

Growth rate of Motor Vehicles in India - Impact of Demographic and Economic Development

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ABSTRACT

While motorization rate in India is lower than many developing countries-both in absolute term and relative to size of population, but over the last decade, India is experiencing one of the highest motorization growth rates in the world. This paper examines the influence of population growth, increase in urbanizations and economic development on rapid growth of motor vehicles in India by using secondary data which are correlated by line graph method. Economic development is the major factor affecting the growth rate of motor vehicles. Motor vehicle growths have been largely concentrated in major cities which deteriorate the environmental condition of Urban India. This leads to concern among environmentalists over the further impact on Indian and global environment and considers their implication for future transportation growth in the country.

Keywords: *Motor vehicles, Growth rate, Population, Economic Development, Urbanization*

Jel Codes: *L91, O18*

Introduction

The growth rate of vehicles is the backbone of economic development and the Indian automotive industry is the second fastest growing in the world. About 8 million vehicles are produced annually in the country today. In 2009, the country reported 121.63 million registered motor vehicles, a motorization rate of 22 vehicles per 1000 population (Road Transport Yearbook, 2008). (In comparison, the United States – the world's most motorization nation - reported 675 vehicles per 1000 population).

The motorization rate of India is lower than many developing (Brazil- 222 per 1000 population, South Africa 153 per 1000 population) countries throughout the world. But, over the last three decades, motor vehicles numbers have been doubling every ten or fewer years in India as against a 2 % - 5 % annual growth rate in Canada, the United States, the United Kingdom & Japan (Badami, 2009).

Motor vehicle growth rate has been largely concentrated in the major cities. India has experienced tremendous growth rate in motor vehicles & this leads to interest of environmentalists, business leaders, government officials and researchers for a number of reasons. Already, India's motor vehicles have had a substantial detrimental impact on the environment. Automobiles are the primary sources of air pollution in India's major cities. In India, the transport sector emits an estimated 261 Tg of CO₂, of which 94.5 % was contributed by road transport. In Delhi, the data show that out of total 300 metric tonnes of pollutants belched out every day, close to two-thirds (66%) is from vehicles. Similarly, the contribution of vehicles to urban air pollution is 52% in Bombay & close to one-third in Calcutta (Vinish, 2008). The transport sector in India consumes about 17 % of total energy & is responsible for 60% of the Green House gas from various activities (Tedoy, 2008). The pollution from vehicles is due to discharge like CO, unburnt HC, Pb, NO₂ & suspended particulate matter mainly from tail pipes.

Furthermore, India is experiencing second largest growing automobile industry & this rapid growth rate of automobile has raised both excitement among business leaders over the potential enormous and largely untapped market for automobile and concern among environmentalists. The potential massive size of the nation's motor vehicle fleet has raised concern over the addition of carbon dioxide to the atmosphere & its potential for global change.

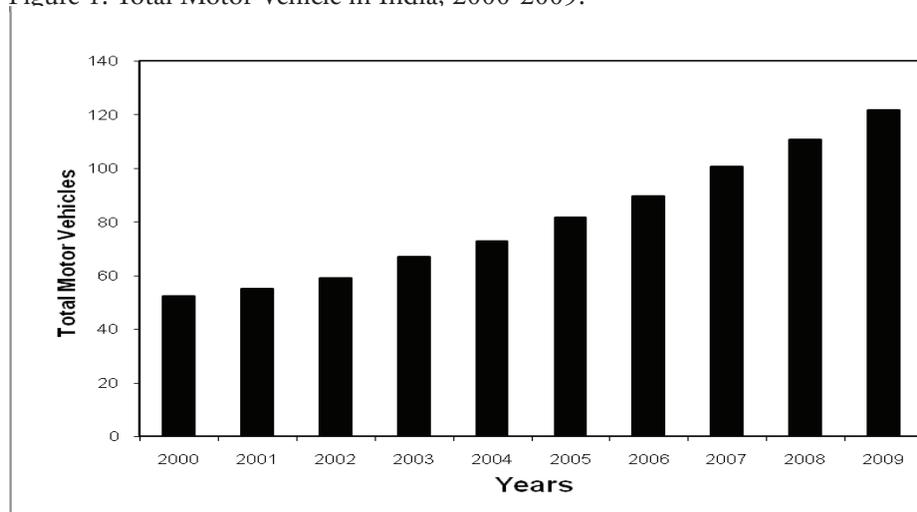
An examination of the factors that have contributed to rapid growth rate of motor vehicle in India is very important to understand the likely future course that the growth

might take. This paper presents an analysis of these factors in India and considers their implication for future motor vehicle growth rate in the country.

Growth rate of Motor Vehicles in India

India has experienced tremendous growth rate in motor vehicle in recent years (see Fig. 1). The total number of motor vehicles increased from 52.37 million in 2000 to 121.63 million in 2009-i.e. an average growth rate of 9 % per year in the country. Some analysts predicted that India's motorization rate will continue to grow to 40 vehicles per 1000 by 2020.

Figure 1. Total Motor Vehicle in India, 2000-2009.



Source: Road Transport Year Book (Issues of 2007, 2008 and 2009).

The largest majority of vehicles in India are found in metro cities. Number of vehicles in Indian cities is 40 millions with a share 30 % of total vehicles in India. Chennai, Bangalore, Kolkatta, Delhi and Mumbai with 15.2 million vehicles constitute 38 % of total vehicles of important cites and 13 % of total vehicles in India (Motor Transport Statistics, 2009). The second tier cities like Coimbtore (12 %), Mudrai (11 %), Nagpur (14.6 %) and Vishakhapatnam (17.2 %) posted a compound annual growth rate (CAGR) of about 11 % or more. Mumbai & Chennai posted a

growth rate of 6.2 % and 13.2 % respectively (Road Transport Year book, 2009.) What are the factors which are responsible for growth rate in motor vehicles? Experience & lesson from other developing countries can give an idea about the process unfolding in India. Many analysts identify these primary factors that influence the growth rate of motor vehicle in many developing countries and they are population growth, increased urbanization and economic development (Riley, 2002). These factors can provide a basis for examination if the change that have taken place in India in last 10 years. Table 1 summarizes these changes.

Table 1. Total Population, Urban population, GDP and Motors vehicle, 2000-2009.

Year (As on 31st March)	Population (Thousands)	Urban Population (Thousands)	GDP (At Constant Price in crores) Base year 1999-2000	Total Motors Vehicles (Million) ¹
2000	1016710	281416	1822767	52.37
2001	1028610	285748	1954276	54.99
2002	1045547	294668	2137952	58.92
2003	1067388	301224	2291770	67.01
2004	1079117	307721	2570644	72.72
2005	1095722	314145	2923237	81.5
2006	1112186	321623	3339976	89.61
2007	1128521	329112	3847477	100.7
2008	1144734	336746	4399451	110.52
2009	1160813	371460	4629702	121.63
<i>Growth Rate</i>	1.48	3.16	10.96	9.81

Note: ¹Include both passenger and commercial vehicles.

Source:

- 1) Road Transport Year Books-2007 and 2009 (Published by Ministry of Surface Transport and highway, India)
- 2) Indian Demographic Statistics. Data retrieved from www.tradingeconomics.com/statistics

Population Growth

Population growth can have a significant influence on the number of motor vehicles in most of the developing countries. As the size of population increases, the consumption level of per person increases in term of goods & services. In modern world, transport is an important service used by peoples, so the size of transportation sector is sensitive to these population changes.

It can be argued that population growth largely influences the absolute number of vehicles in the country. If a population growth were the only explanatory factors, the number of motor vehicles would be grew at the same rate as population, then by influencing absolute size of vehicles fleet and not the number of vehicles relative to population size.

There is indication in Table 1 that population growth has not contributed substantially to motor vehicle growth rate in India. As seen in Table 1, population growth in the country has been relatively moderate. The population growth fell considerably after 2003-04 and in recent years. According to projected population by Ministry of Home affairs, India population growth rate peaked till 2003, at that time, nation population grew at nearly 1.75 % annually. As a result, 10 million people are added to population each year. But after that the population growth fell sharply. The reasons of slow down in population growth are due to lower fertility in the country. The nation's fertility rate declined to 2.65 in 2009 as compared to 2.91 in 2003 and 6.2 in 1951. This fertility decline often contributed overall socio economic development and rising cost of child bearing and successful voluntary family planning programme in recent year due to mass awakening (Chaurasia, 2010). The rate of growth of motor vehicles in recent years is much more than that of growth of population. The populations grow at the rate 1.48% annually during last 10 years while motor vehicles grow at 9.82 %. It suggest that population growth has played a very minor role in India's motor growth rate. Simple arithmetic supports this assertion. If the population growth was the only factor effecting motor vehicle growth rate between 2000-2009, the motorization rate would be remain constant as population growth rate.

But motor vehicles grow near about 9 times of the growth rate of population. Clearly, additional factor are influencing the nation motorization rate and driving the nation's motor growth rate.

Urbanization

India has been predominantly rural in character throughout the ages, but now many urban centers have flourished from time to time. The country is growing rapidly with 32% population residing in urban areas and this is expected to increase to 40% by 2030 (Annual Report, NIPFP, 2007-08). Urbanization makes more & more people migrate to the town for jobs, education and medical aid. It leads to significance influence on the number of motor vehicles. As the proportion of the population living in urban areas increases, the demand for motor vehicles also rises in proportions. With their higher income & modern western standard of living – private ownership of vehicles (Car, two-wheeler etc.) is often seen as one of the first symbol of success and prosperity. (European Environment Agency Report, 2008). Urbanization promotes growth of trade, commerce and service sector which rely on heavy commercial vehicles (Mondal & Chary, 2006). For job movement taxicabs, passenger vans and buses are appearing in Urban Center for transportation. While growth in dense urban areas like Delhi, NOIDA, Gurgaon, Mumbai, Kolkatta etc., lead to development of public or alternative transport system and effect on demand for personal vehicles especially in nearby non urban areas, where individuals and business rely on motor vehicles to access and participate in their urban areas.

India's currently having some of the world's large and most densely populated urban areas. India has three mega cities with population over 10 million, Mumbai (16.4 millions), Kolkatta (14 million) and Delhi (13.1 million). In addition, the numbers of cities with population above 1 million were 35 in 2001 and current trends likely to result in the emergence of 60 – 70 such cities by the year 2021 (Annual Report, NIPFP, 2007-08).

However there is some indication that urbanization has also not contributed substantially to the number and growth rate of motor vehicles in India. Despite the rapid growth of urbanization, the proportion of the country's population living in urban area is relatively low. As shown in table, 27 % of total population living in urban areas in 2000 which merely increased to 32 % in 2009. The average growth rate of urban population is 3.16% which is higher than population growth but have been relatively very moderate with growth rate of motor vehicles.

The four main components of urban growth- natural increase, migration, boundary change and declassification attributed to urban growth in India. The largest contributor is natural increase (Pathak & Mehta, 2005).

Rural to urban migration has played some role in growth of urban population. The other most affecting the urban population growth in India involves a transition process, by which total urban population is increased by creation of new cities and town and by expansion of existing urban areas.

These factors influencing urban growth in India suggest that urbanization alone has a little effect on motor vehicle growth.

Economic Development

Industrialization and economic development in developing countries can have a strong impact on number and growth rate of motor vehicles. Economic growth and development affects the motorization rate in many ways. First, due to rise in national income, personal income rises, demand for consumer goods tends to increase. The availability of more income gives individuals and households the economic opportunity to purchase more luxurious item like automobiles. As more and more persons buy motor vehicles, the motorization rate will increase (Richet & Ruet, 2008)

Economic development also significantly influences the demand and supply of motor vehicles in a country. On demand side, due to more demand, economics of scale in vehicle production take place and it reduces the price of vehicles, and operation of law and demand, it added a greater segment of the population and economic development lead to small and nuclear family which increase the number of household and in turn goods and services demanded by them increases and so vehicles. On supply side, growth in business sector can lead to increase in production or import of new vehicles.

Economic development means more funds and facilities of infrastructure like road, fuel sources and other services relate to motor vehicles, which also fuelled more production and vehicles (Riley, 2002). Thus, on both side there is a trend of increase motorization in the country.

Of the three primary factors identified as affecting motor vehicles in India, Economic development in India is the most substantial influencing factor. Economic development in India occurred at rapid pace in recent years in spite of global slow down. (Annual Gross Income-India, 2008)

The gross domestic production for the nation was 1822761 crores in 2000 and it increase to 4629702 crores in 2009. The GDP grew at annual rate of 9 % in recent years.

Economic development in India is largely a result of LPG (Liberalization, Privatization and globalization) policy of 1991 and its second generation reform in last decades. In 1991, Indian government deregularise the economy and began instituting a series of measures to shift the controlled and regulated economy to market oriented economy. This paradigm shifts opened the door of economy to foreign trades and investment. The result of these measures has been tremendous growth in the country that continues in recent year.

Economic reform and subsequent increases in income have been associated with changing patterns of spending on goods and services and emergence of consumerism in India.

Along with diversification and expansion of economic activities, owing private vehicles (Two wheelers and car) is becoming a practical option for many Indians.

Comparison of factors over Time

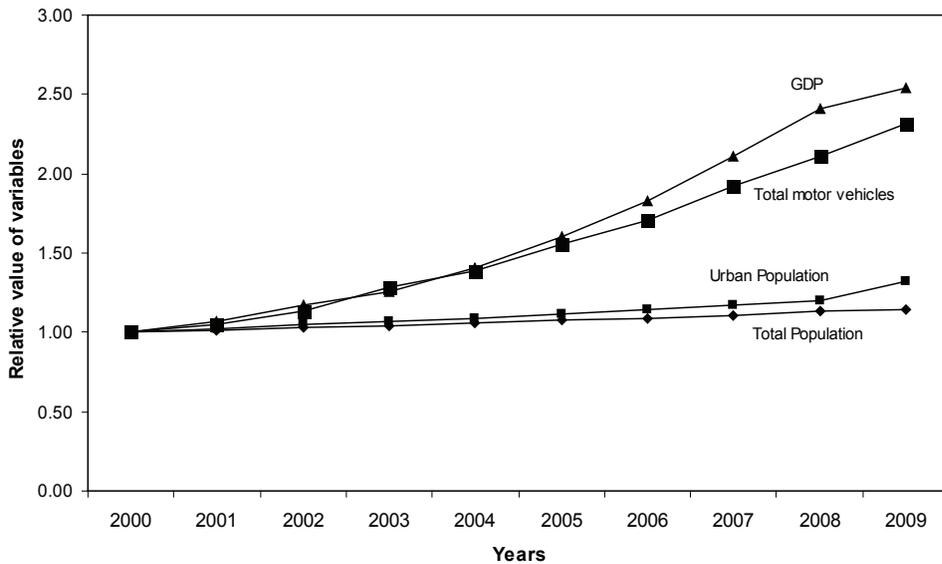
These data suggest that economic development is the most significant factor influencing motor vehicles growth rate in India. It appears to be consistent with similar finding that vehicle grow with income and economic development. (Riley, 2002).

The closer examination of data suggest that situation in India is not so simple but quite complex. Figure 2 shows the relative increase in motor vehicle with relative increase in total population, urban population and GDP during 2000-2009. Each of variables is standardized to value 1 in year 2000. Lines of graph show the increase in variable each year relative to base year 2000. As shown in graph, total population growths were moderate during the time period. However, growth of urban population is also moderate but higher than total population. It shows the trend of rising in coming years. The growth of GDP was substantially increasing over time and increase is more than four fold over the last 10 years.

Graphically, the relationship between motor vehicles and total population and urban population is as expected, motor vehicles growing at a significantly faster rate than these two demographic variables. But the relationship between motor vehicles and GDP is more complicated.

During year 2000 to 2005, total motor vehicle and GDP look like to be growing at a relatively similar rate with GDP only slightly ahead of vehicles. But after 2005, Growth and GDP appear to accelerate much more than growth rate in motor vehicles, but trends of rising motor vehicles seen as it catch the GDP trend in coming years

Figure 2. Relative increase in Motor Vehicles as compared to total population, Urban Population, GDP, 2000-2009.



Source: Based on the data in Table 1.

The relationship of motor vehicle and GDP indicate the strong growth of both the variables but more acceleration of motor vehicle growth rate and one might expect that if motor vehicles grow at this rate it may overcome the GDP growth and one has to find out more factors influencing its growth.

In fact, the growth rate make an important feature which during the increase in motor vehicles in India i.e. the unique composition of motor vehicle fleet. When the composition is taken into account, the situation look significantly interesting and different (Halcrow group limited, Saxena & Banister, 2008).

Indian Composition of Vehicle Population

Motor vehicle fleet in whole country composed of two-wheelers, three wheeler (car, Jeep and taxi), passenger vehicle (Bus and other passenger vehicle) and commercial vehicle.

India had 121.63 million vehicles at the end of year 2009. Personalized mode (constituting mainly two wheeler and cars) accounted for more than four-fifth of motor vehicles in the country compared to their share of little three-fifth in 1951. Further breakup of motor vehicle population reflects preponderance of two wheeler with share of more than 73 % in total vehicle population followed by three wheeler (Car and Jeep) at 15 % and passenger vehicles at 10 % (See Table 2). Share of commercial vehicle is very low, near about 5 %. With a rising income and greater need for mobility the personalized mode of transport is likely to grow in importance in coming year.

India like many other countries in Asia has experienced high annual growth rate in excess of 10 %. This is equivalent to doubling vehicle fleet in about seven years. The two wheeler population in India is 3856 Crores in 2001 which increase upto 91235 crores in 2009 almost tripled in 9 years.

With the rapid pace of urbanization and economic development, more is a rising trends of personal vehicles. Car is most comfortable vehicle and luxurious option for transportation in India. So share of car is rising in India. Share of cars in total vehicles is near about 9 %. The car owner ship in India is 8 per thousand people (Burange & Yamini, 2010). With country's highway infrastructure improving and business growing, growth of small and heavy commercial vehicles segment outperforming in the growth. The commercial vehicle population doubled of in last ten years. The growth rates of commercial vehicle remain same in all the years and steadily rising. The motorization trends itself is dominated by following preferences in India.

- High specification car, including small utility vehicles.
- Diesel four wheeler
- Motorcycle in two wheelers (Halcrow group limited, Saxena & Banister, 2008).

Table 2. Composition of Indian Motor Vehicle Population, 2000-2009

YEARS (Ending on 31 st March)	Two Wheelers (In crores)	Three Wheelers (In crores)	Passenger vehicles (In crores) ²	Commercial Vehicles (In crores)
2000				
2001	38556	7058	6429	2948
2002	41581	7613	6756	2973
2003	47519	8599	7397	3492
2004	51922	9451	7596	3749
2005	58799	10320	8349	4031
2006	64743	11526	8913	4436
2007	73209	11860	9080	4985
2008 (P) ¹	81235	12026	10263	5401
2009 (P)	91235	12523	10500	5967

¹Provisional Data estimated by using previous year data and net addition.

²Constitute Taxis, Cab and others public Four- wheelers transport

Source: Ministry of Surface Transport of India, Society for Automobile Association of India.

Impact of government policy on motorization

Government policy can have a significant impact on the size, composition and growth rate of a nation's motor vehicle fleet. In India, state and national governments directly or indirectly control the supply, demand, the distribution of automobiles, fuel price and fuel supply, the development of road and other component of infrastructure needed to motor vehicles. In India, state also directly involve in the development of public transport system (The Energy Resource Institute, TERI, 2009).

Indian transport passed through the phase of tight government control and licensing to liberal economic reform which results higher level of foreign investment in automobile sector and increase vehicle production and its sale. The liberalization steps, such as, relaxation of the foreign exchange and equity regulations, reduction of tariffs on imports, and the banking reforms, initiated by the Government of India, have played an equally important role in enabling the Indian Automotive industry achieve great heights. According to society for automobile manufacturer, India is second largest manufacturer of motorcycle and seventh largest manufacturer

of car in 2009 in the world. Healthy competition benefited the end consumer since cost of service or product come down substantially, added many consumer dreaming of an own vehicle. So number of privately vehicles has grown substantially in last 10 years. Car ownership is growing at a rate of 10-15% per year (Tiwari, 2007). The growth rate of motorcycle is 17.4 % during last 6 year and overall penetration of two-wheeler in India become 28 % of all household (Indicus, 2010).

Secondly, large investments have been made for the development of transport infrastructure and facilities. There has also been impressive qualitative development by state government also. Private participation is made for development of highway, service centre and maintenance of road etc. This promotes better quality services to transport and have a positive impact on the growth rate of private vehicle. Private vehicle accounts for 30 % of total transport in India (Tiwari, 2007).

India has taken the lead in redesigning the car for buyer who might otherwise be able to afford only a motorcycle. The emergence of “low cost cars” appears to be the single most important trend in growth rate of cars. Now it is easier for two wheeler buyers to migrate car like Nano. The relaxation in import duty, allowing second hand purchasing of vehicles, giving tax holidays and other incentive developed a system of private vehicle ownership. The inadequate public transport and easy availability of financing facilities, institutionalizations of automobile finance for private vehicle have resulted in increase in vehicle ownership level and their usage. Simple vehicle registration process and easy availability of driving license also fuelled to motor vehicle ownership.

Recently, some scientists and environmentalists have directly challenged government policy to develop a western style automobile centered transportation system. They pointed that automobile will increase traffic congestion and worsen air pollution. So policy maker should concern about problem associated with development of motorized India (Vinish, 2008).

Methodology

Research is based on secondary data collection through various agencies and research groups. These data are tabulated to find out coordination between growth and automobiles and various affecting factors using trend line method to find out positive correlation between them. No regression coefficient is discovered to show

the cause and affect in this study. This study discusses the relation by observing variable trends which may be closely related. The research analysis of many researchers also mentioned to show positive relationship between considered variables.

Research Findings

This paper finds a positive relation between increases of automobiles and its effecting factors like growth of population, growth of urban population and growth of nation income. After considering the correlation trends of various factors, it finds that it is the change in income which mostly promoting the growth of automobile in India, however, growth of population and urban population also influences the growth rate of vehicles. But it is the economic development in India which support the growth rate of personal vehicles which look the most comfortable and luxury items in Indian Consumer basket. Economic change also promotes urbanization and the process promotes transportation which is called backbone for movement and economic development. But the unregulated and unplanned growth rate of vehicles gives a concern to environmentalists and town planners.

Conclusion and Implications

The most important trends in India are therefore of rapid population growth, increasing urbanizations, growing per capita incomes and rising motorizations. As Indian cities grow in population, they are also sprawling outwards. The lack of effective urban planning strategy or control is resulting in low density development which is associated with an increase in the number and length of trips. For most Indians this forces an increased reliance on motorized transport. Cars and motorcycles are increasingly necessary to get around.

The economic growth, increasing disposable income, and increasing urbanization is creating greater demand for transport and the number of vehicles on India's road system is growing rapidly. India like many other counties in Asia has experienced high annual growth rate in excess of 10 %. This is equivalent to doubling vehicle fleets in about seven years. Traffic composition in India is of mixed nature. A wide variety of about a dozen type of slow –and fast moving vehicle exists. Personalized mode (constituting mainly two wheeler and cars) accounted more than 80% of the

vehicle population in India. The explosion in passenger vehicle due to economic development in recent years suggests that economic demand for motor vehicle existed in country and as infrastructure and institutional framework improved and government liberalized the policy, passenger vehicle particularly personal vehicles – have exhibited tremendous growth and the sale of these vehicles is increasing very fastly.

Transport poses a dilemma in that it is necessary for economic and social development, yet it is associated with environmental degradation, especially with regard to atmospheric pollution. Transport activities have a very adverse effects on the environment such as air pollution, noise pollution etc. Transport infrastructure in India is expanding considerably in terms of network and services. Road transport accounts for a major share of air pollution load in major metropolitan cities of India. In most urban areas, air pollution has worsened due to traffic congestion. The environmental effects of fuels like oil and petroleum products are of growing concern owing to increasing consumption levels. The combustion of these fuels in vehicles has been a major source of pollution. With the increasing vehicles in country, the vehicular pollution has also increased and it accounts for a considerable share of vehicular pollution in India. The inevitable urbanization and its growth in India will result in the pressure on urban transport, which is likely to increase substantially in the coming years. In addition; it is associated with adverse noise and land use impacts.

Rapid motorization in India also has important implications for energy security and climate change. The growth in energy consumption in road transport, which has tripled since 1981 and accounts for 90 percent of energy consumption for all transport modes, has been the most rapid of all sectors. Road transport accounts for 9 percent of all energy consumption, it does so for as much as 30 percent of the consumption of petroleum products; by contrast, the residential sector accounts for only 20 percent. It is important to mention that our research methodology based on graphical correlation which may have the chance of inclusion of many factors affecting the growth rate of motor vehicles which are not in our study but these three factors are more prominent. In conclusion, it is important to prioritize the road transport sector in energy and climate change policy, given the rapid growth in energy in this sector, and its almost exclusive dependence on, and large share of consumption of petroleum fuels. It is certainly desirable to implement technological measures to improve vehicle fuel economy (and shift to less carbon-intensive and cleaner energy sources, where possible). But equally, it is important to apply a wide range of economic and institutional approaches in a concerted fashion to promote accessibility and curb motor vehicle activity.

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