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SUMMARY OF DOCTORAL THESIS

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Title: Econometric Analysis of Cigarette Demand in Japan

日本のたばこ需要に関する計量経済分析

Cigarette consumption is an issue of serious concern and, though preventable, it is believed to be one of the leading causes of death worldwide. The tobacco industry continues to be the focus of attention for many economists, public health advocates, and policy makers. Over the past few decades, numerous economic studies on the determinants of cigarette demand have been conducted in various countries, including Japan, and one general consensus which has emerged is that smoking has a serious impact on health, not only to the person consuming it, but also to others through second hand smoking. Due to smoking's hazardous effect and health burden to society, many governments have and continue to adopt policies to reduce its overall incidence and potential burden to society as a whole. The major intervention policies adopted by governments include high cigarette taxes, banning smoking in public places, advertisement restrictions, imposing health warning labels on cigarette packaging, promotion of anti-smoking campaigns, and public health awareness. The effectiveness of such policies however tends to vary by country or region and remains a subject of debate.

Worldwide, Japan is one of the countries with a very high smoking prevalence, with an estimated 40% of male and 13% of female adults smoking. In a bid to reduce its consumption, several policies have been adopted by the Japanese government, such as increasing the tax on cigarettes (one in July of 2003, another in July of 2006 and a more recent and large one in October of 2010), ban on product advertising, setting up of smoking areas in public places, promotion of general public awareness programs on the effect of smoking, and the recent "Taspo" age verification initiative with the aim of reducing underage smoking. The effectiveness of these policies is yet to be determined. This research therefore seeks to contribute to this subject by analyzing and explaining how, to what extent and by which factors the tobacco demand responsiveness is influenced in Japan from a national, regional and city level's point of view. Specifically, this thesis determines the true responsiveness of cigarette demand to expenditure changes for Japan through the analysis of expenditure elasticity estimates; evaluates the effects of tax reforms and spill-over effects of TASPO on cigarette consumption; assess the effects of socio-demographic factors on tobacco consumption; and determines the geography of smoking in Japan. The subject matter of this thesis has been of interest to the author mainly because of the growing health concerns associated with smoking. While this study acknowledges the health aspect of smoking, its analysis is limited to policy evaluation for planning purposes.

Demand analysis plays an important role in understanding and predicting behavior in relation to price and income changes, as well as other factors. The standard properties of a demand equation for a particular item may be expressed as a function of income and commodity prices. However, after experimenting with various demand models, this research

established that the standard demand models do not provide an accurate picture of observed behavior for cigarettes consumption in Japan, given that the price of cigarettes is fixed throughout and does not fluctuate as is the case in other countries. Taking into account the dynamic long-term and short-term properties, an Engel curve error correction model, which is a quadratic extension of Working's (1943) model, was adopted. Engel curves are important in expressing how the demand of a commodity changes as one's income vary, assuming fixed prices. An error correction form was chosen because its structures allows for an evaluation of the short-term disequilibrium, adjustment processes, as well as the long-term equilibrium, therefore giving a more informative analysis of cigarette demand.

The data used in this research was obtained from the Family Income and Expenditure Survey of Japan, carried out by the Ministry of Internal Affairs and Communication. While the use of micro data is desirable, such data is not available in the Family and Income Expenditure Survey of Japan, hence the use of aggregate micro data in this thesis, which creates a limitation to the study. Taking into account the changes in relative prices, all expenditure data were deflated using the general consumer price index and adjusted for seasonal variations.

The estimation results for the expenditure elasticities were highly inelastic, both in the short- and long-term; an indication that cigarette demand is slightly responsive to expenditure changes. This study therefore concludes that changes in income will not significantly alter demand behavior downwards in the long-term. This result was anticipated given the addictive nature of cigarettes. Though this is the conclusion, the estimation results showed that cigarettes faces negative trend effects, therefore other factors, not changes in expenditure, influence cigarette cessation in Japan.

Another conclusion from this study is that the two tax increases were slightly effective in reducing consumption in the long-term. From a city level's point of view, the response to each of the two tax reforms varied, with some cities not recording any significant reduction in consumption. Based on the data available, it is not clear why the tax response differed significantly at a city level's point of view, and the author leaves this to future studies. Furthermore, this research concludes that single households are less responsive to price changes, as both tax hikes were not effective in reducing cigarette consumption among single household group; though the same policy was effective for two-or-more-people households.

The research also concluded that the TASPO age verification initiative had a positive spillover effect on a significant number of cities. In addition, the estimation results showed a complex variation of cigarette consumption among the major cities with no clear neighboring or regional similarities. Thus, the research concludes that the consumption of cigarette in Japan is not influenced by geographical distance and policies targeting cigarette consumption need not be regional specific. The research also concluded that demographic variables play a significant role in cigarette consumption, and it is therefore important to factor in these variables in any future policies to ensure maximum effectiveness of cigarette reduction policies.

This research concludes that the question of how to reduce cigarette consumption in Japan is not simply one dimensional, given that what works for some regions or cities within Japan might not work for others. Any policy targeting cigarette reduction in Japan should take into account various factors from a micro-level point of view. Also, to ensure meaningful reduction in cigarette consumption, higher cigarette taxes may need to be considered.