Fiscal rules and creative accounting: Evidence from Japanese municipalities

Hirota, Haruaki and Yunoue, Hideo

Musashi University, Nagoya City University

20 June 2017

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Haruaki Hirota † Hideo Yunoue ‡

January 29, 2021

Abstract

The purpose of this paper is to analyze the fiscal effects and creative accounting by stock-flow adjustments in Japanese municipalities after the introduction of a new fiscal rule using a difference-in-differences method. We contribute to the literature on creative accounting in the following three ways. First, we focus on the interrelationship of the new fiscal indexes that include three flow indexes and one stock index. Second, we investigate the stock-flow adjustments regarding the relationship between the increase in the change in debt stock and the decrease in the deficit to measure creative accounting. Third, we reveal the kinds of expenditures and revenues that affect the deficit. Our main contribution is the finding that the municipalities engage in stock-flow adjustments while improving the new fiscal indexes through intergovernmental transfers. This phenomenon is creative accounting because the municipalities delay improving their fiscal deficits.

JEL Classification: H72, H73, H74, H77

Keywords: fiscal rule, creative accounting, stock-flow adjustments, soft budget constraint, difference in differences

*We would like to thank Michihito Ando, Sebastian Bless, Geoffrey Brennan, Julie Berry Cullen, Takero Doi, David Fielding, Mototsugu Fukushige, Keigo Kameda, Kimie Harada, Isao Horiba, Hitoshi Inoue, Mitsunari Ishida, Shigemichi Kanasaka, Takashi Kuramoto, Tomohisa Miyashita, Yutaro Murakami, Makoto Hasegawa, Hideo Nakai, Katsuyoshi Nakazawa, Masashi Nishikawa, Shuhei Nishitateno, Tatsuyoshi Okimoto, Hitoshi Saito, Shin Saito, Ahmed Skali, and Kota Sugahara for their helpful comments and suggestions. We also thank the participants of the 2017 Japan local public finance seminar, the 2017 Australasian Public Choice Conference, the 2017 Japan Public Choice Conference, the Workshop on Municipal Mergers and Local Public Finance at the VATT, the 74th Annual Congress of the International Institute of Public Finance, the AJRC seminar at ANU, the Public Economics seminar at the University of Adelaide, and the Japan-Taiwan Seminar on Public Finance for their many useful comments. The authors acknowledge the financial support received from the JSPS KAKENHI (No. 17K13752, No. 18H03433, No. 18K01662, No. 19H01500, No. 20H01504, No. 20H01450), Grant-in-Aid for Research in Nagoya City University (No. 2021202) and Shikishima Foundation (JOSE402001).

†Haruaki Hirota, Professor, Faculty of Economics, Musashi University; 1-26-1, Toyotama-kami, Nerima-ku, Tokyo, 176-8534, Japan. E-mail:hirota@cc.musashi.ac.jp

‡Hideo Yunoue, Associate Professor, Graduate School of Economics, Nagoya City University; 1 Yamanohata, Mizuho-cho, Mizuho-ku, Nagoya, Aichi, 467-8501, Japan. E-mail:yunoue@econ.nagoya-cu.ac.jp

1 Introduction

Alesina and Perotti (1996) show that a fiscal policy encouraging the issuance of government bonds tends to expand fiscal deficits due to political influence. They argue that the expansion of the fiscal deficit is caused by a lack of specific fiscal rules or the low transparency of budget institutions.

Previous studies of the positive effects of fiscal rules are conducted using country- or state-level data from places such as the US, the EU, or the OECD (e.g., Eichengreen and Bayoumi (1994), Poterba (1994), von Hagen and Harden (1995), Kirchgässner (2002), Debrun et al. (2008)). Similarly, some studies investigate the effects of the fiscal rules on local government and support the effectiveness of fiscal rules (e.g., Luechinger and Schaltegger (2013), Foremny(2014), Chatagny (2015), Grembi et al. (2016), Burret and Feld (2018a), Burret and Feld (2018b)). Most previous studies show that a relationship exists between fiscal rules and fiscal deficits and reveal that fiscal deficits are likely to be small when fiscal rules are strict.

To the best of our knowledge, however, some studies note that fiscal deficits could increase when fiscal rules are suddenly changed or that the transparency of the budget institution is decreased even when fiscal rules are strict. Milesi-Ferretti (2003) conducts a theoretical analysis suggesting that fiscal adjustment or creative accounting can easily result when introducing fiscal rules under fiscal institutions with low transparency. Moreover, even if fiscal rules have a strong effect on improving fiscal conditions, introducing overly strict fiscal rules can result in the use of accounting gimmicks, including creative accounting.

In addition to the theoretical analysis, although the definitions of creative accounting differ depending on the country or study, some studies empirically investigate creative accounting using country-level data (e.g., Koen and van den Noord (2005), von Hagen and Wolff (2006), Beetsma et al. (2009), Maltritz and Wüste (2015), Reischmann (2016)). In particular, von Hagen and Wolff (2006) define creative accounting as "stock-flow adjustments" including the issuance of zero-coupon bonds, transactions in public assets, the privatization of public enterprises, the manipulation of record timing, etc. Their study reveals that there are large differences between the accumulated fiscal deficits as flow variables and debt stocks as stock variables. Maltritz and Wüste (2015) find a significant influence on fiscal rules and stock-flow adjustments in countries. Also, Reschmann (2016) finds that countries engage in creative accounting before regular elections to improve the appearance of the budget balance.

Moreover, creative accounting in local governments has been empirically studied. Balduzzi and Grembi (2011) focus on changes in the fiscal rules of Italian municipalities to investigate creative accounting but find that the municipalities are not affected by changes in the fiscal rules. Conversely, Clémenceau and Soguel (2017) detect creative accounting in Swiss cantons. Furthermore, Burret and Feld (2018a) reveal that Swiss cantonal debt brakes reduce fiscal deficits, but the debt brakes cause some unintended effects, including evasion into unconstrained accounts, emphasizing the importance of constraining all accounts[1]. Therefore, the study of creative accounting in local governments remains controversial.

In this paper, we identify the fiscal effects of a new fiscal rule in Japan - called "The Law Relating to the Financial Soundness of Local Governments" (*Chihou*

[1]Goto and Yamamoto (2019) investigate creative accounting regarding municipal mergers.

Koukyoudantai no Zaisei no Kenzenka ni Kansuru Houritsu in Japanese) - which focuses on creative accounting, including stock-flow adjustments, by applying a difference-in-differences (DID) method and using data from fiscal years (FY hereafter) 2007 to 2010. The new fiscal rule introduces four fiscal indexes comprising three flow indexes and one stock index. These new indexes target not only the general accounts of each municipality but also those of extra-governmental organizations to reveal the fiscal conditions of all public sector entities.

Before the introduction of the new fiscal rule, the fiscal management of all municipalities operated under the former fiscal rule for approximately 60 years. However, because the former fiscal rule included only two of the indexes related to fiscal balances and targeting general accounts, some of the municipalities were easily able to shift a portion of the fiscal deficits in their general accounts to extra-governmental organizations to hide their poor fiscal condition. The new fiscal rule was introduced in FY2008 to address this problem.

Then, on April 1, 2008, the central government enforced the new fiscal rule and disclosed the formulas of the new fiscal indexes to the municipalities on April 28, 2008. We use the time lag of institutional change because the municipalities could not calculate their new fiscal indexes by themselves before the enforcement of the rule. In particular, some of the municipalities that suffer from a large former redemption index might engage in creative accounting under the new fiscal rule.

We contribute to the literature on fiscal rules and creative accounting in the following three ways. First, we focus on the interrelationship of the four new fiscal indexes. From a global perspective, this new fiscal rule in Japan is atypical because, in many countries, local governments introduce either budget or debt-limit rules. Previous studies have investigated the effects of only one type of fiscal rule. However, the new fiscal rule in Japan simultaneously adopts three flow indexes and one stock index for the municipalities.

These three flow indexes have both "yellow cards", which require the municipalities to plan for early financial soundness, and "red cards", which require the municipalities to be under the control of the central government to rebuild stable financial conditions. The stock index does not include a red card. Thus, some of the municipalities that suffer from large fiscal deficits may have an incentive to attain fiscal effects to avoid fiscal management under the supervision of the central government. Thus, these municipalities may decrease their flow indexes by increasing their stock indexes, which would not include a red card.

Moreover, another contribution of this study is its focus on extra-governmental organizations after the introduction of the new fiscal rule. The Japanese new fiscal rule is clearly different from those of other countries. The new fiscal indexes target not only the general accounts but also extra-governmental organizations. Thus, we consider fiscal effects that may occur among all of the public sector accounts.

Second, to investigate creative accounting, we focus on the definition of stock-flow adjustments based on von Hagen and Wolff (2006). Even if municipalities appear to improve their new fiscal indexes, sugarcoated results might be obtained by stock-flow adjustments. According to von Hagen and Wolff (2006), stock-flow adjustments define $SFA_t = B_t - B_{t-1} - D_t$, where B_t is debt stock in period t, and D_t is deficit at period t. We evaluate the relationship between the change in debt stock $B_t - B_{t-1}$ and deficit D_t, where D_t is the difference between expenditure E_t and revenue R_t in period t.

Since it is difficult for municipal government outsiders to know whether the increment of SFA_t is really caused by an increased deficit or a change in debt stock values, which is accounted as SFA_t when the debt stock increases, municipalities would manipulate SFA_t to hide the increase in the deficit. In other words, if the change in debt stock is positive and the deficit is negative when stock-flow adjustment is positive in our estimations, we conclude that municipalities engage in creative accounting by stock-flow adjustments.

Third, to investigate how municipalities engage in stock-flow adjustments within legal limitations, we also focus on categories of expenditures and revenues, which are the contents of the deficit D_t. We must check whether municipalities change their expenditures or revenues, including intergovernmental transfers from upper-governments. Even if the municipalities improve the new fiscal indexes without breaking the new fiscal rule, engagement in stock-flow adjustments can result in the delay of fiscal soundness or hide fiscal conditions.

Supposed that the sign of the deficit D_t is negative and that of the change in debt stock $B_t - B_{t-1}$ is positive. As one of the scenarios, municipalities engage in stock-flow adjustment by decreasing their expenditures E_t for the decrease in the deficit while increasing the change in debt stock. In this scenario, municipalities delay the fiscal improvement and shift their fiscal burdens toward future generations because they decrease public services for current generations. As another one of the scenarios, municipalities engage in stock-flow adjustments by increasing their revenues R_t for the decrease in the deficit while increasing the change in debt stock. In this scenario, we consider that there are two cases to increase the total revenue R_t: the increase in local taxes and the increase in the intergovernmental transfers from upper-governments.

In the former case, if municipalities increase local taxes while increasing the change in debt stock, they delay the fiscal improvement and shift their fiscal burdens toward future generations similar to the scenario with the decrease in expenditure E_t. Conversely, in the latter case, if municipalities increase both the intergovernmental transfers from upper-governments and expenditures at the same time, we are concerned about the problem of the soft budget constraint. The soft budget constraint problem explains that public finance becomes inefficient due to expectations for relief by upper-governments, and the problem arises whenever the local governments can extract ex-post larger transfers or bonds than would have been considered efficient ex-ante[2].

In other words, municipalities can achieve a decrease in the deficit with both an increase in expenditures and a greater increase in revenues through a large number of intergovernmental transfers from upper governments. The reason is that the fiscal conditions of Japanese municipalities largely depend on transfers from upper-governments, which account for more than 30% of local governments' total revenue, on average. Some municipalities largely depend on transfers, which account for approximately 70% of the total revenue. For example, Akai et al. (2003) revealed the problem of the soft budget constraint by using the 1990s data of both intergovernmental transfers from the central government and expenditures at the municipal level. Therefore, we investigate the fiscal effects on both categories of

[2]The concept of the soft budget was first proposed by Kornai (1986) in the context of a socialist economy. For more information, please see Kornai et al. (2003), Akai and Sato (2008), and many other studies.

expenditures and revenues.

This paper is structured as follows. Section 2 explains the institutional background and former fiscal rule. Section 3 presents the Japanese new fiscal rule enacted in 2008. Section 4 explains the empirical methods used. Section 5 presents the estimation results and robustness checks, Section 6 presents the mechanism of stock-flow adjustments, Section 7 discusses our results, and Section 8 concludes the paper.

2 Institutional background

2.1 Local public finance in Japan

We briefly describe the institutional background of Japanese local public finance and fiscal rules. The public sector, based on the System of National Accounts, comprises the central government, local government, and social security fund.

In FY2007, the gross domestic expenditures of Japan were 515 trillion Japanese yen (JPY), which was approximately 5 trillion United States dollars (USD) at an exchange rate of 100 JPY to one USD. Local governments' expenditures were 57 trillion JPY (0.57 trillion USD), while the central government's expenditure was 20 trillion JPY (0.2 trillion USD). The proportion of the local governments' expenditures relative to the gross domestic expenditures was approximately 11.2% in FY2007, which is approximately three times greater than that of the central government. This finding indicates that the local government is highly dependent on intergovernmental transfers from the central government.

In terms of the scale of the settled accounts, the ratio of the central to the local governments' tax revenue was six to four in FY2007. Conversely, the ratio of the central to local governments' expenditures was four to six. Thus, the central government's revenues were larger than those of the local governments, but the former's expenditures were smaller. This gap was filled by intergovernmental transfers from the central to local governments. On average, the intergovernmental transfers accounted for 30% of local governments' total revenues.

Japanese government exists in a three-layer system: the central, prefectural, and municipal governments (cities, towns, and villages). Local governments play an important role in providing many public services, including public education, public welfare, public health, fire services, construction work, and waste disposal. In the municipalities, the expenditure size comprises public welfare, construction work, and debt servicing expenses.

In addition, classified by expenditure categories, municipal expenditures can be divided into obligatory expenses (personnel expenses, social assistance expenses, and public debt payments); investment expenses, including ordinary construction expenses; and other expenses, including reserve funds and money transfers to extra-governmental organizations.

The obligatory expenses were approximately 46.4 trillion JPY in FY2007 (the expenditure composition ratio was 52.1%); the investment expenses were approximately 13.8 trillion JPY (the ratio was 15.6%); and the other expenses, including reserve funds, loans, and money transfers, were approximately 28.8 trillion JPY (the ratio was 32.2%). In the 2000s, social assistance expenses and public debt payments gradually increased, while ordinary construction expenses decreased.

Classified by revenue categories, municipal revenues can be divided into general purpose revenues that comprise local taxes, local tax allocation grants (LAT grants), special local tax allocation grants (special LAT grants), etc.; specific purpose revenues that comprise subsidies, local bonds, etc.; and other revenues. LAT grants are a general purpose grant for local governments. The number of LAT grants provided to each municipality is determined by the central government based on municipal fiscal shortages for each fiscal year. Also, special LAT grants are general purpose grants for disaster recovery and unexpected special cases. Subsidies are specific purpose revenues for public projects and educations.

The local taxes were approximately 40 trillion JPY in FY2007 (revenue composition ratio was 44.2%); both LAT and special LAT grants were approximately 15 trillion JPY (the ratio was 16.7%); the subsidies were approximately 10 trillion JPY (the ratio was 11.2%); and local bonds were approximately 9.5 trillion JPY (the ratio was 10.5%). Other revenues were approximately 16 trillion JPY (the ratio was 17.4%)[3].

2.2 Classification of municipalities

The number of the municipalities was 1,799 at the end of FY2007, which was divided into 783 cities (*shi*), 815 towns (*machi*), and 201 villages (*mura*). The cities are also divided into four categories: ordinance-designated cities (*Seirei Shitei toshi*), core cities (*Chukaku shi*), special-case cities (*Tokurei shi*), and standard cities. The cities comprise 17 ordinance-designated cities, 35 core cities, 44 special-case cities, and others.

The cities have different types of authorities and fiscal resources for the administration. Ordinance-designated cities are those with a population of 500,000 or more and are designated by a cabinet order under a special provision. Such cities have nearly the same level of authority and fiscal resources as prefectures. Core cities are those with a population size of at least 300,000, and part of their authority is delegated by the prefectures, although the scope of their authority is smaller than that of ordinance-designated cities. Similarly, special-case cities are those with a population size of at least 200,000, and part of their authority is delegated by the prefectures, although the scope of their authority is smaller than that of core cities. Cities are defined as having a population size of at least 50,000; the authority is similar to that among cities, towns, and villages. However, there is a little difference in the authority of urban planning or other policies among cities, towns and villages.

2.3 Public accounts for municipal governments

Normally, in public finance, the accounts of the municipal government are divided into general and special accounts. Special accounts consist of public enterprise accounts, such as those for transport businesses, electricity businesses, gas businesses, and residential land development projects. However, because each municipality provides different services depending on the local conditions, the types of special accounts differ.

[3]For further information on the LAT grant system, see Ihori (2009), Saito and Yunoue (2009), and Hirota and Yunoue (2017). Moreover, other revenues comprise special grants (Chihou tokurei koufukin), etc.

To compare the accounts of all municipalities uniformly, the Japanese central government establishes "ordinary accounts" that cover the general accounts and a common component of the special accounts. Thus, we can elucidate the fiscal conditions of the municipalities and conduct a statistical comparison among them using ordinary and other public enterprise accounts.

The municipal governments include some extra-governmental organizations, including partial administrative associations (*Ichibu Jimu Kumiai*), wide-area local public bodies (*Kouiki Rengou*), local public corporations (*Chihou Kousha*), and third-sector enterprises. These organizations have accounts independent from the ordinary accounts. Partial administrative associations and wide-area local public bodies are extra-governmental organizations that cooperate with neighboring municipalities to provide public services, including fire rescue, waste-removal services, and public long-term care insurance. Partial administrative associations provide a single service in cooperation with neighboring municipalities. Wide-area local public bodies provide multiple services in cooperation with neighboring municipalities. Third-sector enterprises are joint enterprises between the public and private sectors.

2.4 Former fiscal rule

2.4.1 Former deficit index

Before the new fiscal rule was enacted in FY2008, the fiscal management of all of the municipalities was conducted under "The Law on Special Measures for the Promotion of Local Financial Reconstruction" (*Chihou Zaisei Saiken Sokushin Tokubetsu Sochi Hou*), which is referred to as the former fiscal rule. The former fiscal rule was enforced from FY1955 to FY2009 and targeted only the ordinary accounts for the municipalities.

The central government established a "former deficit index" (*Jisshitsu Akaji Hiritsu*) for local governments and defined the financial reconstruction stage (red card) in the former fiscal rule. If the former deficit index was less than 20%, the municipalities had to undertake fiscal reconstruction under the control of the central government and were not allowed to issue local bonds. The municipalities under the control of the central government had to formulate a fiscal reconstruction plan with the agreement of the Ministry of Internal Affairs and Communications (MIC). Thus, since the former fiscal rule had only the red card criterion, not the yellow card, the municipalities suddenly faced the problem of fiscal reconstruction when the former deficit index exceeded 20%.

Additionally, "The Local Public Enterprise Law" (*Chihou Koei Kigyo Hou*), which corresponds to the former fiscal rule for the municipalities, was applied to the public enterprise accounts. Although public enterprises had adopted a financially independent accounting system approximately 60 years previously, the system in Japan is quite far removed from international accounting standards or those used in private companies.

For example, the notice of the MIC relating to public enterprises approved the municipalities' implementation of an expense of "money transfers" (*Kuridashikin*) to the extent that they considered necessary from the ordinary accounts to the public enterprise accounts or other accounts for management.

2.4.2 Former redemption index

In addition to the former fiscal rule, the central government practically managed the permission system of the bond issuance for local governments from FY1947 to FY2006 based on "The Local Autonomy Law" (*Chihou Jichi Hou*), which is a different legal basis from the former fiscal rule. The aim of the permission system of the bond issuance was for the central government to impose a temporary limitation of the bond issuance to control local public finance for restoration in the post-WWII period. The law required temporal permission for bond issuance by the minister or prefectural governor.

However, the permission system for bond issuance had been managed previously by the central government as a customary practice of the local public finance system without a clear legal basis. The official notices for bond issuance permission from the administrative vice-minister (*Chihousai Hakkou Kyoka Houshin*) were frequently announced to reduce bond issuances and were sufficient for local governments over the past 60 years. Although the notices had no legal basis, they strongly affected fiscal management, especially the ordinary accounts of the municipalities (see, for example, Doi (2007), Mochida and Hayashi (2018) for details.).

To manage the permission system of bond issuance, the central government established a "former redemption index" (*Kisai Seigen Hiritsu*) and set some criteria for the ordinary accounts. If the former redemption index ranged from 14% to 20%, the municipalities were called a caution group, and they then had to formulate a bond management plan, on which no penalties were imposed. Additionally, if municipalities were in the caution group and had to formulate the plan, they would receive special LAT grants from the central government. In contrast, the municipalities with indexes ranging from 20% to 30% were called a partial limitation group, and those with indexes greater than 30% were called a strict limitation group. These two limitation groups had to obtain permission from the central or prefectural government to issue new bonds. Thus, these criteria were exogenously determined by the upper government under the former fiscal rule.

2.4.3 Problems with the former fiscal rule

The former fiscal rule had many problems, rendering the high transparency and accountability of fiscal management difficult because these indexes were based on different laws. Considering these points, the MIC summarized the problems of the former fiscal rules as follows: (1) the disclosure of fiscal information is inadequate; (2) the red card criterion exists only for the deficit index, and no yellow card criterion exists; (3) the deficit index is a flow index and targets only the ordinary accounts; and (4) public enterprises have the same problems.

Even if some municipalities seemed to have better fiscal conditions, they made it seem so by drawing on "reserve funds" (*Tsumitatekin*), which were kept for the repayment of debts in the future. Some municipalities were easily able to shift a part of the fiscal deficits of their ordinary accounts to extra-governmental organizations to hide poor fiscal conditions since the former fiscal rule included only two of the indexes related to fiscal deficits and the redemption indexes of the ordinary accounts as a target.

Other municipalities have sometimes manipulated the fiscal conditions of the public enterprise accounts by increasing the amounts of money transfers from ordi-

nary accounts to public enterprise accounts beyond the expected level of the central government (*Kuridashi Kijyun*) to compensate for the public enterprises' fiscal deficits (for example, Konishi (2014)). This phenomenon has occurred because public enterprises are divided under the law into two groups between regulated (*Hou Tekiyou*) and non-regulated enterprises (*Hou Hi Tekiyou*), rendering money transfers difficult to monitor. The amounts of the money transfers for regulated enterprises, including water, transportation, electricity, gas, hospital services, etc., were monitored by the central government, but those for non-regulated enterprises, including small-scale water service, the management of sewerage service, etc., were weakly monitored. Thus, the criteria for money transfers to public enterprises were proposed by the central government each year as a preferable transfer level, but the money transfers for sewerage services of non-regulated enterprises quite often exceeded the criteria. Thus, the fiscal conditions of extra-governmental organizations were difficult to observe under the former fiscal rule because these organizations did not have a certain index, and no penalties were in place for money transfers.

As an unusual case apart from creative accounting, Yubari city in Hokkaido prefecture went practically fiscal bankrupt in March 2007, when its former deficit index reached 791%. This event was due to illegal creative accounting between ordinary accounts and extra-governmental organizations, such as third-sector enterprises. Because Yubari city transferred large debts, which it had to repay, to the other accounts, it accumulated debts approximately 65 times as large as its tax revenue before bankruptcy. Thus, Yubari city is reconstructing its fiscal conditions with a severe restriction under the control of the central government from 2007 to 2027.

3 New fiscal rule in 2008

3.1 Introduction of the new fiscal rule

To improve fiscal conditions and work toward a high level of transparency in fiscal management, the central government enacted "The Law Relating to the Financial Soundness of Local Governments" (*Chihou Koukyoudantai no Zaisei no Kenzenka ni Kansuru Houritsu*) for local governments, which is referred to as the "new fiscal rule". The new fiscal rule went into force in FY2008 and included four new fiscal indexes.

Fig. 1 shows the timeline for the introduction of the new fiscal rule. Japanese fiscal year begins in April. The new fiscal rule was promulgated on June 22, 2007, and announced the setting of the new fiscal indexes on December 7, 2007, but the detailed formulas of the new fiscal indexes were not decided at that time. The central government ordered local governments to disclose the new fiscal indexes from the settled account of FY2007. Thus, we can obtain the confirmed data of the new fiscal indexes in each municipality from FY2007.

The enforcement of the new fiscal rule means that, except for the fiscal indexes in FY2007, the municipalities are penalized if they do not meet the criteria and could come under the control of the central government. While the confirmed indexes of FY2007 carry no penalties, penalties are imposed after FY2008 if at least one index exceeds a criterion.

An important point of this enforcement of the fiscal rule is that the formulas

of the new fiscal indexes were not disclosed to the municipalities in FY2007. The central government enforced the new fiscal rule on April 1, 2008. The formulas of the new fiscal indexes were disclosed on April 28, 2008, and then an explanatory meeting was held by the MIC to present detailed formulas for the municipalities on May 9, 2008. Based on the result of the meeting, the municipalities disclosed their confirmed indexes for FY2007 on November 28, 2008. Since the fiscal year in 2007 had already ended at the time of the formula's disclosure, municipalities found it difficult in practice to manipulate their indexes for FY2007 by using the methods described in the previous section, such as decreasing reserve funds, increasing money transfers, or hiding deficits.

This paper assumes that the new fiscal rule affects the municipal settled accounts after FY2008. Thus, we focus on both the timing of the announcement of the new fiscal rule in FY2007 and on the fiscal indexes after FY2008 to identify the fiscal effects of the introduction of the new fiscal rule.

3.2 New fiscal indexes

The new fiscal indexes comprise four fiscal indexes, including both the revised deficit and the revised redemption indexes: three flow indexes and one stock index. These new indexes cover not only the ordinary accounts in each municipality but also extra-governmental organizations to reveal the true fiscal condition of the public sector[4].

The "deficit index" is the ratio of the fiscal deficit of the ordinary accounts to the standard financial scale of the municipalities as a flow index[5].

$$Deficit = \frac{Fiscal\ deficit}{Standard\ financial\ scale}$$

The standard financial scale includes the general purpose revenues of the municipalities for each fiscal year, which consist of standard local tax revenues and LAT grants from the central government. The deficit index covers only the ordinary accounts with nearly the same scope as the former fiscal rule.

The "consolidated deficit index" is the ratio of the consolidated fiscal deficit of the ordinary accounts and the public enterprise accounts to the standard financial scale of the municipalities as a flow index.

$$Consolidated\ deficit = \frac{Consolidated\ fiscal\ deficit}{Standard\ financial\ scale}$$

The consolidated deficit index covers the ordinary accounts and the public enterprise accounts. Under the former rule, we were able to check for the bad debt only of each public enterprise. Although the municipalities generally manage public enterprises, the relationship between the ordinary accounts and the public enterprise accounts was difficult to confirm.

[4]Appendix B.1 presents the target accounts of the new fiscal indexes that measure the degree of municipal fiscal soundness.

[5]In this section, we follow the "White Paper on Local Public Finance, 2007", which was published by the MIC. For details, see MIC (2007), and appendix A

The "redemption index" is the ratio of the number of the redeemed bonds of the ordinary accounts, the public enterprise accounts, the partial administrative associations, and the wide-area local public bodies to the standard financial scale of the municipality as a flow index.

$$Redemption = \frac{Redemption\ of\ bond}{Standard\ financial\ scale}$$

The redemption index covers the ordinary accounts and the wide-area local public bodies and shows how much debt the municipalities must repay each year. However, the redemption index is calculated by excluding specific grants from the numerator of the index. Therefore, if the municipalities increase the number of specific grants that they are awarded, they can reduce their redemption indexes.

The "future burden index" is the ratio of the current outstanding balance of the future burden, including that of the debts of the local general account, as well as other likely future payments. It represents the extent to which finances may be tight in the future. The future burden index covers all public sector entities in each municipality.

$$Future\ burden = \frac{Future\ burden}{Standard\ financial\ scale}$$

The numerator of the future burden index consists of the accumulated debts in the ordinary accounts and the debt burdens of extra-governmental organizations and also includes the consolidated fiscal surplus as a stock variable. Thus, if the municipalities have a large debt burden in their third-sector enterprise accounts, their future burden indexes increase. However, the future burden index is calculated by excluding the estimated amount of specific grants and appropriable funds, including reserved funds and others, from the numerator of the index. Therefore, if the municipalities increase the amount of their specific grants or decrease their reserved funds, then they can reduce their future burden indexes.

Additionally, we focus on fund reserves and money transfers to public enterprises. The numerators of both the consolidated deficit and the future burden indexes include the amount of fund reserves. If municipalities increase fund reserves, they can improve both of these indexes. Then, the numerators of both the consolidated deficit and the future burden indexes include, to some extent, estimated amounts of the money transfers from the ordinary to other accounts, but the money transfers to both regulated and non-regulated enterprises remain important problems. Thus, we should investigate the money transfers, in addition to the new fiscal indexes.

3.3 Criteria of the new fiscal indexes

Fig. 2 presents a diagram of the financial status of the local governments. The new fiscal rule establishes four new indexes and requires local governments to disclose them thoroughly with the aim of quickly achieving financial soundness or rebuilding.

The four new indexes include a number of financial criteria: For example, if the municipalities exceed the deficit index by between 11.25 and 15%, depending

on their fiscal size, they are within the early financial soundness restoration stage (yellow card) and must improve their fiscal conditions by themselves. In these cases, the municipalities must formulate a financial soundness plan to be approved by local councils and conduct a mandatory external audit. Additionally, the municipalities must report on their implementation progress to local councils and via public announcements every fiscal year. If the early achievement of financial soundness is deemed very difficult, the MIC or the prefectural governor makes necessary recommendations. All four indexes include a yellow card.

Moreover, if the municipalities exceed the deficit index of 20 %, they are within the financial rebuilding stage (red card) and must be fiscally managed under the control of the central government. These municipalities must perform thorough financial rebuilding with the involvement of the central government. In these cases, the municipalities must formulate a financial rebuilding plan to be approved by local councils and conduct a mandatory external audit. Additionally, they must obtain agreement on the financial rebuilding plan in consultation with the MIC.

Similarly, the criteria for the consolidated deficit, redemption, and future burden indexes are determined under the new fiscal rule. Although the future burden index includes a yellow card, for which the criterion is 350 %, it does not include a red card.

Fig. 3 presents a comparison of the criteria between the former and new redemption indexes. The formulas for both the former and new redemption indexes are similar, but those for coverage among accounts are quite different. Because, after the introduction of the new fiscal rule, the coverage of the new redemption index is expanded to include not only the ordinary accounts but also the public enterprise accounts and other associations, each municipality must improve the fiscal conditions of the public enterprise and other accounts.

If the new redemption index is greater than 18 %, the municipalities must obtain permission from the central government to issue a new bond under the new fiscal rule. A different point is that the caution group of the former index, which ranged from 14 % to 20%, did not impose any penalties, but under the new fiscal rule, the caution group requires agreement from the MIC to issue new bonds.

We expect that the municipalities could not precisely calculate the new index in FY2007 because the formulas were disclosed on April 28, 2008. Therefore, the municipalities found it difficult to implement creative accounting between the ordinary accounts and the other accounts in FY2007, and they must accept the situation. Conversely, some municipalities that ranged in the caution group under the former rule might fiscally adjust their fiscal conditions among their related accounts after FY2008 to avoiding the deterioration of their new indexes because they are concerned with the new penalties associated with the yellow card.

4 Empirical framework

4.1 Identification strategy

In this section, we explain our identification strategy by applying the DID approach to identify the fiscal effects of the introduction of the new fiscal rule. We focus on the institutional change between the announcement of the new fiscal rule in FY2007 and its enforcement in FY2008.

Let Y_{it} denote an outcome variable, such as new fiscal indexes and stock-flow adjustment variables. The subscript i represents the municipality, and t represents the fiscal year. Equation (1) presents the DID estimation model[6].

$$Y_{it} = \beta T_{it} + \delta X_{it} + \mu_i + \tau_t + X_{iT_0} * \tau_t + \epsilon_{it} \tag{1}$$

where X_{it} is the covariates of the municipality, μ_i is the fixed effects of municipality i, τ_t is the year fixed effects for year t, and ϵ_{it} is an error term. β is a parameter of interest.

The treatment group T_{it} in this setup is the trend variable for municipality i that ranges from 1 in FY2008 to 3 in FY2010 for the treatment group or zero for the control group. To identify the fiscal effects of the new fiscal rule, we define a certain treatment group of municipalities by applying the criterion of the former redemption index, which was determined exogenously by the central government under the former rule. We did so because Japan, a country with centralized policy making, rarely exploits sub-national policy changes for the DID estimation (see, for example, Meyer et al. (1995)).[7] The new fiscal rule applies to the whole of each municipality, although it might largely affect the municipalities with worse fiscal conditions. Thus, the municipalities with relatively better fiscal conditions are used as a control group in the DID. The detailed assignment for the treatment group is described below in subsection 4.2.

Considering this situation, however, we should carefully set the assignment between the treatment and control groups. Therefore, we should consider interaction terms $X_{iT_0} * \tau_t$ between the predetermined covariates and the year fixed effects. T_0 shows a pretreatment period. In our estimation, we apply the first year of the pretreatment period to T_0. To control the correlation between the covariates and the year fixed effects with the treatment groups, we add the interaction terms, which are the predetermined covariates multiplied by the year fixed effects with the treatment groups, following Zeldow and Hatfield (2019).

For example, after the introduction of the new fiscal rule, the municipalities with better fiscal conditions have conditions that are easier to improve than those with worse fiscal conditions. If such characteristics were completely time invariant, the fixed effect model would obtain consistent estimates. If not, the model would be inconsistent due to selection bias regarding whether the treatment group equals 1 or not. To address the problem of the assignment between the treatment and control groups being affected by the time-invariant predetermined covariates, we consider the interaction terms.

4.2 Data

In the DID model, we use the Japanese municipal data from FY2007 to FY2010 because the new fiscal rule has been in force since FY2008. The data on the mu-

[6] Bertrand et al. (2004) suggested applying the DID estimation with the cluster-standard error. In our DID estimations, we use cluster-robust standard error at the municipal level. For details, please see Stock and Watson (2008).

[7] Meyer et al. (1995) assigned high-earning workers to a treatment group and low-earning workers to a control group for a DID estimation to examine the impact of increases in benefits for work-related injuries in the US states of Kentucky and Michigan.

nicipal governments are derived primarily from the Statistics of the Final Accounts of Municipal Governments (*Shi Chou Son Kessan Jyokyo Shirabe*), Municipal Financial Situation list (*Zaisei Jyokyo tou Ichiran Hyou*) and the Digital Archive of Municipal Mergers (*Gappei Digital Archive*).

4.2.1 Sample

We use data from 1,791 municipalities from FY2007 to FY2010 in our estimation. Note that, however, we cannot obtain the new fiscal indexes before the introduction of the new fiscal rule even if the outline of the new indexes is disclosed (see appendix A). To calculate the new fiscal indexes, we definitely must obtain the basic figures, such as the estimated amount of the burden, for each municipality and extra-governmental organization. Although we obtain the data from FY2007 to the latest year on the website[8], we were not allowed to obtain the basic figures before FY2006.

Additionally, to evaluate the fiscal effects of the new fiscal rule properly, we did not use data from FY2011 because a number of the municipalities were severely damaged by the Great East Japan Earthquake on March 11, 2011. In the subsequent years, these municipalities received many kinds of support, including a large number of special grants issued by the central government and others. We omitted the data from FY2011 in this paper to avoid the effects of the earthquake.

Moreover, many municipalities chose to merge, especially between FY2004 and FY2005. The number of municipalities rapidly decreased from 3,232 in FY1998 to 1,821 in FY2005. This result occurred because the central government enforced the special municipal mergers law and induced municipalities to choose to merge by using special incentives, such as special grants and bonds. Hirota and Yunoue (2017, 2020) revealed that the merged municipalities increased their public investment expenses and local bonds by becoming free-riders on their partners. Therefore, we use the data from FY2007 to FY2010, which exclude the merged municipalities after FY2007. However, the data include the merged municipalities that chose to merge up to FY2005, which are controlled in our estimation.

In addition, since Yubari city is under the control of the central government under the new fiscal rule, we exclude Yubari city from our estimation. The future burden index of Yubari city was more than 1,000% for a few years.

4.2.2 Treatment group

On December 7, 2007, the central government set the new fiscal indexes for the municipalities. The central government began enforcing the new fiscal rule on April 1, 2008, and disclosed the formulas of the new fiscal indexes to the municipalities on April 28, 2008. Accordingly, we employ the former redemption index under the former fiscal rule as the treatment group. Some of the municipalities that suffered from a previously high redemption index before the introduction might manipulate their accounts within the allowable range under the new fiscal rule.

Therefore, we define as the treatment group any municipality with former redemption indexes in "FY2006", which is immediately before the announcement of

[8]See the MIC website in Japanese (`https://www.soumu.go.jp/iken/zaisei/kenzenka/youshiki/index.html`); we tried to request the disclosure of the official information to the MIC, but unfortunately, we did not obtain the basic figures for the new fiscal indexes before FY2006.

the new fiscal rule in FY2007, that were greater than 14%. As mentioned above, the municipalities with indexes ranging from 14% to 20% were called the caution group but were not punished in any way. However, the municipalities with indexes greater than 20% were the limitation group, which included the strict limitation group. These limitation groups had to obtain permission from the central government to issue bonds. Thus, we consider that these criteria were exogenously decided by the central government under the former fiscal rule. For these reasons, we apply the former redemption index as the determiner of the treatment group. Thus, the number of the treatment group is 287 municipalities, but that of the control group is different in each year because there were some municipal mergers.

4.2.3 Outcome variables

In this paper, we focus on two categories of outcome variables: the new fiscal indexes and the stock-flow adjustment variables under the new fiscal rule. The new fiscal indexes comprise the deficit, consolidated deficit, redemption, and future burden indexes. The stock-flow adjustment variables comprise the difference between the change in debt stock and the deficit based on von Hagen and Wolff (2006). In particular, we mainly investigate the following two points.

First, we focus on the interrelationship of the new fiscal indexes after the introduction of the new fiscal rule. We consider the following situation, in which, even if the municipalities improve their flow indexes, they might worsen their stock indexes since the future burden index does not entail a red card penalty. Moreover, the new fiscal rule aims to revise the former fiscal rule, including improving the fiscal indexes' formulas and the expansion of the coverage of public accounts. Thus, we investigate the fiscal effects regarding whether the new fiscal rule overcomes the problems of the former rules described above.

Second, to investigate the use of creative accounting by stock-flow adjustments, we apply the definition of the stock-flow adjustments (SFAs), defining the difference between the change in debt stock and the deficit. According to von Hagen and Wolff (2006), Maltritz and Wüste (2015) and Reischmann (2016), the stock-flow adjustment is shown in Eqs (2) and (3).

$$SFA_{it} = \quad B_{it} - B_{it-1} - D_{it} \tag{2}$$

$$D_{it} = \quad E_{it} - R_{it} \tag{3}$$

where B_{it} denote the debt stock in year t, B_{it-1} denote the debt stock in year $t-1$, and D_{it} denote the deficit in year t, which is the difference between the total expenditure E_{it}, including interest payments and total revenue R_{it} in year t. The subscript i denotes municipality. We calculate the difference between the change in debt stock $B_{it} - B_{it-1}$ and the deficit D_{it} to capture stock-flow adjustments.

In this paper, we estimate three outcome variables, including SFA_{it}, $B_{it} - B_{it-1}$ and D_{it}. If the stock-flow adjustment SFA_{it} is positive, debt stock increases by more than the deficit in year t. That is, if the change in debt stock $B_{it} - B_{it-1}$ is positive, and the deficit D_{it} is negative when the SFA_{it} is positive, and the

treatment group engages in stock-flow adjustments. The values of the outcome variables can be deflated by the population size of each municipality. Thus, we use per capita outcome variables for each municipality in our estimations. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

4.2.4 Control variables

The covariates consist of the cubic function of the population size, the share of the population size younger than 15; the share of the population size older than 65; the merged trends; the dummies of the ordinance-designated cities, core cities, special-case cities, and cities; and the share of the primary and secondary industrial workers among total workers. Moreover, we consider that the interaction terms $X_{iT_0} * \tau_t$ are between the predetermined covariates of FY2007 and the year fixed effects.

The merged trends indicate the past year after the municipal mergers through the special municipal mergers law in place between FY1999 and FY2005. This result occurs because the merged municipalities received special treatment, including special grants and special bonds after the mergers of 15 years. We, however, exclude the municipalities that chose to merge after FY2007, as mentioned above.

The city size dummy variables consist of an ordinance-designated cities dummy, a core cities dummy, a special-case cities dummy and a cities dummy. Because these cities provide different types of public services depending on their size, we must consider city size in our estimation. Specifically, the yellow card of the future burden index criterion for ordinance-designated cities is 400%, while that for other cities is 350%.

Japanese municipalities have little right to impose their own local taxes since the system is centralized. Most local tax rates are determined by central government law for obtaining horizontal fiscal equity among municipalities. The tax capacity of the municipalities depends on their population size or area. Additionally, almost all of the municipalities depend on a large number of transfers from the central government. The revenue side of Japanese municipalities is inflexible and determined. Therefore, we exclude the fiscal covariates.

4.3 Summary statistics

The summary statistics of the unbalanced panel data between FY2007 and FY2010 are reported in Table 1. The means of the deficit and consolidated deficit indexes are -5.004 and -15.356, respectively. On average, municipalities have a fiscal surplus during the period. The maximum of the deficit index is 16.310. The maximum of the consolidated deficit index is 68.76. The mean of the redemption index is 13.271, which is less than 18% of the yellow card criterion. The mean of the future burden index is 81.59. The maximum of the future burden index is 409.47, which is more than 350% of the yellow card criterion. Also, the future burden indexes of the other three municipalities exceed the criteria for the same period[9]. Some municipalities

[9]The maximum of the deficit index is 16.310 for Gose city in Nara prefecture in FY2008. The maximum of the consolidated deficit index is 68.760 for Akahira city in Hokkaido prefecture in FY2007. The maximum of the future burden index is 409.47 for Owani town in Aomori prefecture in FY2007. Also, the future burden indexes of Ajigasawa town in Aomori prefecture, Izumisano city in Osaka prefecture, and Awaji city in Hyogo prefecture exceed 350%.

exceed the yellow card criteria of the new fiscal indexes immediately after the new fiscal rule. However, there is no red card criterion for the future burden index.

Since there were some municipal mergers from FY2006 to FY2007, and the treatment group is assigned by using the former redemption index in FY2006, the observation numbers of both the stock-flow adjustment and the change in debt stock are different from those of the new fiscal indexes. We use the data from FY2006 to FY2010 to calculate the difference $B_{it} - B_{it-1}$. The mean of the stock-flow adjustment is 3.153, but there is a large difference between the maximum and minimum values. The means of both the debt stock and deficit are negative. On average, municipalities might achieve fiscal improvement after the new fiscal rule.

Fig. 4 shows the trends in new fiscal indexes. The solid line shows the treatment group, which suffered from poor fiscal conditions before the introduction of the new fiscal rule, and the dashed line shows the control group. We reveal that the trends for all of the four indexes improve after the enforcement of the new fiscal rule. In particular, the balance index of the treatment group clearly decreases. The consolidated balance index exhibits a similar tendency. The redemption and future burden indexes improve.

In addition, Fig. 5 shows the trends in stock-flow adjustment variables. The SFA shows the trend in the stock-flow adjustment. The SFA of the treatment group increases from FY2008 more than the control group. The change in debt stock has a similar tendency to the SFA. Moreover, the deficit of the treatment group clearly improves after the new fiscal rule. The debt stock shows the net debt stock each year. The debt stock slightly decreases in both groups during the period. Because the change in debt stock of the treatment group increases, although the deficit largely decreases (improves), the treatment group might engage in stock-flow adjustment. Thus, to statistically reveal the municipal behavior, we apply the DID approach in the next section.

5 Empirical results

5.1 Effects on new fiscal indexes

Table 2 shows the estimation results for the new fiscal indexes by using the DID method for the period from FY2007 to FY2010. We use some control variables to estimate each index described as the following two patterns: the covariates and the year fixed effects; and all of the controls including the interaction terms between the predetermined covariates and the year dummy variables.

As a benchmark, the left side of each index in Table 2 reports the DID model with covariates and year fixed effects. All of the treatment groups are statistically significant in each index. For both the deficit and the consolidated deficit indexes, the treatment groups each year are significantly negative. The treatment groups of the redemption and the future burden indexes are significantly negative.

Our main results for the new fiscal indexes are shown on the right side for each index in Table 2. For the deficit index, the treatment group is statistically significantly negative. The Average Treatment Effect on the Treated (ATT) of the deficit index is -0.363. The ATT is slightly smaller than the left side in the absolute value because we consider the interaction terms between the predetermined covariates and the year variables. The ordinary accounts of the municipalities improve after

the introduction of the new fiscal rule. For the consolidated deficit index, this result exhibits a similar tendency as the deficit index results. The treatment group is also statistically significantly negative. The ATT of the consolidated deficit index is -0.763. The figure is larger than that of the deficit index in the absolute value. The result indicates that the municipalities improve the fiscal conditions of the public enterprises more than they do their ordinary accounts. For the redemption index, the treatment group is statistically significantly negative. The ATT of the redemption index is -0.883. The municipalities with high former redemption indexes improve their redemption index. For the future burden index, the treatment group is statistically significantly negative. The ATT of the future burden index is -5.972. The municipalities with high former redemption indexes improve their future burden and the other new fiscal indexes.

The new fiscal rule is effective for the new fiscal indexes of the municipalities. However, as mentioned above, to investigate the fiscal effects of the new fiscal rule, we should investigate not only the new fiscal indexes but also the stock-flow adjustment variables.

5.2 Stock-flow adjustments

Given these results for the new fiscal indexes, we consider the estimation results of the stock-flow adjustments. We show the results of the stock-flow adjustments in Table 3. The SFA shows the results of the per capita stock-flow adjustment in Eq (2), the change in debt stock shows the results of the per capita change in debt stock, and the deficit shows the results of the per capita deficit. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD. Similarly, we show the estimation results for each variable from the two patterns: the covariates and the year fixed effects; and all of the controls, including the interaction terms between the predetermined covariates and the year dummy variables.

On the left side of each stock-flow adjustment variable of Table 3, all of the treatment groups are statistically significant in each stock-flow adjustment variable. For the SFA, the treatment group is significantly positive. The treatment group of the change in debt stock is significantly positive, although that of the deficit is negative. Using standard two-way fixed effect DID methods, we reveal that municipalities that suffered from the higher former redemption index and engaged in creative accounting by stock-flow adjustment.

Our main results for the stock-flow adjustments are shown on the right side for each variable in Table 3. The ATT of the SFA is 5.251 (approximately 52.51 USD) and is statistically significant at the 1% level. After the introduction of the new fiscal rule, the treatment group increases their SFA. Similarly, the ATT of the change in debt stock is 2.863 (approximately 28.63 USD) and is statistically significant at the 5% level. In contrast, the ATT of the deficit is -2.397 (approximately -23.97 USD) and is statistically significant at the 5% level. We reveal that specific municipalities engage in creative accounting by stock-flow adjustments based on von Hagen and Wolff (2006)

We turn our attention to the relationship between stock-flow adjustments and the improvement of the new fiscal indexes in the same period. However, we investigate and discuss the relationship in the following sections 6 and 7 after checking

the robustness of the DID estimations.

5.3 Robustness checks

5.3.1 Event study design

First, we formally test for the common trend assumption for our main outcomes of interest by using event study design. We set the event timing in FY2008 as the 0 year dummy variable. That is, in the first year of the introduction of the new fiscal rule, the 0 year dummy variable takes 1 for the treatment group or zero for the control group. Similarly, in the second year, the 1 year dummy variable takes 1 for the treatment group, or zero for the control group. We consider the event window from -2 years to 2 years. Because the reference year of the event study design is in FY2007, we exclude the -1 year dummy variable in our estimation. In this case, if the -2 years dummy variable is not statistically significant, there is no difference between the treatment and control groups in the pretreatment period.

However, we cannot obtain the new fiscal indexes before the introduction of the new fiscal rule in FY2007. To check the common trend assumption between the treatment and control groups in the pretreatment period, we apply the stock-flow adjustment SFA, the change in debt stock, the deficit, and the redemption as outcome variables. The redemption denotes the per capita redemption expenses that are part of the total expenditures. We use the data from 1,810 municipalities between FY2006 and FY2010 because there were some municipal mergers during the period, but the number of the treatment group is the same 287 municipalities as the DID estimation above. Also, we consider the same control variables, including covariates, time-invariant municipal fixed effects, year fixed effects, and the interaction terms between the predetermined covariates and year fixed effects.

Table 4 reports the estimation results in the event study design. In all of the estimations, the -2 year dummy variables of the pretreatment period are not statistically significant. That is, there are no differences between the treatment and control groups in the pretreatment period. The SFA dummy variables between 0 and 2 years are statistically significant and positive. The 2 year dummy variable of the change in debt stock is statistically significant and positive. In contrast the deficit dummy variables between 0 and 2 years are statistically significant and negative. We obtain similar results to the above section. Moreover, the 2 year dummy variable of the redemption is statistically significant and negative. The result has a similar tendency to the results of the redemption index, which is one of the new fiscal indexes. Therefore, we reveal that the treatment group engages in stock-flow adjustments because the change in debt stock is positive, while the deficit is negative.

5.3.2 Different thresholds

Second, to check the robustness of the treatment group, we consider other treatment variables by using the different thresholds of the former redemption index. In particular, we consider six treatment cases: the municipalities of the former redemption index from greater than 15% to those greater than 20%. That is, Treat 15 denotes that, if the former redemption index was higher than 15%, it takes 1 or zero otherwise. Treat 16 denotes that, if it was greater than 16%, it takes 1 or zero

otherwise, and so on. We do so because the criterion of the new redemption index for the limitation group is 18%; the municipalities with indexes between greater than 14% and less than 18% under the former rule might react after the new rule. Additionally, since the municipalities with indexes greater than 20% under the former rule comprise both the limitation and the strict limitation groups, they might react actively after the new rule.

Table 5 reports the estimation results of the treatment group with different thresholds. The outcome variables are the new four fiscal indexes and three stock-flow adjustment variables. For the new fiscal indexes, the treatment groups between Treat 15 and Treat 20 are statistically significant and negative. The results are similar to our main results of the new fiscal indexes shown in Table 2, but the treatment groups of the balance index are larger than those of our main results. Those of the consolidated balance index are larger. The treatment groups of the redemption index are negatively estimated, and the values are larger than our main results in absolute values. Similarly, the treatment groups of the future burden index are statistically significantly negative, and the coefficients are larger than our main results in absolute values. Additionally, for the stock-flow adjustment variables, the treatment groups between Treat 15 and Treat 18 are statistically significant, and those of the SFA are positive. The change in debt stocks between Treat 15 and Treat 18 are positive, while the deficit between them is negative. The values are larger than our main results in absolute values. In other words, the caution group, which had the former redemption index between greater than 14% and less than 18%, engages in stock-flow adjustments after the introduction of the new fiscal rule. As a result, we reveal that the caution group under the former fiscal rule, when the former redemption index ranged from 14% to 18%, implemented creative accounting by increasing the change in debt stock to improve the related deficits.

6 Mechanism

In this section, we investigate the categories of expenditures and revenues of the treatment group that affect their deficits. Since the deficit D_{it} comprises the difference between total expenditure E_{it} and total revenue R_{it}, we evaluate each category of expenditures and revenues[10].

6.1 Categories of expenditures

We use some categories of expenditures to estimate by using the following six patterns: total expenditure, personnel expenses, construction work expenses, net transfer expenses, redemption expenses, and funds stock[11]. These variables are shown in per capita (thousand JPY). The net transfer expenses denote the difference between money transfers from ordinary to extra-governmental organization accounts and vice versa. The fund denotes the fund stock per capita. For example, if municipalities decrease net transfers, both the consolidated deficit and future

[10]Trends in both expenditures and revenues are shown in appendices C.1 and C.2.

[11]The total expenditure is Saishutu Sogaku, the personnel is Jinken-Hi, the construction work is Futukensetu Jigyo-Hi, the net transfer is Jyun Kuridashi Kin, the redemption is Kosai-Hi, and funds stock is Tumitatekin Genzaidaka in Japanese, respectively

burden indexes improve. Also, if they increase fund reserves, both of those indexes improve[12]. Thus, we consider both the net transfer and fund reserves.

As mentioned above, under the former fiscal rule, some municipalities shifted their fiscal deficits to their own extra-governmental organizations to hide their fiscal conditions. The money transfers affect the consolidated deficit and future burden indexes because, if the municipalities increase their money transfers, they can pretend to improve both of these indexes through a consolidated fiscal deficit. Although the numerators of both the redemption and future burden indexes include, to some extent, the estimated amounts of the money transfers, the problems of both regulated and non-regulated enterprises remain important. Non-regulated enterprises are allowed to increase money transfers easily because they are weakly monitored by the central government. Additionally, some municipalities that suffered from poor fiscal conditions reduced the funds reserved for the repayment of bonds to improve the former deficit index. The future burden index includes some amount of the reserve funds but does not entail the red card criterion.

Table 6 reports the estimation results of expenditures by using the DID approach. The treatment groups are statistically significant at the 1% or 5 % levels except for personnel expenses. The total expenditure is 23.795, which is approximately 240 USD at the exchange rate of 100 JPY to one USD. The construction work, which comprises both the commissioned projects from the central government and non-commissioned projects, is 19.564 (approximately 195.64 USD). Because the redemption is -3.611 (approximately -36.11 USD), the result is consistent with the results of the new redemption index and event study design. The net transfer, which is one of our interest items, is 2.674 (approximately 26.74 USD). The treatment group clearly increases money transfers to extra-governmental organizations, including public enterprises. Also, the fund stock is 9.510 (approximately 95.1 USD). We reveal that the increase in the SFA, which comprises both the increase in the change of debt stock and the decrease in the deficit, is not caused by the decrease in expenditures.

6.2 Categories of revenues

Next, we use some categories of revenues as outcome variables by using the following six patterns: total revenue, local tax, LAT grants, special LAT grants, central subsidies, and prefectural subsidies[13]. These variables are shown in per capita (thousand JPY). The local tax, LAT grants, and special LAT grants are general purpose revenues. In contrast, the central subsidies and prefectural subsidies are specific purpose revenues.

Table 7 reports the estimation results of revenues by using the DID method. The treatment groups are statistically significant at each level except for the prefectural subsidies. The total revenue is 27.608 (approximately 276.08 USD) and greater than the result of the total expenditure by 3.813. The local tax is 1.122 (approximately 11.22 USD) but is relatively less than the results of other categories. The LAT and special LAT grants are 5.307 (approximately 53.07 USD) and 0.937 (approximately 9.37 USD), respectively. The treatment group that suffered from

[12] In detail, please see section 3 and appendix A

[13] The total revenue is Sainyuu Sogaku, local tax is Chihozei, LAT grants are Futu Koufuzei, special LAT grants are Tokubetu Koufuzei, central subsidies are Kokko Shishutu kin, and prefectural subsidies are Ken Shishutu kin in Japanese, respectively

poor fiscal conditions receives a slightly larger amount of the LAT grants as general purpose revenues than the control group. The central subsidies are 16.495 (approximately 164.95 USD), and the largest coefficient is in the categories of revenues. The figure accounts for approximately 60% of the coefficient of the total revenue, which is 27.608. We reveal that the increase in SFA, which comprises both the increase in the change of debt stock and the decrease in the deficit, is caused by the increase in revenues such as transfers from the central government.

7 Discussion

Our main results in Tables 2 to 7 are consistent with creative accounting by stock-flow adjustments under the new fiscal rule. Municipalities improve the new fiscal indexes while engaging in stock-flow adjustments. Our results reveal that the increase in intergovernmental transfers from the central government makes it possible for municipalities to decrease the deficit D_{it} and then to increase the change in debt stock $B_{it} - B_{it-1}$. The results are not obtained by decreasing expenditures or increasing local taxes. Therefore, it is difficult to insist that the new fiscal rule improves fiscal conditions or is effective.

In Table 2, we find that the municipalities improve their new fiscal indexes without an increase in the stock index after the introduction of the new fiscal rule, although the future burden index does not have the red card criterion. One of the purposes of the introduction of the new fiscal rule was to improve municipal fiscal conditions, including those of extra-governmental organizations. The new fiscal rule is effective for the new fiscal indexes of the municipalities. Because the municipalities fully understand that the new fiscal indexes are stricter than the former indexes, they positively implement the improvement of the new fiscal indexes.

For the stock-flow adjustments variables, however, municipalities decrease (improve) fiscal deficits as the flow variable although increasing (deteriorating) their changes in debt stock as the stock variable after the introduction of the new fiscal rule. In Table 3, the coefficient of the SFA_{it} is 5.251, that of $B_{it} - B_{it-1}$ is 2.863, and that of D_{it} is -2.397. Therefore, our results reveal that municipalities with poor fiscal conditions engage in creative accounting by stock-flow adjustments based on von Hagen and Wolff (2006). Additionally, according to Tables 6 and 7, the coefficient of the total revenues E_{it} is 23.795, and that of the total revenue R_{it} is 27.608. We find that the decrease in the deficit is caused by the increase in the total revenue because the coefficient of the total revenue is larger than that of the total expenditure.

In Table 6, municipalities increase their expenditures except for redemption expenses. The coefficient of the construction work expenses is positive and larger than the others. Because the fiscal resources of the construction work depend on central subsidies and bonds, the increase in these resources results in an increase in the construction work. The coefficient of the funds is positive. Because the numerators of both consolidated deficit and future burden indexes include fund reserves, municipalities increase fund reserves to improve these fiscal indexes.

Also, the coefficient of the net transfer is positive. We consider that the increase in money transfers to public enterprises is caused by the difference between regulated and non-regulated enterprises due to the different governance systems.

Public enterprises numbered 9,210 groups in FY2007. The breakdown shows that regulated enterprises numbered 2,880 groups, but non-regulated enterprises numbered 6,330 groups in FY2007. Although the consolidated deficit and the future burden indexes include some parts of the money transfers to public enterprises, neither their transparency nor their accountability is sufficient[14]. Therefore, in future research, we must obtain more detailed data, including from each public enterprise, to reveal these points.

In Table 7, municipalities increase their revenues except for prefectural subsidies. In particular, the coefficient of the LAT grants is larger than that of the local taxes. The coefficient of the local taxes is 1.122. In contrast, that of the LAT grants is 5.307, and that of the special LAT grants is 0.937. That is, the increase in the LAT grants affects the increase in the total revenue R_{it}.

The intergovernmental transfers from the central government, including the LAT grants, affect expenditures. Municipalities are allowed to avail themselves the LAT grants as general purpose revenues, so they can increase their fund reserves to improve their fiscal indexes without the reduction in the total expenditures or the increase in local taxes.

Normally, if municipalities increase their money transfers, both the consolidated deficit and future burden indexes would deteriorate because the numerators of these indexes consider money transfers to public enterprises. However, we reveal that both of these indexes improve in Table 2. The increase in the LAT grants causes municipalities to ignore the deterioration of the new fiscal indexes through the increase in money transfers. The reason is that the LAT grants are included in the denominator of the new fiscal indexes. That is, the increase in the denominators of both the consolidated deficit and future burden indexes through the LAT grants is alleviated, to some extent, with the increase in the numerators of both indexes through money transfers to public enterprises.

The coefficient of the central subsidies of 16.495 is similar to that of the construction work expenses of 19.564. Because most of the fiscal resources of construction works comprise the central subsidies and bonds, the result of the central subsidies is consistent with the results of the construction works.

In other words, the negative sign of D_{it} is obtained by the increase in the intergovernmental transfers from the central government without the decrease in expenditures or the increase in local taxes. The increase in the intergovernmental transfers, including LAT grants, can improve the new fiscal indexes because the denominator of the new fiscal index comprises standard tax revenues and LAT grants.

The important point to note is that the increase in intergovernmental transfers from the central government becomes the trigger of the soft budget constraint problem (for example, Kornai et al. (2003) and Akai et al. (2003)). As a result, municipalities improve all new four fiscal indexes although they increase expenditures, including fund reserves and money transfers to public enterprises.

Consequently, on one side, municipalities sugarcoat the deterioration of the new

[14]For example, a part of the future burden index consists of the estimated amount of the money transfers from the ordinary accounts to the public enterprise accounts, but the detailed formula for the estimated amount of the money transfers is not disclosed in the guideline for the formula of the future burden index. The same problems occur in the guideline for the formulas of the new fiscal indexes. Non-regulated enterprises are weakly monitored by the central government.

fiscal indexes through intergovernmental transfers from the central government. On the other hand, they engage in stock-flow adjustment, which is the relationship between the deterioration of the stock variable and the improvement of the deficit. This phenomenon is not illegal behavior, but it is a delaying behavior of fiscal improvement. To evaluate the new fiscal rule, we should check not only targeted indexes but also untargeted indexes, which municipalities do not have an incentive to control. Therefore, we reveal that, although the new fiscal indexes clearly improve after the new fiscal rule, stock-flow adjustments are detected in our estimations.

8 Conclusion

In this paper, we contribute to the literature in several ways. We analyze the use of creative accounting after the introduction of the new fiscal rule in Japanese municipalities. In particular, we focus on the institutional change between the announcement and the enforcement of the new fiscal rule. Our primary contribution is that we identify the causal effects of the new fiscal rule focused on the use of stock-flow adjustments by applying the DID method.

Our findings reveal the following points. First, the municipalities with poor fiscal conditions in the former rule improve the new fiscal indexes that comprise three flow indexes and one stock index. The results, however, are sugarcoated results. Second, municipalities engage in creative accounting by stock-flow adjustments. Although municipalities decrease their deficits, they clearly increase the change in debt stock after the introduction of the new fiscal rule. Third, the decrease in deficits is caused by the increase in revenues, including in intergovernmental transfers.

This phenomenon, which constitutes stock-flow adjustments, is not illegal behavior, but it is a delaying behavior of the fiscal improvement. Simultaneously, the behavior relates to the problem of the soft budget constraint. Municipalities that must improve fiscal conditions increase their expenditures because they are allowed to receive larger intergovernmental transfers from the central government. To evaluate the new fiscal rule, we should check not only targeted indexes but also untargeted indexes, which a local government does not have an incentive to control. Therefore, we find that the municipalities engage in creative accounting by stock-flow adjustments under the new fiscal rule.

References

[1] Akai, N., Sato, M., Yamashita, K., 2003. *"Reform of intergovernmental transfers in Japan."(Chihou Koufuzei no Keizaigaku)*, Yuuhikaku. (In Japanese)

[2] Akai, N., Sato, M., 2008. "Too big or too small? A synthetic view of the commitment problem of interregional transfers." *Journal of Urban Economics*, 64, November, 551-559.

[3] Alesina, A., Perotti, R., 1996. "Fiscal discipline and the budget process." *American Economic Review*, 86(2), 401-407.

[4] Balduzzi, P., Grembi, V., 2011. "Fiscal rules and window dressing: The case of Italian municipalities." *Giornale degli Economisti e Annali di Economia*, 70(1), 97-122.

[5] Beetsma, R., Giuliodori, M., Wierts, P., 2009. "Planning to cheat: EU fiscal policy in real time." *Economic policy*, 24(60), 753-804.

[6] Bertrand, M., Duflo, E., Mullainathan, S., 2004."How Much Should We Trust Differences-In-Differences Estimates?", *The Quarterly Journal of Economics*, 119(1), 249-275.

[7] Burret, H. T., Feld, L. P., 2018a. "(Un-)intended effects of fiscal rules." *European Journal of Political Economy*, 52, March 2018, 166-191.

[8] Burret, H. T., Feld, L. P., 2018b. "Vertical effects of fiscal rules: the Swiss Experience." *International Tax and Public Finance*, 25(3), 673-721.

[9] Chatagny, F. 2015. "Incentive effects of fiscal rules on the finance minister's behavior: Evidence from revenue projections in Swiss Cantons." *European Journal of Political Economy*, 39, 184-200.

[10] Clémenceau, M., Soguel, N., 2017. "Does personal background influence a finance minister to cook the books? An investigation of creative accounting in Swiss cantons." *Applied Economics*, 49(10), 941-953.

[11] Debrun, X., Moulin, L., Turrini, A., Kumar, M. S., 2008. "Tied to the mast? National fiscal rules in the European Union." *Economic Policy*, 23(54), 297-362.

[12] Doi, T. 2007. *The economics of local bond system reform (Chihousai Kaikaku no Keizaigaku)*, Nihon Keizai Shinbun Shuppansha. (In Japanese)

[13] Eichengreen, B., Bayoumi, T., 1994. "The political economy of fiscal restrictions: Implications for Europe from the United States." *European Economic Review*, 38, 783-791.

[14] Goto, T., Yamamoto, G., 2019. "Why governments employ creative accounting?: Theory and evidence from municipal mergers in Japan." *OSIPP Discussion Paper, DP-2018-E-012(October)*

[15] Grembi, V., Nannicini, T., Toroian, U., 2016. "Do fiscal rules matter?" *American Economic Journal: Applied Economics*, 8(3), 1-30.

[16] Hirota, H., Yunoue, H., 2017. "Evaluation of the fiscal effect on municipal mergers: Quasi-experimental evidence from Japanese municipal data." *Regional Science and Urban Economics*, 66, September 2017, 132-149.

[17] Hirota, H., Yunoue, H., 2020. "Public investment and the fiscal common pool problem on municipal mergers in Japan." *Economic Analysis and Policy*, 67, 124-135.

[18] Ihori, T. 2009. "Political decentralization and fiscal reconstruction in Japan." in: Ichimura, S., Bahl, R. (Eds.), *Decentralization Policies in Asian Development.* World Scientific, Singapore, 55-83.

[19] Kirchgässner, G. 2002. "The effect of fiscal institutions on public finance: A survey of the empirical evidence." in S.L. Winer and H. Shibata (eds.), *Political Economy and Public Finance*, Cheltenham, 145-177.

[20] Koen, V., Noord, P., 2005. "Fiscal gimmickry in Europe: One-off measures and creative accounting." *OECD Economics Department Working Papers*, 417.

[21] Konishi, S. 2014. *Reform of public sector accounting and The Law Relating to the Financial Soundness of Local Governments (Kou Kaikei Kaikaku to Jichi-taizaiseikenzenkahou wo Yomitoku*), Nihon Kajo Shuppan Kabushiki Gaisha. (In Japanese)

[22] Kornai, J. .1986. "The soft budget constraint." *Kyklos*, 39, 3-30.

[23] Kornai, J., Maskin, E., Roland, G., 2003. "Understanding the soft budget constraint." *Journal of Economic Literature*, 41, 1095-1136.

[24] Luechinger, S., Schaltegger, C.A., 2013. "Fiscal rules, budget deficits and budget projections." *International Tax and Public Finance*, 20(5), 785-807.

[25] Maltritz, D., Wüste, S., 2015. "Determinants of budget deficits in Europe: The role and relations of fiscal rules, fiscal councils, creative accounting and the Euro." *Economic Modelling*, 48, 222-236.

[26] Meyer, B. D., Viscusi, W. K., Durbin, D. L., 1995. "Workers' compensation and injury duration: Evidence from a natural experiment." *American Economic Review*, 85(3), 322-340.

[27] Milesi-Ferretti, G M. 2003. "Good, bad or ugly? On the effects of fiscal rules with creative accounting." *Journal of Public Economics*, 88, 377-394.

[28] Ministry of Internal Affairs and Communications. "White Paper on Local Public Finance, 2007, [Illustrated]"

[29] Mochida, N., and M. Hayashi. 2018. *The economics of local government bonds (Chihousai no Keizai Bunseki)*, Yuuhikaku. (In Japanese)

[30] Poterba, J.M. 1994. "State responses to fiscal crises: the effects of budgetary institutions and politics." *Journal of Political Economy*, 102(4), 799-821.

[31] Reischmann, M. 2016. "Creative accounting and electoral motives: Evidence from OECD countries", *Journal of Comparative Economics*, 44(2), 243-257.

[32] Saito, S., Yunoue, H., 2009. "The reform of Japanese local governments." in: Ichimura, S., Bahl, R. (Eds.), *Decentralization Policies in Asian Development.* World Scientific, Singapore, 265-280.

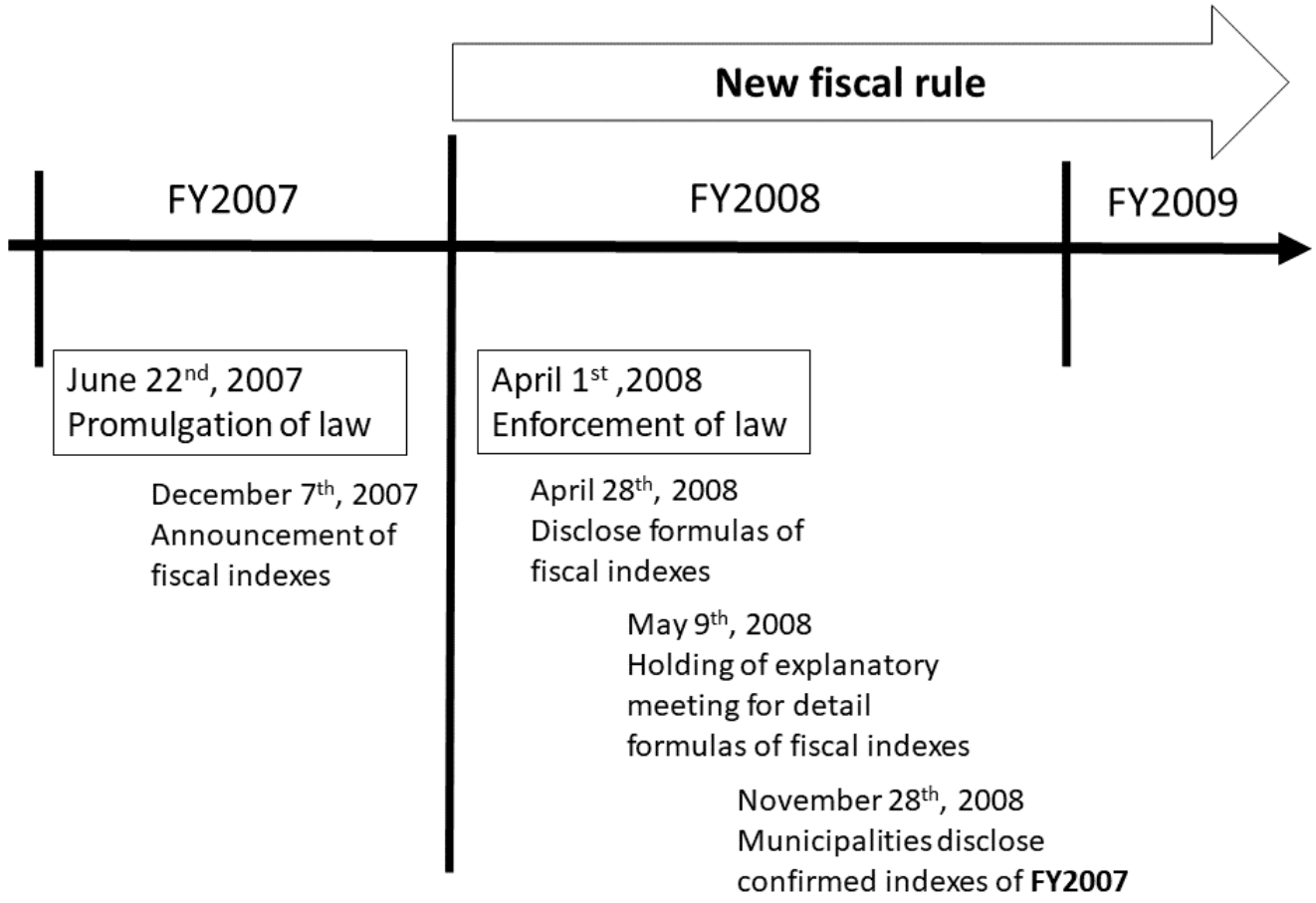
[33] Stock, J. H., Watson, M. W., 2008. "Heteroskedasticity-robust standard errors for fixed effects panel data regression." *Econometrica*, 76, 155-174.

[34] von Hagen, J., Harden, I. J., 1995. "Budget processes and commitment to fiscal discipline." *European Economic Review*, 39, 771-779.

[35] von Hagen, J., Wolff, G. B., 2006. "What do deficits tell us about debt?: Empirical evidence on creative accounting with fiscal rules in the EU." *Journal of Banking and Finance*, 30(12), 3259-3279.

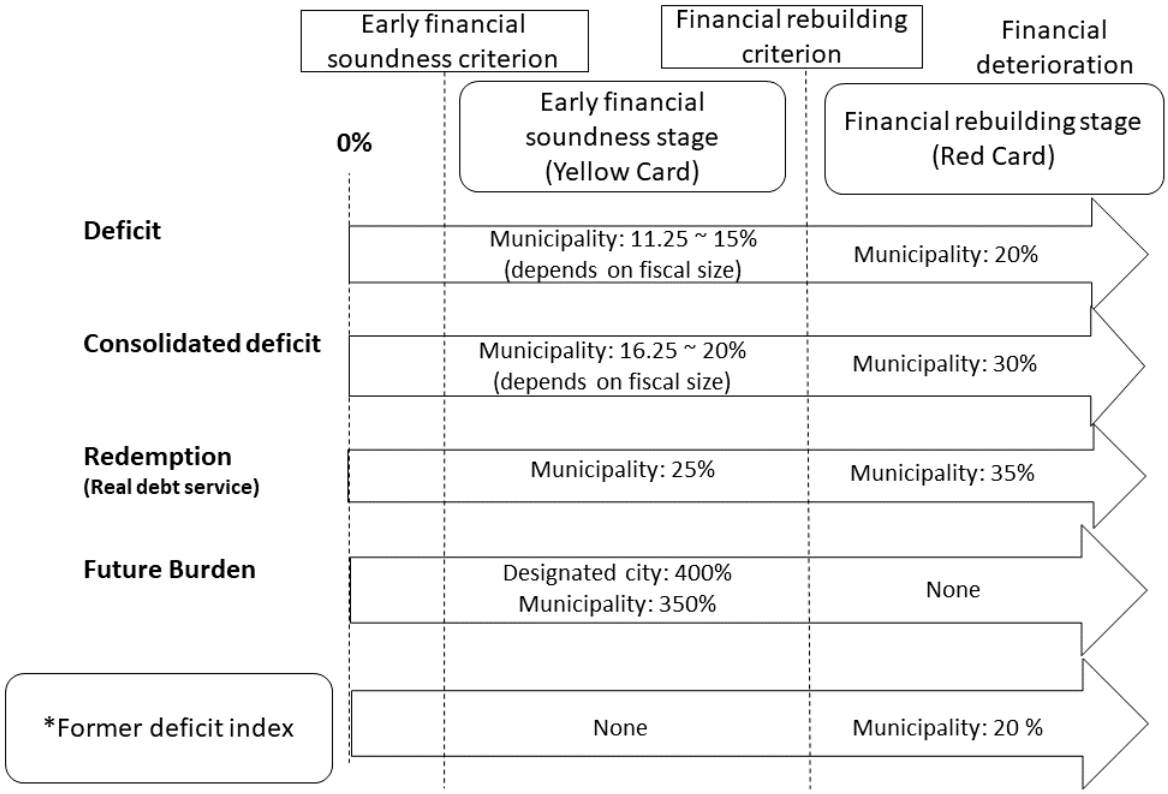
[36] Zeldow, B., Hatfield, L. A., 2019. "Confounding and Regression Adjustment in Difference-in-Differences", arXiv:1911.12185.

Figure 1: Timeline for the introduction of the new fiscal rule



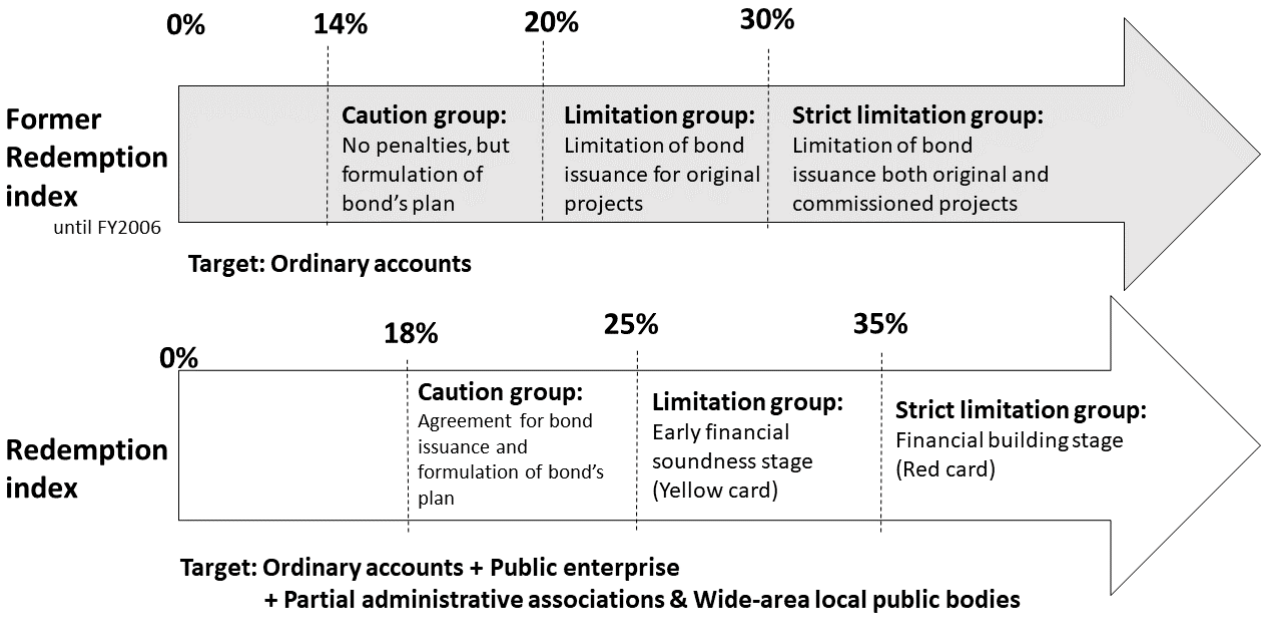
The new fiscal year begins in April in Japan

Figure 2: Image of the early financial soundness, financial rebuilding and soundness of public enterprise management



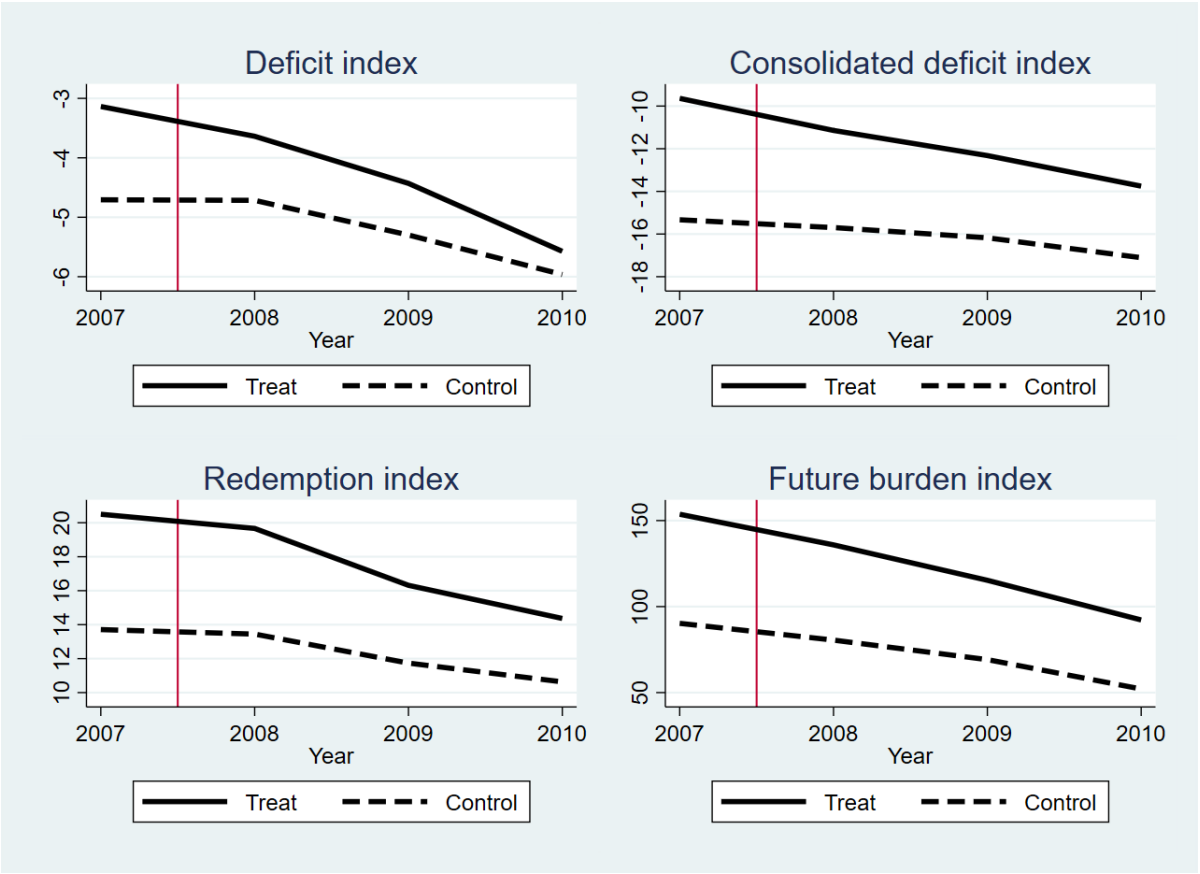
Notes: For the purpose of comparison between the former and new fiscal rules, the figure adds the criterion of the former balance index.

Figure 3: Criteria for both the former and the new redemption indexes



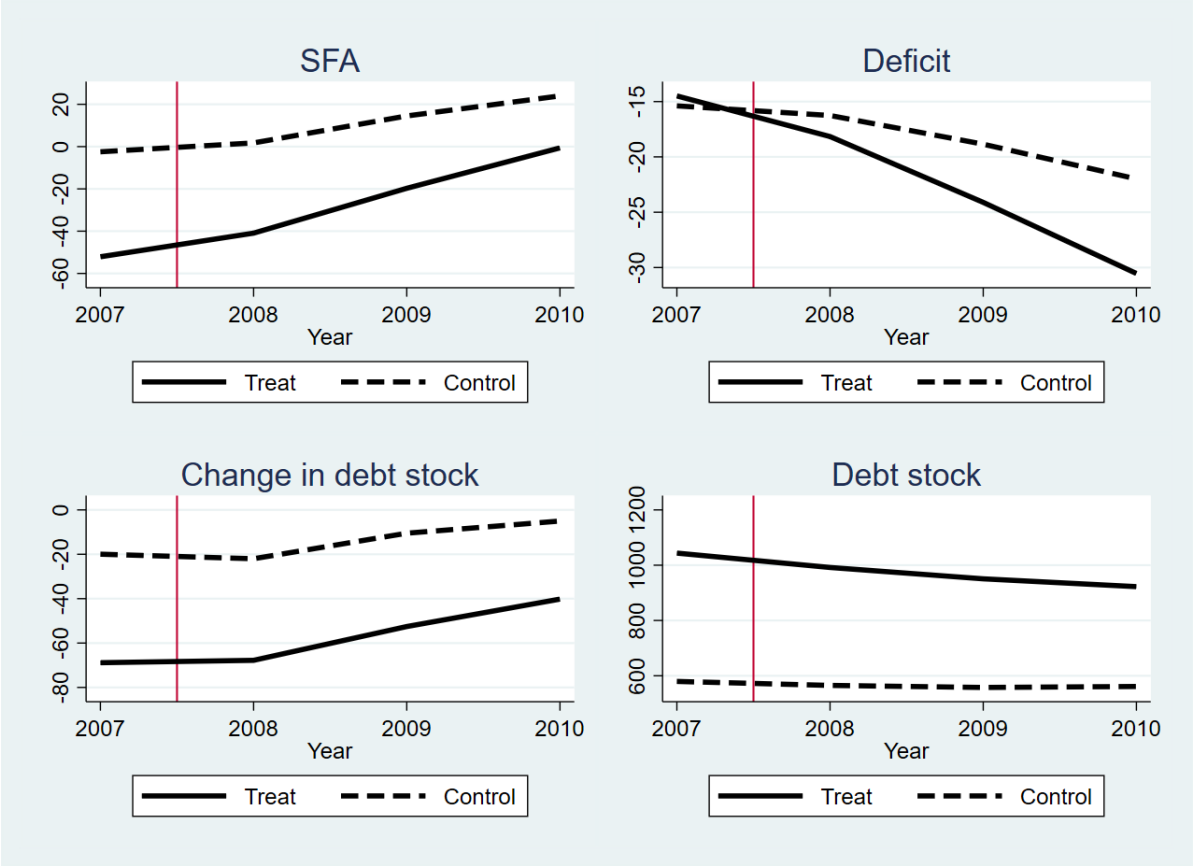
Notes: In the new fiscal rule, the municipalities with redemption indexes of 18 % or more require permission to issue local bonds from the Ministry of Internal Affairs and Communications. The "strict limitation" group means that the municipalities are prohibited from the bond issuance of both original and commissioned projects by the upper government, except for disaster recovery projects.

Figure 4: Trends in the new fiscal indexes



Notes: The new fiscal indexes (deficit, consolidated deficit, redemption, and future burden) are the ratios of the standard financial scale. The solid line shows the treatment group, and the dashed line shows the control group.

Figure 5: Trends in stock-flow adjustments



Notes: The stock-flow adjustment is the difference between the change in debt stock and the deficit. Also, the debt stock of the figure shows the net debt stock each year. The solid line shows the treatment group, and the dashed line shows the control group. We use per capita outcome variables for each municipality. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

Table 1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Outcome					
Deficit index	7,005	-5.004	3.612	-42.490	16.310
Consolidated deficit index	7,005	-15.356	11.388	-117.830	68.760
Redemption index	7,005	13.271	5.142	-8.264	42.615
Future burden index	7,005	81.590	84.400	-492.446	409.470
Stock-flow adjustment	6,998	3.153	57.203	-1208.855	969.224
Change in debt stock	6,998	-21.443	59.530	-1213.630	539.936
Deficit	7,005	-18.681	26.403	-694.719	42.204
Covariates					
Pop	7,005	67556.64	174643.3	157	3627000
Pop.65	7,005	0.271	0.068	0.107	0.569
Pop.15	7,005	0.128	0.023	0.037	0.218
Designated cities	7,005	0.010	0.100	0	1
Core cities	7,005	0.022	0.147	0	1
Special-case cities	7,005	0.024	0.153	0	1
Cities	7,005	0.391	0.488	0	1
Merged trend	7,005	1.635	2.473	0	12
Primary industry	7,005	12.632	10.668	0.1	77.9
Secondary industry	7,005	27.872	8.219	1.3	52.9

Notes: The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

Table 2: Estimation results of targeted indexes

Variables	Deficit index		Consolidated deficit index	
Treat	-0.391***	-0.363***	-0.759***	-0.763***
	[0.090]	[0.089]	[0.177]	[0.175]
Obs	7,005	7,005	7,005	7,005
Number of mun	1,791	1,791	1,791	1,791
Number of Treat	287	287	287	287
R-squared	0.136	0.147	0.094	0.109
Covariates	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
pre-Cov*Year	No	Yes	No	Yes

Variables	Redemption index		Future burden index	
Treat	-1.028***	-0.883***	-7.563***	-5.972***
	[0.100]	[0.095]	[0.714]	[0.675]
Obs	7,005	7,005	7,005	7,005
Number of mun	1,791	1,791	1,791	1,791
Number of Treat	287	287	287	287
R-squared	0.471	0.513	0.570	0.603
Covariates	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
pre-Cov*Year	No	Yes	No	Yes

Notes: Cluster-robust standard errors at the municipal level in brackets. *** p<0.01, ** p<0.05, * p<0.1. We control for the covariates, the time-invariant fixed effects of the municipalities, the year fixed effects, and the predetermined covariates-year fixed effects.

Table 3: Estimation results of stock-flow adjustments

Variables	SFA		Change in debt stock		Deficit	
Treat	7.597***	5.251***	3.741***	2.863**	-3.331***	-2.397**
	[1.926]	[1.765]	[1.279]	[1.219]	[1.063]	[0.950]
Obs	6,998	6,998	6,998	6,998	7,005	7,005
Number of mun	1,791	1,791	1,791	1,791	1,791	1,791
Number of Treat	287	287	287	287	287	287
R-squared	0.156	0.190	0.092	0.107	0.101	0.140
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
pre-Cov*Year	No	Yes	No	Yes	No	Yes

Notes: Cluster-robust standard errors at the municipal level in brackets. *** p<0.01, ** p<0.05, * p<0.1. All of the models control for the covariates, the time-invariant fixed effects of the municipalities, the year fixed effects, and the predetermined covariates-year fixed effects. We use per capita outcome variables for each municipality in our estimations. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

Table 4: Estimation results of event study design

Variables	SFA	Change in debt stock	Deficit	Redemption
-2 years	6.586	6.583	0.616	-1.406
	[5.538]	[5.053]	[0.656]	[6.653]
0	6.323*	3.549	-2.950***	-6.114
	[3.739]	[3.441]	[0.918]	[5.903]
1 year	10.568*	5.161	-5.927***	-9.941
	[5.826]	[4.617]	[2.284]	[6.605]
2 years	17.003***	9.874***	-9.160***	-12.253**
	[5.041]	[3.555]	[2.889]	[5.775]
Obs	8,797	8,797	8,808	8,808
Number of mun	1,810	1,810	1,810	1,810
Number of Treat	287	287	287	287
R-squared	0.141	0.076	0.110	0.032
Covariates	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
pre-Cov*Year	Yes	Yes	Yes	Yes

Notes: Cluster-robust standard errors at the municipal level in brackets. *** p<0.01, ** p<0.05, * p<0.1. All of the models control for the covariates, the time-invariant fixed effects of the municipalities, the year fixed effects, and the predetermined covariates-year fixed effects. We use per capita redemption for each municipality. The 0 year dummy is FY2008, which is the introduction of the new fiscal rule. The 1 year dummy is FY2009, and the 2 year dummy is FY2010. Because the reference year of the event study design is FY2007, that is, -1 year, we exclude the -1 year dummy. The -2 year dummy is FY2006. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

Table 5: Robustness checks with different treatments

Variables	Defecit index	Conslidated deficit index	Redemption index	Future burden index	SFA	Change in debt stock	Deficit
Treat 15	-0.504***	-0.927***	-1.048***	-6.097***	7.517***	3.264**	-4.016***
	[0.118]	[0.229]	[0.111]	[0.822]	[2.403]	[1.533]	[1.380]
Number of Treat	194	194	194	194	194	194	194
Treat 16	-0.507***	-1.202***	-1.083***	-6.685***	9.865***	4.369**	-4.821***
	[0.151]	[0.297]	[0.143]	[1.010]	[3.200]	[2.013]	[1.865]
Number of Treat	134	134	134	134	134	134	134
Treat 17	-0.530***	-1.391***	-1.235***	-7.587***	15.055***	5.943*	-7.298**
	[0.202]	[0.438]	[0.205]	[1.482]	[5.156]	[3.072]	[3.025]
Number of Treat	75	75	75	75	75	75	75
Treat 18	-0.601**	-2.210***	-1.287***	-8.399***	21.045**	8.306*	-9.345*
	[0.288]	[0.642]	[0.307]	[1.976]	[8.172]	[4.364]	[4.844]
Number of Treat	44	44	44	44	44	44	44
Treat 19	-0.353	-2.551***	-1.261***	-10.264***	17.372**	8.197*	-3.665
	[0.325]	[0.876]	[0.410]	[2.621]	[7.421]	[4.647]	[2.412]
Number of Treat	29	29	29	29	29	29	29
Treat 20	-0.431	-2.456***	-1.258**	-10.593***	16.292**	8.184	-5.116
	[0.396]	[0.912]	[0.603]	[3.643]	[8.065]	[5.953]	[3.335]
Number of Treat	19	19	19	19	19	19	19
Obs	7,005	7,005	7,005	7,005	6,998	6,998	6,998
Number of mun	1,791	1,791	1,791	1,791	1,791	1,791	1,791
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pre-Cov*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Cluster-robust standard errors at the municipal level in brackets. *** p<0.01, ** p<0.05, * p<0.1. All of the models control for the covariates, the time-invariant fixed effects of the municipalities, the year fixed effects, and the predetermined covariates-year fixed effects. We use per capita outcome variables for each municipality in our estimations. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

Table 6: Estimation results of expenditures

Variables	Expenditure	Personnel	Construction	Redemption	Net transfer	Fund
Treat	23.795**	0.208	19.564**	-3.611**	2.674***	9.510***
	[10.874]	[0.303]	[9.898]	[1.677]	[0.901]	[3.026]
Obs	7,005	7,005	7,005	7,005	7,005	7,005
Number of mun	1,791	1,791	1,791	1,791	1,791	1,791
Number of Treat	287	287	287	287	287	287
R-squared	0.142	0.074	0.072	0.044	0.067	0.234
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
pre-Cov*Year	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Cluster-robust standard errors at the municipal level in brackets. *** p<0.01, ** p<0.05, * p<0.1. All of the models control for the covariates, the time-invariant fixed effects of the municipalities, the year fixed effects, and the predetermined covariates-year fixed effects. We use per capita outcome variables for each municipality in our estimations. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD. The Fund is the per capita fund stock. The Net transfer is the per capita net transfer, which is the difference between transfers to other accounts and transfers from other accounts.

Table 7: Estimation results of revenues

Variables	Revenue	Local tax	LAT grants	Special LAT grants	Central subsidy	Prefectural subsidy
Treat	27.608**	1.122***	5.307***	0.937**	16.495*	0.908
	[11.750]	[0.321]	[1.101]	[0.363]	[9.623]	[0.932]
Obs	7,005	7,005	7,005	7,005	7,005	7,005
Number of mun	1,791	1,791	1,791	1,791	1,791	1,791
Number of Treat	287	287	287	287	287	287
R-squared	0.156	0.061	0.453	0.140	0.095	0.034
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
pre-Cov*Year	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Cluster-robust standard errors at the municipal level in brackets. *** p<0.01, ** p<0.05, * p<0.1. All of the models control for the covariates, the time-invariant fixed effects of the municipalities, the year fixed effects, and the predetermined covariates-year fixed effects. We use per capita outcome variables for each municipality in our estimations. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

A Outline of the new fiscal indexes

- Deficit index

$$Deficit = \frac{Real\ deficit\ of\ ordinary\ accounts}{Standard\ financial\ scale}$$

  - Real deficit of the ordinary accounts: Amount of real deficit in accounts corresponding to ordinary accounts among the general and special accounts
    - Amount of real deficit = amount of advanced appropriation + (amount of deferred payment + amount of business balance carried forward)

- Consolidated deficit index

$$Consolidated\ deficit = \frac{Consolidated\ real\ deficit}{Standard\ financial\ scale}$$

  - Consolidated real deficit: If the total amount of 1 and 2 exceeds the total amount of 3 and 4, the exceeding amount is as follows.
    - 1. Among the general and special accounts excluding public enterprises (enterprises regulated and enterprises not regulated by the Local Public Enterprise Law), the total amount of the real deficit of the accounts subject to real deficits
    - 2. Among the special accounts of public enterprises, the total amount of deficits of funds of the accounts subject to the deficit of funds
    - 3. Among the general and special accounts excluding public enterprises, the total amount of real balance surplus of the accounts subject to the real balance surplus
    - 4. Among the special accounts of public enterprises, the total amount of surplus of funds of the accounts subject to the surplus of funds

- Redemption index

$$Redemption = \frac{(A\ +\ B)\ -\ (C\ +\ D)}{Standard\ financial\ scale\ -\ D}$$

  - A: Redemption of principal and interest of bonds
  - B: Quasi-redemption of principal and interest

    B is the total amount of 1 to 5
    - 1: Amount corresponding to the annual redemption of principal in case of principal equal to amortization, where the redemption period is 30 years regarding bullet bonds
    - 2: Among the transfers from the general accounts, etc., to the special accounts other than the general accounts, etc., the amount acknowledged to be appropriated for revenue resources for the redemption of public enterprises bonds
    - 3: Among the burdens and subsidies to associations/local development corporations, the amount acknowledged to be appropriated for revenue resources for the redemption of bonds issued by the associations, etc.

    - 4: Expenditure based on liabilities that can be treated similarly to debt service among the expenditures based on the debt burden
    - 5: Interest on a temporary loan
  - C: Special revenue resources
  - D: Amount included in the standard financial requirements pertaining to the redemption of principal and interest and the quasi-redemption of principal and interest

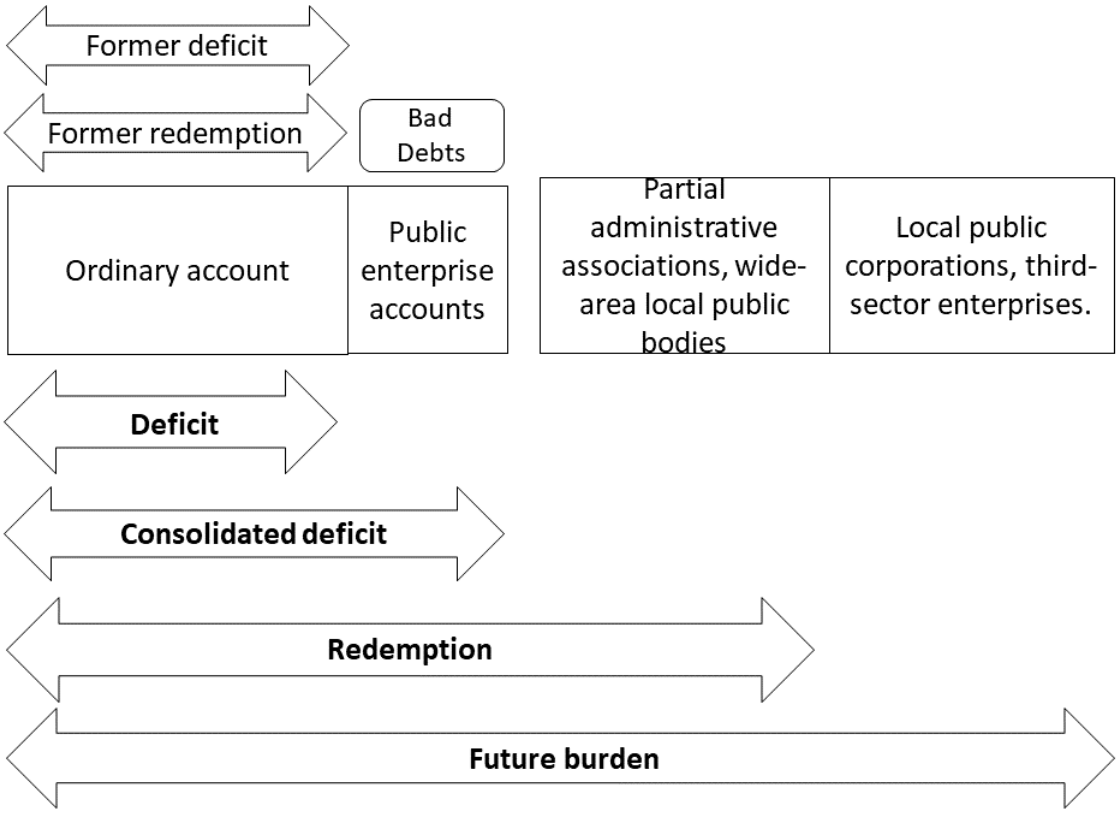
- Future burden index

$$Future\,burden = \frac{Future\,burden\ -\ (A\ +\ B\ +\ C)}{Standard\,financial\,scale\ -\ D}$$

  - Future burden: Total amount of 1 to 8
    - 1: Outstanding bonds as of the end of the fiscal year previous to the relevant fiscal year of the general accounts, etc.
    - 2: Expected amount of expenditure based on the debt burden (those pertaining to the expenses of each item under Article 5 of the Local Finance Law)
    - 3: Estimated amount of the transfer from the general accounts, etc., to be appropriated for the redemption of the principal of the bonds of the accounts other than the general accounts, etc.
    - 4: Estimated amount of the burden, etc., of the local government concerned to be appropriated for the redemption of the principal bonds of the associations, etc., of which the local government concerned is a number
    - 5: Among the expected amount of the retirement allowance to be paid (amount of the allowance that will be paid to all employees at the term end), the estimated amount of the burden of the general accounts, etc.
    - 6: Among the amount of debts of certain corporations established by the local government and among the amount of the debt burden in the case of bearing the debts for such certain corporations, the estimated amount of the burden of the general accounts, etc., considering the financial and business conditions of such corporations, etc.
    - 7: Consolidated real deficit
    - 8: Among the amount corresponding to the consolidated real deficit of the associations, etc., the estimated amount of the burden of the general accounts, etc.
  - A: Amount of appropriable funds
    - Funds under Article 241 of the Local Autonomy Law that can be appropriated for the amount of redemption, etc., of 1 to 6
  - B: Estimated amount of special revenue sources
  - C: Amount expected to be included in standard financial requirements pertaining to outstanding local government bonds, etc.
  - D: Amount included in standard financial requirements pertaining to the redemption of principal and interest and the quasi-redemption of principal and interest

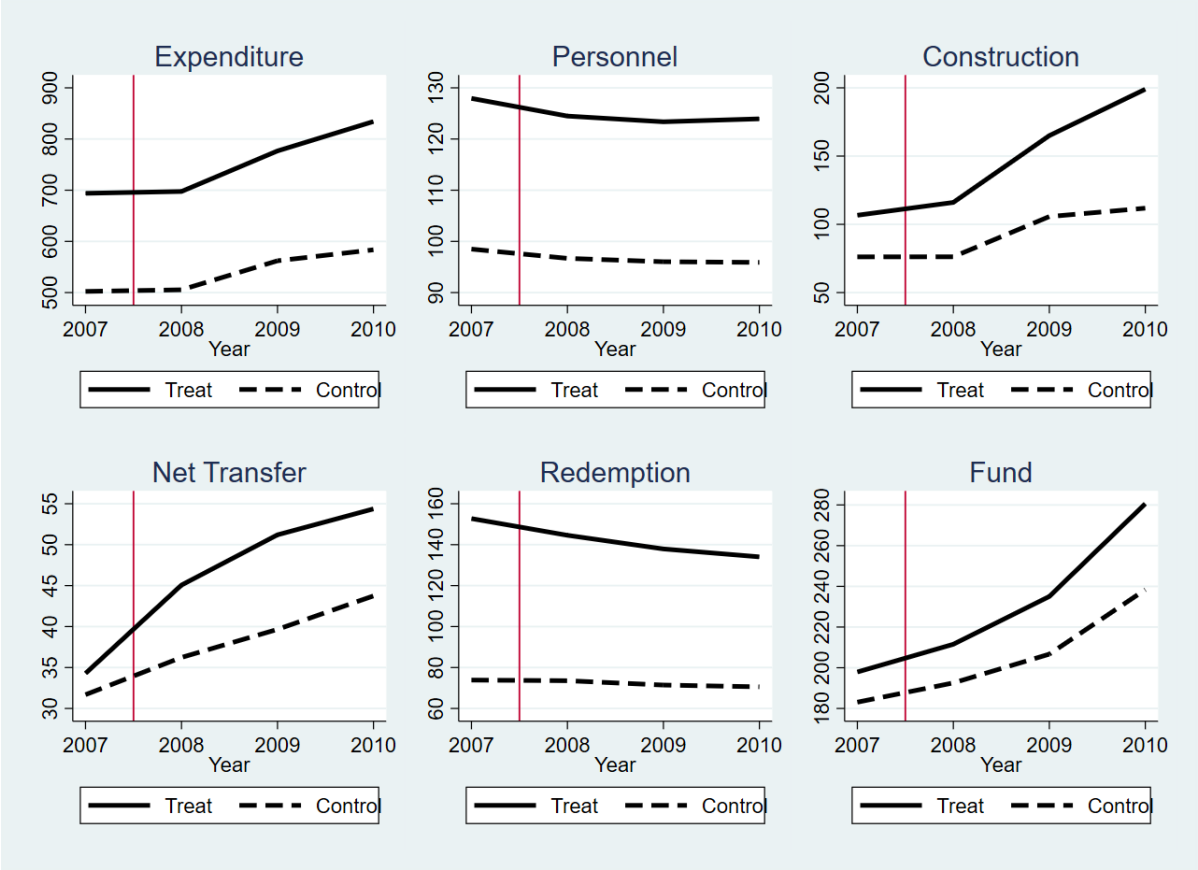
B Target accounts of the indexes for determining the soundness

Figure B.1: Target accounts of the indexes for determining the soundness



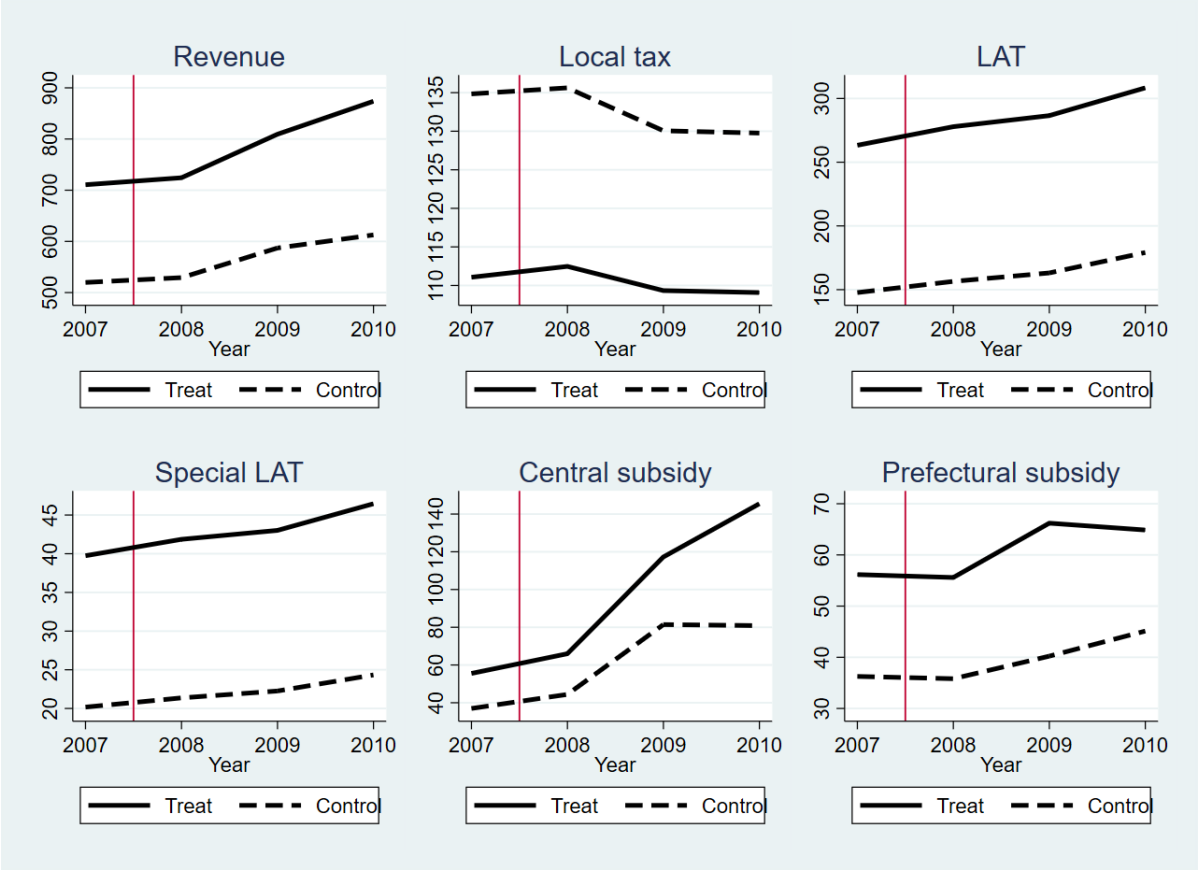
C Trends in expenditures and revenues

Figure C.1: Trends in expenditures



Notes: The solid line shows the treatment group, and the dashed line shows the control group. We use per capita outcome variables for each municipality. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.

Figure C.2: Trends in revenues



Notes: The solid line shows the treatment group, and the dashed line shows the control group. We use per capita outcome variables for each municipality. The monetary unit is one thousand JPY, which is approximately 10 USD at the exchange rate of 100 JPY to one USD.