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SUMMARY OF DOCTORAL THESIS

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Title: An Empirical Analysis of Japanese Food Demand with Special Reference to Beef

(日本の食料需要に関する実証分析—特に牛肉について—)

In this research, the multifaceted importance of food in Japan has been discussed. The importance of food in Japan is not only as a meal to be eaten, but also one of the important tools of socialization. Japanese invest a substantial amount of money on gift-giving. Food is considered the traditional type of gift in Japan. Japanese buy luxury food seasonally as gifts for family, friends, or colleagues. O-chūgen and o-seibo are particularly popular gift-giving events in Japan.

Japanese food consumption pattern has been undergoing dramatic changes over the last several years. There have been increasing consumption of meats, such as beef and dairy products, while there have been decreasing consumption of rice, fish, fresh fruits, as well as fresh and processed vegetables in Japan. Meat consumption, beef in particular, does not have a long history in Japan due to a dietary ban on the eating of flesh from four-legged animals before the Meiji Restoration. However, there has been gradual changes for years and eventually meat products have become important food items in the Japanese diets. The followings could be some of the contributing factors; the opening of Japan's borders was seen as an opportunity to integrate Western customs into Japanese culture and removal of the longstanding social taboo against the eating of meat became a symbol of this integration. For long time, Japan had protected its domestic beef market from imported beef through various protectionism policies. Now, beef import has rapidly increased due to greater Japanese demand for beef, limitations on increasing domestic beef production, and pressure from beef exporting countries.

The dramatic price changes in beef have also influenced the prices and consumption levels of all meats and meat substitutes. There are also other demand shifting variables, such as taste, religion, socio-economics, demographics, region, season, household dynamics and media information, time trend, food scare outbreaks, tariff reductions, days of the week, public holidays, Golden Week, Bon, o-chūgen and o-seibo that impacts the demand for beef. Beef demand analysis in Japan has captured attention of many economists. It is in part due to Japan being the nation that has likely experienced the most dramatic shifts in the dietary preference.

Deaton (1985) suggests that the use of pseudo panel data is an alternative econometric method for estimating demand models of individual household behavior. Therefore, since micro data is not available in the family income expenditure survey (FIES) of Japan, the aggregate micro data has been used in this study. All the price and expenditure data are deflated using consumer price index (CPI). Daily and monthly aggregated pseudo panel data for two or more person households were used. The FIES and CPI data are published by the Statistics Bureau, Ministry of Internal Affairs and Communications of Japan. There are also other data sources, the quantity and wholesale prices of both imported and domestic beef items are published by the agriculture and livestock industries corporation (ALIC), and the data for the quantity of exported Japanese beef is published by the Trade Statistics of Japan. In this data, there are various non-economic factors, such as regions, seasons, time trend, months, days of the week, public holidays (observances), Golden Week, Bon, and end and beginning of the year, BSE and FMD as well as JAEPA and *JUSFTA* are aimed to be estimated for their impacts on the demand for beef in particular and food in general.

The estimation techniques that have been chosen for the studies in this thesis are

the linear approximate quadratic almost ideal demand system (LA/QUAIDS) and quadratic extension of Working's models. The AIDS a versatile system capable of studying various aspects of food demand. However, the AIDS model has difficulty of capturing the effects of non-linear Engel curve because it has budget share equations that are linear in the logarithm of expenditure. The quadratic form of the AIDS model (QUAIDS), which was first developed by Banks et al. (1997), is not only more versatile in modelling consumer expenditure, but also it restores the relevant properties of AIDS. The linear version (LA/QUAIDS), which was developed by Matsuda (2006), embraces the characteristics of closed under unit scaling (CUUS) even with demand shifters.

Working (1943) finds the tendency for the proportion of expenditure devoted to food decreases in an arithmetic progression as total expenditure increases in a geometric progression. This relationship applies for families of every size, occupation, and community. At an individual level, as total expenditure per person increases, the proportion of an expenditure devoted to food decreases. Leser (1963) investigates various forms of Engel functions that are satisfying the additivity criterion. He suggests that a form of relationship used by Working (1943) has great advantageous. However, the Working-Lesser Engel curve has difficulty in capturing non-linear effects of expenditure because it has a budget share equation that are linear in the logarithm of expenditure. The appropriate form that can support generalization in the shape of Engel curve relationship is shown by a quadratic extension of Working's model.

LA/QUAIDS is used to estimate the demand for twelve food categories for gift-use and home-use, respectively in Japan. The expenditure elasticities show that nine of the twelve gift food categories are expenditure elastic, while only seafood, fruits, beverages, alcohol and eating out are expenditure elastic for home-use food categories. This suggests that gift food is relatively more luxurious than food that is routinely consumed in a household. Demographic variables have significant effects more on the home-use food categories than gift food categories. There are also regional effects on the quantity demanded for gift food categories as Japan has various regional cuisines and food specialties. For instance, demand for meat gift is high in Kobe supposedly as a result of famous brand called Kobe beef. In the study of regional effects on the demand for meat, the effects of regions on beef is opposite to pork. Pork is popular in major cities in eastern Japan, while beef is popular in western Japan. Chicken is similar to beef except for Yokohama.

The quadratic extension of Working's model is used to estimate the impacts of the BSE and FMD outbreaks on the demand for meat. Also, the impacts of the months, days of the week, public holidays, Golden Week, and Bon as well as the end and beginning of the year are evaluated. The latter factors have significant effects on the demand for most of the meat items. The result shows that there is a gradual shift in the structure of consumer demand following the BSE and FMD outbreaks. That is, BSE reduces demand for beef and raises demand for pork and chicken. FMD reduces demand for beef, pork and chicken. The broad-spectrum effects of FMD include the reduction in the demand for chicken. FMD is not chicken's disease. However, as a result of fear of the disease, consumers might have refrained from consuming even chicken. The impact of BSE on the demand for beef is more severe than that of FMD. It also takes longer time to recover than the impact of FMD.

The LA/QUAIDS model is used to estimate Japan-Australia EPA and Japan-US FTA effects. The estimated expenditure elasticities show that US beef and Australian beef are expenditure elastic, while Wagyu beef, crossbred beef and dairy beef are expenditure inelastic. It suggests that the response of demand for imported beef is larger than that for domestically produced beef. The JAEPA and *JUSFTA* trade deals have significant impacts on the quantities demanded for all the beef items. Among the domestically produced beef items, dairy beef is the most impacted both by Australian and US agreements, whereas the Wagyu beef is the least impacted by the agreements.