

Fiscal Prevention or Consolidation? Differential Analysis Using Mixed Logit Model*

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Abstract

Political Economy of Budgetary Process has shown the importance of budgetary institutions on fiscal performance. This paper attempts to show varying effects between keeping public finance in a good state (Fiscal Prevention) and restoring it from once worsened state (Fiscal Consolidation) following the two step approach of Lavigne (2006) but using not the multinomial logit model that Lavigne adopted but the mixed logit model which can overcome the problem of the Irrelevance of Independent Alternatives. Using the database of Hallerberg (2004) and appending the data of Anglosaxon countries and Japan based on historical overview, this paper shows that there are varying effects for delegation state strategy, between Fiscal Prevention and Fiscal Consolidation, and the latter may not be realizable using delegation state strategy. This is a serious result for all delegation countries which are predicted to encounter enormous difficulties in trying to restore public finance. As a policy relevant suggestion, fiefdom countries such as Japan may have to consider the opportunity of commitment approach, although a drastic political reform may be indispensable for this strategy and specifically one would need to diminish the influence of veto players.

Keywords: Fiscal consolidation; Political economy; Budgetary institutions;
Multinomial Logit; Mixed Logit.

Introduction

Economic and fiscal crisis of 2008 hit hard most of industrialized countries. Especially, large European countries like France, Germany, and the United Kingdom have shown unequivocal deterioration of public finance which has far

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overflowed away the borderline of 60% debt per GDP, one of EU fiscal criteria. On the contrary, relatively small countries, such as Denmark, Finland and the Netherlands keep their fiscal state mostly under control, even though its deterioration at the end of 2000's is undeniable.

This situation was in fact inverse during 1980's. At that moment, France, Germany and the United Kingdom have been among the most reliable players of the European fiscal game. They were keeping good score during this period, while such small countries as Denmark and the Netherlands (but not Finland) were struggling with persistent fiscal fiasco.

This contrast may not be by chance. Jürgen von Hagen, pioneer of political economy approach for governmental budgeting, classified 15 European countries into Delegation States, which are characterized by concentration of fiscal power, and Contract States (including "Mixed" states), characterized by mid-term fiscal planning and coalition government. Large European countries like France, Germany and the United Kingdom were classified as the former, while small European countries like Denmark, Finland and the Netherlands were classified as the latter. In the beginning of 1990's, superior performance of delegation states was evident for von Hagen, while success of contract states or commitment approach to keep the fiscal governance in good state was limited.

This contrasting image of 1980's and 2000's may suggest us a new potential source for reflection which could henceforth navigate us towards relevant strategy for robust fiscal governance. Generally we are likely to adopt one size fits all solution, which is also one of the characteristics of EU fiscal prudence framework. But what if we couldn't apply one solution to all countries regardless of the difference of each country's background, and had better be oriented for a more context driven fiscal governance strategy?

Especially, the crisis that the world is confronting now is not comparable in its size to past temporary fiscal and economic crises. So can we believe that the measures effective in an economically stable era are still effective in such a historical disaster? It is possible that we had better distinguish between the measures effective in normal times and those needed in emergency.

France, Germany and the United Kingdom have all been keeping their public finance relatively managed, but especially France and Germany have never experienced rapid restoration of once deteriorated fiscal state. The quality of their fiscal management has been gradual improvement. Surely the

UK had more fluctuations in its fiscal management, but in general, these representative delegation countries may not be good at rapid fiscal consolidation in times of financial crisis. Furthermore, other delegation states like Spain, Italy, Greece all suffer from the recent economic crisis and rapidly deteriorating public finance, so that they have been ridiculed as “Club Med” by the ex-Chairman of the Federal Reserve in the United States, Alan Greenspan. They may not be resistant to a big crisis.

In this respect, a recent contribution of an Economist of Bank of Canada, Robert Lavigne, draws our interest. He suggested a two step analysis aimed at distinguishing the eventuality of serious fiscal needs (worsening) and that of fiscal consolidation from once worsened fiscal state. He suggests that different institutional settings have different effects in fiscal needs eventuality and in the choice of fiscal consolidation. Although his analysis didn't directly include budgetary institution variables, he could still discriminate centralized countries from more democratic countries using various political variables.

Nevertheless his analysis has a shortcoming of using multinomial logit model, irrelevant for his problem framework. This paper tries to remedy this defect using a different analytical approach, “Mixed Logit Model”. This paper also applies direct indicators of budgetary institutions developed by Hallerberg (2004) and tries to offer a differential analysis between two cases. One case is fiscal consolidation which means restoring once deteriorated public finance and has been the subject of a lot of studies. This paper adds the second case of maintaining good fiscal performance without fiscal consolidation endeavor. We will call thereafter this case “fiscal prevention”, or “fiscal crisis prevention”, using an expression similar to “disease prevention” or “infection prevention”.

This paper hopes to give another contribution of enlarging the sample of countries being analysed. Until now, the approach of political economy of budgetary process has mostly paid attention to European Countries. Other regions like Latin American countries, African countries have also been analysed, but we have never seen an analysis enlarging the sample of countries from Euro zone to other industrialized countries like, the United States, Westminster Countries (Canada, Australia, New Zealand), and Japan. Anglosaxon countries have had a reputation of leading world-wide new public management revolution including budgetary reform. We would need to explain their fiscal performance and its relation to various budgetary reforms. What

von Hagen and Hallerberg have maintained could be only an European phenomenon valid for Euro zone only. Moreover, Japan is famous for its huge debt, touching 200% per GDP. Good political economy analysis of budgetary process should also explain this extreme case. That is why our paper has the sample of 15 European countries and 5 other countries, Japan and 4 Anglosaxon countries. Especially we shall try to get some policy relevant implications for the country with the most serious fiscal problem in the world, Japan, which is not realizable through traditional Euro-zone oriented studies as those of von Hagen and Hallerberg.

Figure 1: Debt per GDP of Delegation and Contract states in 2000's

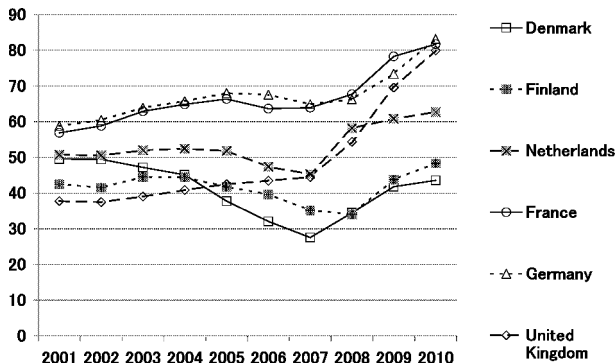
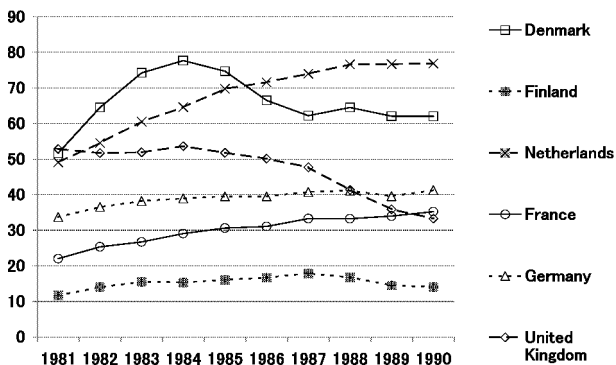


Figure 2: Debt per GDP of Delegation and Contract states in 1980's



This paper has the following structure. First, a review of the literature on political economy of budgetary institutions and the research on fiscal consolidation will be presented. Second, the problems of multinomial logit model adopted by Lavigne's paper will be analysed and the alternative method of mixed logit analysis will be proposed. Third, data description will be undertaken, especially focusing on the problems encountered when preparing data from Japan and Anglosaxon countries with regard to the characterization of budgetary institutions. Fourth, first the results of multinomial logit model and second, those of mixed logit model will be compared. Finally, the results of analysis will be summarized as conclusion.

1 Previous Research on Budgetary Institutions and Fiscal Consolidation

1.1 Previous Literature on Political Economy of Budgetary Institutions

We have seen the surge of political economy research on budgetary process, under the influence of social movement intending to apply balanced budget clause stipulated in many State constitutions, into the Federal government following the same assertion put forth in the famous book of James Buchanan, "Democracy in Deficit" (Buchanan (1977)). Indeed, many studies on State governments (ACIR (1989), Poterba (1994), and Bohn & Inman (1996)) have shown the relationship between balanced budget clause and the State fiscal performance. With these studies in mind, one started to ponder the relevance of what is the case for American State governments to European countries, thinking of installing a similar constitutional prescriptions in the new European Communities. Nevertheless, many European researchers didn't agree with the prevalent view in the United States. They have maintained that there might be two principal approaches for sound budgetary institutions, i.e. numerical rules and procedural rules, and that the latter is more effective than the former if it is applied in the central or federal governments (Alesina & Perotti (1995, 1996)).

Particularly, the pioneering work of von Hagen (von Hagen (1992) or von Hagen & Haden (1994)) is representative of this "European View" of political economy of governmental budgeting, and later such works as Hallerberg & von Hagen (1999), Hallerberg (2002, 2004), Hallerberg, Strauch & von Hagen (2004, 2009) have developed further in this approach. For other regions too, we have

seen such works as Alesina et al. (1996) for Latin American countries, Gollwitzer (2011) for Africa, which illustrate generalization of this approach in the world wide settings.

Here it is important to enumerate main alternatives of institutional strategy for sound fiscal performance, if we consider the development to be made in this paper based on this classification. The representative work of Hallerberg & von Hagen (1999) classified two main strategies for good fiscal governance, i.e. the approach of delegation state and that of contract state. The former is the approach which recommends centralization of fiscal power in the hands of the Prime Minister or the Minister of Finance. It is suitable to the environment of majority system which makes highly promising the eventuality of absolute majority of one party in the parliament. The latter is the approach which recommends restricting budgetary process using mid-term numerical target. It is thought to be apt to the environment of proportional representation which often generates many political parties to coexist inside one country.

One of the later works using this approach, Hallerberg (2004), enriched this classification developing it into the new one of 4 options, adding “mixed state” and “fiefdom”. A mixed approach tends to emerge in states with minority governments. Even with minority government, mixed remedies of centralization of budgetary power or strong minister of finance, and binding multiparty agreement in the mid-term in terms of numerical target can be effective enough to make these countries equally fiscally resistant ones as contract or delegation states. Except for the minister of finance, all ministers do not have an incentive to consider the implications of their spending decisions upon the full tax burden. If a government does little to address this “common pool problem”, then a fiefdom form of governance predominates. Ministers would consider their domains their “fiefdoms,” and they decide spending levels more or less in isolation from one another.

As for the explaining variables of the choice of budgetary institutions for each country, von Hagen and Hallerberg (and other researchers such as Mit Rolf Strauch) use two approaches interchangeably. One is the budgetary institutions index developed since their first survey of 1991 through 2000 and until 2004. This is qualitative index ranging from fiscal rule index, long term constraint index, transparency index, or intergovernmental relationship index. The second is more qualitative judgement classifying sample countries into 4

categories “annually”. Since this paper uses annual data, it is dependent on the latter approach which is the initiative of Mark Hallerberg.

1. 2 Research on Fiscal Consolidation

We have shown historical development of political economy approach on budgetary process, which has given us a lot of contributions for checking the influence of budgetary institutions on fiscal performance, as works of von Hagen and other researchers have taken a lead in this field. But the focus of this paper is looking into the influence of budgetary institutions on the possibility of a large scale fiscal consolidation. Small improvement of fiscal performance is not sufficient to be said to have triggered such a big task. That is why one should mention here the literature on so called “fiscal adjustment” or “fiscal consolidation”. This line of studies originates from the works of McDermott & Wescott (1996), Heylen & Everaert (2000), Alesina & Perotti (1997) or Alesina & Ardagna (1998), and so on. They have set threshold on the improvement of fiscal performance to some level during some duration, in order to define the occurrence of “fiscal consolidation”, using such indicators as Cyclically Adjusted Primary Balance: CAPB, or others. Studies thereafter have followed similar approaches.

We should note, however, that this line of studies has tended to mix value judgement of any defined fiscal adjustment, for instance, time duration of good fiscal performance after triggered fiscal consolidation, or good influence of fiscal consolidation on pushing up economy (so called non-Keynesian effect or expansionary fiscal consolidation, as shown in the studies pioneered by the work of Giavazzi & Pagano (1996)). But we intend to concentrate on occurrence of fiscal consolidation itself. We could refer as this line of studies to von Hagen et al. (2001), von Hagen & Strauch (2001), Ahrend et al. (2006), Mierau et al. (2007), Guichard et al. (2007), Larch & Turrini (2008), Wagschall & Wenzelburger (2011)...etc. Still, the number of these studies are fewer than the aforementioned literature on “good” fiscal consolidation.

Although fiscal consolidation research has been sufficiently rich as we have seen, one could add one pioneering study that appeared recently. This is the work of Robert Lavigne (Lavigne (2006)), which suggested a two step approach which distinguishes the fiscal consolidation from worsened fiscal state and the generation of fiscal needs, i.e. worsening of fiscal performance over some

defined threshold. Just as political economy factors can affect the likelihood of successfully implementing a public austerity program, they might also be critical in determining whether a country falls into a situation of fiscal distress in the first place. However, the probabilities of achieving an exceptional fiscal effort and maintaining good fiscal policy over time (that is, avoiding fiscal crises) may not be influenced by the same set of political economy factors. For instance, in developing countries, high institutional quality usually imposes greater rigour on fiscal policy, but inflexible institutional frameworks can constrain government action in times of fiscal distress, impeding fiscal adjustment (Lavigne (2006)). Lavigne said that this interpretation is broadly in line with Abiad and Baig (2005), who find that high executive constraints (a measure of checks and balances) weaken fiscal efforts by inducing decision-making paralysis. Such findings of differential effects of political economy factors are highly interesting for future consideration of improvement strategy of budgetary institutions.

Nevertheless, this pioneering work of Robert Lavigne still has certain limits. First, Lavigne's paper tries to show that the political and institutional dimensions of large and sustained fiscal adjustments matter. It set forth key factors chosen from a number of such factors as political stability variables, vested interest variables, social divisions variables and the role of institutions variables. And he takes a whole of the world sample using a panel of 61 advanced and developing countries, analysed for each country group. It means he doesn't get involved with the budgetary institutions themselves. He adopted as political variables "Rule of law" indicator, democratic accountability, political stability and election, which could be indirectly related with budgetary institutions, but none of them is the direct representation of the state of budgetary process. What is more necessary for the analysis of governmental budgeting is an analysis based on some direct indicator of budgetary institutions, even though this strategy is likely to restrict available sample for the analysis due to data availability of the details of budgetary process. This is necessary for more policy relevant analysis, which intends to offer an important policy choice on governmental budget process. Second, analytical method of Robert Lavigne has also important defect as we could guess it from the change of analytical method between Lavigne (2006) and Lavigne (2011) (this problem will be discussed intensively in the next section).

Despite of these limits, policy implications contained in Lavigne (2006) are

highly important. If we denied the value of his works, it would be similar to a sinful waste like “throwing the baby out with the bath water”. This can be said despite low profile of Lavigne (2011). Surely Lavigne (2011) mentions as precedent an important work, Mierau et al. (2007) which is published and accepted after Lavigne (2006), and naturally never mentioned in Lavigne (2006). Although Mierau et al. (2007) is important as one of good panel data analysis papers, it only intended to have two similar but quantitatively different analyses, making the most of the difference of definition of fiscal consolidation adopted by Heylen & Eeveart (2008) and von Hagen et al. (2002), the former having adopted mild consolidation strategy, the latter radical one. It never enables us to show the cases, as Lavigne (2006, 2011), of maintaining good fiscal policy over time or avoiding fiscal crises, or of failing or not trying to make necessary fiscal consolidation when governments should face it. This paper is intended to offer useful and policy relevant study following policy implication proposed in Lavigne’s papers, while overcoming problems in their analytical aspects.

2 Empirical Methods

2.1 Problems of Multinomial Logit Model

As this paper put forth the mixed logit model as superior method to the multinomial logit model adopted in Lavigne (2006), which all the same offered a complex structure of two step choice, one being the generation of fiscal needs, the other the occurrence of fiscal adjustment, it is important here to simply review important characteristics of the multinomial logit model before pointing out its structural problems (Glasgow (2001a)).

Multinomial Logit Model assumes that the utility yielded by alternative j to individual i can be represented by:

$$U_{ij} = V_{ij} + e_{ij} \quad (1)$$

Here V_{ij} represents the systematic (observed) portion of utility, and e_{ij} represents the stochastic (unobserved) portion of utility. The multinomial logit model assumes that the unobserved portions of utility e_{ij} are identically and independently distributed (IID) in accordance with the extreme value distribution. The probability that individual i will select alternative j is given by:

$$P_i(j) = \frac{e^{V_{ij}}}{\sum_{k \in C_i} e^{V_{ik}}} \quad (2)$$

where V_{ik} is the utility yielded by alternative k to individual i and C_i is the choice set faced by individual i . The probability is between zero and one, and the probabilities sum to one over all alternatives.

The Multinomial Logit Model can be thought of as simultaneously estimating binary logits for all comparisons among the alternatives. MNL is superior to repeated applications of binomial logit in terms of efficiency. In general, with j alternatives, only $j-1$ binary logits need to be estimated. All j estimations could include redundant information.

These are the simplest sketch of multinomial logit model. Lavigne (2006) tried to adopt this multinomial logit approach to the following problem settings. His paper introduced the notion of fiscal need, which makes it possible to differentiate between three different states: when a country succeeds in making a fiscal adjustment in the presence of a large need (type 1), when a country fails to do so (type 0) and when a country faces no fiscal need (type 2).

Lavigne (2006) applied multinomial logit model to this choice structure of three alternatives. But this choice structure hides his original and theoretical choice structure of three stage choice. First countries face the choice of generating serious fiscal needs or avoiding this by making successfully preventive fiscal management. This is the choice 1 (Fiscal Needs or No Fiscal Needs). Second, among the countries with serious fiscal needs, some try to make fiscal efforts, others do not. This is the choice 2 (Try to Make a Fiscal Effort or Does not Try). Even though the countries make fiscal efforts, some will not succeed after various efforts. This is the third choice of Successful Fiscal Consolidation or Failed Fiscal Consolidation. For his analysis, Type 2 is No Fiscal Needs case, Successful Fiscal Consolidation is type 1, and there is some amalgam between the countries with fiscal need but which do not try consolidation, and the countries which tried consolidation but failed to do that, both of which are mixed together into the same box of Type 0. But this amalgam is not the problem here. The problem is that, while Lavigne (2006) supposed some sequential structure of choice theoretically, the analytical tool chosen is the multinomial logit model, which supposes the choice structure of the same level. The multinomial logit should be used for an indifferent structure among multiple choices. But the theoretical reasoning adopted by Lavigne (2006) is oriented for

some nested or sequential structure, it means that his choice of method may not be suitable to his problem settings. He should have chosen nested logit or sequential logit model for his research objective although panel data analysis is normally not feasible for these models.

Approaching this problem from another aspect, we could point out the problem of the Independence of Irrelevant Alternatives: IIA, which requires the independence of the probability of one particular alternative to be chosen relative to the second alternative, from the existence of the third alternative. For multinomial logit model, this IIA condition should necessarily hold.

The essence of IIA condition is the independence of the share of one commodity from that of the other commodity, if there are only two commodities. A famous good example for explaining that is “red bus/ blue bus problem”. Commuters initially face a decision between two modes of transportation: car and red bus. Suppose that a consumer chooses between these two options with equal probability, 0.5, so that the odds ratio equals 1. Now suppose a third mode, blue bus, is added. Assuming bus commuters do not care about the color of the bus, consumers are expected to choose between bus and car still with equal probability, so the probability of car is still 0.5, while the probabilities of each of the two bus types is 0.25. But IIA implies that this is not the case: for the odds ratio between car and red bus to be preserved, the new probabilities must be: car 0.33; red bus 0.33; blue bus 0.33. This is a completely strange result.

This irrationality is due to the IIA imposed on the environment in which red bus and blue bus are similar or substitute. Generally IIA doesn't hold especially if there are similar alternatives or substitutes. A partial solution for this problem is adopting nested logit model, if one surely knows that particular options are mutually similar or substitute. IIA will also be violated if we omit a variable that is common to two alternatives since the omitted variables will be captured in the stochastic components of the two alternatives, making them appear correlated (Glasgow, Golder & Golder (2010, 2011)).

In fact this relates to another important assumption inherent in Multinomial Logit model, which is the assumption of the unobserved portions of utility being identically and independently distributed (IID) in accordance with the extreme value distribution. And IIA will hold in any discrete choice model that assumes the unobserved portions of utility are IID. IID holds if each of a sequence of random variables has the same probability distribution as the others and all are

mutually independent. MNL has a type II extreme value distribution.

We can formalize IIA in the case of MNL as follows.

$$\frac{P_i(j)}{P_i(l)} = \frac{e^{V_{ij}}}{e^{V_{il}}} = e^{V_{ij}-V_{il}} = e^{(x_j-x_l)\beta} \quad (3)$$

This holds since the MNL is expressed as $U_{ij} = V_{ij} + e_{ij}$, and e_{ij} is iid extreme value. Here the utility of the alternatives depends only on j and l . Moreover, as the data doesn't change between x_j and x_l , when IIA is violated, we see that β is different among alternatives. We have, for testing this condition, several procedures as Hausman test or Small-Hsiao test.

In fact Lavigne (2006) reports that the chi-squared test results failed to reject the null hypothesis that IIA holds and it indicates that the multinomial approach is appropriate (The seemingly unrelated regression estimation (SURE) technique, which is a generalization of the Hausman test for cross-model hypotheses, was used.). Nevertheless there is a report that empirical tests for IIA condition are not necessarily reliable. Cheng & Long (2002) ran Monte Carlo experiments to examine the properties of these tests, including Hausman-McFadden(HM) test and Small-Hsiao(SH) test. They report that the Hausman-McFadden test shows substantial size distortion that is unaffected by sample size in their simulations. For some data structures, the size properties of SH test are extremely poor and do not get better as the sample size increases. Their conclusion is that these tests are not useful for assessing violations of the IIA property. Their best advice is to follow an early statement of McFadden (1974), who wrote that the multinomial logit model should be used only in cases where the alternatives “can plausibly be assumed to be distinct and weighted independently in the eyes of each decision maker”. They also cite Amemiya (1981) who suggests that the multinomial logit model works well when the alternatives are dissimilar. Following their conclusion, we have no choice but to evaluate qualitatively the opportunity of the use of the multinomial logit model, not blindly depending on empirical tests.

Meanwhile, Lavigne (2006) had a contradiction in that it supposes nested structure as analytical hypothesis, but it adopted the multinomial model, which supposes no nested structure among alternatives. Nevertheless, supposing nested structure would not necessarily solve the problem. It is not clear whether the research object is nested or non nested before the analysis. And in this paper's case, a government may not face the choice first, on the opportunity of

fiscal prevention and second, that on fiscal adjustment. It may ponder the choice of the maintainance of good fiscal performance, taking into account the probability, its necessarily painful endurance, the enabling environment in the case of fiscal consolidation. Such fiscal choice structure in this paper may have both the property of sequential or nested choice, and simultaneous choice. That is why we neither recommend simply supposing nested structure in this analysis, nor adopting nested logit model which has also feasibility problem (not suitable for panel data).

2. 2 Logit and Sequential Logit

Lavigne (2006), intensively discussed here, adopted multinomial logit model, while it was followed by his second article Lavigne (2011), which adopted sequential use of logit model twice in panel data settings. Nothing is reported for the reason of this change of methods between the two papers. But we can guess some problem existed for the use of multinomial logit model.

Exactly saying, we can call this two step use of logit model “sequential logit model”, which is not logit model itself.

Sequential logit model has been used in sociology studies, for example studies on the influence of economic and social factors on the rates of students who go up for each higher stage of education. But there are some problems pointed out as analytical method.

Cameron & Heckman (1978) point out that unobserved heterogeneity problem of sequential logit model will necessarily lead to biased estimates. For solution, Buis (2011) proposes a sensitivity analysis, specifying a number of plausible scenarios concerning the unobserved variables, and estimate the effects within each scenario. This approach mitigates problems inherent in sequential logit model but it doesn't clear them out.

Lavigne (2011), which is a sequential application of logit model in panel data settings, does not mention this problem inherent in sequential logit model.

2. 3 Mixed Logit Model

Under the perspective similar to Lavigne (2006, 2011), this paper adopts neither multinomial logit model nor sequential use of logit model, but mixed logit model. Mixed logit model is a highly flexible method, adoptable to any random utility model, and it covers sufficiently the cases where aforementioned IIA condition is

violated. There is another approach called multinomial probit model, similarly adoptable to vast scope of situations, but it has such limits as assumption of normal distribution, or its calculation is difficult. That is why recently there are increasing applications of mixed logit model, rather than multinomial probit model, especially in transport choice projects.

While multinomial logit model supposes iid for error components, mixed logit model mitigates this condition allowing models which do not allow IIA (Glasgow (2001a, b, c)). For that, mixed logit model partitions the error components into the portion of systematic change and that of true iid error components.

$$e_{ij} = \delta_i z_{ij} + \varepsilon_{ij} \quad (4)$$

Here z_{ij} is a variable particular to the alternative j and/or the individual i . δ_i is a random variable, different for each individual. The average of the random variable δ_i is set to zero so that the average of the entire error components can be zero. ε_{ij} is a random variable with zero average and iid extreme value. Adopting this new error components into random utility theory, we can describe as follows.

$$U_{ij} = \beta x_{ij} + \delta_i z_{ij} + \varepsilon_{ij} \quad (5)$$

This formula shows that mixed logit model is reduced to multinomial logit model when $\delta_i = 0$ for all i . δ_i is not necessarily normally distributed, it can assume any distribution (but in practice normal distribution is often adopted).

If the elements of $z_{ij} = x_{ij}$ then we are specifying a “random-coefficients model”. In this instance the vector β gives the mean coefficient values for the elements in x_{ij} , while the vector δ_i gives the deviations of each individual from the mean vector β . Of course $z_{ij} = x_{ij}$ does not necessarily hold (Glasgow (2001a, b, c)). If some elements of x_{ij} are not included in z_{ij} , they are set not as random coefficients, but fixed coefficients. If some elements of z_{ij} are not included in x_{ij} , they are set as varying coefficients of zero mean in the population. Concretely, if some elements of z_{ij} are set as variables fixed among individuals, but varying among alternatives, we can have “error components model”. And we can get it if we can find randomness for the intercept for each alternative. (We don’t try random coefficient model in this paper, which is not our main target.)

Still we could also see some correlation among alternatives in mixed logit model if we want. We could see that through covariance among alternatives, which was, however, neither significant in our study, nor shown in this paper.

But it has nothing to do with IIA condition problem. Even if the elements of δ_i are not correlated, under the condition of no difference of δ_i among alternatives for each individual, unobserved portion of utility is necessarily correlated among alternatives. This means $Cov(e_{ij}, e_{il})$ is not zero for $j \neq l$. Moreover if some elements of z_{ij} are different among alternatives, for $j \neq l$, we get $Var(e_{ij}) \neq Var(e_{il})$. So if we can estimate the parameters of δ , naturally unobserved portion of utility is not iid extreme value, and IIA is violated (Glasgow (2001a, b, c)).

Based on these analytical foundations we can proceed with estimation of mixed logit model, for which we can refer to the already voluminous literature in the domain (for example, Train (2009)). In essence, the estimation is based on the probability $P(j|\delta)$ to choose the alternative j conditional on δ , which is unobservable however, and there is no other choice but to derive unconditional probability as weighted integration using the distribution of δ . The name of mixed logit is originated from this mixture of distribution. Next, estimation is made using log likelihood function. But mixed logit model cannot have analytical solution. So it is based on simulation. Recently “Halton Sequence” has been used as an efficient method for that. In this paper we adopt 125 Halton draws following studies of Glasgow (Glasgow (2001a, b, c)).

Note that, in mixed logit model, panel data can be accepted (Train(2009)). We cannot exaggerate too much the importance of panel data in recent studies. There are discrete models for panel data, but they usually suppose only binomial choice, it cannot offer such multiple choice models as multinomial logit or nested logit model. All that we could have from logit model for this context is, if any, sequential structure. Mierau et al. (2007) is panel data analysis but only for two different binomial choices of different steepness of fiscal adjustment. For multinomial logit model, we can only pool the panel data for estimation, although cluster standard error can be adopted for each individual, which this paper also adopts for multinomial logit analysis following Lavigne (2006). In contrast, mixed logit model can accept panel data. But it only includes different timings of the same individual in the meaning of “group”, as often used in any mixed model as Multilevel Linear Model. It does not automatically express individual heterogeneity as fixed effect model. Similar effect could be obtained by setting intercepts as random variables.

3 Data

3.1 Overview on data

In this paper the definition of dependent variables is important since we have three alternatives. For the definition of fiscal consolidation, we follow previous literature using Cyclically Adjusted Primary Balance (CAPB). We use the data from OECD Outlook Database No.82 for that. From this data, following Lavigne (2006), we define as fiscal consolidation, improvement of CAPB over 2.5% over 5 consecutive years. We set this fiscal adjustment as the state 2. We also need to have the definition of “fiscal prevention” or “fiscal crisis prevention”, which is the state of maintaining a good fiscal performance without temporarily degrading public finance and coming back to a good state afterwards. This is the state 1. We simply adopt the definition of having CAPB not below -2.5%. Firstly we defined for each year / individual the state 2, secondly defined the state 1 for the rest, and finally the residual elements were set as the state zero, meaning neither fiscal prevention, nor fiscal adjustment, simply unmanaged fiscal degradation. Lavigne (2006, 2011) adopted the concept of “Fiscal Needs”, and first classified the countries into those which need fiscal consolidation with deteriorating public finance, and those without such needs and with sound public finance, and secondly those which succeeded in fiscal consolidation and those which failed, among the countries with fiscal needs. We don't adopt such nested structure. We adopt the concept of “fiscal prevention” rather than “fiscal needs”, insisting on the existence of the strategy of keeping good fiscal condition without temporarily deteriorating public finance and consolidating it afterwards. This may be a parallel choice structure rather than nested or sequential one.

For independent variables, we adopt such economic variables as unemployment rate, instability measured by the standard error of real growth rate during past 10 years, real growth rate during past 5 years, and “trade dependency” (export and import divided by GDP), following various papers including Annett (2006). Unemployment should have negative coefficient since with higher unemployment rate it is more difficult to make fiscal consolidation or fiscal “prevention”. Economic instability is also expected to have negative coefficient for both the state 1 and the state 2, since more unstable economy puts more pressure towards adopting stabilization policy, Keynesian policy and debt

accumulation. Besides under the hypothesis that pressure from the outside world accelerates fiscal consolidation and prevention, we adopt trade dependency calculated by the sum of export and import divided by the GDP. This trade dependency is expected to have positive coefficient. It is likely to be larger for smaller countries, of course, although the size of the country does not completely overlap with this trade dependency ratio. What is important is the pressure from outside, the size being one of the factors constituting this pressure. Economic growth is thought to be useful for fiscal adjustment and prevention, and supposed to be positive in coefficient. We use the database of the aforementioned OECD Outlook Database No.82 for these variables, except for the trade dependency which was derived from export, import and GDP data (all nominal) of EU AMECO database.

This paper also includes political variables. One is the political constraint index using the Political Constraint Index (POLCON) Dataset of Witold J. Henisz (Associate Professor of Management at the Wharton School, the University of Pennsylvania). This index was constructed taking into account veto players (Tsebelis (2002)) in multiple layers, for expressing difficulty for political change. First, this measure identifies the number of independent branches of government (executive, lower and upper legislative chambers) with veto power over policy change. This initial measure is then modified to take into account the extent of alignment across branches of government using data on the party composition of the executive and legislative branches. The measure is then further modified to capture the extent of preference heterogeneity within each legislative branch which increases (decreases) decision costs of overturning policy for aligned (opposed) executive branches. This variable shows the power of veto players in multidimensional structure, and is expected to have negative coefficient if fiscal improvement is thought to be a drastic change to status quo, or positive coefficient if it means a continuation of status quo. That is why negative coefficient is expected for the state 2 while negative or positive for the state 1, depending on whether it means change or status quo.

The other variable adopted is the measure of duration of the ruling party. This shows stability of the government. Since unstable government is expected to make populist policies, leaning on deficit budgeting, this measure is thought to have positive coefficient for the state 1 and the state 2. But too long a duration of governing party means uncompetitive political system, or the system

of one party dictatorship, so that it could accelerate deficit budgeting, according to the discussion of Hallerberg, and have negative coefficient. For this measure we take data from World Bank's DPI2010 (Database of Political Institutions).

We adopt the same budgetary institutions classification with Annett (2006), which develops the data based on the classification of Hallerberg (2004). This classification between delegation state, contract state, mixed state and fiefdom, is well documented in Hallerberg (2004), p38. This is followed by Annett (2006), and Pina & Venes (2011) which prepared their data until 2007 using also European Commission (2006). We can safely say that this classification has not basically changed since Hallerberg (2004) until now.

Note that this classification is not the product of mechanical calculation. The classification of budgetary institutions has often changed since the pioneering work of von Hagen (1992). Hallerberg (2004) has come up with mixed state and fiefdom for the first time. Portugal was first classified as delegation state, but reclassified as fiefdom. This is an example of fluctuation during time of definition in budgetary institution classification. This index / classification is based on survey, not according to some objective standards, but mainly with qualitative case study approach, as von Hagen and other researchers have sent the questionnaires to governments and made interviews through field research. There are also indices based on objective criteria such as "predicted delegation state" or "predicted contract state" which do not, however, overlap with the classification of delegation state or that of contract state (Hallerberg et al. (2004)). It follows that we cannot expect objective and mechanical indexation from the budgetary institutions classification which is based on qualitative judgement. We cannot exclude the possibility of fluctuation depending on each researcher's judgement.

We took the sample for the period from 1981 to 2007, since for this interval we can have all the data for all these variables. Nevertheless we excluded Luxembourg and New Zealand which don't have CAPB data during this interval. The sample in this paper is composed of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, the United Kingdom, Australia, Canada, Japan and the United States.

3. 2 Anglo-Saxon Countries and Japan

We can depend on the classification of Hallerberg for 15 European countries,

while we have no data for Anglo Saxon countries and Japan. Therefore we have to create some data for these countries in order to have some useful and policy-relevant information. This is nothing but an attempt which is basically weak as compared to Hallerberg's classification based on the results of long range research since the beginning of 1990's. Nonetheless, we thought that this tentative classification or the researcher's own judgement based on historical overview is acceptable considering the fact that even Hallerberg's research depends on case study, and is not the product of mechanical application of objective criteria.

First, Canada and Australia can be classified as delegation state because we see concentration of power in the hands of Prime Minister or Minister of Finance. These countries are also known for their strong mid term planning function of budgeting. The same is true for the United Kingdom, one of delegation states, so it may be one of characteristics which are typical in all Westminster countries. For example, the indices of budgetary institutions for the United Kingdom are high both for delegation state index and for contract state index. If we could make the same kind of database for Canada, Australia and New Zealand, we would get the same kind of tendency. In fact, these countries have centralization of power based on often absolute majority of governing party, generated from the majority election system which characterizes Westminster countries.

Note that recently we see minority or coalition governments in the United Kingdom, Canada and Australia. New Zealand quit the majority system and adopted the proportional representation system. Recently coalition government became a rule in New Zealand. It can be classified as contract state although we don't adopt this sample in this paper. Coalition governments or minority governments of other three countries are mostly outside of our time span. We classified these countries as delegation states while we are afraid that recent Canada may have become a mixed state, judging from minority governments in the 60's and 2000's (since 2004 until recently).

The presidential system in the United States makes our classification very difficult. There is an aspect of delegation state as we see some degree of concentration of power in central budgetary office, backed up by the strong power of the President. OMB's strong power can be illustrated by the allotment control. Nevertheless, this traditional strong power of budgetary execution of CBO has gradually declined before the surge of parliamentary power. One

example is the impoundment, the power of the President not to spend money that has been appropriated by the U.S. Congress. While it has been regarded as a power inherent to the office of the U.S. President since its foundation by Thomas Jefferson in 1801 until Nixon, who massively resorted to this budgetary technique, the Congressional Budget and Impoundment Control Act of 1974 was passed in response to perceived abuse of the power under President Nixon. This severely inhibited the president's ability to combat excessive spending. Moreover, Congressional Budget Office established in 1975 gave birth to strong budgetary power in the hands of the Congress, exceptional phenomenon in the world. The "Gramm-Rudman-Hollings" Balanced Budget and Emergency Deficit Control Act of 1985, which specified a schedule of gradually declining deficit targets leading to a balanced budget in 1991 and imposed automatic and across-the-board spending reductions, can be a good example of the contracts closed by the President and the Congress together. We could imagine that this cooperation of the President and the Congress is similar to the coalition deal made among parties in Europe. After these historical findings we conclude that the United States can be classified as contract state. This is a tentative hypothesis as the classification of budgetary institutions for presidential system countries has not been discussed in the literature since political economy of budgetary process has concentrated on parliamentary system countries. Further development for this problem is to be expected in the future research.

Japan is regarded as fiefdom as is Portugal in Hallerberg's study. For consideration of Japanese budgetary institutions we need to divide the historical development until 1980's and the further development since 1990's. In Hallerberg's classification, what is important is not the election system itself, but the party system, especially party competition and party stability (Hallerberg (2004), p.15).

Japanese situation until 80's can be thought to be similar to Italian situation. Japanese ruling party was LDP, while Christian Democrats ruled Italy. The very heart of the common pool resource problem is that there is a temptation to draw from the common pool to pay for specific goods, if there is no punishment for ignoring the full tax burden, then parties will spend and spend. The punishment ultimately comes from voters who punish irresponsible governments. Voters cannot punish governments if there is no credible opposition. Fiscal reforms, therefore, will fail when there are uncompetitive party systems.

Italy before the early 1990's is an illustrative case for that (Hallerberg (2004)).

In 1994, Italy ceased its proportional representation system and introduced a new electoral law which is a mixed system based both on plurality for 75% of the seats and on proportional representation for 25%. After that, generated political competition led to the presence of two clear electoral blocks, and with delegation of power to a strong finance minister, Italy became one of the delegation states. Japan has witnessed a similar electoral reform in 1996 (37.5% is for proportional representation), but Japanese political system has remained unstable. From 1990's to 2000's, there have been massive changes in party alignment. The main opposition party against LDP has also changed from Socialist Party, Shinshinto, to Democratic Party, coalition partners of LDP or Democrats have also changed, for example from Social Democrats to Komeito (Clean Government Party), and so on. In 2000's gradually we have seen the surge of two electoral blocs of one part LDP and Komeito, and the other part Democratic Party and Social Democratic Party, but none of them remain sufficient to make an absolute majority often seen in Westminster countries, especially since Japanese two chamber system tends to break absolute majority by the election of one of the two chambers (elections of two chambers are not held simultaneously in Japan). Supremacy of the lower chamber over the upper is also partial and not complete. As Hallerberg says, an unstable political system like Ireland or Portugal, makes it difficult to institutionalize a given form of governance. A shift back and forth among one party majority government, minority government and multiparty coalition government does not allow the institutional structure to gel. This leads to another way of becoming fiefdom as well as politically uncompetitive system, and Japan since 90's seems to be following this scenario.

Note, however, that this is only a "provisional" classification of budgetary institutions for Japan and Anglo Saxon countries. This is also based on qualitative observation, subjective to the researcher's non objective judgement. But it is basically the same as in Hallerberg's study, primarily based on secondary sources but completed by on site interview, phone call, correspondence by fax or e-mail (Hallerberg (2004)). Qualitative data can help researchers to make prudent judgement considering social context of each country. We judged that making classification of budgetary institutions for Japan and Anglo Saxon countries from historical data is a permissible practice, and made a decision to

make the most of these data in this paper's analysis.

4 Results

First we describe the descriptive statistics of our sample. Next we proceed to make multinomial logit analysis before finally showing the results of mixed logit model.

4.1 Descriptive Statistics

This paper adopts as explanatory variables unemployment, instability, growth, trade dependency, political constraint, years of the rule of the governing party, and dummy variables of budgetary institutions signifying delegation state and contract or mixed state. The dependent variable is set as 2 for fiscal adjustment, 1 for fiscal prevention, and zero for the other cases. This dependent variable is modified from the rate of CAPB for fiscal adjustment, and CAPB itself for fiscal prevention. These “materials” of dependent variables are added before the dependent and independent variables in the table 1 showing the descriptive statistics of these variables.

We cover the interval of 27 years from 1981 to 2007, and 18 countries except Luxembourg and New Zealand, so we have $27 \times 18 = 486$ samples for each variable. Primary balance is slightly positive on average. We seem to have balanced samples between positive and negative balances, even though we have slight tendency for positive balance. Similarly we have slight improvement in

Table 1: Descriptive Statistics

Variables	Mean	S.D.	N
CAPB	0.589	2.814	486
$\Delta CAPB$	0.158	1.418	486
Consolidation/Prevention	1.082	0.542	486
Delegation	0.356	0.479	486
Contract/Mixed	0.348	0.477	486
Unemployment	7.61	3.31	486
Instability	1.858	0.759	486
Growth	2.661	1.404	486
Trade Dependency	66.031	34.046	486
Political Constraints	0.476	0.094	486
Government Years	7.239	6.9	486

CAPB on the average. Dependent variable is slightly over 1. In fact, we have a lot of country / year cases of the state 1 (fiscal prevention). We have more limited samples for the state 2 (fiscal consolidation) and the state zero (deteriorating public finance).

For independent variables, mean unemployment rate is 7%, and it represents matured or stagnating economy of already developed countries like in Europe. The growth rate of 2.7% represents low growth rate of developed countries. Trade dependency is over 60%. We have mostly open economy sample here, while Japan is more closed hitting a very low score of 20%. This variable shows pressure from outside, seen in many countries, towards restoring or keeping public finance. Years of ruling party governance is over 7 years, which makes us imagine stable or stagnated political structure. We have one third probability for delegation state or contract / mixed state. It means that the probability of fiefdom is also one third. Note here that we add mixed state samples to contract state samples, following Annett (2006). It has been judged that mixed state is not so different from contract state in its effects or characteristics.

This sample is, first, used for multinomial logit analysis in the next subsection.

4. 2 Results of Multinomial Logit Analysis

Table 2 shows positive effects both for delegation states and for contract / mixed states, whichever approach appears to be effective for fiscal prevention or consolidation. These are clear effects considering 1% significance for all these variables. These effects are bigger for contract / mixed states than for delegation states, meaning that contract / mixed state approach is superior to delegation state approach in this analytical setting.

Turning to other explanatory variables, we find that unemployment rate was a negative coefficient for both cases, while both sides are non significant. Instability has a negative coefficient for both cases, and clear result of 1% significance for both. Growth rate has a positive coefficient for both, while only fiscal prevention case has 1% significance, leaving fiscal consolidation phase non significant. Trade dependency has positive effect for both and clear effect of 1% significance. Political constraints have negative effect for both and 1% significance for both. The years of the rule of governing party have positive

Table 2: Results: Multinomial Logit

Variable	Coefficient	(S.E.)	Variable	Coefficient	(S.E.)
Prevention			Consolidation		
Delegation	1.740**	(0.427)	Delegation	1.596**	(0.477)
(cluster S.E.)	1.740**	(0.649)	(cluster S.E.)	1.596*	(0.682)
Contract/Mixed	3.310**	(0.701)	Contract/Mixed	2.617**	(0.741)
(cluster S.E.)	3.310**	(1.065)	(cluster S.E.)	2.617**	(0.954)
Unemployment	-0.082	(0.052)	Unemployment	-0.056	(0.058)
(cluster S.E.)	-0.082	(0.060)	(cluster S.E.)	-0.056	(0.064)
Instability	-0.715**	(0.231)	Instability	-0.849**	(0.265)
(cluster S.E.)	-0.715*	(0.320)	(cluster S.E.)	-0.849**	(0.315)
Growth	0.387**	(0.150)	Growth	0.026	(0.168)
(cluster S.E.)	0.387**	(0.124)	(cluster S.E.)	0.026	(0.201)
Trade Dependency	0.033**	(0.008)	Trade Dependency	0.029**	(0.009)
(cluster S.E.)	0.033**	(0.010)	(cluster S.E.)	0.029**	(0.009)
Political Constraints	-6.728**	(2.393)	Political Constraints	-8.481**	(2.603)
(cluster S.E.)	-6.728†	(3.981)	(cluster S.E.)	-8.481*	(3.584)
Government Years	0.035	(0.028)	Government Years	0.064*	(0.030)
(cluster S.E.)	0.035	(0.049)	(cluster S.E.)	0.064	(0.067)
Intercept	2.997*	(1.504)	Intercept	3.814*	(1.620)
(cluster S.E.)	2.997	(2.109)	(cluster S.E.)	3.814*	(1.530)
N			486		
Log-likelihood			-324.759		
$\chi^2_{(19)}$			135.879		

Significance: †: 10% * : 5% ** : 1%

coefficient for both, while only fiscal consolidation phase has 5% significance.

In general, we got similar effects both for fiscal adjustment phase and fiscal prevention phase. We got many clear effects of 1% significance. We found that effects differ between two phases only for growth rate and years of governance.

We attempted to assess the IIA condition test, “suest-based Hausman test” as did Lavigne (2006), a modified version of Hausman & McFadden test. It is recently often practiced on the grounds that the result of Hausman test and that of Small-Hsiao often lead to different conclusions. The result of the test is 20.751 for fiscal prevention phase, 17.450 for fiscal adjustment phase, superior to 16.92 of Chi 2 value with the degree of freedom being 9 (5% significance), with probability 0.014 and 0.042 respectively, rejecting the null hypothesis of IIA condition. Application of multinomial logit would be seriously flawed if we are to judge from this test.

We have also tried cluster standard error results following the strategy of Lavigne (2006). There are some differences between two trials. Economic

instability is now less significant for fiscal prevention case, now 5% significant rather than 1% significant. Political constraints have now less significant effects for both cases, 10% significant for fiscal prevention, 5% significant for fiscal consolidation. The years of the rule of the governing party is no more significant for fiscal adjustment. But in general, the results are not that different from those without cluster standard errors.

It follows that we can safely conclude that we don't have much different effects between contract state and delegation state, both for fiscal prevention and fiscal adjustment as far as we adopt multinomial logit model as one research method. We also have clear effects for all variables except unemployment and the years of governance. In general, every variable has similar effects for fiscal prevention and fiscal consolidation, with slight difference in numbers. It is often significant for both fiscal prevention and fiscal consolidation, except growth rate and political constraints index in cluster case, meaning that we have parallel effects between two phases in general.

Note, however, that the results of multinomial logit model have the following limitations.

First, multinomial logit model is not applicable if IIA is violated. Empirical tests for this are also unreliable. And we got the result of IIA violation using "suest-based Hausman test" at least.

Second, multinomial logit is based on pooled data. We cannot use fixed effect of panel data model. If we could deduce unobserved heterogeneity, the estimation results could be quite different. We will see that we can treat this problem using random coefficient in mixed logit model. Surely we can partially take into account this problem because we adopted cluster standard errors following Lavigne (2006). But this approach cannot completely solve this problem and the opportunity for trying panel data analysis still holds.

Third, multinomial logit model is difficult to interpret. It is said that we cannot use coefficients themselves as "effects" and we need to rely on marginal effects calculation (Greene (2008)). There is no mention of this problem in Lavigne (2006). But the disadvantage of marginal effects in multinomial logit model is that they often return different sign and different size of effects as compared to the coefficients. That is why alternative way of RRR (Relative Risk Ratio) representation is proposed for interpretation (Powers and Xie (2000)). We can also represent effects using RRR concept as follows.

Table 3: multinomial logit: RRR representation

Variable	RRR: Prevention	RRR: Consolidation
Delegation	5.70	4.93
Contract/Mixed	27.38	13.69
Unemployment	0.92	0.95
Instability	0.49	0.43
Growth	1.47	1.03
Trade	1.03	1.03
Political Constraints	0.00	0.00
Year of Governance	1.04	1.07

This RRR representation shows the probability of fiscal prevention relative to fiscal degradation, and that of fiscal consolidation relative to fiscal degradation. The numbers smaller than 1 are parallel to negative coefficients in the table 2, the absolute value shows the bigger probability of fiscal prevention or consolidation as compared to fiscal degradation. The numbers nearly zero mean greater probability of fiscal degradation. The numbers nearly unity are ambiguous effects. Judging from this RRR representation, the effects of budgetary institutions are clear. But other control variables have ambiguous effects, especially so for unemployment rate, trade dependency, and the year of governance of ruling party. There are clear effects for instability and political constraints, both seem to make sufficient pressure toward fiscal degradation. Growth rate has varying effects, with clear effect for fiscal prevention, and ambiguous effect for fiscal consolidation.

RRR representation gives us somewhat easier interpretation of multinomial logit model, although the appropriateness of multinomial logit model in this case is doubtful due to IIA violation. If we use mixed logit model, we don't need any such manipulation since the marginal effects are the same as the coefficients.

We will next show the results of mixed logit model using panel data.

4. 3 Results of Mixed Logit Analysis

The table 4 shows estimation results of mixed logit model. This paper adopts error components model, realized by setting only intercepts for fiscal prevention and consolidation as random variables. Note here standard deviations of intercepts for fiscal prevention and consolidation. As these are significant of 1%, this fact is already sufficient in order to say that we have error

Table 4: Results: Mixed Logit

Var.	Coef.	(S.E.)	Var.	Coef.	(S.E.)
Prevention: Mean			Consolidation: Mean		
Unemployment	-0.209*	(0.097)	Unemployment	-0.063	(0.088)
Growth	0.384*	(0.184)	Growth	0.026	(0.198)
Instability	-0.984**	(0.328)	Instability	-1.421**	(0.379)
Trade Dependency	0.043**	(0.014)	Trade Dependency	0.032**	(0.012)
Political Constraints	-3.380	(3.613)	Political Constraints	-11.012**	(3.770)
Government Years	0.001	(0.002)	Government Years	0.039†	(0.023)
Delegation	3.589**	(0.791)	Delegation	0.740	(0.803)
Contract/Mixed	3.619**	(0.910)	Contract/Mixed	2.715**	(0.905)
Intercept	2.247	(2.292)	Intercept	6.291**	(2.267)
Prevention: S.D.			Consolidation: S.D.		
Intercept	1.649**	(0.366)	Intercept	-0.968**	(0.290)
N			1458		
Log-likelihood			-302.046		
$\chi^2_{(2)}$			46.344		

Significance Level: †: 10% * : 5% ** : 1%

components model. When we have error components model, this automatically means that expressions are models with IIA condition violated. So this is a sufficient argument for mixed logit model to be considered superior to multinomial logit model in this application.

Next, we will test the important hypothesis of this paper that the strategy of budgetary institutions may give us different effects depending on whether the authorities are trying to keep good public finance or restoring it after deteriorating it first. For that we need to see if the coefficients and significance of two strategies “delegation state” and “contract state”, can be different depending on the phase of fiscal prevention or that of fiscal adjustment.

First, in case of contract / mixed state, we have positive coefficients both for fiscal prevention and consolidation. Both are significant of 1%. So we can say that multiparty fiscal commitment with mid term planning function is effective both for keeping good public finance and restoring once deteriorated budget, and it is the similarity between mixed logit model and multinomial logit model. While the coefficient for fiscal prevention is higher than that for fiscal consolidation, the latter is sufficiently important in its size effect.

On the contrary, for delegation state, the coefficient is positive and sufficiently important in its size for fiscal prevention phase. Effect is significant of 1%, meaning that the results are reliable similarly to the results of multinomial

logit model. Especially the absolute value of coefficients is large and similar between delegation states and contract / mixed states, showing clearer effect for delegation state than in case of multinomial logit model. Nevertheless, the result for fiscal consolidation is no more significant with its absolute value being much smaller too. Such differential effect between fiscal prevention and fiscal consolidation is not what can be obtained through multinomial logit model, suggesting potential power of mixed logit model as a research method.

We could give some interpretation to the differential effect of delegation state between two phases of fiscal prevention and consolidation. Delegation state function has a merit of concentration of power in the hands of minister of finance and prime minister, avoiding by this the common pool problem. Such concentration of power should also be seen in all the aspects of budgetary process: budget formation, budget discussion in parliament, and finally budget execution. For each aspect we must avoid influence of stakeholders other than central budget office. A fortiori, CBO must be able to intervene into all the details of budget. Fiscal performance can be improved in delegation state if CBO can accumulate small economies from detail intervention to budgetary programs. Nevertheless once fiscal performance has deteriorated severely, it would be difficult to improve it drastically only with such small economies, since this can be effective only if we can continue such economies constantly, and it is fundamentally impossible to realize “one shot” drastic cut with this strategy. Necessarily we would need more drastic and macroeconomic strategy, which, based on mid term fiscal planning, clarifies total economy to realize, and distribute share parts to the departments, forcing them to realize cut “come hell or high water”.

For instance, faced with serious fiscal crisis in mid 90's Japanese local governments tried to improve fiscal performance using performance and program budgeting but it meant squeezing economy by conducting close investigation which takes a lot of time and energy. When fiscal crisis got deepened in 2000's this old method became defective in dealing with sudden fall of fiscal revenue, and they turned to a more radical method like “Frame Distribution Budget”, which first set total saving plan and next distributed share parts to the departments. This fact illustrates well the difference between two strategies and their advantage / disadvantage.

Such a differential effect can also be seen in other independent variables.

We can recall that in multinomial logit model, we got generally similar effects in terms of sign and size of coefficients and their significance, for fiscal prevention or fiscal consolidation. We have got cases of growth and political constraints which showed significance only on one side, while other variables didn't show significant difference between the two cases.

In mixed logit model, we get more differential effects in terms of sign and size of coefficients and their significance. Particularly, we have many variables with significance only on one side. Unemployment rate has a negative sign, which means that fiscal improvement is difficult under difficult economic situation with a lot of unemployed workers, but this is significant only for fiscal prevention case. Non significance for fiscal consolidation phase could mean that fiscal consolidation from sufficiently deteriorated public finance could be a kind of emergency, which makes fiscal consolidation indispensable with or without high rate of unemployment. Higher growth rate may make fiscal improvement easier since the coefficients are positive, but we have got significant coefficient only for fiscal prevention. The coefficients of political constraints are all negative, but one is significant for fiscal consolidation, and the other is non significant for fiscal prevention. The value of the coefficient itself for fiscal adjustment is large. This represents an accentuated contrast with multinomial logit analysis, which showed significance only for fiscal prevention. The result suggests that it is important to diminish the influence of veto players in the phase of fiscal consolidation, when we can expect a lot of stakeholders to resist the reform. Veto players' resistance may not be serious in normal phase of "daily" fiscal crisis prevention efforts. Besides, the years of governance of ruling party is significant of 10% (probability of 9.2%) for fiscal consolidation. while there was no significant result related to years of governance in multinomial logit model. All positive results of governance years, in mixed logit analysis or multinomial logit analysis, may mean that this variable should be interpreted as stability factor of governance which makes any fiscal improvement more feasible, and not as stagnation factor which may hinder any fiscal efforts without political competition. But this can be observed only with fiscal consolidation phase with very limited significance which makes us vigilant against focusing too much on this variable.

For the other two variables, we don't see accentuated difference between the two phases. Instability has negative coefficients with 1% significance both

for fiscal prevention and for fiscal consolidation, although the size of coefficients is slightly different. Economic instability could prevent the country from improving its fiscal performance, both at a rapid pace or by progressive steps. Trade dependency is positive and 1% significant for both, pressure from outside is good for any fiscal improvement, and the same tendency was shown in multinomial logit analysis. Japanese case may be typical of lack of this outside pressure since its value is 22% on sample average against total sample average of 66%.

5 Conclusion

In this paper, we have analysed differences between fiscal prevention and consolidation, of delegation state approach and that of contract or mixed state, developing the framework used in Lavigne (2006) but replacing the multinomial logit analysis used in Lavigne (2006) with mixed logit model. Our use of mixed logit model avoided IIA problem inherent in multinomial logit model, detected by “suest-based Hausman test” for multinomial logit as well as the existence of error component model shown in mixed logit analysis. Estimation results of mixed logit model show that effects of fiscal prevention and consolidation for delegation state differ, and other variables have also often shown different effects between the two scenarios. This finding was not obtained when we used multinomial logit model.

The mixed logit analysis adopted in paper uses panel data, sets random intercepts, and introduces unobserved heterogeneity among countries in the model. Panel data analysis with fixed effect normally deals with this unobserved heterogeneity, but ordinary binomial panel data analysis cannot offer the choice structure among multiple alternatives, which is only logical in this paper’s context and made feasible by the mixed logit model. That is why we can say that the study like Mierau et al. (2007) does not solve the problem confronted by Lavigne (2006). Sequential approach adopted by Lavigne (2011) is also not a solution to this problem since sequential logit analysis is necessarily accompanied by unobserved heterogeneity problem. Only mixed logit analysis can solve this problem of heterogeneity as it permits the use of panel data and setting of random intercepts.

If the delegation state strategy is effective in fiscal prevention phase but not

in fiscal adjustment phase, as our analysis has shown, such countries are expected to encounter extreme difficulty in the face of recent financial crisis and rapidly deteriorating public finance. Even though they could have maintained relatively good public finance until recently, it may be due to the size of fiscal crisis which has been so limited that even delegation state approach could regulate the situation. For instance, the pace of deterioration in delegation countries such as France, Germany and the United Kingdom is now remarkable. They are so far away from the limit of EU criteria that no perspective of their coming back can be credible. Countries such as France and Germany are also well known to have veto players strongly resistant to any drastic reform. Delegation states also include Greece, Italy, Spain, all the “Club Med”, fiscal sustainability of which is seriously doubted by financial market. It means that this paper’s analysis using mixed logit model also suggests a sort of prediction that delegation states will face extreme difficulty in attempts to overcome a big fiscal crisis.

This paper is also intended to give some policy relevant recommendations for budgetary institutions reform, apart from predictions for delegation or contract states in the face of recent economic crisis. If we try to suggest something for a country with huge debt such as Japan, of course, we may need to concentrate power in the hands of the minister of finance as is typical in delegation countries, but it would not be sufficient due to the seriousness of situation, with such enormously deteriorated public finance. It means that we may need fiscal consolidation rather than fiscal prevention, and commitment approach may be important for that. Then it may be essential to strengthen mid term planning function, especially enhance predictability, for example. The problem with this strategy is that one cannot freely choose delegation approach or commitment approach, but we are constrained by political institutions particular to each country. Japan would have limited perspective, both for purer majority system enabling delegation state, and for stable coalition government enabling contract state. Japanese majority system is mixed with proportional representation part, and the two chamber system, with sometimes different ruling parties for the two chambers, hinders realization of durable absolute majority that would have been an ideal environment for such radical changes as budgetary consolidation. Elections are also frequent so that we have difficulty of striking a long term stable deal among coalition partners. In terms of budgetary process, more profound discussion is needed in Japan, especially for

the reform of political institutions, rather than that of budgetary institutions themselves. At least, as we know from using mixed logit analysis, we may need an institutional reform diminishing the influence of veto players in such countries as Japan or other “Club Med” countries facing rapid deterioration of public finance, since veto players generally have strong negative influence on large fiscal consolidation attempt.

In any case, budgetary institutions have varying effects depending on the fiscal environment under which their reforms are conceived. One size fits all reform of budgetary institutions is not feasible. We need to profoundly investigate background environment of a country which is supposed to be considering a budgetary reform, in terms of not only budgetary and political institutions but also the seriousness of fiscal environment (or opportunity for fiscal prevention or consolidation). Without such information, the studies of budgetary process, which should be as policy relevant as possible, cannot be fruitful.

This paper introduces into political economy of budgetary process a mixed logit model which realizes a logical and coherent platform for multiple and simultaneous choice structure. The results suggest a policy relevant view which shows the potential of the mixed logit model in this field.

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Mixed logit is a fully general statistical model for examining discrete choices. The motivation for the mixed logit model arises from the limitations of the standard logit model. The standard logit model has three primary limitations, which mixed logit solves: "It obviates the three limitations of standard logit by allowing for random taste variation, unrestricted substitution patterns, and correlation in unobserved factors over time." Mixed logit can also utilize any distribution for the random