



The impact of policy measures on consumer intention to adopt electric vehicles: Evidence from China



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ARTICLE INFO

Keywords:

Electric vehicles
Policy measures
Environmental concern
Adoption intention

ABSTRACT

Electric Vehicles (EVs) have been recognized as a promising means to reduce carbon emissions from the transport sector. To promote the adoption of EVs, great efforts have been made and a series of policy measures have been introduced. However, the widespread adoption of EVs is likely to be insufficient. This study divides policy measures into three catalogs (i.e., financial incentive policy measures, information provision policy measures and convenience policy measures) and investigates how these policy measures motivate consumers to adopt EVs and how such effects are moderated by consumers' environmental concern. The results of a survey of 324 respondents suggest that three catalogs of policy measures are positively and significantly related to EVs adoption intention, and convenience policy measures are the most important policy measures to promote EVs. In addition, the results indicate that consumers' environmental concern plays a moderating role in the relationships between two catalogs of policy measures (financial incentive policy measures and convenience policy measures) and EVs adoption intention. Implications and suggestions for future research are provided.

1. Introduction

Transport sector has been one of the top contributors in increasing greenhouse gas emissions (Klößner et al., 2013; Larson et al., 2014; White and Sintov, 2017). The report of the International Energy Agency (IEA) suggests that transport sector contributes approximately one-fourth of the total worldwide greenhouse gas emissions, which is predicted to increase from 23 to 50% by 2030 (IEA, 2009). Reducing carbon emissions from transport sector has a significant role in alleviating the serious environmental problems (Schuitema et al., 2013; Larson et al., 2014). Electric vehicles (EVs), one type of energy-efficient transport innovations, have been recognized as one of the most promising means in the transport sector to reduce carbon emissions (Klößner et al., 2013; Schuitema et al., 2013; Li et al., 2016).

Electric vehicles (EVs) are defined as the vehicles that derive motive power exclusively from onboard electrical battery packs that can be charged with a plug through an electric outlet (Egbue and Long, 2012; Wang et al., 2017). Compared with conventional gasoline vehicles, EVs have advantages in improving fuel efficiency and reducing carbon emissions (Lieven et al., 2011; Egbue and Long, 2012). For example, EVs can lower carbon emissions by 30–50% and achieve 40–60% improvements in fuel efficiency on average (Romm, 2006). Scholars and environmentalists regard EVs as a generic cure for many environmental issues (Graham-Rowe et al., 2012; Wang et al., 2017). However, there are also some obstacles may impede consumers to adopt EVs, such as high purchasing cost, short driving distance, long charging time and limited charging station (Egbue and Long, 2012; She et al., 2017; White and Sintov, 2017). Thus, to stimulate consumers to uptake and use of EVs, great efforts have been done and wide packages of policy

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measures have been taken into account (Coad et al., 2009; Li et al., 2016; Wang et al., 2017). For instance, the Chinese government has put forward the strategy of “Energy Saving and Electric Vehicles”. The policy measures of this strategy mainly focused on carrying out pilots to subsidize EV buyers, promoting charging facilities construction and accelerating EVs commercialization (Wang et al., 2016). In addition, other policy measures such as providing accurate information about technologies and performance attributes of EVs and constructing dedicated parking space for EVs are also initiated (Potoglou and Kanaroglou, 2007; Coad et al., 2009; Li et al., 2016).

Though these efforts and policy measures have been undertaken, the widespread adoption of EVs is likely to be insufficient. The enthusiasm for consumers to adopt EVs still seems to be low (Coad et al., 2009; Zhang et al., 2013; Li et al., 2016). According to the statistics of China Association of Automobile Manufactures (CAAM),¹ the number of whole vehicle sales was 24.6 million while the number of EV sales was only 207,500 by the end of 2015. The market share of EVs is merely 0.8%. In Norway and U.S., the market share of EVs only accounted for about 2% and 0.7% in 2015 (Li et al., 2016; White and Sintov, 2017). As we can see, EVs not only in China but also in other developed countries are facing a dilemma of “hot policy” but “cold market” (Li et al., 2016). The low level enthusiasm for consumers to adopt EVs highlights the necessity to explore the relationships between policy measures and the acceptance of EVs.

According to the *Blue Book of China New Energy Vehicle (2015)*, the policy measures issued to promote EVs adoption are divided into six catalogs: industry management, technology innovation, demonstration, infrastructure construction, financial subsidy and preference tax (CATARC et al., 2015). Li et al. (2016) divided the EV-related policy measures into seven catalogs: macroscopic policy, demonstration policy, subsidization policy, preference tax policy, technical support policy, industry management policy and infrastructure policy. Considering the pertinence, practicability and the connecting link between the policy measures, several scholars have combined them into two or three parts, such as information provision policy and financial incentive policy (Coad et al., 2009), pilot policy and financial subsidy policy (Zhang et al., 2014), and demonstration policy, infrastructure construction policy and fiscal support policy (Yuan et al., 2015). Based on the classifications mentioned above, three catalogs of EV-related policy measures were divided in this study, namely financial incentive policy measures, information provision policy measures and convenience policy measures, and we reckoned that this classification is better covering the present EV-related policies in China. Financial incentive policy measures aim to lower the EVs purchasing cost and operating cost, such as direct subsidy policy, tax exemption policy and road tolling exemption policy. Information provision policy measures aim to provide information about EVs to consumers, such as the price, practicality, reliability, safety, driving range, charging time, battery life, fuel consumption, environmental performance and other issues. Convenience policy measures aim to provide convenience to consumers when they use EVs. For example, facilitating the infrastructure construction and permitting the owners of EVs to enjoy some “privileges” (e.g., EVs are permitted to access to high occupancy vehicle (HOV) lanes, allowed to own a dedicated parking space and unrestricted by the rules of even-and odd-numbered license plates).

In fact, the effect of policy measures on EVs adoption has received considerable attention from scholars and practitioners (Potoglou and Kanaroglou, 2007; Helveston et al., 2015; Wang et al., 2017). However, previous studies were mainly focus on financial incentive policy measures; other policy measures were not considered (Zhang et al., 2013; Wang et al., 2017). Though the financial incentive policy measures significantly affect the EVs adoption rate, the price signal can be seen only as one predictor of EVs adoption (White and Sintov, 2017). Consumers’ adoption decisions cannot be understood without considering other policy measures, such as information provision policy measures and convenience policy measures. Exploring the effects of these three catalogs of policy measures on EVs adoption jointly would enrich previous studies and provide insights into promoting EVs adoption.

Furthermore, with the environmental degradation and the worsening of health problems, and with the increase of government propaganda recent years, consumers’ environmental concern has increased (Wang et al., 2016). Environmental concern is a general understanding and awareness toward environmental issues and it is an important determinant for making individual changes from current behavior to a more environmentally friendly behavior (Bamberg, 2003; Schuitema et al., 2013). In fact, the market penetration of EVs is not just relying on the supportive policy measures, consumers’ environmental concern and intention to adopt is also important (Turrentine et al., 2011). Thus, developing a more comprehensive understanding of the relationships between policy measures, environmental concern and EVs adoption, and investigating how policy measures affect EVs adoption contingent upon the consumers’ environmental concern would shed new light on the understanding of the underlying influential mechanism of policy measures.

The main research motivation of the current study is to examine the effects of these three catalogs of policy measures and explore the combined effects of policy measures and consumers’ environmental concern on EVs adoption so as to enrich the research on EV-related policy measures and better understand the influential mechanism of policy measures. Meanwhile, this research aims to provide a reference for relevant government agencies to improve current policy measures and increase consumers’ intention to adopt EVs. This study makes several contributions to the current literature. Firstly, previous work mainly examined the effect of financial incentive policy measures on EVs adoption. However, in this study, we extended prior work and divided the current EV-related policy measures into three catalogs to evaluate the influences of financial incentive policy measures on EVs adoption alongside with information provision policy measures and convenience policy measures. Secondly, previous studies have indicated that consumers’ environmental concern has a significant effect on EVs adoption and regarded environmental concern as an internal driving factor (Egbue and Long, 2012; Carley et al., 2013; Wang et al., 2016). In this paper, we extended the study by considering the combined effects of internal driving factor (environmental concern) and external driving factor (policy measures) rather than evaluated the

¹ “See detail at <http://www.auto-stats.org.cn/>.”

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