry
- Federal agencies are focusing on employee “seats” instead of “population”, to maximize office space flexibility
- Unclear when and to what degree commuters will return to Metro
- Diverse, mixed-use communities are more attractive for economic activity and office workers, while single-use neighborhoods will struggle
- Expects fewer conferences and corporate travel, resulting in a slower recovery for the hospitality industries and lower hotel occupancy rates, short-term

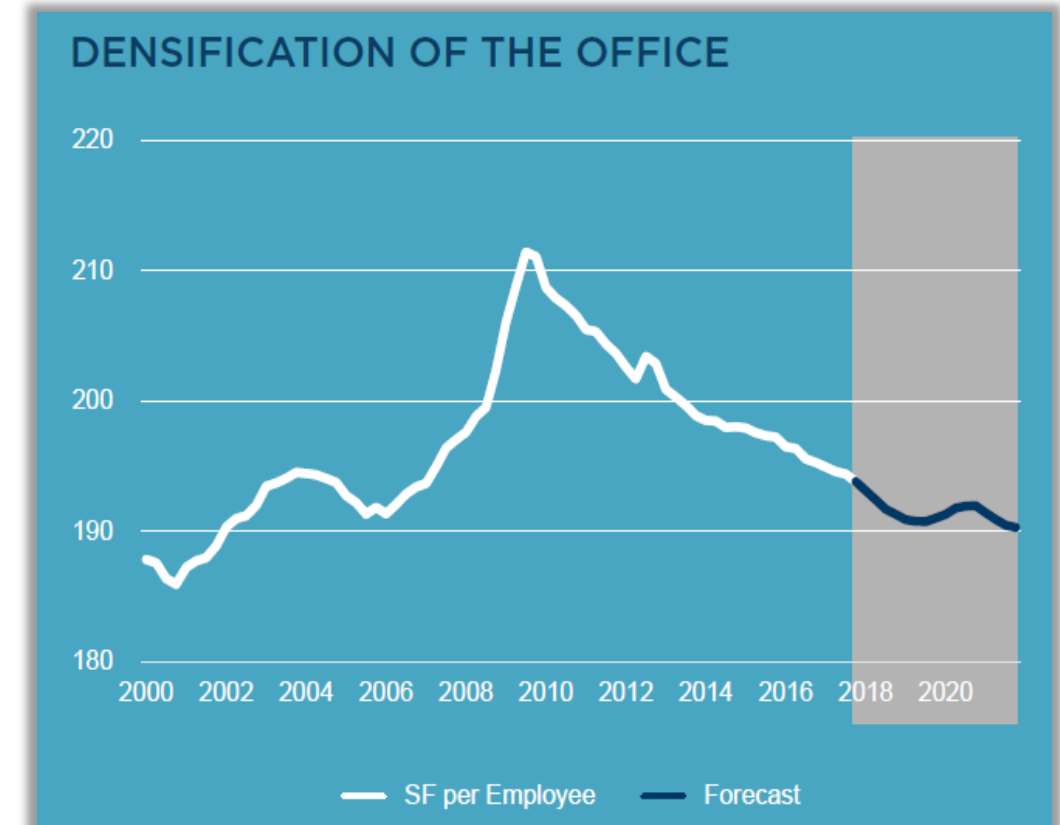
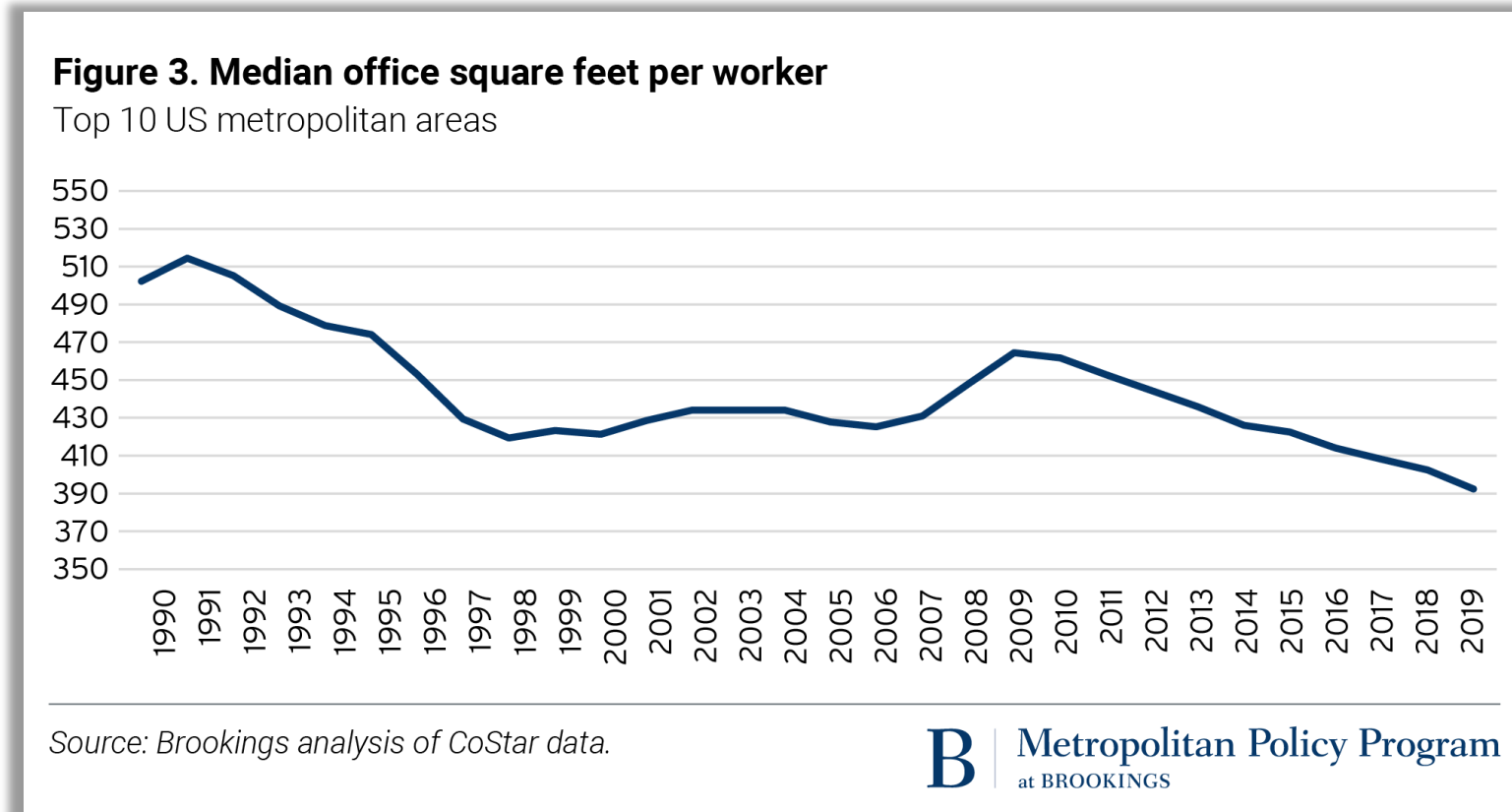
Regional Office Space Density



Data and office density definitions self-reported by COG members (Round 8, 2010)

Office Space Trends

- Knowledge industries are considering downsizing or reevaluating office space needs
- Coupled with the rise of remote work, office hoteling, and shared workspaces, square footage per worker is expected to further decrease after the COVID-19 pandemic

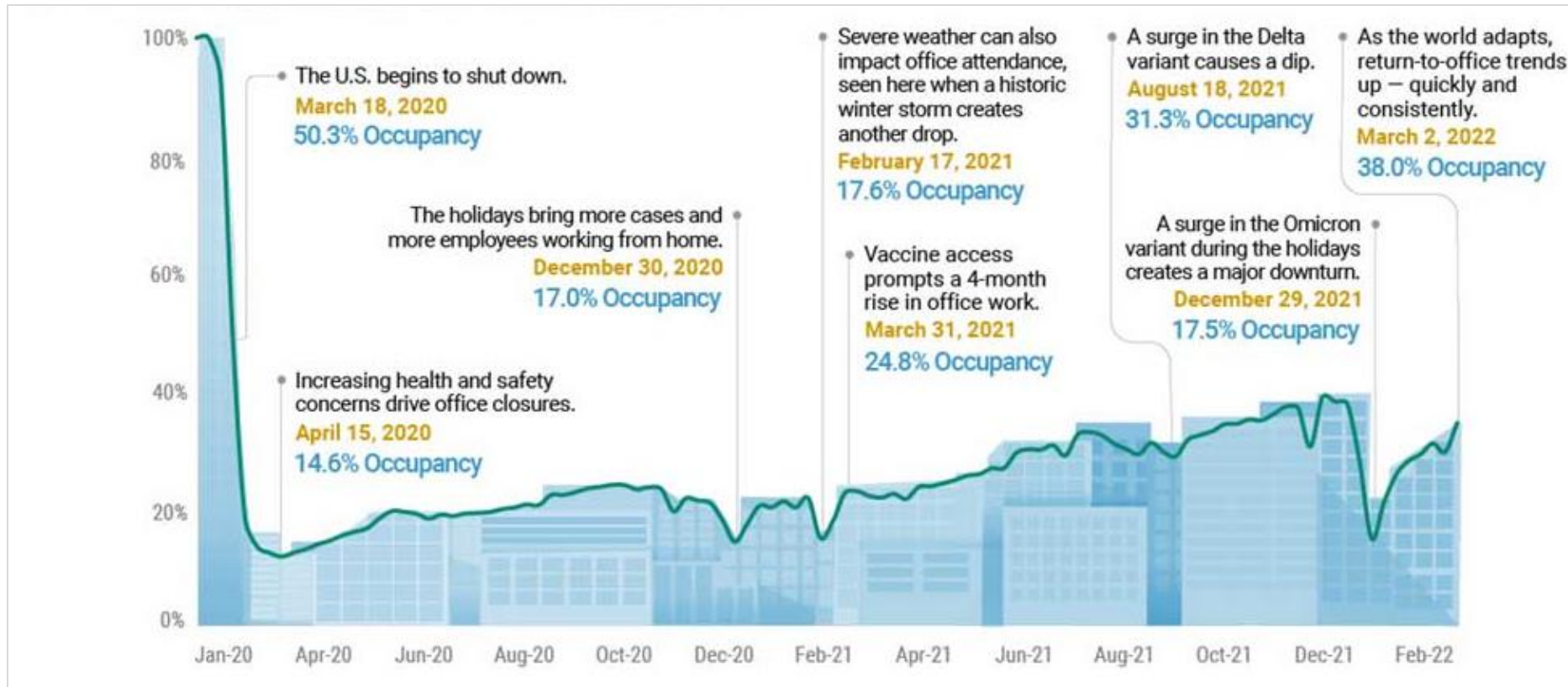


Cushman & Wakefield

Office Space Trends

- Broad consensus that remote/hybrid working arrangements will be a permanent change that will prompt long-term shifts in commuting and office space utilization
- Coworking/sharing office trends are continuing
- Shifting of economic activity to mixed-use and university-based neighborhoods

Return to Office



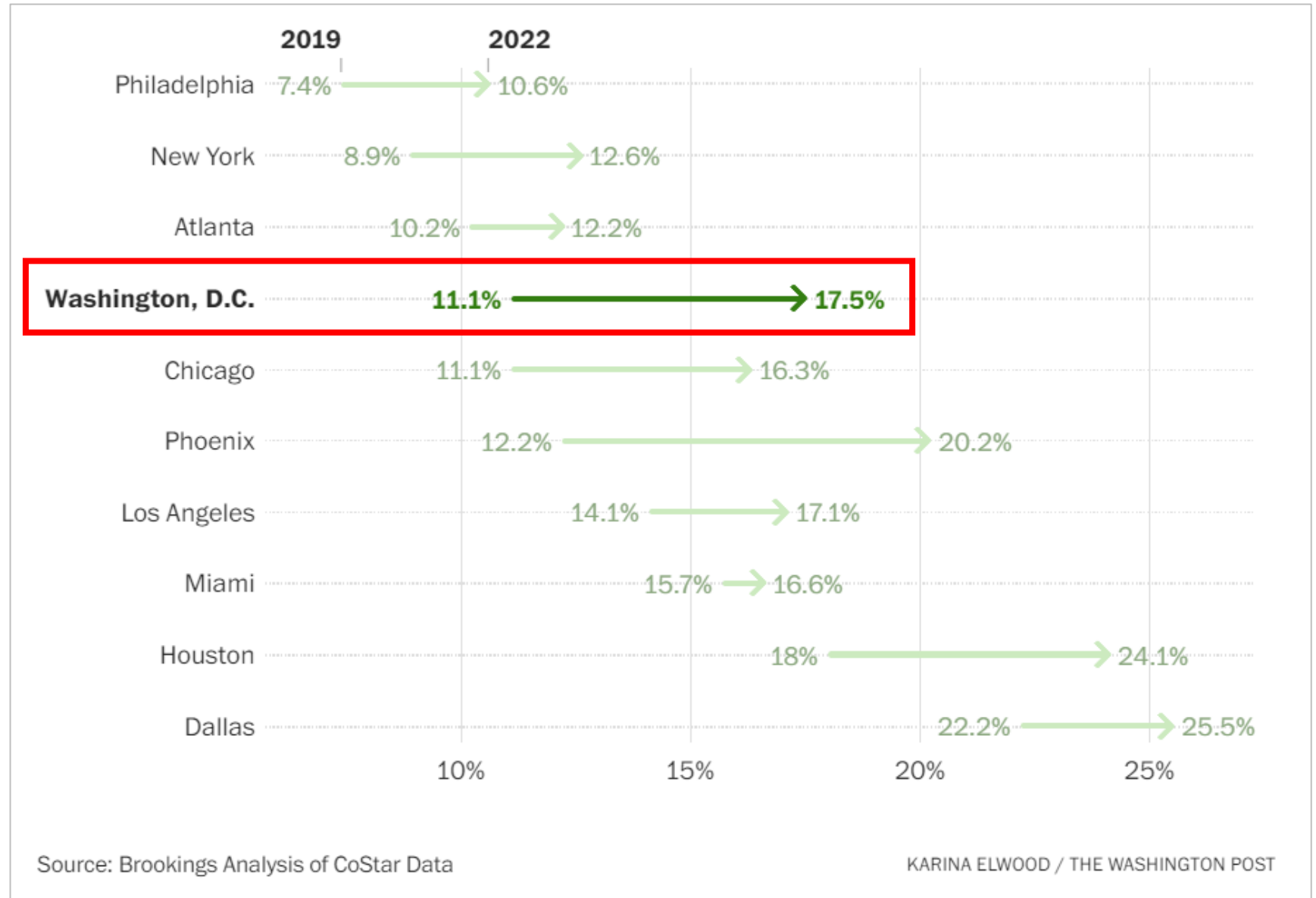
Weekday office activity/building access relative to 2019

| | 5/25/22 | 6/1/22 | % Change |
|-----------------------|--------------|--------------|---------------|
| Chicago metro | 40.0% | 37.2% | 2.7% ▼ |
| Austin metro | 58.5% | 56.1% | 2.4% ▼ |
| Houston metro | 56.0% | 53.8% | 2.1% ▼ |
| San Francisco metro | 33.6% | 31.6% | 2.0% ▼ |
| Washington D.C. metro | 39.1% | 37.3% | 1.8% ▼ |
| San Jose metro | 33.9% | 32.1% | 1.8% ▼ |
| Average of 10 | 42.9% | 41.2% | 1.7% ▼ |
| Philadelphia metro | 38.1% | 36.7% | 1.4% ▼ |
| New York metro | 38.0% | 36.6% | 1.4% ▼ |
| Dallas metro | 51.3% | 50.2% | 1.1% ▼ |
| Los Angeles metro | 41.0% | 40.5% | 0.5% ▼ |

Office activity calculated based on app, keycard, and fob usage

Impact on Central Business District

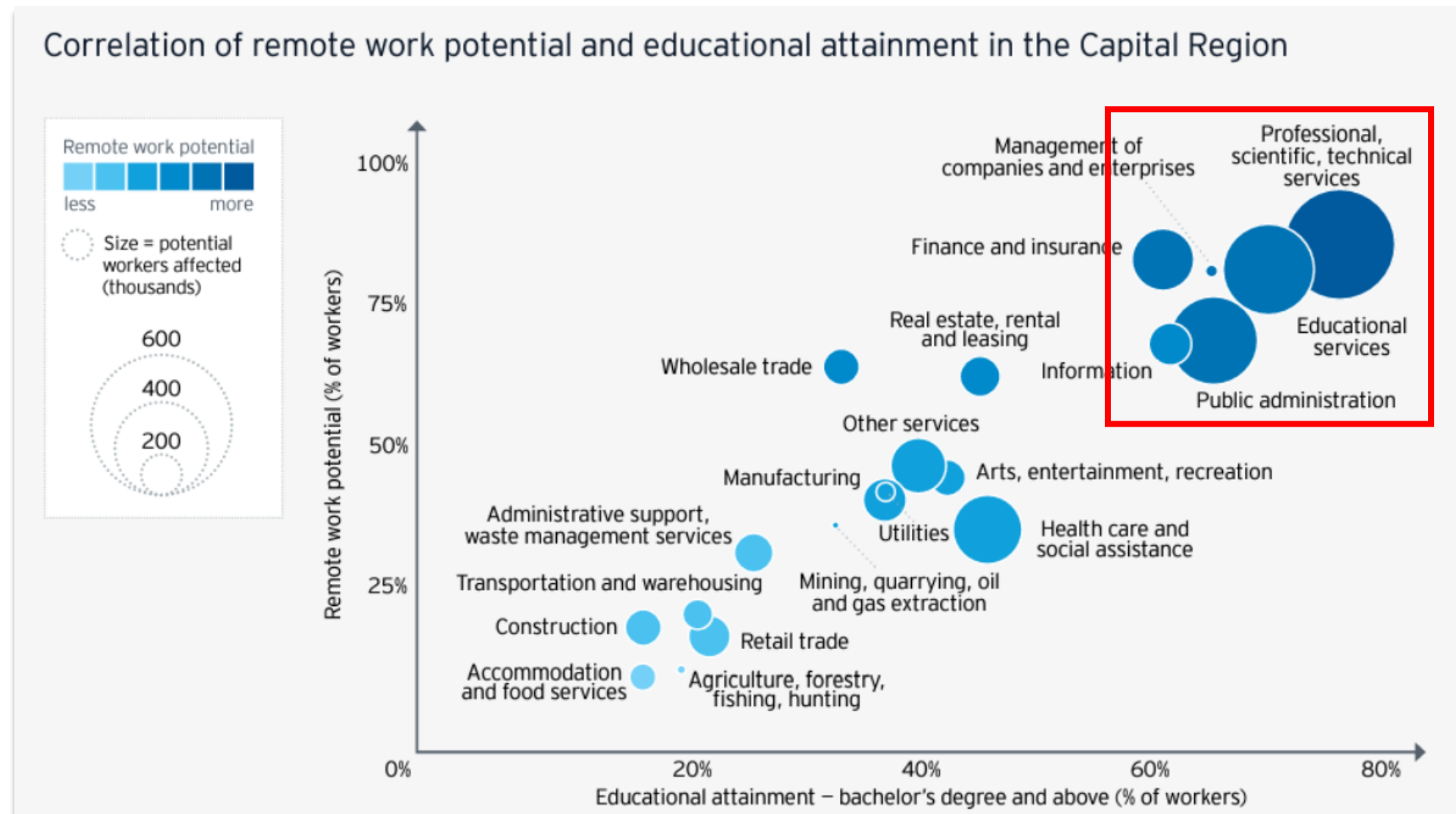
- Office vacancy rates increased in CBDs nationwide
- 6.4% increase in D.C. from 2019 to 2022
- Potential for office-to-residential conversions (2.3M SF being targeted as of 2021)



CBD Office vacancy rates (2019-2022)

Remote-Work Potential

- Significant remote-work potential exists among the region's highly-educated work force and primary industries (scientific and technical services, FIRE)

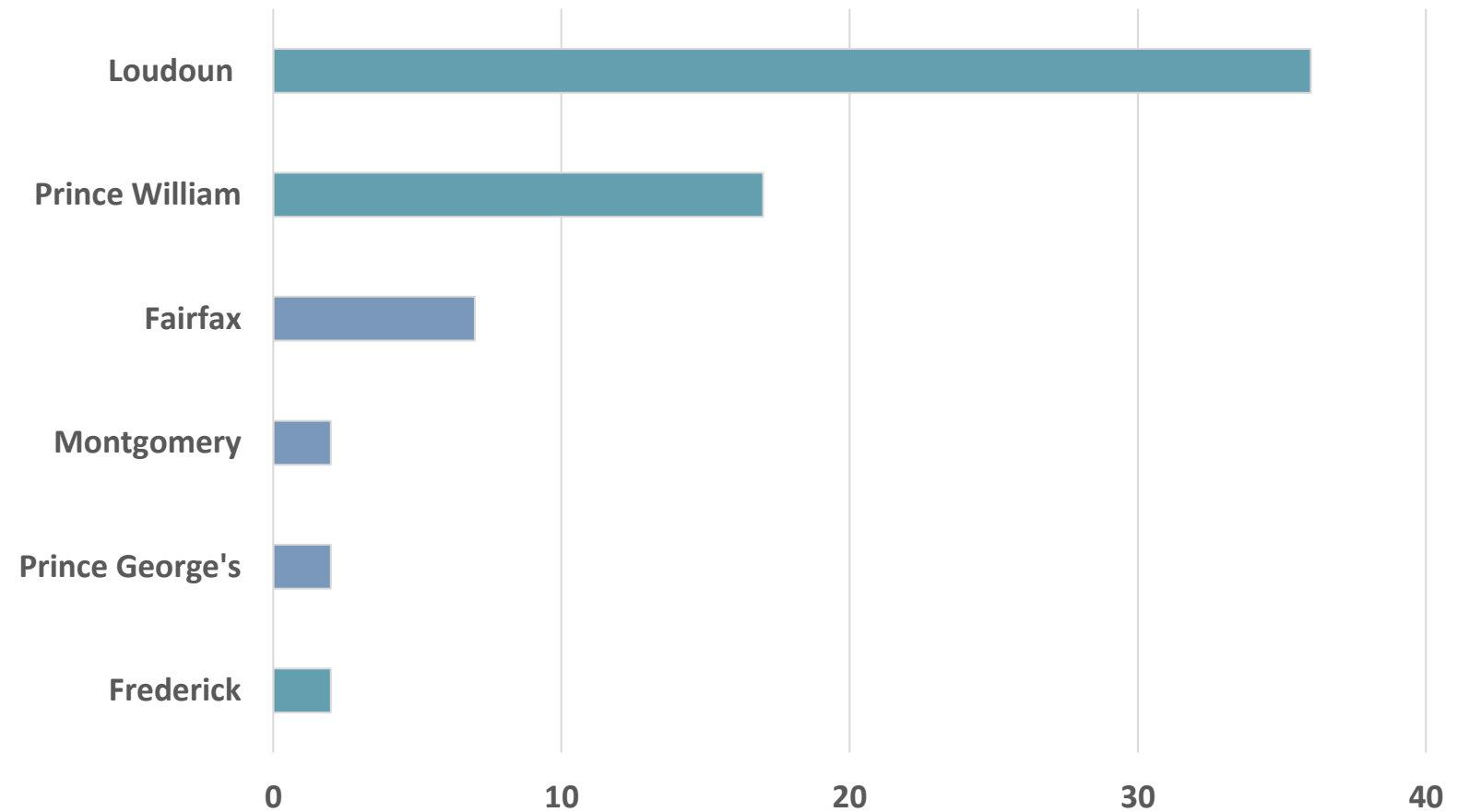


Industries that have historically driven the region's economy



Data Centers

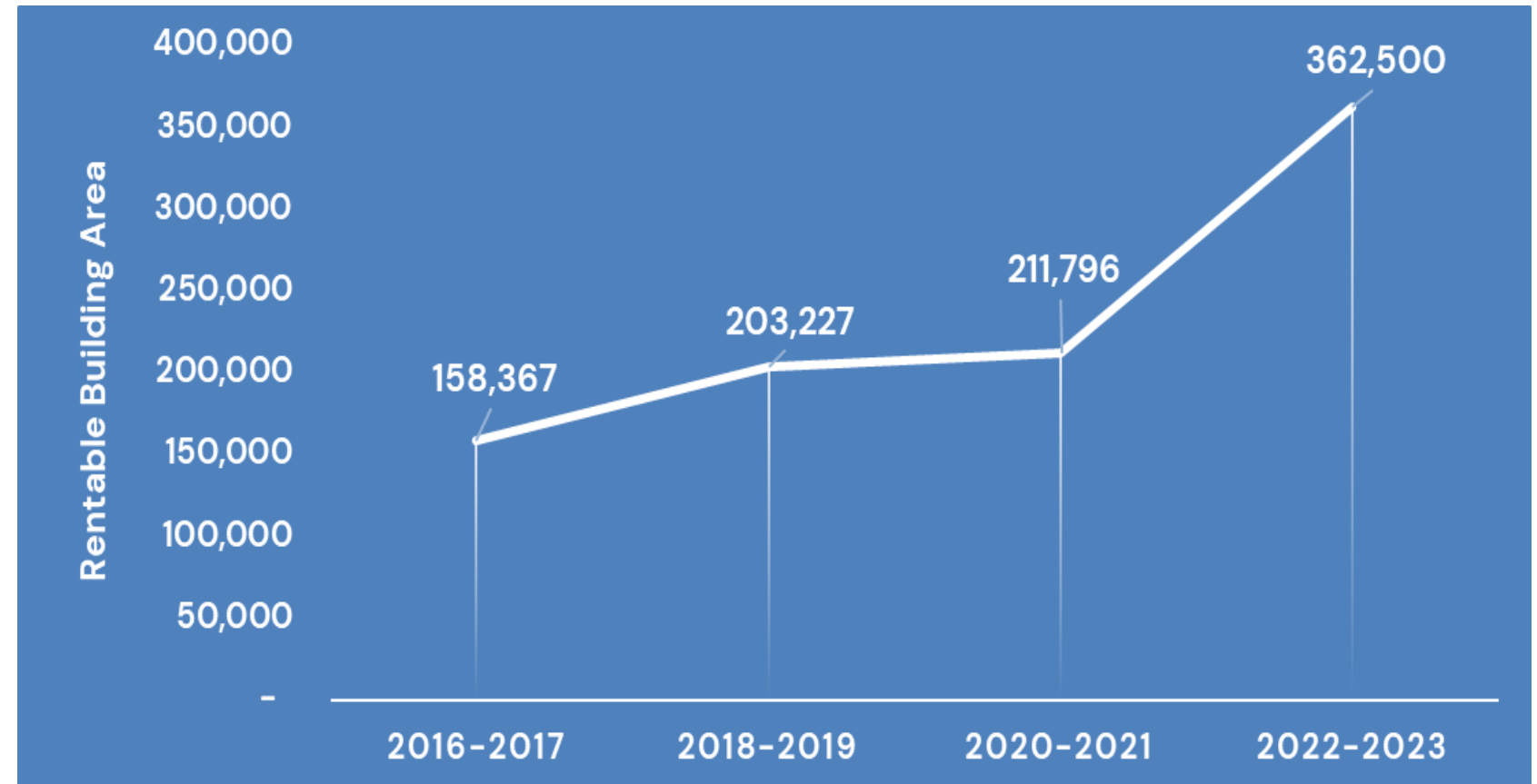
- Northern Virginia is the largest global data center market
- Minimal job creation, significant tax revenues
- Require access to fiber optic trunk lines and sustained power delivery
- 29 data centers constructed (or planned) since 2016



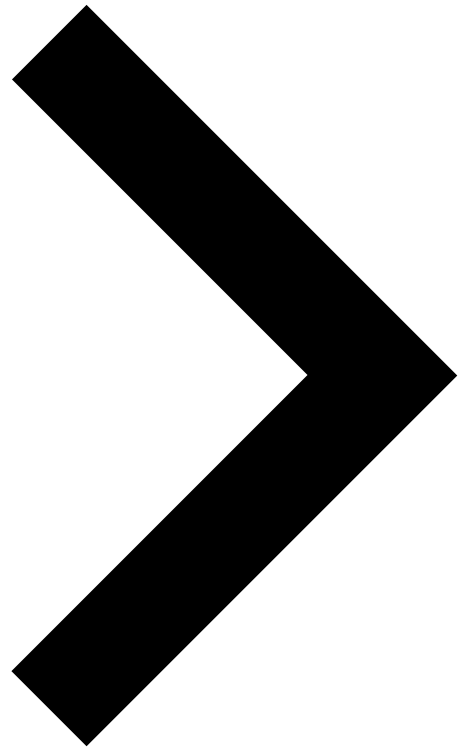
Location of data centers in the Washington Region (1974-2023)

Data Centers

- Average size of data centers in the region has doubled since 2016
- Multilevel data centers becoming more common in Loudoun County
- Data center workforce typically ranges from 20-50



Average SF/data center constructed in the Washington region (2016-2023)



Economic Model Forecasts

Conclusions/findings

- Literature is rich on “looking backward” at the first two years of COVID and “looking forward” on philosophy and stated preferences, but not on quantitative forecasts
- Primary effect of COVID is “delay of growth” by two to three years of recovery
- Technology may cause a small redistribution of population from core to exurb (up to -7% in core; +1% for exurbs)

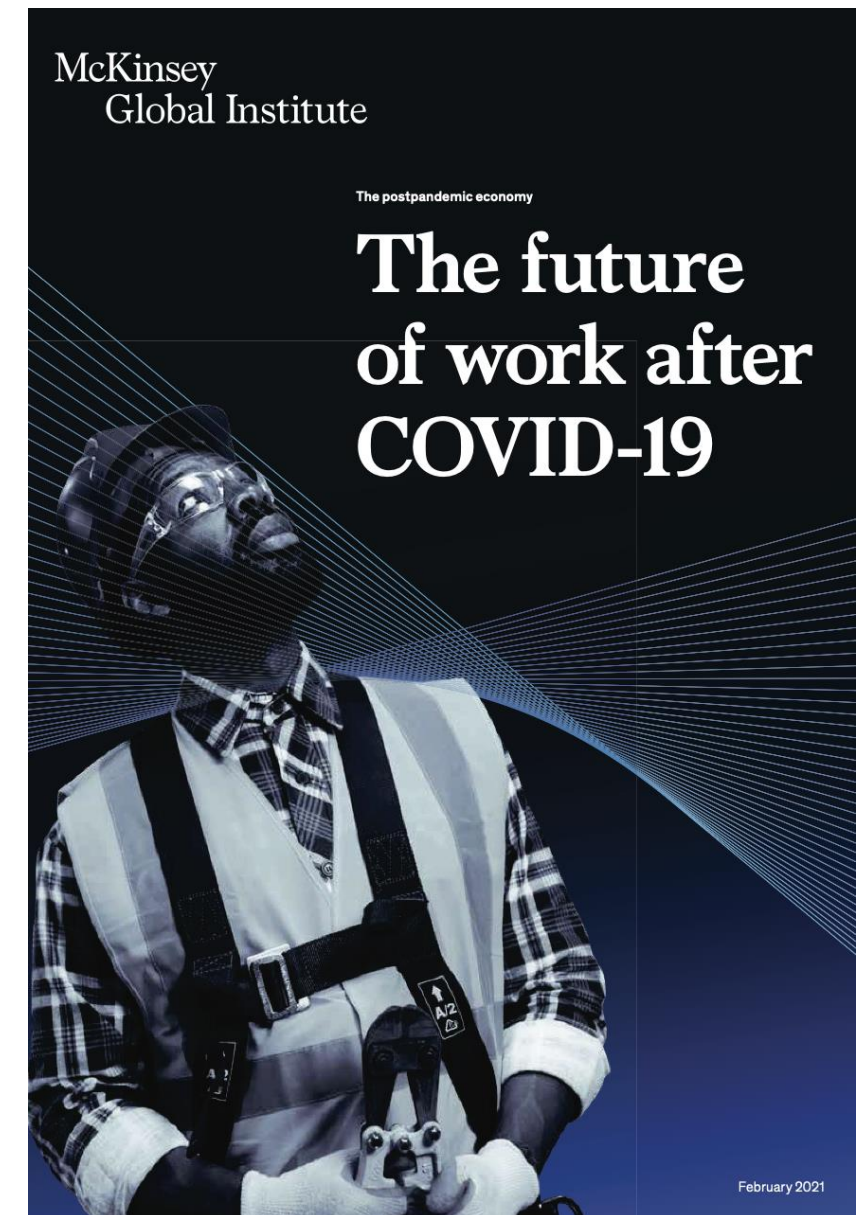


Task 3A. Economic Model Forecasts

Task 3B. Regional Housing Changes

Supporting info

- Literature review
- Evolution of third-party forecasts
 - S&P Global
 - MD/VA state population forecasts
- Independent analyses
 - Monte Carlo approach
 - Value of Time approach
- Conclusions



Task 3A. Economic Model Forecasts

Task 3B. Regional Housing Changes

Literature review

Three basic categories

- “Looking backward” – what changed during the pandemic?
- “Looking forward qualitatively” – what types of changes might be expected?
- “Looking forward quantitatively” – what is the direction and magnitude of change?

The first two categories are well-covered and summarized as a sort of a meta-analysis approach.

The third category is sparse: national-level assessments and two more granular studies reported on.



Task 3A. Literature

Task 3B. Literature

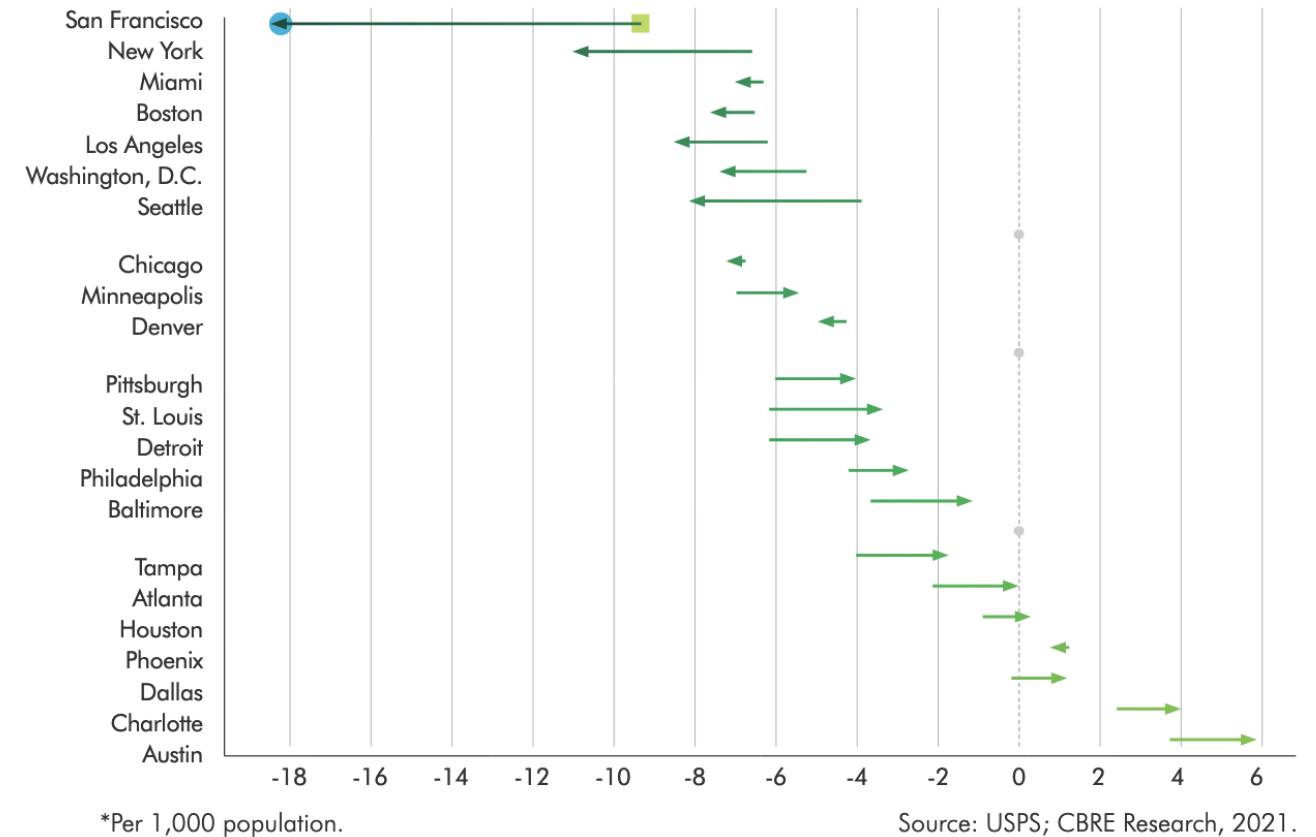
Literature review: Category 1. Looking backward

Looking Backward

- The pandemic was disruptive and influenced shifts in both employment and residency
- Population shifted at least temporarily from large/dense/costly metro areas to less dense places
- 2020 versus 2019 effect, though was small (CBRE example showed < 1% change in trends everywhere examined but San Francisco).

FIGURE 2 | NET MOVES, 2020 VS. 2019*

● 2020 Net Moves per 1,000 Population ■ 2019 Net Moves per 1,000 Population



Literature review: Category 2. Looking forward qualitatively

Key takeaways

- Stated preference surveys indicate some trends such as market penetration for autonomous vehicles or eligibility for telework
- Many academic papers from notable authors (i.e., Ewing, Florida) outline expected dynamics and potential policy responses but do not attempt to predict results of the dynamics

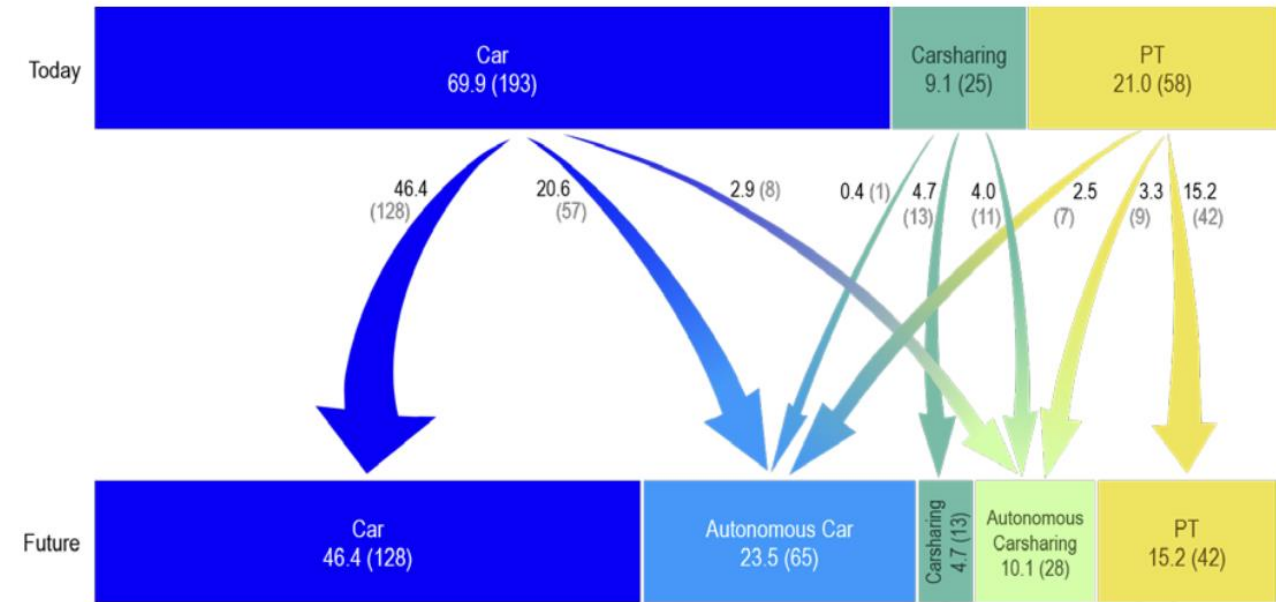


Figure 2. User's preference migration.

Unintended Effects of Autonomous Driving: A Study on Mobility Preferences in the Future

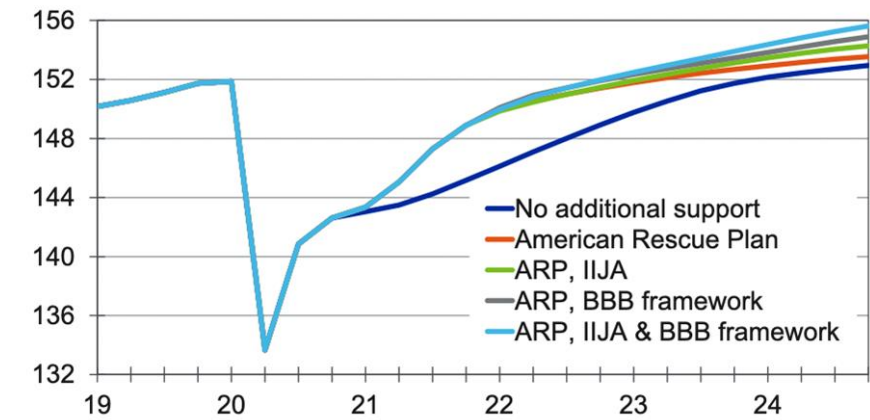
Literature review: Category 3. Looking forward quantitatively

National Perspective

- In the near term (3 – 5 years) growth will rebound; we'll lose a couple years of progress almost regardless of federal spending
- In the longer term, however, sustained economic growth will be affected by levels of deficit spending in the near term (Per CBO; Scenario 1 no deficit spending, Scenario 2 has deficit spending)

Chart 2: Employment Gets a Boost...

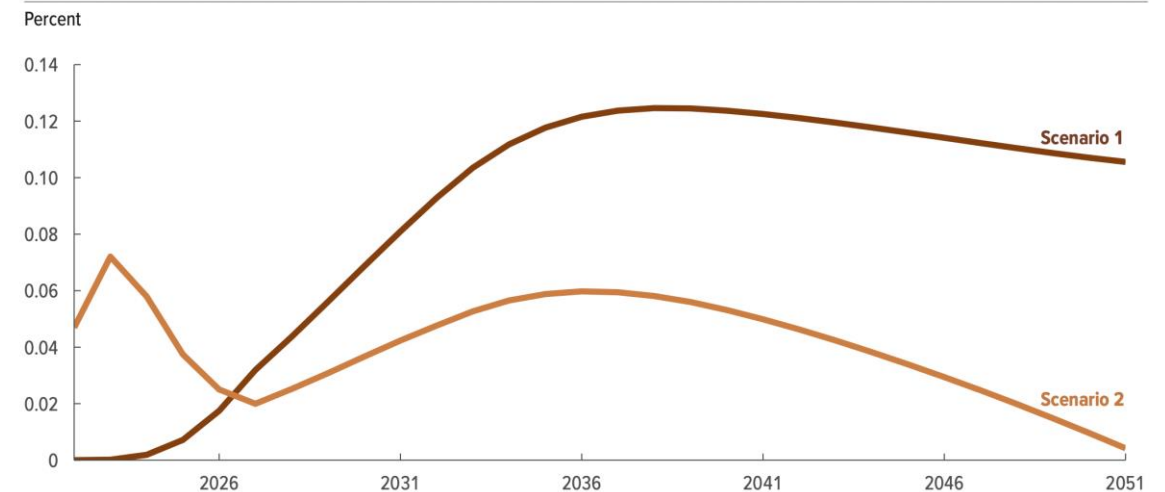
Nonfarm employment under different policy scenarios, mil



Sources: BLS, Moody's Analytics

Figure 1.

Increases in the Level of Real GDP



Task 3A. Literature

Task 3B. Literature

Literature review: Category 3. Looking forward quantitatively

First of two notable studies at a more granular level:

- NBER study 2022 examines CBDs other metro counties to develop a theoretical framework of effects on prototypical metro area with a CBD, a Zone 1 in the same county as the CBD, and a Zone 2 reflecting other counties
- A fourfold increase in WFH from pre-pandemic levels a given
- Testing for location/pricing: CBD office rents down ~10%, non-CBD housing prices up
- Marginal shifts in **home location (0% to 4%)**

Table 6: Model Prediction for Distribution of Incomes and Population

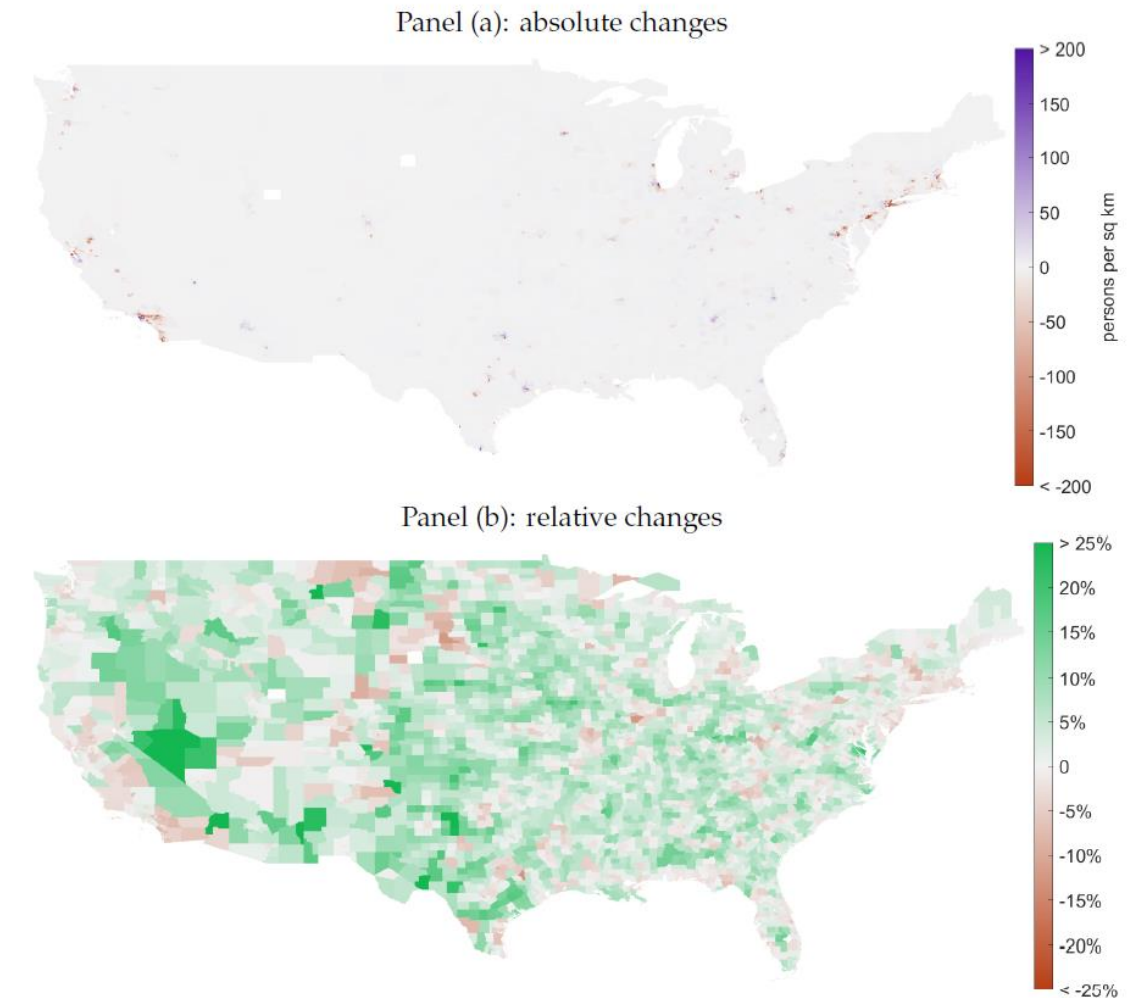
| Row | | Pre-COVID | Post-COVID Scenarios | | |
|-----------------------------|---|-----------------|----------------------|------------|-----------------------------|
| | | Baseline (1) | SR (2) | LR (3) | LR Putty-Clay (4) |
| <i>Technology:</i> | | | | | |
| (1) | A_1^h/A_1^l | 0.365 | 0.665 | 0.666 | 0.665 |
| (2) | A_2^h/A_2^l | 0.348 | 0.515 | 0.515 | 0.515 |
| (3) | A_1^l | 9330 | 9254 | 9241 | 9245 |
| <i>Incomes:</i> | | | | | |
| (4) | Type 1 avg. ann. income per worker | \$ 108,862 | \$ 141,424 | \$ 144,440 | \$ 146,114 |
| (5) | Type 2 avg. ann. income per worker | \$ 77,776 | \$ 84,921 | \$ 85,302 | \$ 86,685 |
| (6) | Type 3 avg. ann. income per worker | \$ 93,135 | \$ 94,170 | \$ 91,804 | \$ 94,184 |
| (7) | Type 4 avg. ann. income per worker | \$ 60,176 | \$ 61,630 | \$ 60,176 | \$ 61,688 |
| (8) | High-skill avg. ann. income per worker | \$ 103,620 | \$ 125,673 | \$ 126,894 | \$ 128,804 |
| (9) | Low-skill avg. ann. income per worker | \$ 64,486 | \$ 67,334 | \$ 66,329 | \$ 67,810 |
| (10) | Ratio of high-skill to low-skill Income | 1.61 | 1.87 | 1.91 | 1.90 |
| <i>Consumption:</i> | | | | | |
| (11) | Type 1 avg. non-housing consumption | \$ 80,664 | \$ 94,557 | \$ 95,170 | \$ 96,721 |
| (12) | Type 2 avg. non-housing consumption | \$ 48,463 | \$ 50,634 | \$ 50,038 | \$ 51,125 |
| (13) | Type 3 avg. non-housing consumption | \$ 71,074 | \$ 71,925 | \$ 70,010 | \$ 71,902 |
| (14) | Type 4 avg. non-housing consumption | \$ 37,457 | \$ 38,468 | \$ 37,457 | \$ 38,459 |
| (15) | High-skill avg. non-housing consumption | \$ 77,467 | \$ 87,013 | \$ 86,784 | \$ 88,448 |
| (16) | Low-skill avg. non-housing consumption | \$ 40,152 | \$ 41,447 | \$ 40,538 | \$ 41,561 |
| (17) | Ratio of high-skill to low-skill avg. consumption | 1.93 | 2.10 | 2.14 | 2.13 |
| <i>Population Location:</i> | | | | | |
| (18) | Total high-skill | 51.0% | 51.0% | 51.0% | 51.0% |
| (19) | Living in Zone 1 | 35.6% | 34.0% | 32.0% | 32.0% |
| (20) | Living in Zone 2 | 64.4% | 66.0% | 68.0% | 68.0% |
| (21) | Total low-skill | 49.0% | 49.0% | 49.0% | 49.0% |
| (22) | Living in Zone 1 | 34.8% | 36.5% | 34.2% | 34.1% |
| (23) | Living in Zone 2 | 65.2% | 63.5% | 65.8% | 65.9% |

Literature review: Category 3. Looking forward quantitatively

Second notable study at a more granular level:

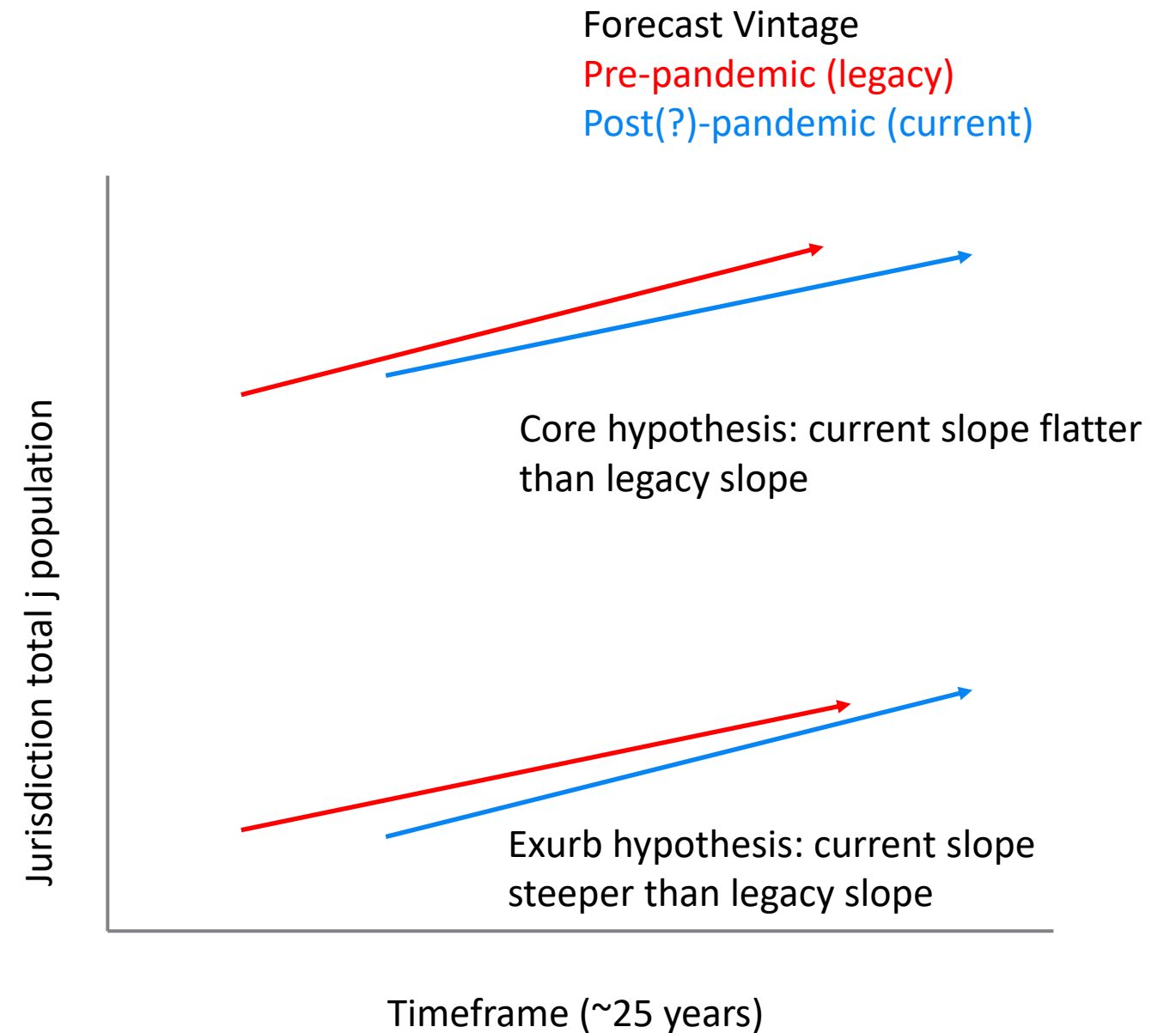
- Delventhal/Parkhomenko study forecasts changes in population/jobs due to removing telework “aversion” among employees and firms
- Conclusion is nationally about 0.8 more days/week of telework (1.1 for college grads, 0.6 for others)
- PUMS-level database online
- Results generally comparable to Value of Time analysis (in next section):
 - D/P study includes job shifts; large metros attract jobs if agglomeration outpaces cost
 - D/P study considers metro overlaps

Figure I.2: Density of residents



Third Party Forecast evolution

- If the pandemic is believed to meaningfully affect the pace and pattern of growth, it should show up in forecasts from groups who routinely prepare them.
- Comparison of pre-pandemic and post(?) - pandemic sources:
 - S&P Global (aka IHS Markit)
 - Maryland Department of Planning (population only)
 - Virginia Weldon-Cooper Center (population only)
- None of the sources support the hypothesis that the pandemic has accelerated expectations for sprawl



Third Party Forecast evolution

For S&P Global population and employment forecasts for the MWCOCG region:

- Employment forecast growth rates are lower for all types of jurisdictions
- The core and inner suburbs are more attractive, relative to the rest of the region for both population and jobs

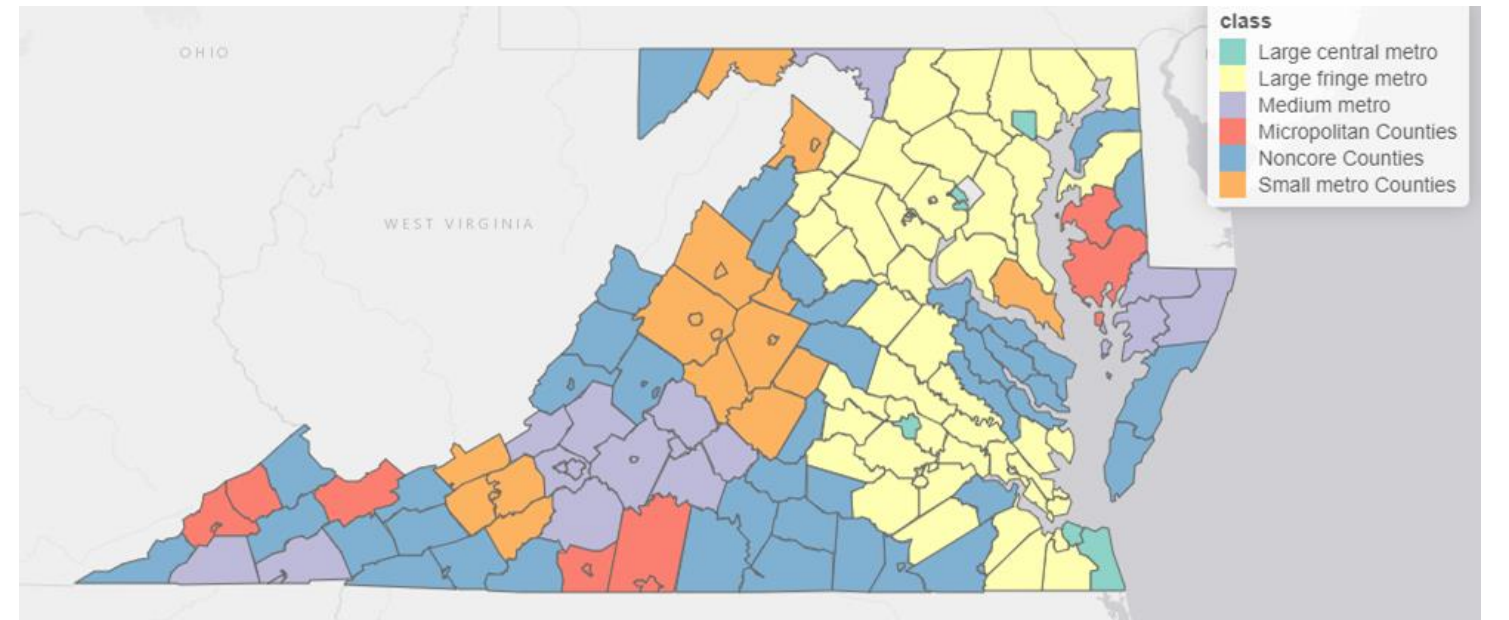
| | Average Annual Growth Rate - S&P Global | | | | | |
|-------|---|-------|--------|------------|-------|--------|
| | Population | | | Employment | | |
| | 2015 | 2022 | Change | 2015 | 2022 | Change |
| Core | 0.26% | 0.39% | 0.13% | 0.58% | 0.56% | -0.02% |
| Inner | 0.26% | 0.34% | 0.08% | 0.65% | 0.57% | -0.08% |
| Outer | 2.27% | 1.47% | -0.80% | 2.58% | 1.46% | -1.12% |
| Exurb | 0.94% | 0.63% | -0.31% | 1.20% | 0.70% | -0.50% |

Third Party Forecast evolution

For Maryland and Virginia population forecasts:

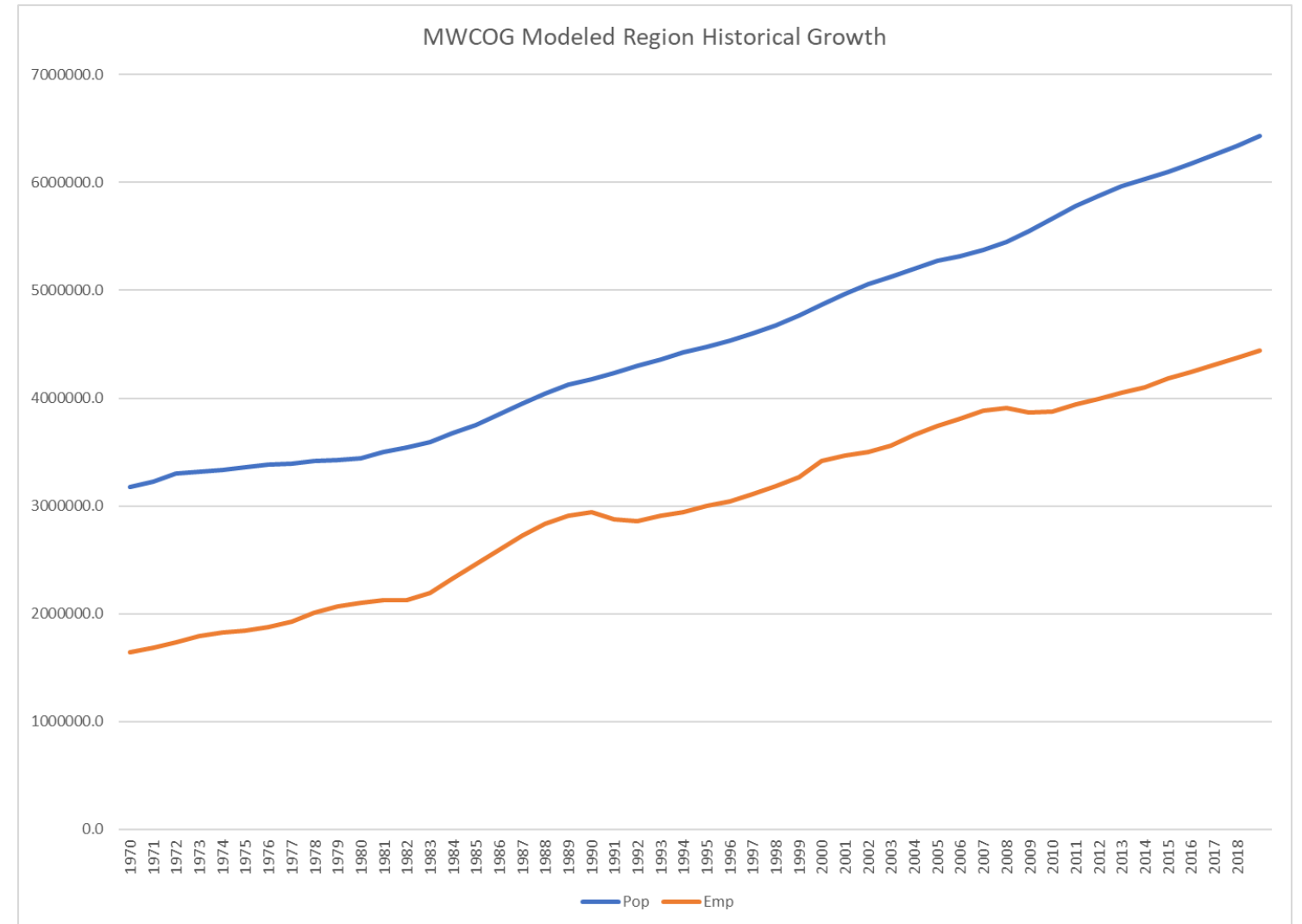
- Both states have lower AAGRs in current forecasts than in legacy forecasts
- Neither state suggests large metro counties (center or fringe) will grow faster than other, more rural locations

| County Class (CDC) | Weldon Cooper AAGR | | | MDP AAGR | | |
|-----------------------|--------------------|----------------|--------|---------------|----------------|--------|
| | Legacy (2017) | Current (2021) | Change | Legacy (2018) | Current (2020) | Change |
| Large central metro | 0.51% | 0.42% | -0.09% | 0.15% | 0.05% | -0.10% |
| Large fringe metro | 1.17% | 1.04% | -0.13% | 0.55% | 0.52% | -0.03% |
| Medium metro | 0.43% | 0.30% | -0.14% | 0.92% | 0.78% | -0.15% |
| Micropolitan Counties | -0.45% | -0.66% | -0.20% | 0.62% | 0.47% | -0.15% |
| Noncore Counties | 0.08% | -0.08% | -0.16% | 0.74% | 0.64% | -0.10% |
| Small metro Counties | 0.86% | 0.75% | -0.11% | 0.98% | 0.80% | -0.18% |



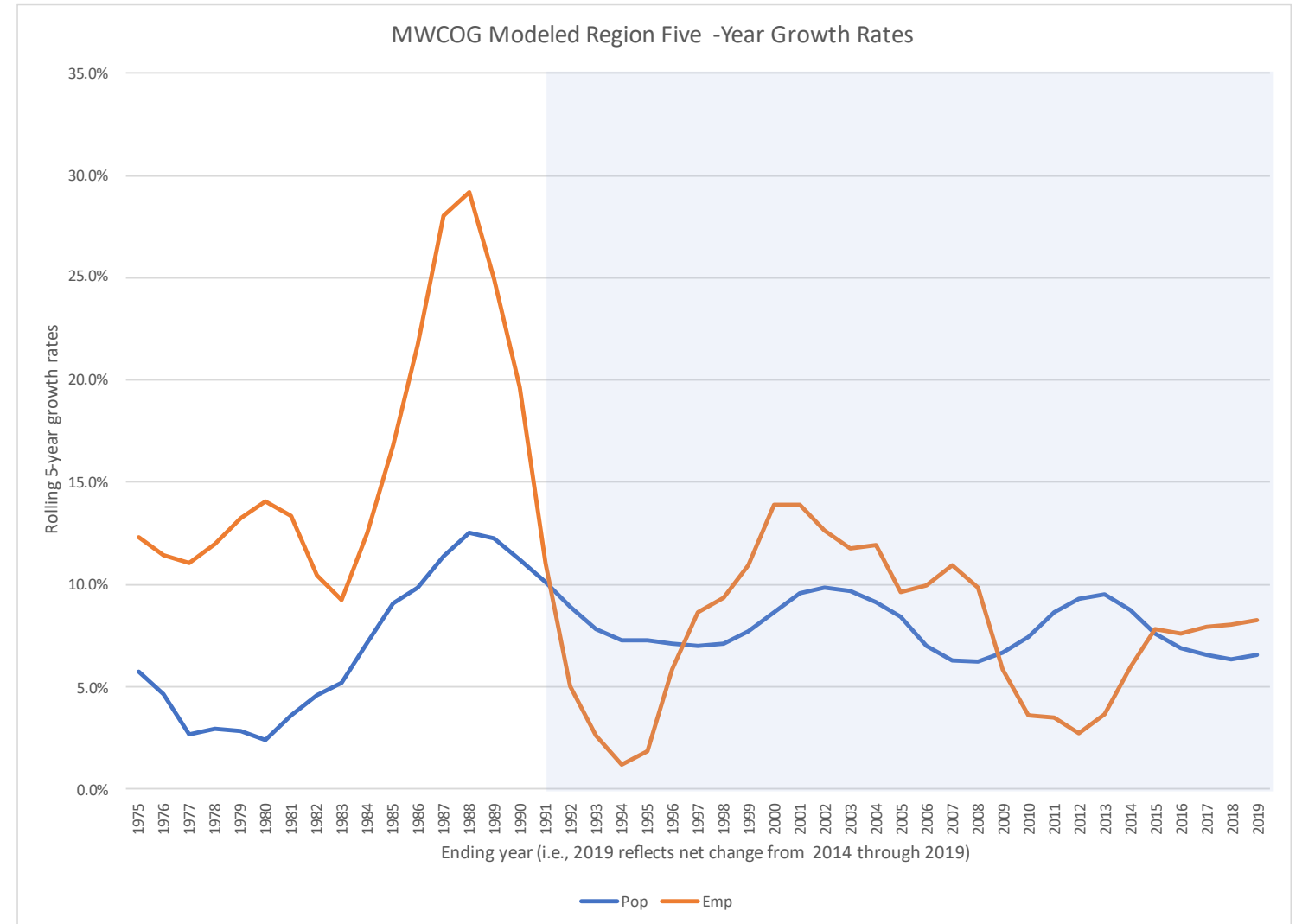
Monte Carlo approach

- Historic growth trends show steady growth; recessions affect jobs more than population
- A Monte Carlo simulation can provide a sense of variation associated with economic uncertainty
- What if the exogenous changes affecting regional growth over the past 25 years were randomized?



Monte Carlo approach

- Rolling 5-year growth rates since 1986 show stabilizing patterns (compared to earlier outlier jobs growth)
- Again, job growth has greater variability than population growth



Monte Carlo approach

- Re-organizing the growth from chronological to percentile facilitates Monte Carlo simulation
- For a 30-year forecast, each of six 5-year periods can be assigned a randomly selected growth rate (each line at right has a 5% chance of occurring in any period)
- The simulation was run 1,000 times to develop a range of forecasts

MWCOG Region
Based on 1986-1991 onward

POPULATION DISTRIBUTION
INPUT

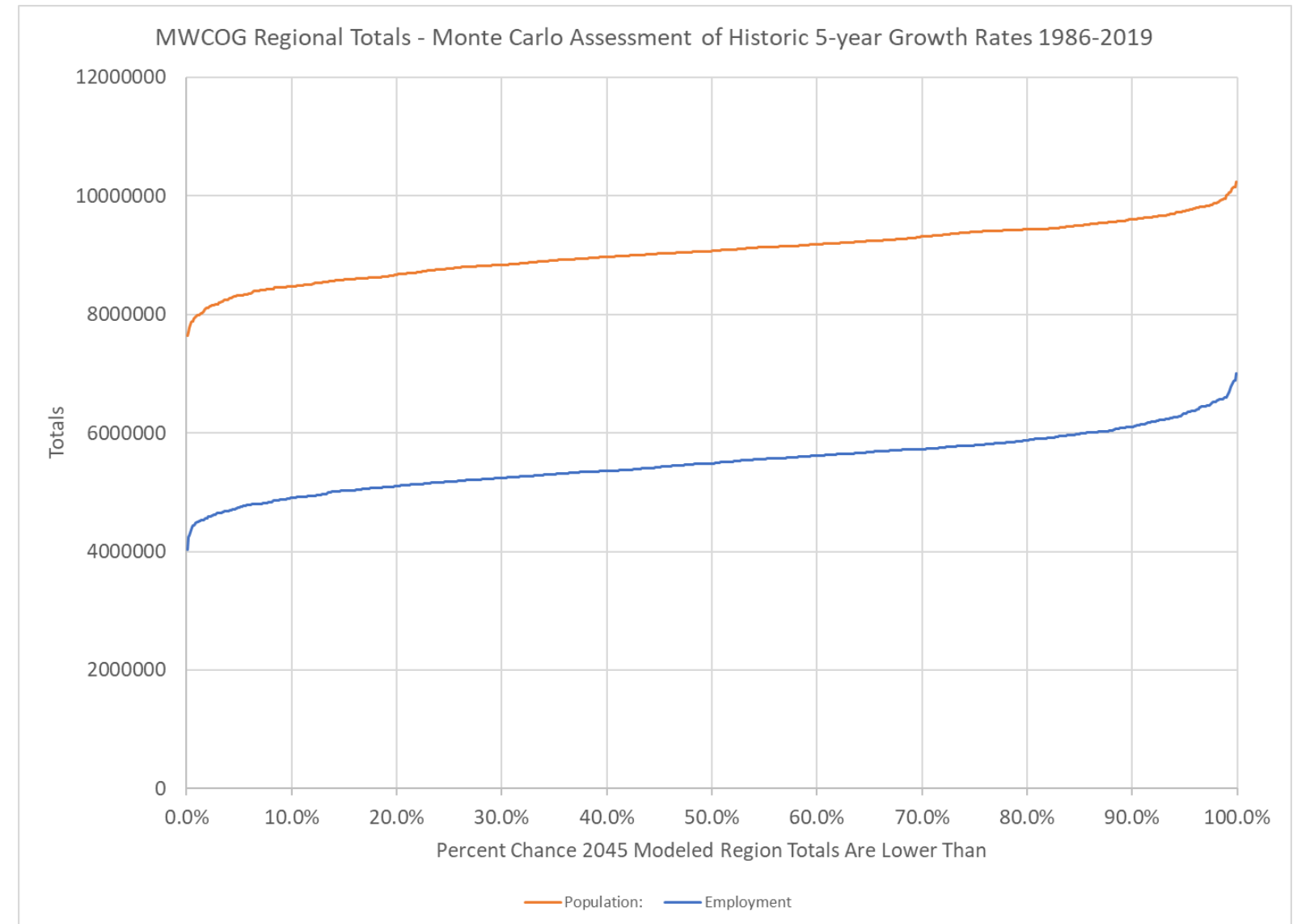
| Percentile | 5-year growth |
|------------|---------------|
| 5% | 6.3% |
| 10% | 6.6% |
| 15% | 6.9% |
| 20% | 7.0% |
| 25% | 7.1% |
| 30% | 7.1% |
| 35% | 7.3% |
| 40% | 7.4% |
| 45% | 7.6% |
| 50% | 7.8% |
| 55% | 8.3% |
| 60% | 8.6% |
| 65% | 8.7% |
| 70% | 8.9% |
| 75% | 9.2% |
| 80% | 9.4% |
| 85% | 9.6% |
| 90% | 9.7% |
| 95% | 10.0% |

EMPLOYMENT DISTRIBUTION
INPUT

| Dist | 5-year growth |
|------|---------------|
| 5% | 1.4% |
| 10% | 2.4% |
| 15% | 2.8% |
| 20% | 3.5% |
| 25% | 3.6% |
| 30% | 5.1% |
| 35% | 5.8% |
| 40% | 5.9% |
| 45% | 7.6% |
| 50% | 8.3% |
| 55% | 9.3% |
| 60% | 9.7% |
| 65% | 9.9% |
| 70% | 10.8% |
| 75% | 11.0% |
| 80% | 11.5% |
| 85% | 11.9% |
| 90% | 13.0% |
| 95% | 13.9% |

Monte Carlo approach

- The Round 9.1 forecasts reflect the median (i.e., “p50”, or 50th percentile) forecast for 9.1M population and 5.1M jobs.
- The standard deviation (the difference between a “p15” and a “p85” forecast is roughly 0.9M people or 0.9M jobs

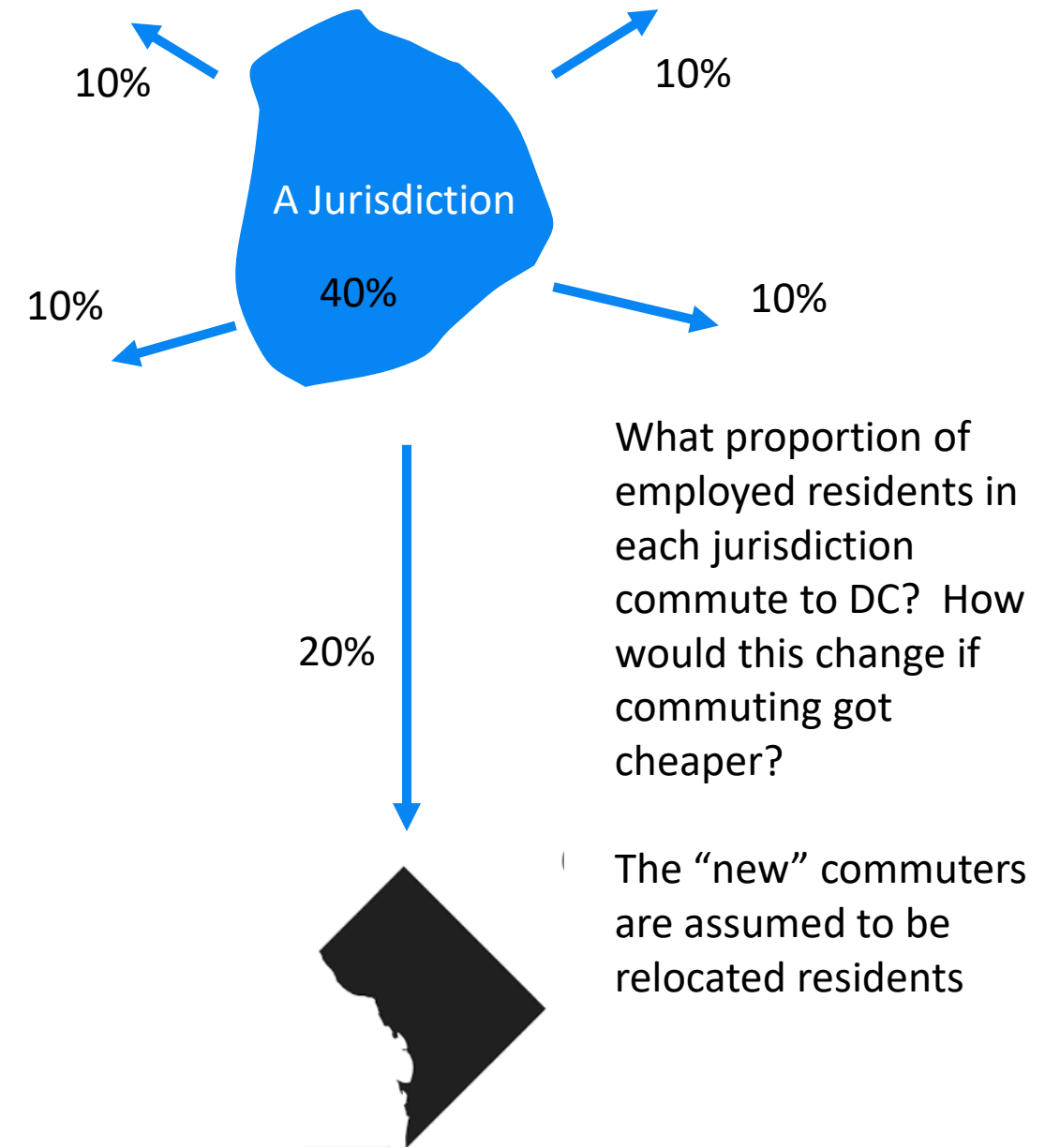


Value of Time approach

How much might virtual travel replace physical travel due to technology/societal changes?

The Value of Time approach considers the tradeoff in a quick-response, three-stage process:

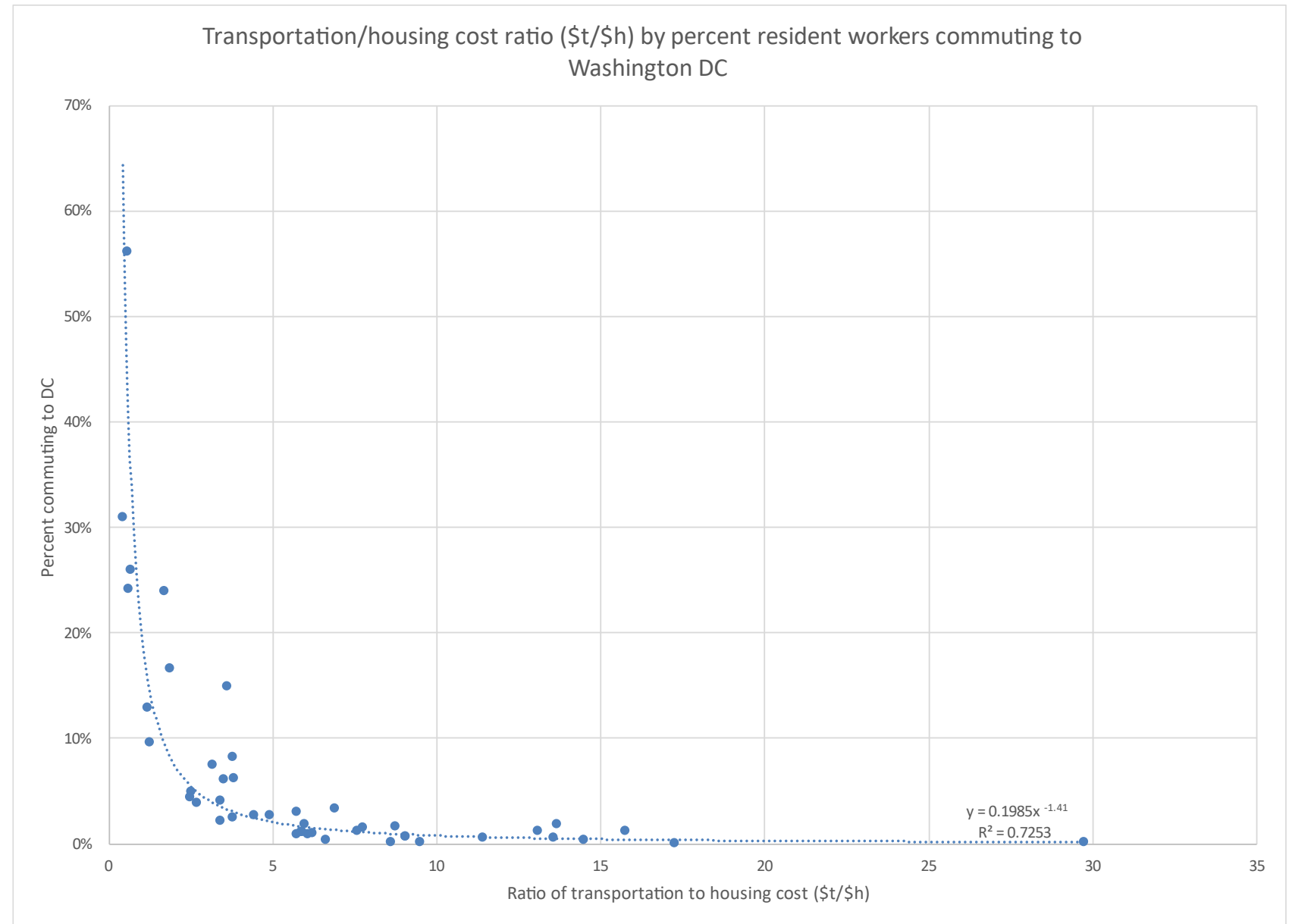
1. How does the ratio of transportation to housing costs by jurisdiction affect the percent working in DC?
2. How would the percent working in DC change if transportation costs dropped?
3. How much should the effect be magnified to consider the whole region?



Value of Time approach

First stage:

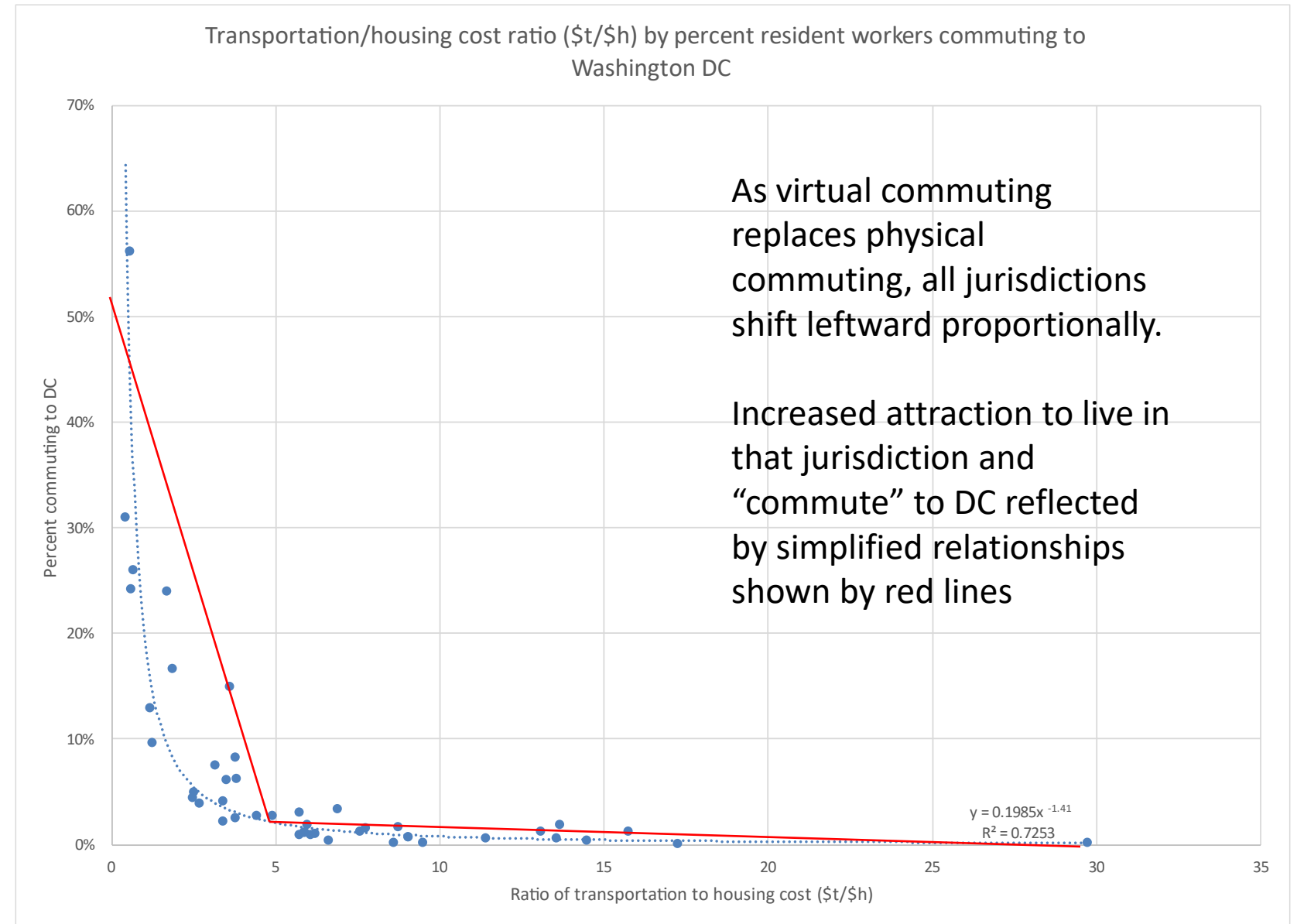
- The percentage of employed residents in any jurisdiction that commute to DC is a function of the ratio of transportation costs (\$t) to housing costs (\$h)
- Note that transportation costs used VOT=\$12.50 per hour; the fact that VMT has rebounded to 97% pre-pandemic levels suggests operating costs (often not consciously priced anyway) can be decoupled from the investment in time



Value of Time approach

Second stage:

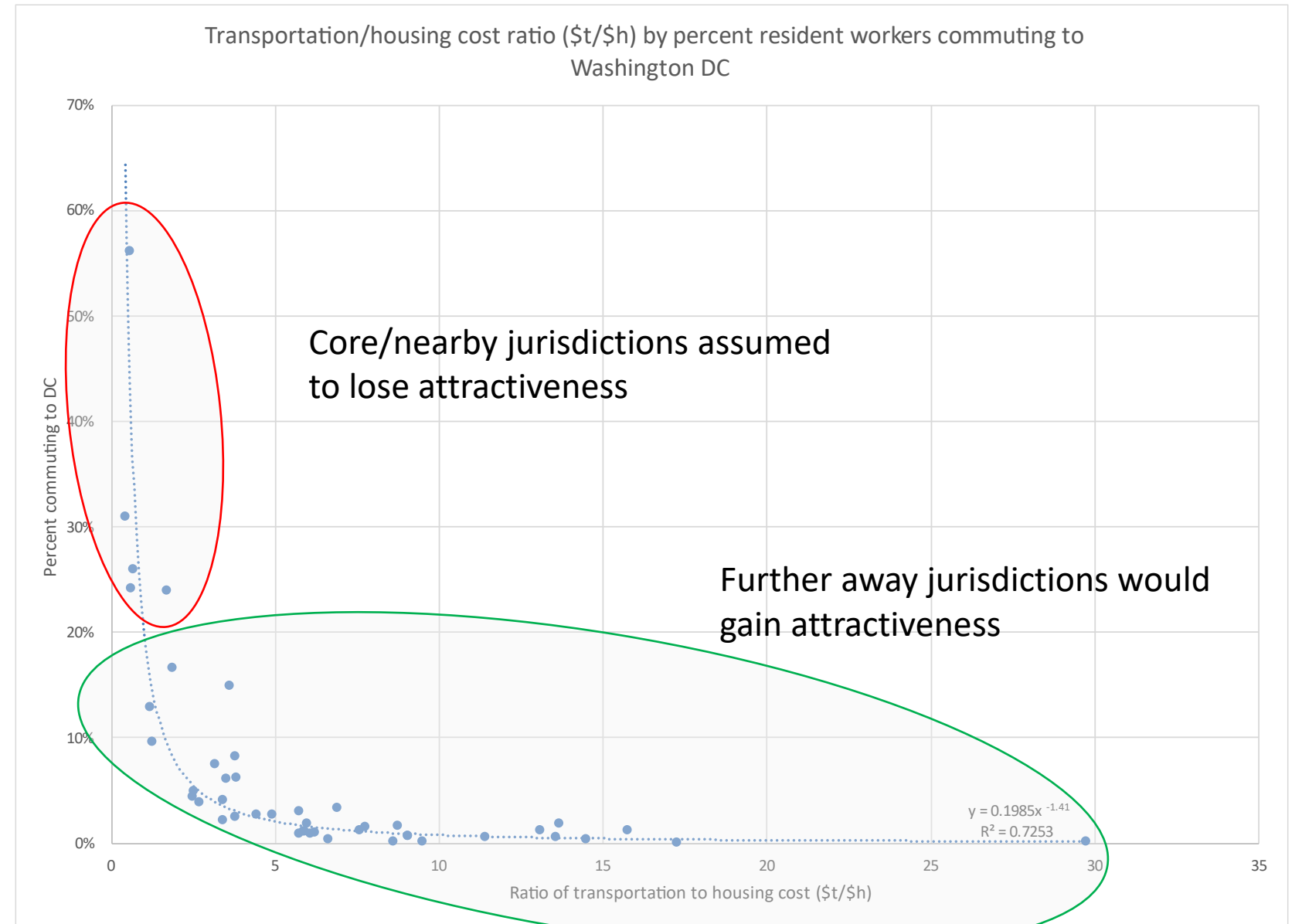
- As the percentage of days commuting drops towards zero, the ratio of transportation to housing cost drops (for all jurisdictions, even DC)
- Dots would all move toward the left as commuting costs drop
- A greater percentage of residents would take a more distant job if commuting time were reduced.



Value of Time approach

Second stage:

- The effect is assumed to increase resident workforce attraction to DC for jurisdictions with less than the typical “21.6% of residents currently commute to DC”



Value of Time approach

Second stage:

- For considering commuting to DC only, the maximum effect on population is roughly a 4% loss in core jurisdiction population and ~1% gain in more distant jurisdiction population. This equates to ~80% telework; we assume there is always some physical connection (i.e., key meetings/events) to the workplace

Stage 2. Assemble effect on population by geography using DC as destination

| Jurisdiction | Population | Median Housing Price | Commute Time to DC (minutes) | Max Population Shift | Shift as percent of 2020 Population |
|----------------|------------|----------------------|------------------------------|----------------------|-------------------------------------|
| Core | 1,133,000 | \$ 639,000 | 15 | -39100 | -3.5% |
| Inner | 3,168,000 | \$ 473,000 | 30 | 200 | 0.0% |
| Outer (Member) | 1,217,000 | \$ 429,000 | 56 | 7000 | 0.6% |
| Outer (Model) | 1,722,000 | \$ 378,000 | 50 | 10600 | 0.6% |
| More Distant | 3,240,000 | \$ 254,000 | 76 | 6800 | 0.2% |
| TOTAL | 10,480,000 | \$ 403,000 | 28 | -14400 | -0.1% |

Value of Time approach

Third stage:

- The effect for DC overlaps with similar effects for other activity centers
- Based on a rough sense (dated, but still relevant) of employment in activity centers and a judgment on value of time for commuting to the core versus other jurisdictions, we suggest that the effect for the region as a whole might be roughly twice that for DC alone

Stage 3. Estimate expansion effect associated with all activity centers

Note: From 2002 report, rough sense of activity center employment (Round 6.2)

[Regional Activity Centers Report.pdf](#)

| Location | 2000 Jobs | 2025 Projected | | Relative Weight Based on | | Multiplier |
|-----------------------------|------------------|------------------|-----------------|--------------------------|-------------|------------|
| | | Jobs | 2025 Employment | Value of Time (judgment) | | |
| DC Core | 493,700 | 605,600 | 100% | 100% | 1.00 | |
| Mixed-Use Centers | 316,900 | 440,200 | 73% | 50% | 0.36 | |
| Employment Centers | 282,200 | 383,000 | 63% | 50% | 0.32 | |
| Suburban Employment Centers | 312,000 | 485,000 | 80% | 25% | 0.20 | |
| Emerging Employment Centers | 87,400 | 182,900 | 30% | 25% | 0.08 | |
| TOTAL | 1,492,200 | 2,096,700 | | | 1.96 | |

Value of Time approach – compared to Delventhal/Parkhomenko study

Comparing Value of Time approach (including 2x multiplier for non-DC locations) with Delventhal/Parkhomenko study for same jurisdictions.

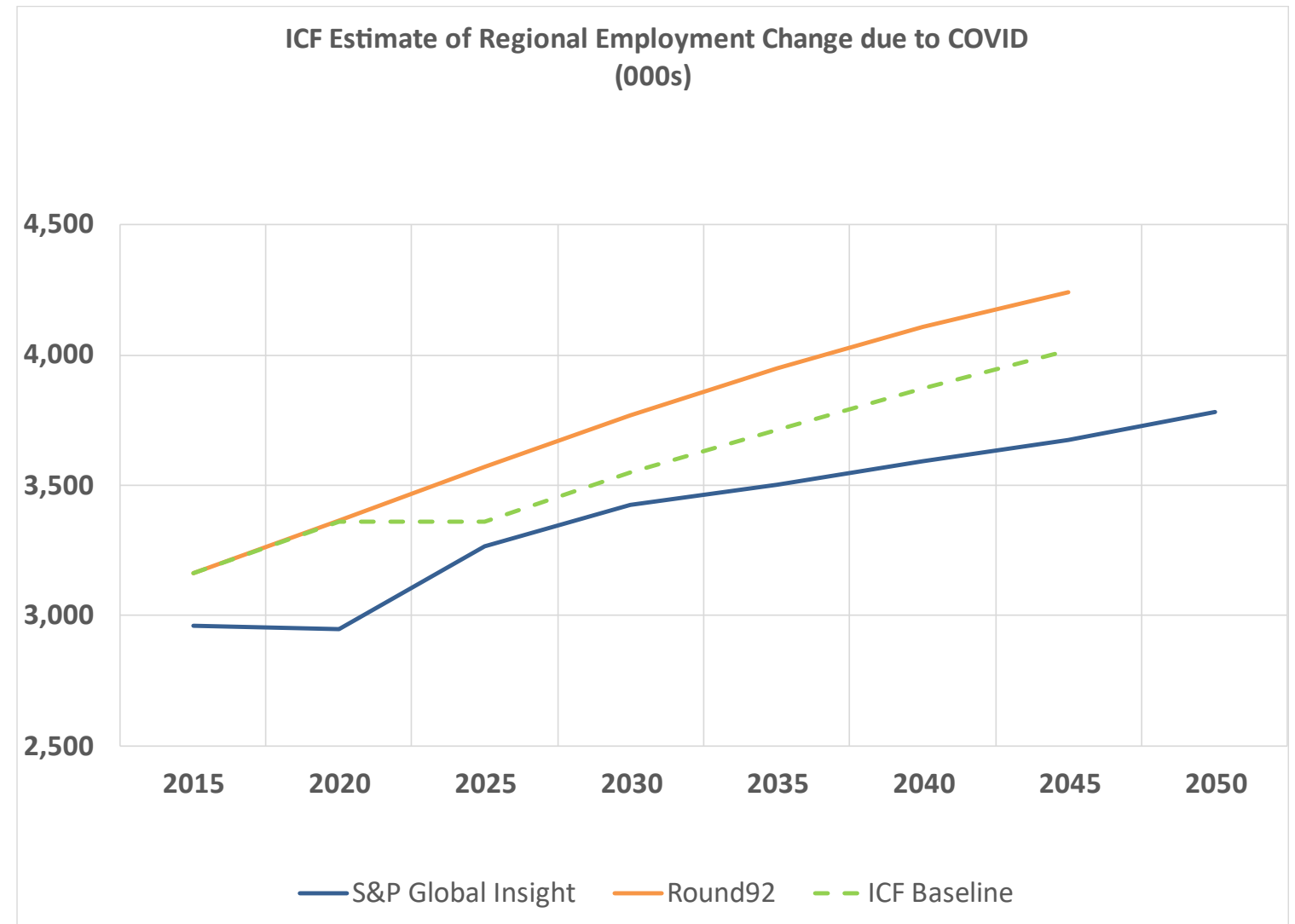
- directionality and general magnitude correlate well
- Core a bit of an outlier (partly due to our 2x multiplier)

| Jurisdiction | Population | Shift in 2020 population | |
|----------------|-------------------|--------------------------|--------------------------|
| | | Value of Time analysis | Delventhal / Parkhomenko |
| Core | 1,133,000 | -6.9% | -0.4% |
| Inner | 3,168,000 | 0.0% | -0.6% |
| Outer (Member) | 1,217,000 | 1.2% | 0.8% |
| Outer (Model) | 1,722,000 | 1.2% | 2.5% |
| More Distant | 3,240,000 | 0.4% | 0.9% |
| TOTAL | 10,480,000 | | |

Regional summaries

Looking at the full MWCOG region in 5-year increments:

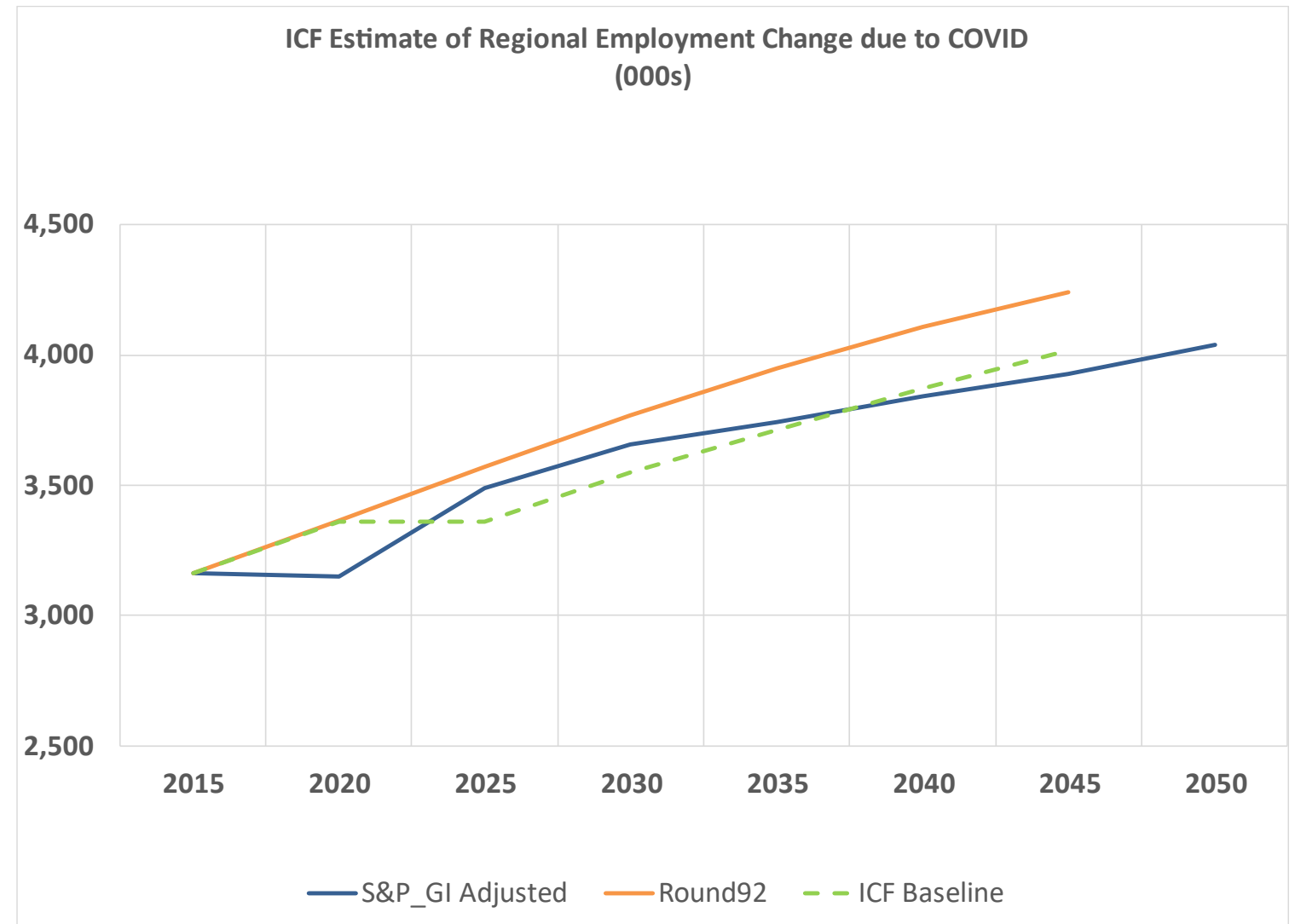
- **COVID effects are non-negligible, but in the same ballpark as other effects:**
 - Round 9.2 is pre-COVID (2018)
 - S&P Global Insight is from February 2022
- **Employment will take until 2025 to rebound but will regain momentum (at least as far as COVID is concerned)**



Regional summaries

Looking at the full MWCOG region in 5-year increments:

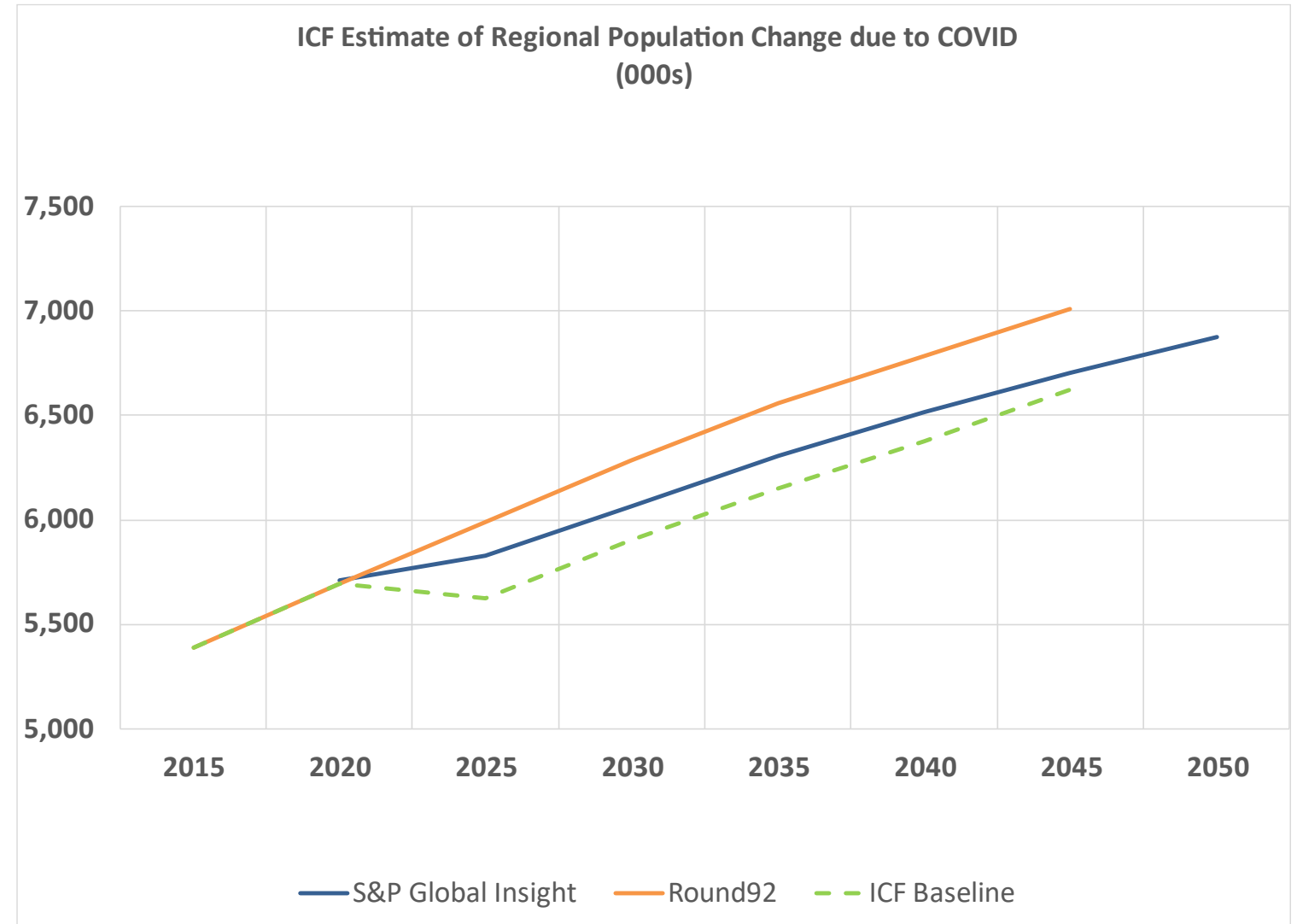
- COVID effects are non-negligible, but in the same ballpark as other effects:
 - Round 9.2 is pre-COVID (2018)
 - S&P Global Insight is from February 2022
- **Adjusting S&P Global Insight to match Round 9.2 baseline shows a relatively consistent expectation for all horizon years**



Regional summaries

Looking at the full MWCOG region in 5-year increments:

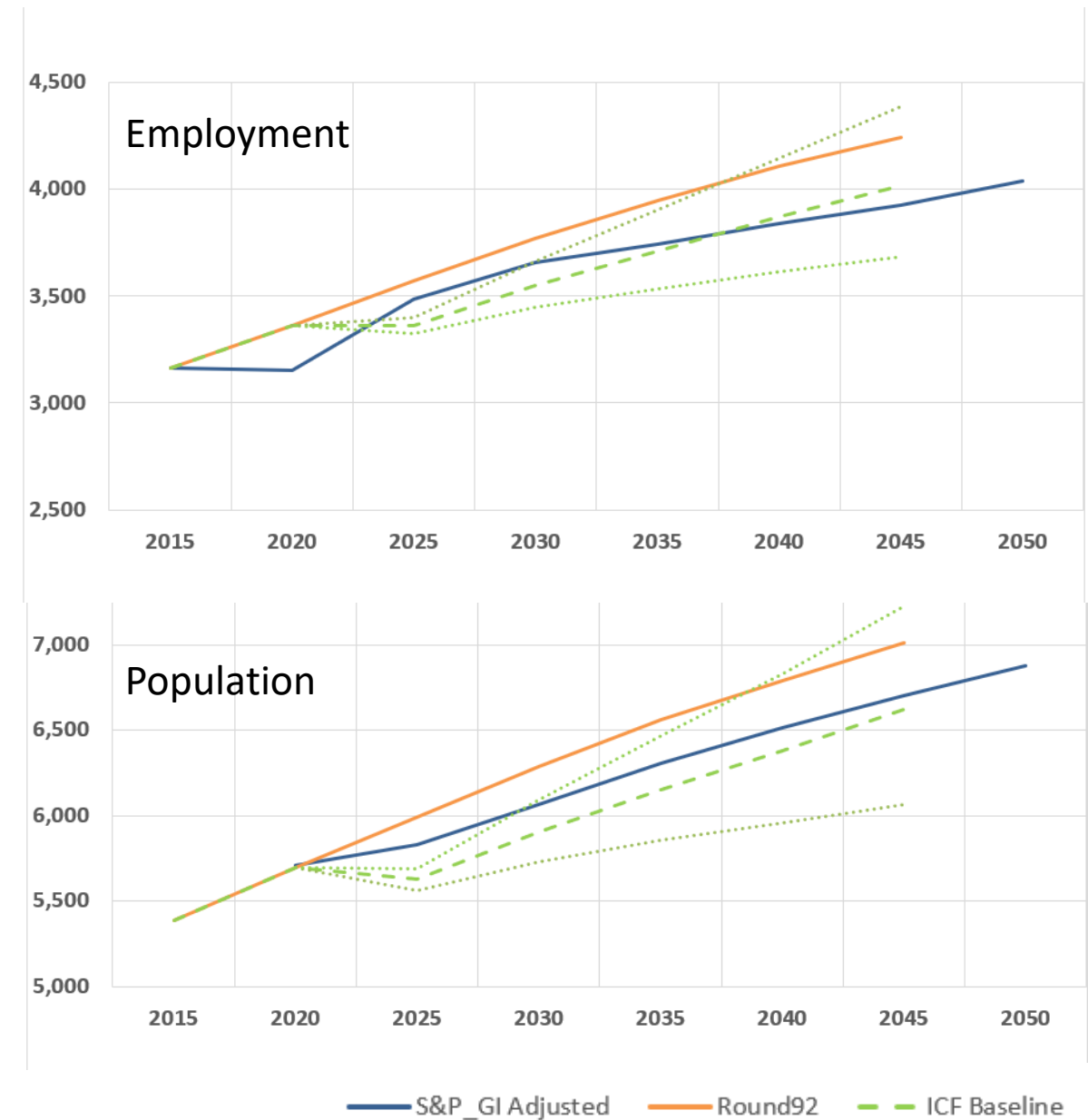
- COVID effects are non-negligible, but in the same ballpark as other effects:
 - Round 9.2 is pre-COVID (2018)
 - S&P Global Insight is from February 2022
- **Population effects tend to lag slightly behind employment**
- **Population within MWCOG region drops slightly with effects of COVID**

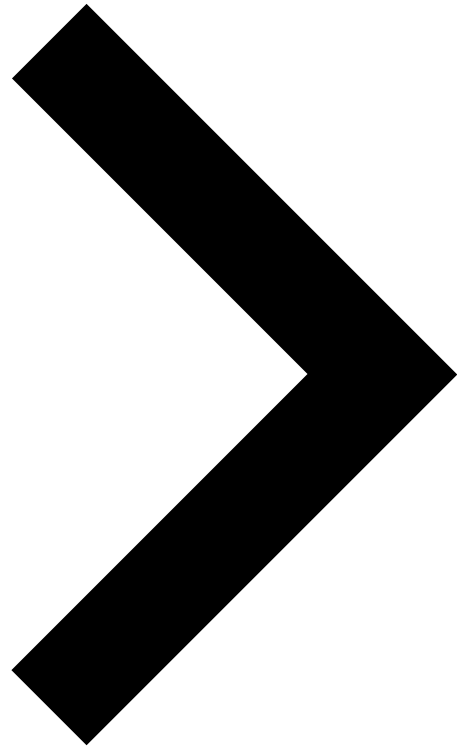


Regional summaries

Considering the Monte Carlo effects on forecast variability:

- **15/85th percentiles show high/low totals about 9% off baseline in 2045, (indicated by thinner dashed lines)**
- **Uncertainty is inherent in each exogenous element, as well as the policy responses**
- **Focus is on sensitivity rather than precision (updated S&P_GI forecasts will be acquired for the Round 10 baseline)**





Average Household Size

Key Findings

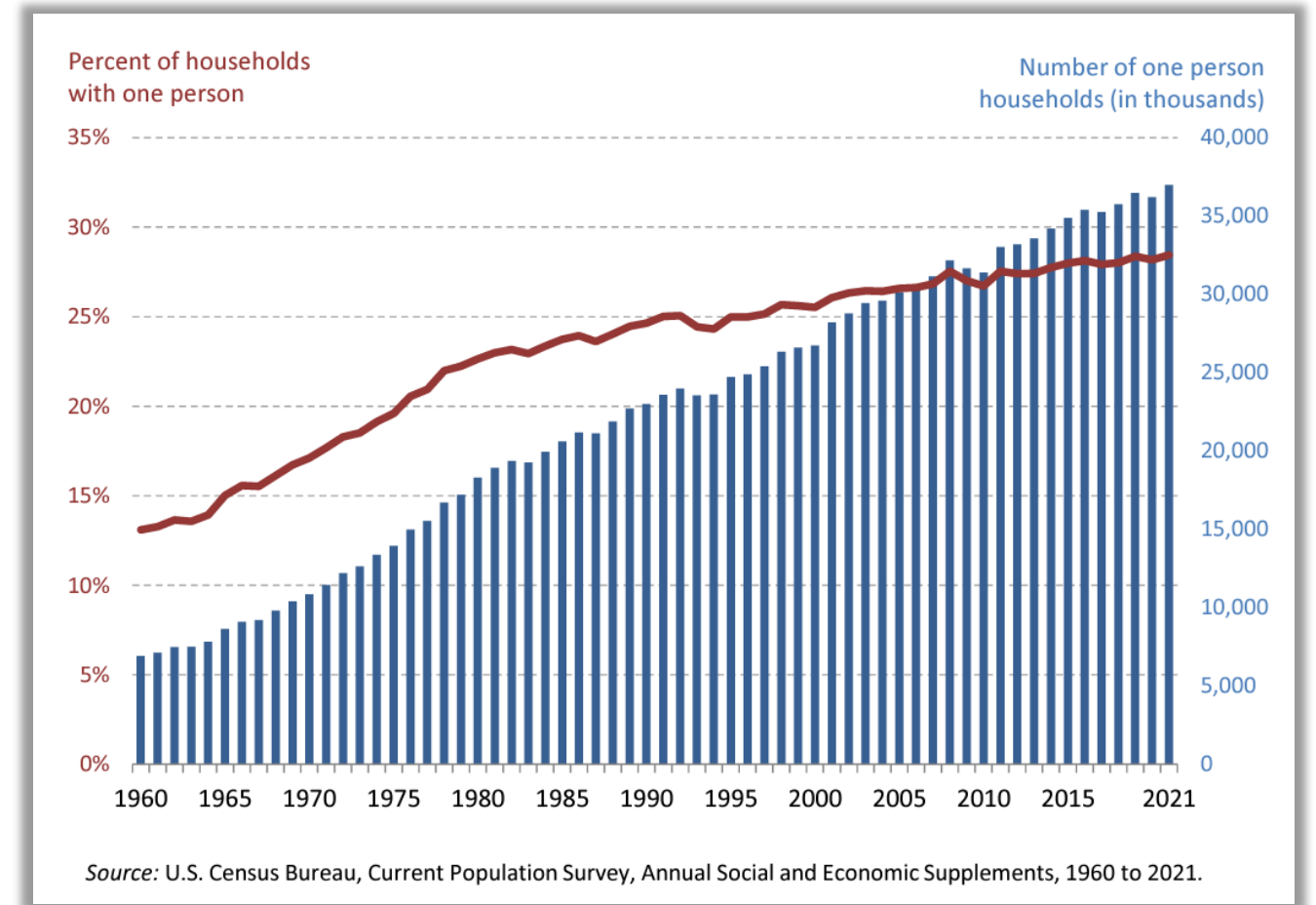
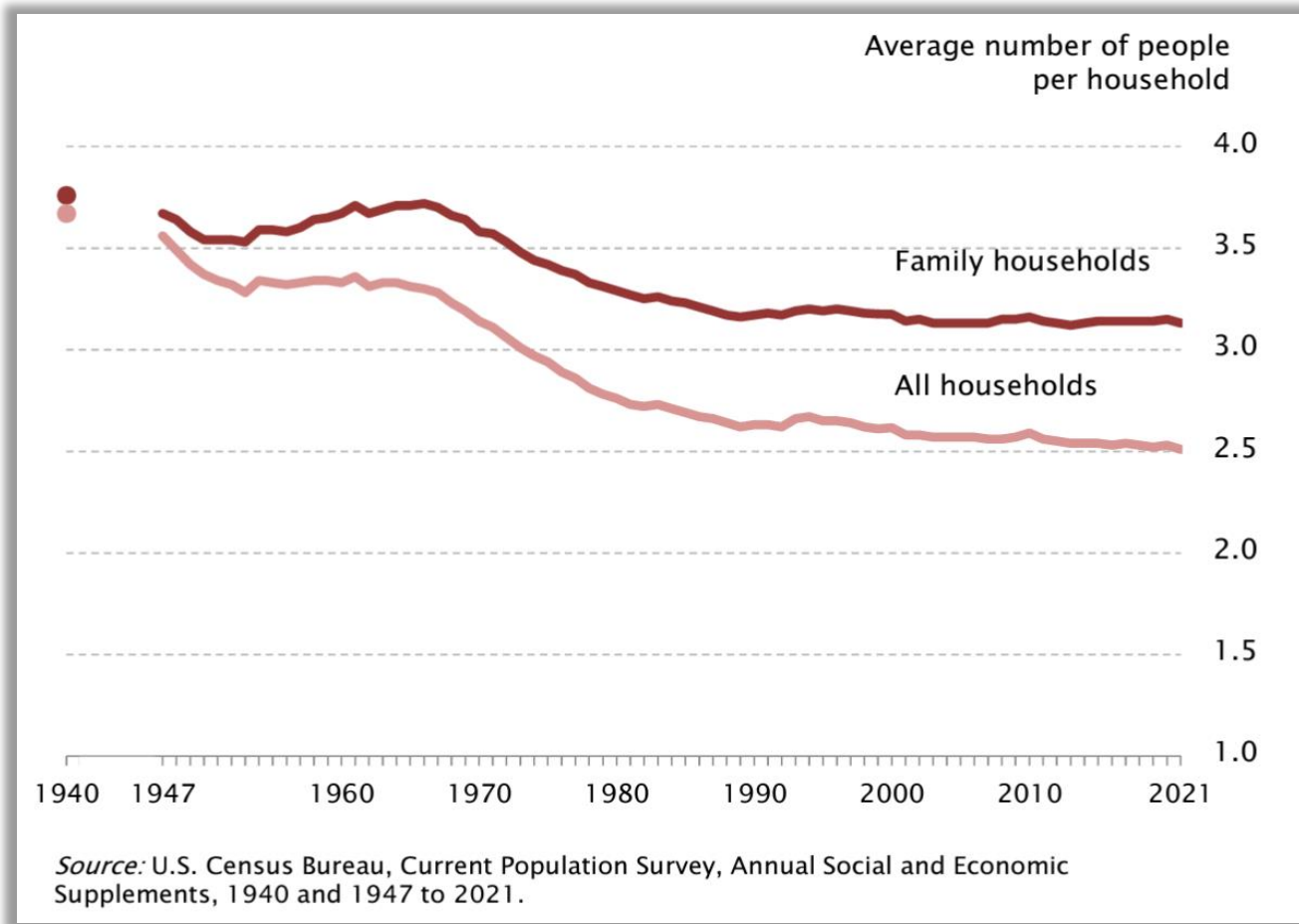
- Lagging housing construction, the COVID-19 pandemic, and recent inflation will result in a short-term stabilization of the region's average household size
- Long-term, average household size in the region will decrease due to declining birth rates, focus on multifamily development, and an aging population
- Average household size is expected to reduce throughout the region, but will slightly increase in the Outer Suburban Jurisdictions where land availability and development potential for single-family homes still exists

Interviews with Regional Experts

- Qian Cai, Weldon Cooper Center (UVA)
- Alfred Sundara, Maryland State Data Center
- Joy Phillips, DC Office of Planning
- Jenny Schuetz, Brookings Metro
- Peter Tatian, Urban Institute

Household Size Declines

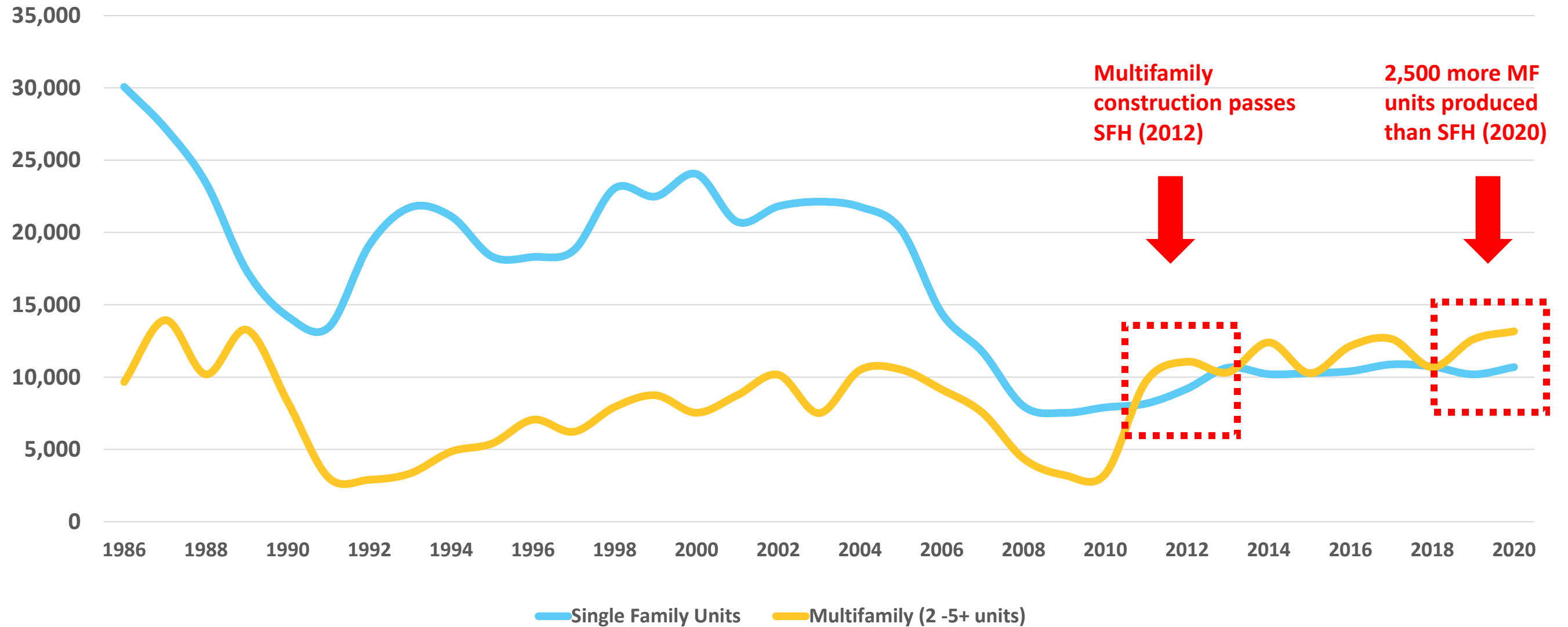
- Consistent decline in household size dating back to mid-20th Century
- Single-person households now represent one-third of all households



Regional Factors Impacting Household Size

- Declining birth rates
- Aging population
- Insufficient housing supply
- Region buoyed by international migration
- COVID-19 uncertainties
- Multifamily units being constructed at higher rates than SFH (since 2012)

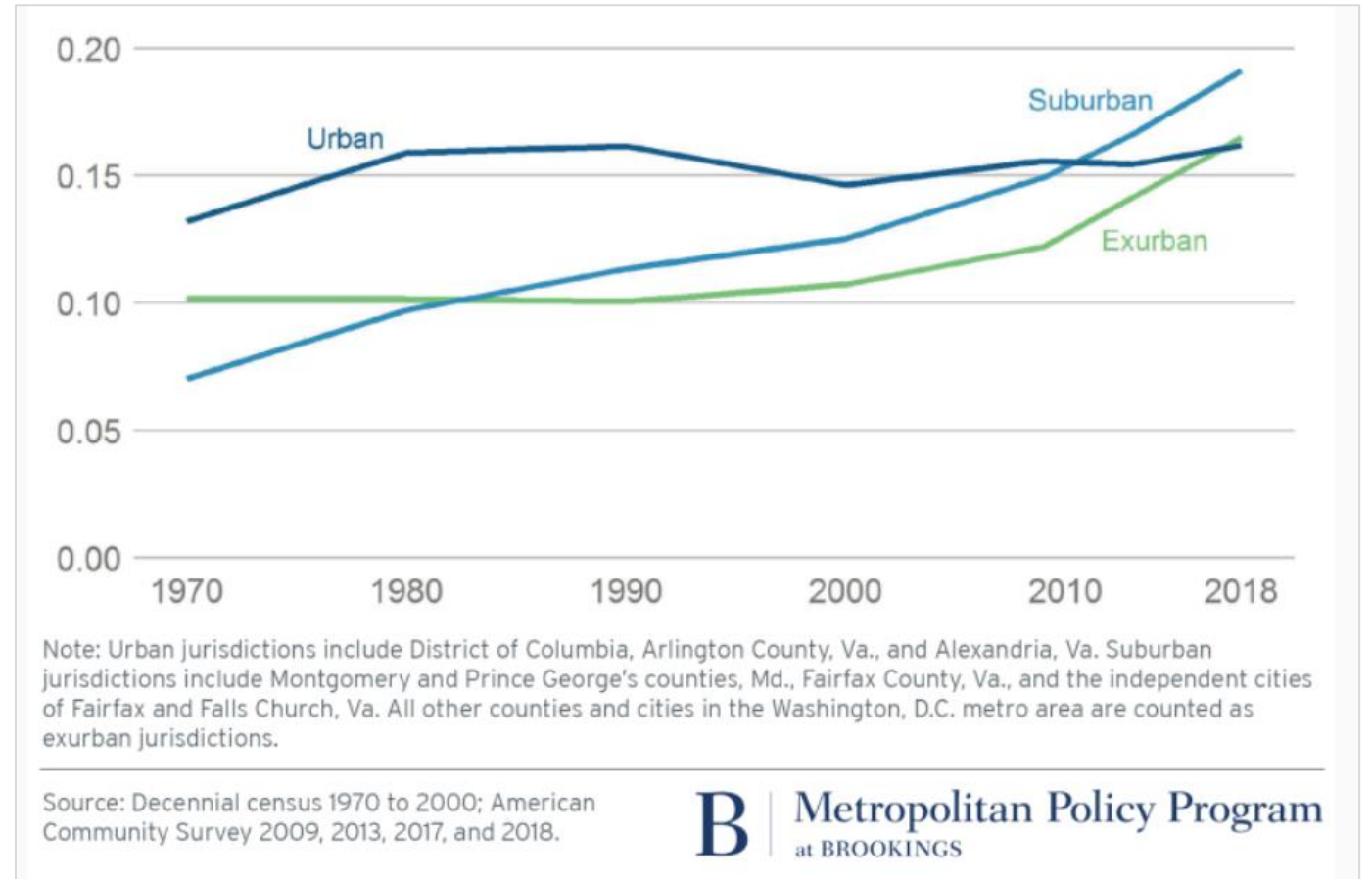
Lagging Housing Construction



Housing Construction in COG Region (1986-2020)

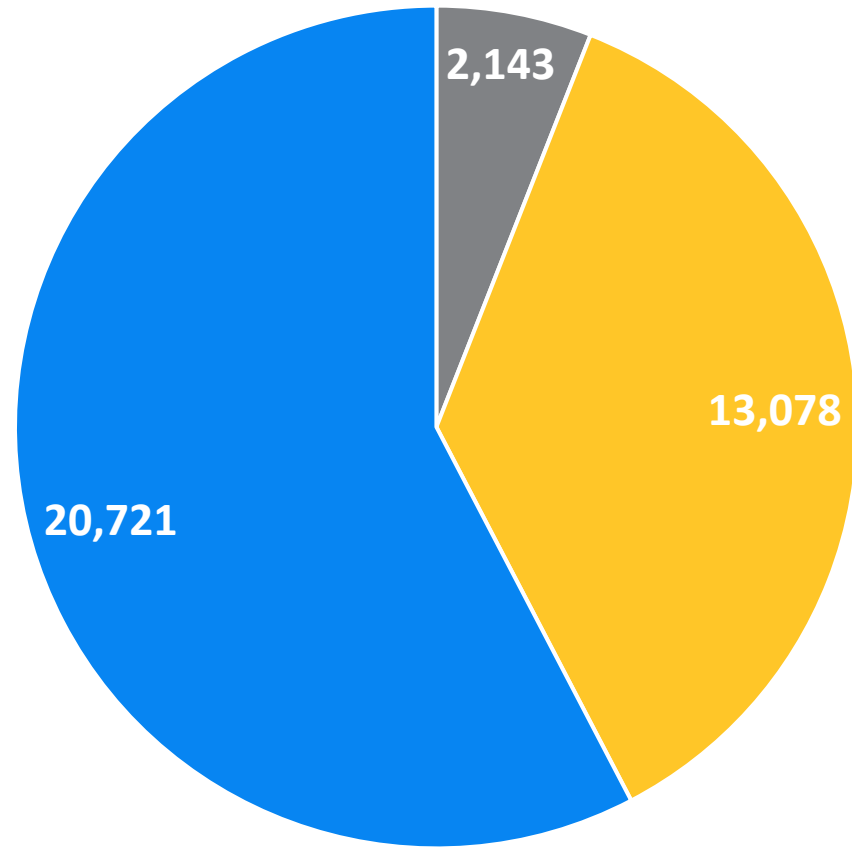
Aging Population

- Populations in suburban jurisdictions are aging at a faster rate than urban jurisdictions
- Average household sizes are historically smaller for older adults, with higher rates of solo households

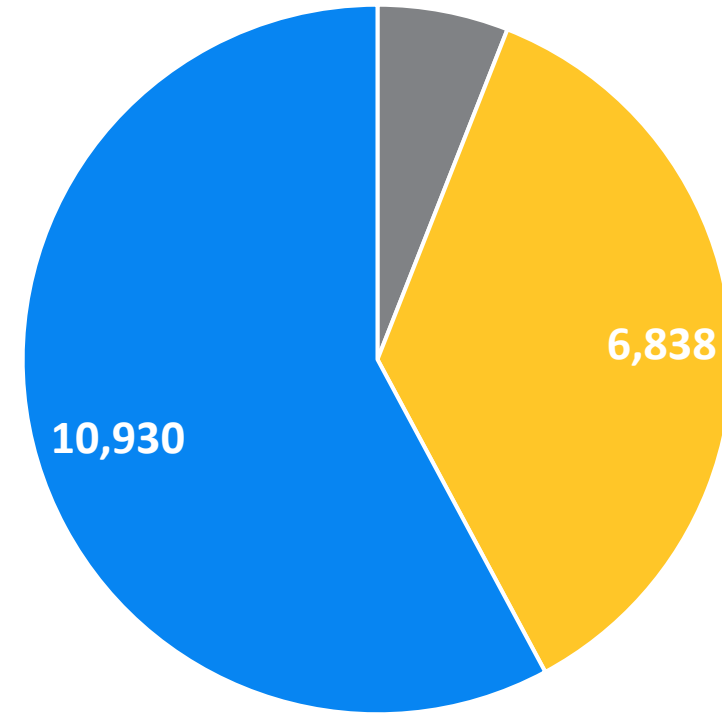


Share of population over age 59 (1970-2018)

International In-Migration



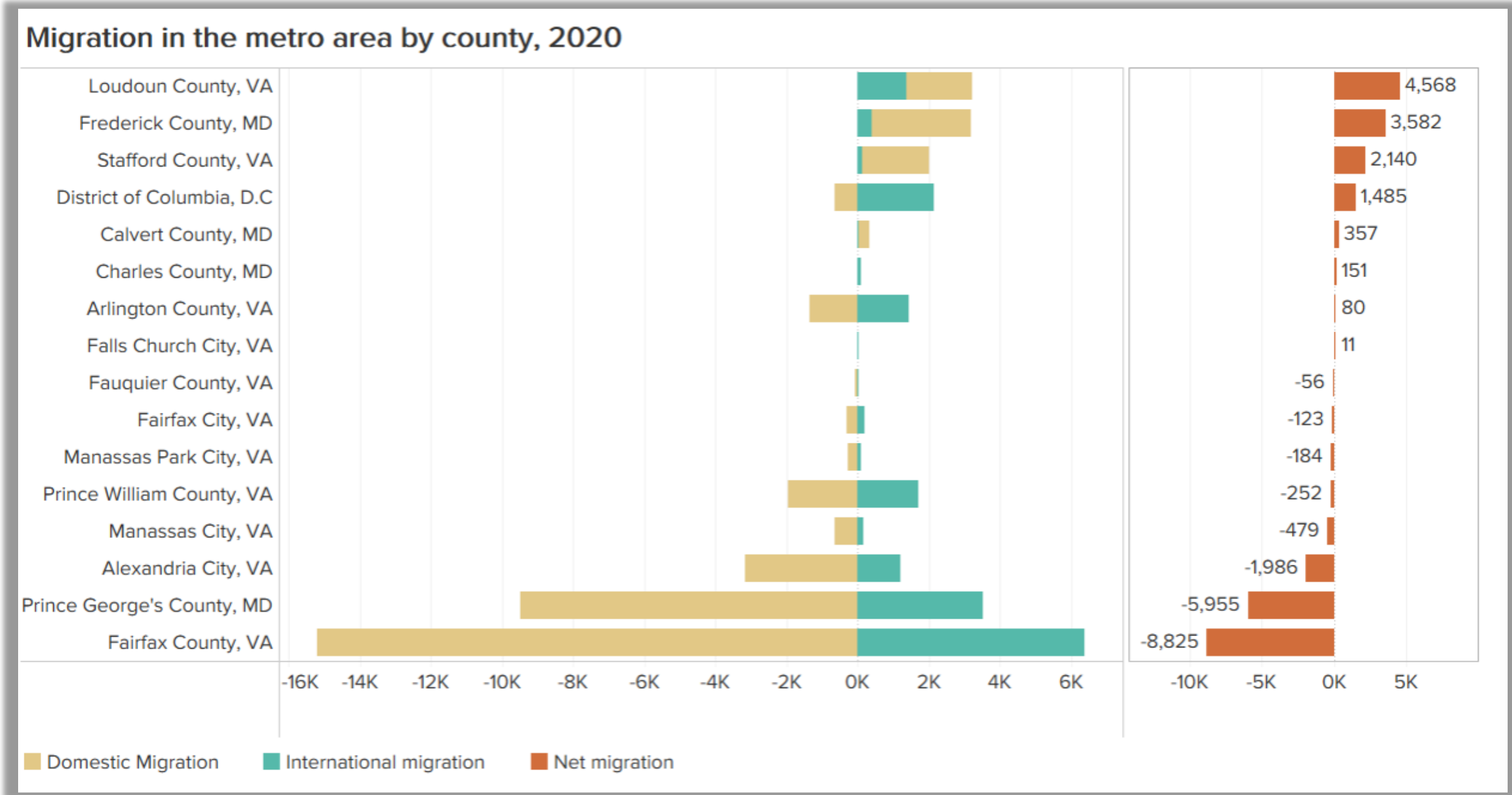
July 2019-June 2020



July 2020-June 2021

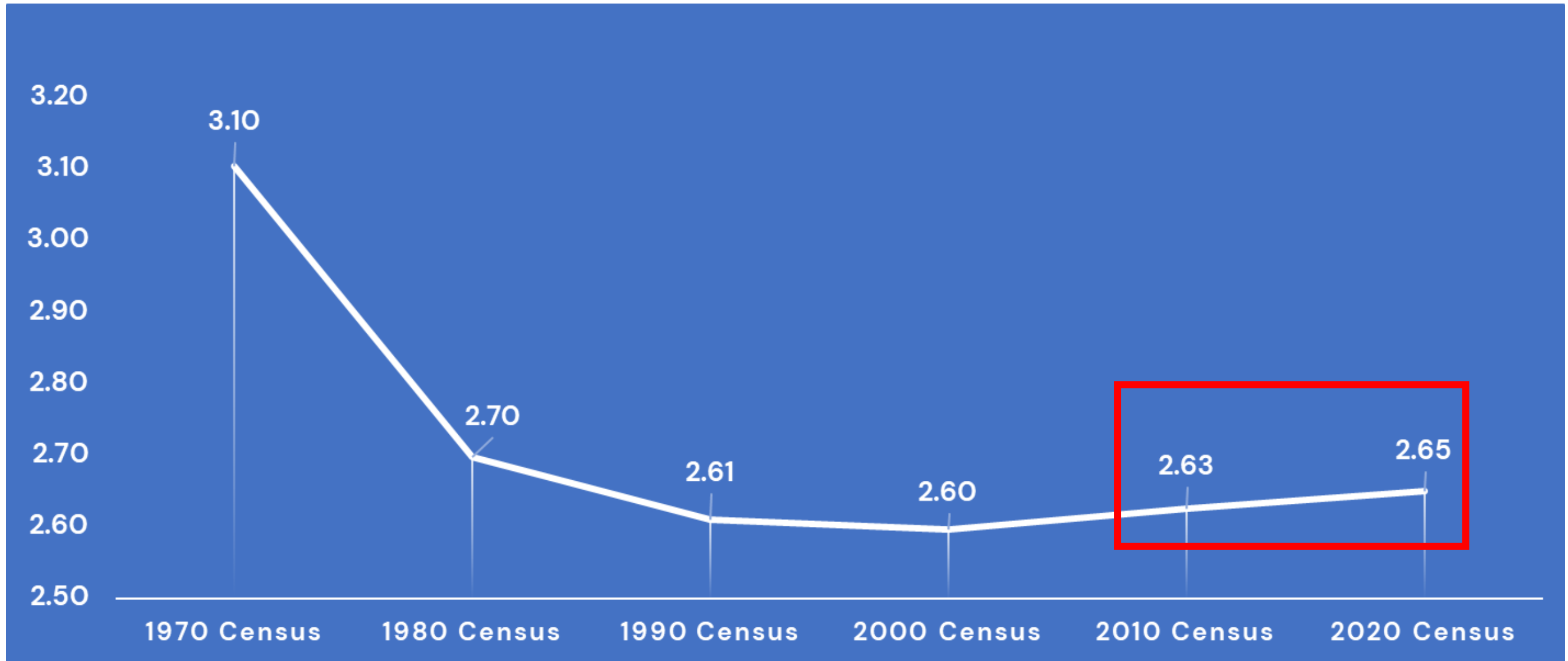
■ Washington, D.C. ■ Maryland ■ Virginia

International Migration



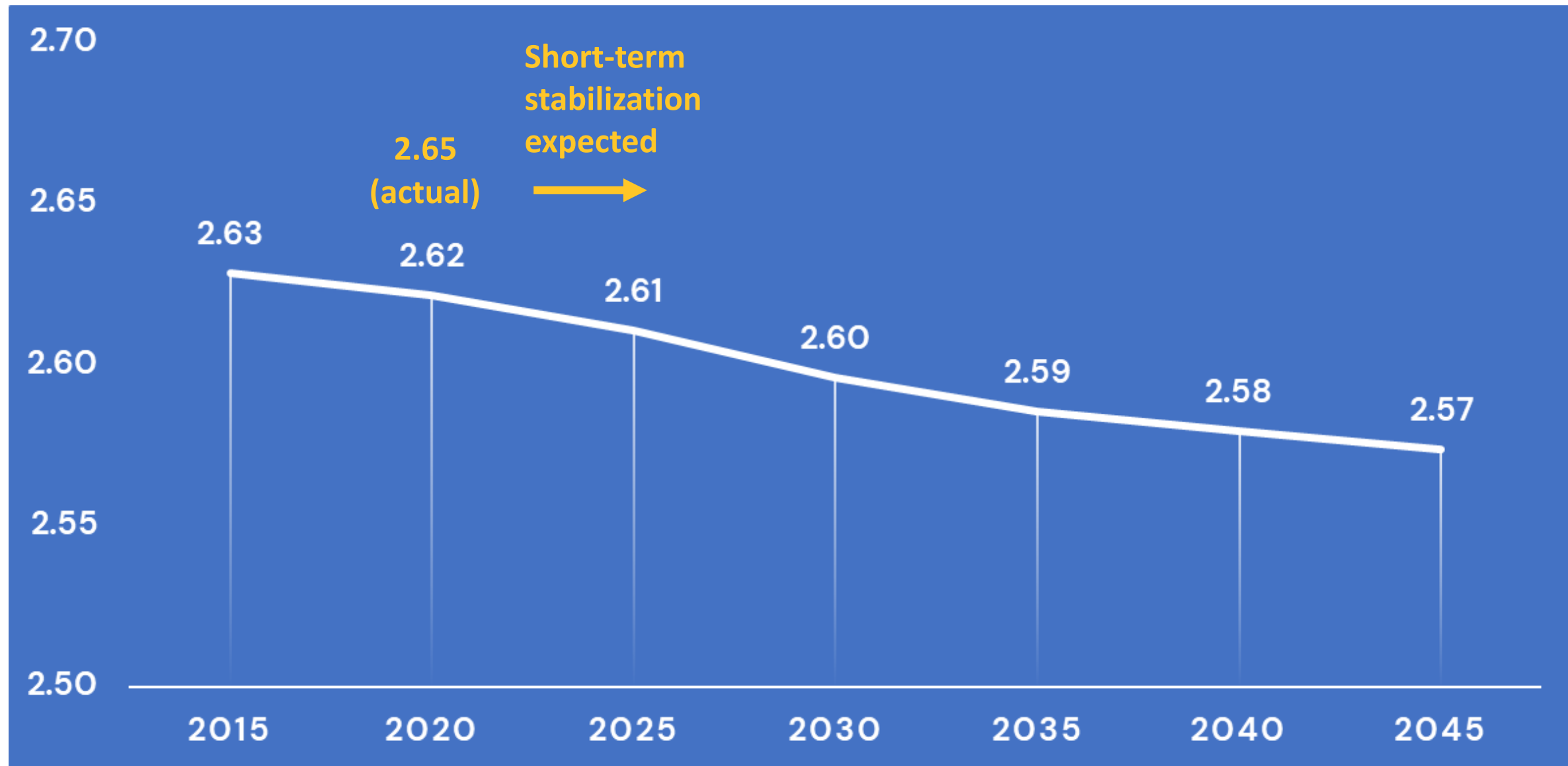
Source: U.S. Census Bureau 2020 Estimates, via D.C. Policy Center

Historic Regional Average Household Size



COG Region Average Household Size (1970-2020)

Forecasted Regional Average Household Size



Source: COG Round 9.2 Forecast (2021)

Regional Implications

- Increases to average household size reduces housing demand and depresses housing construction and demand for home goods and services
- Office to residential conversions are attractive, which could boost the region's household formation rate and reenergize CBDs
- Temporary increase in average household size in the inner and outer suburban jurisdictions is being driven by growth of Hispanic/Latino communities, along with high housing costs, inflation, decreased housing construction, and uncertainty related to the pandemic
- Increased multifamily construction will result in greater household formation regionwide, but smaller average household sizes long-term

Questions/Comments



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