Rationality vs Reality

Challenging the standard rationational choice theory

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1 Introduction

2 Literature review

2.1 "The challenge of our time"

In the last decades, the increase in income inequality has generated growing concern. In 2013 it was defined "the challenge of our time" by President Obama and one year later Pope Francis condemned the global "economy of exclusion". In fact, inequality and economic growth can be regarded as two sides of the same coin and the rise of the former associates both developed economies, where the gap between rich and poor is now at highest levels in decades, and emerging economies, experiencing more mixed trends (Dabla-Norris et al. 2015).

The relation between economic develompemtn and inequality is bilateral. On the one hand, a rise in income inequality reduces economic growth through various channels. First, by triggering political instability, which in turn tends to reduce investment and - consequently - economic growth. Moreover, disparities in income distribution encourage poor people to undertake rent-seeking or illegal activities threatening property rights, and that drives down investment (Alesina and Perotti 1996). In addition, inequality reduces the capacity of poorer members of the society to invest in education thus hampering social mobility and skill development (Cingano 2014). Furthermore, it reduces social consensus required to adjust shocks and sustain growth. Neverthess, all those effects may be non linear: increases in inequality from low levels provides growth enhancing incentives, while increases part some point encourage rent-seeking and lower growth (Ostry, Berg, and Tsangarides 2014). Finally, in highly unequal context, the majority of the voters - who are usually poor - ask for redistributive policies, which decrease the after-tax marginal product of capital, hence lowering the rate of accumulation and driving down growth (Alesina and Perotti 1996). Nevertheless, redistribution policies may also affect growth positively, by reducing tensions and incentivizing productive activities and capital accumulation. Yet, the net effect of redistributive policies on growth has to weigh the costs of distortionary taxation against the benefits of reduced social tensions. More broadly, taxation may not be inherently detrimental to growth, as long as it reduces tax expenditure or loopholes that benefit the rich, increases public investment through progressive taxation or social insurance spending on welfare favouring poor people (Ostry, Berg, and Tsangarides 2014).

On the other hand, economic growth may produce a rise in income inequality, leading to social tensions and political discontent that jeopardize the wellbeing of society (Gallo 2002). According to the inverted U hypothesis(Kuznets 1955), there income inequality widens in the early phases of economic growth; then it stabilizes for a while; and finally it narrows in the later phases. There are two factors explaining the rise in income inequality. First, the concentration of savings in the hands of the upper social classes leads to higher amount of income for them and their descendants. Second, increase in the urban share of the population resulting from economic growth is assumed to be more unequal than rural population, whose income is lower than the urban one. Hence, this gap in relative mean incomes tends to widen as a result of a more rapid growth of the per capita productivity in economic urban activities than in agriculture. However, such negative effects of economic growth only hold in the short run, since in the long run this trend tends to reverse due to government redistribution policies and other exogenous factors (the decrease in the proportion of rich families and immigration entering at the lower income levels). Moreover, this tendency towards increasing inequality is reversed when all the surplus labour is absorbed into modern sector employment, becoming a scarce factor of production. Therefore, further growth, implying an increase in labour demand, will push the wages up, thus levelling inequality. However, no definite causal relation has been found that allows generalizing the ways in which economic growth affects income inequality. Instead, empirical evidence shows that the impact of economic growth on income distribution depends more on the way in which growth is pursued than on the level of per capita income or the rate of growth (Gallo 2002).

2.2 Inequality and consumption behavior

According to rational choice theory, individuals have rational preferences and use the full and relevant information at their disposal to determine which options are available, rank them and choose the most preferred one in order to maximise their utility (optimization-based apprioach)(Levin and Milgrom 2004). It is further assumed that individuals rationally pursue their self-interest taking into account all economics constraints (such as time, prices, income and capital). Particularly, in maximising utility consumers are constrained by the total amount of wealth they draw upon to purchase goods/services, save money or invest. Hence, utility maximisation is a matter of arranging spending permitted by the budget constraint to achieve the highest total utility possible. Ultimately, it is by weighing up the marginal benefit (the increased benefit obtained by consuming an additional unit of a product) and marginal cost of making a given purchase, that consumers make the final consumption decision: only if the marginal benefit of purchasing one item exceed its marginal cost the consumer will make the purchase (Green 2002).

Despite optimization-based approach has been witnessing a remarkable intellectual convergence that proceeded almost without interruptions since the 19th century (Levin and Milgrom 2004), in recent years it has started to be Standard rational choice theory has been challenged and/or complemented by findings in the behavioral economics turf. Differently from the standard theory, behavioural economics draws on psychology and the behavioural sciences in assessing consumer behaviour, maintaing that there is a wide variety of cognitive, social and emotional variables that can influence consumers' choice. The behavioural factors which affect consumer choice can be broadly categorised as follows: - Loss Aversion: people would rather not lose than not win. - Reference Point: people may evaluate changes relative to some reference point rather than objectively. + Priming: people's behaviour may be impacted if they are first exposed to certain sensations. + Anchoring: people use an initial reference point in estimating values. + Salience: consumers are drawn to what seems relevant to them. - Time Inconsistency: people may change their minds over time + Hyperbolic discounting: people may change their valuation of goods over time. + Procrastination: important decisions may be delayed. - Social Factors: Choice can be impacted by the choices of others + Social norms: people are influenced by the actions of those around them. + Ego: consumers behave in a way that supports the impression of a positive self-image. + Messenger: consumers are influenced by who communicates information. - Additional Factors + Mental accounting: consumers may be inconsistent in valuing money. + Heuristics: people may use mental short-cuts when making choices. + Affect: emotions can be powerful in shaping consumer behaviour (Green 2002). Following this approach, consumption decisions can therefore be explained not only by comparing costs and benefits related to them, but consumers can also act "irrationally" and get fully emotional basing their decisions on the feelings like pleasure, happiness and gratification, that they get through the buying behavior. For instance, people purchase quality and luxury goods to acquire some hedonic values because of the consumption activity (**???**).

Among the above-mentioned variables that may drive to luxury consumption, reference points and attach bias. Reference points are mental thresholds that individual set in order to compare themselves with others. It is often assumed that the relevant reference point for evaluating gains and losses is the current status of wealth and welfare, exhibited, for instance, by purchasing and expensive good (Wilkinson and Klaes 2012): in fact, especially when information is incomplete, people may use conspicuous consumption as a signal of their wealth to acquire acknowledgement of the social status (**???**). However, the reference point may also be the expected status, rather than the current one. Moreover, rational choice may be distorted when the value of a good is not give exclusively by its measurable value but by subjective attached values. For example, the car used by a Rock Star can reach higher prices on an auction that the very the same model, because its additional embedded attributes: fame, status, etc (Wilkinson and Klaes 2012).

In general, income inequality can produce two different consumption behaviour in the the people, depending on the social stratus of which they are part. In the case of lower classes, inequality may strengthen the incentive to reduce consumption and accumulate wealth so as to improve social status. However,if both the poor and the rich tend to over-accumulate in the rat-race of status seeking, the poor have a stronger status-seeking incentive to save than rich families do: in fact, the diminishing marginal utility of status means that the poor get more pleasure from a marginal increase in their relative wealth than the rich. Sociologists have long emphasized that individuals care about social status, and their behavior are often motivated by the desire to improve their ranks in the hierarchy, not less than by pecuniary rewards such as consumption (**???**).

3 General overwiew of the project

3.1 Research question, justification and hypotheses

The aim of our work is to investigate **how the rise in inequality, economic growth and usage of public transportation influences the purchase of cars (as an example of luxury good) in Singapore, from 1995 to 2014**.

In fact, Singapore claims to be a successful country, which implies increasing competition, economic development, as well as inequality in comparison with other countries that lack Singapore's success standards. The government of Singapore constantly displays **how well ranked the country is**, in order to promote the *'success'* paradigm. Kishore Mahbudani, Dean of Lee Kuan Yew School of Public Policy, recently stated that the island went from having a 500 dollars GDP per capita in 1965 to 76.237 dollars in 2015, almost doubling U.K., its former colonizer. Likewise, He said that *'more than one out of six households have $1 million in cash savings'* (Mahbudani 2015a). International competitiveness of Singapore is out of doubt. However, how competitive Singaporeans are between each other, how unequal the society is and what is triggered by this traits, are considerations worth analyzing.

According to a recent survey(Mahbudani 2015b), 9 out 15 Singaporeans agreed that its society is based on competitiveness, materialism, self-centredness, *'kiasi-ism'* (fear of diying) and blame-shifting. Additionally,the same rate of Singaporean youngsters are worried that extreme competition would get them out of not affording what they called "basic goods", namely flats and a cars (Rachel and Maryam 2014).

The consideration a cars as a basic need in a country that has relentlessly tried to have world class transportation systems indicates that there are hidden reasons for owning cars. Singapore has tried to deter the purchase of cars by subjecting the purchase of cars to high taxaation: in fact car onwers need to own a certificate of car entitlement that can cost even more than 70.000 dollars. Therefore *'Singapore has made the car one of the most important status symbols in Singapore. This explains the attraction of European car brands in Singapore'* (Mahbudani 2014).

When in the so-called developing world - to which Singapore belongs - the number of private cars grows despite the attempt of the state to reduce their usage (The Economist 2012), such overpopulation of cars might be nderstood under the lenses of high inequality, fierce competition and the need of displaying status symbols. That is true especially if that occurs in a context providing a wide variety and density of alternative public means of transportations, as shown by the figure below.

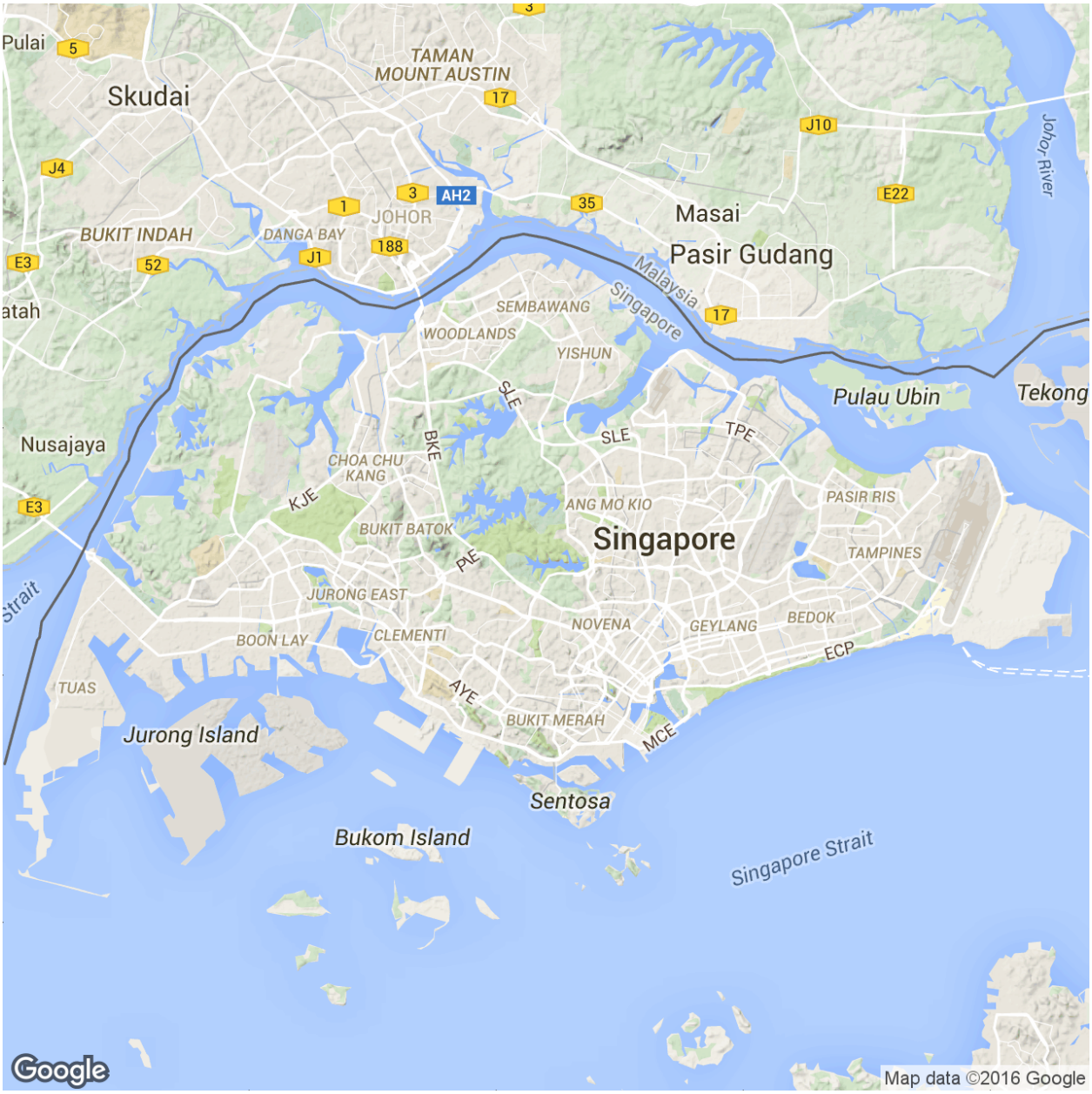
Table 1: Public transport in Singapore

Variable	Description
MRT	Mass Rapid transit: available from 1987, it is now the major component of the railway system in Singapore, covering the entire city-state.
LRT	Light Rail Transit: opened in 1999, it consists of localised rail systems acting as feeder services to the MRT
Taxis	A popular form of public transport in Singapore, with relatively low fares compared to most
Buses	The most convenient and accessible modes of public transport in Singapore, complementing the MRT and LRT systems

```
## Information from URL : http://maps.googleapis.com/maps/api/geocode/json?address=Singapore&sensor=fals
```

```
##        lon      lat
## 1 103.8198 1.352083
```

```
## Map from URL : http://maps.googleapis.com/maps/api/staticmap?center=Singapore&zoom=11&size=640x640&s
## Information from URL : http://maps.googleapis.com/maps/api/geocode/json?address=Singapore&sensor=fal
```



Therefore by collecting and analysing data on economic growth, inequality, and usage of public tranportation, the hypotheses to be tested are the following:

- *H1:* The higher the economic growth, the higher the purchase of luxury cars
- *H2:* The higher the inequality, the higher the purchase of luxury cars
- *H3:* The less usage of public transport, the higher the purchase of luxury cars

3.2 Description of variables

As suggested by the research question and the hypotheses, the dependent variable is the number of private cars in Singapore between 1995 and 2014 (in thousands)

On the other hand, the explanatory variables are economic growth, inequality and usage of public transports. Economic growth is measured by Singopore's GDP per capita in singaporean dollars (in thousands) at current prices, derived by dividing current price GDP by total population. Inequality is measured by the number of times by which in number of times by which the top 10% earners are richer than those earning the bottom 90% average income. Both top 10% average income and bottom 90% average income are measured in real singaporean dollars (in thousands). Finally, the usage of public transports can be divided into three parts: - usage of buses;

- usage of MRT;
- usage of LRT; In all of the cases data is expressed by the daily average of commuters (in thousands) using public trasport yearly.

The following table summarizes the variables taken into consideration for the analysis.[1]

Table 2: Summary of variables

Variable	Description	Time.frame
gdp per capita	measured in singaporean dollars at current prices	1980-2021
inequality	top 10% and bottom 90% singaporean's average income measured in singaporean dollars	1947-2009
anual motor vehicle	number of: cars, rental cars, buses, taxis, buses, motorbikes	1960-2015
public transport utilization	average commuters using daily: MRT, LRT, Buses, Taxis	1995-2014

3.3 Methodology

3.4 Data sources and gathering

This document and particularly data processing was made using: R (**???**), Quandl (**???**), Corrplot (**???**), Ggplot(**???**), Pander (**???**), Repmis (**???**) and Rio (**???**).

The data for our empirical analysis were retrieved from:

- IMF Cross Country Macroeconomic Statistics open data available on Quandl. From this source we downloaded data showing the trend in Singopore's GDP per capita meassured in singaporean dollars from 1981 to 2021 (forecasted from 2015 onwards). The data was provided in csv format and imported on R using the URL of the website.
- World Top Incomes Database available on Knoema, provides access to data on the distribution of top incomes in more than twenty five countries across the globe. From this source we downloaded data on the top 10% average income and bottom 90% average income in Singapore from 1947 until 2009,

[1]Time frame refers to the time span available in the sources from which gathered the data. Instead, as specified by the research question, our analysis only takes into account the years from 1995 to 2014

meassured in singaporean dollars. Since it was not possible to directly import the database to R, we requested and received the data via e-mail in csv format. This data set is available in the repository.[2]

- Singapore's open data portal offered two data bases:
  - The Annual Motor Vehicle Population, provides the number of public and private vehicles from 1960 to 2015, including: mortorbikes, rental cars, buses, taxis and other type of vehicles. While mortorbikes, rental cars and cars are private means of transportation, buses and taxis are to be considered public since in Singapore even the taxis are provided by the state.
  - Public transport utilization. This data is expressed as the daily average of thounsand commuters using public trasport by year. It covers the span from 1995 to 2014 and includes the following modes of transportation: MRT (underground), LRT (a localised rail systems acting as feeder services to the Mass Rapid Transit network), taxis (publicly run) and buses.

3.5 Cleaning, processing and merging data sets

- After importing data we used the "date" variable (year) as a unique identifier for all four datasets, in order to merge them afterwards.
- Since time frames of the data were different, we selected a common span of time: 1995-2014. In the case of bottom 90% and top 10% average income, we had to make a linear regression to forecast missing values (from 2009 until 2014). The results, available in a new dataframe, were later on bounded with the orginal one, in order to have the entire time series. As for LRT, values from 1995 until 1998 were missing since the service started to be provided from 1999 (Infopedia 2005); therefore, we completed the dataframe giving the value "0" for the first 4 years of the time span taken into consideration.
- Cleaning the data was limited to changing column names, eliminating the unnecesary ones and organizing the various data frames so to merge them more easily afterwards, using the year as common denominator. Only in the case of the dataframe cointaining the number of private cars in Singapore from 1995 until 2014 (car.pop.1) we had to change the format of the data from characters to integers, due to an incorrect import.
- In order to have an indicator showing the trend in inequality in Singapore between 1995 and 2014, we created a new variable - named "inequality" - by divididing the top 10% avereage income by the bottom 90% average income for each year: the coefficient of the division shows how many times Singaporeans earning the top 10% average income are reacher than the bottom 90% earners of the population.
- As for the number of cars, we simply divided them into the categories provided in the data original set: cars, buses, etc. Originally, they were in one column so we separate them in several ones to have the year as a unique identifier.
- Finally, we merged all the single dataframes into the new one, containing all the variables that we used to perfom descriptive and inferential statistical analyses.

4 Statistical analysis

4.1 Descriptive statistics

4.2 Inferential Statistics

5 Conclusion

[2]We did not gather data from the database Clio Infra as initially stated in our ResearchProposal, since it did not provide sufficient data for the time span we are considering.

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