Growth of the Middle Class: Meeting the Challenges

Cristian Huse[1]

Claudio Lucinda[2]

1. Introduction

Since the end of World War II, G7 economies accounted for the majority of the global GDP, even though this period witnessed major economic events such as the end of Bretton Woods international agreements, oil price shocks and various exchange rate crises (Kharas, 2010).

Among other reasons, this remarkable performance is also the result of such countries having large middle classes. Despite lacking a comprehensive definition, the middle class can be understood in terms of the ability of living a comfortable life, in terms of housing, education, support in adversities of life and ability to pursue its goals in life. This last point is one of the reasons why middle classes are considered one of the major sources of innovation and entrepreneurship.

In the last decade or so, an ever increasing number of consumers became members of the so-called middle class and gained better access to the credit and consumer markets. This had a dramatic impact on the purchase of durables (in particular, automobiles, our focus, and other durables such as electric appliances), and brought with itself important implications for energy use and the environment.

Another consequence of the rapid growth in emerging countries is the increase in urbanization rates, which increases the strain in the existing infrastructure and increases the usage of fuels and energy.

This chapter begins by reviewing the extent of the increases in urbanization and energy demand in emerging countries, followed by a discussion on the

[1] Assistant Professor, Stockholm School of Economics.
[2] Associate Professor, University of São Paulo.

increases on the motorization rates. The fourth section reviews the existing policies regarding traffic demand in cities and the fifth concludes.

2. Urbanization and Energy Demand

According to UN Habitat, cities are the main creators of wealth, generating on average 75% of a country's GDP.[3] In fact, most businesses are located in or in the vicinity or urban areas, thus providing jobs to the urban population. Maintaining the operations of a city, from transport infrastructure to garbage collection, is a costly undertaking and the escalation of competition among cities locally, nationally and internationally suggests that such costs are bound to increase in the coming years.

Since cities concentrate better-paying jobs, they attract large parts of a country's workforce. In fact, UN Habitat estimates that as of today, over 50% of the world's population is urban dwellers, with this figure expected to rise to over 65 per cent by 2030.[4] It is not surprising then that middle classes – whether current or aspiring – are typically located in cities.

The pace of urban growth is especially dramatic in developing countries, where a massive influx of people aiming for better-paying jobs is more likely to generate slums and putting an additional strain on existing infrastructure and services. An ever growing subset of those migrants is to become middle-class in the years to come.

[3] See http://unhabitat.org/urban-themes-2/economy/ .

[4] See http://unhabitat.org/urban-themes-2/economy/ .

The increase in urbanization in the next years is going to increase the income of a large share of world population. According to McKinsey Global Institute (2012), one billion people will enter the global “consuming class” by 2025 – with incomes over USD PPP 3600 in constant 2005 PPP dollars.

Sixty per cent of this new “global consuming class” will live in around 440 cities, that are expected to generate close to half of this growth between 2010 and 2025.

In these 440 cities, one can find megacities, such as Shanghai, São Paulo, Istanbul and Lagos, which will generate growth corresponding to a growth rate of 7.6% per annum. Even though this is quite impressive – and beyond the growth rate of developed economies, for instance – it is smaller than the growth of cities between 200,000 and ten million inhabitants. These cities are spread across 57 cities, and are expected to grow at an 8% per annum in the same period.

The regional distribution of these cities is more skewed towards Asia, in which more than half of the cities (242) are locates in China and 36 in the South Asia. Latin America features 57 cities in this category. Africa and Middle East feature 37 cities in this group.

This increase will necessarily put some new problems for policymakers. Cities are a source of positive and negative external effects. The most important positive external effects are the Economies of Agglomeration derived from the large amounts of people coexisting together. As cities grow, not only these Economies of Agglomeration increase but also the negative external effects – congestion and pollution.

Besides the increases in congestion and pollution, the growth of cities also has perverse distributional effects. Especially in developing countries where the available infrastructure can be insufficient to face the demand, the price of better located land is expected to increase steeply. This eventually leads to the displacement of poor people, forced to live either in inner city slums or in faraway peripheries. Combined with increased incomes and greater access to

motorization, a decrease in quality and quantity of public transportation often occurs together with the displacement of poor people.

This set of developments poses a puzzle to policymakers: the increase in motorization can lead some people to become even poorer, by living in worse conditions and experiencing higher transportation costs. Furthermore, such costs could even be increased with the elimination of bottlenecks without some measures to constrain the additional traffic. Some examples will be discussed later in this chapter.

In order to operate, cities require a vast and continuous supply of energy. In fact, cities consume about 75 per cent of global primary energy and emit between 50 and 60 per cent of the world's total greenhouse gases. In particular, buildings consume vast amounts of energy, be it for raw materials, its construction process, or daily operational needs such as lighting and air conditioning. Moreover, increasing distances between destinations and inefficient public transport systems prompt overall reliance on private motorized transport, which typically relies on fossil fuels and have high energy consumption.[5]

More impressive than the level of energy consumption in cities is the staggering growth they experienced in the last decades. Back in 1970, for instance, the proportion of people living in urban areas was virtually equal at around 630 million, while nowadays, over 70% of the more than 7 billion inhabitants of the world are urban residents. In particular, the share of urban residents living in developing countries – approximately 82% of the world population – is over 70% and tends to increase in the foreseeable future (UN Habitat 2012). Since transport systems within and between cities rely excessively on fossil fuels and building designs tend to overuse non-renewable resources, governments are required to rethink their policies in fundamental ways.

A key driver of the growth in energy demand is the process of urbanization witnessed in the last decades: cities contribute to roughly 70% of global

[5] See http://unhabitat.org/urban-themes-2/energy/

greenhouse-gas emissions (UN Habitat 2012).[6] This happens because energy is a major factor for development. It is needed for industrial and commercial activities, transport, buildings and infrastructure, activities which tend to take place in, or gravitate around, cities. In fact, UN Habitat (2012) reports that cities are on average responsible for over 75% of a country's GDP and therefore the main engines of economic growth.[7] As a by-product, cities or their vicinities are where higher salaries are located, where the emerging middle classes tend to live.

The growth in energy demand is switching decisively to emerging economies which drive global energy use, notably China and India. According to estimates in IEA (2013), emerging economies are expected to account for more than 90% of net energy demand growth by 2035. Unfortunately, fossil fuels will continue to meet a major share of global energy demand, with its share in the energy mix decreasing slightly from 82% to 76%, thanks partly to the distortions caused by subsidies to fossil fuels, still commonplace in a number of countries (IEA 2013). The implications of growing energy demand in such a scenario for the environment are worrying, as the energy sector is the source of two-thirds of global greenhouse-gas emissions, which are key drivers of climate change (IEA 2013). Although statistics are less widespread, energy consumption is also linked to the emission of local air pollutants.[8] The IEA also estimates that transport and petrochemical will keep oil use on an upward trend until 2035, albeit at a slower pace of growth. In particular, transport oil demand rises by 25% by 2035. This is potentially worrisome as road transport is currently responsible for 20% of CO2 emissions generated by fuel consumption worldwide (IEA 2011).

[6] Cities are major contributors to climate change: although they cover less than 2 per cent of the earth's surface, cities consume 78 per cent of the world's energy and produce more than 60% of all carbon dioxide and significant amounts of other greenhouse gas emissions, mainly through energy generation, vehicles, industry, and biomass use, see http://unhabitat.org/urban-themes-2/climate-change/.

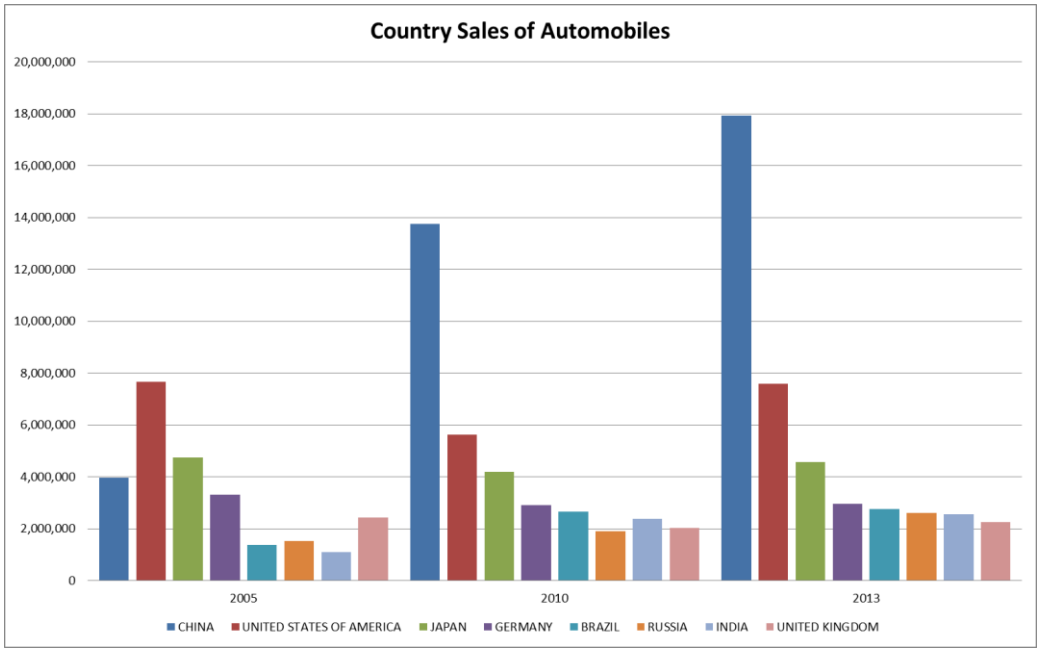
[7] See http://unhabitat.org/urban-themes-2/energy/

[8] Local air pollutants such as nitrogen oxides (NOx) and particulate matter (PM) are not greenhouse-gases but are known to harm human health, thus being classified as criteria pollutants by the US Environmental Protection Agency.

3. Vehicle Ownership

In 2013, according to OICA, worldwide sales of automobiles not including light trucks neither other vehicles reached over 62 million units. Together with this increase, a change in the international landscape of largest producers has also happened, with China taking over the US as the largest producer of automobiles, as Figure 1 shows.

Figure 1- Worldwide Automobile Sales - Largest Markets



Source:OICA Automobile sales statistics. www.oica.net

China is not the only large emerging market in the list, though; all of the BRIC countries are represented in the top eight 2013 markets for automobiles – and all of them also have increased greatly since 2005. Brazil, India and Russia were all smaller markets than the United Kingdom in this year, and in the eight following years they leapt to the fifth (Brazil), sixth (Russia) and seventh (India) places.

The trend is expected to continue in the next years, with the motorization rate (cars per 1000 inhabitants) expected to reach 542 in Russia, 198 in China, 172 in Brazil and 72 in India (J.D. Power, according to Roland Berger 2011).

These cars will also be much more intensively used – especially in emerging markets. Still according to Roland Berger (2011), non-OECD per capita mobility will still be below OECD levels, but will be the majority of global automotive mobility by 2050.

Not only they will be more intensively used, but also the emerging middle class is asking for somewhat larger cars – KPMG (2013) surveyed experts in the auto sector and indicated two trends, one for the BRIC countries and another for developed countries. The first trend is the high expected increase in the demand for SUV-type vehicles for BRIC countries. According to this Survey:

"SUVs are the fastest growing car segment in the Chinese automotive market, registering a dramatic year-on-year increase of more than 24 percent during the first 10 months of 2012 compared to an increase in overall car sales of 5.9 percent in the same period.[…] Luxury automakers are also getting in on the act. Lamborghini chose the 2012 Beijing auto show to introduce its Urus SUV and the Porsche Cayenne is extremely successful in China. SUV growth is driven by the emerging Chinese middle classes. The vehicles are especially popular among women, who can transport the whole family in safety and style, whether it is for the school run or sports lessons. Ultimately many choose an SUV for the caché it brings, as one owner commented: "If you can't afford a chauffeur, at least it is nice to drive a car with high seats so you can look down on other motorists"." (KPMG Auto Executive Survey 2013, p. 11)

The second trend, for developed countries, is for smaller and more fuel efficient cars, with the largest increases in basic and subcompact categories – an example given by KPMG Auto Executive Survey are sales for the Dacia model, which are expected to increase by 14% by 2019.

These trends indicate the demand for automobiles in emerging markets, if unchecked, will proceed along the lines of developed countries, easily becoming unsustainable. The next section will provide some examples of measures taken by governments worldwide to face such problems.

4. Facing the Problems: Policies and Infrastructure

In this section we provide a selective overview of environmental policies based on our own research. It is thus very focused and restrictive by nature.

4.1 Policies Focusing on the New Passenger Car Market[9]

Given its high energy intensity, the transport sector has been the target of regulatory initiatives in a number of countries in recent years, amid the ever growing concern with greenhouse gases and the quest for oil independence. For instance, subsidies were awarded to hybrid and electric vehicles in the US and Canada, sales tax was reduced in China and Brazil and stimulus/scrappage programs were launched in France, Germany, Italy Spain, the United Kingdom and the US in 2008 and 2009 (see Huse 2014).

Given its focus on the environment, in what follows we will focus on the Swedish GCR (Ministry of the Environment 2007), which was implemented before the global crisis (see Huse 2014 for details). Policies such as the ones described above during the same period were typically stimulus programs, thus not necessarily aiming emission reductions. However, the GCR was close in spirit to the US hybrid subsidy introduced in 2007. Another feature which distinguishes the GCR from its counterpart is that policies aimed at the transport sector have typically not applied widely enough to affect a large fraction of the new vehicle market, itself a small share of the car fleet.

In addition to being broad, another crucial feature of the GCR is its embracing of alternative fuels, arguably inspired by policies adopted in Brazil, where thanks to ethanol the CO2 emissions per unit of fuel consumption in road transport are 20 percent below the global average (IEA 2011). Promoting alternative fuels comes hand-in-hand with the promotion of alternative fuel vehicles (AFVs) -- those able to operate using alternative fuels, such as Gasoline/CNG and Gasoline/Electric hybrids but, most prominently, Gasoline/Ethanol vehicles, the so called flexible-fuel vehicles (FFVs).

[9] This Section draws heavily on Huse (2014), to which we refer the interested reader for further details.

By combining the increased market shares of green cars and the lower carbon intensity of ethanol as compared to fossil fuels, the GCR was arguably bound to be a success. However, what seems to be the lack of understanding of the technologies being incentivized resulted in two important drawbacks of the policy. First, the very definition of what a green car consists of induced carmakers to produce high-emission AFVs instead of low-emission RFVs (regular fuel vehicles, those able to run using only fossil fuels, e.g. gasoline and diesel). That is, while RFVs were required to emit no more than 120 gCO2/km (47 mpg running on gasoline) to qualify as green cars, the threshold for AFVs was set to the equivalent of about 220 gCO2/km (25.5 mpg running on gasoline).[10] [11]

This regulatory loophole was quickly explored by carmakers and consumers alike: following the GCR, CO2 emissions of AFVs increased markedly as compared to those of RFVs in both supply and registration data. That is, carmakers reacted by increasing CO2 emissions (equivalently, reducing fuel economy by increasing engine power and/or engine size) of AFV models available pre-GCR and/or by introducing new variants of existing gasoline models, e.g. a (higher emission) FFV version of a captive gasoline vehicle.

The reaction in the AFV camp was swift, with the action happening mostly in the FFV segment; this is so because the FFV technology piggy-backs on the Otto cycle technology used in gasoline vehicles. Moreover, given the lax treatment dispensed to AFVs, essentially every FFV qualified as a green car; being available at roughly similar prices than their captive gasoline counterparts, the FFV segment thus experienced an increase in market shares.

Second, since the dominant AFVs are FFVs, which can seamlessly switch between gasoline and ethanol, and a substantial share of consumers purchases the cheapest fuel, those high-emission FFVs benefiting from the rebate were

[10] These figures are equivalent to, respectively, ratings 10 (the highest) and 7 according to the US EPA Fuel Economy and Environmental label introduced in 2011. The corresponding figures for diesel are 51.7 mpg and 28.2 mpg, respectively.

[11] In what follows, we refer as low-emission (high-emission) vehicles to those emitting up to (more than) 120 gCO2/km. Emissions of 120 gCO2/km amount to consumption of about 5 liters of gasoline or 4.5 liters of diesel per 100 km. While being applied to individual cars rather than to a brand-level sales-weighted average as in the US CAFE standard, the lower emission threshold is also more stringent than the 250 gCO2/mile (156.25 gCO2/km) CAFE standard to take effect from 2016 in the US.

often fuelled with gasoline, which emits more CO2 than ethanol. In fact, fuel switching by FFV owners is apparent even from aggregate data, as witnessed by a dramatic drop of over 70 percent in country-wide ethanol sales following the 2008 drop in international oil prices. That is, FFVs were also attractive to consumers for providing lower operating costs than their captive gasoline counterparts and fuel choice becomes yet another dimension policymakers should account for in policy design.

4.2. Policies focused in the Automobile Usage

Congestion Charge

Singapore was the first city in the world to adopt congestion pricing[12]. The Electronic Road Pricing (ERP) was implemented in 1998 to reduce traffic at roads into Singapore's central business district.

The ERP is an electronic system of congestion pricing based on a pay-as-you-use principle. The scheme consists of gantries located at roads with heavy traffic (nowadays, there are around 80 gantries in Singapore). When a vehicle goes through a gantry it is automatically charged. The value of the charge depends on the location and time - the same route can cost up to 8 times more during the peak hours. Moreover, charges may change on quarterly basis, depending on traffic conditions - in that sense, the pricing scheme is endogenous.

Every vehicle that wishes to use the priced road must be equipped by a device known as "In-vehicle Unit" or simply "IU". These devices carry a stored-value card that is automatically charged when the vehicle crosses a gantry. An IU costs SGD150 (around USD120), being mandatory for all registered vehicles that use priced roads.

[12] Source: http://web.archive.org/web/20080921090813/http://www.lta.gov.sg/motoring_matters/index_motoring_erp.htm

If a vehicle goes through the ERP without sufficient value stored in the IU, the owner must pay the regular charge plus an administration fee of SGD10 (around USD 8). In the case of no payment within 30 days, the fine can reach SGD1,000 or 1 month in jail.

According to the Land Transport Authority (LTA) - the official Singapore's transport agency - "ERP has been effective in maintaining an optimal speed range of 45 to 65 km/h for expressways and 20 to 30 km/h for arterial roads"[13]. Additionally, they reported that traffic has gone down by 13% within the ERP zone. On the other hand, users complain that the implementation of an ERP gantry along any road simply moves the traffic somewhere else, causing more traffic along smaller roads.

In 2008, a report entitled "Lessons Learned from International Experience in Congestion Pricing" demanded by the U.S. Department of Transport (Department of Transportation, 2008) compared the congestion pricing experiences in Singapore, London and Stockholm. Below we resume the main findings and conclusions of the mentioned report on mobility, revenue/costs, economy and business, environment and acceptability.

Mobility: All of the three cities have reached their main objective of reducing congestion and keep it at lower levels. In Singapore, London and Stockholm traffic in the priced zone reduced around 10% to 30%, and that reductions were sustained over time. As consequence, the speeds increased significantly within the priced zone. In the three cities, up to 50% of those car travels through the priced zone have shifted to public transportation.

Revenues/Costs: All of the three cities are generating revenues far in excess of costs. In Singapore, revenues have been over 10 times the operating costs. In Stockholm and London the revenues have been over twice the costs. In these two cities, revenues are used mainly to recover operating and enforcement costs, although the original idea was to use revenues to improve

13 http://web.archive.org/web/20080921090813/http://www.lta.gov.sg/motoring_matters/index_motoring_erp.htm

public transportation. In Singapore, the great surplus of funds has allowed the government to implement new public transportation programs.

***Economy and Business**:* In general, the impacts on economy and business aspects have been neutral to positive. In Singapore, the ERP did not change significantly business conditions and the community responded positively to the program. In London, CCZ has neutral regional economic impacts and the business communities continue to support the scheme. Finally, in Stockholm, until 2008 no significant impacts were identifiable.

***Environment**:* The three cities have experienced a better environment as consequence of the smaller number of trips (and carbon dioxide emissions) inside the charged zone. Besides the reduction in the number of trips, the increasing number of "green cars" as a result of the smaller fees has becoming the air quality even better.

***Acceptability**:* Public acceptance depends on all aspects listed above, and in that sense is very difficult to measure. Congestion pricing is highly controversial with the public, both before and after implementation. Stockholm minimized that controversy through a referendum. In general, the main fear of the populations is that congestion pricing program will become just another tax.

All these results indicate that, even though the effects of policies designed to reduce automobile usage are important, with sizeable reductions in congestion and pollution without adverse effects in the economy, these measures have an important political component involved. Without political support, the implementation and continuation of such policies is unlikely.

5. Conclusion

Growth in emerging markets and the associated growth of emerging middle classes have only started and is bound to last for a number of decades to come. It is thus natural to design long term measures to address this fundamental change in the global economy. For instance, it is unrealistic to assume this emerging middle class to be less willing to purchase consumer – and especially durable – products than its counterpart in developed economies. As a result,

coordinated policies must be designed to address the higher concentration of persons living in cities; their willingness to purchase durable products, notably automobiles, and the strain such behaviour imposes on urban infrastructure and the well-being of urban populations, such as air pollution.

In this chapter we have tried to motivate via a number of examples that economic theory provides guidance to policymakers in that it works on incentive-based policies to change behaviour. That is, by changing the relative prices of products causing less vis-à-vis those causing more pollution, policies will incentivize consumers to switch to the less-polluting alternative. Importantly, incentives can be applied both to purchasing and usage decisions, such as whether to circulate with a car in an urban centre during a weekday instead of using public transport.

The challenges ahead are daunting and will crucially require the coordination of policies in different levels and industries. It is thus crucial to learn from previous initiatives which policies have worked and which have failed.

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