

INTRODUCING NEW CARS: A STRUCTURAL MODEL OF THE DYNAMIC GAME AMONG CAR COMPANIES

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Overview

China is experiencing rapid economic growth and, along with it, rapid growth in vehicle ownership. Evidence from Chinese cities suggests average annual growth rates in per capita vehicle ownership of 10% to 25%. According to data from the China Statistical Yearbook, vehicle ownership increased by nearly 56 times between 1990 and 2011. The rapid growth in vehicle ownership and vehicle usage is linked to increasing global warming, emissions, air pollution, and other problems.

The Chinese automobile industry underwent several phases of growth since the start of China's economic reform in 1978. At that time, Chinese automobile manufacturing had low productivity. In the year 1980, total vehicle output was around five thousand vehicles only. As incomes grew, household demand for passenger vehicles grew rapidly, which resulted in a large amount of cars being imported to China. The Chinese government established several policies to encourage foreign car companies to form joint ventures with Chinese domestic car manufacturers.

Starting as an industry with low output and technology deficiency, however, in 2009 China's automobile market became the largest in the world, surpassing the U.S. automobile market both in sales and production. The annual gross product of the China's automobile industry has exceeded 5% of the country's annual GDP every year since 2002, and was as high as 7.4% of its GDP in 2010. According to China's National Bureau of Statistics, from 2004 to 2014, the total number of civilian passenger vehicles owned in China increased from 17.35 million to 123.27 million, with an annual growth rate of 21.69%. The total number of civilian vehicles owned in China, including civilian trucks, was 145.98 million in 2014.

Methods

In this paper, we analyze model and analyze the dynamic and strategic decisions of Chinese automobile companies of which cars to produce and which new cars to introduce, and the effects of economic factors, strategic interactions, and government policy on these decisions. In particular, we develop and estimate a structural econometric model of the dynamic game among Chinese automobile companies making decision about which cars to produce, which new cars to introduce, what the characteristics of any new cars should be, and whether the new cars should be alternative vehicles.

Results

Inspired by Ryan (2012)'s work, this work would incorporate some unique feature of the Chinese automobile industry. Our model will enable us to examine firms' strategic interactions through their decisions of introducing new models, production and investment decisions, with a special focus on how the sunk R&D cost would affect firms' decision on introducing new models. The policy experiment by simulation would also be performed to see whether the energy-saving subsidy will affect firms' introducing decision, thus affecting consumers' welfare.

Conclusions

Our research is significant for industry, government, society, academia, and NGOs. Our estimates of the factors that affect the introduction of new cars in the Chinese automobile market is significant for policy-makers interested in developing incentive policies to increase market penetration of alternative vehicles with potential environmental and climate benefits.

References

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