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A study on the determinants of private car ownership in China: Findings from the panel data

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ABSTRACT

This study examines the determinants of private car ownership in China. The target cities are 32 provincial capital cities and the target period is from 2001 to 2011. In order to capture the individual effects (heterogeneity), the fixed and random effect models are adopted and compared, in which 8 explanatory variables are selected to include economic characteristics, urban characteristics, and transportation characteristics. Moreover, double natural logarithm model is employed to measure the elastic relationship between the private car ownership and regressors. The estimated results show that the fixed effect model performs better than pooled regression model and the random effect model. In addition, there are variations of private car ownership among cities and regions. Finally, the influence of factors responsible for these variations is also presented and discussed in this paper.

1. Introduction

Even though numerous countries are gradually involved in the efforts to relieve CO_2 emission, it still experienced a dramatic increase in the past few years, which is indicated by Fig. 1. Among factors that affect it, transportation accounts for a big proportion (given by Fig. 2). Further, the emission from private cars almost is half of the total transportation emission, which is illustrated by Fig. 3. Therefore, investigating private car ownership and its determinants, is not only beneficial to forecast private car ownership and traffic demand, but also provides reference basis for determining fuel duty and strong support for making policies related to transportation, automobile industry, energy and environment.

China is experiencing a sharp increase in terms of private car ownership since the year of 2000. Fig. 4 describes the growth of private car ownership in 32 Chinese cities in the year of 2001, 2004, 2008, and 2011. It can be clearly seen from Fig. 4 that private car ownership experienced a sharp increase from 2001 to 2011. Even though GRP (Gross Regional Product) per capital of some cities fluctuated during this period, the number of private cars kept growing, which is demonstrated by the rising broken lines in Fig. 5. In addition, private car ownership per capital in Beijing was the highest, significantly surpassing other cities, followed by Tianjin and Hangzhou, both of which had the similar number of private cars with GRP in Hangzhou being higher than that in Tianjin. The variations of private car ownership per capital in Shenyang and Dalian were similar although Dalian presented a slightly higher level regardless of the number of private cars per 1000 people owned or GRP. Shanghai, however, maintained a sustainable development toward private cars, particularly in the condition of remaining the high level of economic growth, which is indicated by GRP. This reveals that policy, such as auto plate auction, toward

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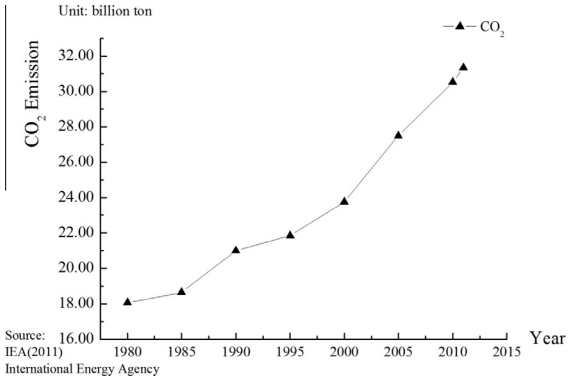

Fig. 1. The dynamics of CO_2 emission throughout the world.

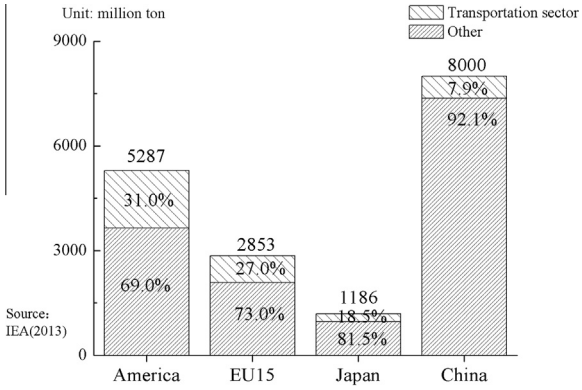

Fig. 2. The ratio of transportation sector accounting for CO_2 emission.

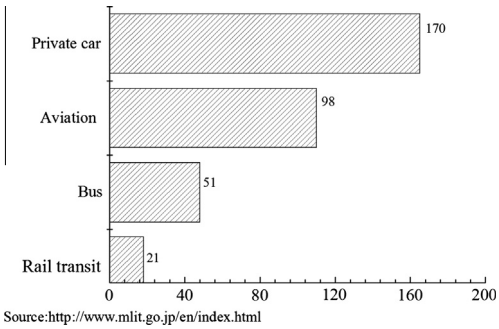

Fig. 3. g-CO_2/Passenger-Kilometer (2011).

private car ownership in Shanghai is effective while their social equity is questionable. The private car ownership per capital in Chongqing was the lowest even though its economy advanced greatly during this period.

In order to explore the inequality of private car ownership, coefficient of theil and coefficient of variation (CV) are employed as indexes (see Fig. 6). According to Fig. 6, the general difference of private car ownership in Chinese cities experienced a downward trend during the period of 11 years, especially after 2006 referring from coefficient of theil. However, the inequality condition must differ in EAST and MW (Middle and West) parts of China, respectively. Fig. 7 depicts the difference in private car ownership within groups of EAST and MW. For group EAST, it declined in general although the decreasing rate remained small from 2007 to 2010. But it witnessed a steep drop in 2011. By contrast, CV of MW fluctuated at first and then maintained a relatively stable level from 2003 to 2005 with the value of approximately 0.72. After reaching the peak of 0.87 in 2006, it decreased with a steady ratio. Overall, the difference of EAST was bigger than that of MW.