【Grant-in-Aid for Scientific Research (S)】

Broad Section A

Title of Project： **Primary and Secondary Education under Declining Population: An Empirical Analysis with Administrative Data**

TANAKA Ryuichi
(The University of Tokyo, Institute of Social Science, Professor)

Research Project Number: 20H05629 Researcher Number：00397704
Keyword：Economics of Education, Fertility Decline, Administrative Data of Education

【Purpose and Background of the Research】

In economics, elementary and secondary education is considered an investment in human capital, and the effectiveness of education has been the focus of many research studies. These studies were conducted mainly during the period of worldwide population growth after World War II. However, few studies exist on education policy in Japan or other developed countries that are currently facing a population decline.

In this study, we examine the effects of educational systems and policies on human capital formation, focusing on elementary and secondary education and applying a policy evaluation method based on statistical causal inference. We try to answer the question, "what kind of system is desirable for elementary and secondary education in a declining population from the perspective of welfare and human capital formation of students?"

【Research Methods】

In this research project, we ask the following six questions: (1) How will the consolidation of elementary and junior high schools affect the welfare of children and students? (2) How will strengthening accountability and autonomy for educational activities in elementary and junior high schools affect children's academic ability and problematic behavior? (3) How does academic rank affect the subsequent formation of academic ability and problem behavior of children? (4) In what grade is educational policy intervention the most effective? (5) How do high school students form their career decisions? (6) How does the increase in the number of years of compulsory education affect the long-term outcomes of students? FIG. 1 illustrates the relationships among these six research themes.

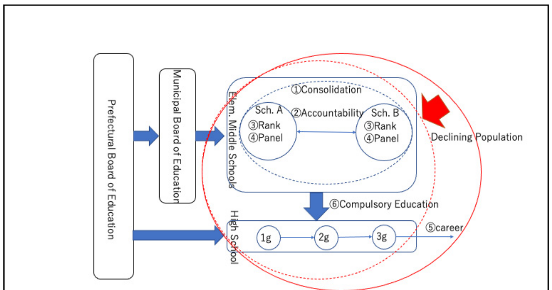

Figure 1: Education Policy and Growth of Children under Population Decline

The research method common to all research themes is to evaluate the policy effect through secondary use of administrative data by applying statistical methods based on causal inference to the data. However, the specific research method differs depending on the theme. In (1) the effect of school consolidation, and (5) dynamic analysis of career decisions for high school students, structural estimation of theoretical models and analysis by counterfactual experiments are performed. In (2) analysis of accountability and autonomy of schools, (3) the impact of the rank of academic ability, and (6) analysis of the increase in compulsory education years, a regression discontinuity design is used. Finally, in (4) the analysis of the difference in the effect of education policy for each grade, we use the administrative panel data of education from local governments.

【Expected Research Achievements and Scientific Significance】

By promoting each research theme, it is expected that the results will be published in international peer-reviewed academic journals. Further, using data from Japan, where the birthrate is declining and the population is rapidly aging, will attract broad academic and international interest. Furthermore, as shown in FIG. 1, each research theme is closely related. Therefore, comprehensively promoting the research themes while considering their mutual relationships has the significance of gaining knowledge about the desirable elementary and secondary education system in Japan under population decline.

【Publications Relevant to the Project】

・ Fukuda, Shin-ichi and Ryuichi Tanaka ed. *Economics of Education in Japan,* special issue in *Japan and the World Economy* (2019).
・ Weese, Eric “Political mergers as coalition formation: An analysis of the Heisei municipal amalgamations.” *Quantitative Economics*, 6(2), 257-307 (2015)

【Term of Project】 FY2020-2024

【Budget Allocation】 103,000 Thousand Yen

【Homepage Address and Other Contact Information】

https://sites.google.com/site/ryuichitanaka/home

【Grant-in-Aid for Scientific Research (S)】

Broad Section A

Title of Project： Interdisciplinary Empirical Research Project on Disfluent Utterance Patterns

SADANOBU Toshiyuki
(Kyoto University, Graduate School of Letters, Professor)

Research Project Number: 20H05630 Researcher Number：50235305
Keyword：disfluency, linguistics, conversational analysis, Japanese language education, language disorder

【Purpose and Background of the Research】

Defining fluency as smoothness and freedom from errors like the speech of a newsreader reading the headlines, traditional linguistics has assumed that native speakers speak fluently. That is, it has seen disfluent utterances by native speakers as exceptional cases. Against this background, I have considered disfluency of utterances, centered on Japanese, since the early 1990s. In the course of this research, I came to realize keenly that in real-world communication disfluent utterances by native speakers sometimes are easy to overlook and tolerate, instead of being treated as disfluent. For example, a hesitating *anoo* when turning down an invitation will, in fact, be received favorably. But how, and on what points, does the disfluency of native speakers differ from the essence of disfluency? This study will consider the question "What is the essence of disfluency?" through comparison of the disfluency of native speakers with two other types of disfluency considered more disfluent (the disfluency of language learners and the disfluency of people with linguistic disabilities), focusing chiefly on contemporary Japanese.

【Research Methods】

The above awareness of the issues concerns the four research areas of linguistics, conversation analysis, second-language education, and research on linguistic disabilities. The method employed in each of these fields is introduced below.

Method 1 (linguistics): We will observe the regularity of disfluent utterances by native Japanese speakers linguistically, to identify, extract, and describe any regularity therein. This observation will be conducted from both qualitative and quantitative perspectives.

Method 2 (conversation analysis): We will elucidate, through methods of conversation analysis, when and how patterns of disfluent utterances by native speakers are acceptable in communication.

Method 3 (second-language education): We will identify the distinguishing features of the disfluency of Japanese-language learners in comparison with the disfluency of native speakers and identify the main reasons why the disfluency of language learners is more likely to be considered problematic.

Method 4 (research on linguistic disabilities): Through physiological observation of disfluency in utterances of native Japanese speakers and language learners and comparison with that of people with linguistic disabilities (e.g., stuttering, aphasia, motor speech disorders, and unclear enunciation due to hearing impairments), we will elucidate the distinguishing features of each type of disfluency.

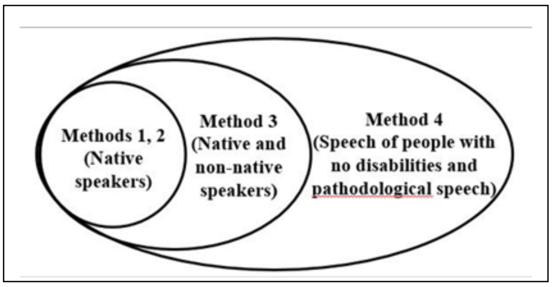

Figure 1 Four methods

To verify and refine the results of observation, we plan to develop a voice-synthesis system which speaks disfluently like native speakers. We also plan to release an online digital archive of typical disfluent utterances.

【Expected Research Achievements and Scientific Significance】

Since disfluency of utterances is a ubiquitous phenomenon in real-world communication, elucidation of its essence could lead to considerable progress in communication research. This study will attempt to elucidate the essence of disfluency of utterances and build a foundation for new research on communication, through researchers from four fields working together under a single shared awareness of the issue.

【Publications Relevant to the Project】

· Sadanobu, Toshiyuki. Komyunikeshon e no Gengoteki Sekkin (A Linguistic Approach to Communication), Tokyo: Hituzi Shobo, 2016.
· Sadanobu, Toshiyuki. Bunsetsu no Bunpou (A Grammar of Bunsetsu), Tokyo: Taishukan, 2019.

【Term of Project】 FY2020- 2024

【Budget Allocation】 112,500 Thousand Yen

【Homepage Address and Other Contact Information】

http://www.speech-data.jp/kaken_hiryu/index_en.html

【Grant-in-Aid for Scientific Research (S)】
Broad Section A

Title of Project : Economic stagnation and widening wealth inequality: Crises of the world economy and a construction of a unified macroeconomic theory

ONO Yoshiyasu
(Osaka University, Institute of Social and Economic Research, Specially Appointed Professor)

Research Project Number: 20H05631 Researcher Number : 70130763
Keyword : wealth preference, secular economic stagnation, widening wealth inequality

【Purpose and Background of the Research】

Since the financial crisis of 2008, many developed countries have been plagued by secular economic stagnation, asset price bubbles, and widening wealth inequality. Conventional theories take various market distortions, arising from factors such as sluggish price-wage adjustments, market concentration and credit market imperfections, as their root cause. It is unlikely, however, that all these distortions emerged suddenly in 2008. In fact, following the conventional wisdom, many countries took measures to improve productive efficiency or expanded money supply so as to minimize distortions, but only to see little success to date: consumption and income continue to be sluggish, with inflated asset prices and widening economic disparities.

In this project, we aim to build a unified framework to analyze these issues by focusing on people's desire for wealth holding, rather than economic distortions. We also investigate characteristics of wealth preferences through questionnaire surveys and experiments, and work on micro-foundations of potential policy measures.

【Research Methods】

This project consists of three subprojects.

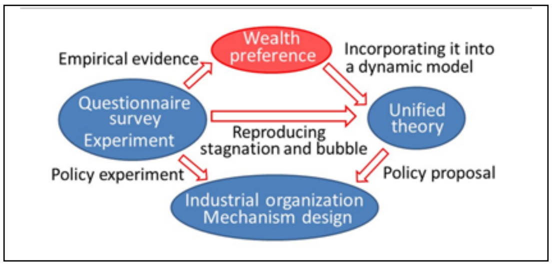

Figure 1 Project structure

Subproject (1) constructs a macroeconomic theory to account for transition to a low-growth stage, long-term economic stagnation and asset price bubbles, and widening wealth inequality in a cohesive framework. To this end, focus is placed on the relative strength of people's desire for wealth holding with respect to that of consumption. The effects of macroeconomic policies are scrutinized within this framework.

Subproject (2) examines quantitative characteristics of wealth preferences through large-scale questionnaire surveys and economic experiments. In the surveys, hypothetical questions are asked to identify how one's income and wealth impact consumption.

Subproject (3) explores micro-foundations of institutions, rules and regulations that can spur product innovation, so as to stimulate aggregate demand and better utilize idle resources.

【Expected Research Achievements and Scientific Significance】

Economic stagnation, malfunctioning of financial markets, and widening wealth inequality have so far been analyzed separately, under the presumption that they are rooted in various economic distortions and imperfections. This research project takes a novel stance in that it relies on a single factor—relative preferences for wealth and consumption—to account for these issues in a unified manner. We expect that our theoretical framework will shed new light on the underlying mechanisms of long-term stagnation and enable us to provide new policy insights to cope with pathological social problems often faced by advanced economies.

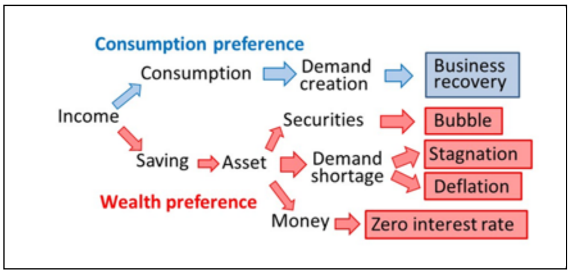

Figure 2 Consumption and wealth preferences

【Publications Relevant to the Project】

· Illing, G., Y. Ono and M. Schlegl, "Credit Booms, Debt Overhang and Secular Stagnation", *European Economic Review*, 108, 78-104, 2018.
· Ono, Y., *Money, Interest, and Stagnation- Dynamic Theory and Keynes's Economics* -, Oxford University Press, 1994.

【Term of Project】 FY2020- 2024

【Budget Allocation】 135,600 Thousand Yen

【Homepage Address and Other Contact Information】

https://www.iser.osaka-u.ac.jp/S-Theory2020/
ono@iser.osaka-u.ac.jp

Title of Project： **Application of Behavioral Economics to Policy Issues: Healthcare, Disaster Prevention, Crime Prevention, Labor, and Education**

OHTAKE Fumio
(Osaka University, Graduate School of Economics, Professor)

Research Project Number: 20H05632 Researcher Number：50176913
Keyword：nudge, healthcare, crime prevention, labor, education

【Purpose and Background of the Research】

This study discusses how to solve the policy issues that occur on the frontline of diverse fields (e.g., disaster prevention, education, healthcare, labor, and crime prevention) by using methods of behavioral economics such as questionnaire surveys, randomized controlled trials (RCTs), and economic experiments. Changing how certain information is presented to people by utilizing behavioral economics (i.e., nudging people) may transform their behaviors into ones that are more desirable for both themselves and the society. However, the effectiveness of nudges depends on the personal and cultural characteristics of the subjects such as region, age, and gender. This study aims to identify effective nudges that may solve various policy issues by clarifying the characteristics of Japanese people from the perspective of behavioral economics. It also unveils the fundamental features of nudges through practical, applied behavioral economics studies.

【Research Methods】

This study aims to clarify the effectiveness of behavioral economics–based interventions in practical applications to healthcare, disaster prevention, crime prevention, labor, and education through questionnaire surveys, RCTs, and

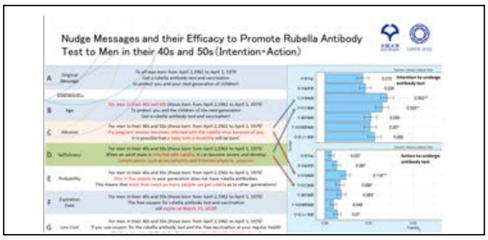

Figure 1 Nudge message for the promotion of a rubella antibody test

economic experiments. To effectively nudge people, both how people make decisions in specific situations and their biases toward different decision-making processes must be understood, and then behavioral economics–based interventions that can correct these biases should be examined subsequently. In this study, we aim to verify the effectiveness of the identified interventions. The academic uniqueness of this study is that it involves personnel working on the frontlines of every target field. Specifically, participants include hospital doctors and nurses for healthcare, personnel from a disaster prevention division of a local government (Hiroshima Prefecture) for disaster prevention, researchers at the National Research Institute of Police Science for crime prevention, personnel from human resources divisions of different private companies for labor, and administrative personnel in charge of education from the cities of Amagasaki and Nara for education. We will discuss real issues that they are facing, conduct surveys to identify the causes of the issues, and then implement feasible interventions to measure their effectiveness. For issues that actually need to be addressed, we will test multiple hypotheses, which should be effective in terms of behavioral economics. To this end, we will use common causal inference methods such as RCTs, matching, and difference in differences (DID).

【Expected Research Achievements and Scientific Significance】

The expected outcomes of this study include developing nudges, which may practically solve real-world policy challenges. We expect to elucidate the following insights on fundamental and practical features of nudges that need to be considered when solving various social challenges: 1) the effectiveness of the nudges in the presence of heterogeneity in individual and cultural characteristics, 2) the degree of heterogeneity in behavioral economic characteristics and the process of heterogeneity formation, and 3) the differences in short-term and long-term effectiveness between different types of nudge.

Figure 2 Use of effective nudge messages

【Publications Relevant to the Project】

・ F. Ohtake and K Hirai. 2018. “*Iryo-genba no koudou keizaigaku*” (behavioral economics in clinical practice). Toyo Keizai Shinposha

【Term of Project】 FY2020- 2024

【Budget Allocation】 151,400 Thousand Yen

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【Grant-in-Aid for Scientific Research (S)】

Broad Section A

Title of Project：Risk Management of Comprehensive Monetary/Fiscal Policy: From Financial Crises to International Relations and Natural Disasters

KAMIHIGASHI Takashi
(Kobe University, Center for Computational Social Science, Director)

Research Project Number: 20H05633　Researcher Number：30324908
Keyword：Monetary/fiscal policy, risk management,

【Purpose and Background of the Research】

In October 2019, the consumption tax rate was increased from 8% to 10% mostly for the purposes of fiscal consolidation and social security reform. Nevertheless, in order to achieve the former purpose, it is essential to curb the expansion of government debt. Since 1964, Japan's government debt has been on an expansionary trend for more than half a century, and is currently at 220% of GDP, a level that stands out among developed countries. This is even higher than the level at the end of World War II.

The Bank of Japan's extensive easing policy is currently underpinning this debt expansion, and monetary and fiscal policies are now inextricably linked. Historically, excessive monetary easing has created bubbles, and the bursting of these bubbles has triggered financial crises and financial collapses.

A possible reason for the repetition of these tragedies is that the risks of bubble bursting and financial collapse are not directly observable, and there is disagreement about the existence of these risks. In addition, the standard approach in current economics (especially the dynamic stochastic general equilibrium approach in standard macroeconomics) assumes that social structure does not change over time (stationarity) and that the structure of the model's solution (equilibrium) also does not change over time (recurrence), so that risks that deviate significantly from the trend in a society with time-varying structure cannot be analyzed.

【Research Methods】

In contrast to the standard dynamic stochastic general equilibrium approach, agent-based models used in computational social science and other fields do not have these limitations, but they have rarely been used in

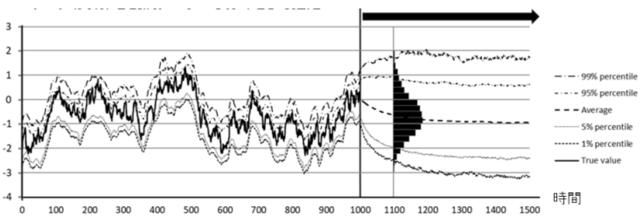

Fig. 1 Risk estimation and forecasting

economics because the behavior of economic agents is generally not based on optimization and expectations about the future. This has improved in recent years, and models have begun to emerge that assume economic agents that learn from past data and act in anticipation of the future, but this type of learning works only when social structure remains unchanged. In this study, we aim to model economic agents that can predict the future at a realistic level, and construct an agent-based model that consists of economic agents that can act in a rational way even in the face of structural changes such as low birthrates and the growing presence of foreign workers, and conduct a realistic policy analysis.

【Expected Research Achievements and Scientific Significance】

The dynamic stochastic general equilibrium approach has been developed mainly in the United States, but it is also the mainstream approach in macroeconomics in Japan. This approach is considered to be at the forefront of not only macroeconomics but also economics as a whole. However, it is not suitable for estimating the risks of deviating from the trend in an economy where social structure changes over time, nor is it suitable for analyzing the problems caused by the structural changes that Japan is currently facing. This study is likely to be appreciated internationally for presenting possible solutions to practical problems that have been largely neglected in macroeconomics.

【Publications Relevant to the Project】

· Masahiko Shibamoto, Wataru Takahashi, and Takashi Kamihigashi, "Japan's Monetary Policy: A Literature Review and Empirical Assessment," RIEB Discussion Paper DP2020-15, 2020.
· Lise Clain-Chamosset-Yvrard and Takashi Kamihigashi, "International Transmission of Bubble Crashes in a Two-Country Overlapping Generations Model," Journal of Mathematical Economics 68, 115-126, 2017.

【Term of Project】FY2020- 2024

【Budget Allocation】146,400 Thousand Yen

【Homepage Address and Other Contact Information】

https://www.rieb.kobe-u.ac.jp/project/risk/index.html

【Grant-in-Aid for Scientific Research (S)】

Broad Section A

Title of Project： Interdisciplinary research on the structure of monumental royal-class mounded tombs

SEIKE Akira
(Okayama University, Graduate School of Humanities and Social Sciences, Professor)

Research Project Number: 20H05634 Researcher Number：40303995
Keyword: Muography, Royal tombs, Kibi region, Kofun period, Interdisciplinary research

【Purpose and Background of the Research】

Through a collaboration between advanced scientific methods and archaeology, this project aims to establish a new, systematic method of survey for monumental royal-class mounded tombs that does not require excavation and to utilize the data on their internal structure to reconsider the nature of the ancient central polity. It aims to develop a new field of "cosmic-ray archaeology" based on a combination of muography and detailed 3D measurements of tomb mounds and their external features, including *haniwa*. An interdisciplinary team will implement these new methods at a tomb undergoing excavation. Additionally, research utilizing both archaeological and ceramic-petrological methods will allow for the presentation of new approaches to *haniwa* studies. Through these diverse and novel methods, we will clarify the structure of the three largest tombs in Okayama and develop a new understanding of these ancient tombs.

【Research Methods】

The muography unit will build a muon receptor suitable for a giant tomb and develop the necessary methodology. Development and experiments will be carried out at the Tobiotsuka tomb in Okayama. After the apparatus has been prepared, surveys will be conducted at the Zōzan, Sakuzan, and Ryōgūzan tombs, each of which measures over 200m in length, rivaling the royal tombs of the central polity. FY2020 will consist primarily of device development, experimentation, and alignment. Zōzan will be surveyed in FY2021 and Sakuzan and Ryōgūzan in FY2022.

The mounded tomb unit will conduct LiDar mapping of the tombs and produce detailed 3D measurements. The maps will be used to compare the three largest tombs in Okayama with the royal tombs of the central polity.

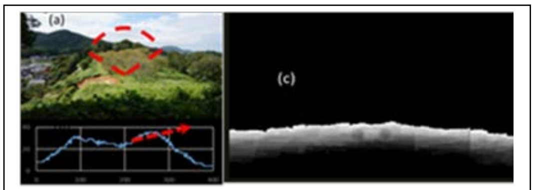

Figure 1 Simulation of a muography survey at Zōzan

The *haniwa* unit will conduct compositional analysis of the clay from the *haniwa* from each tomb, in addition to typological analysis. Through a combination of scientific and traditional archaeological methods, it will present an innovative approach to *haniwa* research.

【Expected Research Achievements and Scientific Significance】

Successful completion of this research is expected to lead to the establishment of survey methods not relying on excavation for monumental royal-class tombs that are otherwise off-limits; this is expected to reveal a significant amount about their internal structure and contents.

Additionally, clarification of the internal structure of the three largest tombs in Okayama will reveal much about similar monumental royal-class tombs, allowing for a new understanding of such tombs. A comparison of their mounds will reveal the nature of the relationship between the central polity and the ancient Okayama region.

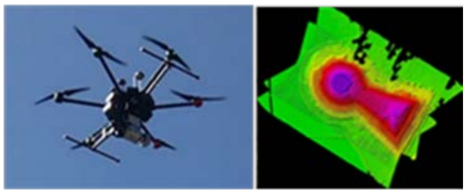

Figure 2 Drone and LiDar map of Zōzan

【Publications Relevant to the Project】

- Seike, A., (2019). Giant mounded tombs in the Kofun period. In S. Fukunaga & N. Ueda (Eds.), *International comparative approach to the relationship between mounded-tomb building and society utilizing the resources of Japan's kofun research* (pp. 19-32). Osaka University. (In Japanese)
- Nagamine, K. (2016). Radiography with cosmic-ray and compact accelerator muons; exploring inner-structure of large-scale objects and landforms. *Proc. Jpn. Acad., Ser. B.*, *92*(8), 265-289.
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【Term of Project】 FY2020- 2024

【Budget Allocation】 150,500 Thousand Yen

【Homepage Address and Other Contact Information】

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