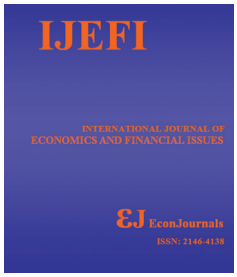

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# Credit Rating Inflation during the 2000s: Lessons from the U.S. State Governments

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**ABSTRACT**

The recent subprime mortgage crisis in 2008 was considered as resulted partly from the credit rating inflation of subprime mortgage bonds. The credit rating market of state governments may face the same risk of credit rating inflation as that witnessed during the recent recession. In this paper, we attempt to examine whether the credit ratings of state governments are inflated, and whether they are accurately reflected in financial or economic conditions. By using a data set from 1999 to 2010, we find that some credit rating agencies don't reflect financial or economic conditions of state governments appropriately and statistically, and we prove that some credit rating results are affected by characteristics other than financial or economic factors in boom years. Thus, in order to prevent the governmental bond markets from similar credit rating risks in 2008, it needs to investigate whether credit ratings of state governments are inflated.

**Keywords:** Credit Rating Inflation, State Governments, Credit Rating Agency, Bond Ratings
**JEL Classifications:** E5, G25

## 1. INTRODUCTION

One of the most important roles of credit rating agencies (CRAs) is to solve asymmetric problems between lenders and borrowers. To protect their money from default risk, lenders must collect sufficient information about borrowers and choose the most creditworthy borrowers. In this manner, CRAs play an important role as mediators. They collect valuable information about borrowers on behalf of lenders and mediate between lenders and borrowers to accomplish financial transactions, invigorating financial markets in the process. In the public sector, state governments frequently strive to borrow money directly from the capital market. It is because fiscal decentralization is strongly emphasized in the evaluation of state governments, and they need huge amounts of money for large capital projects. Thus, they need to monitor on credit rating fluctuations, as creditworthiness is an important for the sustainability in state government (Liu and Kim, 2009). In addition, credit ratings may affect elections and maintaining administrative power of public officials. For these reasons, state governments place a high value on their credit ratings in terms of sustainability.

Meanwhile, CRAs have experienced harsh competition in the credit rating market since Fitch, one of the delegated CRAs of regulators, increased the market share. Originally, the credit rating market was an "investors pay" market, and investors paid CRAs for crediting borrowers, but due to unexpected corporate bankruptcies, by 1974 the system changed from "investors pay" to "issuer pays." Bond issuers such as state governments and other borrowers have had to pay CRAs for their credit rating. The new payment system in the credit rating market moved bargaining power from investors to borrowers and state governments, and bond issuers have enjoyed such bargaining power, which allows them to choose CRAs or credit rating products based on their own preferences. Thus, increased market competition compels CRAs to protect their reputation and market share as dominant information mediators, and in the end, the competition provides strong incentives for CRAs to inflate credit ratings in order to curry favor with borrowers. In the interim, inflated credit ratings caused a devastating recession in 2008 in the form of a subprime mortgage crisis, and CRAs are partly responsible for the recession. From the perspective of state governments, on the other hand, public administrators in state government have long sought to keep

their political power. Their efforts to provide better credit ratings have been so effective that the credit ratings of state governments have become inflated. Thus, in the credit rating market of state governments, there may exist motivation that is identical to that found in the subprime mortgage crisis in 2008.

The purpose of this study is to investigate whether credit ratings have been inflated by comparing the financial condition of state governments with the level of their credit ratings. Using a panel data set from 2002 to 2013 for states in the United States, this paper examines how credit ratings of state governments are inflated based on major conditions, especially financial conditions, by using an ordered probit regression model and a logistic regression model because credit ratings have their own order, and a higher level of credit rating is considered better. In the next section, literature on CRAs and their effects are reviewed, and in the third section, we explain the data and the methodology employed. Following this, the results of the study are provided, and in the last section, we present some conclusions about whether credit ratings of state governments are inflated, with more specific discussions.

## 2. LITERATURE REVIEW

### 2.1. Definition of CRAs

CRAs are considered as authorities who provide information about bond creditworthiness (Ryan, 2012). Here, creditworthiness indicates "the likelihood that an issuer will default on the interest or principal due on its bonds" (Ryan, 2012. p. 6). They assist bond issuers to give information and assessment for investors. CRAs also play an important role in debt financing by addressing the problem from asymmetric information in the markets (Forsythe et al., 1999; Hiller, 1997). From a regulatory perspective, governmental regulators have delegated their authority to monitoring bond issuers. The delegated authorities are CRAs of third party rating agencies such as Standard and Poor's (S and P), Moody's, and Fitch. The Securities and Exchange Commission (SEC) has endowed the CRAs' ratings with the force of law since 1975, when the SEC designated the three CRAs as "nationally recognized statistical rating organizations," or NRSROs, and prevented other agencies from officially rating credit. This regulation resulted in the formation of a duopoly or an oligopoly in the credit rating market. Under the influence of the new system in the credit rating market, CRAs obtained authentic power to provide verification of bond issuers in the financial market.

However, under the "issuer pays" rules, as opposed to the "investors pay" arrangement, bargaining power shifted to borrowers (bond issuers) because they are less interested in information on their default risk relative to investors or lenders and place more emphasize on the cost of borrowing in the financial market (Fridson, 1999). This leads to borrowers seeking higher ratings in order to achieve lower borrowing costs. The problem is that the number of CRAs in the credit rating market is greater than the number of CRAs that bond issuers or borrowers are required to evaluate their credit ratings. The SEC requires debt issuers to officially evaluate two credit ratings, but more than three major CRAs are currently active in the credit rating market. Borrowers are more likely to choose those CRAs that offer better credit ratings or are fit for the borrowers' purpose. Thus, to attract borrowers, CRAs cannot help offering optimistic or inflated ratings so that they can survive in the credit rating market retain their market share (Becker and Milbourn, 2011).

### 2.2. Public Bond Market

Originally, one of the primary requirements for credible bond ratings was the validity of ratings as indicators of how governments are exposed by the default risk. CRAs give credit ratings by using criteria which evaluate if a government can maintain the required cash flow for paying back its debt (Collins, 2014; Liu and Thakor, 1984). In addition to financial conditions, CRAs also consider other factors such as the current tax or revenue base and future industrial circumstances in state or local governments (Moon and Stotsky, 1993; Willson, 1986). Furthermore, scholars have identified political, economic, and administrative factors other than financial characteristics (Krueger and Walker, 2008) and have proven that "divided government, fiscal institutions, unemployment, tax competition, and managerial practices" can also influence changes in government bond ratings (Collins, 2014. p. 113; Denison et al., 2007; Johnson and Kriz, 2005; Krueger and Walker, 2008; 2010; Liu and Thakor, 1984; Zhao and Guo, 2011).

However, in the public sector, government borrowers also seek higher ratings in order to lower borrowing costs and to demonstrate the stellar financial conditions of governments to the financial market. Credit ratings indicate official and reliable evidence of a government's financial capability and preparedness to pay back its debt obligations in timely manner (Liu and Kim, 2009). As the pressure for higher ratings increase competitively, CRAs have greater incentive to offer optimistic or inflated ratings to attract their clients (governments) (Jiang et al., 2012). They provide credit ratings on behalf of regulators (SEC), and the initially favorable ratings on the bonds are crucial for the successful sale of these bonds to various categories of institutional investors (White, 2010).

### 2.3. The Effect of CRAs

Historically, bond market access is one of the most important determinants of financial leverage (Faulkender and Petersen, 2006; Mittoo and Zhang, 2010), and in the process of gaining market access, credit ratings are proven to be one of the most important factors affecting a debt policy according to a large-scale survey of financial managers (Graham and Harvey, 2001). Even though credit ratings are stressed, credit ratings of state or local government issuers have been changed on average less frequently than those of corporate issuers (Liu and Kim, 2009) because state or local governments depend heavily on fiscal transfers from the federal government, which maintains the highest credit rating when compared with other state or local governments. The federal government can be in charge of the payment guarantor for the governments. CRAs also recognize that state or local governments will never collapse unless the federal government breaks down financially. Thus, faced with profit-making pressures, CRAs often streamline their operations and reduce manpower, which is likely to result in inadequate resources for rigorous risk analysis (Liu and Kim, 2009).

The motivation of profit-making also leads to higher credit ratings in the form of inflated ratings in the private finance market, such as commercial mortgage-backed securities (CMBS) or the corporate bond market. If a bond issuer solicits higher credit ratings, CRAs have great incentive to give a higher rating because the issuer or state governments who are "pleased with a high rating might be more likely to become a subscriber and pay for future (solicited) ratings" (Becker and Milbourn, 2011; Jiang et al., 2012; Ryan, 2012. p. 11). Moreover, state governments are almost never exposed to default risk due to the support of the federal government, even though CRAs evaluate the risk "nominally." Therefore, CRAs are more easily motivated to inflate credit ratings because they have less responsibility for default risk compared to corporate bond issuers.

Such a moral hazard may come from the oligopolistic system of the credit rating market, and many studies argue that greater competition is necessary in the industry (House of Lords European Union Committee, 2011). CRAs are also suspicious of enjoying high profits under the guardianship of government authorities such as the SEC. In terms of moral hazard behavior, to prevent inflated credit ratings, CRAs cannot help offering to improve an issuers' rating in return for a higher fee (White, 2010). Moreover, the sustainability of state government precipitates the moral hazard in the governmental bond market more than in the private sector. To conclude, the credit ratings of state governments in the public bond market are inflated, and these inflated ratings may cause another serious problem throughout the entire finance market, or in the financial stability of state governments in the future.

## 3. DATA AND METHODOLOGY

To examine whether credit ratings of state government are inflated, we collected a panel of data from all 50 states over 10 years (from 1999 to 2010). The empirical model is divided into two sections by using the credit ratings of all the major CRAs: S and P, Moody's, and Fitch. First of all, an ordered $\log_{it}$ regression model investigates whether credit ratings of each credit rating agency reflect major financial conditions. Three regression models, setting credit ratings from S and P, Moody's, and Fitch, respectively, include a number of control variables to account for differences in the economic and financial conditions affecting credit ratings in state governments. Second and finally, to examine whether a credit rating increase is valid in boom years, we use a logistic regression model setting of 1 if each credit rating agency increased credit rating in state government and 0 otherwise as a dependent variable. In this analysis, the sample is limited to credit ratings in boom years in order to compare coefficients of financial and economic variables with those in the first model using the whole years from 1999 to 2010. Three different models in this state are used as well: Credit rating increases of S and P, Moody's, and Fitch, respectively.

### 3.1. Variables and Measures

The models that we use in this analysis have the same independent and control variables, suggesting that a range of variables, especially economic and financial factors, could affect a state government's credit ratings of each of the three major CRAs. There are two kinds of dependent variables in our analysis: Credit ratings by their scales and the binary variable explaining whether each credit rating agency increased the credit rating of state government for each state in each year. Credit ratings by their scales mean that they are expressed in figures. As Table 1 indicates, each credit rating agency has a unique rating system. For example, S and P describes investment grades from BBB- to AAA, and, similarly, Fitch ranks from BBB- to AAA for investment grades. Moody's uses a different rating system, employing a range from Baa3 to Aaa, but the essential meanings are the same as the other two agencies. It is natural that we assume all the state governments deserve investment grade unless the United States of America goes bankrupt, and we rank from 1 to 10 in each credit rating. The highest ratings are given a value of 10, and the least appropriate rating for an investment receives a 1. Those numbers from 1 to 10 have an order describing the position of each credit rating, which means that 2 (BBB for S and P or Fitch, Baa2 for Moody's) is better than 1 (BBB− for S and P or Fitch, Baa3 for Moody's), but it doesn't mean that 2 is twice as good as 1. Thus, in this analysis, we use an ordered $\log_{it}$ regression model, setting credit rating scales for each credit rating agency as a dependent variable.

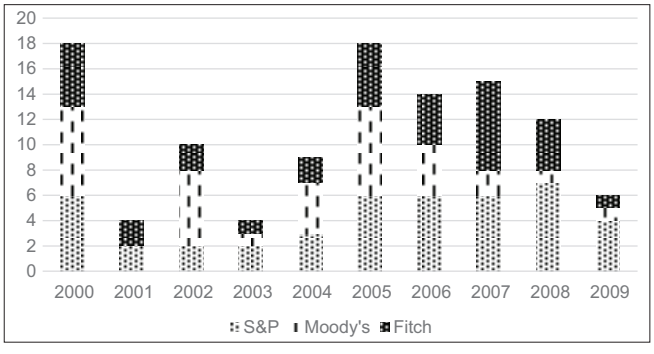
The other dependent variables are binary, indicating 1 if each credit rating agency increases a rating for state government in a given year and 0 otherwise. We test the dependent variables only in boom years because we anticipate credit rating inflation more concretely in those years. For example, if a credit rating agency raised the rating of a state government but we cannot find a significant relationship with financial or economic conditions, then at least we must be suspicious of whether the credit rating is inflated. Especially, the credit rating inflation of CMBS in the mid-2000s was criticized as one of the major causes of the previous recession in 2008. Similarly, according to Figure 1, the credit ratings of state governments from

**Table 1: Credit rating scales**

| Scale | S and P | Moody's | Fitch | Grade |
|---|---|---|---|---|
| 10 | AAA | Aaa | AAA | Prime |
| 9 | AA+ | Aa1 | AA+ | High grade |
| 8 | AA | Aa2 | AA | High grade |
| 7 | AA− | Aa3 | AA− | High grade |
| 6 | A+ | A1 | A+ | Upper medium grade |
| 5 | A | A2 | A | Upper medium grade |
| 4 | A− | A3 | A− | Upper medium grade |
| 3 | BBB+ | Baa1 | BBB+ | Lower medium grade |
| 2 | BBB | Baa2 | BBB+ | Lower medium grade |
| 1 | BBB− | Baa3 | BBB− | Lower medium grade |

S and P: Standard and Poor

**Figure 1:** Frequency of in State Government from 2000 to 2009



2005 to 2007 have increased more frequently than in any other period since 2001. Under similar conditions, state governments were likely to face the same pressures between state governments' desire to receive better credit ratings and profit-seeking behavior of CRAs as those in CMBS markets. Thus, in this analysis, our data set in the other model is limited to credit ratings in boom years, and we determine boom and bust years according to the National Bureau of Economic Research (NBER). To examine credit rating inflation, the logistic regression model is used in the second empirical model due to the binary dependent variables of each credit rating agency.

There are various evaluation factors when CRAs assess ratings in state government, but the fundamental purpose of credit rating is to provide valuable information for investors in the finance market. Thus, general economic conditions in a state and financial conditions of a state government should be one of the major factors that have an impact on the credit rating of state government. In our analysis, we primarily employ major economic and financial variables. To determine the economic conditions of a state, personal income, unemployment rate, and gross state product (GSP) variable are included in the empirical model. The GSP variable is employed after it is divided by the total number of the population in order to use as a GSP per capita. This information is derived from the U.S. Bureau of Economic Analysis and the U.S. Census Bureau. For financial conditions of state government, we divide those financial conditions into two categories: Revenue conditions and expenditure conditions. Revenue conditions of state government consist of three major revenue items, such as intergovernmental grants, sales tax, and income tax. All of the variables are expressed as "per capita" terms. Expenditure conditions, on the other hand, comprise four major categories: Interest expenditure, education expenditure, health expenditure, and general government expenditure. They are also expressed as "per capita" terms, which mean that they are divided by the total number of the population in the state. All of the variables are taken from the National Association of State Budget Officers (NASBO) and the U.S. Census Bureau. Finally, the land size of a state is included as a control variable. Variable specifications are in Table 2, and summary statistics are in Table 3.

### 3.3. Model Specifications

To begin, the empirical models are processed into two parts: Scale of credit ratings and frequency of credit ratings, specifically in boom years. When the scale of credit ratings is used, credit ratings from each credit rating agency are included as a dependent variable in the ordered $\log_{it}$ regression model. The scale has its own ranked soundness of credit rating and represents an ordinal grade of state government. In this model, the scale of credit ratings in state government is estimated in the following form:

$$\text{Credit Rating Scale}_{i,t} = \alpha + \sum(Economic\ Variables_{i,t}) + \sum(Financial\ Variables_{i,t}) + \sum(Control\ Variable_{i,t}) + \varepsilon_{i,t} \quad (1)$$

**Table 2: Variable specification**

| Variable | Description and data source |
|---|---|
| Dependent variable | |
| Credit rating scale | Three sets of scaled credit ratings, depending on the credit rating agency (S and P, Moody's, and Fitch respectively), are ranked from 1 to 10 (from BBB− to AAA for S and P and Fitch, from Baa3 to Aaa for Moody's); Source: The U.S. Census Bureau |
| Credit rating increase | Three sets of binary variable depending on the credit rating agency (S and P, Moody's, and Fitch respectively) express 1 if the credit rating agency increases credit rating of local government for each state in each year and 0 otherwise; Source: The U.S. Census Bureau |
| Independent variable | |
| Land size | Land size of each county measured in thousand square miles; Source: The U.S. Census Bureau |
| Personal income | Total income within a state divided by total number of population in the state; Source: The U.S. Bureau of Economic Analysis |
| Unemployment rate | Unemployment rate in each county from 1999 to 2010 measured in percentage; Source: The U.S. Bureau of Labor Statistics |
| GSP per capita | Total GSP divided by total number of population in a state; Source: The U.S. Bureau of Economic Analysis and the U.S. Census Bureau |
| Intergovernmental grant per capita | Total amount of intergovernmental grant revenue in a state divided by total number of population in the state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |
| Sales tax per capita | Total amount of sales tax revenue in a state divided by total number of population in the state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |
| Income tax per capita | Total amount of income tax revenue in a state divided by total number of population in the state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |
| Interest expenditure per capita | Total amount of interest expenditure divided by total number of population in a state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |
| Education expenditure per capita | Total amount of expenditure in education category divided by total number of population in the state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |
| Health expenditure per capita | Total amount of expenditure in health category divided by total number of population in the state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |
| General government expenditure per capita | Total amount of expenditure in general government category divided by total number of population in the state; Source: The National Association of State Budget Officers (NASBO) and the U.S. Census Bureau |

GSP: Gross state product, S and P: Standard and Poor

Where economic variables include personal income, unemployment rate, and GSP per capita. Financial conditions consist of two categories such as revenue and expenditure variables. Revenue variables comprise intergovernmental grants from the federal government, sales tax revenue, and income tax revenue, and expenditure variables include interest expenditure, education expenditure, health expenditure, and general government. All of the revenue and expenditure variables are calculated as a form of "per capita." For the control variable, land size is included in our analysis.

In the next stage, we investigate credit rating inflation in boom years by using a binary dependent variable. It has a value of 1 if each of the CRAs raised the credit rating for a state in a year, and 0 otherwise. The logistic regression model with a panel set in boom years employed in our analysis measures how economic and financial factors affect the decision to increase the credit rating of a state. According to the NBER, boom years include years from 1999 to 2000, from 2002 to 2007, and 2010. Thus, in our logistic regression model, we limit our panel data set to those only in boom years. The independent variables are listed the same as the first model by using the credit rating scale and the binary dependent variable of whether each credit rating agency raised ratings in state government, which are estimated in the following model:

$$\text{Credit Rating Increase}_{i,t} = \alpha + \sum(Economic\ Variables_{i,t}) + \sum(Financial\ Variables_{i,t}) + \sum(Control\ Variable_{i,t}) + \varepsilon_{i,t} \quad (2)$$

## 4. RESULTS

### 4.1. Results by Scale of Credit Ratings

Table 4 provides the regression results for the model with the scale of credit ratings in the Equation (1). First of all, the model using the credit ratings scale of S and P as a dependent variable indicates that GSP and education expenditure have a positive impact of increasing a credit rating from S and P and they are statistically significant at the level of 5%. On the other hand, intergovernmental revenue per capita has a negative relationship with credit rating increases of S and P. Second, for Moody's, unemployment rate, intergovernmental grant per capita from the federal government, and interest expenditure per capita have negative effects on credit ratings in state government. Education expenditure per capita still shows a positive impact on credit rating of Moody's. Even though intergovernmental grant and interest expenditure are included in the opposite category of government's financial condition, their impacts are made in the same direction. Finally, the third model using the credit rating scale of Fitch as a dependent variable indicates that intergovernmental grant per capita has a positive

**Table 3: Descriptive statistics**

| Variable | Obs | Mean | Standard deviation | Min | Max |
|---|---|---|---|---|---|
| Credit rating scale (S and P) | 568 | 8.4 | 1.2 | 2 | 10 |
| Credit rating scale (Moody's) | 531 | 8.2 | 1.3 | 3 | 10 |
| Credit rating scale (Fitch) | 434 | 8.4 | 1.3 | 2 | 10 |
| Credit rating increase (S and P) | 600 | 0.1 | 0.3 | 0 | 1 |
| Credit rating increase (Moody's) | 600 | 0.1 | 0.2 | 0 | 1 |
| Credit rating increase (Fitch) | 600 | 0.1 | 0.3 | 0 | 1 |
| Land size | 600 | 70.6 | 85.0 | 1.0 | 570.6 |
| Personal income | 600 | 34,128.2 | 6475.9 | 20,578.0 | 56,121.0 |
| Unemployment | 600 | 5.4 | 2.0 | 2.3 | 13.8 |
| GSP | 600 | 40.8 | 9.3 | 22.7 | 80.0 |
| Intergovernmental | 600 | 1437.5 | 577.3 | 508.7 | 4352.9 |
| Sales tax | 595 | 1018.5 | 358.0 | 192.5 | 2478.7 |
| Income tax | 593 | 693.4 | 415.1 | 0.0 | 1932.5 |
| Interest | 600 | 145.9 | 99.1 | 7.3 | 574.5 |
| Education | 600 | 1618.5 | 450.1 | 578.4 | 3675.2 |
| Health | 600 | 171.2 | 89.3 | 40.8 | 528.7 |
| Government | 600 | 184.2 | 110.6 | 62.4 | 859.9 |

GSP: Gross state product, S and P: Standard and Poor

**Table 4: Ordered logistic regression results of S and P, Moody's, and fitch respectively**

| Variable | S and P | | Moody's | | Fitch | |
|---|---|---|---|---|---|---|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Land size | −0.014 | 0.010 | −0.009 | 0.012 | −0.007 | 0.009 |
| Personal income | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Unemployment | −0.074 | 0.080 | −0.447*** | 0.089 | −0.117 | 0.086 |
| GSP | 0.166** | 0.072 | −0.121 | 0.079 | 0.034 | 0.076 |
| Intergovernmental | −0.001* | 0.001 | −0.001* | 0.001 | 0.002*** | 0.001 |
| Sales tax | −0.001 | 0.001 | −0.001 | 0.002 | −0.004** | 0.001 |
| Income tax | 0.001 | 0.001 | −0.001 | 0.001 | 0.001 | 0.001 |
| Interest | 0.000 | 0.004 | −0.013*** | 0.004 | −0.012*** | 0.004 |
| Education | 0.002** | 0.001 | 0.004*** | 0.001 | 0.001 | 0.001 |
| Health | 0.003 | 0.003 | 0.005 | 0.003 | 0.007** | 0.003 |
| Government | 0.003 | 0.004 | 0.005 | 0.005 | −0.005 | 0.004 |

***.**.*Indicates significance at the level of 1%, 5%, and 10%, respectively. GSP: Gross state product, S and P: Standard and Poor

impact on credit rating, but sales tax revenue per capita, on the other hand, has a negative effect on credit rating, even though both variables are included in the same "revenue" category of financial condition. Moreover, the in expenditure category of financial condition, interest expenditure per capita and health expenditure per capita demonstrate the opposite direction for coefficients.

### 4.2. Results by Credit Rating Increase

Turning to the analysis of whether the credit rating of each credit rating agency has increased or not, the first two columns of Table 5 reveal that S and P increases credit rating of state government when sales tax per capita is increased. It is statistically significant at the level of 1% in our analysis. The two columns indicate that credit ratings that Moody's evaluates increase when the unemployment rate decreases, and it is significant at the 1% level as well. Fitch, on the other hand, raises credit ratings of state government when personal income increases. However, credit ratings also increase when the unemployment rate rises and GSP drops. They provide the opposite results from the other two CRAs regardless of statistical significance. Finally, Fitch increases credit ratings of state government when intergovernmental grants per capita from the federal government is raised, and it is significant at the level of 1%.

## 5. CONCLUSION

The purpose of this study is to examine whether credit ratings of state government are inflated, and in this study, we divide our models into two: The credit rating is calculated by uniformly ordered scale and binary condition to determine whether a credit rating agency increases the credit rating of state government as a dependent variable. In each model, we use three different dependent variables based on the following CRAs: S and P, Moody's, and Fitch. In particular, we investigate: (1) Whether credit ratings of state government reflect economic and financial conditions of the state properly, and (2) whether increases in credit rating also incorporate the conditions appropriately. By analyzing the panel date from 1999 to 2010 and the limited data in boom years, we conclude that the credit ratings of all three CRAs don't reflect the economic and financial conditions of state government appropriately. It is true that CRAs evaluate credit ratings of state government according to multifarious factors, such as political conflicts or many social conditions of state government, but financial conditions of state government, especially conditions of major revenue or expenditure sources, on the other hand, should be reflected in the process of evaluating credit ratings. At least statistically speaking, we cannot find any relationship with credit ratings in some financial conditions of state government.

Moreover, if we limit our research scope to credit rating increases in boom years, the relationships with economic and financial conditions deteriorate further, and we can find few statistically significant relationships between credit rating increases and these conditions. Even though each credit rating agency has its own assessment elements when it evaluates the credit rating of state government, it should increase credit ratings under generally accepted conditions such as increasing revenue sources, expenditure cuts, or increased GSP. However, in our analysis, the results demonstrate that credit ratings are likely increased even when generally accepted conditions are not fit. For example, credit ratings of a credit rating agency increase when the unemployment rate increases and when GSP per capita decreases. Moreover, they are statically significant at the level of 1% and 5%, respectively. The results prove that other factors may affect credit ratings more than economic and financial conditions of state government. In our analysis, it is hard to demonstrate which characteristics affect credit rating increases, but at least we prove the existence of more powerful factors when a credit rating agency evaluates the credit ratings of state government, and one of the possible reasons is credit rating inflation as we examine in our analysis.

It is true that a statistical relationship cannot explain everything, but it can provide a clue that credit ratings of state government are probably inflated, especially in boom years. For further research, it is necessary to examine which characteristics drive credit rating increases in the boom years based on this study. If we can find some factors that relate to the general credit rating process, the CRAs can be free from any suspicion that they inflate credit ratings of state government. However, we are potentially suspicious of inflated credit ratings until both pressures between the desire to demonstrate financial stability in state government and profit seeking of CRAs exist in the credit rating market, as CRAs were criticized for credit rating inflation of the CBMS market in the previous recession. Thus, for future research, more specific causal relationships with credit ratings are necessary to prove going forward.

**Table 5: Logistic regression results of S and P, Moody's, and Fitch respectively**

| Variable | S and P | | Moody's | | Fitch | |
|---|---|---|---|---|---|---|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Land size | 0.008** | 0.003 | 0.004 | 0.003 | 0.005 | 0.004 |
| Personal income | 0.000 | 0.000 | 0.000 | 0.000 | 0.000*** | 0.000 |
| Unemployment | −0.108 | 0.130 | −0.309* | 0.164 | 0.395*** | 0.096 |
| GSP | 0.007 | 0.070 | 0.022 | 0.063 | −0.157** | 0.070 |
| Intergovernmental | 0.000 | 0.001 | 0.000 | 0.001 | 0.001* | 0.001 |
| Sales tax | 0.002* | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Income tax | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Interest | −0.001 | 0.003 | −0.004** | 0.004 | −0.003 | 0.003 |
| Education | −0.001 | 0.001 | 0.000 | 0.001 | 0.000 | 0.001 |
| Health | −0.001 | 0.003 | 0.003 | 0.003 | −0.003 | 0.003 |
| Government | 0.001 | 0.004 | 0.001 | 0.004 | 0.002 | 0.004 |

***.**.* indicates significance at the level of 1%, 5%, and 10%, respectively. GSP: Gross state product, S and P: Standard and Poor

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