氏　名（本籍）	ペドロ　オリヴァレス・ティラド（チ　　リ）
学位の種類	博　　士（学　　術）
学位記番号	博　甲　第　6258　号
学位授与年月日	平成 24 年 3 月 23 日
学位授与の要件	学位規則第 4 条第 1 項該当
審査研究科	人間総合科学研究科
学位論文題目	**Predictors of Long-term Care Expenditures in Japan** （日本における介護保険費用の予測因子）

主	査	筑波大学教授	博士（医学）	本田　靖
副	査	筑波大学教授	博士（医学）	大久保一郎
副	査	筑波大学教授	医学博士	田宮菜奈子
副	査	国立社会保障・人口問題研究所第二室長	博士（経済学）	野口晴子

論文の内容の要旨

Objectives:

The main purpose of the researches contained in this thesis, was to improve the understanding of the predictive factors associated with long-term care expenditures among the elderly in Japan, aiming to contribute with empirical evidence useful to track current programs and/or develop futures strategies to ensure the financial sustainability of the system. The specific objectives, were: 1) to quantify the effect of disability status on individual's LTC expenditures, 2) to analyze the association between consumption pattern of LTC services and LTC expenditures, and 3) to analyze the association between a specific insurance factor(URB) and LTC expenditures.

Material/methods:

The study was setting in City A. City A is located in a suburban area approximately 100 km West of Tokyo. The estimated population as of October 1, 2006 was 52,343 and the proportion of persons aged 65 or over was 20.8%. This proportion is the same as the average in Japan. The study cohort was formed by all the elderly person whom stayed 12 months consecutively in LTCI and excluding those have an utilization rate of benefits (URB) <= 5% at baseline or at the end study period. The study period extended from July, 2006 to June, 2007.

An administrative data based on reimbursement claims from LTC provider's monthly collected by the Public LTC Insurer of City A was used. Consent for use the data was approved by the municipal government of City A after a formal application and explicit pledge to remove any individual identifiers to protect the privacy of the personal data supplied. Ethical considerations were examined in accordance with Japanese epidemiological guidelines for secondary data analysis. Ethics approval was obtained from the University of Tsukuba Ethical Committee, Japan.

Two complementary researches were conducted to examine predictors of the LTC Expenditures in Japan. The first research was concerned to the predictive factors of the highest LTC expenditures, and the second research was focused on the lowest LTC Expenditures. In both models, the individual total expenditures during the study period, was the outcome variable and it was calculated as the sum of the total monthly expenditures claimed by providers during the

study period. Then, the data on the individual total expenditures was sorted by values, ordered from smallest to largest. Using a quartile function, the top 25% and the bottom 25% groups were identified, to create two operational samples; a highest and lowest LTC Expenditures samples, respectively. The cut-off (Q3) to choose the interest group for the highest LTC expenditures model was ¥ 3,029,500 then, participants over this amount has been considered as the highest LTC expenditures subgroup, otherwise, were considered as the reference group. On the other hand, subjects under a cut-off (Q1) of ¥ 727,850 were considered to belong to the interest group for the lowest LTC expenditures model, otherwise, were considered as the reference group.

Results:

Highest LTC Expenditures model: The average expenditures was ¥ 3.4 million by participants (range: ¥ 3 mill - ¥ 5 mill) in the interest group. Other characteristics of this group were: a mean age of 85 years (SD: 7.8), 77% females, 76% in middle income level, 23% showed an increased URB, 50% showed a decline the functional status at the end of the study period, 76% belonged to high care need level and 81% of them used LTC facilities.

In a univariate analysis, the differences between the interest and reference groups for the outcome variable were significant for age, change in URB, and change in functional status, care need levels and facility services use. Gender and income level were not significant, however, forced to remain in the model for adjustment purpose.

A moderate expected association between some categories among age and income variables was observed. The Variance Inflation Factor (VIF) for each variable was also examined. Values of VIF ranged from 1.06 to 2.36, indicating the non-existence of multicollinearity in the model. A logistic regression diagnostic was carried out and one case was identified as outlier, then excluded from the final analysis. On the other hand, a second-order interaction between facility services utilization and the highest care needs level category was significant and included in the final model.

The logit result showed that the estimates coefficients of URB, facility services use, care needs level categories and for the interaction term between high care needs level and facility services, were strongly significant ($p < 0.0001$). The estimates coefficients for age categories and a decline in functional status, were also significant but at higher p-value.

Lowest LTC Expenditures model:

The main characteristics of the interest group in this model were: average expenditures of ¥ 469,000 by participants (range: ¥ 147,000 - ¥ 728,000), a mean age of 82 years (SD: 7.2), 72% females, 68% in middle income level, 39% showed a decreased URB,56% unchanged functional status at the end of the study period, 64% belonged to the lowest care needs level categories, 75% used "one service" and 63% of them used commuting services.

The logit results indicated that after controlling for gender and income levels, care needs levels, changes in the functional status and types of services covariates significantly ($p < 0.05$) affected the probability to belong to lowest expenditures group. The goodness –of-fit statistics permits to conclude that this model was significant and adequate to explain the lowest LTC expenditures in City A.

Controlling for other variables in the model and in terms of association, the odds of being in the lowest LTC expenditures group are 179 times greater for subjects in Support Levels and close to 10 times greater for subjects in Care Level 1 as they are for the highest care needs level. On the other hand, the use of in-home services was a moderate predictor (OR=9.2) of lowest LTC expenditures and the use of commuting services was 3.9 times higher than those users of a mix of in-home and commuting services. Furthermore, the odds to belong to lowest expenditures group was around 4 times greater as subjects exhibited an unchanged or a decline in their functional status in comparison with those with improve in the functional status at the end of the study period.

In terms of the difference in predicted probabilities to belong to the lowest expenditures group shows that; users of in-home services, those that unchanged functional status, those whom decline in the functional status, those certified in

support categories (SL1&SL2) and users of commuting services", have 35%, 30%, 29%, 25% and 17% respectively, higher probabilities than their respective reference groups.

Conclusion:

Since Japan is so far one of few countries that have introduced a public LTCI system, the experience from Japan, may be informative for other countries which scrutinize the possibility of this kind of social insurance or are striving to develop coherent, politically acceptable long-term care policies face to the challenge of an ageing population.

Beyond confirming that the disability status of elderly persons more than age per se, is the main factor driving the LTC expenditures, it was demonstrated that the combined effect of the two factors; institutional care conditioned by higher care needs level, more than the severity of the disability per se, was the main driver of the higher LTC expenditures in City A. On the other hand, factors associated with the consumption pattern of LTC services in lowest care need categories, were significant predictors of the lowest LTC expenditures in City A. Undoubtedly, from an insurer perspective, these findings offer a new perspective in dealing with the challenge of retaining the sustainability of the LTCI system in Japan.

Concerning the sustainability of the Japanese LTCI system, Fukawa (2007) suggested that the only positive way to contain the expansion of LTCI expenditures is to prevent the elderly from becoming dependent. Beyond subscribe to Fukawa, I suggest that further researches are urgently needed in the field of LTCI system in Japan. Thus, a critical evaluation of efficiency of the provision system, quality of care and cost-effectiveness of the LTC services becomes major and urgent challenges for researchers concerned with LTCI system in Japan. It is difficult to gain sufficient efficiency in the LTCI system without a clear knowledge about the effectiveness of the services delivered. On the other hand, it is difficult to imagine that the sustainability of LTCI system could be reached without an efficient allocation of available resources in Japan.

審 査 の 結 果 の 要 旨

学位論文として十分ではあるが、quantile regression などを用いれば更に興味深い解析ができるのではないかとの助言などが得られた。重大な批評はなかった。

平成 24 年 1 月 10 日、学位論文審査委員会において、審査委員全員出席のもと論文について説明を求め、関連事項について質疑応答を行い、最終試験を行った。その結果、審査委員全員が合格と判定した。よって、著者は博士（学術）の学位を受けるに十分な資格を有するものと認める。