



Work at Home Data Analysis of Pre, During, and Post-Pandemic

Hsi-Hwa Hu, SCAG

SCAG MODELING TASK FORCE
March 29, 2023

WWW.SCAG.CA.GOV

Objectives

Summarize work from home data and findings

Pre-pandemic data

- ACS (American Community Survey), Travel Survey (CHTS, NHTS)

During & Post-pandemic data

- ACS (to 2021)
- U.S. Survey of Working Arrangements and Attitudes (SWAA)
- UC Davis Transportation Survey

Work at Home (W@H) / Work from Home (WfH)

Model Input for Work at Home

Percentage of work-at-home trips on an average weekday (Mon-Fri)

- Consider “Home” is one of the mode for work trip
- Work at home for 2 days a week = 0.4 work trips at home

W@H Modes

1. Home office/Remote
 - No permanent work location
 - Working at home everyday
2. Telework/Hybrid
 - Has a permanent work location
 - Work at home 1-4 days per week

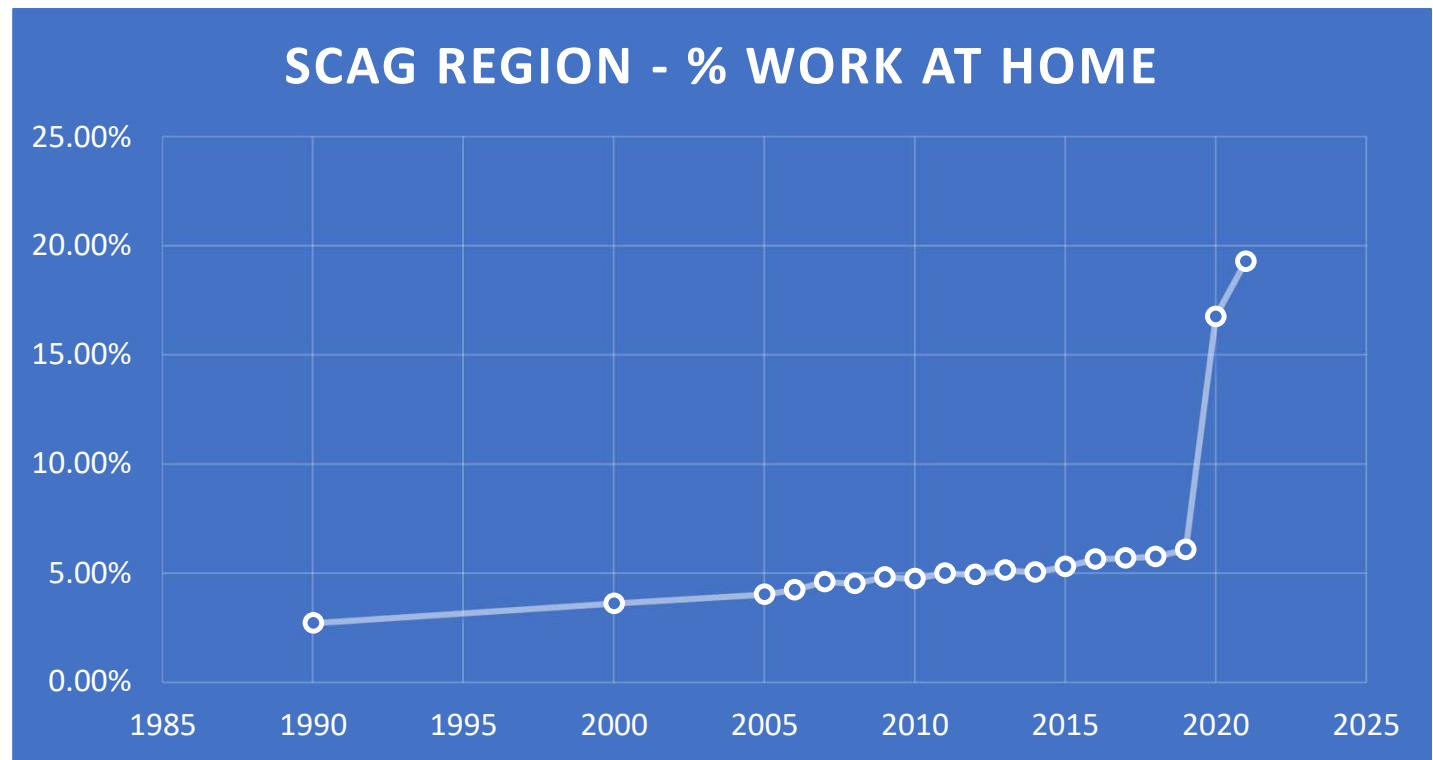


WORK AT HOME DATA BEFORE PANDEMIC

ACS - Home Office/Remote

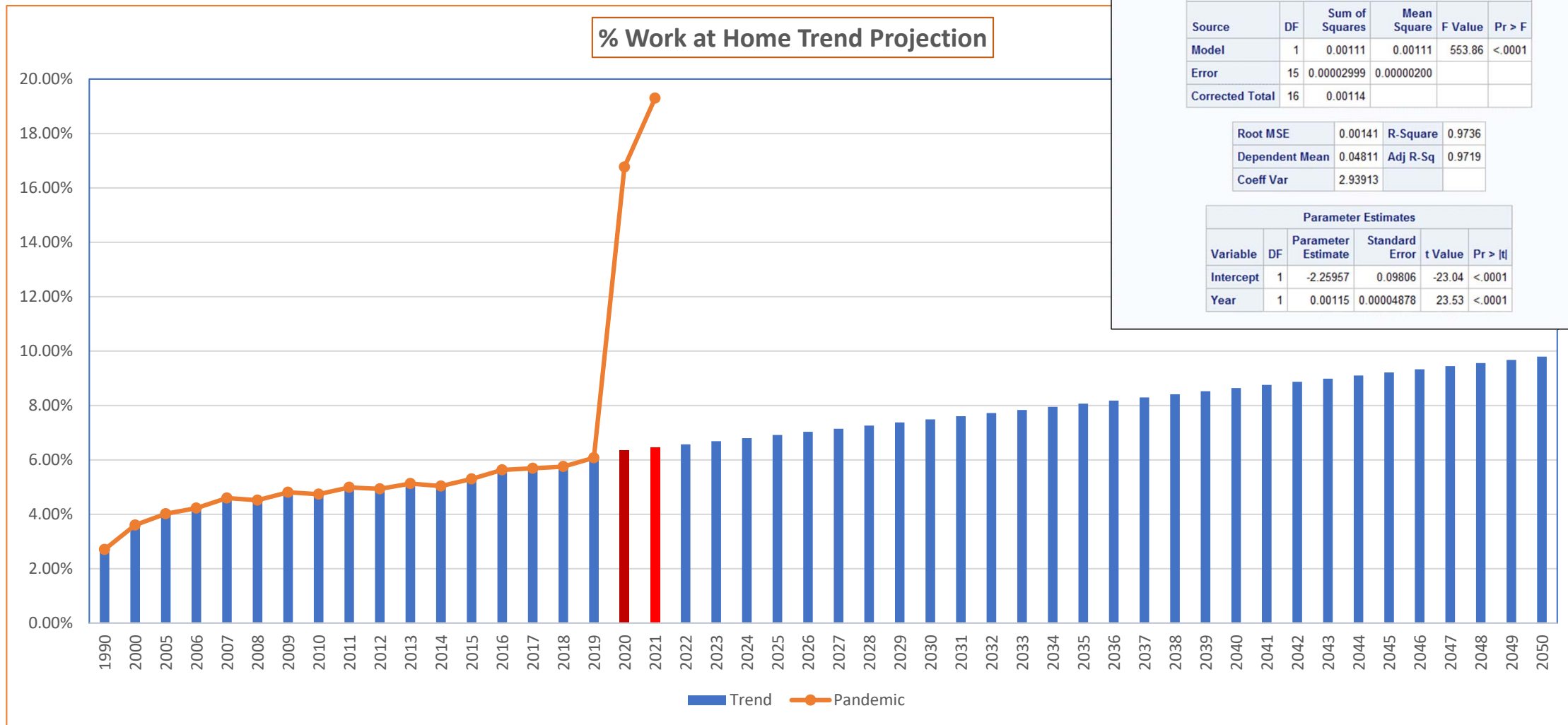
ACS - Means of Transportation to Work

Annual Data	% W@H
1990	2.71%
2000	3.60%
2005	4.02%
2006	4.23%
2007	4.60%
2008	4.52%
2009	4.81%
2010	4.74%
2011	4.99%
2012	4.93%
2013	5.13%
2014	5.04%
2015	5.30%
2016	5.63%
2017	5.69%
2018	5.76%
2019	6.08%
2020	16.77%
2021	19.30%



Source: ACS

Home Office Workers Trend Projection



The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: WFH

Number of Observations Read	17
Number of Observations Used	17

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00111	0.00111	553.86	<.0001
Error	15	0.00002999	0.00000200		
Corrected Total	16	0.00114			

Root MSE	0.00141	R-Square	0.9736
Dependent Mean	0.04811	Adj R-Sq	0.9719
Coeff Var	2.93913		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	-2.25957	0.09806	-23.04	<.0001
Year	1	0.00115	0.00004878	23.53	<.0001

Linear regression: using data before pandemic

Travel Surveys - Telework/Hybrid

- Working for 1-4 days per week
- 2009 NHTS and 2017 NHTS (National Household Travel Survey)
 - SCAG region samples
 - 2009 NHTS: 5,633 sample workers
 - 2017 NHTS: 4,464 sample workers
- 2011 CHTS (California Household Travel Survey)
 - SCAG add-on survey
 - SCAG region: 2,806 sample workers

Key Assumptions and Analysis

1. % of workers who were allowed to telework

* not include home-office workers

- 2009 NHTS – 10.6%
- 2017 NHTS – 12.5%

NHTS question

[\$DO_YOU_CAP] have the option of working from home or an alternate location instead of going into [\$YOUR_THEIR] [\$PRIMARY] workplace?

Key Assumptions and Analysis

2. % actual telework (for those who were allowed telework)

- 2009 NHTS – 70%
- 2017 NHTS – 78%

3. # W@H days per week for teleworkers

- 2009 NHTS – 1.10 days (22% of a week)
- 2011 CHTS – 1.25 days (25% of a week)
- 2017 NHTS – 1.35 days (27% of a week)

Telework from Travel Survey

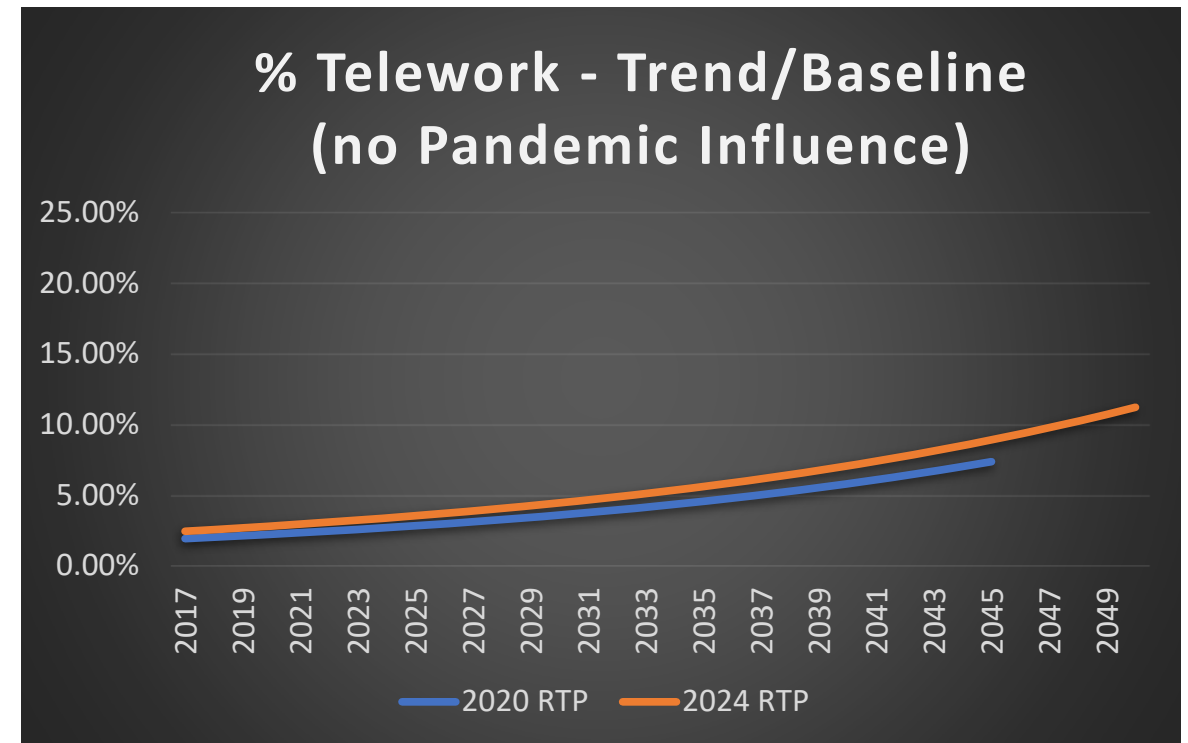
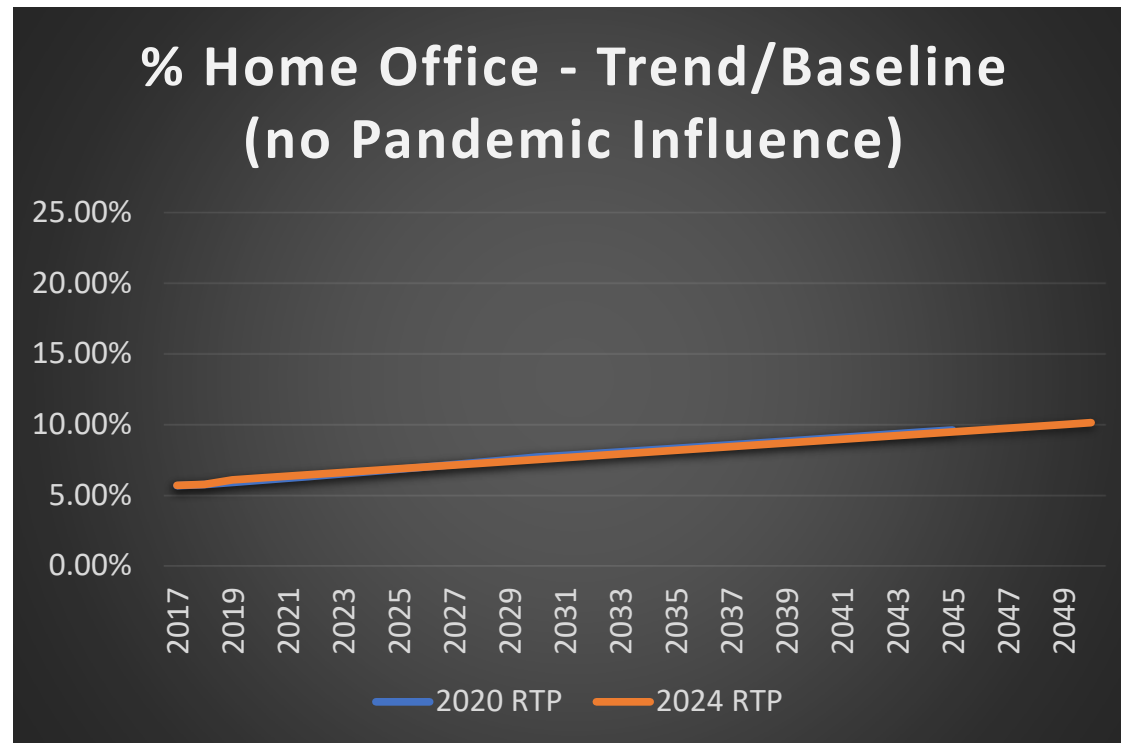
Year		2009 NHTS	2011 CHTS SCAG add-on	2017 NHTS	Note
% Home Office Workers	of All Workers	4.8%	5.0%	5.7%	ACS
% Non Home Office Workers	of All Workers	95.2%	95.0%	94.3%	calculate
% Workers Allowed Telework	of Non Home Office Workers	10.6%	11.1%	12.5%	NHTS*
% Teleworker	of Workers Allowed Telework	70%	72%	78%	NHTS*
% Teleworking of a Weekday	of Teleworkers	22%	25%	27%	NHTS & CHTS
% Teleworks of a weekday	of All Workers	1.54%	1.94%	2.44%	
* Using NHTS 2009 and 2017 to interpolate 2011 data					

Average annual growth rate = 5.9% (2009 and 2017 NHTS)

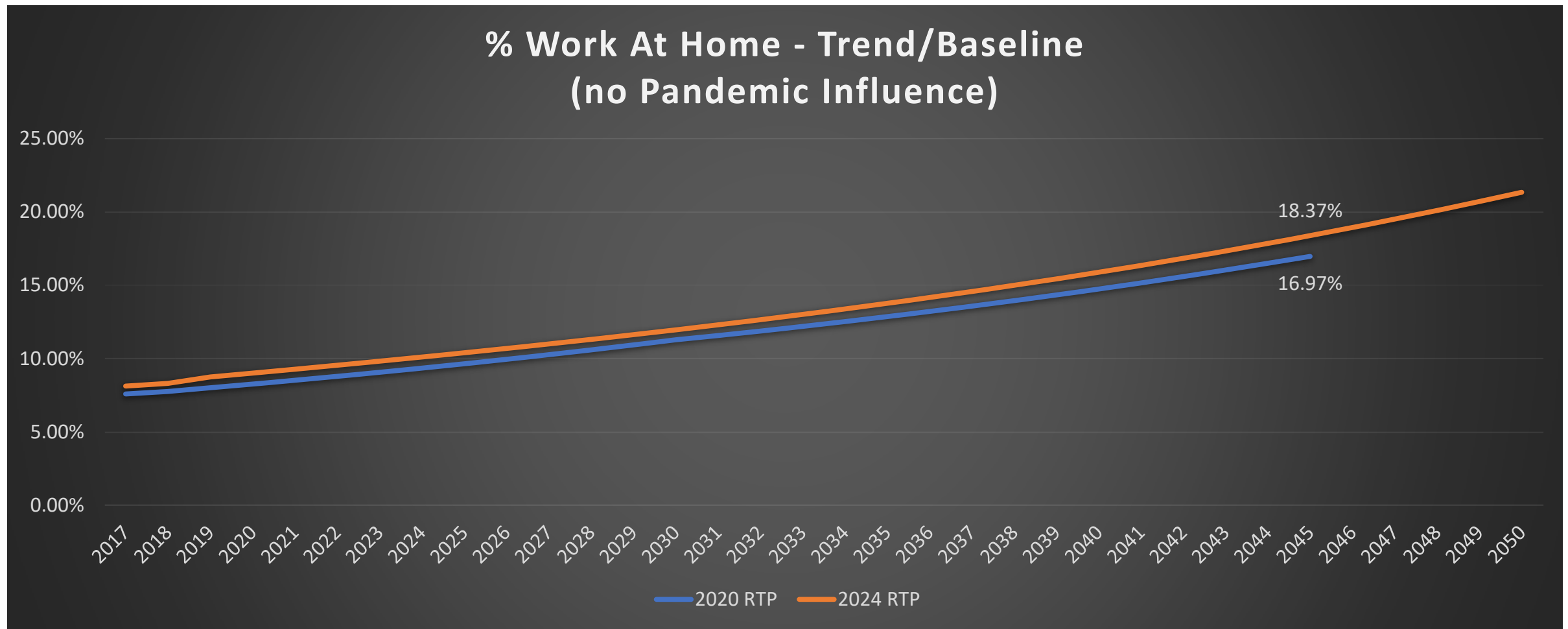
Telework Growth Rate Estimate

- Annual Average Growth Rate for Telework: 4.73%
 - NHTS: 5.90%
 - ACS for Information, Finance, Business Service: 3.57%
- 2019 Base Year projection = 2.67%

Baseline/Trend Projection for Work at Home (without pandemic influence)



Baseline/Trend Projection for Work at Home (combined) (without pandemic influence)





WORK AT HOME DATA DURING & POST-PANDEMIC

- U.S. SURVEY OF WORKING ARRANGEMENTS AND ATTITUDES (SWAA)
- UC DAVIS TRANSPORTATION SURVEY

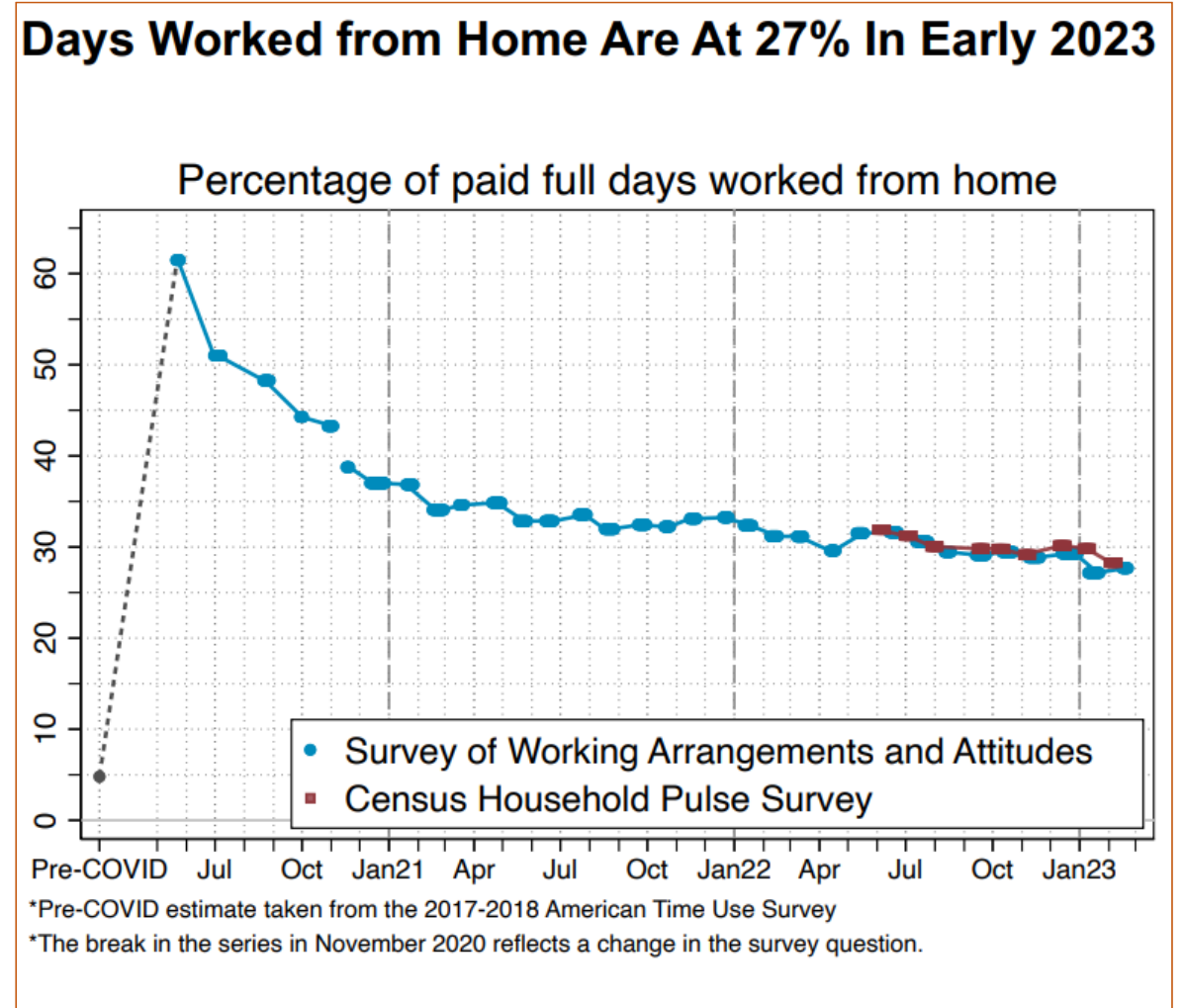
U.S. Survey of Working Arrangements and Attitudes (SWAA)

- WFH (Work From Home) Research and the SWAA were founded in May 2020 in response to the dramatic impact of COVID-19 on working arrangements.
- The SWAA is a monthly online survey run jointly by the University of Chicago, ITAM (Mexico), MIT, and Stanford University.
- Results, micro data, survey instruments, and more are freely available at www.WFHresearch.com

Barrero, Jose Maria, Nicholas Bloom, and Steven J. Davis, 2021. "Why working from home will stick," National Bureau of Economic Research Working Paper 28731.

SWAA Data

- Monthly online survey since 2020.
- Target population:
 - U.S. residents, 20-64, who earned \geq \$10K in 2019
 - 140K samples
 - Weighted to match 2010-2019 CPS worker shares in age-sex-education-earnings



SWAA March 2023 Updates 1 Jose Maria Barrero, Nicholas Bloom, Shelby Buckman, and Steven J. Davis 6 March 2023

SWAA Work from Home – During Pandemic

- The survey asks work status for each day of a week
 - workstatus_monday “Monday of last week, did you work a full day (6+ hours), and if so where?”
 - 1) Did not work, 2) Worked from home, 3) Worked on employer or client premises
- For modeling purpose, we focus on weekday (Mon-Fri) analysis

For each day *last week*, did you work a full day (6 or more hours), and if so where?

Day of the week	Did not work 6 or more hours	Worked <u>from home</u>	Worked at <u>employer or client site</u>
Monday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuesday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wednesday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thursday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saturday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sunday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Did not work 6 or more hours Worked from home Worked at employer or client site

SWAA Work from Home – After Pandemic

A question asks surveyed workers about their "Employer's planned number of paid WFH days after COVID"

wfh_days_postCOVID_boss_ss 1 "Rarely or never"

wfh_days_postCOVID_boss_ss 2 "1 day per week"

wfh_days_postCOVID_boss_ss 3 "2 days per week"

wfh_days_postCOVID_boss_ss 4 "3 days per week"

wfh_days_postCOVID_boss_ss 5 "4 days per week"

wfh_days_postCOVID_boss_ss 6 "5 day per week"

wfh_days_postCOVID_boss_ss 7 "No clear plans from employer"

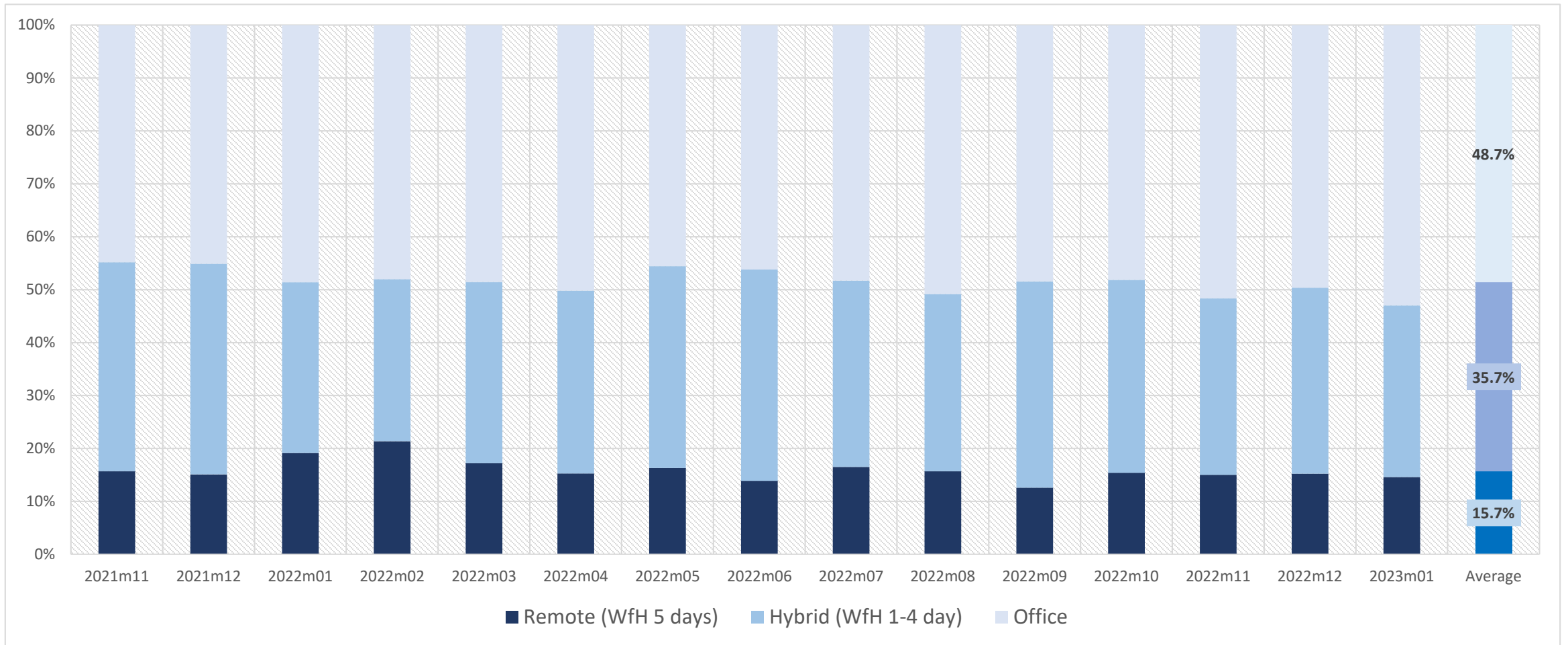
wfh_days_postCOVID_boss_ss 8 "No employer"

Analysis Approach

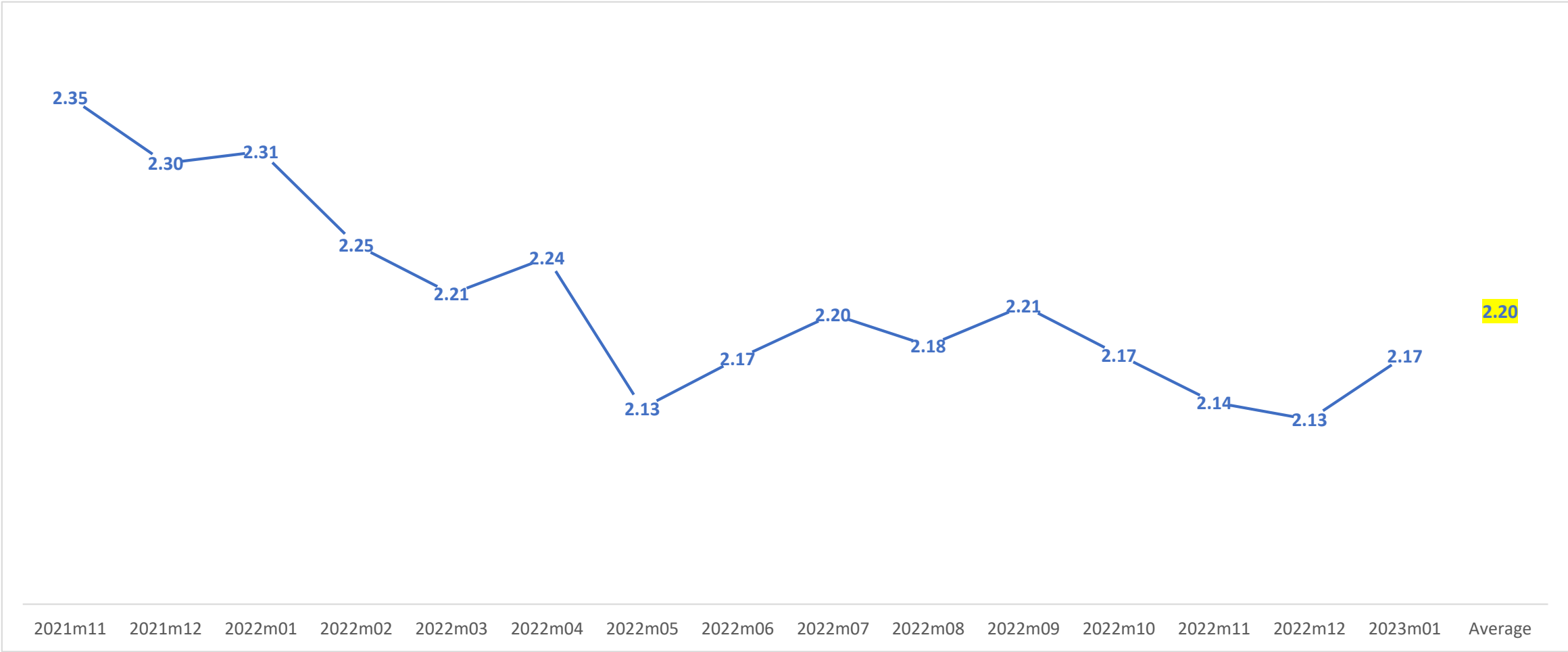
- % of **workers** by WfH modes (Remote/Hybrid)
- Number of **WfH days per week** for hybrid workers
- % of **work trips** by WfH Modes

- During Pandemic:
 - data between 11/2021 ~ 01/2023
- After Pandemic
 - data between 10/2022 ~ 01/2023
- Analyze the data by 3 geographic areas (US, CA, LA), industry, and income

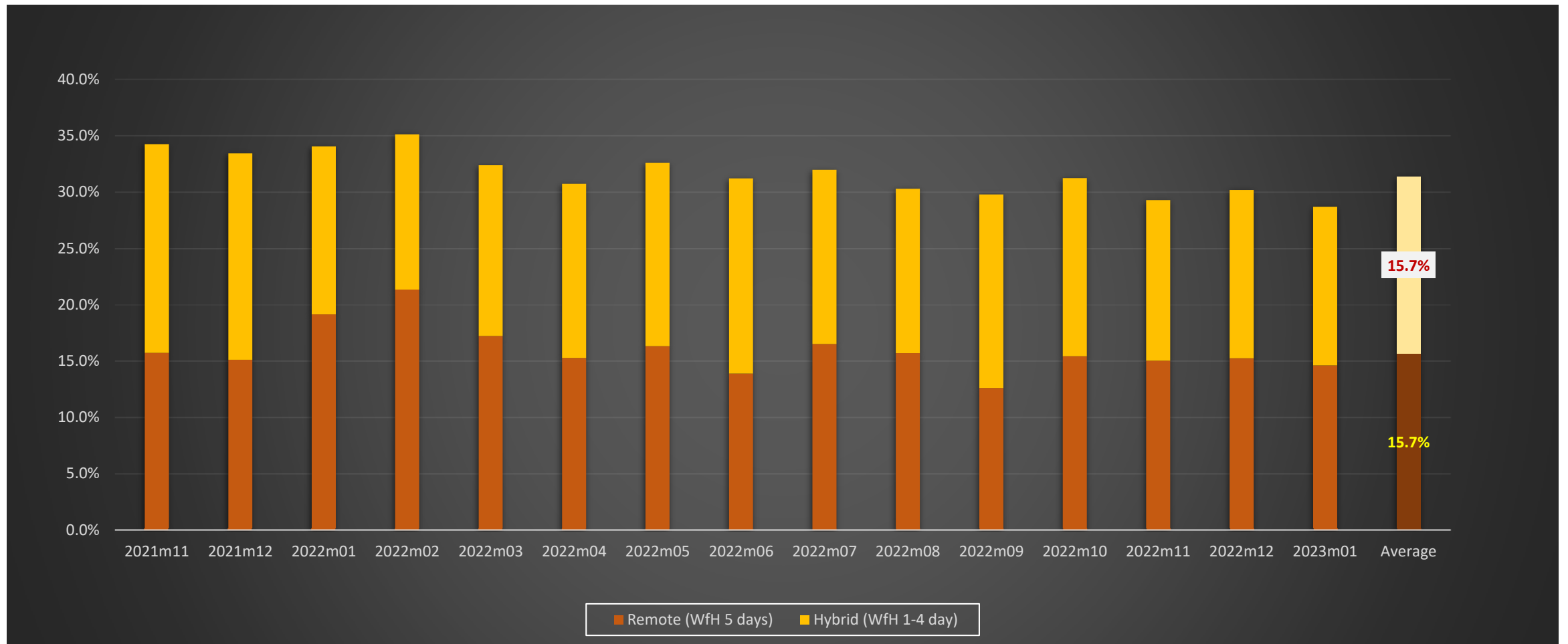
% Workers by WfH Modes During the Pandemic (US)



Average WfH Days per Week (Mon.-Fri.) for Hybrid Workers



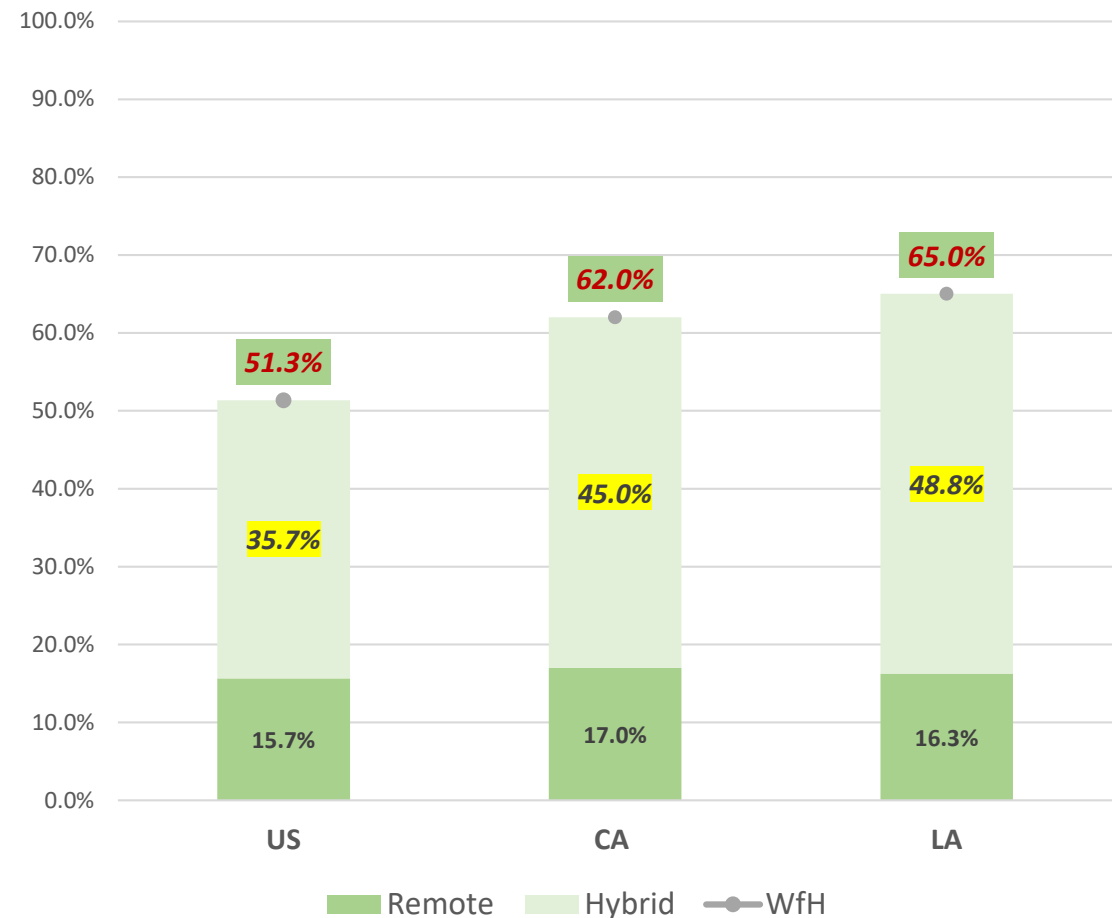
% Work Trips by WfH Modes



% Workers by Work Modes – by 3 Geographic Areas

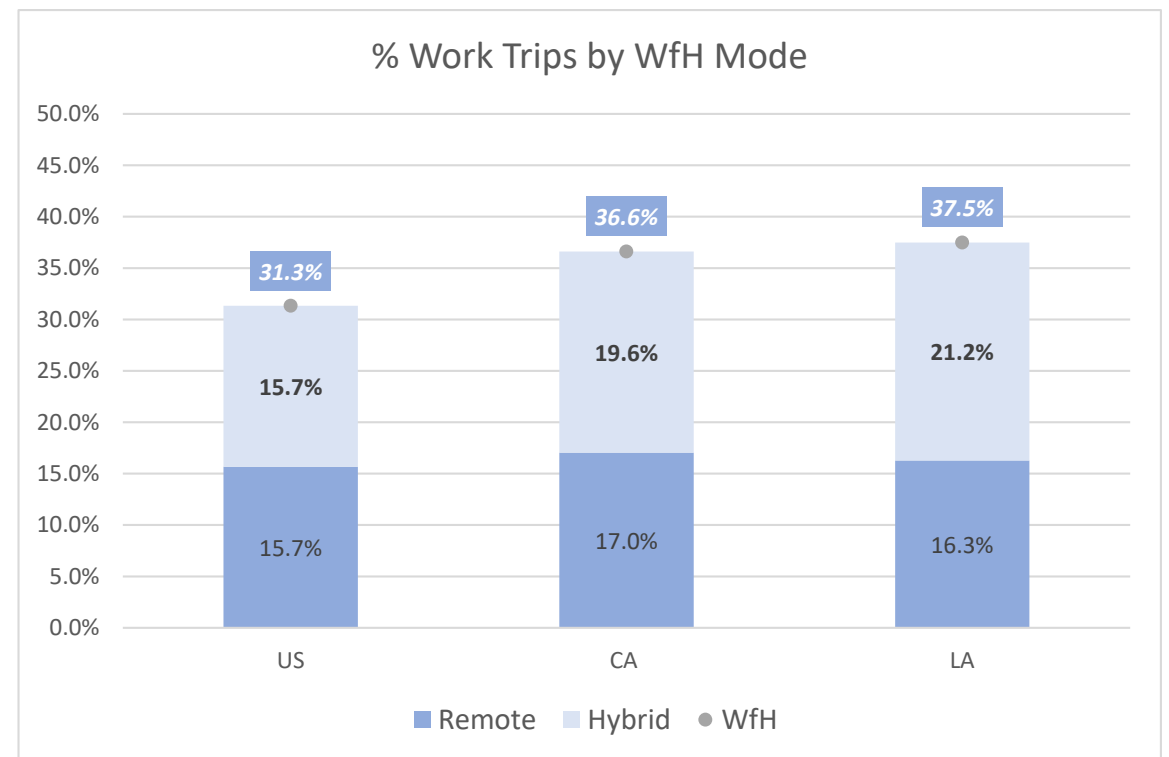
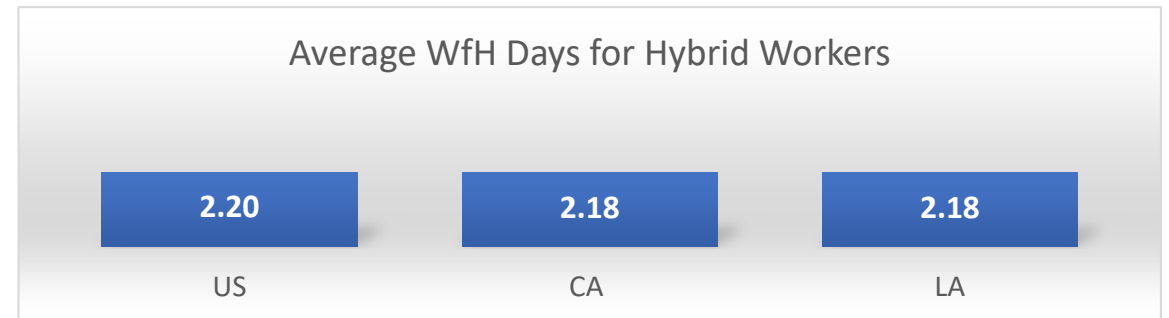
Comparing U.S. with the samples from California and Los Angeles:

- CA and LA tend to have a higher % of hybrid workers and total WfH workers
- % of Remote workers is consistent with ACS
 - SCAG: 16.8% (2020); 19.3% (2021)

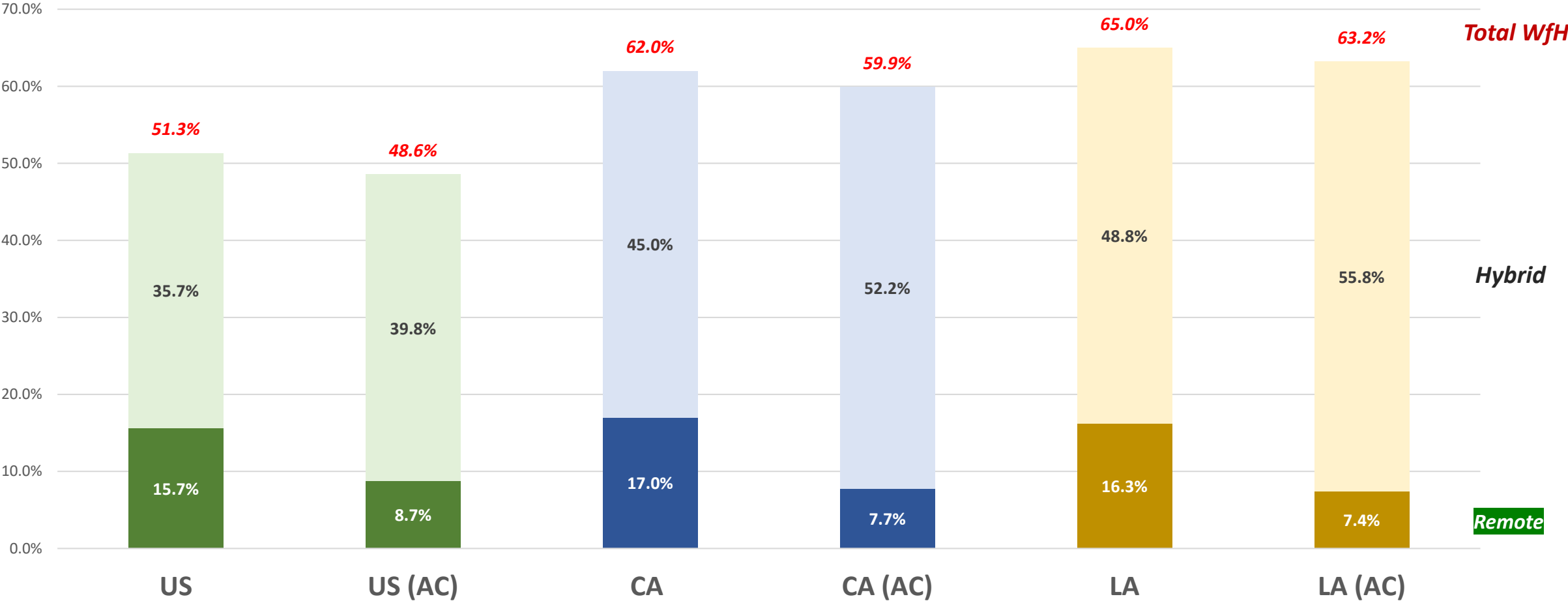


% Work Trips by WfH Modes – by 3 Geographic Areas

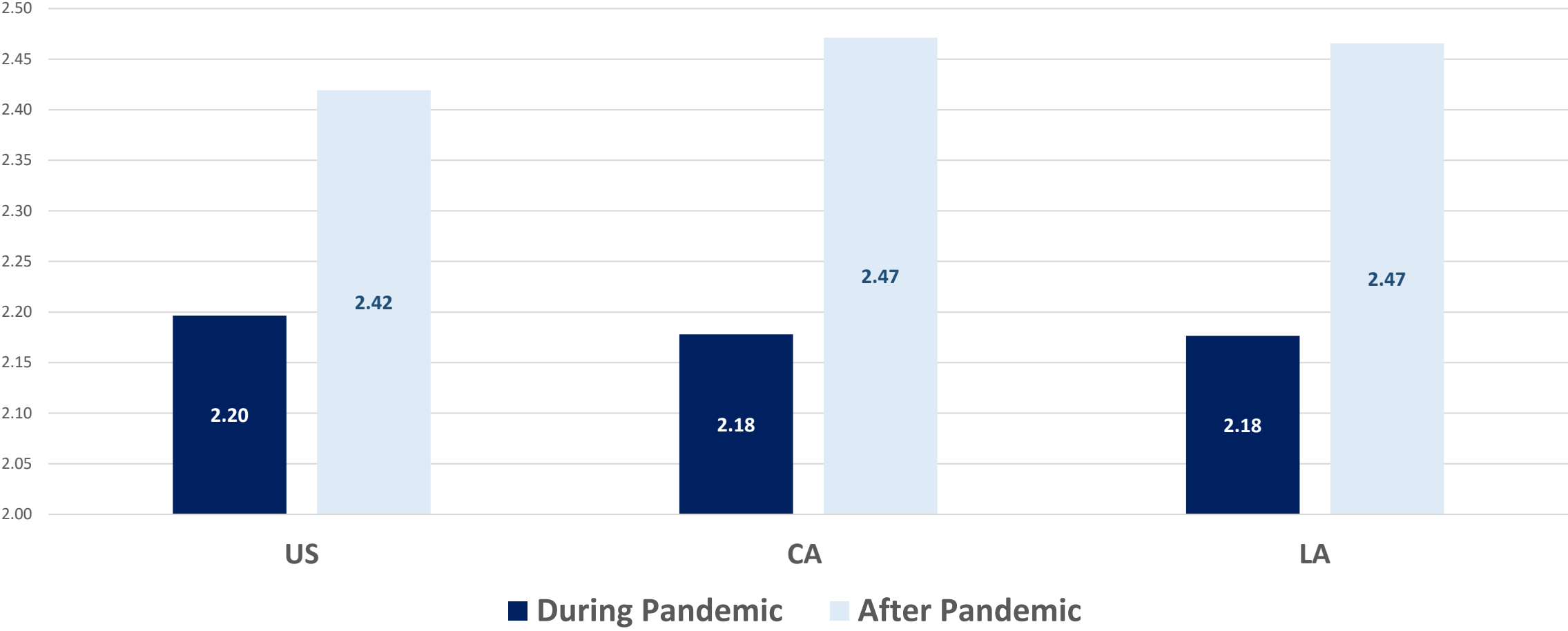
- Average number of WfH days per week for hybrid workers is similar across the U.S., CA, and LA
 - about 2.2 days per week
- % of Hybrid and Total WfH trips is higher in CA and LA than in the U.S.



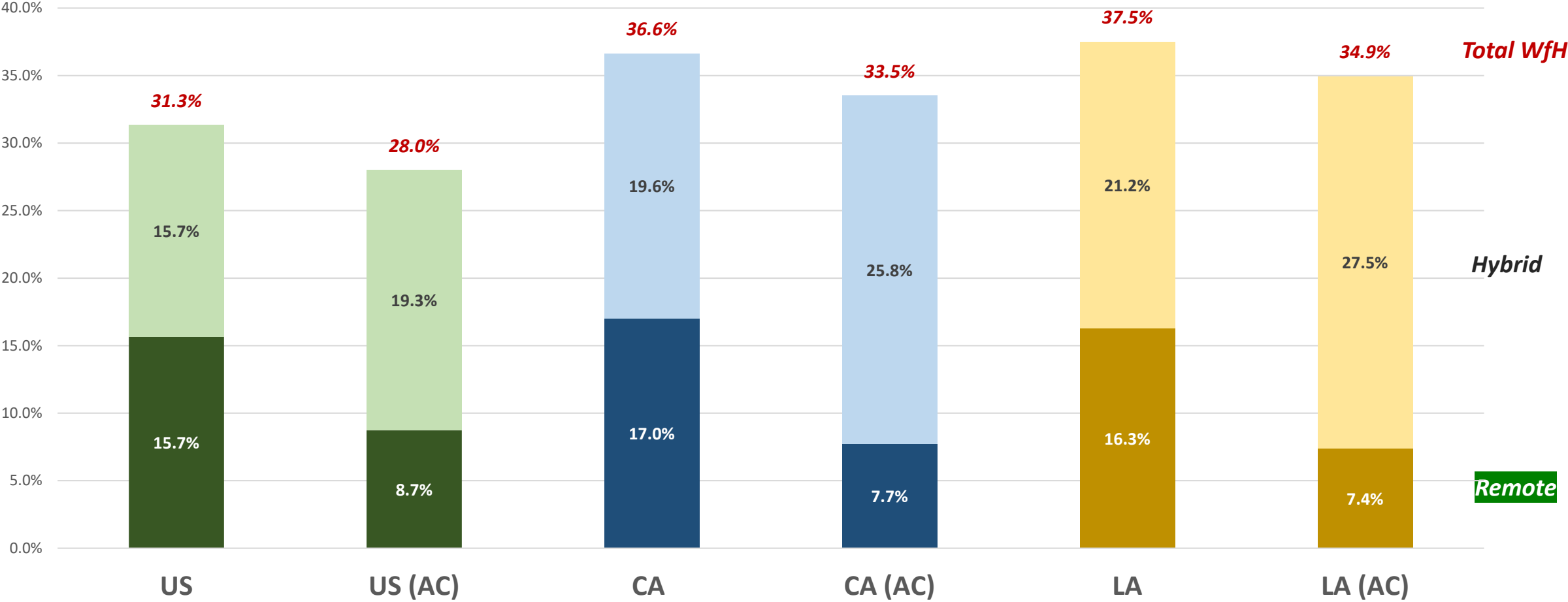
% Workers by WfH Modes – After Covid (AC)



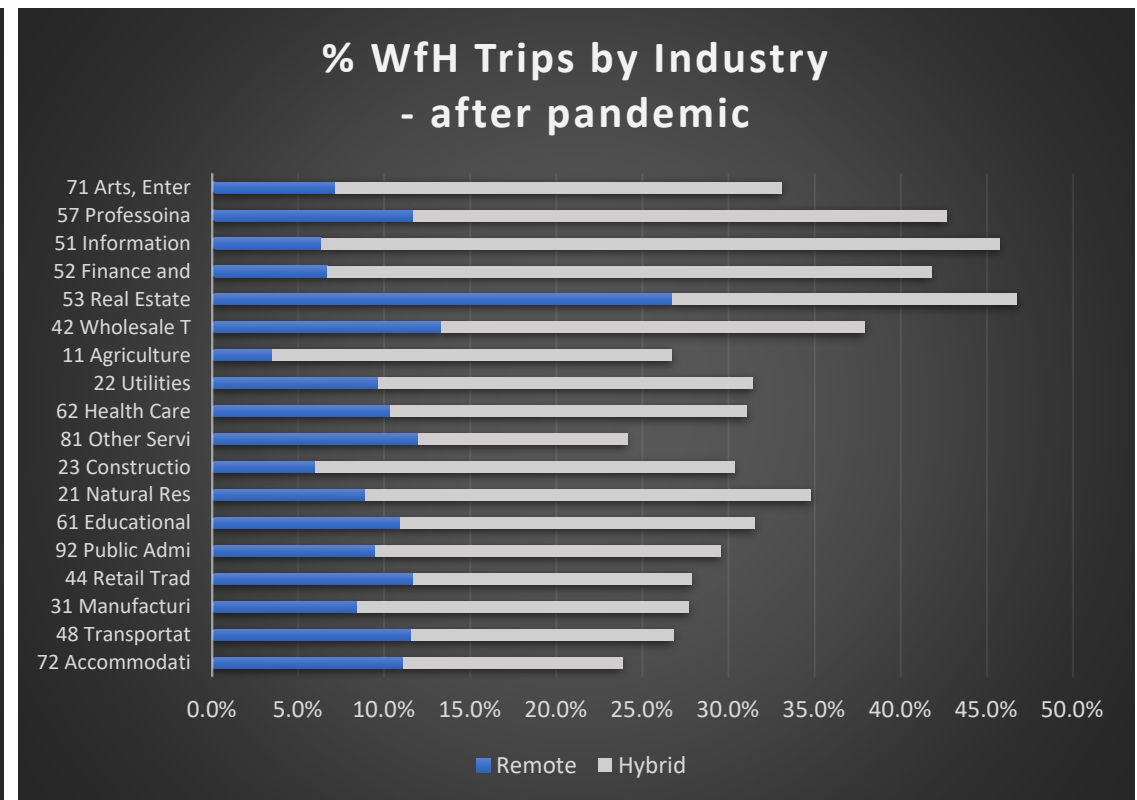
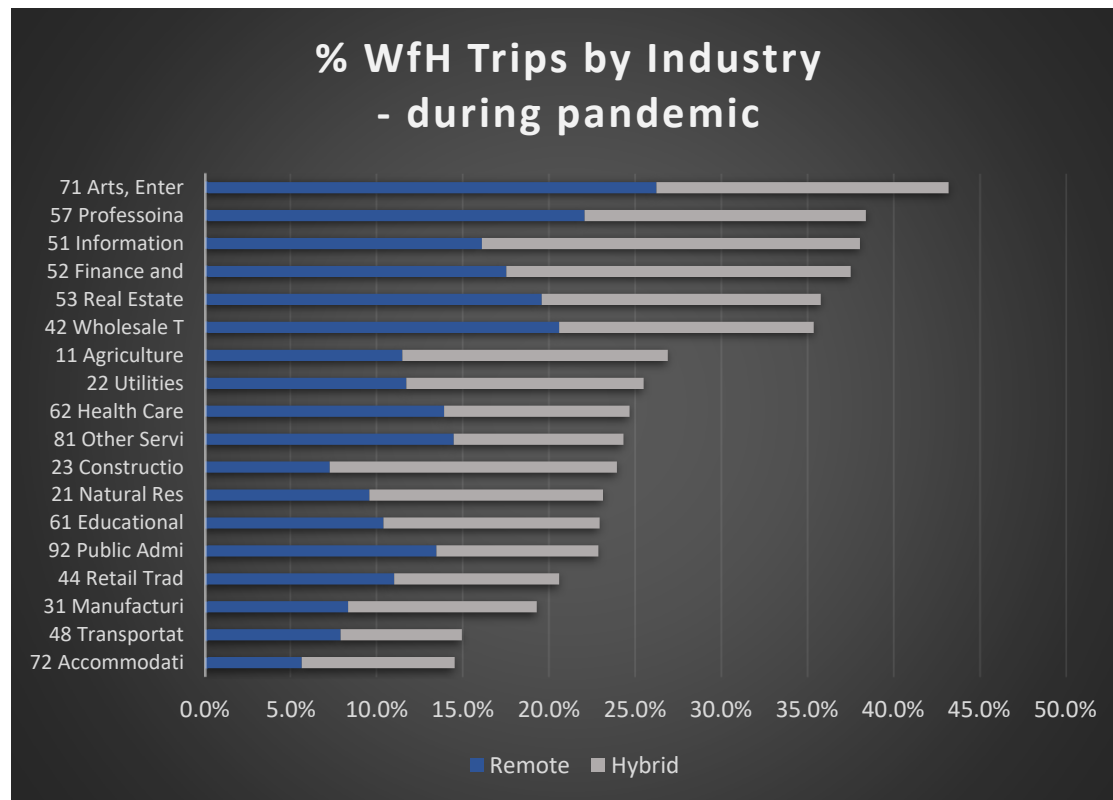
Average WfH Days for Hybrid Workers



% Work Trips by WfH Modes – After Covid (AC)

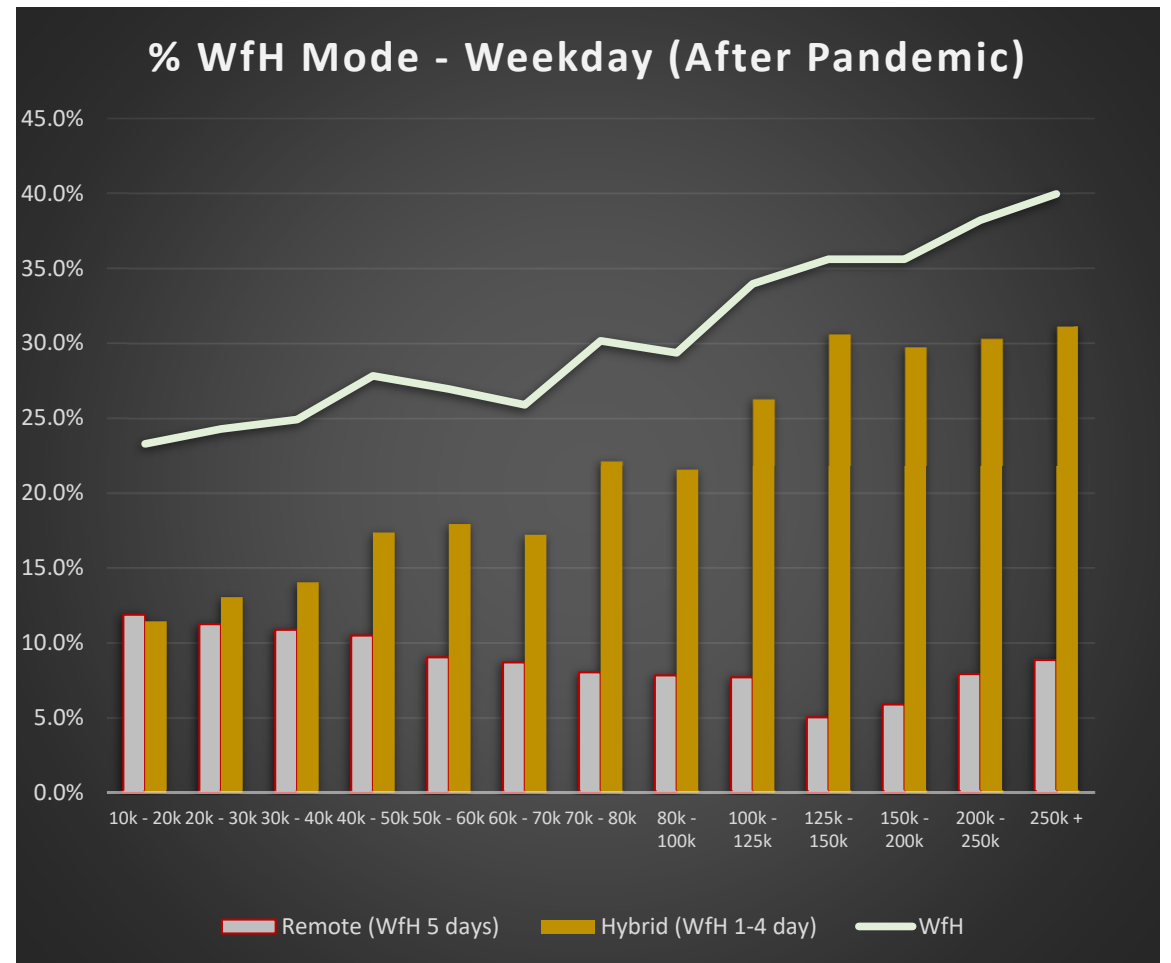
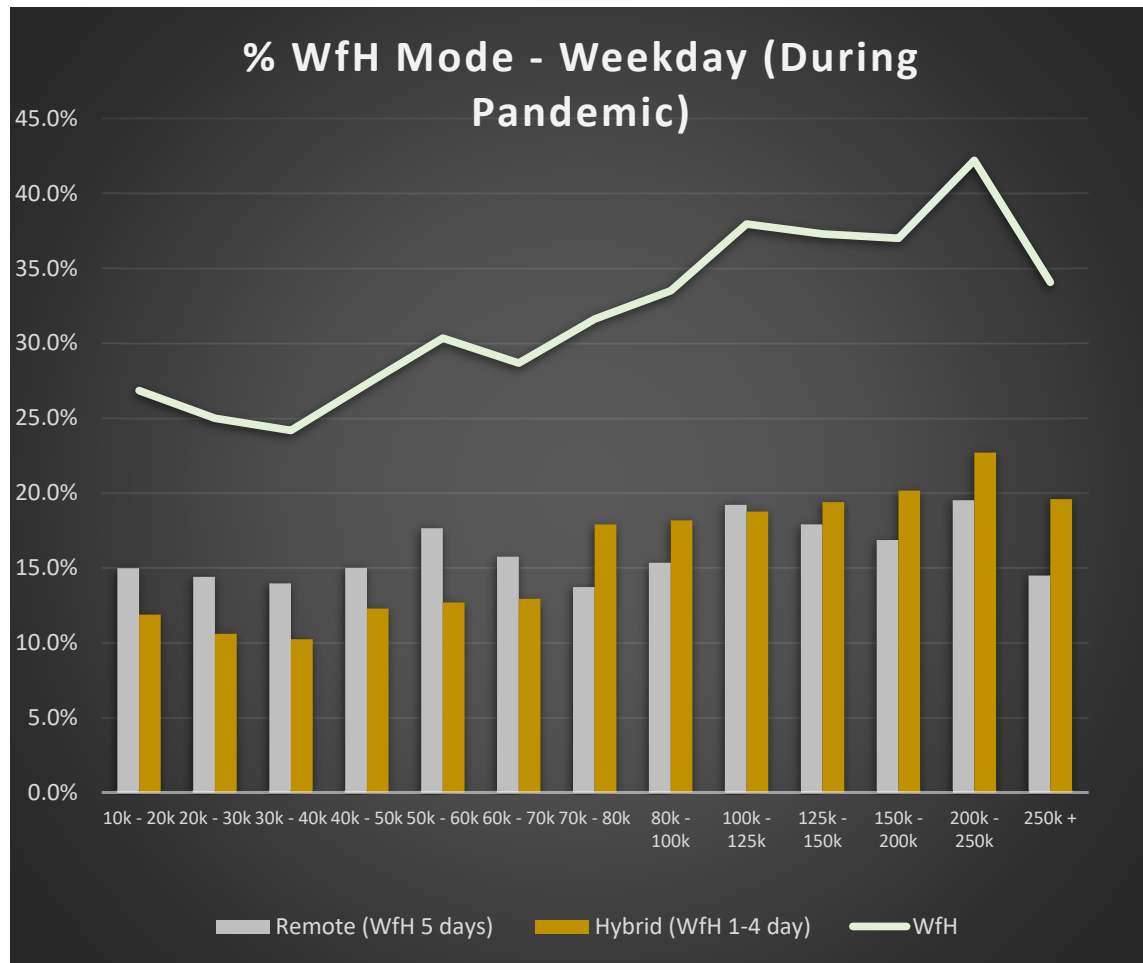


% Work Trips by WfH Modes by Industry

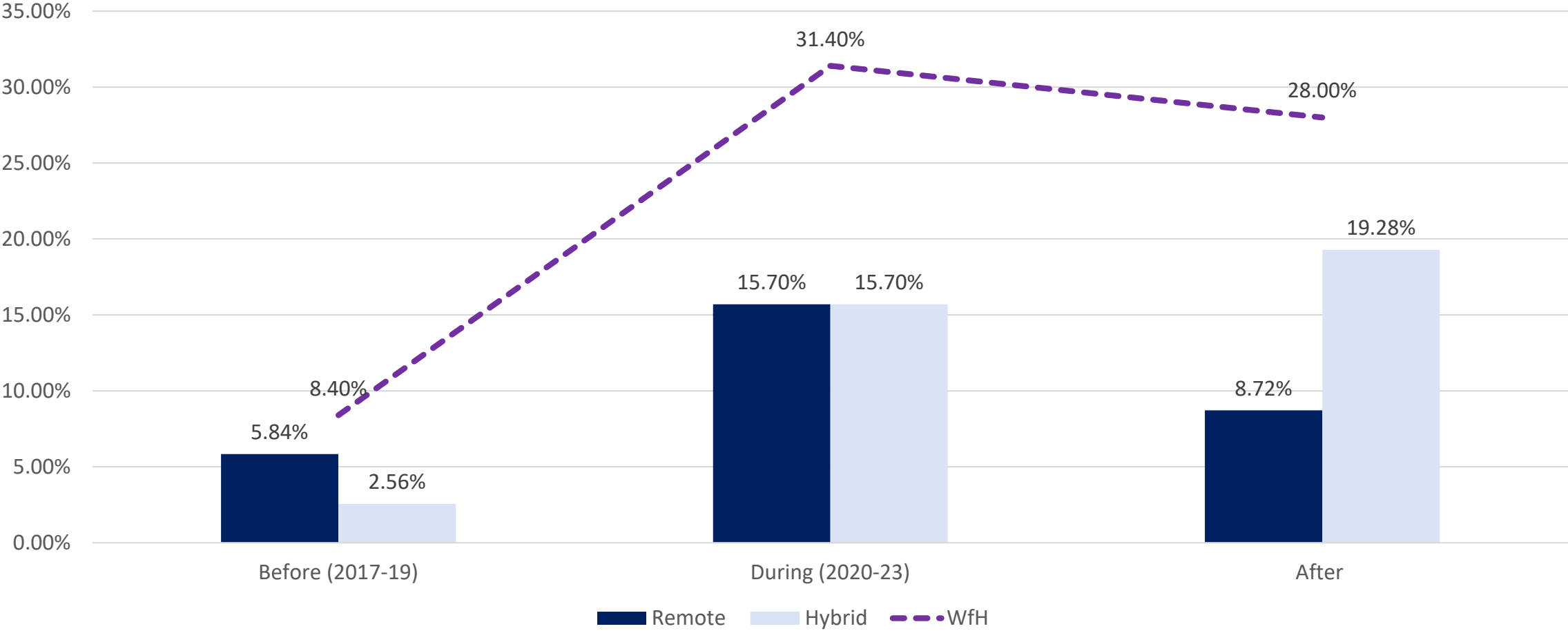


Lower % WfH trips: accommodation/food, transportation, manufacturing, retail
 Higher % WfH trips: professional services, information, finance/real estate

% of Work Trip by WfH Modes by Income



SWAA Summary: % Work Trips by WfH Modes



UC Davis Transportation Survey

- SCAG joined UD Davis travel survey data collection
 - During 2020-2021
- The survey includes questions for working at home:

How often did you generally work at Home or at Primary Workplace

- Prior to the pandemic (before March 2020)
- During the pandemic – 2021 (survey)
- After to the pandemic (a year from now)

UC Davis Transportation Survey

6. In the **months just prior to the pandemic (before March 2020)**, please indicate how often you generally went to each of the following places for work or school.

<i>Just prior to the pandemic, I used to work/study at...</i>	<i>Never</i>	<i>Less than once a month</i>	<i>1-3 times a month</i>	<i>1-2 times a week</i>	<i>3-4 times a week</i>	<i>5 or more times a week</i> ¹
a. ... primary workplace/school location	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
b. ... other workplace/school location/customer location	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂ ⁴	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ ³	<input type="checkbox"/> ₅ ²
c. ... home	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
d. ... temporary locations (e.g., coffee shops, parks, public library)	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

Office

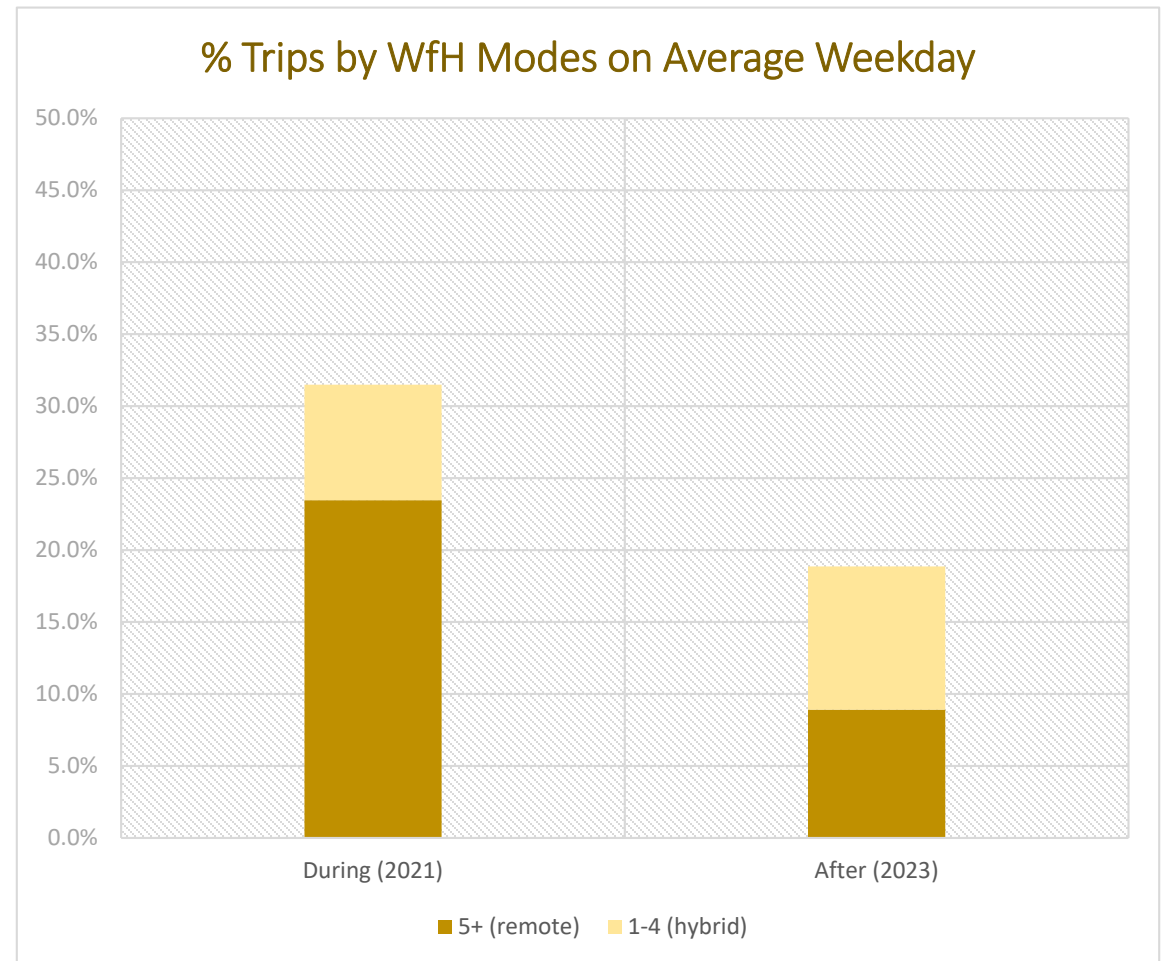
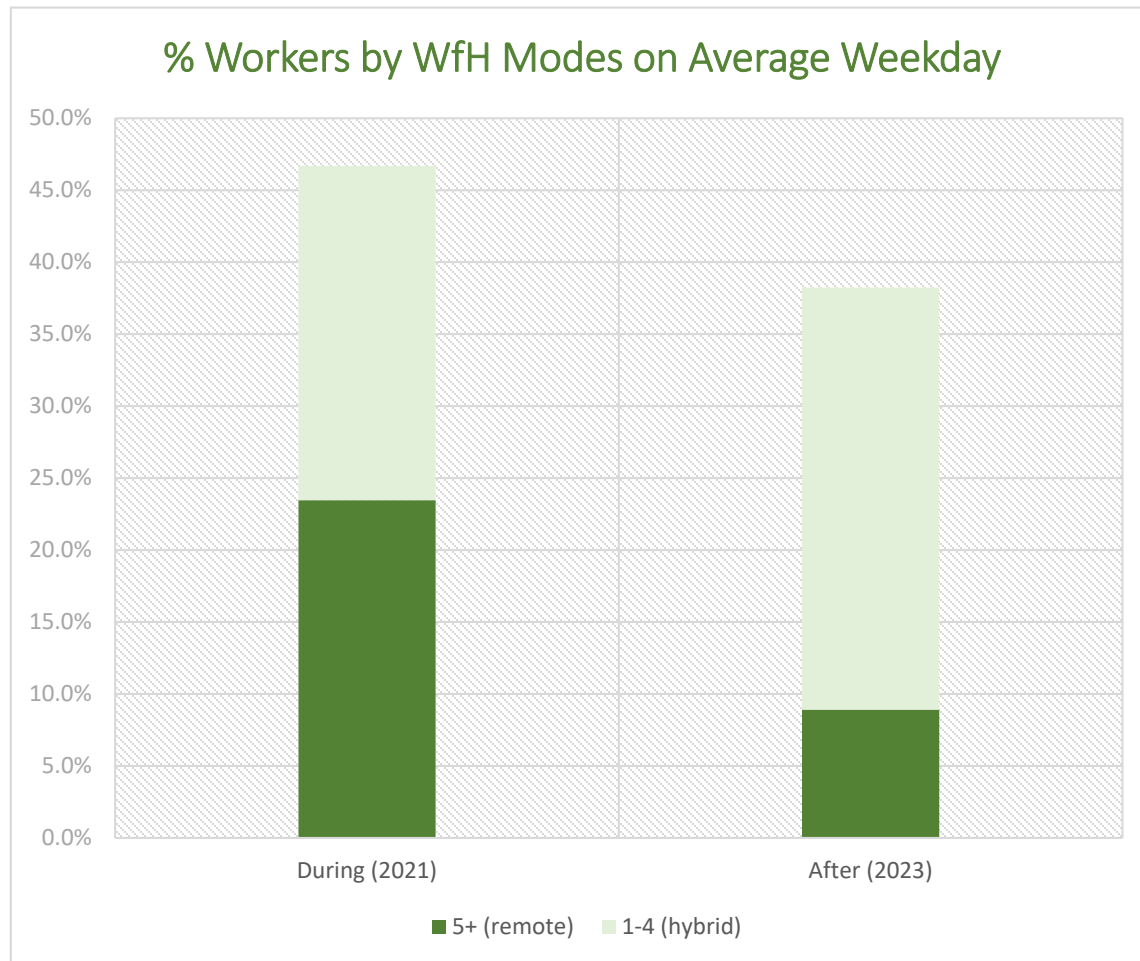
Remote

Hybrid

Analysis Approach

- Using Summer 2021 Survey (SCAG samples)
 - 2,533 sample workers
- This survey tends to over-represent workers that are able to work remotely
 - The issue was addressed by research team.
- Our analysis focuses on W@H patterns
 - Comparing trends of work at home between during and post-pandemic.

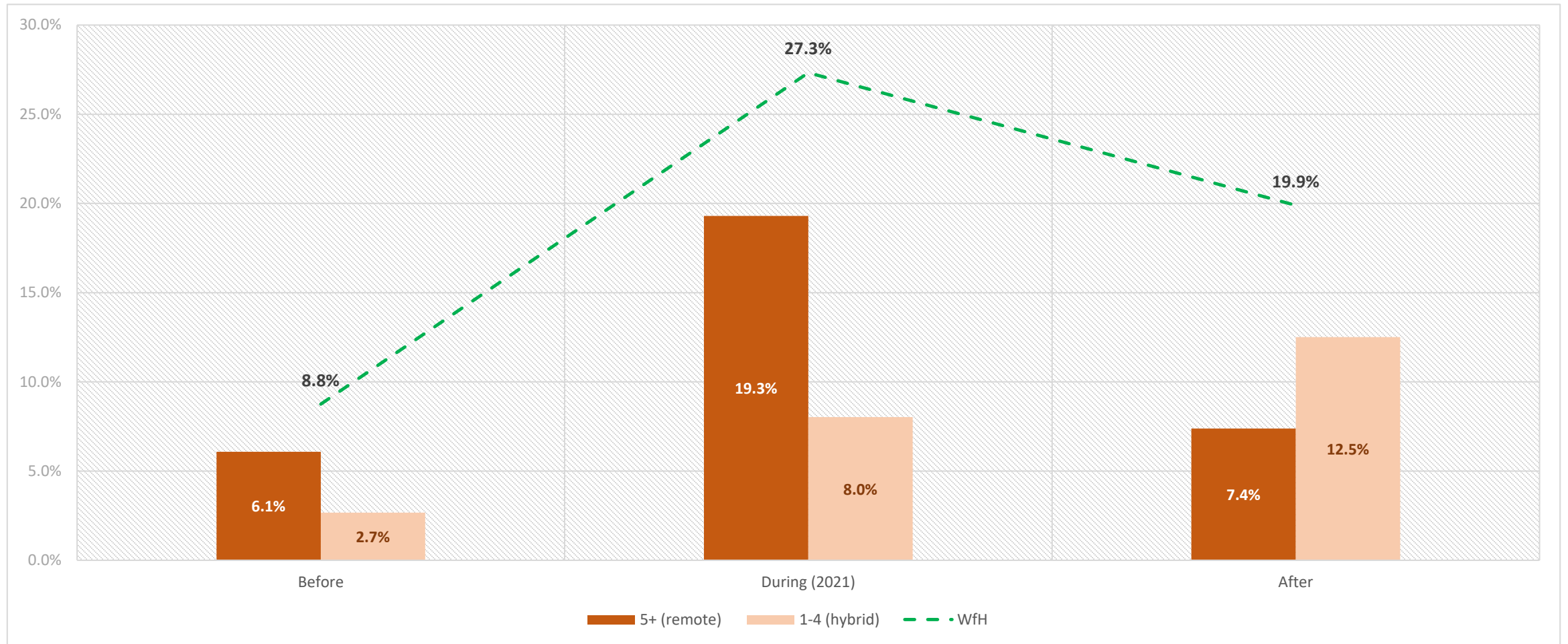
Workers/Work Trips by WfH Modes



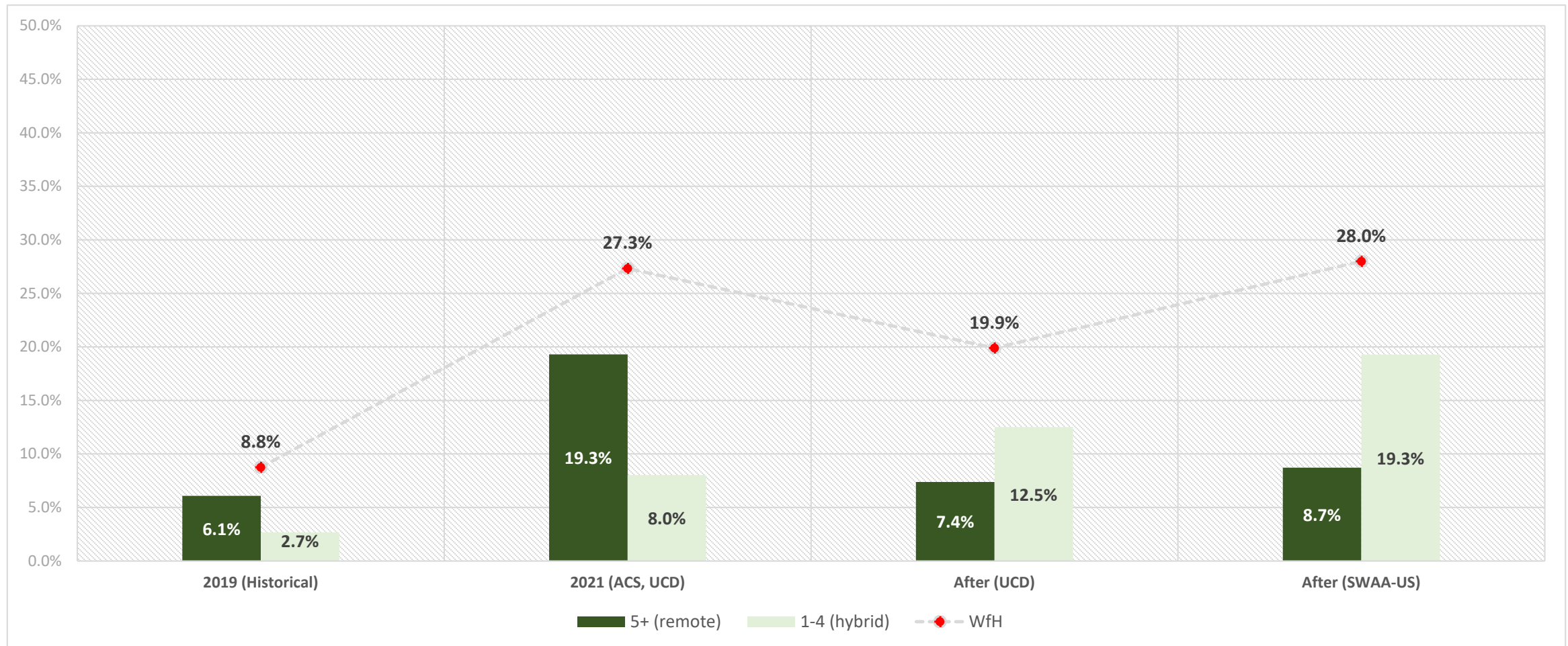
Approach and Assumptions

- Before Covid (2019)
 - Remote: ACS (6.1%); Hybrid: NHTS (2.7%)
- During Covid (2021)
 - Remote: ACS (19.3%)
 - Hybrid: UCD survey (and SWAA WfH days)
- After Covid
 - Remote: ACS data & UCD survey trends
 - Hybrid: UCD survey (and SWAA WfH days)

UCD Survey Summary: % Work Trips by WfH Modes



Final Data Summary: % Work Trips by WfH Modes



Summary/Conclusion

- As a result of the pandemic, many workers were transitioned from working in offices to working remotely from home, either as fully remote or hybrid workers.
- As the pandemic subsides, it is expected that remote workers will return to the office as hybrid workers.
- Notably, the percentage of workers who work from home is much higher post-pandemic than pre-pandemic.



THANK YOU

Hsi-Hwa Hu

hu@scag.ca.gov