Covid-19 Long Term Travel Impacts Study

Research Discoveries – Planning for the 'New' Future

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Introduction

Past Disruptions

Discoveries – The New Normal

Ridership futures

Planning Futures

- Objective:
  - **Understand how C-19 has impacted travel including long term effects**.

- Focus:
  - Melbourne, Australia

Stages of Covid-19

1. Pre-Covid-19 Travel	2. Shutdown ONE	3. Post-Shutdown ONE	4. Shutdown TWO	5. Post-Pandemic Long Term

Pandemic Is Occurring

Long Term focus is when the virus is no longer contagious

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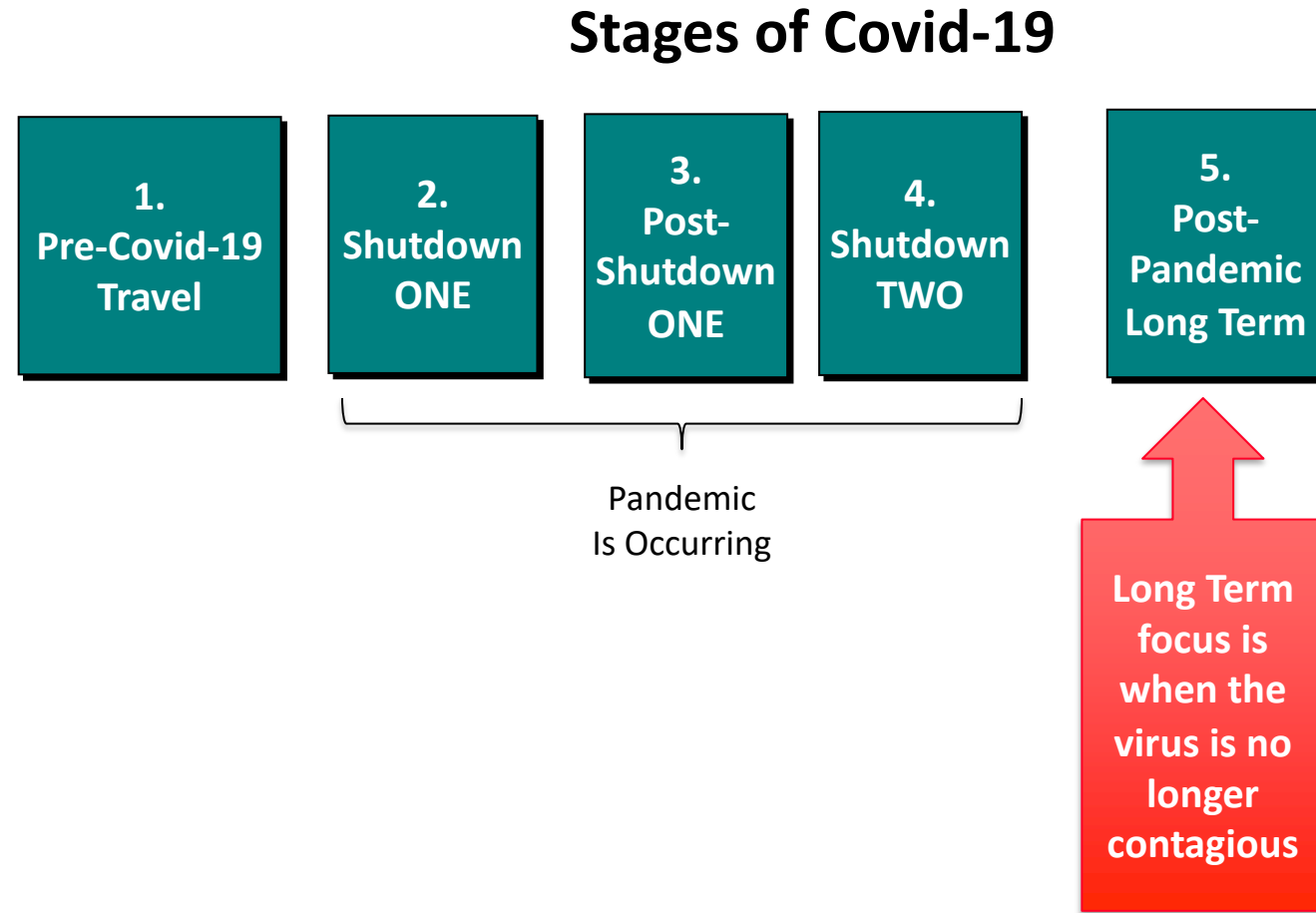
It adopts a forecasting framework developed to capture significant shocks caused by Covid-19

The 'Monash' Framework - An Integrated Framework of Factors Influencing Travel Behavior Before, During and After the Covid-19 Crisis.

Pre-Covid-19 Travel | **Covid-19 Shutdown** | **Post-Shutdown** | **Post-Pandemic Long Term**

Long Term focus is when the Virus is no longer contagious

Scale of Influence

C-19 Impacts

Research Approach

MICRO
- Home isolation
- Travel restrictions
- Illness
- Increased Work from Home
- Increased tele-working/ socialising
- Different use of travel modes
- More localized familiarity
- Increased home deliveries
- Infection fear
- Reduced transport budget
- Housing choice change

Surveys primarily focussed on Micro issues

In addition: literature review of previous disruption evidence for long term travel impacts

MESO
- School/Uni/ shop closures.
- Changes to the transport system

MACRO
- Temporary business shutdown
- Industry shutdown/ Unemployment
- International Trade Shutdown
- Tourism Shutdown
- Industrial restructuring (automation, virtual workplaces)

Analysis of Secondary Evidence

Note: This framework is developed by the research team from a review of previous research literature and also from a workshop with staff from the Victorian Department of Transport

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It is structured as follows;

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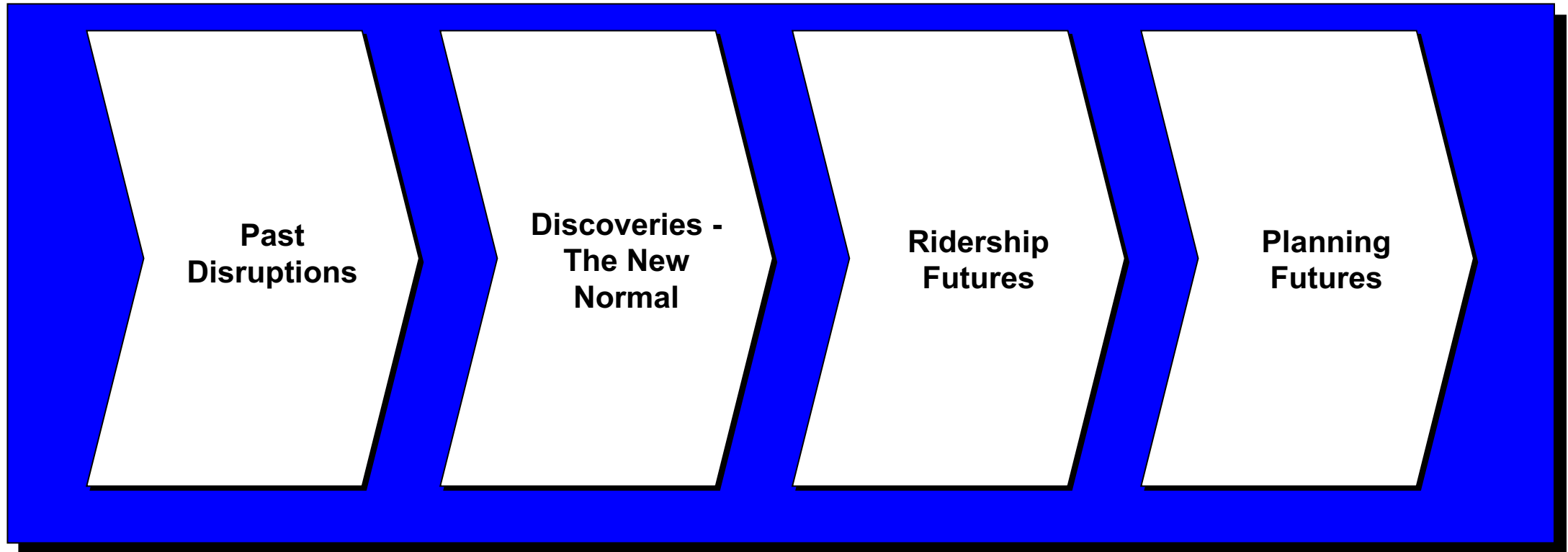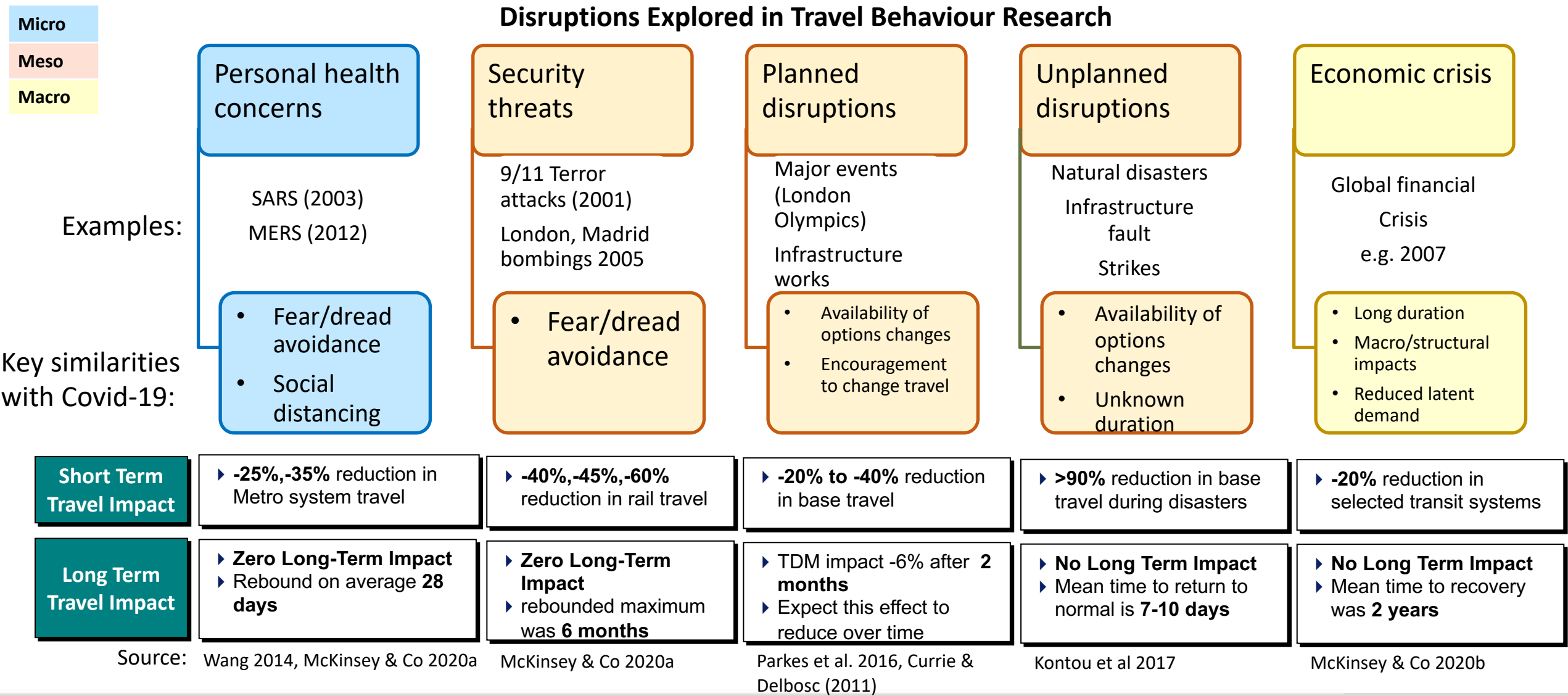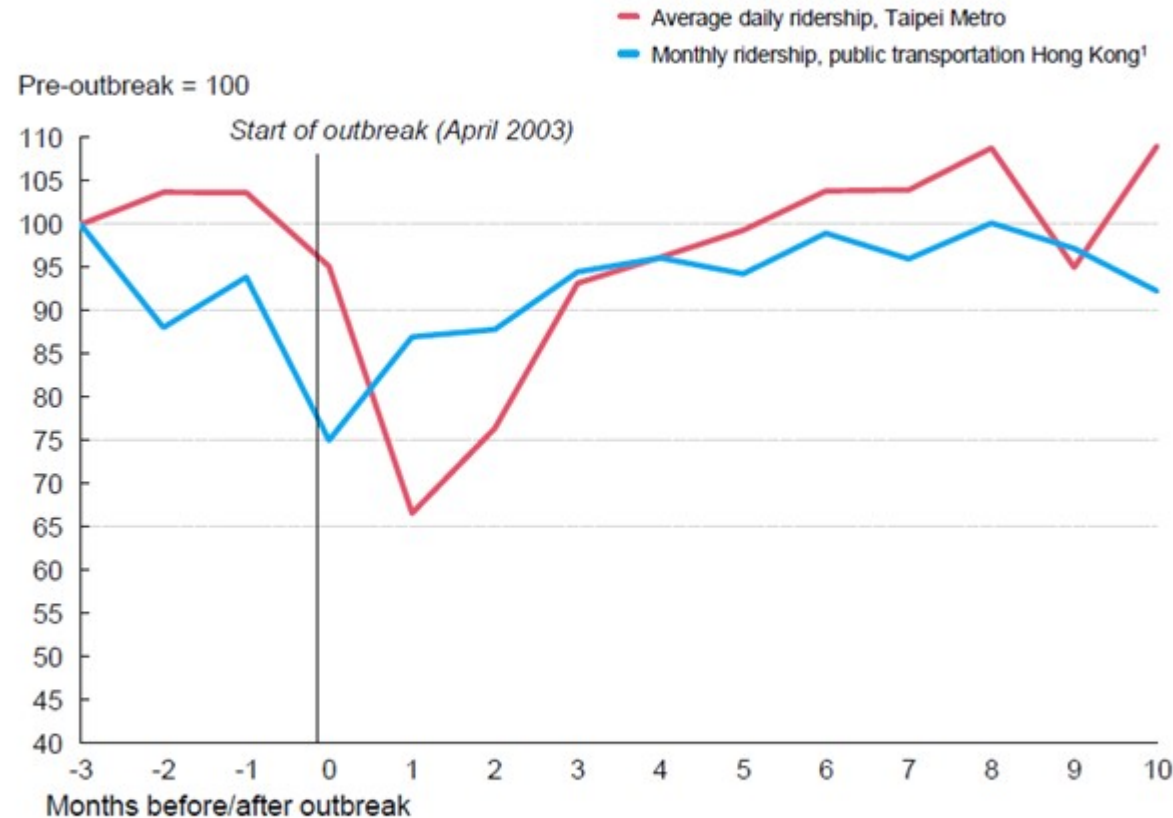# DISCOVERY – Historical disruption evidence says short term travel impacts are big, but long term impacts are small

Micro

Meso

Macro

Disruptions Explored in Travel Behaviour Research

	Personal health concerns	Security threats	Planned disruptions	Unplanned disruptions	Economic crisis
Examples:	SARS (2003) MERS (2012)	9/11 Terror attacks (2001) London, Madrid bombings 2005	Major events (London Olympics) Infrastructure works	Natural disasters Infrastructure fault Strikes	Global financial Crisis e.g. 2007
Key similarities with Covid-19:	• Fear/dread avoidance • Social distancing	• Fear/dread avoidance	• Availability of options changes • Encouragement to change travel	• Availability of options changes • Unknown duration	• Long duration • Macro/structural impacts • Reduced latent demand
Short Term Travel Impact	▸ **-25%,-35%** reduction in Metro system travel	▸ **-40%,-45%,-60%** reduction in rail travel	▸ **-20% to -40%** reduction in base travel	▸ **>90%** reduction in base travel during disasters	▸ **-20%** reduction in selected transit systems
Long Term Travel Impact	▸ **Zero Long-Term Impact** ▸ Rebound on average **28 days**	▸ **Zero Long-Term Impact** ▸ rebounded maximum was **6 months**	▸ TDM impact -6% after **2 months** ▸ Expect this effect to reduce over time	▸ **No Long Term Impact** ▸ Mean time to return to normal is **7-10 days**	▸ **No Long Term Impact** ▸ Mean time to recovery was **2 years**
Source:	Wang 2014, McKinsey & Co 2020a	McKinsey & Co 2020a	Parkes et al. 2016, Currie & Delbosc (2011)	Kontou et al 2017	McKinsey & Co 2020b

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The most relevant is SARS in Asia; immediate impact was a 25%/35% decline in transit ridership; Post Pandemic, ridership returned to normal within 6 months

Effect of health crises – SARS 2003

— Average daily ridership, Taipei Metro
— Monthly ridership, public transportation Hong Kong[1]

Pre-outbreak = 100

Start of outbreak (April 2003)

Months before/after outbreak

1. Includes various modes of transportation, such as bus, rail, and ferry; does not include taxi

McKinsey & Company

rebound on average took 28 days
Wang (2014)

Source: Wang, K-Y 2014, 'How Change of Public Transportation Usage Reveals Fear of the SARS Virus in a City: e89405', *PLoS ONE*, vol. 9, no. 3.

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The online panel survey covers self reported travel by Covid period & Specific Issues affecting long term travel (from the Monash framework) – a sample frame ensures results are representative

Online Panel Survey Questionnaire – Areas Covered

Sample Frame[1]

1. Pre - Shutdown

2. Shutdown One

3. Post – Shutdown One

4. Shutdown Two

5. Post – Pandemic

i.   Employment
ii. Income
iii. Weekday activities
iv. Travel to Work and Study (Workers/Students)
v.   Off Peak Travel (non Workers/Students)

D. Exploring Specific Long Term Impact Issues (The Monash Framework)

Working from Home

Tele-Video Conferencing

Travel Modes

Local Travel

Home Deliveries/ Online Shopping

Residual Public Transport Fear

Impact of Lower Income

Car Ownership/Use

Residential Housing/Location

INNER MELBOURNE (n=700)				
	Annual Personal Income , Before Tax				Total
	Nil Income	Less than	Between	More than	Total
Age Group	Target	Target	Target	Target	Total Target
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)				
	Annual Personal Income , Before Tax				Total
Age Group	Target	Target	Target	Target	Total 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)				
	Annual Personal Income , Before Tax				Total
	Nil Income	Less than	Between	More than	Total
Age Group	Target	Target	Target	Target	Total Target
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

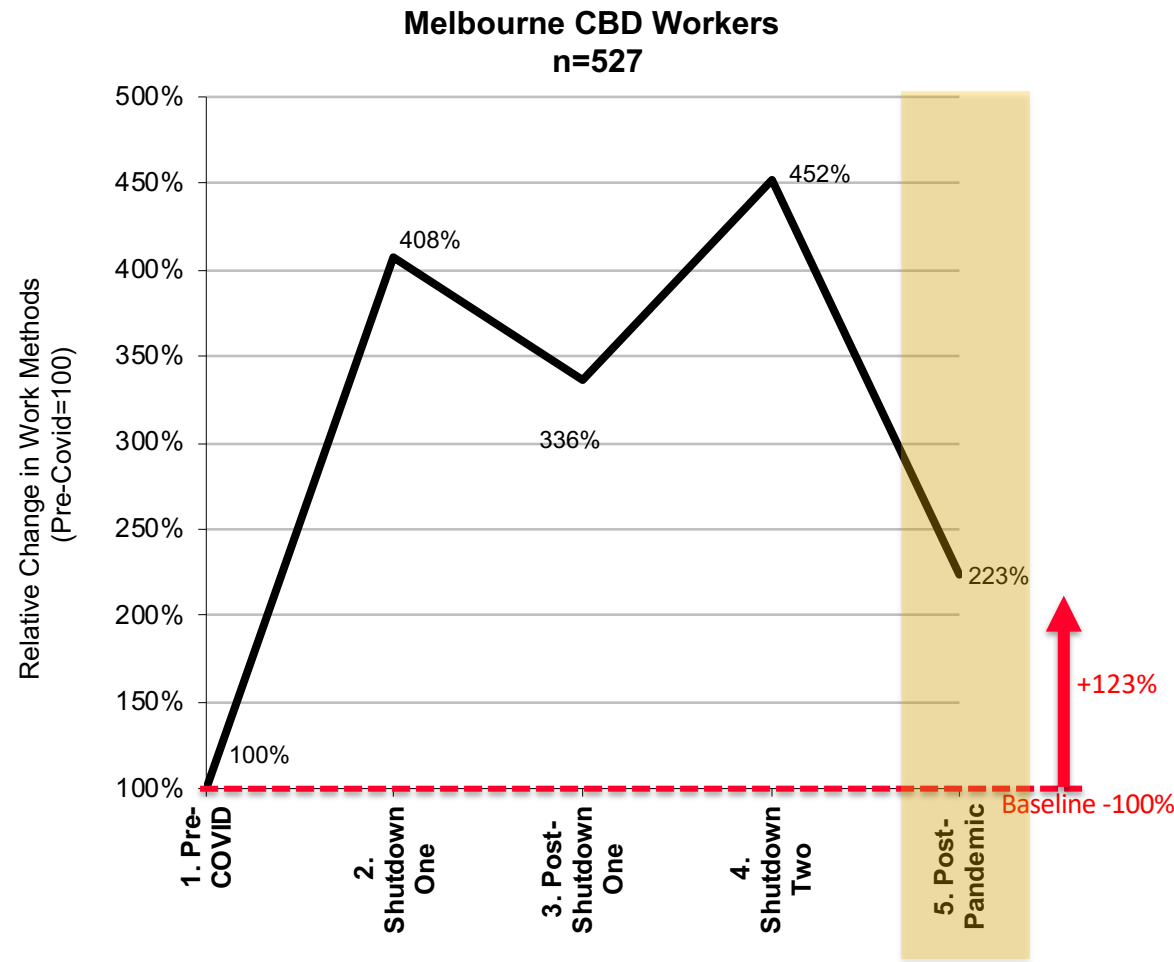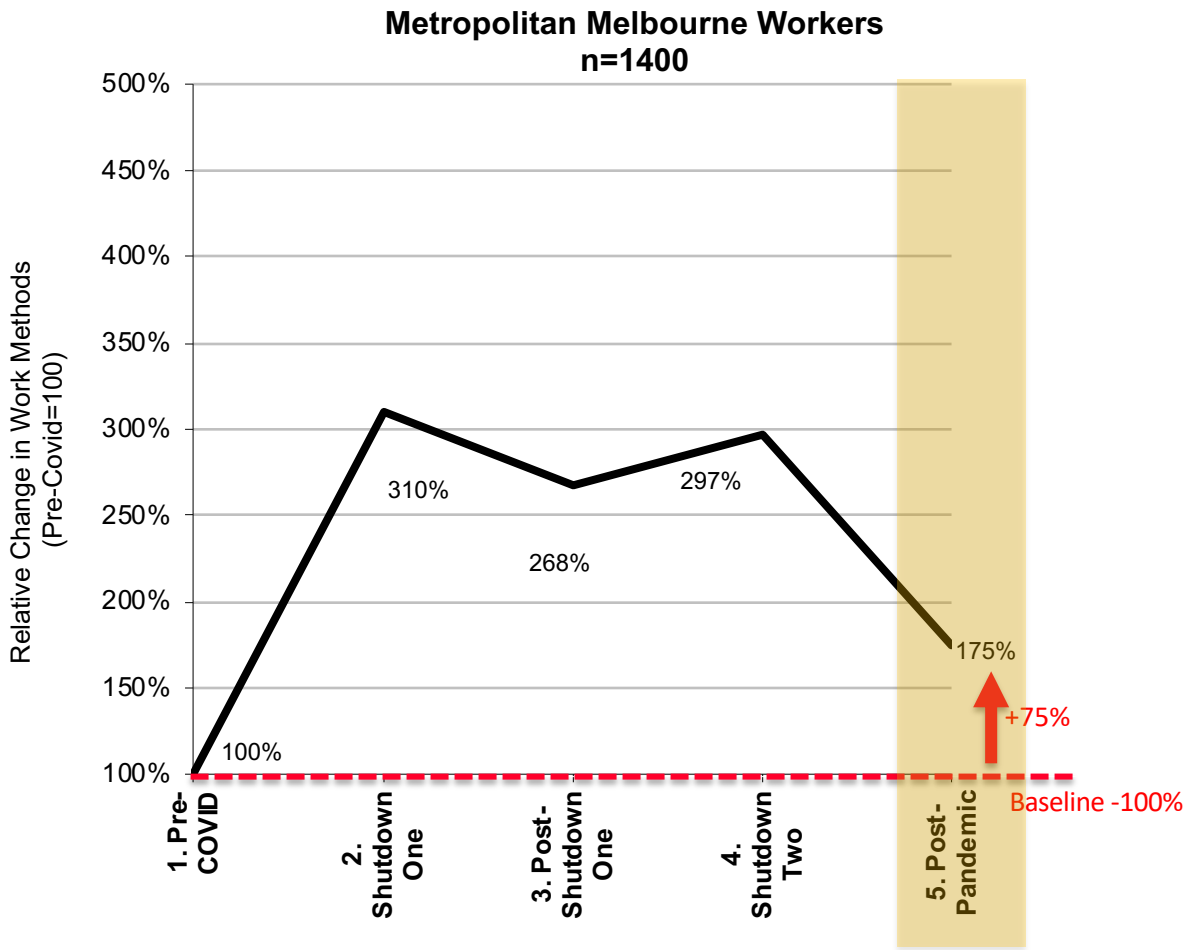| GRAND TOTAL				
	Annual Person Income, Before Tax				Total
	Nil Income	INCOME 1	INCOME 2	INCOME 3	Total
Age Group	Target	Target	Target	Target	Total Target
AGE GROUP 1	116	256	272	76	720
AGE GROUP 2	44	150	274	225	693
AGE GROUP 3	48	318	191	131	688
Total	208	724	737	432	2101

Note:

(1) Quotas in a sample aim to ensure representation of the community with respect to key/influential demographic and spatial criteria

(2) Statistical accuracy minimums are a sample of 600 to achieve a 95% confidence that any result is within 4% standard error.

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DISCOVERY - Work from Home will continue AFTER the pandemic – particularly for CBD workers…

Changes in Work from Home – Greater Melbourne and Melbourne CBD

Commuting

Metropolitan Melbourne Workers n=1400

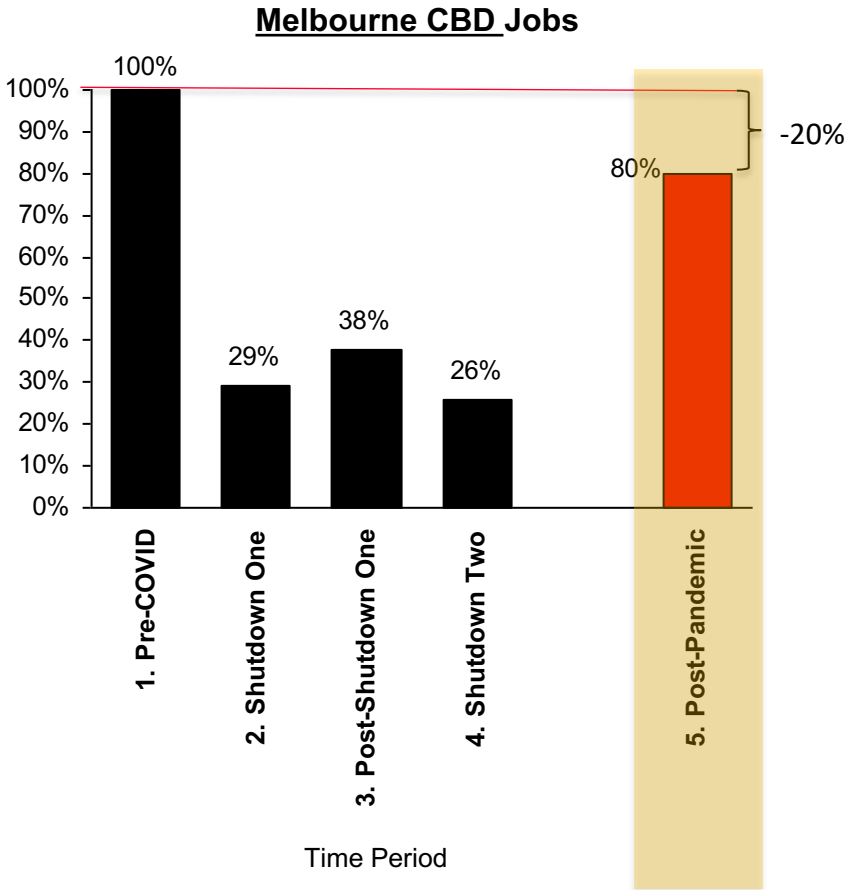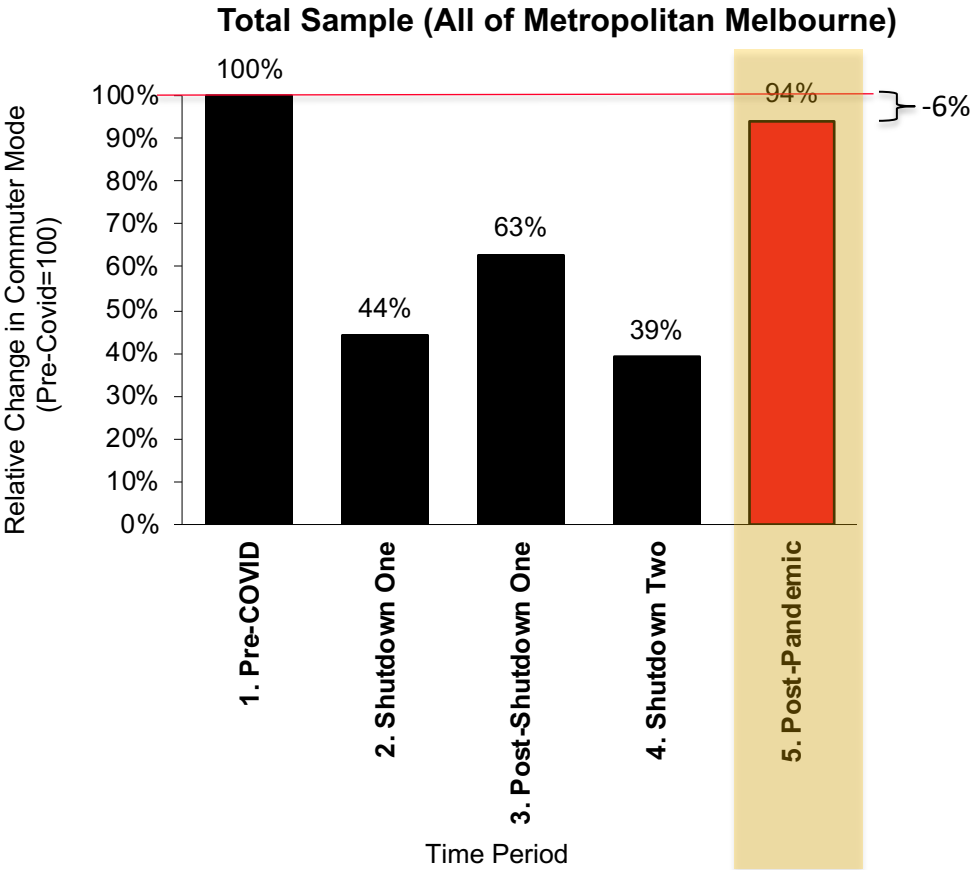**Melbourne CBD Workers n=527**

Note:

(1) Monash - August 2020 Online Panel -10-8-2020 sample - Self reported activity participation volume per week (2) Weighted sample; representative of total Melbourne travel

…this will reduce the commute; but for the CBD; 1 in 5 jobs will no longer be based there acting to reduce CBD activity

Changes in <u>Commute</u> Journey Volume – Greater Melbourne and Melbourne CBD

Total Sample (All of Metropolitan Melbourne)

Relative Change in Commuter Mode (Pre-Covid=100)

- 1. Pre-COVID: 100%
- 2. Shutdown One: 44%
- 3. Post-Shutdown One: 63%
- 4. Shutdown Two: 39%
- 5. Post-Pandemic: 94% (-6%)

Time Period

Melbourne CBD Jobs

- 1. Pre-COVID: 100%
- 2. Shutdown One: 29%
- 3. Post-Shutdown One: 38%
- 4. Shutdown Two: 26%
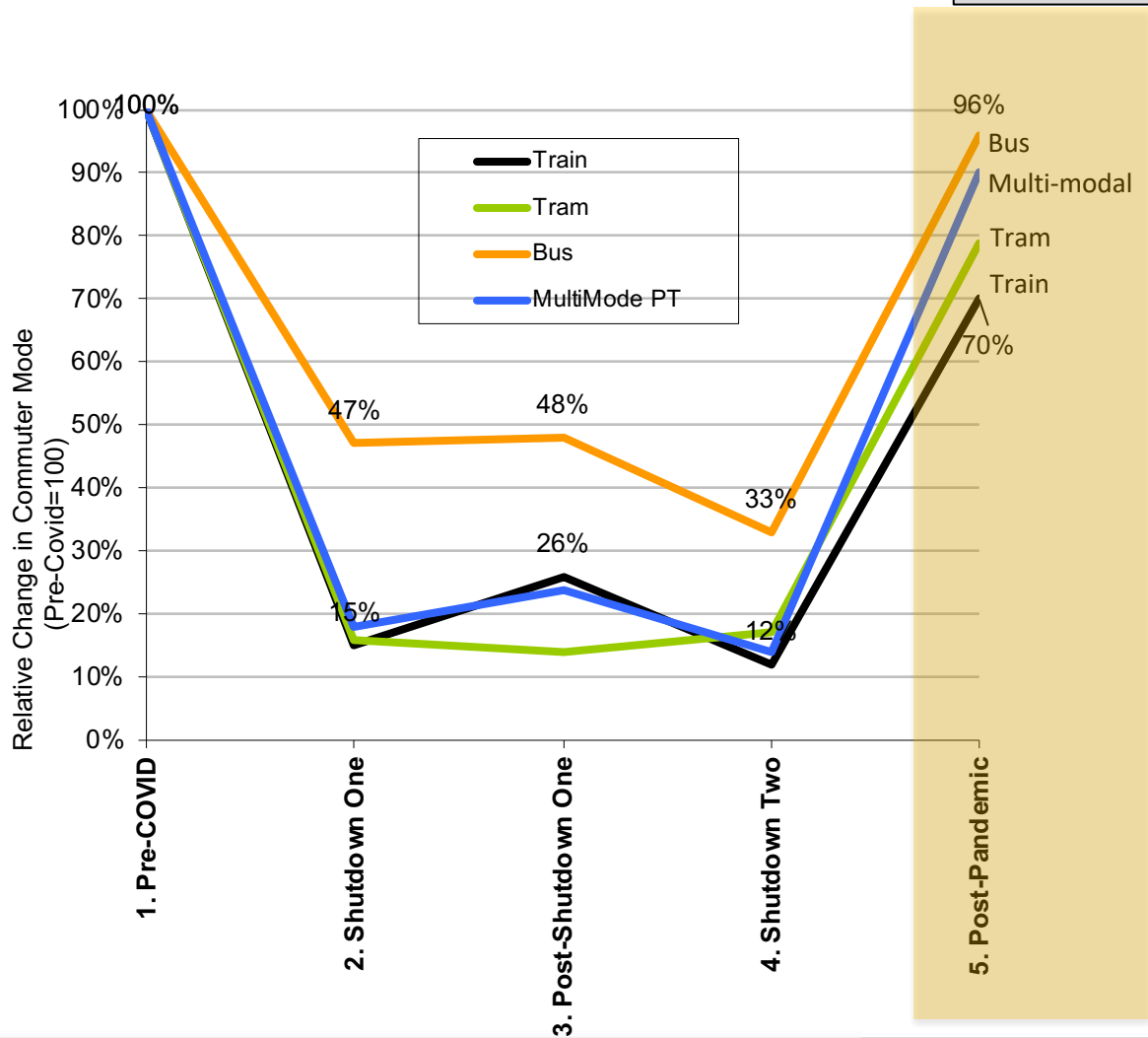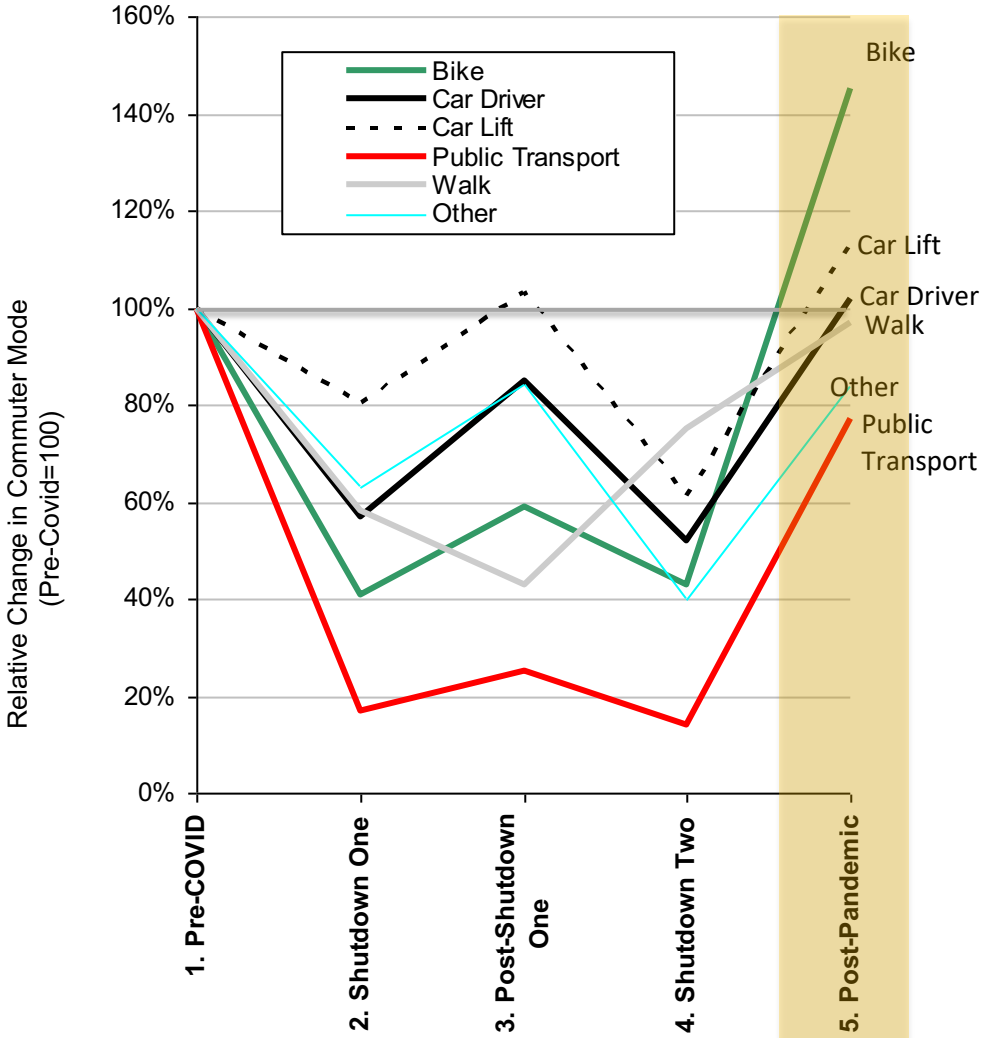- 5. Post-Pandemic: 80% (-20%)

Time Period

Note:

(1) Monash - August 2020 Online Panel – final sample - Self reported CBD travel to work volume per week

(2) Weighted sample; representative of total Melbourne travel

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DISCOVERY – Post-pandemic PT use will recover but to 20% below pre-covid levels – bike and car use will grow

Changes in <u>Commute</u> Journey Volume <u>by Mode</u> – Greater Melbourne

Commuting

Legend (left chart): Bike, Car Driver, Car Lift, Public Transport, Walk, Other

Legend (right chart): Train, Tram, Bus, MultiMode PT

Right chart labels: 100%, 47%, 48%, 33%, 96%, 15%, 26%, 12%, 70%

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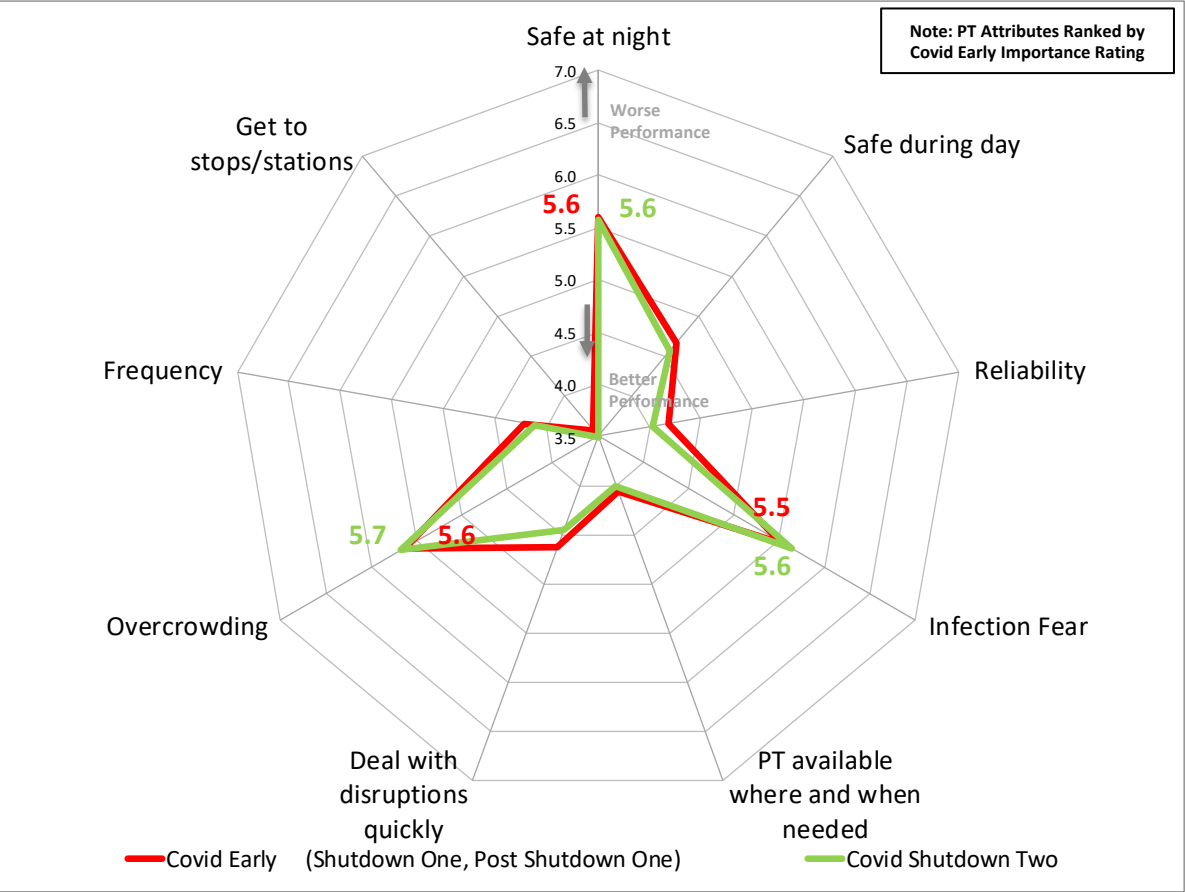# DISCOVERY - Infection Fear and Overcrowding are NEW top concerns for PT Users since the pandemic

Figure C2: Pt User Attitudes to PT Issue IMPORTANCE
Early Covid (Shutdown One and Post Shutdown One) and Late Covid (Shutdown Two)

PERFORMANCE
Average Raw Stated Scores

Attribute (Ranked by Covid Early Importance)	Covid Early (Shutdown One, Post Shutdown One)	Covid Shutdown Two
Safe at night	5.6	5.6
Safe during day	4.7	4.6
Reliability	4.2	4.0
Infection Fear	5.5	5.6
PT available where and when need	4.1	4.0
Deal with disruptions quickly	4.6	4.5
Overcrowding	5.6	5.7
Frequency	4.2	4.1
Get to stops/stations	3.6	3.5

min	3.6	3.5
max	5.6	5.7

Note: PT Attributes Ranked by Covid Early Importance Rating

Covid Early (Shutdown One, Post Shutdown One) — Covid Shutdown Two

Key Points

▸ Covid Early - In terms of performance the biggest concerns are:
  – Overcrowding
  – Safety at Night (from assault/theft)
  – Infection fear
▸ Covid Late – these are still the top issues but there are small changes:
  – Overcrowding remains biggest concern but its rating is worse
  – Infection Fear becomes the second worst rated issue
  – Safety at Night is still a major concern but its performance is rated as slightly of a concern
▸ Other slight changes to shutdown two are:
  – Concern over the performance of safety during the day, reliability and dealing with disruptions are not as larger as they were in early shutdown
▸ Overall shifts between Covid early and late are minor in scale

Note:

(1) Monash - August 2020 Online Panel – final sample - Self reported IMPORTANCE rating; 1-7; 7 = extremely Important, 1=Extremely unimportant (2) Weighted sample; representative of total Melbourne travel

(3) Spiral Plot uses approach from Currie G Delbosc A (2015) Variation in Perceptions of Urban Public Transport Performance Between International Cities Using Spiral Plot Analysis' TRANSPORTATION RESEARCH RECORD No. 2538 pages 54-64.

DISCOVERY - In terms of share of all travel in Greater Melbourne – there is a Post pandemic 5-6% shift from transit to car driving…

Changes in <u>Commute</u> Journey <u>Share</u> by <u>Mode</u> – Greater Melbourne

Commuting

Greater Melbourne Jobs

1. Pre-COVID: Car Driver 57%, Public Transport 36%, Bike 2%, Car Lift 2%, Walk 2%, Other 2%

2. Shutdown One: Car Driver 75%, Public Transport 15%, Bike 2%, Car Lift 3%, Walk 3%, Other 2%

3. Post-Shutdown One: Car Driver 78%, Public Transport 15%, Bike 2%, Car Lift 3%, Walk 2%, Other 2%

4. Shutdown Two: Car Driver 76%, Public Transport 13%, Bike 2%, Car Lift 3%, Walk 4%, Other 2%

5. Post-Pandemic: Car Driver 62%, Public Transport 30%, Bike 3%, Car Lift 2%, Walk 2%, Other 1%

PT Mode Share Decreases 6%

Car Driver Mode Share Increases 5%

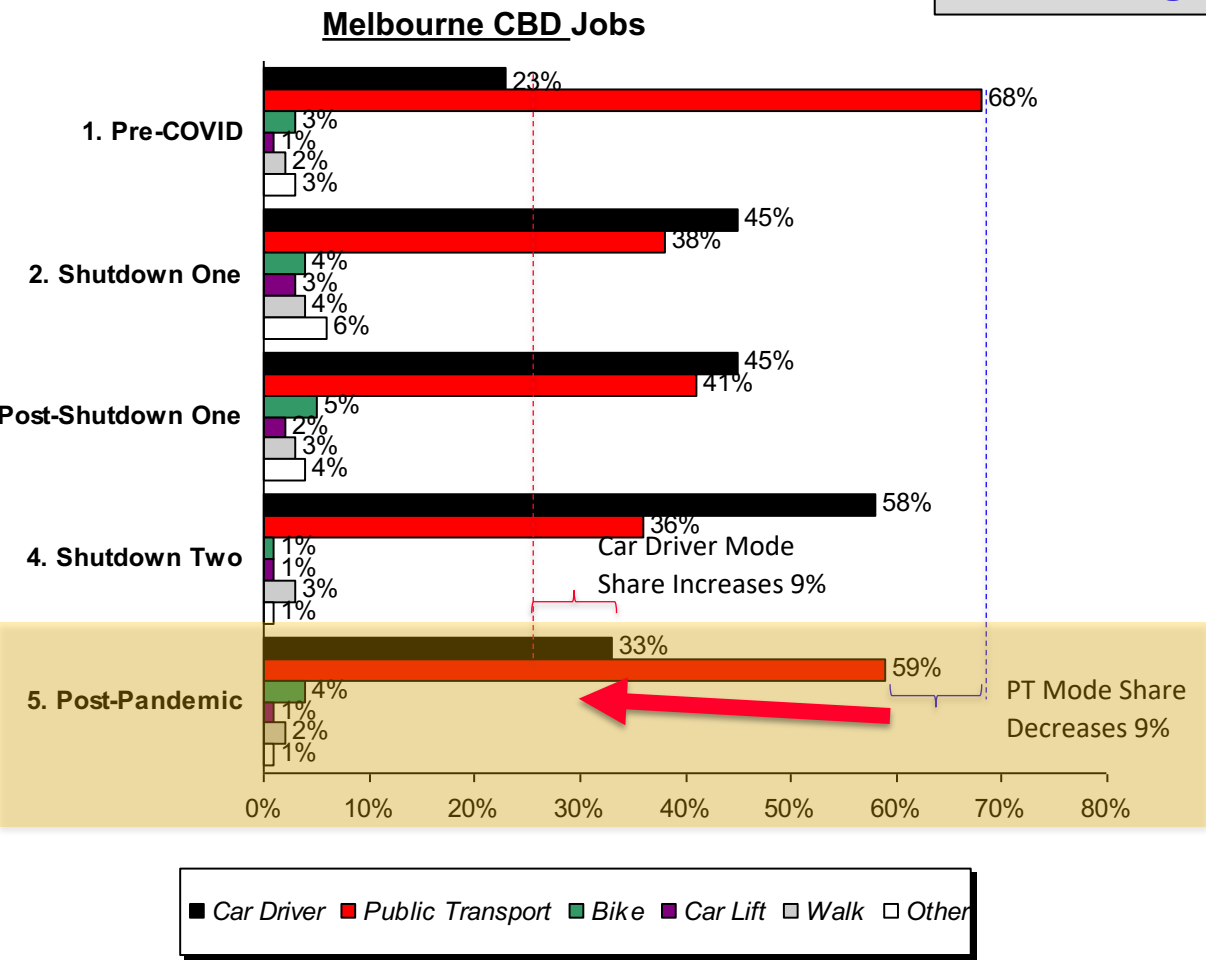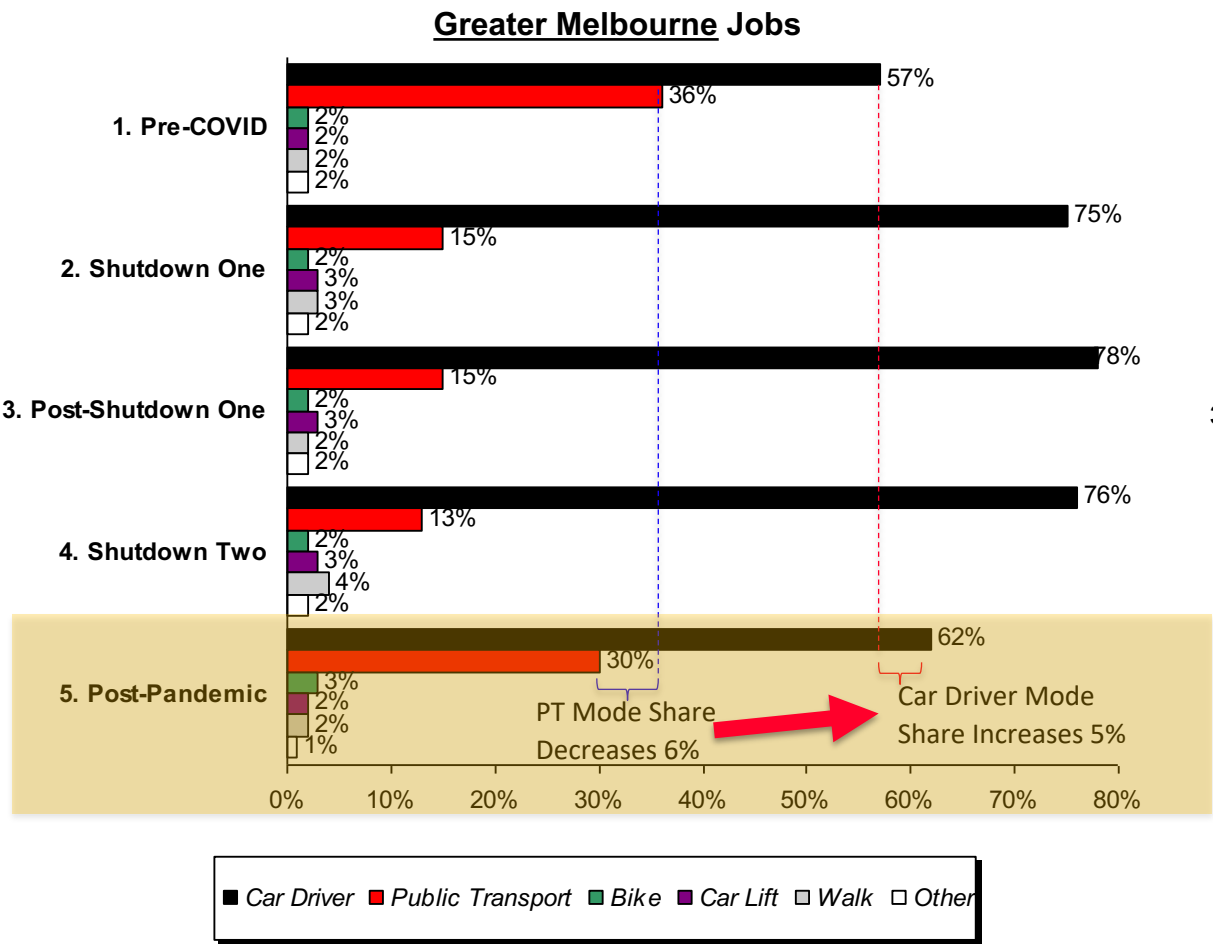Legend: ■ Car Driver ■ Public Transport ■ Bike ■ Car Lift ▫ Walk □ Other

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Key Points

▸ This is the relative SHARE of travel to work by MODE. It is the weighted sample (representative of all travel in Melbourne).

▸ Post Pandemic; major shifts are:
  – Increased car driving; the share of car driving to work will increase from 57% to 62%.
  – Decreased public transport use; although mode share recovers from a low of 13% (Shutdown Two) it returns to a share of 30% of journey to work, 6% below pre covid levels
  – Bike share increases from 2% to 3% post pandemic

▸ During the Pandemic (period 3, 4 and 5) car driving share of journey to work has consistently increased to represent 75-78% of all work travel.

▸ Public Transport travel declines to a share of between 13-15% of travel. Interesting it still represented the second most important means of travel to work after car driving; even during the pandemic.

Note:

(1) Monash - August 2020 Online Panel – final sample - Self reported travel to work volume per week

(2) Weighted sample; representative of total Melbourne travel

...for the CBD; it's a 9% shift suggesting significant future CBD congestion

Changes in <u>Commute</u> Journey <u>Share</u> <u>by</u> <u>Mode</u> – Greater Melbourne & Melbourne CBD

Greater Melbourne Jobs

- **1. Pre-COVID**: Car Driver 57%, Public Transport 36%, Bike 2%, Car Lift 2%, Walk 2%, Other 2%
- **2. Shutdown One**: Car Driver 75%, Public Transport 15%, Bike 2%, Car Lift 3%, Walk 3%, Other 2%
- **3. Post-Shutdown One**: Car Driver 78%, Public Transport 15%, Bike 2%, Car Lift 3%, Walk 2%, Other 2%
- **4. Shutdown Two**: Car Driver 76%, Public Transport 13%, Bike 2%, Car Lift 3%, Walk 4%, Other 2%
- **5. Post-Pandemic**: Car Driver 62%, Public Transport 30%, Bike 3%, Car Lift 2%, Walk 2%, Other 1%

PT Mode Share Decreases 6%
Car Driver Mode Share Increases 5%

Melbourne CBD Jobs

- **1. Pre-COVID**: Car Driver 23%, Public Transport 68%, Bike 3%, Car Lift 1%, Walk 2%, Other 3%
- **2. Shutdown One**: Car Driver 45%, Public Transport 38%, Bike 4%, Car Lift 3%, Walk 4%, Other 6%
- **3. Post-Shutdown One**: Car Driver 45%, Public Transport 41%, Bike 5%, Car Lift 2%, Walk 3%, Other 4%
- **4. Shutdown Two**: Car Driver 58%, Public Transport 36%, Bike 1%, Car Lift 1%, Walk 3%, Other 1%
- **5. Post-Pandemic**: Car Driver 33%, Public Transport 59%, Bike 4%, Car Lift 1%, Walk 2%, Other 1%

Car Driver Mode Share Increases 9%
PT Mode Share Decreases 9%

Legend: ■ Car Driver ■ Public Transport ■ Bike ■ Car Lift □ Walk □ Other
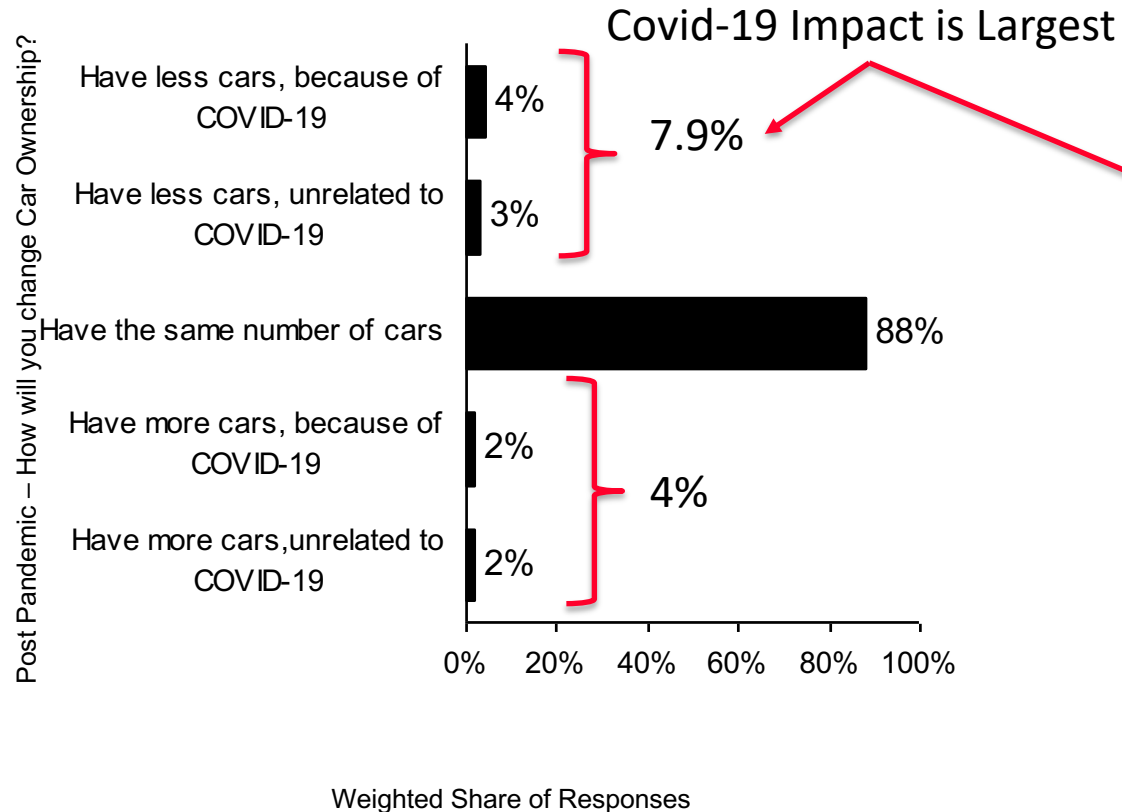
Note:

(1) Monash - August 2020 Online Panel – final sample - Self reported travel to work volume per week

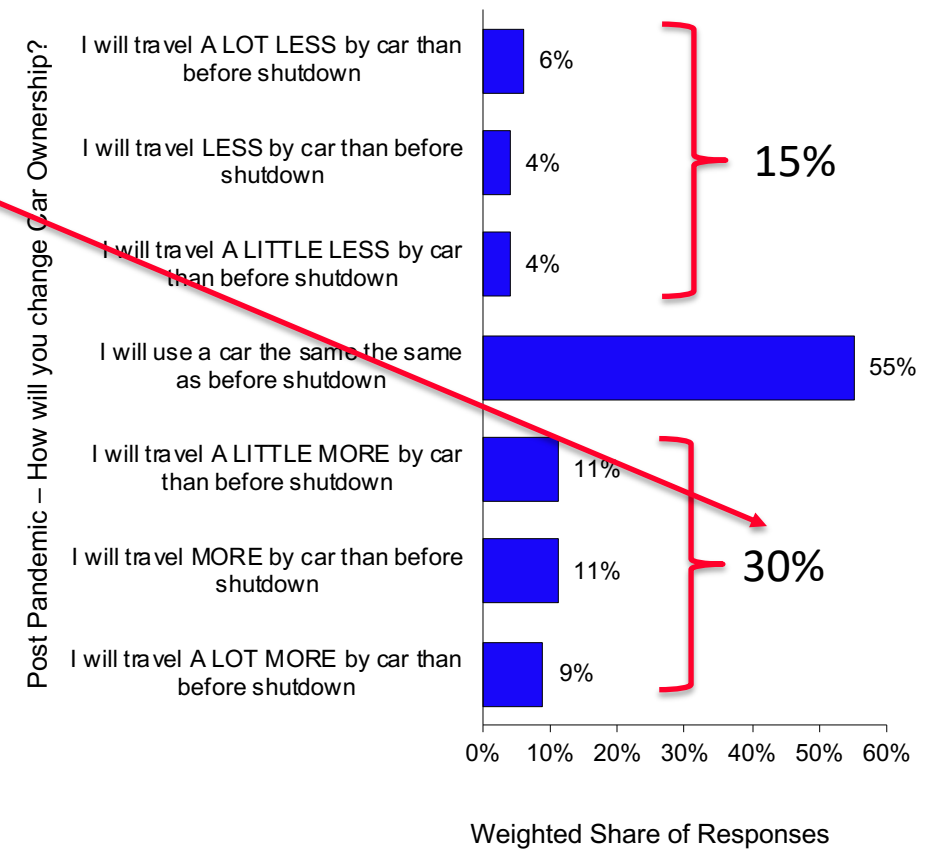*(2) Weighted sample; representative of total Melbourne travel*

DISCOVERY - Post Pandemic, Car Ownership may decline; mainly due to Covid-19 economic impact. However Car Use is likely to increase

Respondent views on Post Pandemic Car Ownership and Use

Changes in CAR OWNERSHIP – Post Pandemic

Changes in CAR USE – Post Pandemic

Covid-19 Impact is Largest

Post Pandemic – How will you change Car Ownership?

Have less cars, because of COVID-19	4%
Have less cars, unrelated to COVID-19	3%
Have the same number of cars	88%
Have more cars, because of COVID-19	2%
Have more cars, unrelated to COVID-19	2%

7.9%

4%

Weighted Share of Responses

Post Pandemic – How will you change Car Ownership?

I will travel A LOT LESS by car than before shutdown	6%
I will travel LESS by car than before shutdown	4%
I will travel A LITTLE LESS by car than before shutdown	4%
I will use a car the same the same as before shutdown	55%
I will travel A LITTLE MORE by car than before shutdown	11%
I will travel MORE by car than before shutdown	11%
I will travel A LOT MORE by car than before shutdown	9%

15%

30%

Weighted Share of Responses

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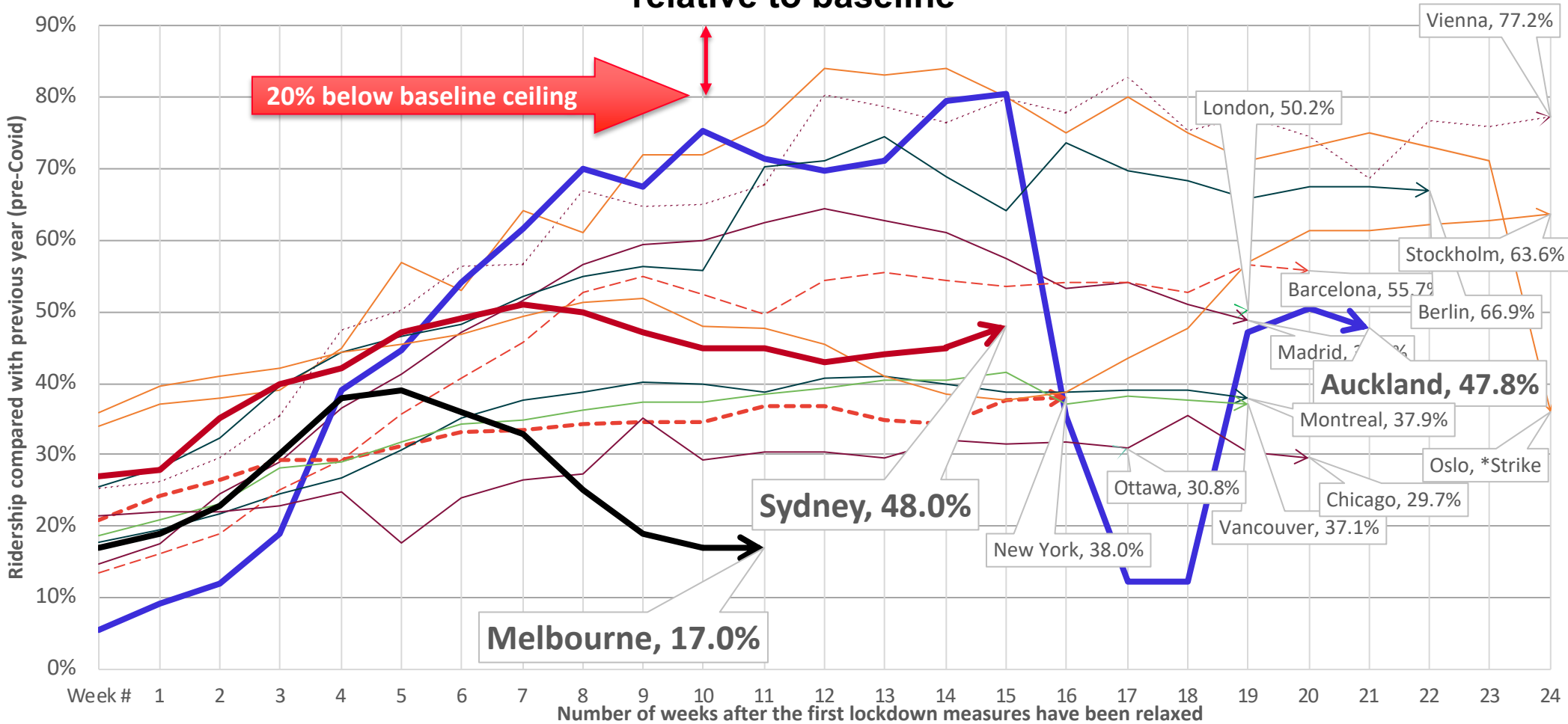
Discoveries – The New Normal

Ridership futures

Planning Futures

DISCOVERY – actual transit recovery trends confirm study recovery predictions including the 20% below baseline ceiling

Recovery Profile of Public Transport in International Cities by week after shutdown end - % relative to baseline


Ridership compared with previous year (pre-Covid)

20% below baseline ceiling

Vienna, 77.2%
London, 50.2%
Stockholm, 63.6%
Barcelona, 55.7%
Berlin, 66.9%
Madrid, 7...%
Auckland, 47.8%
Montreal, 37.9%
Oslo, *Strike
Chicago, 29.7%
Vancouver, 37.1%
Ottawa, 30.8%
Sydney, 48.0%
New York, 38.0%
Melbourne, 17.0%

Number of weeks after the first lockdown measures have been relaxed

Week # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Note:

(1) Monash University analysis of raw data collated from Victorian Department of Transport, Transport for NSW, NZ Transport Agency, UITP.

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Post-pandemic; if we return to prior growth , it will take <u>7 years to catch up</u> a 20% Covid ridership decline impact and return to pre-covid ridership (and crowding) problems

Historical Change in Melbourne Population
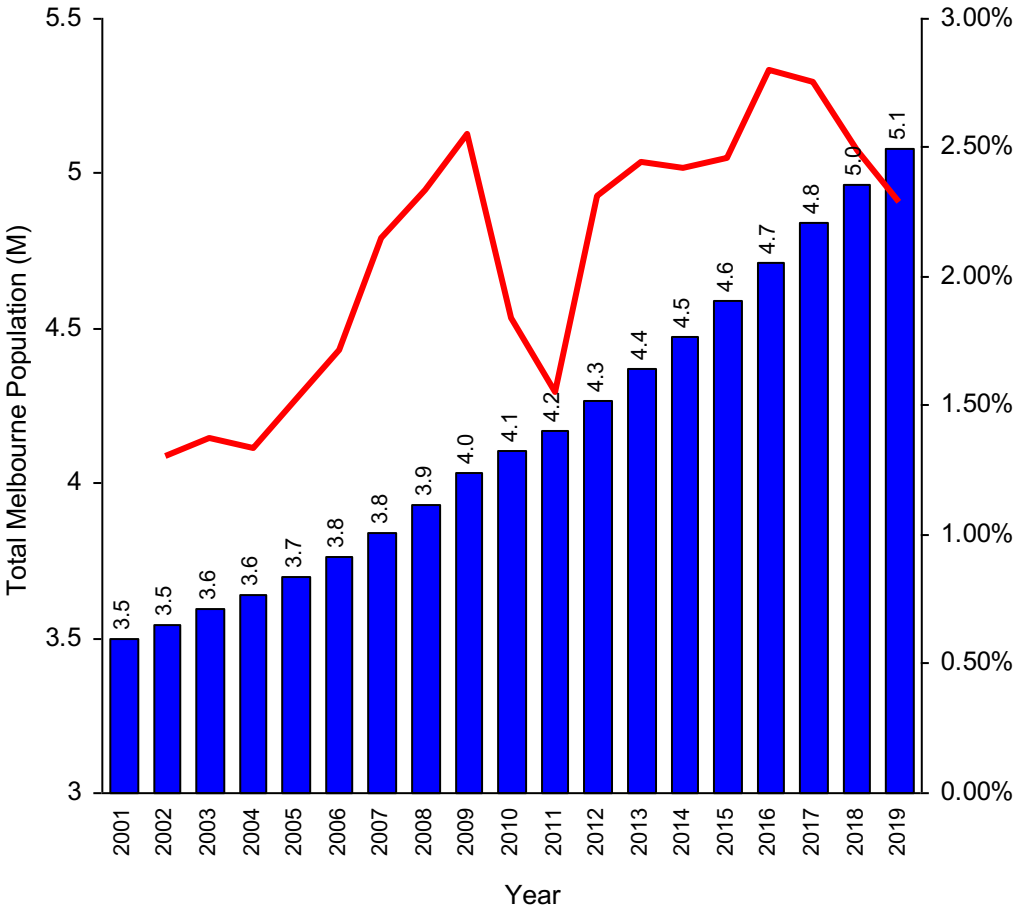
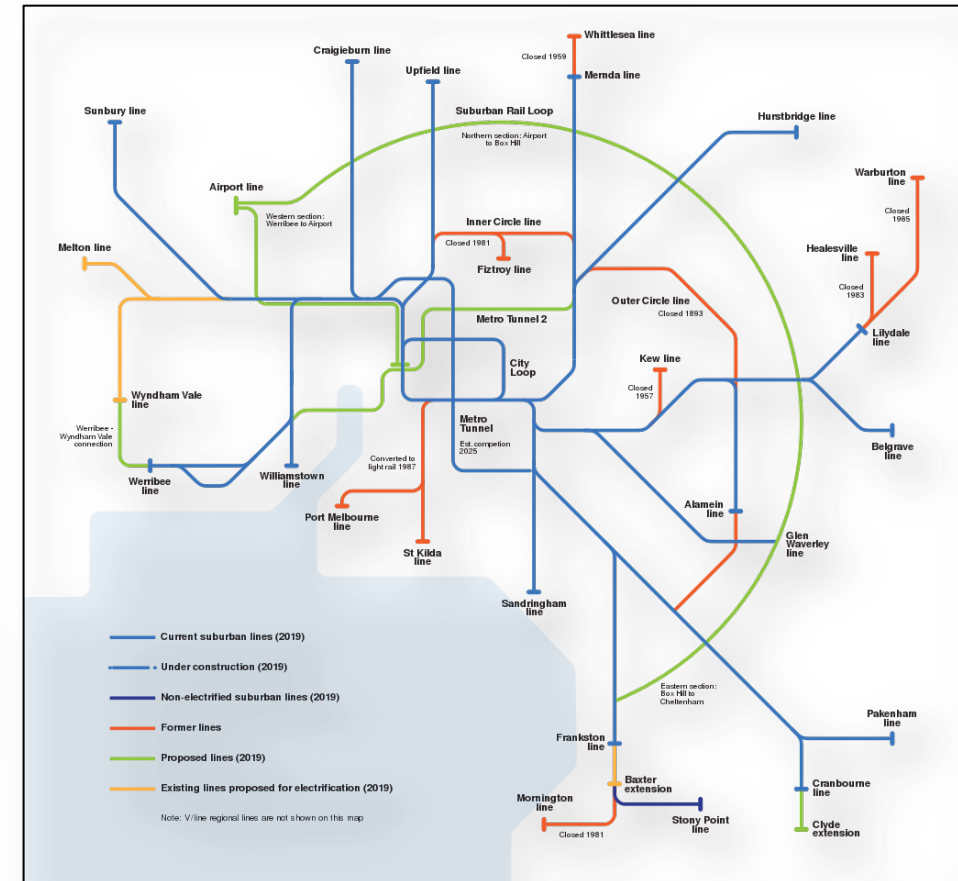**Historical Change in Melbourne Public Transport Ridership**
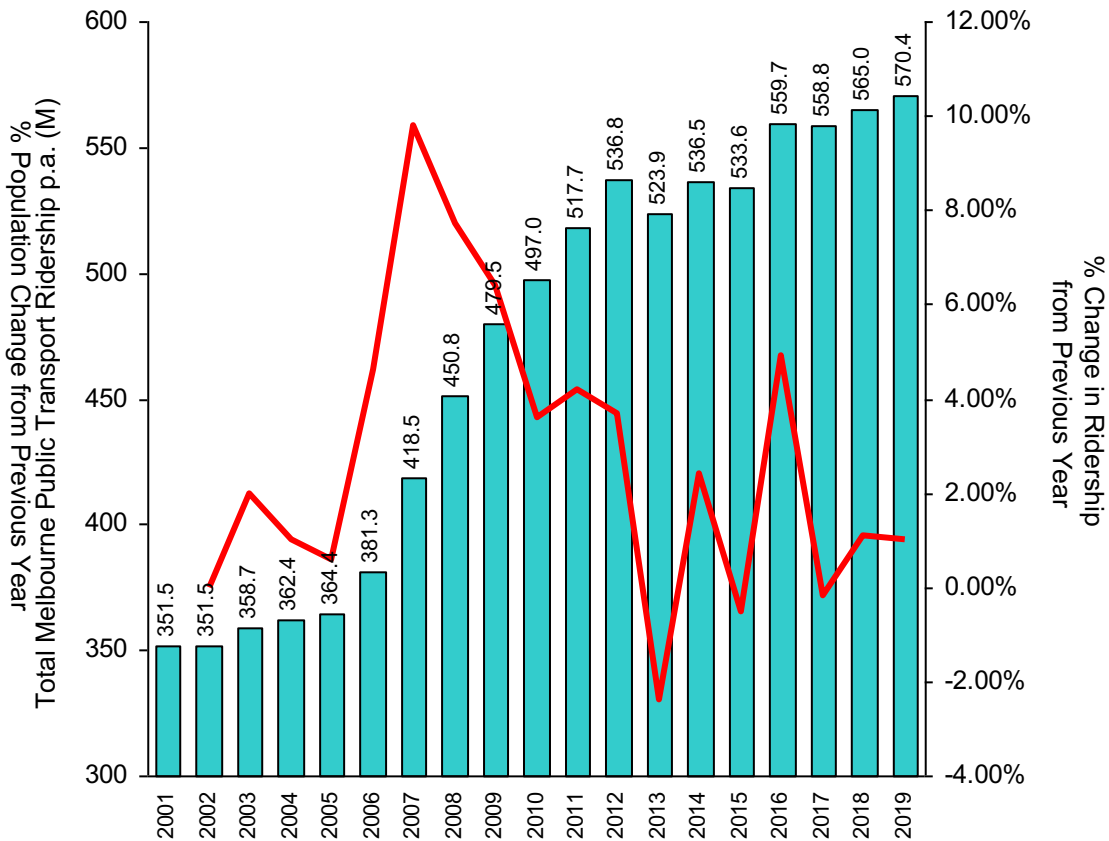
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Our 30-50 year horizon infrastructure investments are safe; well beyond a 7 year horizon

Melbourne Metro Rail Tunnel (Completed 2026)

Suburban Rail Loop (Completed 2050)

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Post Pandemic - Planning futures can be progressive if we take the opportunity; CARPE DEIUM !

Covid Impact ➡️ **20% Less CBD Job Activity**

Covid Impact ➡️ **Increased car driving/ congestion more bike travel**

Metropolitan Melbourne Work from Home

Relative Change in Work Methods (Pre-Covid=100)

- 100% (1. Pre-COVID)
- 310% (2. Shutdown One)
- 268% (3. Post-Shutdown One)
- 297% (4. Shutdown Two)
- 175% (5. Post-Pandemic)

Metropolitan Melbourne Travel Change by Mode

Relative Change in Commuter Mode (Pre-Covid=100)

Legend:
- Bike
- Car Driver
- Car Lift
- Public Transport
- Walk
- Other

Labels: Bike, Car Lift, Car Driver, Walk, Public Transport
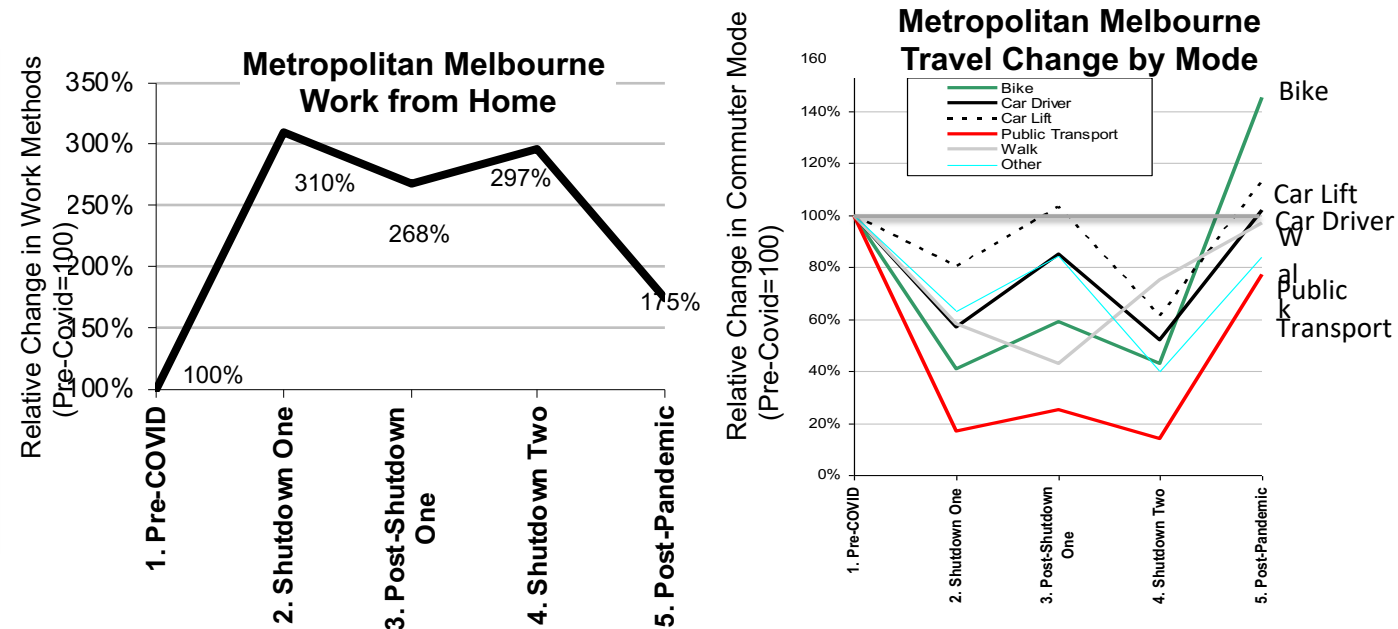
Recovery Opportunity ➡️

- ‣ Redevelop office space for :
  - – European style CBD living
  - – More recreational CBD activities
- ‣ Reduced office space value might make access by lower income business into the CBD
- ‣ Suburbanisation of 1 in 5 CBD jobs matches the 20 min city objective

Recovery Opportunity ➡️

- ‣ Take the opportunity of the Covid forced WFH period to:
  - – reallocate roadspace to Bike/Bus/Tram
  - – reallocate parking space to activities (restaurants)
- ‣ Encourage a quick recovery to all activity including public transport ridership recovery

Please reach out for more information

graham.currie@monash.edu   taru.jain@monash.edu
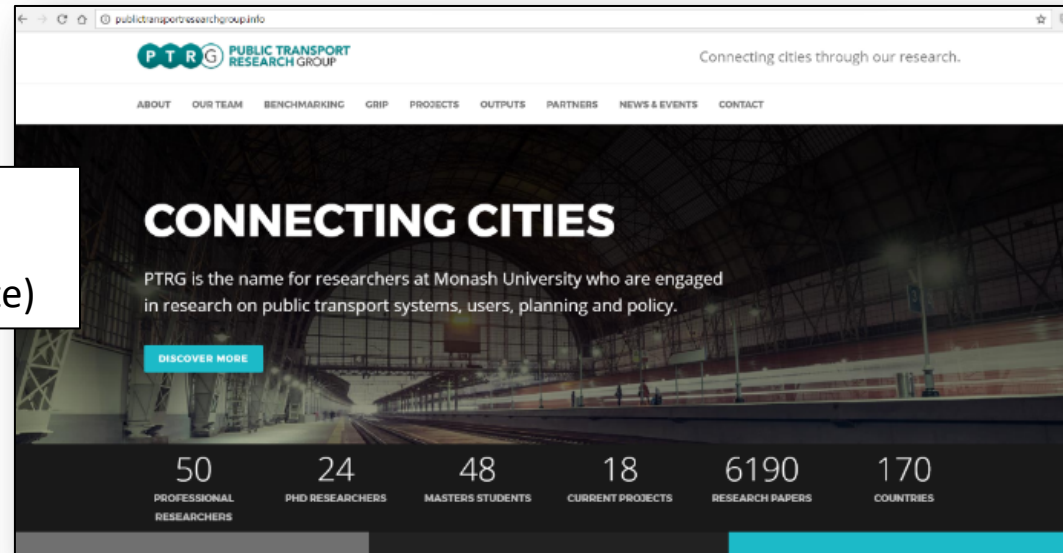
laura.aston@monash.edu

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Researching Transit

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

W: ptrg.info
(project has a webpage on this site)

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