

APPENDIX

	<u>Pages</u>
1. <u>Brief Overview of the dataset</u>	3
2. <u>Analysing Property Price in Greater Melbourne</u>	4-5
3. <u>Reviewing The House Finance Status</u>	6
4. <u>Ownership and Households in Greater Melbourne- Facts and Figures</u>	7-8
5. <u>Supply Vs Demand – A Short Analysis</u>	9
6. <u>A Concise View of the Dwelling Status in Greater Melbourne</u>	10
7. <u>Families in Greater Melbourne</u>	11-12
8. <u>Changes in Marital Status of the Greater Melbourne Population Over the Years</u>	13-14
9. <u>Assessing Employment and Unemployment Status in Greater Melbourne</u>	15
10. <u>Merits of the Visualisation Techniques Applied</u>	16
11. <u>Executive Summary and Conclusion</u>	17-18

1.A brief overview of the dataset

A	B	C	D
Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
MedianHousePrice	\$373,300	\$590,000	\$755,000
MedianUnitPrice	\$315,300	\$474,500	\$552,000
MedianPersonalWeeklyIncome	\$481	\$531	\$673
MedianFamilyWeeklyIncome	\$1,242	\$1,576	\$1,826
MedianHouseholdWeeklyIncome	\$1,073	\$1,333	\$1,542
MedianMortgageWeeklyPayment	\$259	\$417	\$416
MedianWeeklyRent	\$200	\$300	\$350
Population	3,592,591	3,999,982	4,485,211
TotalPrivateDwelling	1,471,155	1,636,167	1,832,043
AverageNumberPeoplePerHousehold	2.6	2.6	2.7
Married(%)	49.3%	48.8%	48.4%
Separated+Divorced(%)	10.2%	10.1%	10.2%
Widowed(%)	5.6%	5.1%	4.7%
NeverMarried(%)	34.8%	35.3%	36.6%
Families	938,488	1,055,604	1,161,643
MedianAge	36	36	36
BirthInAustralia(%)	64.2%	63.3%	59.8%
Worked full-time(%)	61.0%	60.1%	58.0%
Worked part-time(%)	27.7%	28.8%	30.8%
Unemployment(%)	5.3%	5.5%	6.8%
CoupleFamilyNoChildren(%)	34.1%	34.8%	34.5%
CoupleFamilyHasChildren(%)	48.4%	47.9%	48.5%
OneParentFamily(%)	15.4%	15.3%	15.0%
OtherFamily(%)	2.1%	2.0%	2.0%
OccupiedDwellings(%)	91.9%	91.0%	90.4%
UnoccupiedDwelling(%)	8.1%	9.0%	9.6%
SeparateHouse(Dwellings%)	71.9%	72.6%	67.8%
SemiDetached(Dwellings%)	11.4%	11.6%	16.8%
FlatUnitApartment(Dwellings%)	16.1%	15.3%	14.7%
FullyOwned(%)	33.1%	32.7%	30.4%
OwnedWithMortgage(%)	34.6%	36.8%	36.0%
Rented(%)	24.5%	27.2%	30.0%
FamilyHouseholds(%)	68.1%	72.0%	71.7%
SinglePersonHouseholds(%)	22.6%	23.3%	23.2%
GroupHouseholds(%)	4.2%	4.7%	5.0%

The dataset has quantitative data of categorical variables for analysis. These data have been collected over 10 years, in three groups: - 2006, 2011 and 2016.

The objective is to find out whether the property market was moving towards renting or buying based on the trends and other factors analysed.

The data was rearranged as part of data preparation to create new variables for better analysis and to assess the categories which needed to be compared. A new variable “Demand” was created to analyse the demand for properties in Greater Melbourne by dividing the variable, “Population” by another variable “AverageNumberPeoplePerHousehold”. To analyse the seven categories mentioned above, the datasheet was duplicated to suit the corresponding categories which were being studied.

This dataset is from ABS (Australian Bureau of Statistics) data for Greater Melbourne. It comprises of information on the following categories: -

1. Property price
2. House finance status
3. Ownership and household information
4. Dwelling status
5. Family information
6. Population and marriage status
7. Unemployment and employment status

The Australian Bureau of Statistics (ABS) is the statistical agency of the Government of Australia. Here, it has collected the information on the above categories from the Greater Melbourne population through sample surveys and censuses.

The 7 categories in the dataset have characters which are assessed to study the dataset.

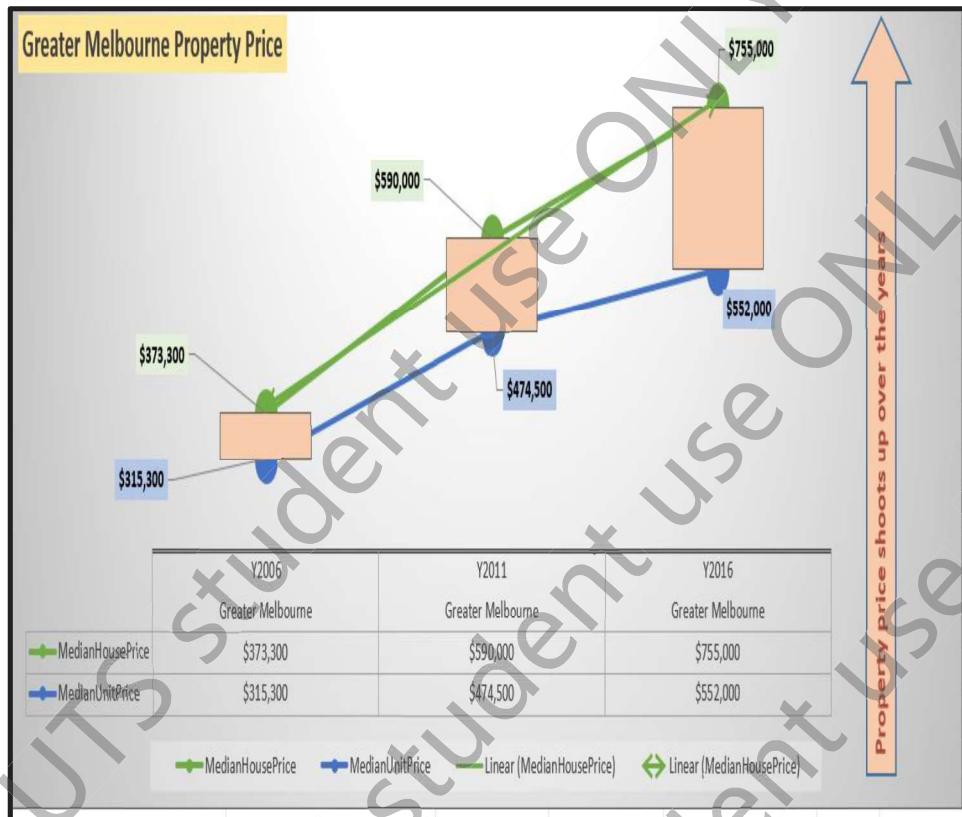
1)Property Price- Median house and unit prices. **2)House Finance Status-** median weekly income at personal, family and household levels compared against weekly mortgage and rent payments. **3)Ownership and household information-** fully owned, mortgage ownership and rented for single, family and group households. **4) Dwelling status-** separate, semi-detached and flat/unit/apartments. **5)Family information-** couples with and without children, one parent and other families. **6)Population and marriage status-** married, never married, separated/divorced and widowed sections in the population. **7)Unemployment and employment status-** worked full or part-time and unemployed.

After scrutinising the supportive variables involved, recommendation would be made about the more beneficial option between renting and buying.

2. Analysing Property Price in Greater Melbourne

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
MedianHousePrice	\$373,300	\$590,000	\$755,000
MedianUnitPrice	\$315,300	\$474,500	\$552,000

Graph1



Analysis of the residential property prices in Greater Melbourne during the period of 2006-2016 is attempted here.

The visual analysis along with the tables tell the ‘story’ themselves.

There has been a steady increase in the property price during the 10 years.

Median house price shot up from \$373,000 in 2006 to \$755,000 in 2016.

Median Unit price took a similar jump from \$352,300 in 2006 to \$552,000 in 2016.

Visualisation Technique

Median house and unit prices in the years 2006, 2011 and 2016 need to be visualized with display of trend lines in a single chart for a comprehensive analysis. Stacked line chart with markers serve this purpose best as we can use different coloured lines connecting prices in different years highlighted with markers for houses and units.

Stacked lines with markers is therefore used here to display the changes in the prices of houses and units separately for the years 2006, 2011 and 2016. Vertical axis was removed after rescaling for space gain. Data table added for and trendlines and up/down bars have been used to for quick comparison and comprehension. Trend lines were highlighted to suit the variables.

Greater Melbourne property price change from 2006 - 2016

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
MedianHousePrice	\$373,300	\$590,000	\$755,000
MedianUnitPrice	\$315,300	\$474,500	\$552,000
HousePrice Change	100%	158%	202%
UnitPriceChange	100%	150%	175%

Graph 2

Visualisation Technique



Summary

The price change of houses in Greater Melbourne is more pronounced when compared with the change of unit price in the 10 years from 2006 to 2016. Median house price increase is 102% in these 10 years while median unit price increase is only 75%. The rise in house prices is 58% in the first 5 years between 2006 – 2011 and this is again continued for the next 5 years from 2011 – 2016 by another 44% to make a total of 102% increase. The period from 2006 to 2011 saw a 50% increase in the unit prices. This was halved to 25% in the next 5 years between 2011 to 2016.

The data demands display of house and d unit prices along with the percentage of changed prices of both over the years. Only a combination chart can display different data measurements in different scales in the same chart.

Therefore, a combo chart is used here. The clustered column chart in the primary axis represents the property prices of houses and units and the stacked lines with markers in the secondary axis represent the price changes over time. Vertical axes have been rescaled to highlight the differences and gain space. Legend and color-formatted data labels added for making the presentation candid. Boxes with arrows were inserted for better and immediate comprehension. Chart area and data series also were colour-formatted. Grid lines deleted to lessen confusion and add aesthetic appeal.

3.Reviewing the house finance status

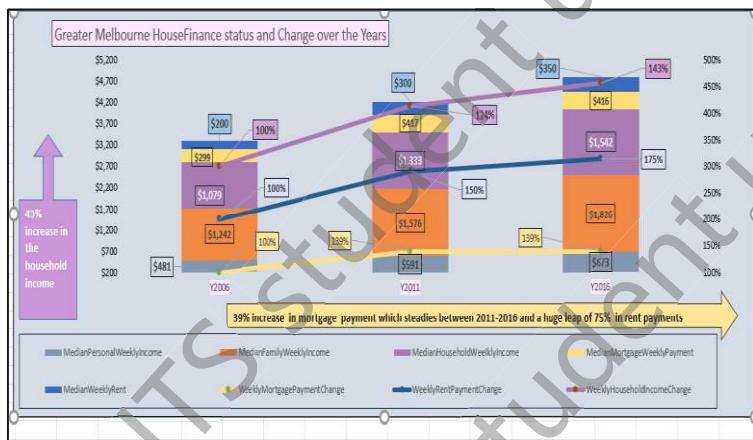
Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
MedianPersonalWeeklyIncome	\$481	\$591	\$673
MedianFamilyWeeklyIncome	\$1,242	\$1,576	\$1,826
MedianHouseholdWeeklyIncome	\$1,079	\$1,333	\$1,542
MedianMortgageWeeklyPayment	\$299	\$417	\$416
MedianWeeklyRent	\$200	\$300	\$350

Affordable housing is a key player that impacts a region's economy and the welfare of the people living there. We will now examine how this soaring residential property price sits with the house finance status.

Changes in house finance status in Greater Melbourne over the years

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
MedianPersonalWeeklyIncome	\$481	\$591	\$673
MedianFamilyWeeklyIncome	\$1,242	\$1,576	\$1,826
MedianHouseholdWeeklyIncome	\$1,079	\$1,333	\$1,542
MedianMortgageWeeklyPayment	\$299	\$417	\$416
MedianWeeklyRent	\$200	\$300	\$350
WeeklyMortgagePaymentChange	100%	139%	139%
WeeklyRentPaymentChange	100%	150%	175%
WeeklyHouseholdIncomeChange	100%	124%	143%

Graph3



Summary

While the figures indicate an overall increase in income at personal, family and household levels, there is also evidence to suggest an increase in expenditure through mortgage and rent payments. To assess whether the balance sways towards income or expenditure, the changes in the income and expenditure over the years are calculated.

The weekly mortgage payments jump up by 39% between 2006 and 2011 and then remain steady so that the increase in 10 years, from 2006 to 2016 is only 39%. Weekly rent payment increases by 50% in the first 5 years from 2006 to 2011 and again by 25% in the next 5 years resulting in an actual increase of 75% between 2006 and 2016.

Household income raise steadily over the 10 years to show an increase of 43% from 2006 to 2016.

The net income therefore balances with the mortgage payment but falls short in comparison with rent payment.

Visualisation Technique

A combination chart is ideal to visualize different data that are measured using different scales in the same chart. The data above requires incomes and payments in each year along with their changes in percentages over the years to be displayed in a single chart. Therefore, a combination chart of stacked column and stacked line with markers is used here. Stacked columns are used to display the incomes and the mortgage and rental payments in each year while stacked line with markers are used to visualize the changes in the household income and the rent and mortgage payments in each year. Vertical axes have been rescaled to gain space and highlight the differences. Data labels are repositioned and highlighted with appropriate colours, and legends added for better and instant understanding. Arrows and boxes with summary of the chart are inserted to tell the 'story' candidly. Grid lines were deleted to de-clutter. Chart area and data series were colour-formatted.

Factors affecting residential property prices

Property prices are influenced by a tug of war between 'demand' and 'supply'. On the demand side- number of households, interest rates, economic growth which in turn affects employment status and availability of mortgages are present. House finance status depends on employment status, and both affect the mortgage availability. On the supply side we have supply of housing- both new builds and old ones which are selling.

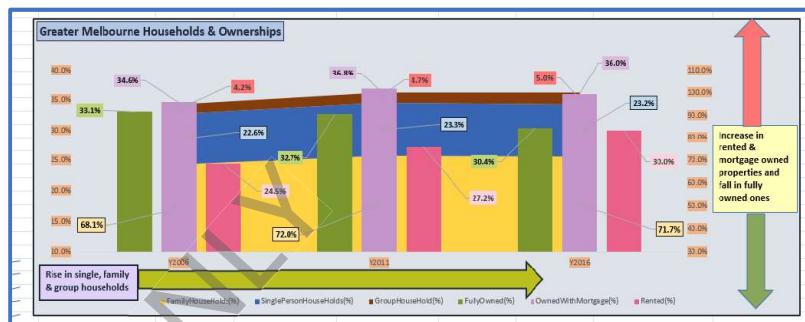
4. Ownership and Households in Greater Melbourne- Facts and Figures

Graph4

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
FullyOwned[%]	33.1%	32.7%	30.4%
OwnedWithMortgage[%]	34.6%	36.8%	36.0%
Rented[%]	24.5%	27.2%	30.0%
FamilyHouseHolds[%]	68.1%	72.0%	71.7%
SinglePersonHouseHolds[%]	22.6%	23.3%	23.2%
GroupHouseHold[%]	4.2%	4.7%	5.0%

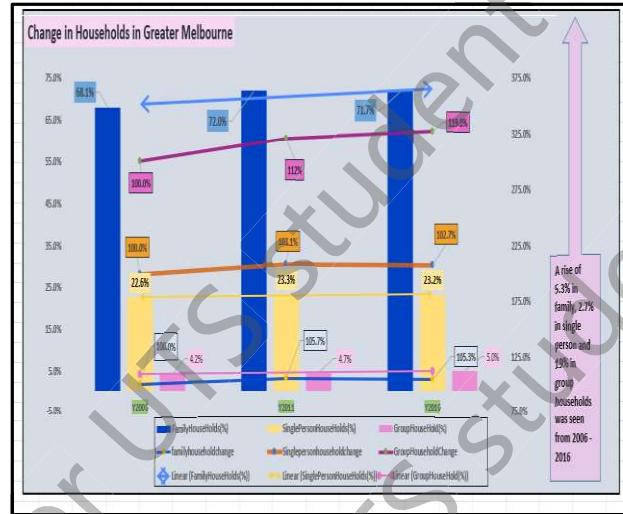
Changes in household

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
FamilyHouseHold[%]	68.1%	72.0%	71.7%
SinglePersonHouseHold[%]	22.6%	23.3%	23.2%
GroupHouseHold[%]	4.2%	4.7%	5.0%
FamilyHouseholdChange	100.0%	105.7%	105.3%
SinglepersonHouseholdChange	100.0%	103.1%	102.7%
GroupHouseholdChange	100.0%	112%	119%



Visualisation Techniques Graphs 4&5

Graph 5



Summary

Number of households in a region impacts the property market in the area from the 'demand' side. In greater Melbourne, group households were favoured over the years as per the figures. There was a noticeable rise of 19% in group households from 2006 to 2016. The increase was 12% in the first 5 years and dropped to 7% in the next 5 years. A minor increase of 5.3% in family households was seen during the 10 years from 2006 to 2016. Here, the period between 2011-2016 was steady with a minimal drop of 0.4%. Single households appear to be the least common showing only a 2.7% increase during the 10-year period between 2006 to 2016.

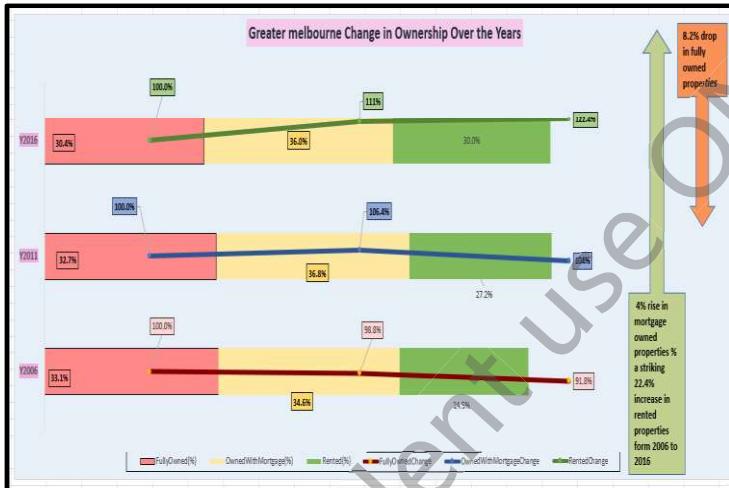
Combination charts are ideal when the data has different types of information that needs to be shown in a single chart. Here we have data on 2 categories; first one is type of households with 3 variables namely single person, family, and group and the second one is based on ownership with 3 variables, fully owned, owned with mortgage, and rented. Therefore, a combination chart with clustered columns for the type of ownership with 3 variables and stacked area for type of household with 3 variables. Vertical axes have been rescaled for better comparison highlighting the difference. Colour-formatted chart area adds to aesthetic appeal. Color-coordinated and repositioned data labels, arrows with summaries and legend included for enhanced visual impact and understanding.

The data requires comparison of 3 variables of the category household namely family single person and group over 3 years, 2006, 2011 and 2016 along with the changes in percentages over these years. A combination chart is ideal to visualize different data that are measured using different scales in the same chart. Therefore, a combination chart of clustered columns for the 3 variables of households and stacked line chart with markers for the data points representing the changes in the households over the years is used here. Data labels were repositioned and formatted with corresponding colours tell the story of the data visually. Vertical axes have been rescaled to highlight the data for better comparison visually. Highlighted trend lines along with legend enclosed in box allow quick comprehension. The chart area and data series were colour-formatted for aesthetic presentation and better visual impact.

Changes in ownership over the years in Greater Melbourne

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
FullyOwned(%)	33.1%	32.7%	30.4%
OwnedWithMortgage(%)	34.6%	36.8%	36.0%
Rented(%)	24.5%	27.2%	30.0%
FullyOwnedChange	100.0%	98.8%	91.8%
OwnedWithMortgageChange	100.0%	106.4%	104%
RentedChange	100.0%	111%	122.4%

Graph 6



Summary

Fully owned houses dropped by 8.2% from 2006 to 2016. There was a minor increase in ownership with mortgage, by 4%. Interestingly, the increase was more between 2006 to 2011, with a value 6.4 which dropped by 2.4% in the next 5 years between 2011 to 2016. A comparatively striking hike was noted in renting in these 10 years. There was 11% rise in rentals between 2006 to 2011 which again doubled and increased by another 11.4% in the period between 2011 to 2016, with an effective total increase of 22.4% from 2006 to 2016 possibly due to increase in group households.

Visualisation Technique

The data requires comparison of 3 variables of the category ownership namely fully owned, mortgage ownership and rented over the years, 2006, 2011 and 2016. along with the changes in percentages over these years. A combination chart is ideal to visualize different data that are measured using different scales in the same chart. Therefore, a combination chart of clustered columns for the 3 variables of ownership and stacked line with markers for the data points representing the changes in the ownership over the years is used here. Data labels are formatted with corresponding colours for better visual impact. Vertical axes rescaled and deleted to gain space and to highlight the difference for comparison.

Despite a 75% increase in the median weekly rent over the years, an increase of 22.4% was noted in the percentage of rented properties from 2006 to 2016.

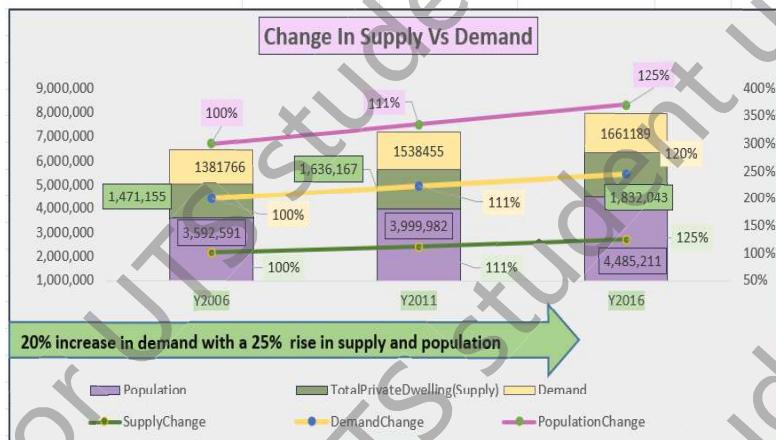
5. Supply Vs Demand

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
Population	3,592,591	3,999,982	4,485,211
TotalPrivateDwelling(Supply)	1,471,155	1,636,167	1,832,043
AverageNumberPeoplePerHousehold	2.6	2.6	2.7
Demand	1381766	1538455	1661189
SupplyVsDemand	106%	106%	110%

Change in Supply & Demand

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
Population	3,592,591	3,999,982	4,485,211
TotalPrivateDwelling(Supply)	1,471,155	1,636,167	1,832,043
Demand	1381766	1538455	1661189
SupplyChange	100%	111%	125%
DemandChange	100%	111%	120%
PopulationChange	100%	111%	125%

Graph 7



Summary

From 2006 to 2011, the population increases concurrently with the supply. The supply increased by 11% and is accompanied by an equal 11% rise in demand and population as well. But during the next 5-year period from 2011 – 2016, supply along with population increase by 14% to make a total of 25% rise in the 10 years from 2006 to 2016, while demand increase by only 9% taking its total rise to 20% in the 10 years from 2006 to 2016. This makes the supply exceed the demand despite an increase in population.

By dividing the population of the given year with the average number of persons per household as suggested by the census in that year, we can calculate the demand for the residential property for that year in the given area. Total private dwelling in a year in a region is the total supply of the residential property available in that region. The figures suggest an increase in both the supply and demand over the years with a corresponding increase in the ratio of supply to demand. It is noteworthy that in the first 5 years from 2006 to 2011, there is no change in the ratio between supply and demand. To find out how exactly the ratio has shifted over the years, we need to know the change in supply and demand over the 10 years from 2006 to 2016.

Visualisation Technique

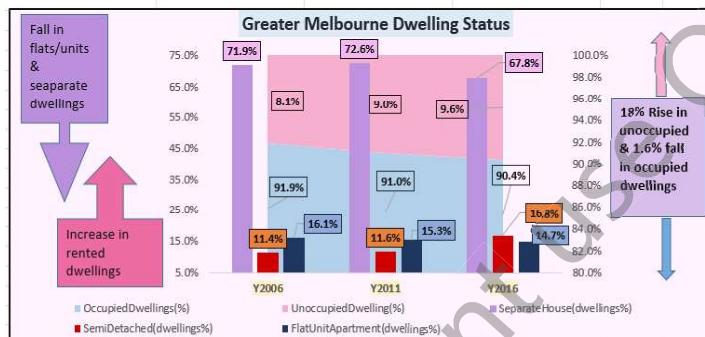
A combination chart is ideal to visualize different data that are measured using different scales in the same chart. The data above requires supply and demand in each year along with their changes in percentages over the years to be displayed in a single chart. Therefore, a combination chart of stacked column and stacked line with markers is used here. Stacked columns are used to display the supply and demand of residential properties in each year while stacked line with markers are used to visualize their changes in each year. Vertical axes have been rescaled to gain space and highlight the differences. Data labels are repositioned and highlighted with appropriate colours, and legends added for better and instant understanding. Arrows and boxes with summary of the chart are inserted to tell the ‘story’ candidly. Grid lines were deleted to de-clutter. Chart area and data series were colour-formatted.

6. A Concise View of the Dwelling Status in Greater Melbourne

Visualisation Techniques-Graphs8&9

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
OccupiedDwellings(%)	91.9%	91.0%	90.4%
UnoccupiedDwelling(%)	8.1%	9.0%	9.6%
SeparateHouse(dwelling%)	11.9%	12.6%	12.8%
SemiDetached(dwelling%)	11.4%	11.6%	16.8%
FlatUnitApartment(dwelling%)	16.1%	15.3%	14.7%
OccupiedDwellingChange	100.0%	99.1%	98.4%
UnoccupiedDwellingChange	100.0%	110.7%	118%

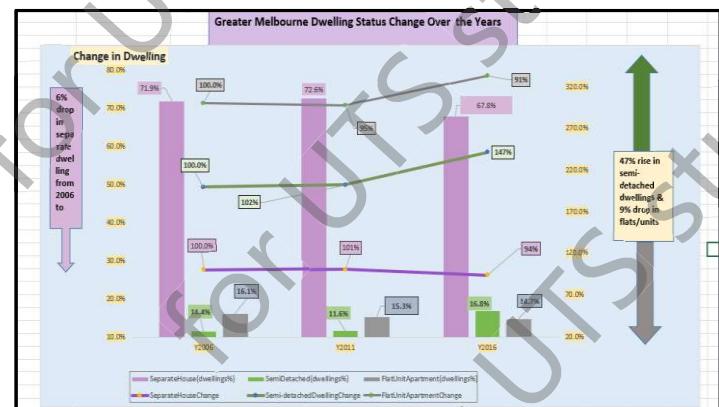
Graph 8



Change in Dwelling Type Over the Years

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
SeparateHouse(dwelling%)	71.9%	72.6%	67.8%
SemiDetached(dwelling%)	11.4%	11.6%	16.8%
FlatUnitApartment(dwelling%)	16.1%	15.3%	14.7%
SeparateHouseChange	100.0%	101%	94%
Semi-detachedDwellingChange	100.0%	102%	147%
FlatUnitApartmentChange	100.0%	95%	91%

Graph9



Summary

Over the 10 years, from 2006 – 2016, there has been a fall noted in the occupied dwelling area along with a rise in unoccupied dwelling area. This information once again underlines the fact we noted before about supply exceeding the demand. Separate dwellings and units, flats and apartments became less preferred type of dwellings whereas semi-detached dwellings gained popularity. There was a minimal 1% rise in separate dwellings during the 5 years from 2006 – 2011 following which a 6% drop occurred. On the other hand, semi-detached dwellings increased by 2% from 2006 to 2011 and then took a giant leap of another 45% in the next 5 years from 2011 to 2016 to make a total of 47% rise. Flats/units/apartments in Greater Melbourne fell out of favour as dwellings in a steady manner, 5% in the first 5 years and another 4% in the next to give a total of 9% decrease.

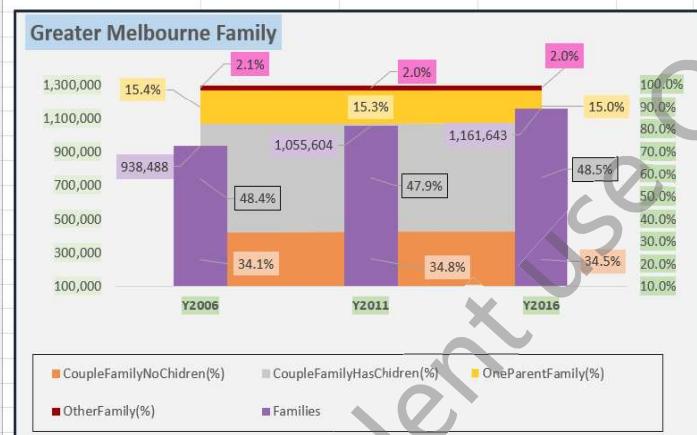
Combination charts are ideal when the data has different types of information that needs to be shown in a single chart. Here we have data on 2 categories, type of dwellings with 3 variables namely separate, semi-detached and flat/units/apartments and the second one based on occupancy with 2 variables, occupied and unoccupied dwellings. Therefore, a combination chart with clustered columns for the type of dwellings with 3 variables and stacked area for occupancy with 2 variables. Vertical axes have been rescaled for better comparison highlighting the difference. Data labels formatted on label and text colours and fonts, arrows with summaries and legend included for enhanced visual impact easy understanding. Grid lines cleared for a clean and aesthetic visual experience.

Combination charts are ideal when the data has different types of information measured in different scales that needs to be shown in a single chart. Here we have data on 3 variables of the category, type of dwellings namely separate, semi-detached & flat/units/apartments and their changes over the years, 2006, 2011 and 2016. Therefore, a combination chart with clustered columns for the type of dwellings with 3 variables and stacked line with markings for the changes of the variables over time. Vertical axes have been rescaled for better comparison highlighting the difference. The data labels have been repositioned and colour-formatted and adjusted in size for easy discernment. Arrows with summaries and legend included for enhanced visual impact and understanding. The data series and chart area were also colour-formatted for a finer presentation that creates better impact.

7. Families in Greater Melbourne

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
Families	938,488	1,055,604	1,161,643
CoupleFamilyNoChildren(%)	34.1%	34.8%	34.5%
CoupleFamilyHasChildren(%)	48.4%	47.9%	48.5%
OneParentFamily(%)	15.4%	15.3%	15.0%
OtherFamily(%)	2.1%	2.0%	2.0%

Graph10



Families with children generally prefer separate or semi-detached homes to flats/apartments. Couple with children tend to buy rather than rent. Naturally families with children prefer living in the suburbs rather than in the CBD where the type of dwellings are mostly flats/apartments. Melbourne being a great metropolitan city boasts of many suburbs which are ideal for a family to thrive. While couples without children would love a suburb that offers a nightlife, café culture, easy commute and gym, schools, parks, and other such facilities get the priority in the list of wants for a couple with children. Therefore, it is quite important to know about the type of families living in a region.

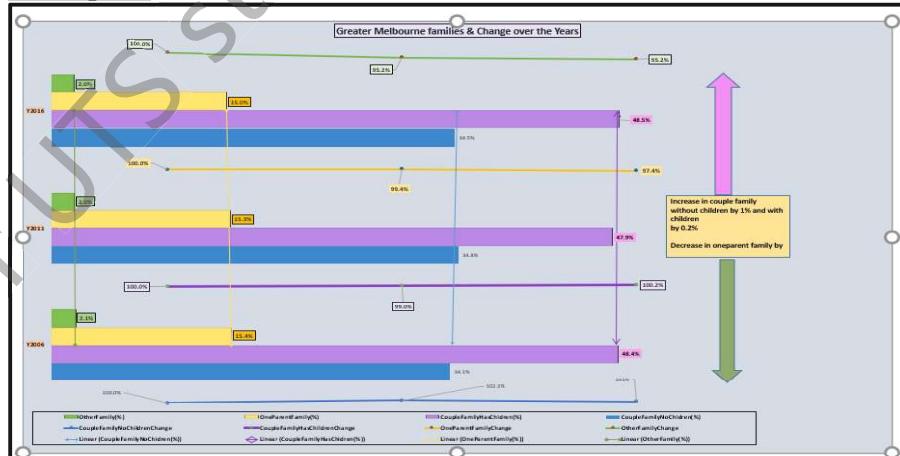
Visualisation Technique

Changes in Family over the years

Combination charts are ideal when the data has different types of information measured in different scales which must be shown in a single chart. Here we have data on families in numbers and 4 variables on type of families namely couple without children, couples with children, one parent family and other family in percentages. Therefore, a combination chart with clustered columns for the families in numbers and stacked area for type of families with 4 variables. Vertical axes have been rescaled for better comparison highlighting the difference. Colour-formatted data labels, and legend included for enhanced visual impact and understanding. Chart area is also colour-formatted.

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
CoupleFamilyNoChildren(%)	34.1%	34.8%	34.5%
CoupleFamilyHasChildren(%)	48.4%	47.9%	48.5%
OneParentFamily(%)	15.4%	15.3%	15.0%
OtherFamily(%)	2.1%	2.0%	2.0%
CoupleFamilyNoChildrenChange	100.0%	102.1%	101%
CoupleFamilyHasChildrenChange	100.0%	99.0%	100.2%
OneParentFamilyChange	100.0%	99.4%	97.4%
OtherFamilyChange	100.0%	95.2%	95.2%

Graph11



Visualisation Technique Graph11

Combination charts are ideal when the data has different types of information measured in different scales that needs to be shown in a single chart. Here we have data on 4 variables of the category, family namely couple family without children, couple family with children, one parent family and other family, and their changes over the years, 2006, 2011 and 2016. Therefore, a combination chart with clustered bars for the type of families with 4 variables and stacked line with markings for the changes of the variables over time. Clustered bars have horizontal display of values and cause less clutter and confusion and are better than clustered columns here. Also, when the values of variable are very low, better visualization is possible with clustered bars as compared to clustered columns. Vertical axes have been rescaled for better comparison highlighting the difference and then deleted to gain space. Colour-formatted data labels, arrows with summaries and legend included for enhanced visual impact and understanding. The data labels were repositioned to prevent clutter and for easy comprehension. Trend lines added to show the movement of data over the years. Trend lines were colour-formatted to suit the corresponding variables and highlighted.

Summary

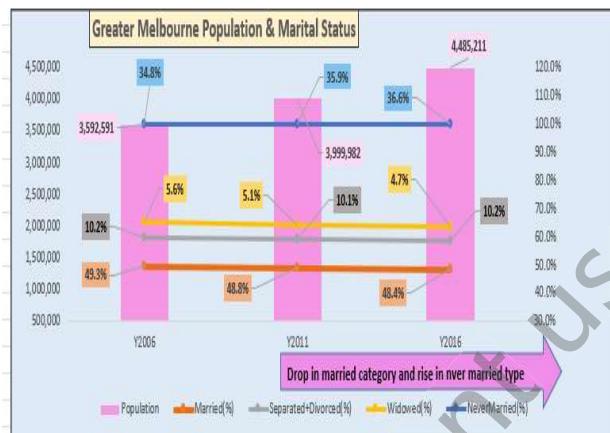
The population of families saw a steady rise from 2006-2016. Couples with and without children showed increase. Interestingly, couples with children had 1% drop in the first 5 years followed by 1.2% increase thereby resulting in a net increase of 0.2%. Couples without children on the other hand showed a 2.1% rise in the first 5 years and a 1.1% fall in the second 5 years thereby causing a net increase of 1%. One parent family type had a steady fall of 2.6%, with 0.6% happening between 2006 – 2011 and 2% occurring later between 2011-2016. Among the family types, other family was the smallest in population by 2016. This type had a fall of 4.8% between 2006-2011 and then it remained steady and did not show any decrease after that in the next 5 years from 2011 to 2016.

8. Marital Status of the Greater Melbourne Population Over the Years

Location	Greater Melbourne Y2006	Greater Melbourne Y2011	Greater Melbourne Y2016
Time			
Population	3,592,591	3,999,982	4,485,211
Married[%]	49.3%	48.8%	48.4%
Separated+Divorced[%]	10.2%	10.1%	10.2%
Widowed[%]	5.6%	5.1%	4.7%
NeverMarried[%]	34.8%	35.9%	36.6%

Visualisation techniques Graphs12&13

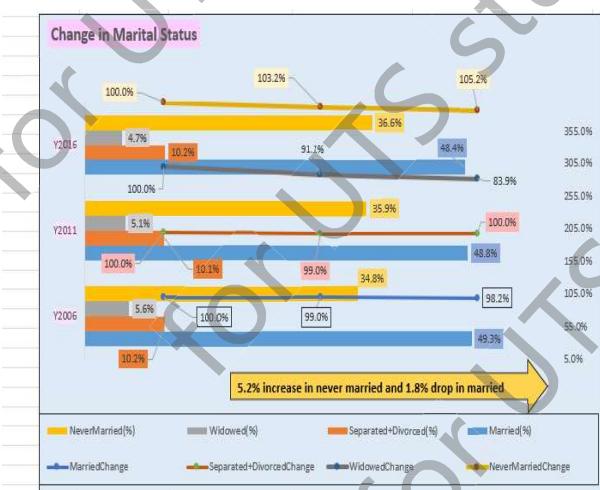
Graph 12



Change in Marital Status

Location	Greater Melbourne Y2006	Greater Melbourne Y2011	Greater Melbourne Y2016
Time			
Married[%]	49.3%	48.8%	48.4%
Separated+Divorced[%]	10.2%	10.1%	10.2%
Widowed[%]	5.6%	5.1%	4.7%
NeverMarried[%]	34.8%	35.9%	36.6%
MarriedChange	100.0%	99.0%	98.2%
Separated+DivorcedChange	100.0%	99.0%	100.0%
WidowedChange	100.0%	91.1%	83.9%
NeverMarriedChange	100.0%	103.2%	105.2%

Graph13

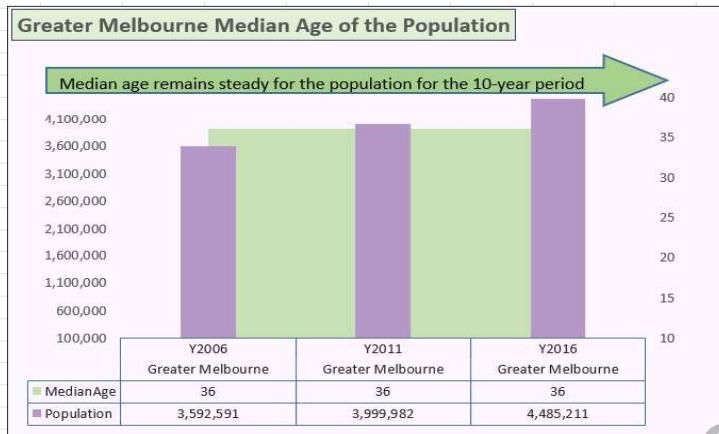


A combination chart is ideal to visualize different data that are measured using different scales in the same chart. The data above requires population in each year in numbers along with the category marital status type with its 4 variables namely, ‘married’, ‘separated+divorced’, ‘widowed’ and ‘never married’ in percentages over the years to be displayed in a single chart. Therefore, a combination chart of clustered column and stacked line with markers is used here. Clustered columns are used to display the population in each year while stacked line with markers are used to visualize the percentage of each type of marital status in each year. Vertical axes have been rescaled to gain space and highlight the differences. Data labels were repositioned to de-clutter and give a clear understanding and highlighted with appropriate colours, and legends added. The plot area was colour formatted to create an instant impact. Arrows and boxes with summary of the chart were inserted in the clear chart area to tell the ‘story’ candidly.

Combination charts are ideal when the data has different types of information measured in different scales that needs to be shown in a single chart. Here we have data on 4 variables of the category, marital status namely married, separated+divorced, widowed and never married, along with their changes over the years, 2006, 2011 and 2016. Therefore, a combination chart with clustered bars for the 4 types of marital status and stacked line with markings for the changes of the variables over time. Clustered bars have horizontal display of values and cause less clutter and confusion and are better than clustered columns here. Also, when the values of variable are very low, better visualization is possible with clustered bars as compared to clustered columns. Vertical axes have been rescaled for better comparison highlighting the difference and then deleted to gain space. Colour-formatted data labels, arrows with summaries and legend included for enhanced visual impact and understanding. The data labels were repositioned to prevent clutter and fonts formatted to bold for easy comprehension.

Population and Median age

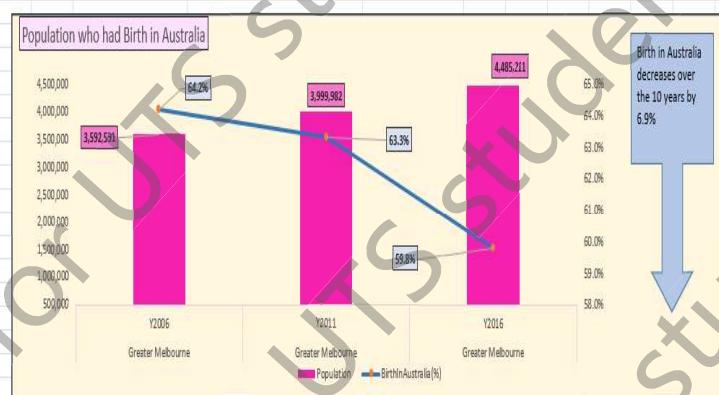
Graph14



Population & Birth In Australia

Location	Greater Melbourne	Greater Melbourne	Greater Melbourne
Time	Y2006	Y2011	Y2016
Population	3,592,591	3,999,982	4,485,211
BirthinAustralia(%)	64.2%	63.3%	59.8%
BirthinAustraliaChange	100.0%	98.60%	93.1%

Graph15



Summary

As we have seen before, Greater Melbourne population has shown a steady rise of 25% over the 10-year period from 2006-2016. But the median age of the population stayed the same at 36 years, within the working age period throughout this interval. Percentage of births in Australia showed a steady fall of 6.9% from 2006-2016. A steady increase of 5.2% in the never married category along with a small but consistent 1.8% fall in married ones was noted. Widowed group dropped by 16.1% and separated stayed the same as there was a hike of 1% between 2011-2016 compensating for the fall between 2006-2011.

Visualisation Techniques Graphs 14&15

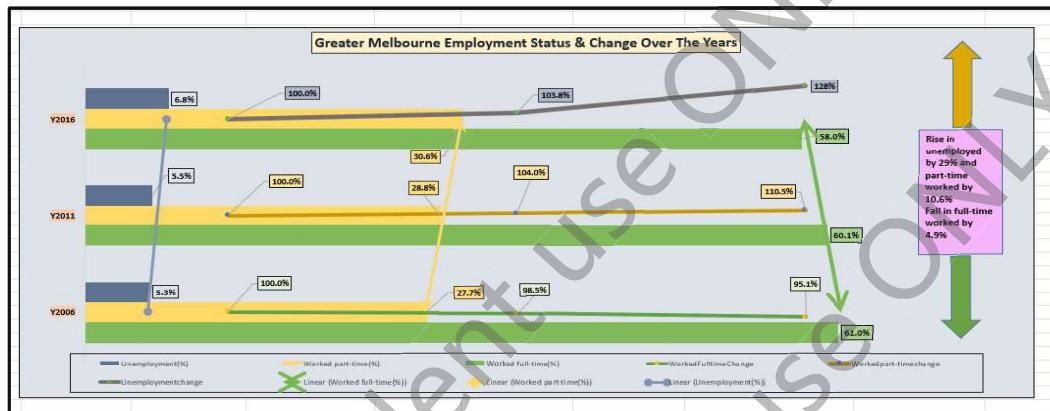
Combination charts are ideal when the data has different types of information must be shown in a single chart. Here we have data on population in the years 2006, 2011 and 2016 along with median age of the populations in these years. Therefore, a combination chart with clustered columns for the populations and stacked area for median age is chosen. Vertical axes have been rescaled for better comparison highlighting the difference. Colour-formatted data labels, and legend included for enhanced visual impact and understanding. Chart area is also colour-formatted. Arrow with summary inserted for quicker comprehension.

Combination charts are ideal when the data has different types of information measured in different scales that needs to be shown in a single chart. Here we have data on population in the years, 2006, 2011 and 2016 and percentage of birth in Australia in these years. Therefore, a combination chart with clustered columns for the population and stacked line with markings for the percentage of birth in Australia. Vertical axes have been rescaled for better comparison highlighting the difference. The data labels have been repositioned and colour-formatted and adjusted in size for easy discernment. Arrows with summaries and legend included for enhanced visual impact and understanding. The data series and chart area were also colour-formatted, and grid lines deleted for a finer presentation that creates better impact.

9. Assessing Employment and Unemployment Status in Greater Melbourne

Location	Greater Melbourne Y2006	Greater Melbourne Y2011	Greater Melbourne Y2016
Time			
Worked full-time(%)	61.0%	60.1%	58.0%
Worked part-time(%)	27.7%	28.8%	30.6%
Unemployment(%)	5.3%	5.5%	6.8%
WorkedFulltimeChange	100.0%	98.5%	95.1%
Workedpart-timechange	100.0%	104.0%	110.5%
Unemploymentchange	100.0%	103.8%	128%

Graph 16



Visualisation technique used

Combination charts are ideal when the data has different types of information measured in different scales that needs to be shown in a single chart. Here we have data on 3 variables of the category, employment status namely worked full-time, worked part-time, and unemployed and their changes over the years, 2006, 2011 and 2016.

Therefore, a combination chart with clustered bars for the employment status with 3 variables and stacked line with markings for the changes of the variables over time. Clustered bars with time series in the x axis have horizontal display of values and cause less clutter and confusion and are better than clustered columns here. Vertical axis has been rescaled for better comparison highlighting the difference and then deleted to gain space. Colour-formatted data labels, arrows with summaries and legend included for enhanced visual impact and understanding. Trend lines added to show the movement of data over the years. Trend lines were colour-formatted to suit the corresponding variables and highlighted.

Summary

A region's economic growth is reflected in the employment market. By assessing the employment status of the population, we can understand the economy and thereby the affordability and demand for property. In the 10-year period from 2006-2016, Greater Melbourne saw a fall of 4.9% in the full-time work force. There was a steady rise in part-time worked of 10.5%. Unfortunately, unemployment rose to a high value of 28%; only a 3.8% in the first 5-year period from 2006-2011 and a huge leap of 24.2% in the next 5 years from 2011-2016.

10. Merits of the Visualisation Techniques Applied

for UTS student use ONLY

for UTS student use ONLY

for UTS student use ONLY

11. Executive Summary and Conclusion

This dataset taken from ABS website comprises of data on population and people, income, family, employment, and residential property prices for the region of Greater Melbourne. Quantitative ratio-scale data for the following 16 variables and their characters amounting to a total of 35, over the years from 2006 – 2016 was analysed: -