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DETERMINANTS OF VEHICLE CHOICE IN METRO MANILA:  
CONSUMER PREFERENCE FOR LOW EMISSION VEHICLES (LEVs)

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ABSTRACT

The consistent increase in the number of motor vehicles in the last two decades has significantly contributed to the deterioration of air quality in the Philippines. In an urban area like Metro Manila, low emission vehicles (LEVs) present an option to reduce vehicular emission while maintaining the necessary mobility of the people. While the availability of LEVs to consumers is a basic prerequisite, determining the number of potential adopters is crucial as reduction in vehicular emission in urban areas depends on the proportion of new car buyers who opt for less polluting vehicle (Ewing and Sarigollu 1998).

The main objective of this study is to model vehicle choice among owners of personal vehicles (i.e. privately-used) in Metro Manila using discrete choice experiment. By modelling vehicle choice, this study determined if there is preference for LEVs. This study also identified ways to promote LEVs among vehicle owners, assessed the impact of selected LEVs on CO<sub>2</sub> emission, and compared its benefits and costs to gasoline and diesel vehicles.

Conditional logit models were estimated from the choice experiment data. Using the choice model, simulations were undertaken to determine the impacts of various policy scenarios on choice probabilities or market share of each vehicle type. The different vehicles included were gasoline and diesel vehicles (conventional vehicles), LPG Dual-fuel (LPG), hybrid electric (HEV), battery electric (BEV), and plug-in hybrid vehicles (PHEV). A total of 300 vehicle owners in Metro Manila were interviewed for this study using a semi-structured questionnaire that included the choice experiment.

The choice model indicates that diesel vehicles are most preferred by the respondents followed by HEV, gasoline vehicles, BEV and LPG vehicles. Initial market simulation shows that increasing the price of gasoline and diesel vehicles would decrease the share of diesel vehicles only. A combination of incentives, lower emission levels, and decrease in cost of travel increased the share of HEV to 30% and BEV to 33%, both higher than the share of conventional vehicles. The reduction in emission level of HEV and BEV had the biggest impact on choice probabilities. However, considering that these vehicles cost twice as much as conventional vehicles, only 13% are considered potential adopters of HEV and

BEV. Factoring in this price constraint, a second simulation done separately for potential adopters and non-adopters showed a lower share of 3% for HEV and 4% for BEV. A third simulation that considered the available model variants for all vehicle types and the price constraint further reduced the share of HEV to 0.9% and BEV to 1.0%.

Assuming all the respondents use PHEV, analysis showed that their vehicular CO<sub>2</sub> emission would decrease by at least 80%. Further analysis on more realistic scenarios for the whole personal vehicle sector showed that a vehicle share of 20% PHEV plus 10% BEV will result in 8% reduction in CO<sub>2</sub> emission and a share of 30% PHEV plus 20% BEV in 28% reduction in CO<sub>2</sub> emission.

A simple cost analysis for a 10-year period revealed that PHEV and BEV are 47% and 79% more expensive to operate, respectively, compared to conventional vehicles. The 40% fuel savings from BEV and PHEV is not enough to compensate for its high purchase price. Even the potential value of carbon credit from these vehicles is very small (less than Php1,000 per vehicle) to have a significant effect on vehicle price.

Despite the benefits from reduced emission and fuel savings, LEVs particularly HEV/PHEV and BEV remain expensive to most of the Filipino vehicle owners. Its price alone limits the number of potential adopters thereby affecting projected market share. This means that significant price reduction is an important first step in promoting LEVs. This can be done through alternative financing schemes, additional incentives and government support, and removal of customs duties for clean vehicles such as HEV and BEV.

Keywords: Low emission vehicles, vehicle choice, Metro Manila, air pollution