KOCHI UNIVERSITY OF TECHNOLOGY

Social Design Engineering Series *SDES-2018-6*

Is an intergenerational retrospective viewpoint effective in forming policy preferences for financial sustainability in local and national economies? A deliberative experimental approach

Yoshinori Nakagawa
School of Economics and Management, Kochi University of Technology
Research Institute for Future Design, Kochi University of Technology

Koji Kotani
Research Institute for Future Design, Kochi University of Technology
School of Economics and Management, Kochi University of Technology

Real Arai
Research Institute for Future Design, Kochi University of Technology
School of Economics and Management, Kochi University of Technology

Masanobu Nagano
Regional Research Institute, Kochi University of Technology

Tatsuyoshi Saijo
Research Institute for Humanity and Nature
School of Economics and Management, Kochi University of Technology
Research Institute for Future Design, Kochi University of Technology

21th September, 2018

School of Economics and Management
Research Institute for Future Design
Kochi University of Technology

Is an intergenerational retrospective viewpoint effective in forming policy preferences for financial sustainability in local and national economies? A deliberative experimental approach

Yoshinori NAKAGAWA[1,2]*

Real ARAI[1,2]

Koji KOTANI[1,2]

Masanobu NAGANO[3]

Tatsuyoshi SAIJO[1,2,4]

1: School of Economics and Management, Kochi University of Technology, Japan.

2: Future Design Research Institute, Kochi University of Technology, Japan.

3: Regional Research Institute, Kochi University of Technology, Japan.

4: Research Institute for Humanity and Nature, Japan.

*Corresponding Author. Email address: nakagawa.yoshinori@kochi-tech.ac.jp

Abstract

Several previous studies have suggested potential benefits of intergenerational retrospective viewpoints to both promote individuals' policy preferences and resolve intergenerational sustainability issues. This study extends this line of research by conducting a deliberation experiment on the challenging issue of determining financial policy at the municipal and national levels, and assessing the versatility of this process. A total of 353 participants were allocated into retrospective and non-retrospective treatment groups. In each group, participants were asked to read the case-method material created for the study and each individual expressed his or her most preferred options, both before and after experiencing deliberation among a group of four participants. By doing so, the relationships between the roles of the retrospective treatment, individual psychological/behavioral characteristics, and deliberation were clarified. The results confirm that a retrospective assessment influences individuals' policy preferences at the municipal level but not at the national level. Specifically, with regard to the former, it was found that, for those who are strong in generativity and critical thinking, the retrospective treatment was effective in changing their policy preferences towards more sustainable choices. For those who are average with respect to these traits, the retrospective treatment was effective when coupled with deliberation. For those who are below average in terms of these characteristics, the retrospective treatment was ineffective even when coupled with deliberation. Overall, deliberation and retrospective treatment complemented each other as way to induce more subjects to choose sustainable options. We also discuss implications for the practice of stakeholder workshops such as scenario development, where the difficulty and importance of participants' disengagement from the present has been recognized (Vergragt and Quist 2011).

Key words: Future design, intergenerational retrospective viewpoint, financial sustainability, fiscal sustainability, generativity, critical thinking disposition, and deliberation.

1. Introduction

Human societies face various intergenerational issues that threaten their sustainability, including environmental degradation, global climate change, and increasing government debt, among others. These problems occur as the current generation tends to choose actions or policies that are to their current benefit without fully considering future generations' needs, despite the fact that they incur what may be irreversible costs for future generations (e.g., Kamijo et al. 2017; Shahrier et al. 2017). Against this backdrop, social scientists, psychologists and neuroscientists claim certain devices, institutions, or mechanisms that allow people to realistically imagine future events may influence how human beings think, possibly affecting their current decisions or strategies (see, e.g., Corcoran, Weakland, & Wals, 2017; Gonzalez-Ricoy & Gosseries, 2017; Szpunara, Spreng, & Schactera, 2014). Furthermore, scholars and practitioners of "future studies" approaches have successfully used backcasting and scenario planning regarding sustainability issues to consider strategies oriented toward the future (Kok et al. 2014; Neuvonen et al, 2014; Peterson et al. 2003; Street, 1997). More recently, a new variant of the "future studies" approach called "future design" has been proposed and used for planning by municipal governments (Hara et al. 2017)[1].

What these studies have in common, is that they intend to advance prospective engagement of stakeholders for sustainable decision making in the present society. In such literature, there is a line of research that attempts to account for the interests of future generations by, paradoxically, utilizing retrospective assessment. The idea of retrospective assessment is "to ask people to think about the bequests of previous generations" in terms of indifference, regret, and gratitude, as a means of "understanding how our stewardship, or lack of it, might be perceived by those in the future" (Anderson, Teisl, & Noblet, 2012). This idea was proposed by drawing upon retrospective technology assessment (Tarr, 1976), historical analysis (Pesch & Garber, 2001), and backcasting (Robinson et al. 2011). Noblet, Anderson, and Teisl (2015) were the first to use this idea in an

[1] Future design can be regarded as a variant of backcasting, although they have different theoretical underpinnings. The originality of future design lies in allowing people to create visions of the future as an imaginary future generation, rather than as the present one. It is expected that this helps them not only to disengage with the present (Vergragt and Quist, 2011) but also to willingly impose burdens on the present generation if they are necessary to bring about their visions of the future.

empirical study, confirming that retrospective assessment undeniably affected citizens' policy preferences regarding issues of land conservation and energy. Nakagawa et al. (2018) extended this line of research by developing what they called "retrospective treatment" that included the task of sending requests to a previous society, based on the reading of a newspaper article from that time, and tested this approach for forest management policy. They found that this treatment did indeed affect people's preferences, despite the fact that the newspaper article's content was irrelevant to the forest policy issue, suggesting that this treatment could be applied to multiple policy issues. (Hereafter, "retrospective treatment" is used generally to refer to interventions that aim to motivate people to adopt sustainable policy preferences by means of helping them to embrace retrospective viewpoints, encompassing the specific treatment methods of Noblet, Anderson, and Teisl (2015) and Nakagawa et al. (2018).)

In spite of these contributions, there remains room for further research based on at least two reasons. First, as Anderson et al. (2012) suggest, social psychology literature identifies cognitive barriers that may limit the effectiveness of retrospective treatment, such as bounded rationality (i.e., an individual's limited cognitive ability leads them to use heuristics in their decision-making). This is problematic, as it may lead to various biases, including the status quo bias (i.e., overestimation of the current status) (De Dreu & Steinel, 2006; Frey and Stutzer, 2007; Zwick et al. 1999) and the optimism bias (i.e., belief that they are at a lower risk of experiencing a negative event in the future compared to others) (e.g., Gigerenzer, 2004; Tor, 2002). Although Anderson et al. (2012) express the expectation that retrospective treatment would be helpful in overcoming these barriers, it may be that some people can benefit more from retrospective treatment in attempting to overcome these cognitive barriers than others. Thus, it is important to identify individual psychological and behavioral characteristics that moderate the effect of retrospective treatment on one's policy preferences. No earlier studies appear to have addressed this question.

Second, apart from retrospective treatment, deliberation is known to influence citizens' policy preferences (Barabas, 2004; Boulianne, Loptson & Kahane, 2018; Gastil, 2000; Gastil, Black & Moscovits, 2008; Lindeman, 2002; Mackie, 2006; Smets & Isernia, 2014; Taylor-Gooby, Chung

& Leruth, 2018; Zimmermann, Heuer & Mau, 2016). Some authors ascribe this to the opportunity that deliberation provides to "encounter different perspectives" (Barabas, 2004: 687) or to "weigh evidence and argument from various points of view" (Lindeman, 2002: 199). Insofar as retrospective treatment is an attempt to help citizens adopt a new perspective, its affinity for deliberation is obvious: it is probable that citizens who are more successful in adopting the retrospective viewpoint are able to help other citizens to empathize with the perspective through deliberations. However, it is not well understood how retrospective treatment benefits from deliberation with regard to citizens determining their policy preferences.

The present study thus aims to investigate how the influence of the retrospective treatment developed by Nakagawa et al. (2018) on individuals' sustainable policy preferences depends on their individual behavioral/psychological characteristics and on the presence/absence of deliberation. The issue of national and local governments' financial sustainability[2], perhaps one of the most challenging areas for the effect of retrospective treatment to be recognized, was chosen for the study. Original case-method materials were created, including an overview of the financial aspects of both the national and a local government in Japan, and a set of four policy directions. The deliberative experiments were conducted for retrospective and non-retrospective treatment groups, where participants chose their favorite policy alternatives, and the research questions shown below were answered. By doing so, the present study contributes to the understanding of the interdependent roles of deliberation, psychological/behavioral characteristics, and retrospective treatment in individuals' attitude formation on a sustainable policy issue.

1) Does retrospective treatment alone (rather than in combination with deliberation) influence citizens' financial policy preferences? If yes, then what psychological/behavioral characteristics

[2] In public economics, the term "fiscal sustainability" is more frequently used than "financial sustainability". In spite of this, the present study consistently adopts the term "financial sustainability" for the following reason. The focus of the present study is not restricted to the ability of governments to sustain their current spending, taxation and other policies in the long run. The fiscal sustainability of public sectors is partly supported by the sustainable tax revenue brought about by the profitability of private sectors in the long run, which is also the focus of the present study.

are seen in those citizens who are influenced the most?

2) Does retrospective treatment in combination with deliberation, influence citizens' financial policy preferences? If the answer is yes, what psychological/behavioral characteristics are seen in citizens who are influenced the most?

The issue of governments' financial sustainability in both national and local economies is extremely challenging and therefore appropriate for testing the versatility and limitations of the retrospective treatment. In fact, considering the interdependency of the national and local economies, as well as the interdependency of the financial systems of national and local governments through the former's allocation of tax receipts to the latter, individuals required to express their policy preferences at these two levels need to understand this hierarchy and form their own preferences so that the preferences at these levels are internally consistent. It might even be that these individuals will have to be aware of the possibility that sustainable policy options at the local level may work against financial sustainability at the national level. These characteristics make the task of forming individual policy preferences cognitively more demanding, and thus less competent individuals may face greater difficulty in using retrospective treatment for forming preferences.

The structure of this paper is as follows. In section 2, the conceptual framework is developed and hypotheses are derived. Section 3 describes the design details of the deliberative experiment. The results of the statistical analyses of the data collected in the experiment, whose objective is to test the derived hypotheses, are shown in section 4. Section 5 is devoted to discussions.

2. Conceptual Framework and Hypotheses

Given the cognitively demanding nature of the issue adopted for study, it is likely that those highly disposed toward critical thinking (detailed below) and therefore accustomed to logical thinking are better at using the experience of retrospective treatment in forming policy preferences.

Also, regarding preferences about sustainability, generativity (detailed below) is expected to play a crucial role in preference formation. Below, we provide more detailed explanations on why these two dispositions are chosen as relevant psychological/behavioral characteristics.

Our conceptual framework regarding the outcomes and effect of retrospective treatment is summarized in Figure 1, which posits that retrospective treatment (A) affects successful adoption of the retrospective viewpoint in forming individuals' policy preferences (D), and that this relationship is moderated by a willingness to adopt a new perspective (B), as measured by critical thinking, and a willingness to attach meaning to one's life in connection with future generations (C), as measured by generativity. Furthermore, although not depicted in Fig.1, it is also posited that the roles of (A) and (B) as moderators are affected by whether or not the retrospective treatment (A) is coupled with deliberation among individuals.

This framework was established on the basis of three independent theoretical frameworks. First, with regard to (B), Garrison (1991) clarified the act of thinking, which is considered to be a process that allows for a purposeful detachment from facts and a contemplation of ideas (connections between facts) and abstract concepts. He then added a critical nuance to this definition of thinking. Although he himself did not give an explicit definition of the concept, Nakagawa (2015) argued that critical thinking may be understood, according to Garrison (1991), as a form of open-minded thinking that aims to gain insight into how to improve things, with a focus on criticism and testing of the acquired insight. Thus, those strongly disposed toward critical thinking are expected to be more successful in putting aside their a priori perspectives and to open mindedly asses the applicability of the retrospective viewpoint in understanding the complex issue of financial sustainability as described in section 1. In this sense, the relationship between (A) and (D) is moderated by (B). To measure one's predisposition toward critical thinking, our study adopts a scale developed by Hirayama and Kusumi (2004) consisting of 13 items shown in Table 1[3].

(Figure 1 inserted about here.)

[3] The original items are in Japanese. They were translated into English by this study's authors.

Second, with regard to (C), generativity is a concept introduced by Erik Erikson (1950) and refers to concern for establishing and guiding the next generation. After several decades McAdams and de St. Aubin (1992) demonstrated that generativity is a configuration of six psychosocial features constellated around the personal and cultural goal of providing for future generations (i.e., cultural demand, inner desire[4], concern for the next generation, belief in the human species, commitment[5], and action). Furthermore, they posited that the subjective meaning of these elements for an individual is determined by the narrative he creates for himself about providing for the next generation. This theoretical framework suggests an affinity between generativity and the adoption of a retrospective viewpoint. In fact, those who have strong generativity are those who attach meaning to their lives, which they place in the context of a long time period that includes the future. Thus, they appreciate future generations as the audience of their life stories. Keeping in mind that the objective of retrospective treatment is to "generate gratitude or indifference and minimize regrets from the future" (Anderson et al. 2012, p.4), it is reasonable to assume that the relationship between (A) and (D) is moderated by (C). To measure generativity, the present study adopts the Generative Behavior Checklist (McAdams and Aubin 1992) with 40 items and 10 filler items. This scale has been confirmed to have moderate to high correlations with other measures of generativity (McAdams and de St. Aubin 1992, 1995; McAdams et al. 1993).

Finally, with regard to deliberation, as summarized by Smets and Isernia (2014), while there is a theoretical framework positing that attitude change takes place throughout deliberations because it makes people more aware of where they stand ideologically on a given issue, there is also a theory called the deliberative model, which assumes that participants in deliberation processes are exposed to various perspectives and are transformed to be "more tolerant toward other perspectives" (Smets and Isenia 2014, p.394). According to this theory, the moderating effects of (B) and (C) are strengthened when individuals are endowed with the opportunity to deliberate. In other words, given

[4] The need to be needed.
[5] Goals, and decisions to act.

the opportunity, it is hypothesized that those with either high or moderate levels of (B) and (C) can be influenced by retrospective treatment (A). On the basis of this conceptual framework, we hypothesize the following:

H1: When deliberation is not incorporated, retrospective treatment requires high critical thinking abilities and generativity scores to influence individuals' policy preferences.

H2: When deliberation is incorporated, retrospective treatment does not require so high critical thinking abilities and generativity scores as it does in **H1**, to influence individuals' policy preferences

It should be noted that it was considered unfeasible to strictly test these two hypotheses in a single study. To test these two hypotheses, we need to prepare both retrospective treatment and non-retrospective treatment groups. Furthermore, if we aim to test **H1** and **H2** sequentially, we need to ask those in the retrospective treatment group to express their preferences from the standpoint of the *present* generation for **H1** (we call this task 1), to discuss in groups the options from the standpoint of the *future* generation (we call this task 2), and finally to express preferences from the standpoint of the *present* generation for **H2** (we call this task 3). This sequence is problematic because the experience of participating in task 1 from the standpoint of the present generation may make it difficult to engage in tasks 2 and 3, which requires participants to deliberate or express individual preferences from the standpoint of the future generation. Thus, in the present study, **H1** was replaced with **H1'**, which is the necessary condition of **H1**.

H1': When deliberation is not incorporated, the retrospective treatment, *along with the request to express policy preferences from the standpoint of future generations*, requires high critical thinking abilities and generativity scores to influence the expressed preferences.

Accordingly, hypothesis **H2** was replaced with the following.

H2': When deliberation is incorporated, retrospective treatment does not require so high critical thinking abilities and generativity scores as it does in **H1'**, to influence individuals' policy preferences

3. Methods and Materials

The experiments were implemented in Kochi Prefecture, Japan, where local residents were invited to participate as subjects. As of 2018, Kochi prefecture has a population of 701,000, and can be considered a typical Japanese prefecture, located far from major cities such as Tokyo, Osaka, and Kyoto, and struggling with various socio-economic problems such as population decline (10% reduction in the last 10 years) and low regional economic growth. Its fiscal structure is weak; approximately 60% of the prefecture government's revenue is subsidized by Japan's national government, the second highest percentage in the country. It is thus likely that the prefecture would be adversely affected if a fiscal crisis or financial weakening of Japan's national government occurred.

3.1. Experimental procedure

We adopt the procedure used in Nakagawa et al. (2018), as summarized in Figure 2. Participants were randomly allocated to either retrospective or non-retrospective treatment groups. Participants in both the retrospective and non-retrospective treatment groups (i) read the case-method material (as detailed in the next subsection), (ii) make an initial choice of a most favorable option as individuals, (iii) deliberate in groups[6] on the most favorable option, and (iv) make their final choice of the most favorable option individually.

[6] Participants in the retrospective treatment group were randomly allocated into groups of four to choose the most favorable option as groups throughout deliberations.

However, there are several important differences in our procedures. First, prior to step (i), only those in the retrospective treatment group were charged with two different tasks: to read a newspaper article published 30 years ago and to discuss in groups (of four participants each) the requests they would like to send to that past society. For details on the newspaper article, see Appendix A2 of Nakagawa et al. (2018)[7]. Second, in the retrospective treatment, participants were requested to choose the most favorable option from the standpoint of the *future generation living 30 years from today* in steps (ii) and (iii), and from the standpoint of the *people living now* in step (iv). In the non-retrospective treatment, all preferences were from the standpoint of people living now.

(Figure 2 inserted about here.)

3.2. The case method material

The material developed for the present study, as presented in Appendix A1[8], consists of two parts. In the first half, a story of an imaginary Japanese family is described to show participants (i) the fiscal condition of the Japanese government[9], (ii) the fiscal condition of the Kochi prefectural government, and (iii) how the revenue of a rural prefectural government such as Kochi's is highly dependent on subsidies from the national government. With regard to step (ii), to better understand the risks and benefits of the status quo and of proactive policies, participants are given the contrasting cases of Güssing City in Austria (known to be a substantially successful case of regional revitalization, where, due to achieving self-sufficiency in energy, local tax revenue increased threefold between 1990 and 2006[10]) and Yubari City in Japan (a case where the municipal government defaulted on its debt, in 2007).

[7] This newspaper article was chosen to stimulate participants' feelings of regret about decisions of the past society.
[8] The core idea of the list of policy options was provided by the fourth author (M.N.). The case-method material was created by the second author (R.A.) to be consistent with the list of options.
[9] Japan has more public debt than the other country in the world, and many people suggest that Japan must immediately adopt a plan to attain fiscal sustainability. The IMF (2013) reports on the Japanese government's severe fiscal situation and suggests increasing the consumption tax rate to achieve fiscal sustainability. A number of studies investigate a sustainable fiscal policy and its effects on the Japanese economy (e.g., Hansen and Imrohoroglu, 2016; Imorohoroglu et al. 2017; Arai and Ueda, 2013).
[10] This information is based on the interview survey by the fourth (M.A.) and first (Y.N.) authors at the municipality of Güssing in September 2009.

In the second half of the material, four policy options (i.e., two national-level and two prefectural level fiscal policies) were presented as follows:

Option 1: Nationally less sustainable, locally less sustainable

The national government continues to subsidize prefectures to secure financial equality among them[11]*, while Kochi Prefecture continues to subsidize the entire area to secure equal levels of public service.*

Option 2: Nationally more sustainable, locally less sustainable

The national government reduces subsidies to prefectures to avoid a national fiscal crisis[12]*, allowing inequality, while Kochi Prefecture continues to subsidize the area to ensure equal, local public service levels.*

Option 3: Nationally less sustainable, locally more sustainable

The national government continues to subsidize prefectures to secure financial equality among them, while Kochi Prefecture subsidizes limited areas for revitalization, allowing inequality.

Option 4: Nationally more sustainable, locally more sustainable

The national government reduces subsidies to prefectures to avoid a fiscal crisis[13]*, allowing inequality, while Kochi Prefecture subsidizes limited areas for revitalization, allowing inequality.*

Note that Option 1 is closest to the status quo. In Options 2 and 3, the national government reduces subsidies to prefectures to attain financial sustainability for itself. In Options 3 and 4, Kochi Prefecture concentrates its financial resources within the limited number of cities that are likely to successfully revitalize, to attain financial sustainability. Although the hope is that Options 3 and 4 are sustainable, sustainability is not guaranteed because concentrating fiscal resources in fewer areas

[11] As of 2018, in Japan, the national government subsidizes all prefectures except for the Tokyo metropolitan government.
[12] Cutting subsidies would be replaced by a large-scale transfer of tax revenue sources to the prefectures. This would transfer the financial risks to the prefectures as well.
[13] Cutting subsidies from the national government would be replaced by a large-scale transfer of tax revenue to the prefectures, thus transferring financial risks to them.

may not lead to revitalization and would result in increased adversity for residents in areas that were viewed as a lower priority by the municipality.

4. Results

Summary statistics are presented in Table 2. Approximately 50% of subjects are 40-59 years old, while the percent of subjects younger than 40 and older than 60 are 30% and 20%, respectively. Half of the subjects are female. Therefore, we believe the group of subjects is balanced with respect to age and gender. Almost one-third of the subjects are married. Approximately 60% have a permanent job and half are university graduates.

(Table 2 inserted about here.)

Table 3 displays the distributions of the most favored policies as chosen by the subjects per treatment for their initial and final choices. Both in the initial and final choice phases, significant differences between the distributions of non-retrospective and retrospective treatment groups were identified (p = 0.010 and 0.000, respectively.) In contrast, no significant differences between the distributions of the initial and final choice phases were identified, in both retrospective and non-retrospective treatment. However, it should be noted that 32 of the 133 non-retrospective treatment group participants (24.1%) changed their opinions in the final choice phase, and 85 of the 220 retrospective treatment group participants (38.6%) also did so, although these numbers are not shown in the table.

Two points should be noted regarding these results. First, the retrospective treatment had a significant effect on the aggregate policy preferences of the participants, both at the initial and final choice phases. This is consistent with Noblet, Anderson, and Teisl (2015) and Nakagawa et al. (2018). However, upon further examination of the details, we note a small discrepancy with Nakagawa et al. (2018). While they found that the retrospective treatment affected individuals' forest

policy preferences only when the treatment was coupled with deliberation (i.e., at the final choice phase), the present study found that the retrospective treatment affected aggregate financial policy preferences even when it was not coupled with deliberation (i.e., at the initial choice phase). It might be that the general public, including our research participants, perceive the connection between intergenerational equity or intergenerational sustainability and financial policy more strongly than with regard to forestry policy, and that the retrospective treatment alone was sufficient for some participants to change their financial policy preferences.

Second, contrary to Nakagawa et al. (2018), in both the retrospective and non-retrospective treatment groups, deliberation did not influence participants' aggregate policy preferences. Taken together with the first point, retrospective treatment seems to have a larger potential to shift individuals' aggregate policy preferences than deliberation, at least with respect to the issue addressed in this study. Smets and Isernia (2014) observed that whether individuals' policy preferences are changed by deliberation depends on the policy issue to be deliberated, and it might be that financial sustainability is an example of an issue where deliberations are less likely to facilitate preference changes, although this cannot be determined by the present study.

(Table 3 inserted about here.)

To test the hypotheses presented in section 2, we ran logistic regressions. Table 4 summarizes the logistic regression analysis, where the dependent variable is set based on each individual's preference for a locally less sustainable option (Option 1 or 2), $y = 0$, or a locally more sustainable option (Option 3 or 4), $y = 1$.

Considering the moderate level of correlation between generativity and critical thinking disposition ($r = 0.296$; $p < 0.01$), these two variables were not independently included in the model. Instead, the entire sample was divided into three subgroups, and corresponding dummy variables were defined. The numbers of participants in the three subgroups were 90, 147, and 116,

respectively[14].

Subgroup 1: (Generativity score < Median) & (Critical thinking disposition score < Median)

Subgroup 2: Either (Generativity score ≥ Median) or (Critical thinking disposition score ≥ Median)

Subgroup 3: (Generativity score ≥ Median) & (Critical thinking disposition score ≥ Median)

The analysis reveals that in the initial choice phase (the choice before deliberation), the interaction of retrospective treatment[15] with "being in subgroup 2" and "being in subgroup 3" were the only significant predictors ($p < 0.10$ and $p < 0.01$, respectively). The odds ratios of these variables were 2.57 and 6.06, roughly suggesting that compared with those in the non-retrospective treatment group, those in the retrospective treatment subgroups 2 and 3 were 2.57 and 6.06 times more likely to choose a sustainable option, respectively. In contrast, those in the retrospective treatment subgroup 1 did not differ with respect to the likelihood of choosing a sustainable option compared with those in the non-retrospective treatment group.

In the final choice phase (choice after the deliberation), the analysis again revealed that the interactions of the retrospective treatment with "being in subgroup 2" and "being in subgroup 3" were significant predictors ($p < 0.01$ and $p < 0.01$, respectively). The odds ratios of these variables were 4.02 and 6.07, respectively.

By carefully comparing the results for the initial and final choice phases, the roles of generativity, critical thinking disposition, and deliberation in the retrospective treatment becomes evident. First, for those high in both critical thinking and generativity, belonging to the retrospective treatment group enhances the likelihood of choosing sustainable options by 6.06 times (before deliberation) and 6.07 times (after deliberation). For these people, the retrospective treatment *alone* has a great effect, and deliberation does not enhance the effect any further. Second, for those high in

[14] Subgroup 2 could have been further divided into two groups, but this strategy was not adopted, taking into account the relatively small sample size (i.e., $n = 353$).

[15] This dummy variable took a value of 1 when an individual was allocated to the retrospective treatment group, and 0 otherwise.

either critical thinking or generativity, belonging to the retrospective treatment group enhances the likelihood of choosing sustainable options by 2.57 times (before deliberation) and 4.02 times (after deliberation). This suggests that the retrospective treatment *alone* has a moderate effect on policy preferences, but the effect is magnified and statistically more significant (from $p < 0.10$ to $p < 0.01$) if the treatment is accompanied by deliberation. Finally, for those low in both critical thinking and generativity, the retrospective treatment had no effect, regardless of whether it was accompanied by deliberation. To summarize, critical thinking and generativity represent the abilities to accept retrospective treatment in forming policy preferences, and deliberation can compensate for these abilities, as long as the critical thinking and/or generativity abilities are not too low. This discussion validates the two hypotheses **H1'** and **H2'** presented in section 2.

With regard to sociodemographic variables, at both the initial and final choice phases, marital status was consistently a significantly negative predictor of choosing sustainable options ($p < 0.10$ and $p < 0.01$, respectively). Considering the moderate level of negative correlation between marital status and age ($r = -0.458$, $p < 0.01$), the results suggest younger individuals tend to choose sustainable options, which is consistent with earlier studies that found older people express increased support for welfare policies (e.g., Blekesaune and Quadagno, 2003; Blekesaune 2007; Peterson et al. 2010), assuming financial sustainability and welfare for the aging in society are incompatible. Furthermore, considering the risks of failure inherent in the (hopefully) sustainable options 3 and 4, our result seems consistent with the studies in corporate finance that found older CEOs are less likely to adopt risk-taking behaviors (e.g., Chen & Zheng, 2014; Serfling, 2013).

(Table 4 inserted about here.)

Table 5 summarizes the logistic regression analysis results where the dependent variable, y, is determined based on whether individuals preferred a nationally less sustainable option (Option 1 or 3), $y = 0$, or a nationally more sustainable option (Option 2 or 4), $y = 1$.

Unlike the case at the prefectural level shown in Table 4, the retrospective treatment was found to have no significant effects on individuals' policy preferences, both at the initial and the final

choice phases, regardless of the scale scores of generativity and critical thinking abilities. The possible reasons for this result will be discussed later.

Regarding the sociodemographic variables, at the initial choice phase there were no significant predictors. At the final choice phase, being aged 60 or older was the only significant predictor ($p < 0.10$). Its odds ratio is less than 1.0 (i.e., 0.45) suggesting those aged 60 or older are less likely to choose sustainable options than those aged 39 or younger. Again, this result is consistent with earlier studies that found older people expressed more support for welfare policies (e.g., Blekesaune and Quadagno, 2003; Blekesaune 2007; Peterson et al. 2010).

(Table 5 inserted about here.)

5. Discussion

This study conducted a deliberative experiment on the national and prefectural financial policy issue in Japan, to investigate whether retrospective treatment influences the formation of individuals' sustainable policy preferences. Special attention was paid to understanding the relationship among the roles of the treatment itself, psychological/behavioral characteristics, and deliberation. Regarding policy preferences at the prefectural level, as the theories predicted, critical thinking and generativity were found to facilitate individuals' acceptance of the retrospective treatment and led them to prefer sustainable options, where deliberation was found to compensate for somewhat lower critical thinking abilities and/or generativity, unless these are simply too low. This suggests that retrospective treatment can be effective even if applied to a more cognitively demanding policy issue than the one dealt with by the previous study (Nakagawa et al. 2018).

In contrast, at the national level, the retrospective treatment had no effect, regardless of the levels of the two dispositions. This result could be understood with reference to the well-known theory proposed by Mancur Olson (1965), who posited that due to the free-rider problem, individuals tend to contribute lower levels of action (e.g., money, effort, time) the larger the group to which belong to (Esteban & Ray, 2001). It might be that at the smaller scale (i.e., at the prefectural level),

individuals are more motivated to contribute to the sustainability of their government at their own expense than at the larger scale (e.g., at the national level). This shows the limitation of our retrospective treatment. It would be useful to update the retrospective treatment so that individuals can be sympathetic to future generations in geographic areas to which they are not directly linked.

With this said, it remains surprising that the retrospective treatment had such a significant impact on individuals in forming sustainable financial policy preferences at the prefectural level[16], in spite of the inherent potential financial threat. Although it is beyond the scope of this study to provide a complete analysis on the basis of the empirical data, one possibility might be found in the reference to the literature on sustainable communities, i.e., "communities who promote or seek to promote sustainability in sectors such as water, food, transport, waste and energy" (Rae and Bradley, 2012; p.6499), including Güssing in Austria. It is conceivable that those who successfully adopted the retrospective viewpoint chose sustainable options, in spite of the obvious potential financial threat, with the expectation that the decision would be appreciated by future generations for providing them with the opportunity to enjoy community ownership, not only in the narrow sense of legal ownership of the projects that promote sustainability, but also in its broader, more subjective meaning of the "sense of ownership" (Warren and McFadyen, 2010; Rae and Bradley, 2012; Bolinger, 2001). In other words, while the status quo options may well cause *inaction* regret[17], the hopefully sustainable options, with risk of failure, may well cause *action* regret in the future. The sense of autonomy and the sense of community ownership might be a reward available only to those who intentionally accept the possibility of action regret.

This study has important implications for the practice of stakeholder workshops such as scenario development, where the difficulty and importance of participants' disengagement from the present has been recognized in the previous literature (Vergragt and Quist 2011). Considering the

[16] Remember Table 3, which says that while only 13.5% of the non-retrospective treatment group participants preferred sustainable options at the final choice phase, the percentage was as high as 36.3% in the retrospective treatment group.

[17] Action (inaction) regret refers to the emotion experienced when people look back on bad decisions to act (not to act) (e.g. Bonnefon & Zhang, 2008; Zeelenberg et al., 2000).

ability of those with stronger generativity and critical thinking dispositions to acquire the perspective of future generations (and thus to disengage from the present perspective), as well as the deliberation's function of providing people with the opportunity to be exposed to perspectives different from the ones they originally possessed, it would be meaningful to organize deliberation groups in such a way that the groups are inhomogeneous with respect to these dispositions, thereby taking the full advantage of deliberations.

Finally, the present study has an important limitation. For a practical reason, we took the approach of testing **H1'**, rather than directly testing **H1**. In the future it would be useful to test the latter. In other words, it is important to test whether the retrospective treatment itself (not combined with deliberation) has an effect on individuals' policy preferences, in a more general situation than one in which they are requested to express preferences from the standpoint of the future generation.

Acknowledgment

We are grateful to the financial supports from the Japan Society for the Promotion of Science as the Grant-in-Aid for Scientific Research A (24243028 and 17H00980), the Grant-in-Aid for Scientific Research B (16H03621), Grant-in-Aid for Challenging Exploratory Research (16K13354 and 16K13362), Research Institute for Humanity and Nature (Project Number 40410000) and Kochi University of Technology

References

Afonso, A., Rault, C. (2010). What do we really know about fiscal sustainability in the EU? A panel data diagnostic. Review of World Economics, 145(4), 731—755.

Anerson, M.W., Teisl, M., Noblet C. (2012). Giving voice to the future in sustainability: Retrospective assessment to learn prospective stakeholder engagement. Ecological Economics, 84, 1—6.

Arai, R., and Ueda, J. (2013). A numerical evaluation of the sustainable size of the primary deficit in Japan. Journal of the Japanese and International Economies, 30, 59-75.

Barabas, J. (2004). How deliberation affects policy opinions. American Political Science Review, 98(4), 687—700.

Blekeaune, M. (2007). Economic conditions and public attitudes to welfare policies. European Sociological Review, 23(3), 393—403.

Blekeaune, M., Quadagno, J. (2003). Public attitudes toward welfare state policies: A comparative analysis of 24 nations. European Sociological Review, 19(5), 415—427.

Bolinger, M. (2001). Community wind power ownership schemes in Europe and their relevance to the United States. Lawrence Berkeley National Laboratory Report LBNL-48357. Available at: http://eetd.lbl.gov/ea/EMS/reports/48357.pdf.

Bonnefon, J., Zhang, J. (2008). The intensity of recent and distant regrets: An integrated model and a large scale survey. Applied Cognitive Psychology, 22, 653–662.

Boulianne, S., Loptson, K., Kahane, D. (2018). Citizen Panels and Opinion Polls: Convergence and Divergence in Policy Preferences. Journal of Public Deliberation, 14(1), Article 4.

Cain, M., McKeon, S. (2016). CEO personal risk-taking and corporate policies. Journal of Financial and Quantitative Analysis, 51(1), 139—164.

Chen, D. and Zheng, Y. (2014). CEO Tenure and Risk-Taking. Global Business and Finance Review 19, 1—27.

Corcoran, P.B., Weakland, J.P., Wals, A.E.J. (Eds.), Envisioning futures for environmental and sustainability education, Wageningen Academic Publishers, 2017.

De Dreu, C.K.W. and Steinel, W. (2006). Social Decision Making in Fuzzy Situations: Motivated Information Processing and Strategic Choice, in Social Psychology and Economics (DeCremer, Zeelenberg and Murnighan eds). Lawrence Erlbaum Associates, Publishers. London.

Ebdonm, C. and Franklin, A.L. (2006) Citizen participation in budgeting theory. Public Administration Review, 66(3), 437—447.

Esteban, J., Ray D., 2001. Collective Action and the Group Size Paradox. American Political Science

Review 95, 663-672.

Frey, B.B. and Stutzer, S. 2007. Economics and Psychology: Developments and Issues. In Economics and Psychology: A Promising New Cross-Disciplinary Field (Frey and Stutzer eds). MIT Press.

Garrison, D.R. (1991) Critical thinking and adult education: a conceptual model for developing critical

thinking in adult learners. International Journal of Lifelong Education, 10(4), 287–303.

Gastil, J. (2000). Is face-to-face citizen deliberation a luxury or a necessity? Political Communication, 17, 357—361.

Gastil, J., Black, L. Moscovits, K. (2008). Ideology, attitude change, and deliberation in small face-to-face groups. Political Communication, 25, 23—46.

Gigerenzer, G. (2004). Fast and frugal heuristics: The tools of bounded rationality. In D.J. Koehler & N. Harvey (Eds.), Blackwell handbook of judgment and decision making (pp. 62–88). Oxford, United Kingdom: Blackwell.

Gonzalez-Ricoy, I., Gosseries, A. (Eds.), Institutions for future generations, Oxford University Press, 2017.

Hansen, G. D., and Imrohoroˇglu, S. (2016). Fiscal reform and government debt in Japan: A neoclassical perspective. Review of Economic Dynamics, 21, 201-224.

Hara, K., Yoshioka, R., Kuroda, M., Kurimoto, S., Saijo, T. (2017). Reconciling intergenerational conflicts with imaginary future generations—Evidence from a participatory deliberation practice in a municipality in Japan, Kochi University of Technology, SDES-2017-9, Working paper.

Hirayama R, Kusumi T (2004) Effect of critical thinking disposition on interpretation of controversial issues: evaluating evidences and drawing conclusions. Japanese Journal of Educational Psychology, 52, 186–198. **(In Japanese.)**

IMF (2013). Japan 2013 Article IV Consultation, IMF Country Report No. 13/253.

Imrohoroˇglu, S., Kitao, S., and Yamada, T. (2016). Achieving fiscal balance in Japan. International Economic Review, 57(1), 117-154.

Kamijo, Y., Komiya, A., Mifune, N., Saijo, T. (2017). Negotiating with the future: incorporating imaginary future generations into negotiations. Sustainability Science, 12, 409–420.

Kok, K., van Vliet, M., Barlund I., Dubel, A., Sendzimir, J. Combining participative backcasting and exploratory scenario development: Experiences from the SCENES project, Technological Forecasting and Social Change 78 (2011) 835–851.

Loukil, N., Yousfi, O. (2013). Does gender diversity on board lead to risk-taking? Empirical evidence from Tunisia. Canadian Journal of Administrative Sciences, 33, 66–81.

Mackie, G. (2006). Does democratic deliberation change minds? Politics, Philosophy, & Economics, 5(3), 279—303.

McAdams, D. P., & de St. Aubin, E. (1992). A theory of generativity and its assessment through self-report, behavioral acts, and narrative themes in autobiography. Journal of Personality and Social Psychology, 62, 1003–1015.

McAdams, D. P., & de St. Aubin, E. (1995). The relations of generative concern and generative action to personality traits, satisfaction/happiness with life, and ego development. Journal of Adult Development, 2, 99–112.

McAdams, D. P., de St. Aubin, E., & Logan, R. L. (1993). Generativity among young, midlife, and older adults. Psychology and Aging, 8, 221–230.

Nakagawa, Y. (2015). Effect of critical thinking disposition on household earthquake preparedness. Natural hazards, 82(2), 807—828.

Nakagawa, Y., Kotani, K., Matsumoto, M., Saijo,T. (2018). Intergenerational retrospective viewpoints and individual policy preferences for future: A deliberative experiment for forest management. Futures. (In press.)

Neuvonen, A., Kaskinen, T., Jeppanen, J., Lahteenoja, S., Mokka, R., Ritola, M. Low-carbon futures and sustainable lifestyles: A backcasting scenario approach, Futures 58 (2014) 66–76.

Mancur, O. (1965). The Logic of Collective Action. Cambridge, MA: Harvard University press.

Peterson, M.B., Slothuus, R., Stubager, R., Togeby, L. (2010). Deservingness versus values in public opinion on welfare: The automaticity of the deservingness heuristic. European Journal of

Political Research, 50, 24—52.

Peterson G.D., Cumming, G.S., Carpenter, S.R. (2003). Scenario planning: A tool for conservation in an uncertain world, Conservation Biology 17, 358–366.

Pesch, C.E., Garber, J. (2001). Historical analysis, a valuable tool in community-based environmental protection. Marine Pollution Bulletin, 42(5), 339—349.

Rae, C., Bradley, F. (2012). Energy autonomy in sustainable communities—A review of key issues. Renewable and Sustainable Energy Reviews, 16, 6497—6506.

Rabin, M. (1998). Psychology and economics. Journal of Economic Literature, 36, 11–46.

Robinson, J., Burch, S., Talwar, S., O'Shea, M., Walsh, M. (2011). Envisioning sustainability: recent progress in the use of participatory backcasting approaches for sustainability research. Technological Forecasting & Social Change, 78(5), 756—768.

Rose, S. (2010). Institutions and Fiscal Sustainability. National Tax Journal 63 (4), 807–837.

Serfling, M. A. (2013). CEO age and the riskiness of corporate policies. Journal of Corporate Finance, 25, 251—273.

Shahrier, S., Kotani, K., Saijo, T. Intergenerational sustainability dilemma and the degree of capitalism in societies: A field experiment, Sustainability Science, 12 (2017) 957–967.

Smets, K., Isernia, P. (2014). The role of deliberation in attitude change: An empirical assessment of three theoretical mechanisms. European Union Politics, 15(3), 389—409.

Street, P. (1997). Scenario workshops: A participatory approach to sustainable urban living, Futures, 29, 139–158.

Szpunara, K.K., Spreng, R.N., Schactera, D.L. (2014). A taxonomy of prospection: Introducing an organizational framework for future-oriented cognition, Proceedings of the National Academy of Sciences of the United States of America 111, 18414–18421.

Taylor-Gooby, P., Chung, H., Leruth, B. (2018). The contribution of deliberative forums to studying welfare state attitudes: A United Kingdom study. Social Policy Administration, 52, 914—927.

Tor, A. (2002). The fable of entry: Bounded rationality, market discipline, and legal policy. Michigan Law Review, 101, 482-568.

Warren, C.R., McFadyen, M. (2010). Does community ownership affect public attitudes to wind energy? A case study from south-west Scotland. Land Use Policy, 27(2), 204–213.

Vergragt, P.J. and Quist, J. (2011) Backcasting for sustainability: Introduction to the special issue. Technological Forecasting & Social Change, 78, 747—755.

Zeelenberg, M., Van Dijk, W., Manstead, A. (2000). Regret and responsibility resolved? Evaluating Ordonez and Connolly's (2000) conclusions, Organizational Behavior and Human Decision Processes, 81, 143–154.

Zimmermann, K., Heuer, J.-O., Mau, S. (2017). Changing preferences towards distribution: How deliberation shapes welfare attitudes. Social Policy Administration, 52, 969—982.

Zwick, R., Erev., I. and D. Budescu. (1999). The Psychology and Economical Perspectives on Human Decisions in Social and Interactive Contexts. In Budescu, Erev and Zwick (Eds.), Games and Human Behavior: Essays in honor of Amnon Rapoport. Lawrence Erlbaum Associates: New Jersey.

Table 1: Critical thinking disposition scale items (Hirayama and Kusumi, 2004)

No	Item
1	I am good at thinking about complex problems in an orderly fashion.
2	I am good at collecting my thoughts.
3	I am confident in thinking about things precisely.
4	I am good at making persuasive arguments.
5	I am confused when thinking about complex problems*
6	I am the one to make decisions because my peers believe I can make fair judgments.
7	I can concentrate on grappling with problems.
8	I can continue working on a difficult problem which is not straight forward.
9	I can think about things coherently.
10	My shortcoming is that I am easily distracted*
11	When I think about a solution. I cannot afford to think about other alternatives*
12	I can inquire into things carefully.
13	I am constructive in proposing alternatives.

Note. *: Reverse item. Items were rated from
1 = ‘‘Strongly disagree’’ to 5 = ‘‘Strongly agree.’’ The theoretical range is 13–65.

Table 2: Sample Characteristics

	n	%	*M*	*SD*
Age				
≦39	103	29.2		
40-59	173	49.0		
≧60	77	21.8		
Gender				
Male	178	50.4		
Female	175	49.6		
Marital Status				
Yes	117	33.1		
No	236	66.9		
Employment Status				
Permanent Job	202	57.2		
Other	151	42.8		
Education				
Univ. Graduate or above	166	47.0		
Other	187	53.0		
Generativiy Scale			24.9	11.3
Critical Thinking Disposition Scale			40.7	7.2
Group Allocation				
Treatment Group	220	62.3		
Control Group	133	37.7		

Table 3: Participants' favorite options

	Non-retrospective treatment					Retrospecitve treatment					p value[1]
Option	1	2	3	4	Total	1	2	3	4	Total	
Initial Choice											
n	90	27	14	2	133	118	43	51	8	220	0.010
%	67.7	20.3	10.5	1.5	100.0	53.6	19.5	23.2	3.6	100.0	
Final Choice											
n	84	31	16	2	133	102	38	70	10	220	0.000
%	63.2	23.3	12.0	1.5	100.0	46.4	17.3	31.8	4.5	100.0	
p value[2]			0.616					0.197			

Notes.
Option 1 = Less sustainable at the national level and less sustainable at the prefectural level (≒Maintenance of Status Quo)
Option 2 = More sustainable at the national level and less sustainable at the prefectural level
Option 3 = Less sustainable at the national level and more sustainable at the prefectural level
Option 4 = More sustainable at the national level and more sustainable at the prefectural level

1: Chi square test of independence between frequency distributions of control and treatment groups.
2: Chi square test of independence between frequency distributions of initial and final choices.

Table 4: Logistic regression analysis result on policy preference at the prefectural level (n = 353)

		Option 1 or 2 (y = 0) vs. Option 3 or 4 (y = 1)[1]							
		Preference *Before* the Discussion				Preference *After* the Discussion			
	Independent Variable	Coeff.	s.e.	OR	95% CI	Coeff.	s.e.	OR	95% CI
	Age								
	≦39 (Ref.)								
1)	40-59	0.02	0.35	1.02	0.51 — 2.01	-0.10	0.32	0.91	0.49 — 1.69
2)	≧60	-0.15	0.45	0.86	0.36 — 2.10	-0.79 †	0.43	0.45	0.20 — 1.05
	Gender								
3)	Male	-0.13	0.28	0.88	0.51 — 1.51	0.25	0.26	1.28	0.77 — 2.11
	Female (Ref.)								
	Marital Status								
4)	Yes	-0.23	0.32	0.80	0.42 — 1.51	-0.35	0.30	0.70	0.39 — 1.27
	No (Ref.)								
	Employment Status								
5)	Permanent Job	0.46	0.30	1.58	0.88 — 2.84	0.29	0.27	1.34	0.79 — 2.28
	Other (Ref.)								
	Education								
6)	Univ. Graduate or above	0.28	0.27	1.32	0.77 — 2.27	0.13	0.25	1.14	0.69 — 1.88
	Other (Ref.)								
	Generativigy and Critical Thinking								
7)	(Gen. = Low) & (C.T. = Low) (Ref.)								
8)	Either (Gen. = High) or (C.T. = High)	-0.28	0.63	0.76	0.22 — 2.61	-0.80	0.63	0.45	0.13 — 1.53
9)	(Gen. = High) & (C.T. = High)	-0.90	0.69	0.41	0.10 — 1.58	-0.97	0.63	0.38	0.11 — 1.30
10)	**Retrospective Treatment ×7)**	0.11	0.58	1.12	0.36 — 3.50	0.65	0.50	1.91	0.71 — 5.12
11)	**Retrospective Treatment ×8)**	0.94 †	0.50	2.57	0.96 — 6.87	1.39 **	0.53	4.02	1.43 — 11.28
12)	**Retrospective Treatment ×9)**	1.80 **	0.59	6.06	1.92 — 19.15	1.80 **	0.54	6.07	2.10 — 17.52

Notes. 1: Options 3 and 4 are sustainable at the prefectural level. †: p <0.10. *: p <0.05. **: p <0.01.

Table 5: Logistic regression analysis result on policy preference at the national level (n = 353)

		Option 1 or 3 (y = 0) vs. Option 2 or 4 (y = 1)[1]							
		Preference *Before* the Discussion				Preference *After* the Discussion			
	Independent Variable	Coeff.	s.e.	OR	95% CI	Coeff.	s.e.	OR	95% CI
	Age								
	≦39 (Ref.)								
1)	40-59	-0.41	0.34	0.67	0.34 — 1.30	-0.43	0.33	0.65	0.34 — 1.25
2)	≧60	0.36	0.41	1.44	0.65 — 3.18	-0.45	0.42	0.64	0.28 — 1.45
	Gender								
3)	Male	0.35	0.27	1.42	0.84 — 2.39	-0.04	0.26	0.96	0.58 — 1.62
	Female (Ref.)								
	Marital Status								
4)	Yes	-0.54 †	0.32	0.58	0.31 — 1.10	-0.71 *	0.33	0.49	0.26 — 0.94
	No (Ref.)								
	Employment Status								
5)	Permanent Job	0.43	0.29	1.54	0.87 — 2.73	-0.13	0.28	0.88	0.51 — 1.52
	Other (Ref.)								
	Education								
6)	Univ. Graduate or above	0.03	0.26	1.03	0.61 — 1.73	0.21	0.26	1.24	0.74 — 2.06
	Other (Ref.)								
	Generativigy and Critical Thinking								
7)	(Gen. = Low) & (C.T. = Low) (Ref.)								
8)	Either (Gen. = High) or (C.T. = High)	0.22	0.56	1.25	0.42 — 3.77	0.35	0.55	1.42	0.48 — 4.15
9)	(Gen. = High) & (C.T. = High)	0.41	0.55	1.50	0.51 — 4.40	0.61	0.53	1.85	0.65 — 5.22
10)	**Retrospective Treatment ×7)**	0.47	0.54	1.59	0.55 — 4.58	0.08	0.55	1.08	0.37 — 3.15
11)	**Retrospective Treatment ×8)**	0.01	0.45	1.01	0.42 — 2.43	-0.16	0.43	0.85	0.36 — 1.99
12)	**Retrospective Treatment ×9)**	0.04	0.45	1.04	0.43 — 2.50	-0.43	0.43	0.65	0.28 — 1.52

Notes. 1: Options 2 and 4 are sustainable ones at the national level. †: p <0.10. *: p <0.05. **: p <0.01.

Figure 1: Conceptual framework on the realization of the effect of retrospective treatment.

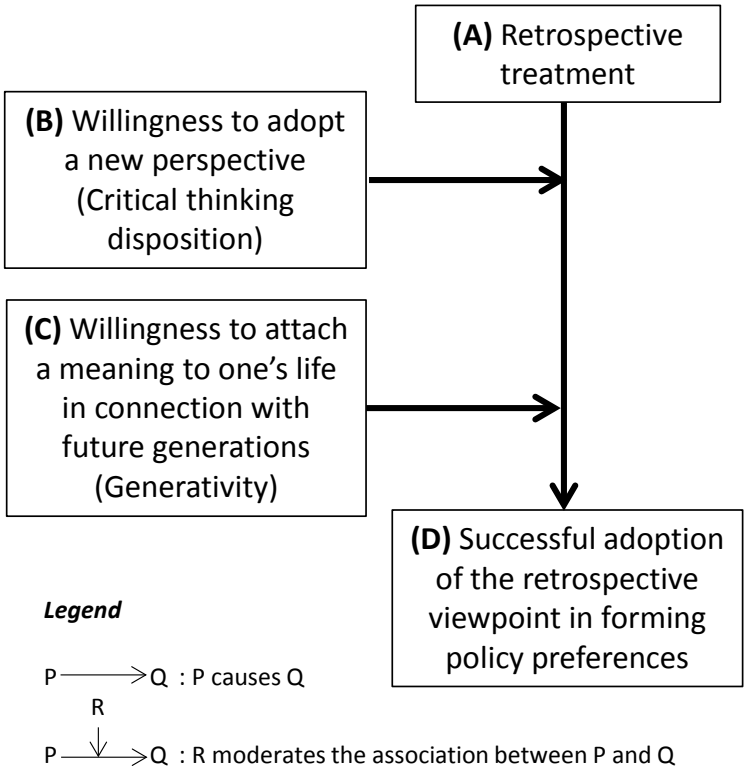
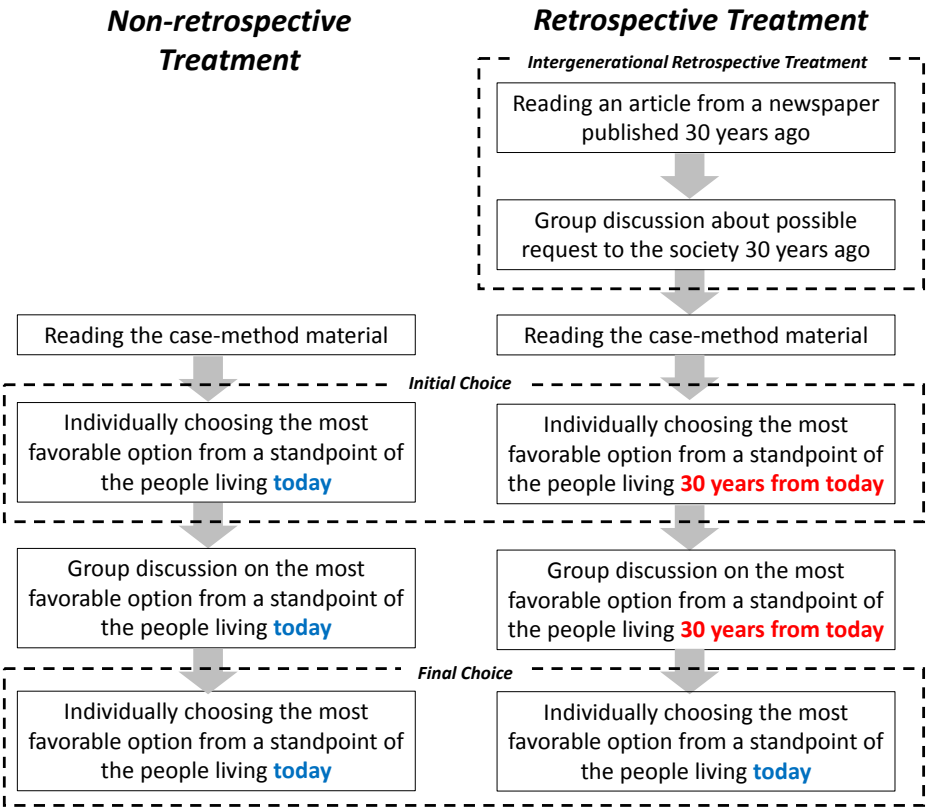


Figure 2: Experimental procedure.



Appendix A.

A1. A case of financial sustainability problems

A.1.1. A narrative account

Beneath a beautiful sunset, third-grade middle school student Yuma walked home feeling dejected in spite of the sky. He felt dejected because, even though the music instruments for the school brass band club were getting old and there were not enough of them, it had been decided that the club would not buy any more. Despite pestering the club's staff advisor about it, the response had been unsympathetic.

Staff advisor: All the same, the school didn't have the budget for it to begin with, and the budget has been cut recently… I'm really sorry.

The club has to avoid being unable to enter competitions due to a lack of instruments. The club's members thus came up with various ideas, such as raising money from classmates and local people, but there was also opposition, which included the view that there was no reason for people to pay and questioning who will collect the money. Today's club activity adjourned without the discussion reaching any resolution. Even after going home and having dinner with his family, the expression on Yuma's face was still downcast. His father, Shigeo, worried about the taciturn Yuma, spoke to him.

Shigeo: Yuma, what's the matter? You've been looking sad ever since you got home. Has something happened?

Yuma: Dad, um… at the club today… they said they can't replace our instruments because the school doesn't have the budget. Everyone in the club talked about it, but there wasn't any resolution…

So far, Yuma has been directing an unfocused resentment at the school budget, wondering why the school has so little money. Speaking of this, a teacher said in a recent civics class, “The Japanese government has more than ¥800 trillion debt, and social security expenses, such as pensions and healthcare, are continuing to increase. People may somehow be able to live well now. But if the government cuts spending and increases taxes, the people born in the future will face an unimaginable burden to pay the bill.” Did continual spending of the government budget and personal debts in the past lead to the current lack of budget for the brass band club? Yuma vented his discontent to his father.

Shigeo: I see. There certainly is talk that Japan is up to its neck in debt at the moment. On the other hand, there also seems to be an approach attempting to improve the nation’s financial position through the promotion of decentralization by the national government, so that local matters will be decided locally.

Taking the time to listen, Yuma gradually understood. At the moment, the national government gives local governments many subsidies. Kochi Prefecture is no exception, and approximately 60% of the prefecture’s budget is made up of subsidies, which it also uses for daily expenses, such as personnel expenses and infrastructure repairs (Figure A1). In exchange for cutting these subsidies, the national government will transfer tax revenue sources to local governments, so that they will pay for their own future expenditure with their own taxes. However, feeling that he did not understand completely, Yuma kept asking questions.

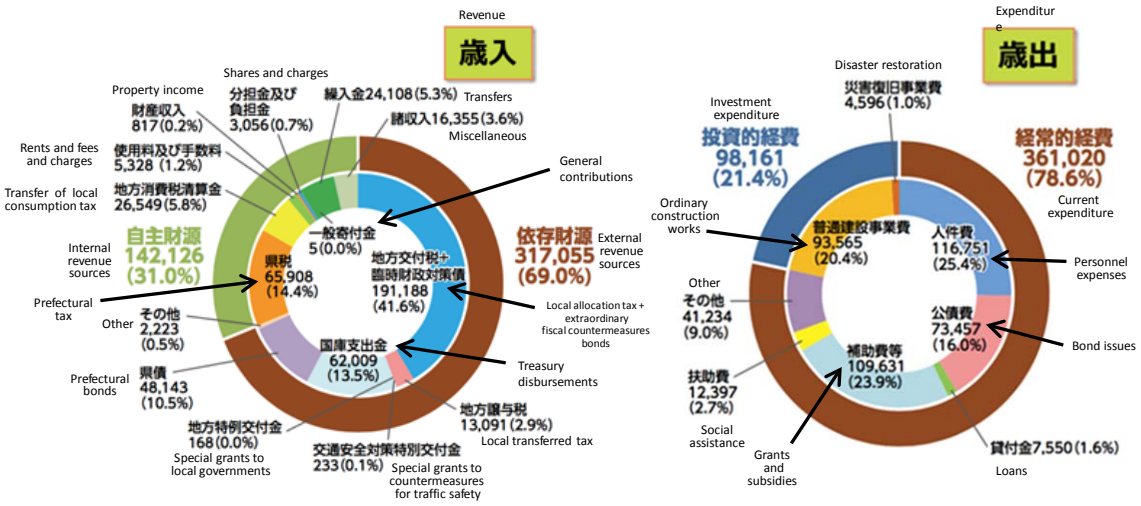


Figure A1: The revenue and expenditure of Kochi Prefecture in 2017[18]

Yuma: But if they do that, won't the national government's finances get worse because the taxes for the national government will decrease?

Shigeo: That may certainly be the case at the moment. But it may change in the future. For example, take Kochi Prefecture. The population will probably fall from what it is now in the future. Then prefectural taxes will decline. But because they won't necessarily make the roads shorter and gradually reduce the size of the schools to match the population, expenditure won't fall by that much. The only choice will be to further increase the subsidies from the national government. But if tax revenue sources are transferred to local governments, the national government will no longer pay that portion. It's a case of transferring tax revenue sources to localities beforehand and then saying later that you made an effort.

Well, that's true. Viewed from a long-term perspective, it is likely to help the national government's finances. But which is better? If there are subsidies from the national government, the prefecture will get by somehow, even as the declining birthrate and aging of the population continues. But the national government's future finances are unreliable, and it will be the end if the national

[18] Source: http://www.pref.kochi.lg.jp/soshiki/110401/files/2008123100544/file_20174241142754_1.pdf

government can no longer give out subsidies. Having said that, even if Kochi Prefecture does receive tax revenue sources to control from the national government, will it be able to cope with the decline in both the population and prefectural taxes without subsidies from the national government? Seeing Yuma's anxious expression, his father Shigeo showed him an article on the tablet as if he were reading his son's mind. It was about the town of Güssing in Austria. A small municipality with a population of approximately 4,000 people, Güssing was apparently called the "poorest region in Austria." Yuma read the article feeling anxious that municipalities in Kochi Prefecture might end up like that. However, the article was about how Güssing had promoted private-sector-led heating and power generation businesses using wood biomass with aid from the state, national government, and EU, successfully transforming itself into a wealthy municipality. More than 1,000 people had been employed in new jobs, and tax revenue was more than double the previous level. This was because Güssing was now able to generate a large amount of funds from outside the municipality with its biomass business.

Yuma: Güssing became a wealthy municipality with a lot of tax revenue by being able to earn money from external sources. If we can do business like this ourselves, we'll be able to manage even without subsidies.

Shigeo: That's right. But there are a lot of difficulties involved in actually trying to promote this kind of business.

It seems his father had heard talk about Güssing from acquaintances. Apparently, it was the EU rather than the local state or national government that initially worked for cooperation. At first, despite attempts to enlist local support, it seems that people throughout the electricity and gas industry, water companies, and smokestack industries were opposed, and politicians were not enthusiastic either. The reason the EU embarked on assistance was apparently the concern that, with a high rate of dependence on energy from outside the region, external energy supplies might cease in

the future.

Shigeo: But… if I were a business person in Güssing, I think I would probably have opposed it too. Imagine if your work is gone, and you or your family lose your livelihood… In the first place, I would worry about using Kochi Prefecture's budget for a project when we don't know if it will work or not. Unlike Güssing, if the project fails, the taxes won't come back, and we might be left with nothing but abandoned buildings.

Yuma was surprised to see his normally quiet father speaking with such unusual passion. His father's impassioned remarks continued.

Shigeo: Even if the project goes well in one area, it might widen inter-regional disparities between rich and poor. If Kochi Prefecture has the budget, shouldn't it try to help many regions even if only a little and protect the livelihoods of as many people as possible? I couldn't stand it if my town was abandoned and deserted.

Saying this, Shigeo started searching the internet for an article about Yubari. A succession of articles was displayed about the Yubari of the past, nostalgic for the days when it was full of coal mines, and articles reporting the decline of Yubari after the disappearance of its budget, which led to bankruptcy (Table A1). Apparently, after the bankruptcy in Yubari, most of the schools were closed and the number of public servants was reduced by 60%. Many young people left Yubari, while only the elderly remained. Yuma had the desolate feeling that he too might want to leave, even if it was his hometown.

Table A1: Changes in Yubari City over a Ten-Year Period

Item	Pre-bankrupcy	Current
Population based on basic resident register	13,268 (March 2006)	9,025 (March 2016)
Aging rate	40% (fiscal 2005)	49% (fiscal 2015)
Balance of debt	¥35.3 billion (fiscal 2006)	¥25.9 billion (fiscal 2015)
No. of city employees	263 (March 2006)	97 (March 2016)
No. of assembly members	18 (fiscal 2006)	9 (fiscal 2015)
Monthly salary of mayor	¥862,000 (fiscal 2006)	¥259,000 (fiscal 2015)
Monthly remuneration of assembly members	¥301,000 (fiscal 2006)	¥180,000 (fiscal 2015)
No. of elementary schools	7 (fiscal 2006)	1 (fiscal 2015)
No. of middle schools	4 (fiscal 2006)	1 (fiscal 2015)
No. of elementary school students	414 (fiscal 2006)	220 (fiscal 2015)
No. of middle school students	242 (fiscal 2006)	119 (fiscal 2015)
No. of shops	234 (2004)	114 (2012)
No. of tourists	1,469,000 (2005)	597,000 (2014)

(Source: Report of the Review Committee on Yubari City's Regeneration Policy. Translated by the author.)

Widening disparities could also mean that there will be more and more such municipalities. Güssing was successful, so it can be discussed in glowing terms, but there are also probably many regions where similar attempts failed, and earning money is essentially difficult. Ultimately, should the national government subsidize local government or should the local government be independent? Yuma suddenly remembered the school's brass band club. His own club might be the same as a region where subsidies have been cut. Up until now, the club had somehow been receiving subsidies from the school, but the school budget itself is insufficient, and the club does not know if it will be

able to continue receiving subsidies in the future. In the first place, the school budget is for everyone in the school, and not just for the use of the brass band club. In this situation, should they attempt to continue the brass band club's activities by seeking subsidies from the school or should they act to obtain funds from outside and organize the instruments themselves? They will have to choose either way. Doing it themselves sounds cool, but, in fact, it could mean getting into disputes like at today's club activities. If they do allocate club expenses only to their own club activities, they might raise donations if their activities become famous enough nationally as a result, but would the children in other clubs allow that? Yuma sighed deeply while imagining the school and brass band club of the future.

A.1.1 2. Addressing the Issues Surrounding the Positions of National and Local Governments

From the parent-child conversation in the previous section, what kind of position is conceivable for Japan's national government and Kochi Prefecture in the future? Japan's government has a lot of debt, even from a global perspective. Additionally, social security expenses (pension benefits, healthcare benefits, and nursing care benefits) are expected to increase sharply in the future. If Japan faces a major disaster, such as a Nankai earthquake or a recession, the national government will plunge into a fiscal crisis and the risk of no longer being able to afford the budget, including subsidies to local governments, will increase. In these circumstances, Kochi Prefecture's finances have become heavily dependent on subsidies from the central government. Given this fact, the following two issues for the future of Japan and Kochi Prefecture are likely to arise:

Issue 1: How much should the national government remove subsidies to prefectures and promote the transfer of tax revenue sources to prefectures to reduce Japan's national government debt over the long term? The more the central government cuts subsidies and transfers tax revenue sources, the more people who live in prefectures that have relied on subsidies, like Kochi Prefecture, will endure a steady decline in public services as the population declines. The national government will use the subsidies that have been cut to reduce Japan's national debt. This could lead to the national

government abandoning prefectures in regions where there is a heavy dependence on subsidies from the national government.

Issue 2: How much should Kochi Prefecture concentrate its budget on regions with projects that could earn money from outside the prefecture for Kochi Prefecture to be independent in the long term? The more Kochi Prefecture concentrates its budget on regions with projects that can earn income from outside the region, the more people who live in other regions within the prefecture will endure a steady decline in public services. Meanwhile, if projects are successful, regions where the budget was invested will be revitalized, but if the projects fail, these regions will decline. This could lead to Kochi Prefecture abandoning regions that did not establish projects that can earn external income and regions in the prefecture where the establishment of projects failed.

Ultimately, both issues are focused on how much individuals can endure a decline in public services.

A1.1.3. What actions should society take in 2017?

Based on the content so far, the four options in Table A2 are conceivable as positions that could be taken by Japan's national government and Kochi Prefecture. Which option is preferable for you, a Japanese citizen living in Kochi Prefecture?

Table A2: Overview of the four options

		Issue 2: To what extent will the prefecture abandon its internal regions for the sake of the independence of Kochi Prefecture?	
		(Financially less sustainable) Prefectural independence is important, but it should not abandon many regions.	**(Financially more sustainable)** There is no choice but to abandon many regions for the sake of prefectural independence.
Issue 1: To what extent will the national government abandon regional prefectures to maintain national public services?	**(Financially less sustainable)** Maintaining national public services is important, but the national government should not abandon regional prefectures.	**Option 1** "Equality-oriented Kochi takes a small gamble, relying on the national government."	**Option 3** "Practical Kochi takes a big gamble, relying on the national government."
	(Financially more sustainable) To avoid the cessation of national public services, there is no choice but to abandon regional prefectures.	**Option 2** "Persevering Kochi takes a small gamble, without relying on the national government."	**Option 4** "Self-reliant Kochi takes a big gamble, without relying on the national government."

Option 1 (Equality-oriented Kochi takes a small gamble, relying on the national government.)

While gradually transferring tax revenue sources to prefectures, the national government will provide insurance to partially compensate for a lack of prefectural funds with subsidies from the national government so that equality between prefectures can be ensured. The possibility of avoiding a fiscal crisis for the national government can be increased somewhat, and the expansion of economic disparities between prefectures can be reduced a little, even with the declining birthrate and aging population in the future. Under this scenario, Kochi Prefecture will invest approximately 10% of its available budget in regions with projects likely to earn external income before the national government's fiscal position reaches a crisis and subsidies from the national government are reduced. The prefecture can allocate a budget on a scale befitting a key policy to promising regions, but it does not know whether projects will succeed. Moreover, some regions in the prefecture will be left without a budget, causing serious adverse impact.

Option 2 (Persevering Kochi takes a small gamble, without relying on the national

government.)

While implementing a large-scale transfer of tax revenue sources to prefectures, the national government will practically eliminate all its subsidies to prefectures. Although the possibility of being able to avoid a fiscal crisis for the national government can be increased, economic disparities between prefectures are likely to increase as the decline in the birthrate and aging of the population advance. Under this scenario, Kochi Prefecture will invest around 10% of its available budget in regions with projects likely to earn external income, before the decline in the birthrate and aging of the population advance and prefectural tax revenue declines significantly. The prefecture can allocate a budget on a scale that corresponds to a key policy to promising regions, but it does not know whether projects will succeed. Moreover, some regions in the prefecture will be left without a budget, giving rise to a serious impact.

Option 3 (Practical Kochi takes a big gamble, relying on the national government.)

While gradually transferring tax revenue sources to prefectures, the national government will provide insurance to partially compensate for a lack of prefectural funds with subsidies from the national government, so that equality between prefectures can be ensured. The possibility of avoiding a fiscal crisis for the national government can be increased somewhat, and the expansion of economic disparities between prefectures can be reduced a little, even when the declining birthrate and aging population advance in the future. Under this scenario, Kochi Prefecture will invest around 30% of its available budget in regions with projects likely to earn external income before the national government's fiscal position reaches a crisis and subsidies from the national government are reduced. The prefecture can allocate a budget on an unprecedented scale to promising regions, but it does not know whether projects will succeed. Moreover, many regions in the prefecture will be left without a budget, giving rise to a serious impact.

Option 4 (Self-reliant Kochi takes a big gamble, without relying on the national government.)

While implementing a large-scale transfer of tax revenue sources to prefectures, the national

government will essentially phase out all its subsidies to prefectures. Although the possibility of being able to avoid a fiscal crisis for the national government can be increased, economic disparities between prefectures are likely to increase, as the decline in the birthrate and aging of the population advance. Under this scenario, Kochi Prefecture will invest around 30% of its available budget in regions with projects likely to earn external income before the decline in the birthrate and aging of the population advance and prefectural tax revenue declines significantly. The prefecture can allocate a larger budget to promising regions, but it does not know whether projects will succeed. Moreover, most regions in the prefecture will be left without a budget, giving rise to serious repercussions.

Several things should be noted regarding the above mentioned four options. First, regarding **Option 1**, when gradually transferring tax revenue sources from the national government to prefectures, prefectural tax revenue will not decline immediately, but is expected to fall approximately 15% by 2040 and Kochi Prefecture will have contributed that amount to increasing the national fiscal soundness. Additionally, if Kochi Prefecture invests 10% of its budget in promising regions, this is tantamount to a 10% decrease in the budget from the perspective of other regions. Based on the above, in the future, from the perspective of the abandoned regions within Kochi Prefecture, the prefectural budget will be (1 - 0.15) * (1 - 0.1) = 0.765, which will be a decrease of approximately 23% from the current budget. The impact will be the following examples, which will occur simultaneously in the regions that have been abandoned in Kochi Prefecture.[19] (The simulations listed below will not definitely occur in the real economy. You should consider them as examples of the policies required to remedy a budget shortfall. Obviously, there are ways of remedying a budget shortfall through other means, and the policies required will change according to different economic environments.)

[19] The population of Kochi Prefecture is forecast to decline by 30% by 2040 due to the declining birthrate and aging population. There is a strong mutual relationship between population, the size of the economy, and tax revenue. Therefore, tax revenue is expected to decline in the same way as the population. However, because half of the budget shortfall will be provided through national government subsidies, we anticipate that the decline in tax revenue will be 15%.

- The repair of 23 out of 100 damaged sections of prefectural road will be carried forward to the next fiscal year.
- If there are 10 public high schools, two or three of them will be closed and consolidated.
- The 209 full-time doctors at Kochi Prefecture's health centers will be reduced by 48.
- The number of wooden houses that can receive assistance for earthquake-reinforcement work per year will decline by 23%.

Second, regarding **Option 2**, when eliminating subsidies in exchange for the transfer of tax revenue sources from the national government to prefectures, prefectural tax revenue will not decline immediately, but is expected to fall by about 30% by 2040 and Kochi Prefecture will have contributed that amount to increasing the national fiscal soundness. Additionally, if Kochi Prefecture invests 10% of its budget in promising regions, this is tantamount to a 10% decrease in the budget from the perspective of other regions. Based on the above, in the future, from the perspective of the abandoned regions within Kochi Prefecture, the prefectural budget will be (1 - 0.3) * (1 - 0.1) = 0.63, which will be a decrease of approximately 37% from the current budget. This will result in the following examples occurring simultaneously in the regions that have been abandoned in Kochi Prefecture:

- The repair of 37 out of 100 damaged sections of prefectural road will be carried forward to the next fiscal year.
- If there are 10 public high schools, three or four of them will be closed and consolidated.
- The 209 full-time doctors at Kochi Prefecture's health centers will be reduced by 77.
- The number of wooden houses that can receive assistance for earthquake-reinforcement work per year will decline by 37%.

Third, regarding **Option 3**, when gradually transferring tax revenue sources from the national government to prefectures, prefectural tax revenue will not decline immediately, but is expected to fall by about 15% in 2040 and Kochi Prefecture will have contributed that amount to increasing the national fiscal soundness. Additionally, if Kochi Prefecture invests 30% of its budget in promising

regions, this is tantamount to a 30% decrease in the budget from the perspective of other regions. Based on the above, in the future, from the perspective of the abandoned regions within Kochi Prefecture, the prefectural budget will be (1 - 0.15) * (1 - 0.3) = 0.595, which will be a decrease of approximately 40% from the current budget. The impact will be that the following examples will occur simultaneously in the regions that have been abandoned in Kochi Prefecture:

- The repair of 40 out of 100 damaged sections of prefectural road will be carried forward to the next fiscal year.
- If there are 10 public high schools, four of them will be closed and consolidated.
- The 209 full-time doctors at Kochi Prefecture's health centers will be reduced by 83.
- The number of wooden houses that can receive assistance for earthquake-reinforcement work per year will decline by 40%.

Fourth, regarding **Option 4,** when eliminating subsidies in exchange for the transfer of tax revenue sources from the national government to prefectures, prefectural tax revenue will not decline immediately, but is expected to fall by about 30% in 2040 and Kochi Prefecture will have contributed that amount to increasing the national fiscal soundness. Additionally, if Kochi Prefecture invests 30% of its budget in promising regions, this is tantamount to a 30% decrease in the budget from the perspective of other regions. Based on the above, in the future, from the perspective of the abandoned regions within Kochi Prefecture, the prefectural budget will be (1 - 0.3) * (1 - 0.3) = 0.49, which will be a decrease of approximately 51% from the current budget. This will result in the following examples occurring simultaneously in the regions that have been abandoned in Kochi Prefecture:

- The repair of 51 out of 100 damaged sections of prefectural road will be carried forward to the next fiscal year.
- If there are 10 public high schools, five of them will be closed and consolidated.
- The 209 full-time doctors at Kochi Prefecture's health centers will be reduced by 106.
- The number of wooden houses that can receive assistance for earthquake-reinforcement work

per year will decline by 51%.

The possible impact of the four options are summarized in Table A3.

Table A3: Possible Impact of the four options

Option/Impact	Risk of national government fiscal bankruptcy	Level of uniform public services for prefectural residents	Independence of Kochi Prefecture
Option 1 "Equality-oriented Kochi"	Quite large	Will not decline until national government is bankrupt	Aiming for a little
Option 2 "Persevering Kochi"	Moderate	Will decline significantly	Aiming for a little
Option 3 "Practical Kochi"	Quite large	Severe decline	Aiming for a lot/ Contradiction of independence with support from national government
Option 4 "Self-reliant Kochi"	Moderate	Extremely severe decline, possibility of riots and demonstrations	Aiming for a lot/Failure means prefecture will go under