



Thursday 24th March 2022

Horizons Program 4.0 Shaping the Technical Future of Rail – Forum 1

Rail Industry Safety and Standards Board

Deakin Downtown, Melbourne Australia

COVID Shaping Rail

Ridership Impacts of COVID-19; Monash PTRG Research Update

Prof Graham Currie FTSE

Public Transport Research Group

Monash Institute of Transport Studies

Monash University, Australia



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STUDIES



Introduction

Impact

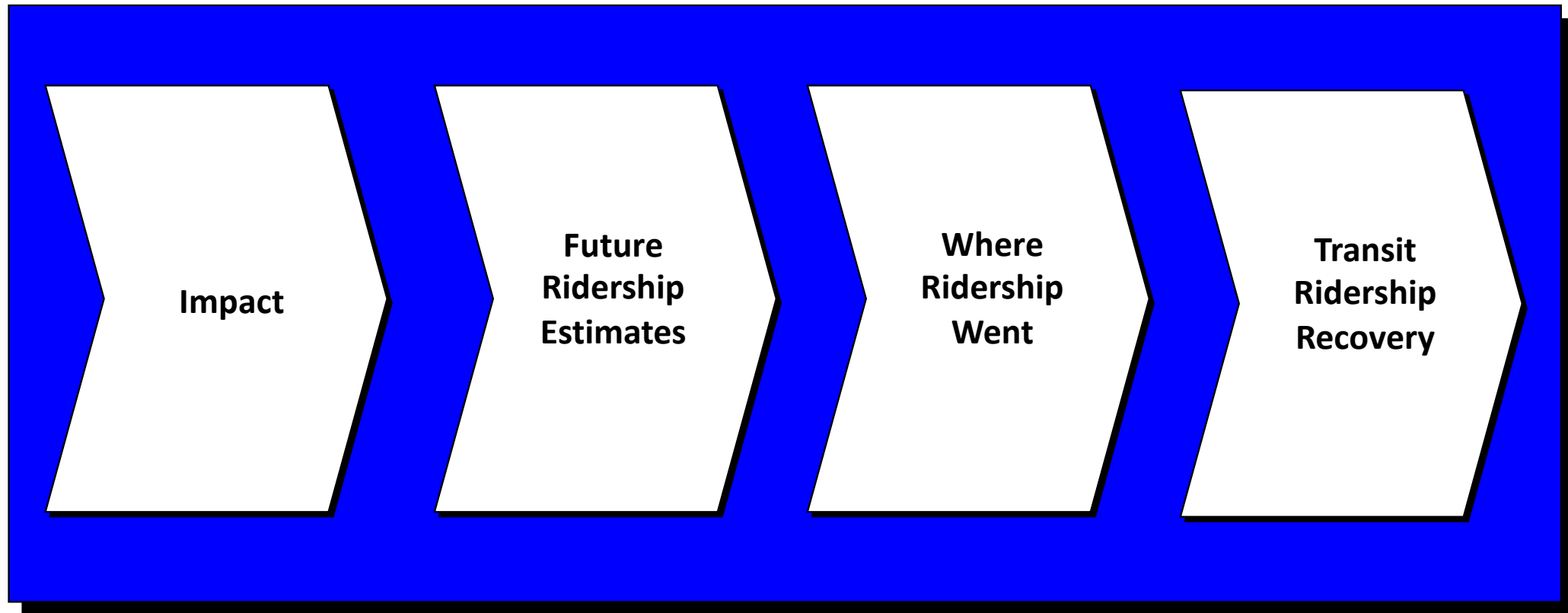
Future Ridership Estimates

Where Ridership Went

Transit Ridership Recovery



This presentation updates PTRG research to understand the long term impacts of COVID-19 on public transport travel in cities



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Future Ridership Estimates

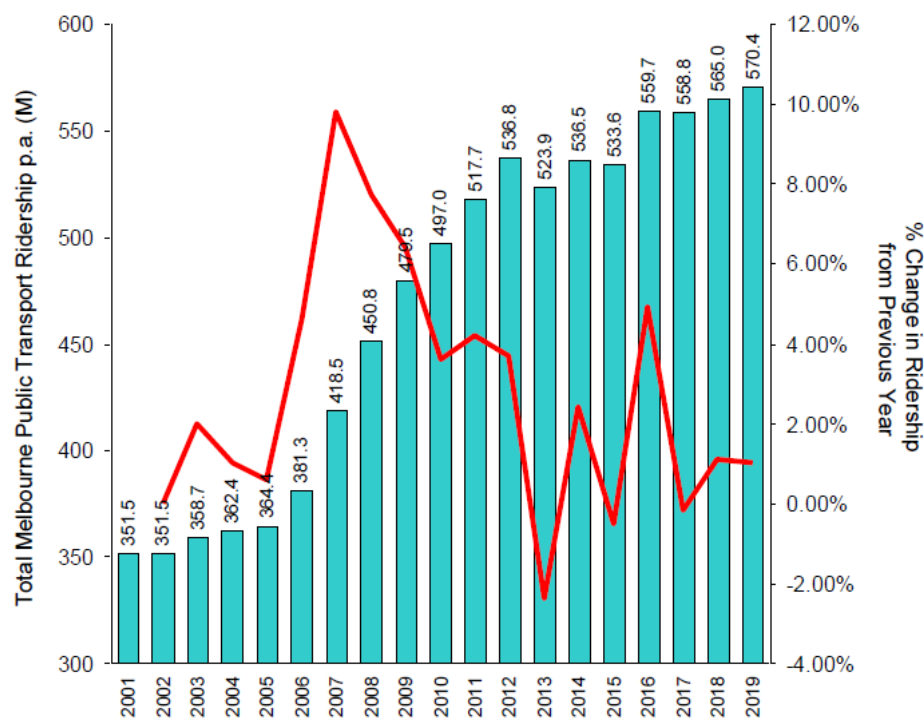
Transit Ridership Trajectories

Transit Ridership Recovery



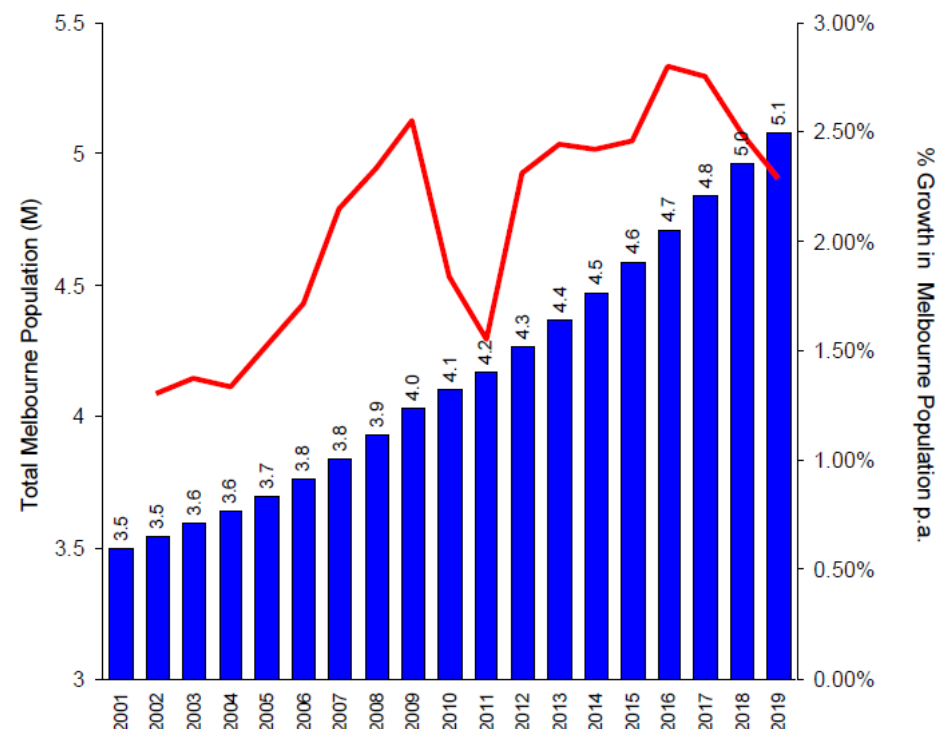
Public transport ridership in Melbourne has been BOOMING – fuelled by a booming and increasing population growth rate

Historical Change in Melbourne Public Transport Ridership



Note:
(1) Public Transport Victoria, Victorian Department of Transport and Transport Victoria Annual Reports

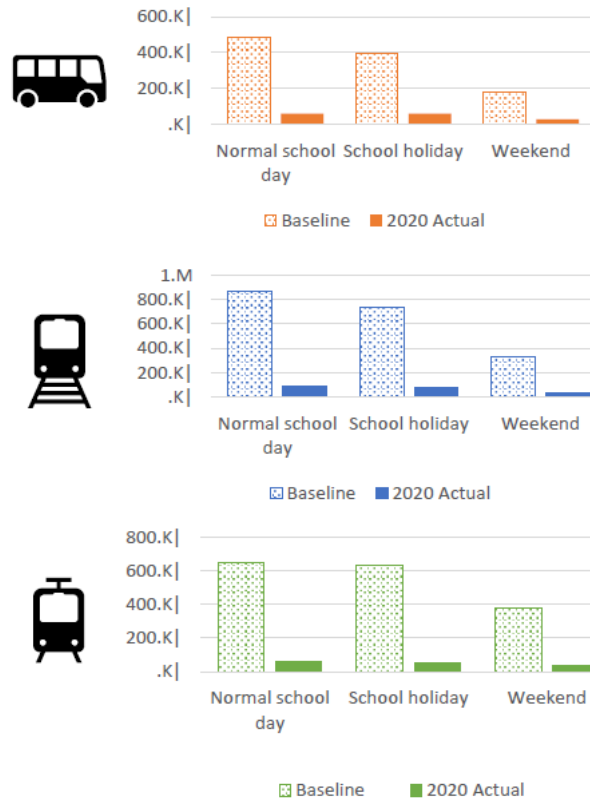
Historical Change in Melbourne Population



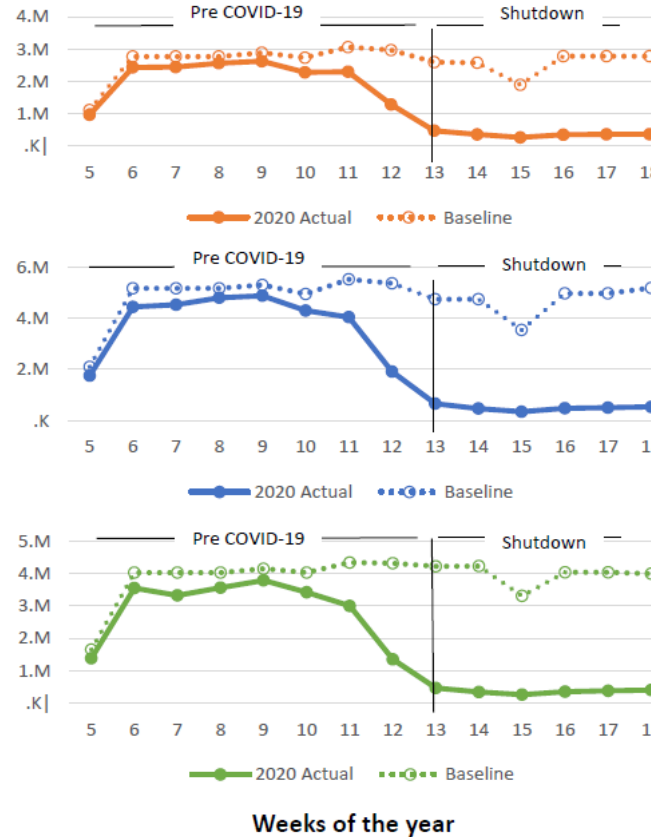
Note:
(1) Australian Bureau of Statistics – Estimated Regional Population

Then Covid-19, shutdowns and social distancing reduced ridership by over 90%

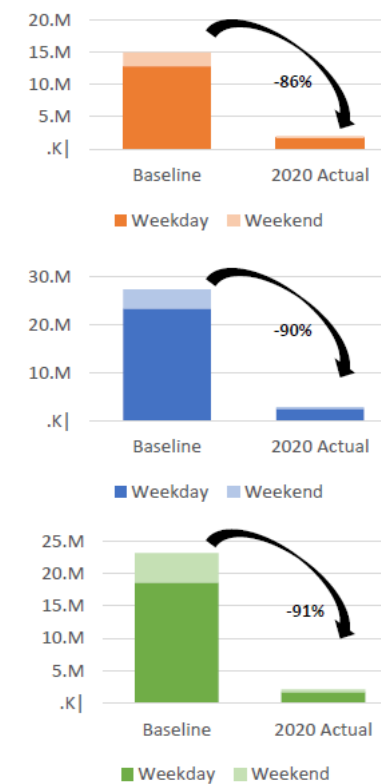
1. Average daily trips during shutdown (thousands)



2. Average weekly trips (millions)

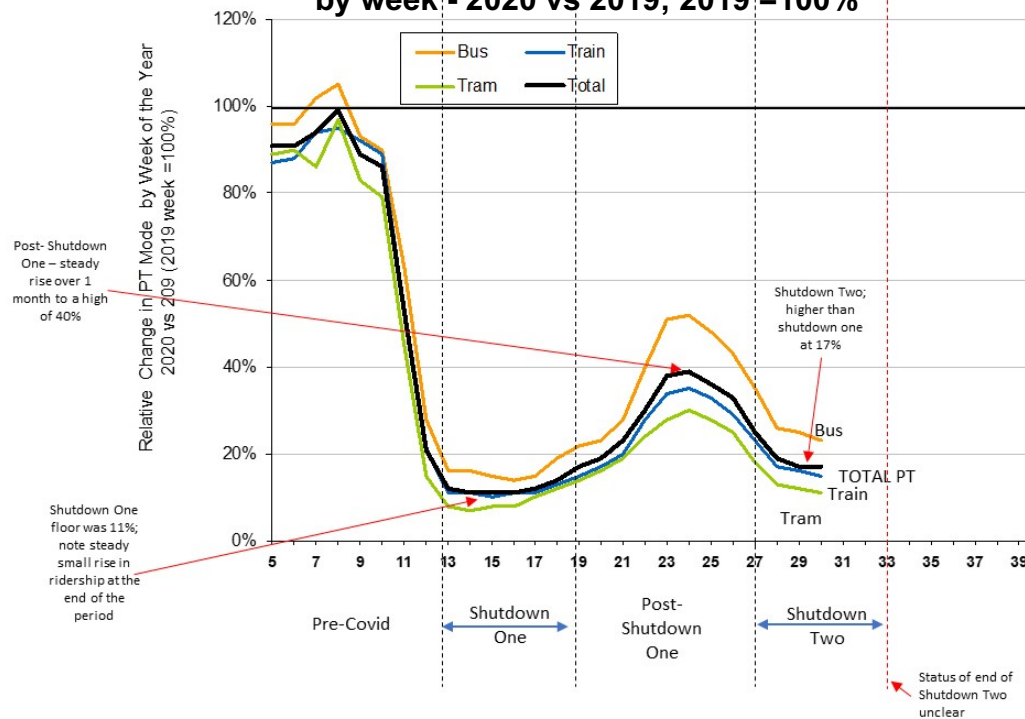


3. Total trips during shutdown (millions)



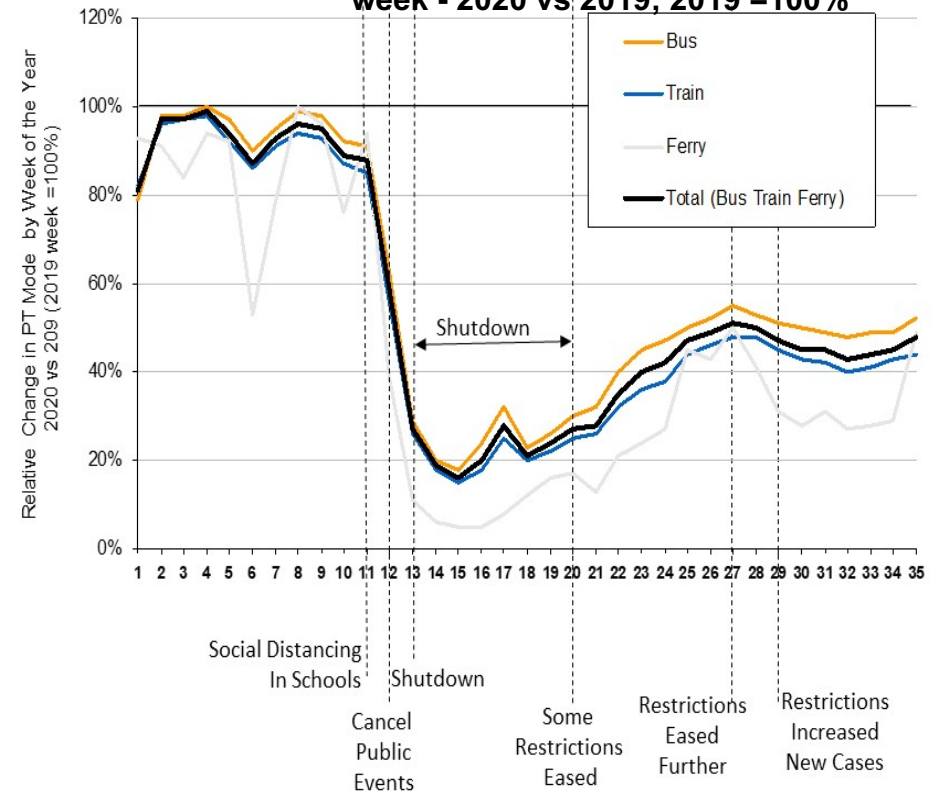
Melbourne & Sydney ridership fell during lockdowns then recovered a bit out of lockdowns, but were still well below pre-Covid levels – bus has always done better than rail

Changes in MELBOURNE Total Public Transport Travel by Mode by week - 2020 vs 2019; 2019 =100%



- Note:**
- (1) Source: Department of transport 2020, Daily patronage estimates by mode, compared to baseline data, for February to July 2020
 - (2) Patronage baselines are based on monthly predictions for weekdays, Saturdays, Sundays and public holidays, derived from 2019 patronage estimates the same month and with a year on year growth rate applied. Baselines do not reflect fluctuations in patronage that occur throughout each month or week.

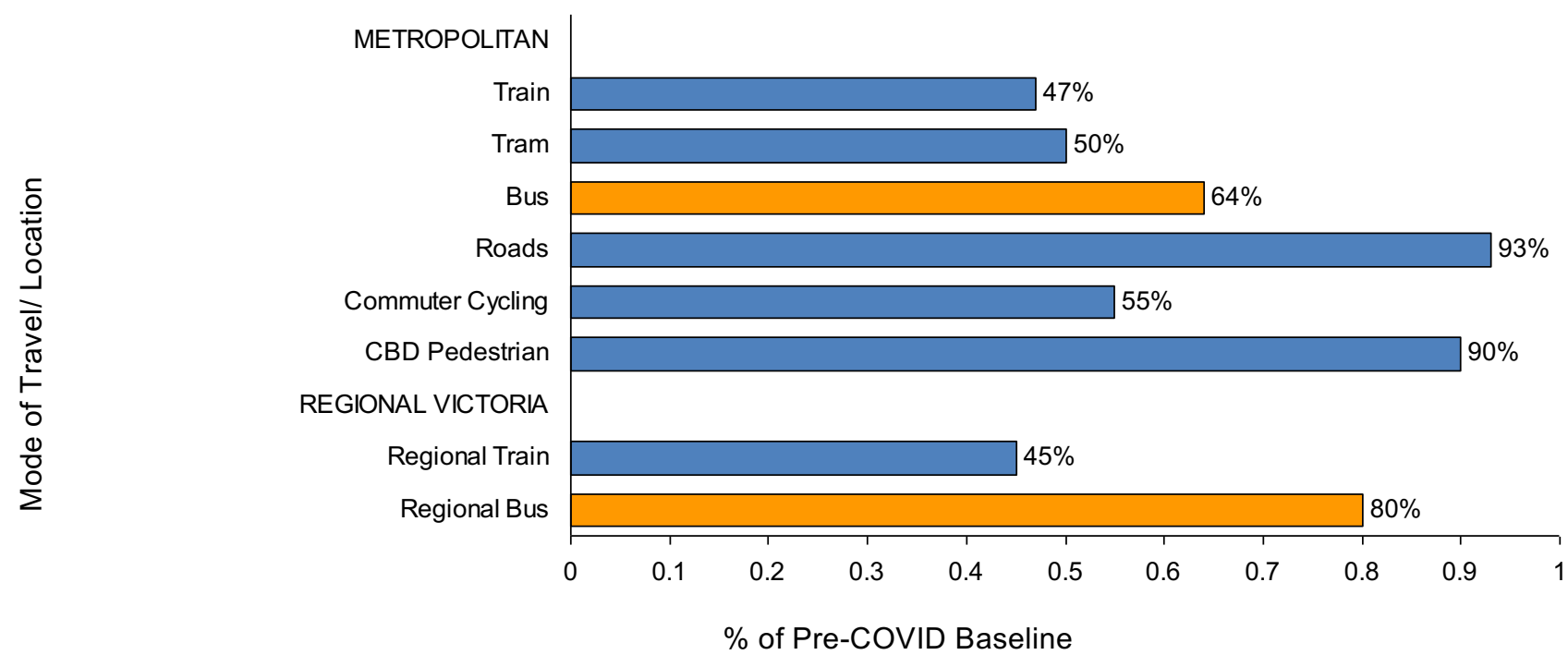
Changes in Sydney Total Public Transport Travel by Mode by week - 2020 vs 2019; 2019 =100%



Note: Data courtesy of the Transport for New South Wales
 Note: Light Rail and Metro not included as significant new service introduced in 2019 distorting effects pre-post Covid 19

Metro PT was at 52% baseline in Feb; bus has always been higher; particularly in regional Victoria

Current Travel Demand Status – Friday 25th Feb 2022



(Source: Department of Transport – Daily Dashboard 28-02-2022)

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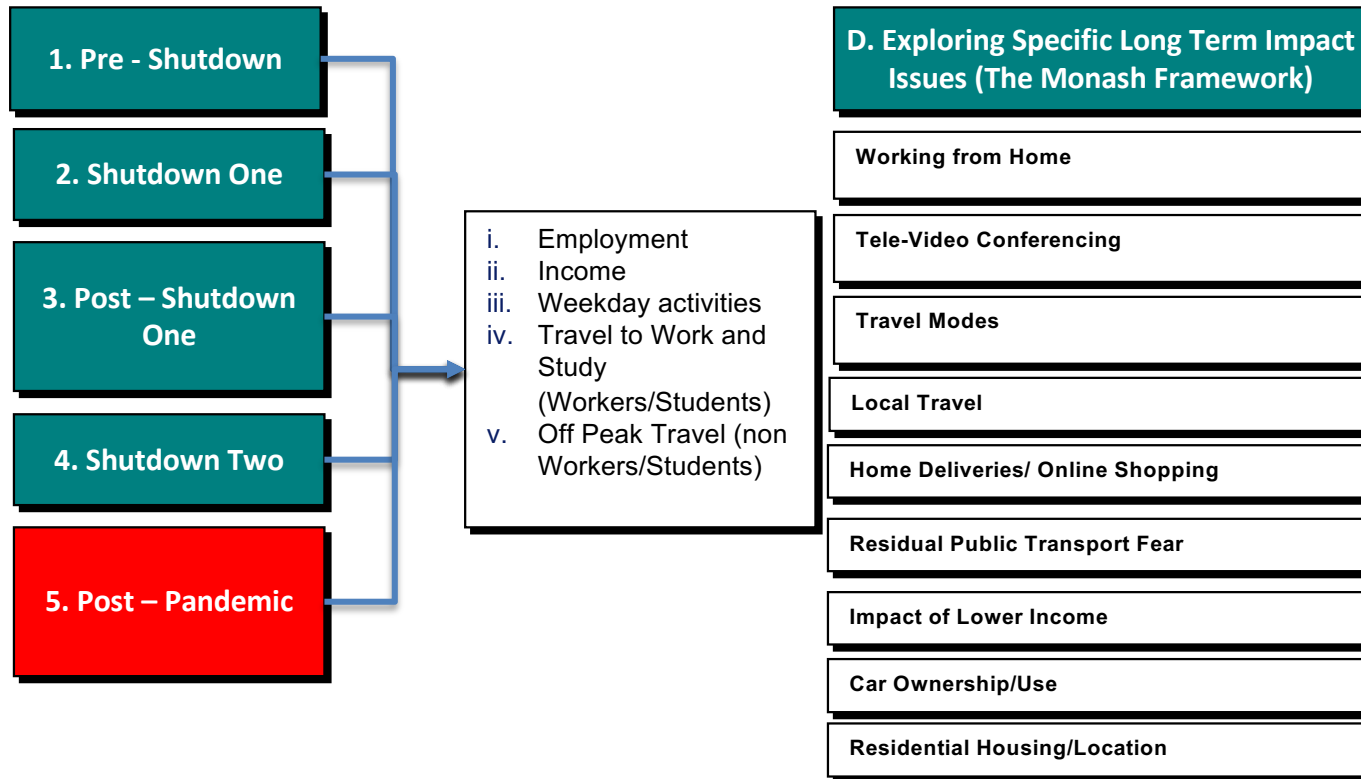
Where Ridership Went

Transit Ridership Recovery



Monash ran an online panel survey on self reported travel by Covid period & Specific Issues affecting long term travel ; AFTER THE VIRUS HAS GONE

Online Panel Survey Questionnaire – Areas Covered



Sample Frame¹

INNER MELBOURNE (n=700)					
Age Group	Annual Personal Income , Before Tax				Total
	Nil Income	Less than	Between	More than	
18-29	53	96	83	16	248
30 - 44	12	43	86	79	220
45 and over	12	89	62	69	232
Total	77	228	231	164	700

MIDDLE MELBOURNE (n=700)					
Age Group	Annual Personal Income , Before Tax				Total
	Target	Target	Target	Target	
18-35	37	73	92	36	238
36-54	17	43	87	90	237
55 and over	18	107	64	37	226
Total	72	223	243	163	701

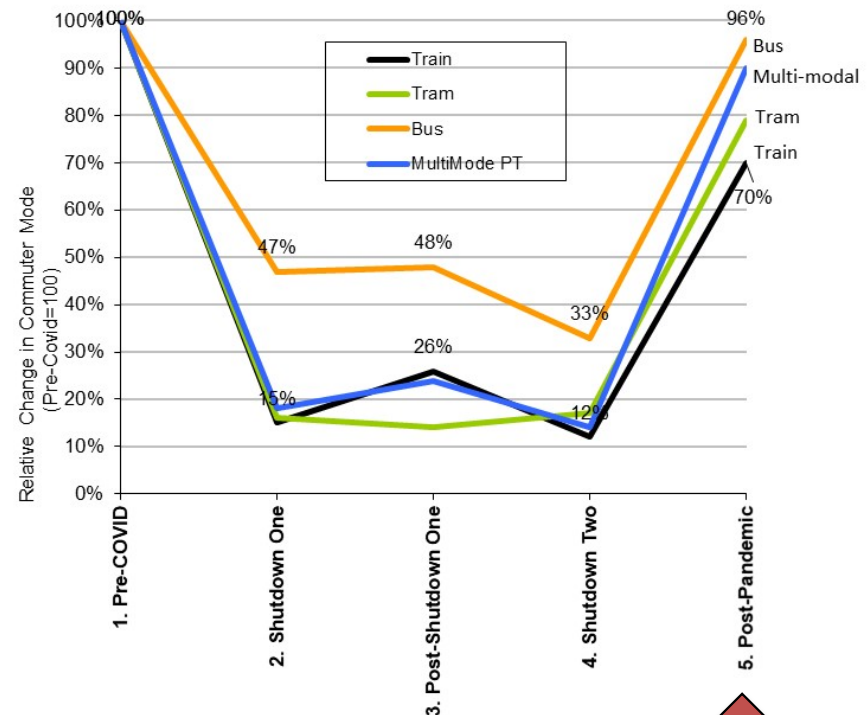
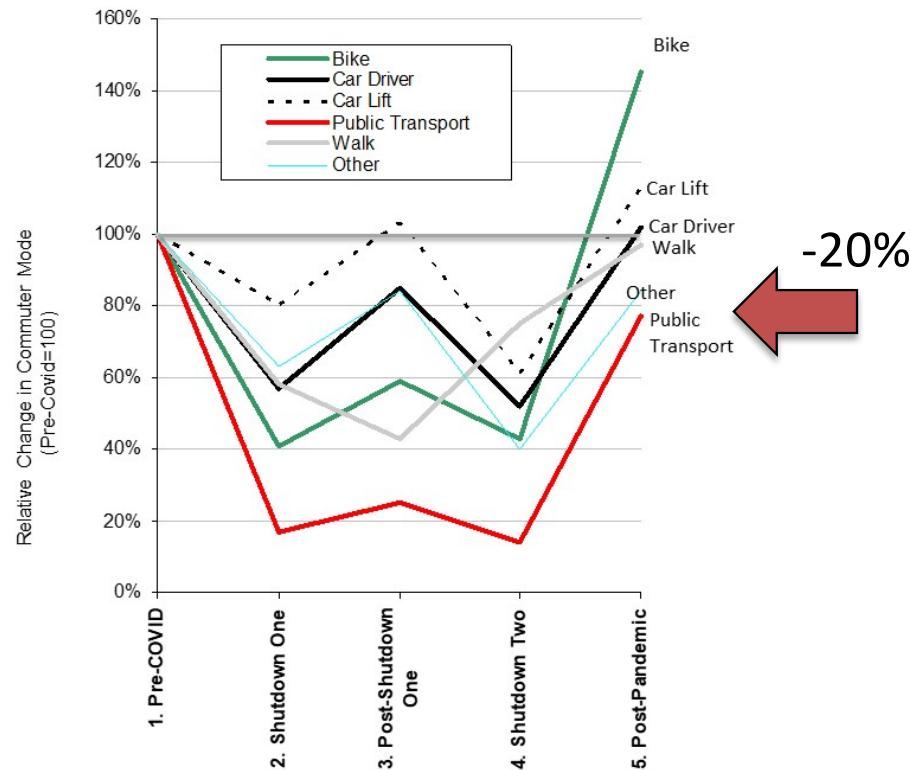
OUTER MELBOURNE (n=700)					
Age Group	Annual Personal Income , Before Tax				Total
	Nil Income	Less than	Between	More than	
18-35	26	87	97	24	234
36-53	15	64	101	56	236
54 and over	18	122	65	25	230
Total	59	273	263	105	700

GRAND TOTAL					
Age Group	Annual Person Income, Before Tax				Total
	Nil Income	INCOME 1	INCOME 2	INCOME 3	
AGE GROUP 1	116	256	272	76	720
AGE GROUP 2	44	150	274	225	693
AGE GROUP 3	48	318	191	131	688
Total	208	724	737	432	2101

Source: Currie G, Jain T and Aston L (2021) "Evidence of a Post-COVID Change in Travel Behaviour - Self-Reported Expectations of Commuting in Melbourne" Transportation Research Part A Volume 153, November 2021, Pages 218-234

Post-Covid, AFTER THE VIRUS HAS GONE, results suggest PT ridership will be 20% less than pre-Covid levels; bus is much less affected than rail – train is 30% down Post COVID

Figure D5: Changes in Commute Journey Volume by Mode ; Pre-Covid=100% Peak-Related Travel

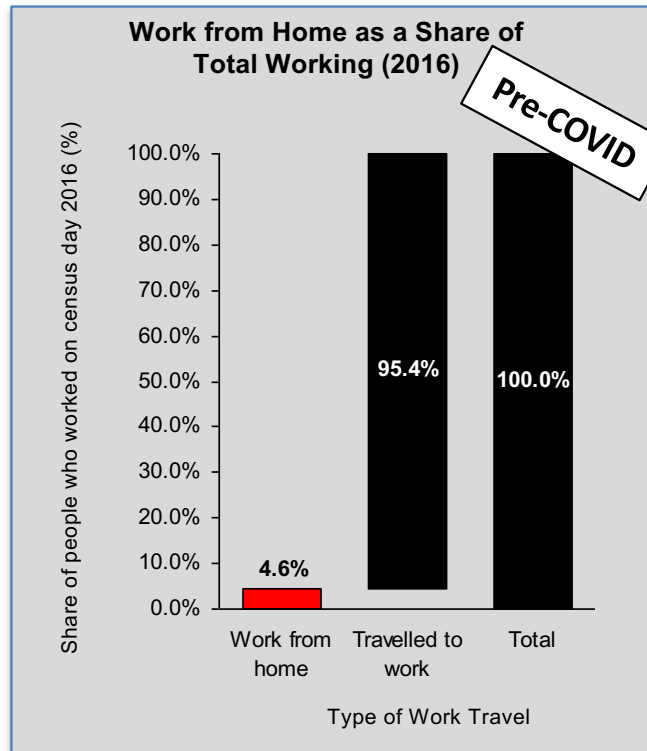


There are four KEY new travel behaviours which will affect POST-COVID travel

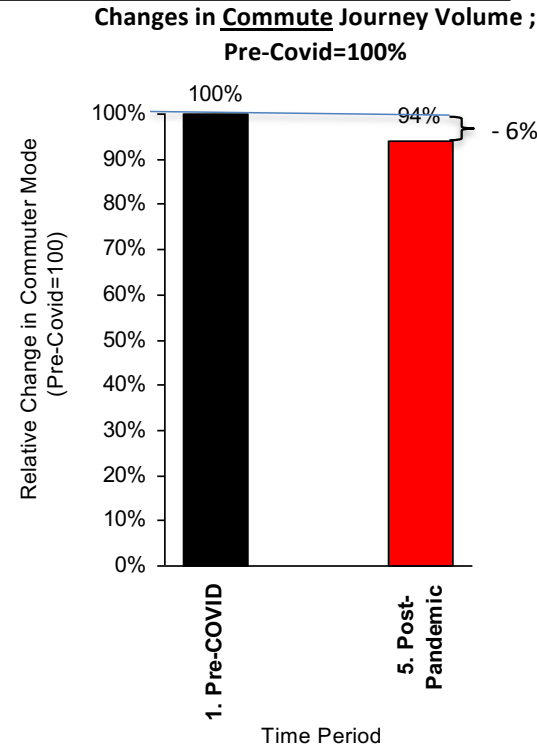
- 1. Commute Trip REDUCTIONS - due to increased WORK FROM HOME**
- 2. MODE SHIFT from Transit to Car Driving – due to INFECTION FEAR**
- 3. SPATIAL Variations in the Above**
- 4. SOCIO-ECONOMIC Variations in the Above**

POST COVID total work travel declines by 6% - mainly due to increased Work from Home (WFH) – the scale of shift is small (6%) because WFH is small as a share of work

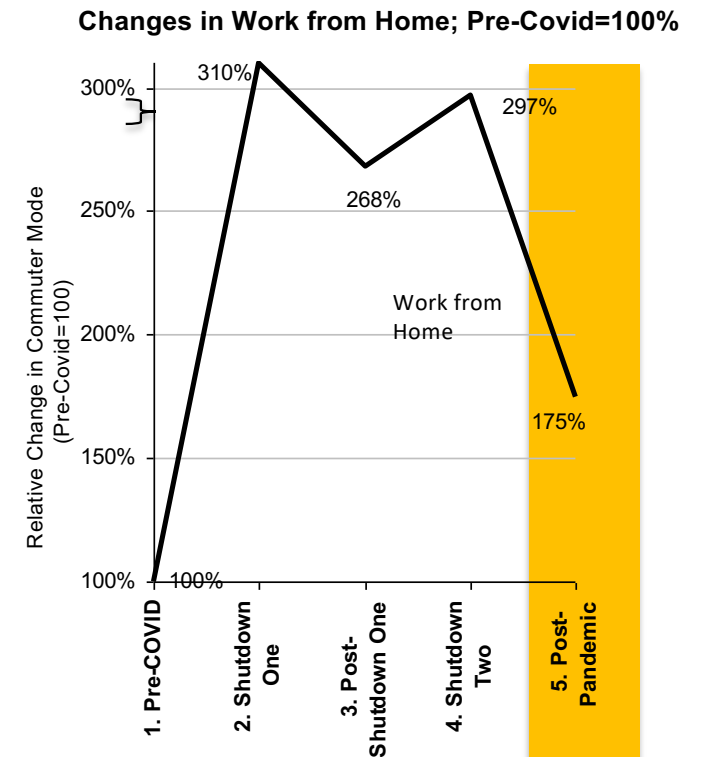
1. Commute Trip REDUCTIONS - due to increased WORK FROM HOME



Source: Australian Bureau of Statistics, 2016 Census Journey to Work

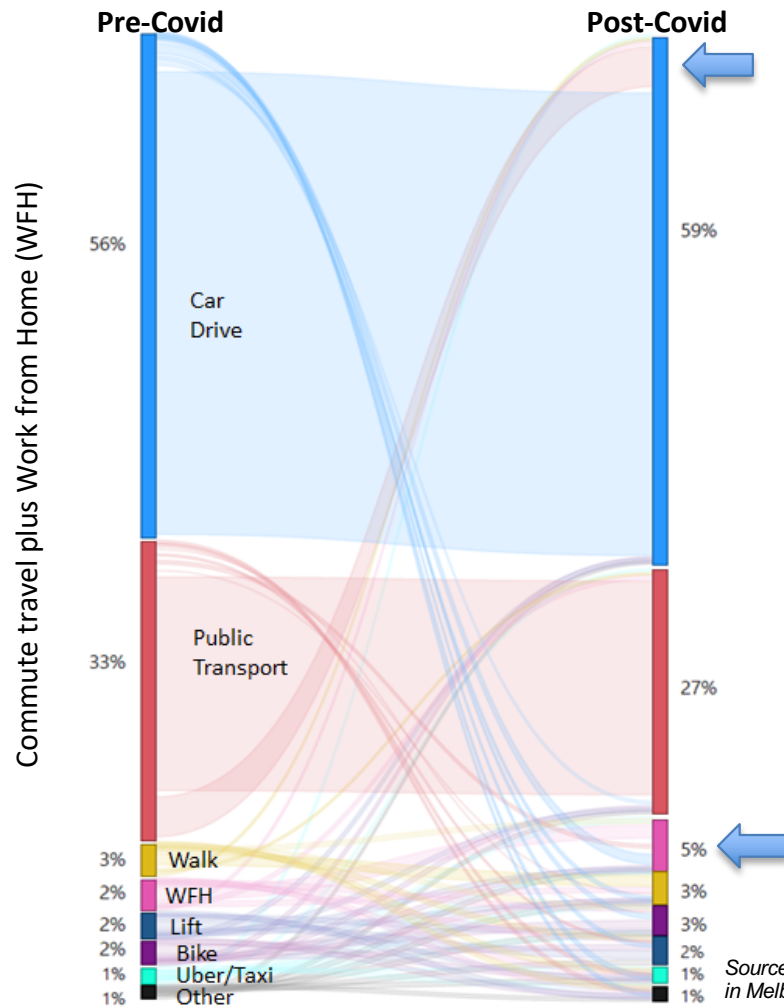


Source: Currie G, Jain T and Aston L (2021) "Evidence of a Post-COVID Change in Travel Behaviour - Self-Reported Expectations of Commuting in Melbourne" Transportation Research Part A Volume 153, November 2021, Pages 218-234

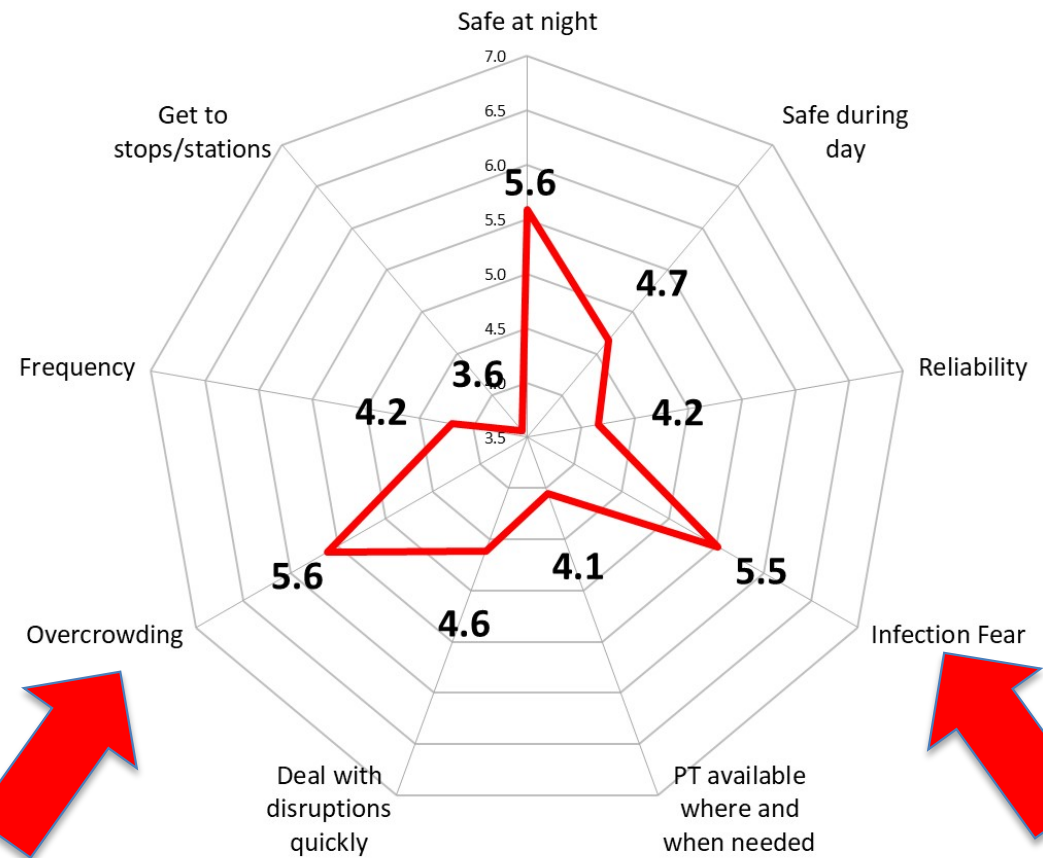


POST COVID work travel has a mode shift from transit to car-drive – this is caused by ‘residual infection fear’ related to crowding; new major concerns of passengers

2. MODE SHIFT from Transit to Car Driving – due to INFECTION FEAR



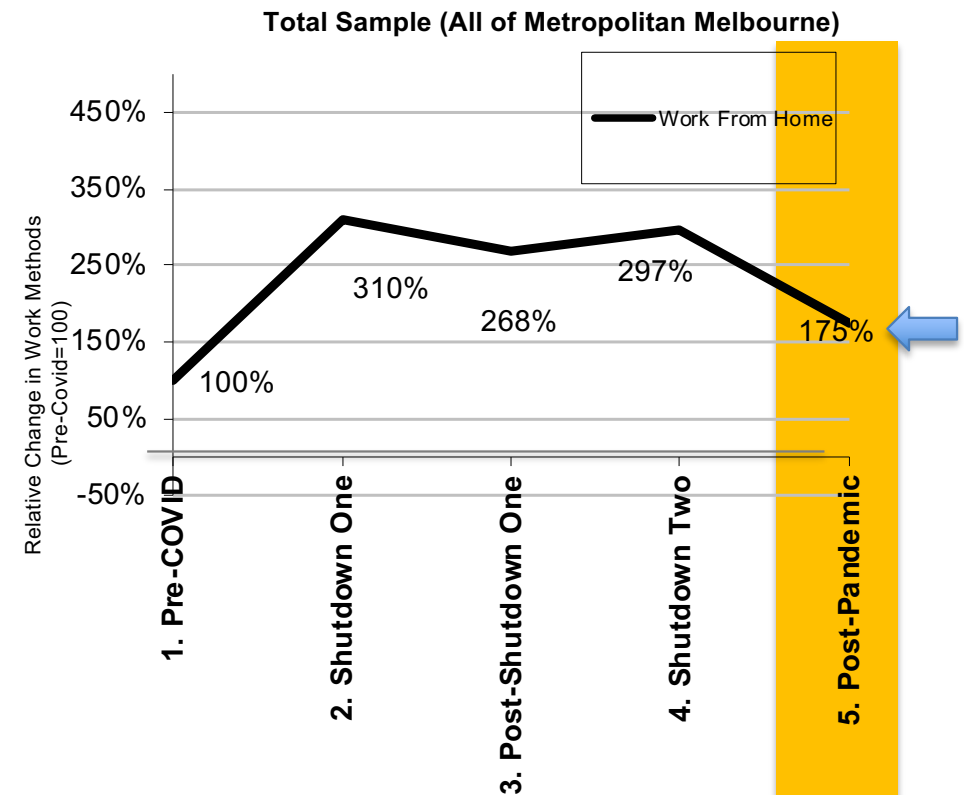
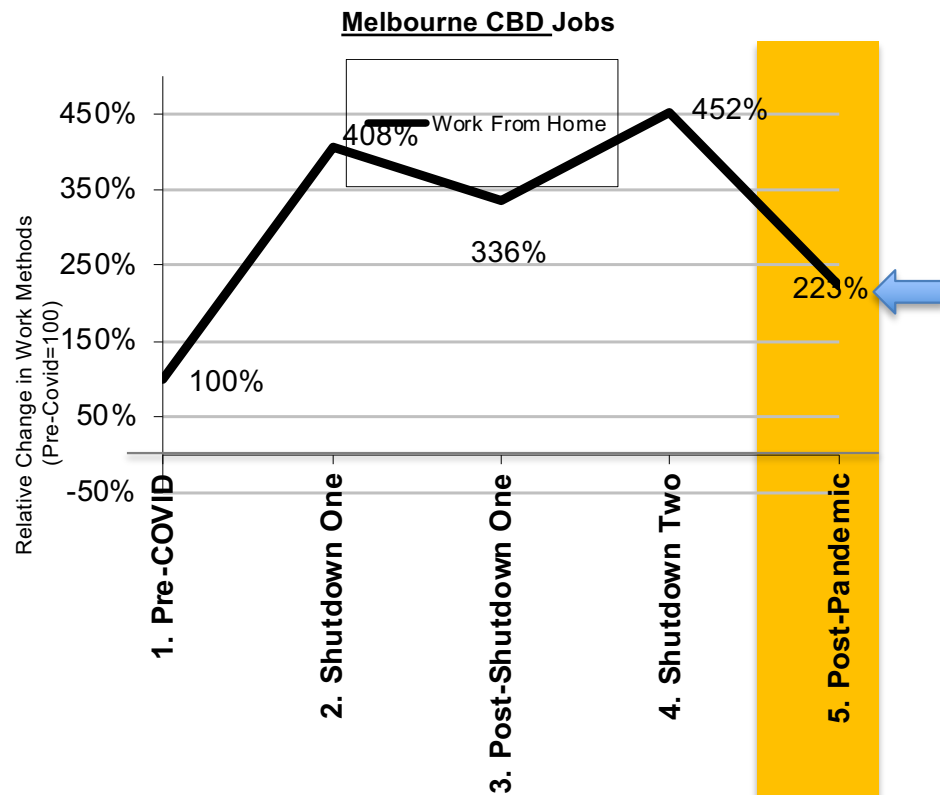
Perceived Concerns About Public Transport – Performance Rating



Source: Currie G, Jain T and Aston L (2021) "Evidence of a Post-COVID Change in Travel Behaviour - Self-Reported Expectations of Commuting in Melbourne" *Transportation Research Part A* Volume 153, November 2021, Pages 218-234

Work from Home is MUCH more common for CBD workers; whos WFH is expected to more than double (+123%) compared to pre-covid, much higher than for Melb as a whole (+75%)

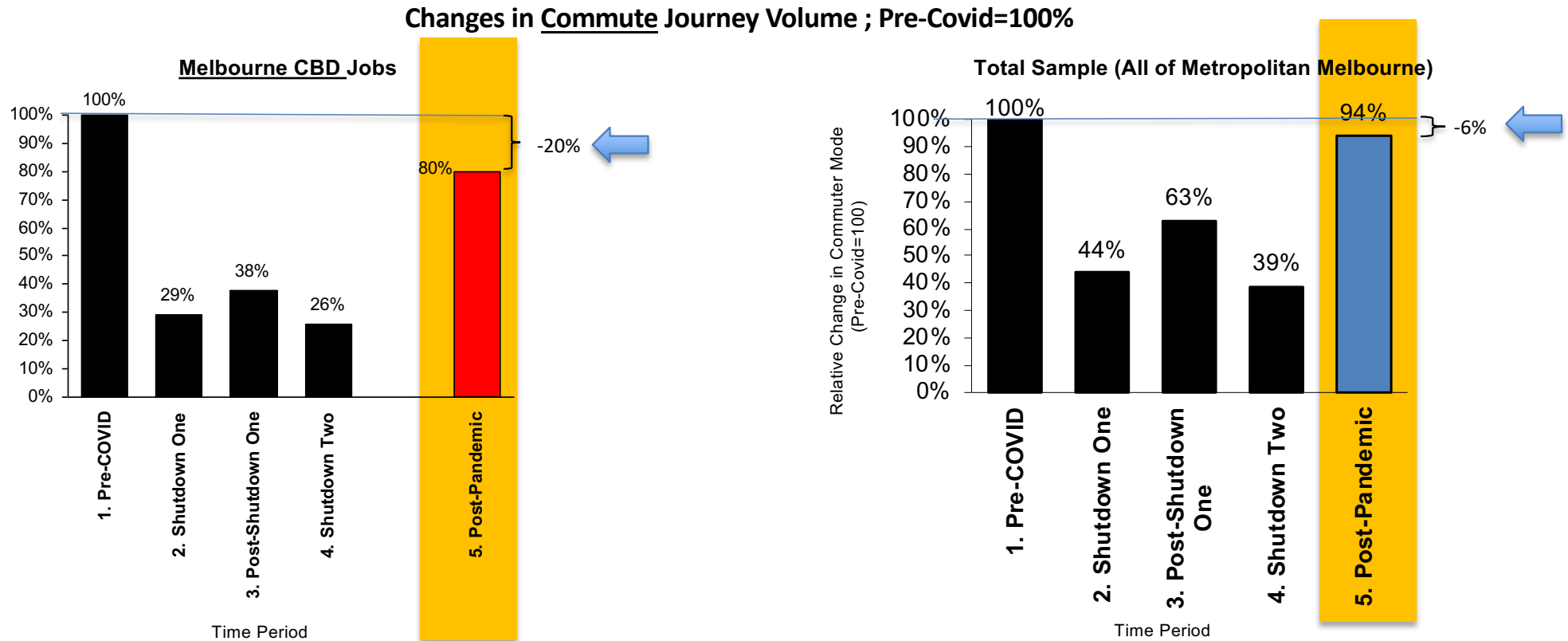
3. SPATIAL Variations in COVID Behaviours



Source: Currie G, Jain T and Aston L (2021) "Evidence of a Post-COVID Change in Travel Behaviour - Self-Reported Expectations of Commuting in Melbourne" *Transportation Research Part A* Volume 153, November 2021, Pages 218-234

Respondents say CBD COMMUTE will reduce more than the rest of Melbourne; Post Pandemic a 20% decline in CBD COMMUTE is self estimated - much larger than for Melbourne as a whole (6%)

3. SPATIAL Variations in COVID Behaviours

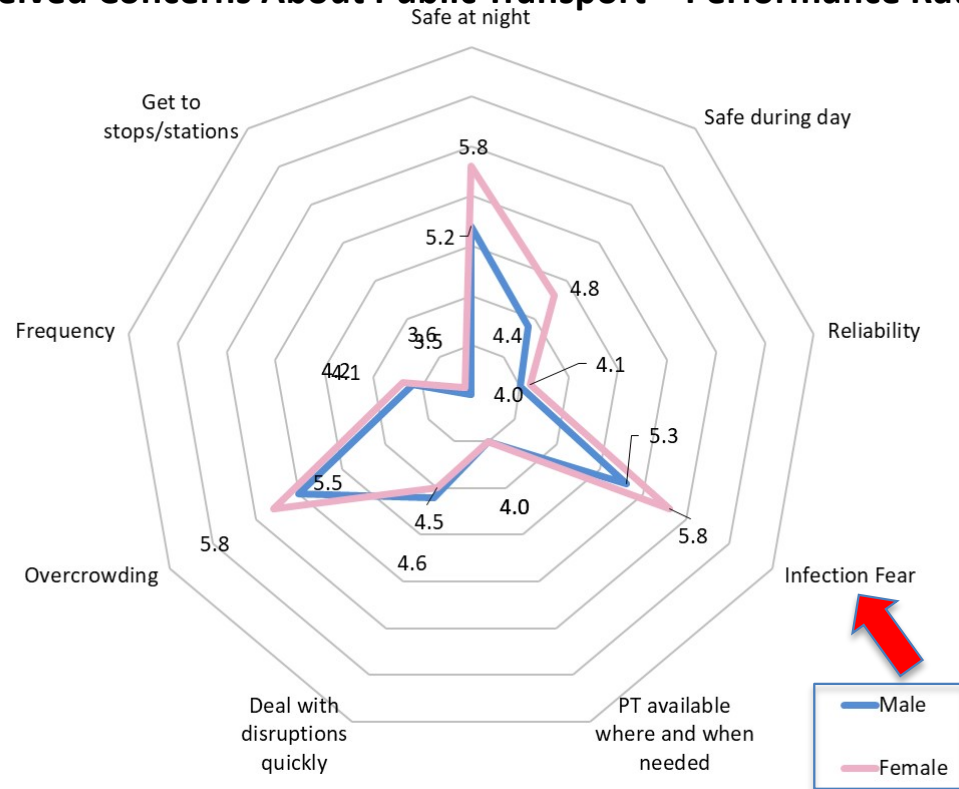


Source: Currie G, Jain T and Aston L (2021) "Evidence of a Post-COVID Change in Travel Behaviour - Self-Reported Expectations of Commuting in Melbourne" *Transportation Research Part A* Volume 153, November 2021, Pages 218-234

Infection Fear is Gender Biased. Work from Home shifts are larger for White Collar workers and High Income Groups

4. SOCIO-ECONOMIC Variations in COVID Behaviours

Perceived Concerns About Public Transport – Performance Rating



Socio-Economic Patterns of COVID Behavior Change

- ▶ Female respondents demonstrated slightly higher post pandemic commute reductions than male respondents
- ▶ Income was found to have significant variations in post pandemic commute volume (Kruskal Wallis Test, $H(7) = 48.328$, $P=0.000$).
 - In general higher income groups self-report significantly higher reductions in commuting post-pandemic compared to their commuting before COVID
 - income '\$1,870-\$3,200'; -22.6% and income '\$3,200 or more'; -23.9%.
 - Lower income groups (<\$1,870) between -0.36% and -3.5% for cohorts with larger samples).
- ▶ We also found a statistically significant difference in post pandemic commuter reductions for white collar workers (Mann Whitney U test, $U=62846$, $P=0.000$).
 - White collar workers had an average -12.5% reduction in commute volume after the pandemic while
 - other workers had an average of -2.8%.

Why is current/future bus ridership less affected? – because COVID ridership impacts affect bus much less than rail

Influence of COVID-19 Ridership Drivers by Transit Mode

Covid Ridership Driver	Rail	Tram	Bus
Commuters – work from home increase	***	***	*
Infection Fear – crowding impact	***	***	*
CBD travel Reduction	***	***	*
Reduced travel – high income groups	***	***	*

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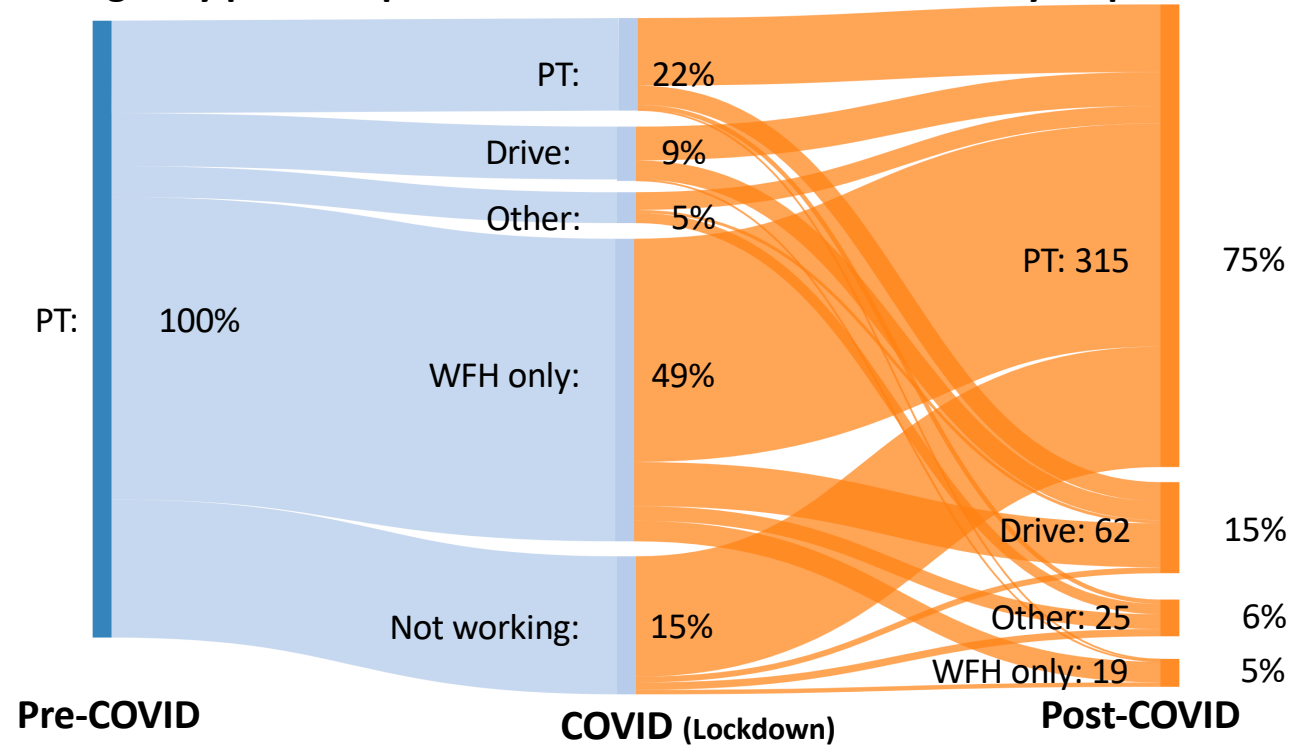


We are researching where ridership went and where it will come from after COVID-19

Inclusion criteria

- ▶ Working pre- & post-COVID:
 - Full time,
 - Part time, or
 - Casual
- ▶ PT user pre-COVID

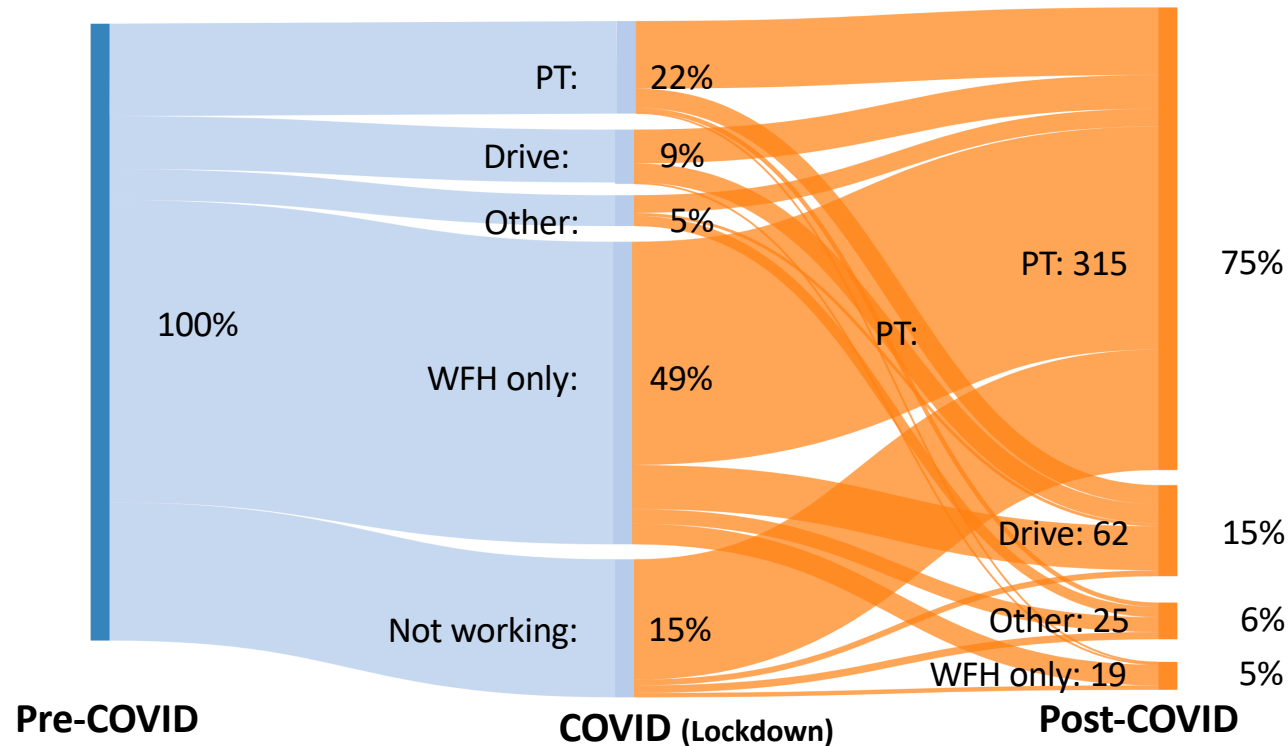
Travel changes by pre- and post-COVID workers who commute by PT pre-COVID



Source: Preliminary results Monash Research 2022

In Lockdowns most of the pre-Covid PT market are WFH (49%), Not working (15%) or driving (9%); 22% were still using PT

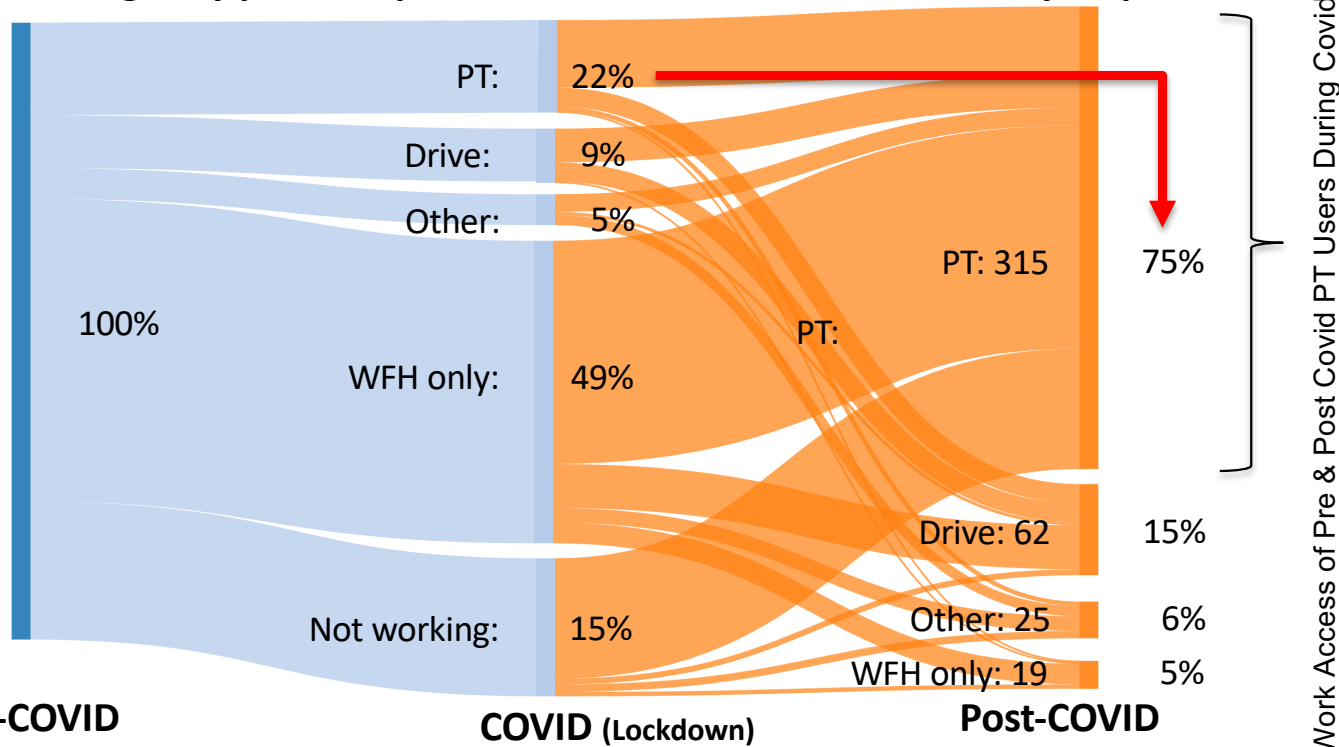
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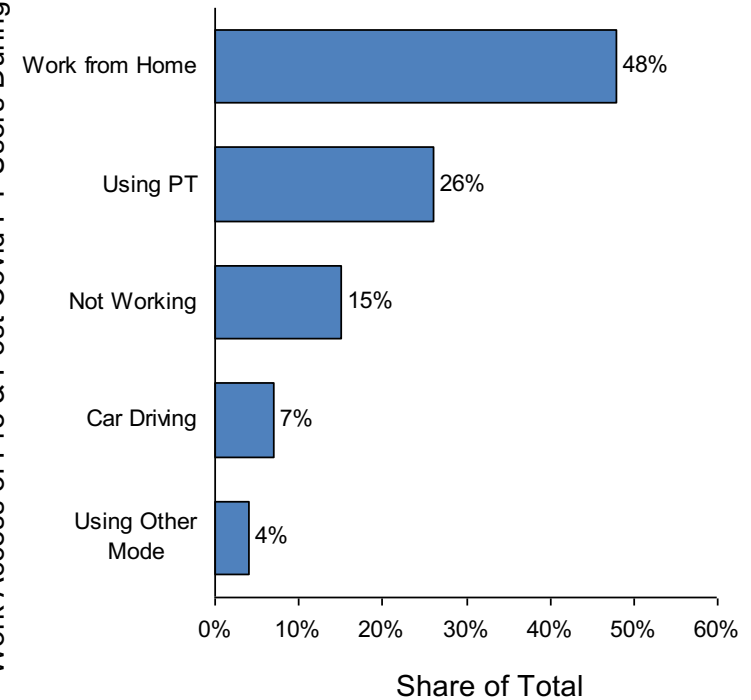
Source: Preliminary results Monash Research 2022

Post-COVID the Mkt will grow from 22% (lockdown) to 75% of pre Covid levels – Future ridership will come from WFH (48%) using PT (26%) out of work (15%) or other modes

Travel changes by pre- and post-COVID workers who commute by PT pre-COVID



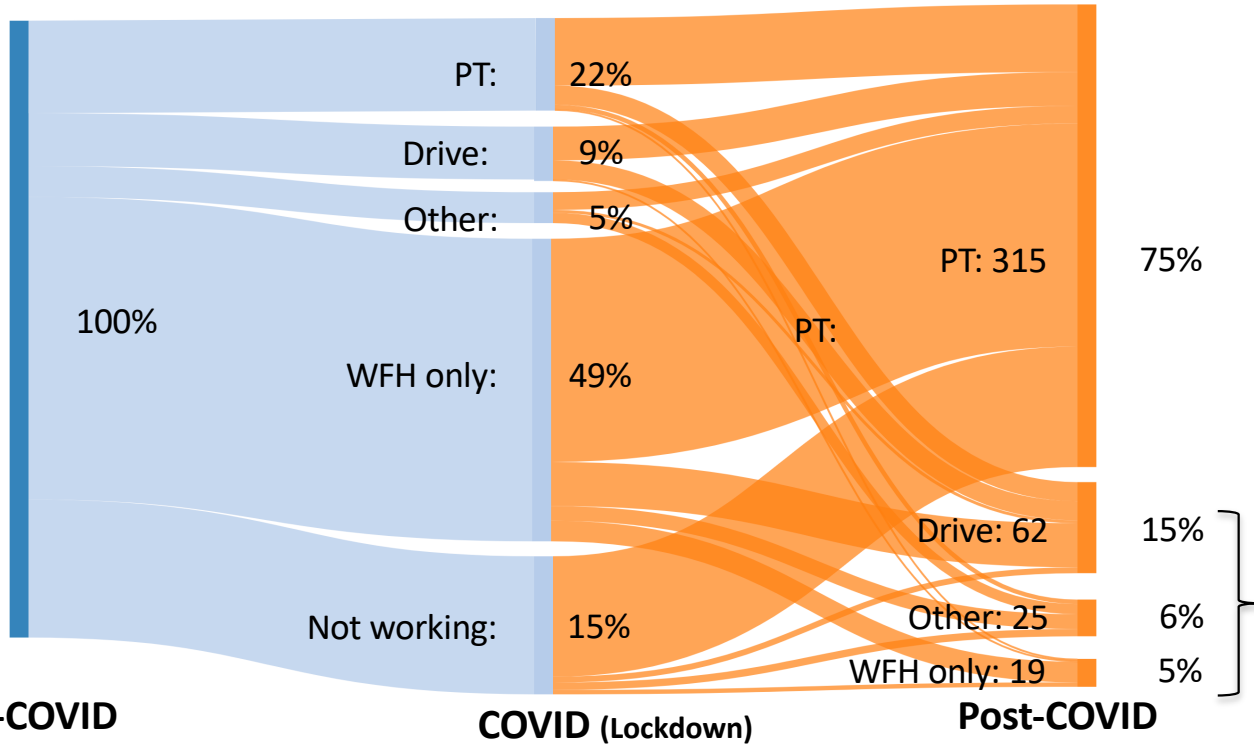
What is the Future PT Market Doing Now During COVID-19



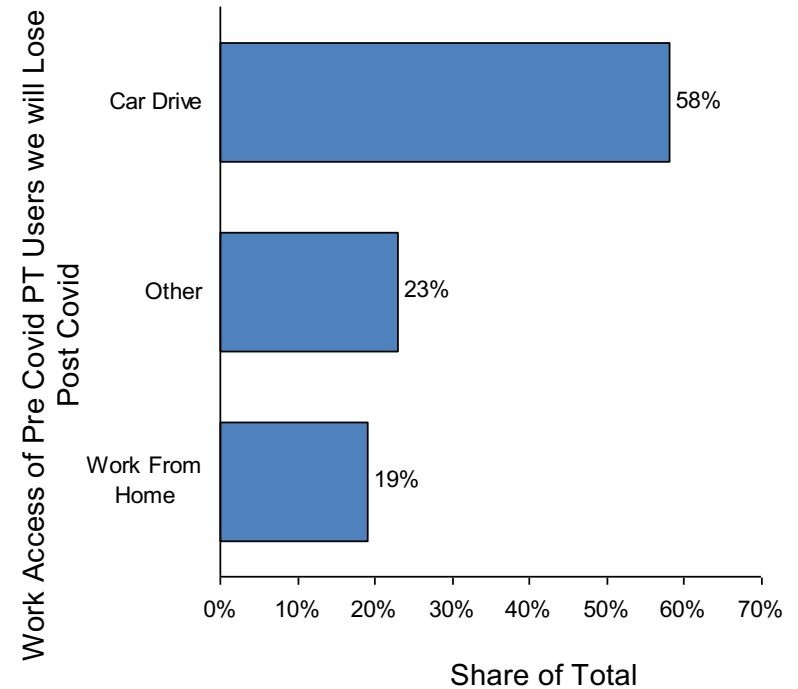
Source: Preliminary results Monash Research 2022

Another Perspective – Post COVID we lose ~25% of our pre-Covid PT market; 58% will drive, 19% WFH; the rest using other modes

Travel changes by pre- and post-COVID workers who commute by PT pre-COVID



Where are the PT Users we will Lose in Future Going to Go Post-Covid



Source: Preliminary results Monash Research 2022





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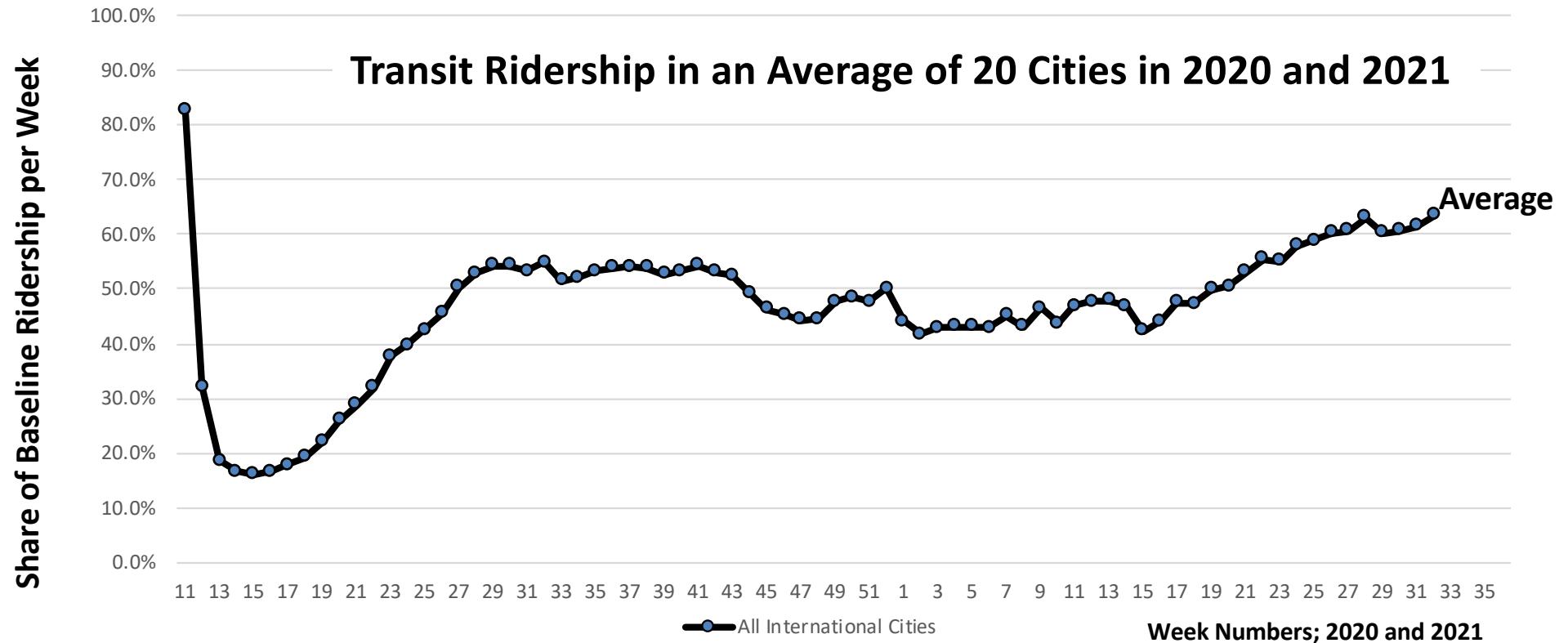
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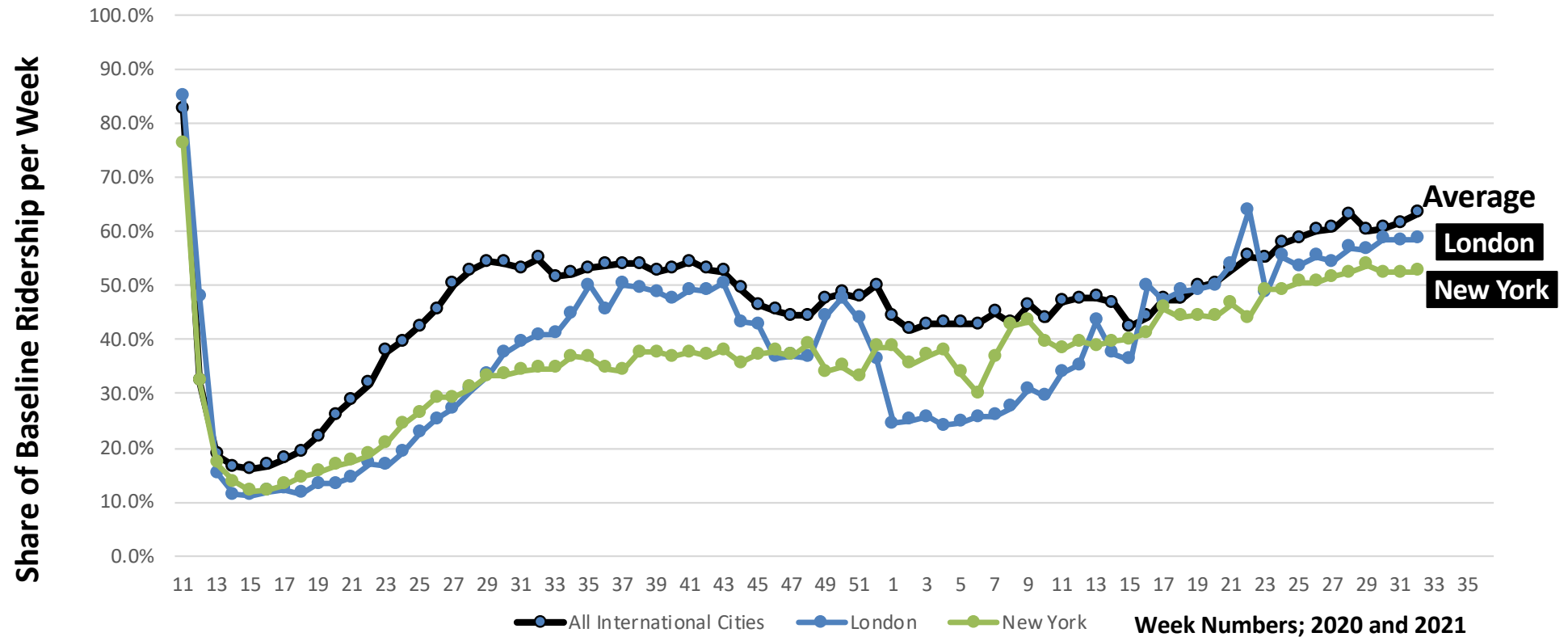


City Transit ridership fell, recovered then slightly declined from early 2020; from 2021 a slow recovery was underway



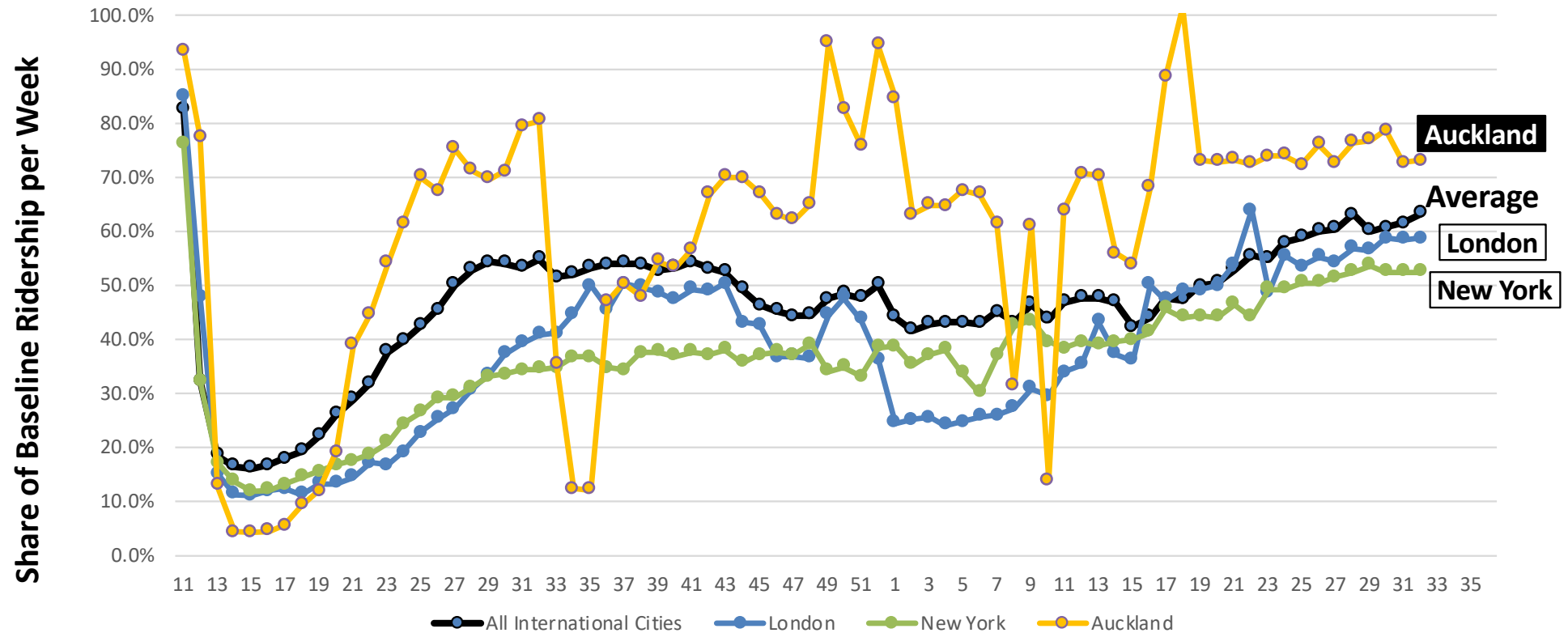
Source: Data courtesy of UITP; cities include Vienna, Oslo, London, Montreal, Madrid, Auckland, Pilsen, New York, Kayseri, Barcelona, Berlin, Vancouver, Chicago, Ottawa, Stockholm, Jersey City, Dijon, Warsaw, Reenes, Toronto

London/New York – Poor Pandemic Containment Cities who Rely on Vaccination – have underperformed but are in a recovery trend



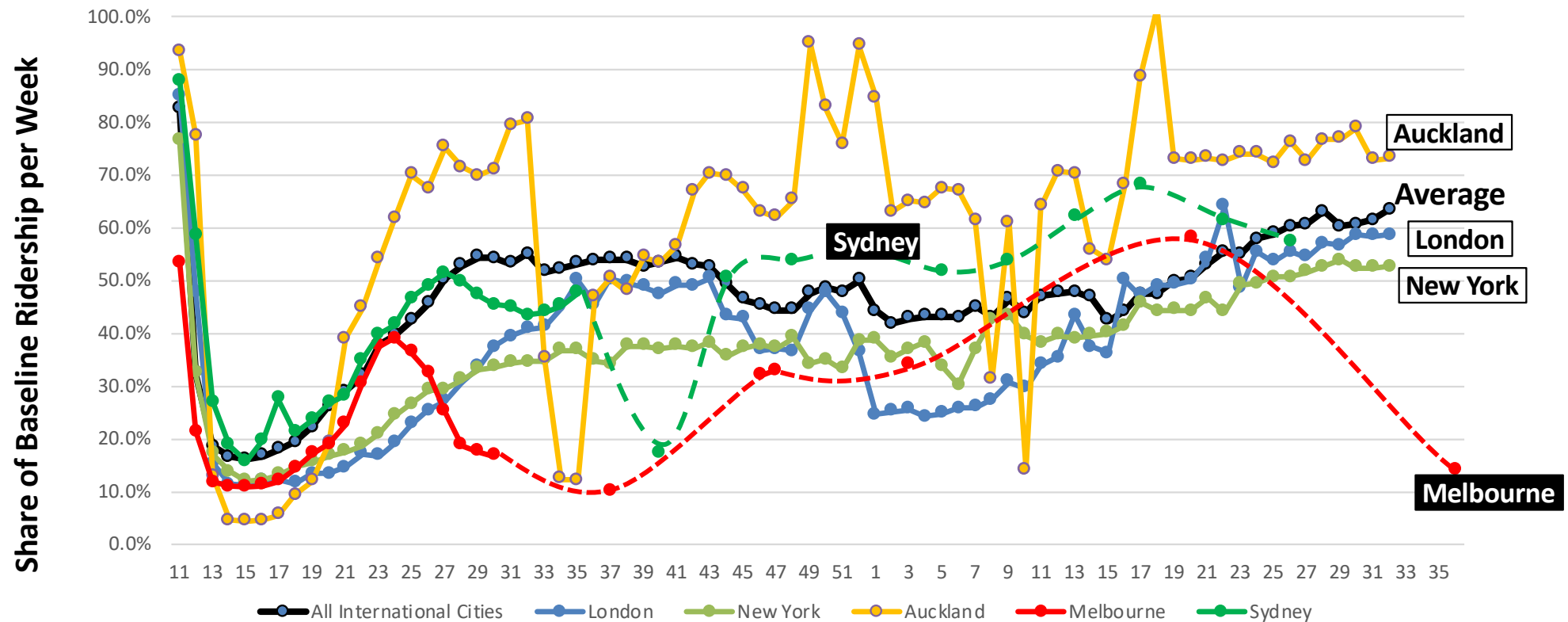
Source: Data courtesy of UITP

Auckland – A Strong ‘Lockdown and Eradicate’ City – has better performance during eradication; and poor during lockdown – but is also on a recovery path



Source: Data courtesy of UITP

Sydney/Melbourne – also Lockdown/Eradicate – have a generally similar performance – Melbourne has low ridership due to extensive lockdowns (2nd longest in the world)



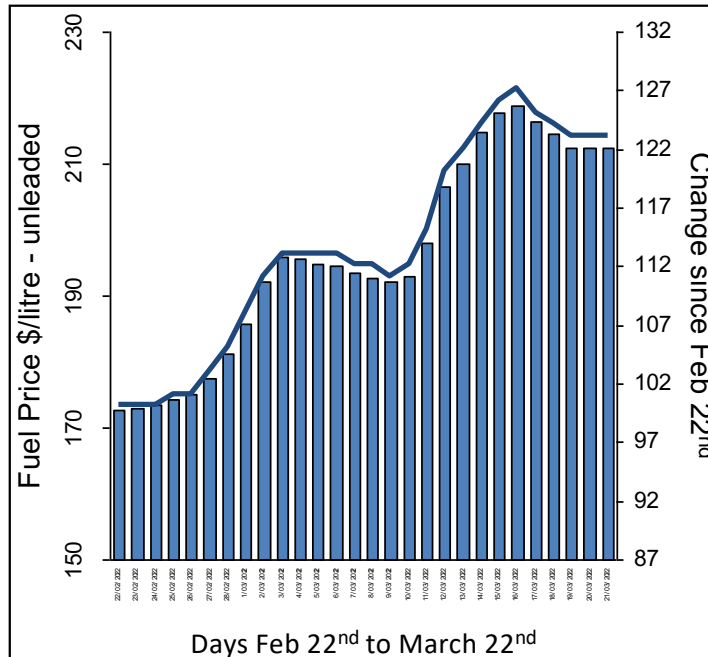
Source: Data courtesy of UITP

In 2022 ridership was down with Omicron but has recovered strongly – influenced by fuel price increases

Recent Melbourne Ridership Trends

- ▶ Late February 2022: 52% (DoT)
- ▶ March 17th 2022: 63% (The Age)

Melbourne Fuel Price Trends



Source: RACV

Impact of Fuel Price on Transit Demand

- ▶ General long term impact of fuel price rise on ridership in Australia is:
 - $E=+0.15$
 - Or: a 10% fuel price rise = 1.5% increase in ridership
- ▶ On this basis a 25% increase in fuel is expected to grow ridership by 3-4%
- ▶ We conclude that most recent ridership growth has been driven by activity increases.

Source: Currie, G. and Phung J (2008) 'Understanding Links Between Transit Ridership and Gasoline Prices Evidence from the United States and Australia' TRANSPORTATION RESEARCH RECORD, No. 2063, pp. 133-142

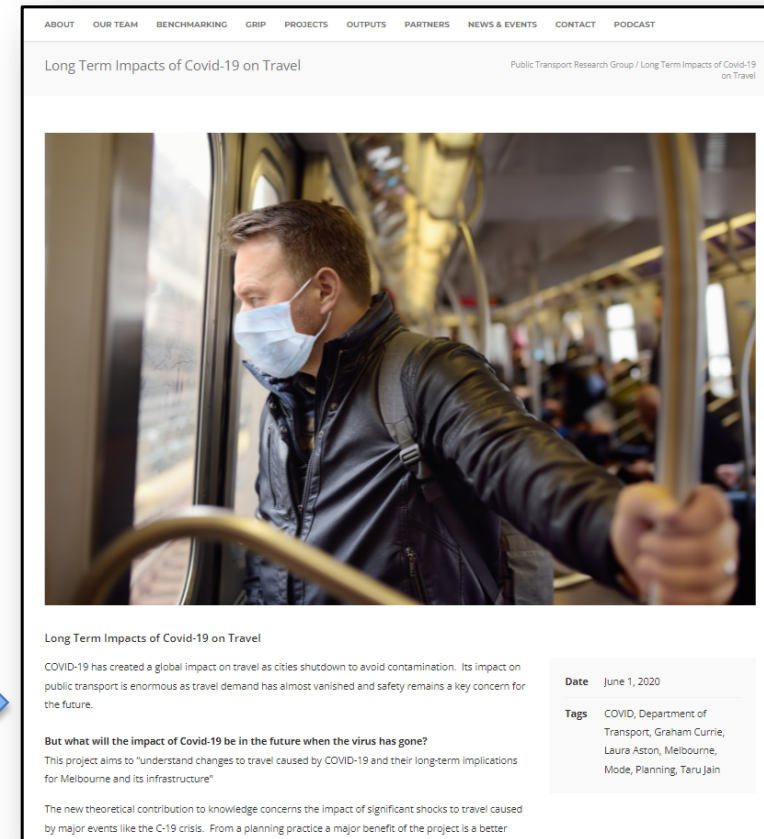
Monash COVID-19 Research has been made OPEN ACCESS; free to assist industry

■ Published papers in top journals:

- Currie G, Jain T and Aston L (2021) "[Evidence of a Post-COVID Change in Travel Behaviour - Self-Reported Expectations of Commuting in Melbourne](#)" Transportation Research Part A Volume 153, November 2021, Pages 218-234
- Jain T Currie G and Aston L (2022) "[COVID and Working from Home: Long-term Impacts and Psycho-social Determinants](#)" Transportation Research Part A Volume 156, February 2022, Pages 52-68

■ PTRG Monash website for COVID-19 Travel Research:

<http://publictransportresearchgroup.info/portfolio-item/covid-19-long-terms-impacts/>

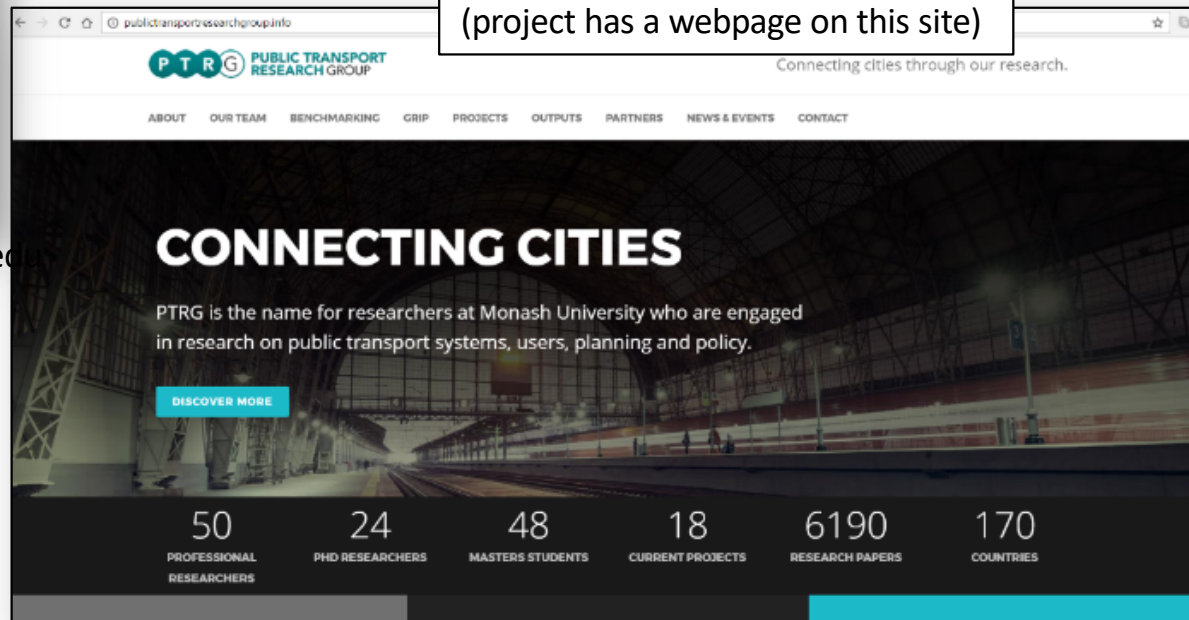


Please reach out for more information



graham.currie@monash.edu

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Researching Transit



RT5 – Long term
impact of COVID-
19 on Travel
Behaviour

