



An evaluation of government incentives for new energy vehicles in China focusing on vehicle purchasing restrictions



Shao-Chao Ma^a, Ying Fan^{b,*}, Lianyong Feng^a

^a School of Business Administration, China University of Petroleum, Beijing, China

^b School of Economics and Management, Beihang University, Beijing, China

ARTICLE INFO

Keywords:

New energy vehicles
Policy evaluation
Vehicle purchasing restrictions on
Panel co-integration

ABSTRACT

In order to reduce carbon emissions and urban smog, the Chinese government has instituted a number of policies to promote the diffusion of new energy vehicles (NEVs), achieving remarkable results. This paper aims to quantify the effectiveness of various policies. After reviewing and quantifying the policies directly related to the sales and driving of NEVs in the past five years, we established a multivariate co-integration model and an error correction model to analyse the long- and short-term effects of these policies. The results demonstrate positive co-integration for the relationship between the NEV market share and the NEV purchase subsidy, tax exemption, the policy of restricting internal combustion engine vehicle (ICEV) purchase, and the abolishment of traffic restrictions for NEVs. China's unique policy of restricting ICEVs has in fact promoted NEV sales by adjusting the supply and demand to influence the consumers' choices. Finally, we found technology to still be a bottleneck factor in the NEV industry, and technological progress's effect on NEV diffusion is greater than the economic subsidy policy. Therefore, this study suggests that the funds being made available from the gradual reduction of the purchase subsidy should be transferred to research and development.

1. Introduction

With the entry into force of the Paris Agreement in November 2016, energy conservation and emission reduction has become a common goal shared by the world's major countries. According to data from the UN Framework Convention on Climate Change (UNFCCC), the transport sector accounts for approximately 30% of CO₂ emissions in developed countries and about 23% of the global total for man-made CO₂ emissions. Because of this, there is widespread agreement on the need to reduce CO₂ emissions from transport by a minimum of 50% by 2050 at the latest (UNFCCC, 2017). Renewable energy power generation technologies are progressing rapidly, both making them cheaper and allowing electric transportation to become a major starting point for reducing CO₂ emissions in this sector (REN21, 2016). Many countries have adopted new energy vehicles (NEVs) powered primarily by electricity. The country with the most carbon emissions, China, is one of the nations currently taking an active interest in this technology.

China's interest in reducing CO₂ emissions by adopting NEVs is more urgent than many countries. With China's rapid economic development,

urban air pollution problems have been ubiquitous in major cities across the nation. In recent years, the frequent occurrence of smog has seriously affected its residents' quality of life, attracting worldwide attention. Beijing is an example of this. As shown in Fig. 1, the number of pollution days per year in Beijing has been in decline since the National Health and Family Planning Commission of China began to monitor smog health effects in 2013. However, Beijing residents still faced poor air quality for 40% of days in 2015. The transportation sector is an important source of pollution in the city. As such, it is important for Beijing, and China in general, to promote the development of NEVs to replace internal combustion engine vehicles (ICEVs) in order to solve the problem of urban air pollution (Nichols et al., 2015).

The Chinese government has chosen to adopt NEVs¹ as a strategy to address climate change and the regional air pollution present in the transport sector, and they have achieved remarkable results in these efforts. In January of 2009, the Ministry of Finance (MOF) launched its TVTC (Thousands of Vehicles, Tens of Cities) programme, promoting NEVs in pilot cities for the first time. At the end of 2015, China's NEV sales totalled 497,000, more than anywhere else in the world (CATARC,

* Corresponding author.

E-mail address: yfan1123@buaa.edu.cn (Y. Fan).

¹ NEV (New Energy Vehicle): according to the Energy-saving and new energy automotive industry development plan (2012–2020) issued by the state council of the PRC, NEV refers to vehicles that use a new type of power system entirely or primarily relying on new energy, including BEVs (Battery Electric Vehicles), PHEVs (Plug-in Hybrid Electric Vehicles), and HFCEVs (Hydrogen Fuel Cell Vehicles). From motor vehicle production data issued by the Ministry of Industry and Information Technology in 2015, China domestically produced only 10 fuel cell vehicles for that year. Therefore, NEVs mainly refer to BEVs and PHEVs in China's current context.

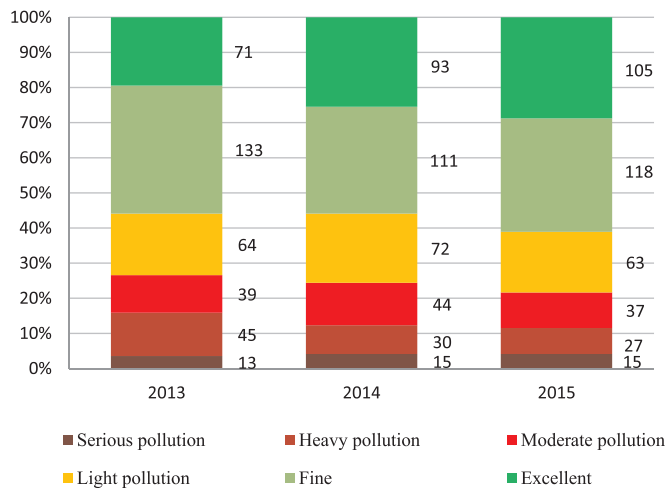


Fig. 1. Air quality in Beijing in recent years and the corresponding number of days. (Source: Beijing Municipal Environmental Protection Bureau, 2016).

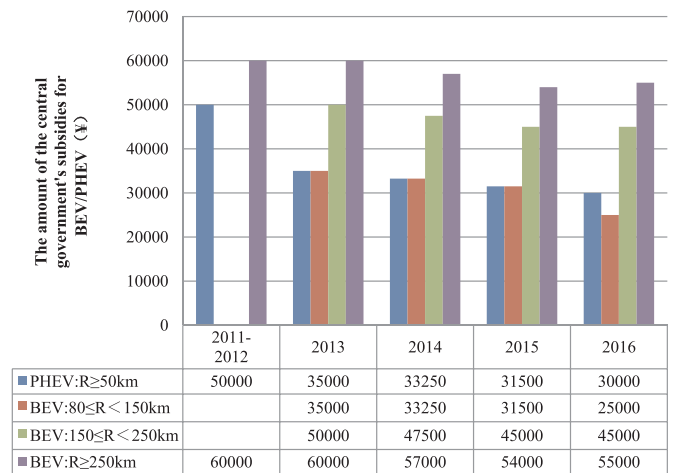


Fig. 3. The subsidy amounts for BEVs/PHEVs in recent years.

2016). In just six years' time, China ascended from almost zero NEVs to being the first country with NEVs on the road. In addition to the development of the market itself, a large number of government incentives played an important role in this process (Yuan et al., 2015).

As shown in Fig. 2, we reviewed the incentive policies directly related to NEV sales and use issued by the Chinese central government from January 2011 to June 2016. This section will introduce four of these policies in greater detail, namely, a purchase subsidy, a tax exemption, traffic management, and the construction of a charging infrastructure.

The direct economic cost of purchase subsidy for NEVs is the highest among the various incentive policies, so it is also the most controversial policy. As shown in Fig. 2, the central government issued four circulars for the purchase subsidy of NEVs over the past few years. The primary content of these circulars was adjustments to subsidy amounts and qualifying vehicle models. In 2011–2012, the subsidy amount was determined according to the energy of the NEV's power battery, ¥3000 per kWh. The maximum subsidy for each PHEV was ¥50,000, and the maximum subsidy for each BEV was ¥60,000. From 2013–2016, the annual subsidy amount was determined by the NEV's pure electric driving mileage (indicated by indicated by R). Fig. 3 illustrates these specific amounts. Specifically, the mileage range of the NEV

corresponding to the first level subsidies has been modified from $80 \leq R < 150$ km to $100 \leq R < 150$ km since 2016.

Fig. 4 shows the relationship between each subsidy grade adjustment and NEVs' monthly market share. We can see that the sales market share was downbeat with no clear upward trend prior to January 2014, after which there was a rapid growth process.

As shown in Fig. 2, there were two main tax exemption policies for NEVs: an exemption from the tax on vehicles and ships as well as the tax on vehicle purchasing. The State Administration of Taxation issued these exemption circulars in January 2012 and September 2014, respectively. Although different regions set different taxation standards according to the vehicle's engine displacement for the tax on vehicles and ships, the tax needed to be paid for passenger vehicles did not exceed ¥1000 per year. By comparison, the exemption from the tax on vehicle purchase was a relatively strong incentive because that tax rate was 10% of the vehicle price. Due to the insignificance of the tax on vehicles and ships, we only consider the exemption from tax on vehicle purchase.

China's incentives for traffic management and its restrictions on vehicle purchases are unique and important policies. These policies were adopted in major cities in order to solve the problem of urban traffic congestion and air pollution, which are prominent issues in China. The fact that there are no such restrictions on NEVs increases

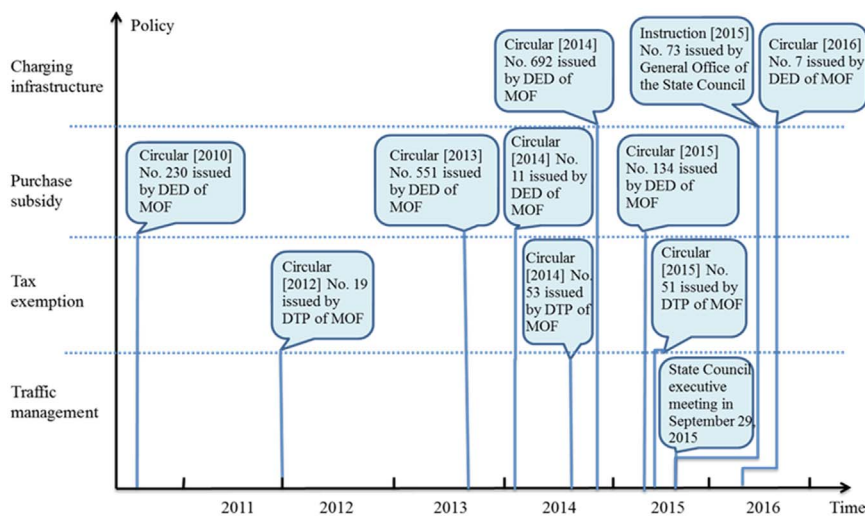


Fig. 2. The time and order of the government incentives. Note: DED denotes the Department of Economic Development; DTP denotes the Department of Tax Policy.

Download English Version:

<https://daneshyari.com/en/article/5105537>

Download Persian Version:

<https://daneshyari.com/article/5105537>

[Daneshyari.com](https://daneshyari.com)