THE CONTRIBUTION OF TAX SYSTEMS AND
POLITICAL AND ECONOMIC DIFFERENCE FOR THE FISCAL CONDITION
OF EACH STATE IN THE UNITED STATES

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ABSTRACT

Many governments in the world struggle with realizing and keeping a good fiscal position. This study tries to determine the factors which contribute to the ideal fiscal condition by focusing on the tax systems of 50 states in the United States and the District of Columbia. The regressions use a fixed effect model and include fiscal condition indicators as dependent variables, tax revenue variables for each tax sources as independent variables, and economic/political control variables.

The results show that both operating ratio (total revenue / total expenditure) and surplus (deficit) per capita work very well as indicators for fiscal condition. Furthermore, corporate tax revenue has positive relationship with fiscal condition, while property tax revenue has negative correlation.

In addition, the regressions reveal that Republican control in executive and legislative branches seems to affect states' budgets positively. On the other hand, states with top-10 cities tend to be in worse fiscal situations. Finally, although increased GDP and average income are good for fiscal conditions, relying on information and finance industries might cause negative effects on states' budgets. Rather, the regressions imply that states should focus on trade industry more.

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Many thanks,
Takayuki Shirai

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I. INTRODUCTION

This paper aims to examine what kinds of tax policies and political and economic situations have influences on fiscal conditions of governments by comparing the 50 states in the United States and the District of Columbia. The main questions are as below.

(1) Do tax systems make differences in the fiscal condition of these states?

(2) Are other political and economic factors correlated with the fiscal condition?

There are two hypotheses that arise from the first question. First, if the tax revenue from each tax source increases, the state's fiscal condition would simply improve. The second hypothesis is that proportions of tax revenue for property tax, income tax and sales tax out of whole tax revenue have positive effects on states' fiscal condition, respectively. This is because these three taxes are the major revenue sources in most states. Especially property tax is relatively stable regardless of economic situation, which will lead to a predictability for budgets. On the other hand, corporate tax revenue will not affect fiscal condition as much because the amount of its revenue is quite small relative to that of the other tax resources.

For the second question, I anticipate that, if economic conditions improve, the states' revenues would also increase and their fiscal condition would also become better. Also, based on this hypothesis, states with Republican control may have a better fiscal condition because my perception is that Republicans tend to create pro-business policies. As for the industrial structure, states that focus on mining and manufacturing tend to have good fiscal conditions because these sectors create huge job opportunities and expenditures. Also, states with huge tertiary sectors should realize better fiscal conditions because the sectors can incubate high-income jobs. Finally, states with big cities may use their economic advantage to improve their fiscal conditions.

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Recently, the finances of many countries in the world are constrained, and the countries are seeking effective countermeasures for this problem. One of the possible solutions is creating tax systems that attract new businesses and people. The theory is that, if the tax rates are low or there are favorable tax incentives, new businesses and influxes of people increase, which leads to economic growth and finally increases in tax revenue.

A typical example is corporate tax. With the progress of technology in recent years, the economy has become globalized, and the movement of people and companies has become much easier than before. In addition, thanks to the development of the Internet, the degree of freedom of companies' locations has increased. In response to these environmental changes, each country and state has competed to attract companies that have the potential to revitalize domestic economies. In such cases, governments usually have used tax incentives. The corporate tax rate of each country has drastically decreased, which is expressed as a "race to the bottom."[a] Furthermore, many countries created ambitious preferential taxations for companies.

However, it is still not clear what types of tax systems are most effective for improving fiscal conditions. Nobody knows whether the tax incentives for corporations are the best way to attract business and people. Moreover, business opportunities and population growth may not necessarily increase a government's revenue especially in states with many tax incentives.

When examining such relationships between fiscal conditions and tax systems, there is a significant problem. Simply comparing the policies of many countries is quite difficult because they are sometimes in extremely different environments (geographically, politically, and

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[a] Oxfam. (2016). TAX BATTLES: The dangerous global Race to the Bottom on Corporate Tax. retrieved from https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp-race-to-bottom-corporate-tax-121216-en.pdf.

economically). To minimize such differences, this paper focuses on state governments in the United States. Although there are also regional differences inside the United States, the states must share fundamental similarities as members of the United States. They can decide rates and incentives for state taxes like other governments in the world. Furthermore, they determine policies through intense debate under some separation of three powers (Legislative, Executive, Judiciary) like other countries.

From the above viewpoint, this paper analyzes data from the state governments of the United States and examines which tax sources have positive influences on their fiscal conditions. Also, this analysis uses a regression with dummy variables which express political and economic features of each state government.

The paper proceeds as follows: The next two chapters present background information and a literature review, respectively. Chapter IV contains the theoretical model, and Chapter V covers the empirical model. Chapter VI shows the characteristics of the data and their sources. Chapter VII indicates the results of the regressions, and Chapter VIII demonstrates limitations of the analysis in this paper. Finally, the conclusions and policy recommendations are in Chapter IX.

II. BACKGROUND

Fiscal conditions vary from state to state and year to year. According to the PEW Charitable Trusts, most states have regained the fiscal and economic ground to almost the same level as just before the Great Recession in 2008; tax revenues in about 28 states had already recovered in the first quarter in 2017.[b] For example, the tax revenues in the first quarter of 2017 compared with each state's peak are 23.4 percent higher in North Dakota, 22.9 percent higher in Minnesota, and 18.9 percent higher in Colorado, respectively. On the other hand, for other states that are still in the process of rebounding from the recession, Alaska is at -88.7 percent, Wyoming is at -43.0 percent, and Florida is at -16.6 percent relative to each state's peak.[cd]

Each state earns its own revenue from various sources. Some examples of the revenue sources are: taxes, charges for usages such as highways and hospitals, utility fees, and insurance trusts. Among them, the tax resource accounts for the largest proportion. In addition, each state acquires revenue from the federal government through intergovernmental transactions.

Two of the types of taxes in the United States are federal and state taxes. Each state has the right to determine the tax rates, taxable items, and preferential treatments for its own state taxes by itself. In other words, each state, to some extent, can control the proportion of the tax revenues from each tax source by changing its tax system. Generally, each state relies on sales tax, property tax, and personal income tax. For example, the average state revenue from each tax

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[b] The PEW Charitable Trusts. (2017). Number of States in Which Tax Revenue Has Recovered, After Inflation. retrieved from http://www.pewtrusts.org/~/media/assets/2017/10/bar_chart_v1_1012.pdf.

[c] The PEW Charitable Trusts. (2017). Fiscal 50: State Trends and Analysis. retrieved from http://www.pewtrusts.org/en/multimedia/data-visualizations/2014/fiscal-50#ind0.

[d] The PEW Charitable Trusts. (2017). Real Tax Revenue in 28 States Has Recovered From Recession Tax collections in Q1 2017 compared with each state's peak, adjusted for inflation. retrieved from http://www.pewtrusts.org/~/media/assets/2017/10/real_taxrevenue_map_v1_1012.pdf.

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resource in 2016 is as follows; 35 percent for sales tax, 31 percent for property tax, 23 percent for personal income tax, and 4 percent for corporate tax. In fact, however, these proportions have wide diversity across states. For example, the main tax revenue sources are property tax in New Hampshire, sales tax in Nevada, Tennessee, and Washington, and personal income tax in Oregon.

One of the two critical factors for amount of tax revenue is tax rate. The tax rate of each tax source varies in each state. In 2016, the revenues from both personal income tax and corporate tax are zero in Nevada, Texas, Washington, and Wyoming. The revenues from personal income taxes in Alaska, Florida, and South Dakoda are also zero. Like these examples, the ideas for taxation differs from state to state.

The second factor is the amount of taxable income. Without the effects of tax incentives, this amount will increase as economic conditions improve. In this respect, each tax is divided into two types: tax revenues which are highly sensitive to economic situations and those which are relatively stable regardless of economic situations. The tax revenues from sales taxes, income taxes, and corporate taxes are categorized in the former type which highly depend on the conditions of businesses and households in each state.[e] On the other hand, property tax is in the latter type: The revenue from property tax is relatively stable because the tax amount for existing facilities is not related to economic conditions. These facts lead to the following two points:

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[e] Sales tax is calculated based on transaction amount, income tax is calculated based on individual income, and corporate tax is calculated based on profit of a company. Because the amounts of transactions, the income of individuals, and the profits of companies change according to state of the economy, the tax revenues from these tax sources also depend on the level of economic activity. On the other hand, the amount of property tax is calculated by multiplying the present value of a property by the tax rate. Therefore, if the value of the property does not change, the tax amount also will not change.

(1) The tax system is the foundation of the finances in each state, and it is the state governments' strategies that determine how much they obtain in tax revenues from each tax source.

(2) If states' finances mainly depend on sales taxes, income taxes, and corporate taxes, increases in the GDPs of the states directly correlate with increases in tax revenues.

Across the world, governments have changed their strategies for tax revenue. As a recent trend, governments compete by lowering their corporate tax rates in order to attract multinational companies. In fact, between 2006 and 2017, the corporate tax rate changed on average from 28 percent to 24 percent in OECD countries (Fig.1).[f] Most notably, the UK aggressively lowered its tax rates from 30 percent in 2006 to 19 percent in 2017. Although Japan and Germany were famous for their high corporate tax rates previously, both countries reduced the rates from about 40 percent in 2006 to about 30 percent in 2017. This is because attracting large companies can revitalize the regional economy and create jobs. Corporate tax revenues can increase if the increase in economic activity outweighs the reduction in tax rates. In addition, if the revitalization leads to population and transactions increases, other tax revenues such as from sales tax would increase.
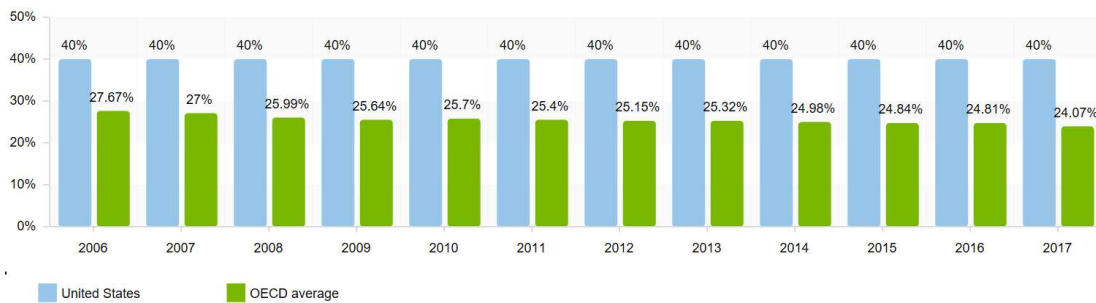
Figure 1. Corporate Tax Rates from 2006 to 2017

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[f] KPMG. Tax Rates Online. retrieved from https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online.html.

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In addition to the corporate tax rate, tax incentives affect the total tax burden of multinational corporations. Each country gives tax incentives to companies that meet certain conditions (e.g., specific industries or specific company functions) and these measures enable multinational companies to keep their actual tax burden lower than prevailing rates.

In contrast to such global trends, the United States, maintaining a federal corporate tax rate of 35 percent,[g] seems to take a different strategy. However, this is controversial. In fact, only famous and large companies are subject to the corporate tax in the United States. Other companies bear the personal income tax of their owners (Alm & Rogers, 2011).[h] Therefore, it is difficult to distinguish precisely between revenue from individuals or that from companies at the federal level in the United States.

Unlike corporate taxes, indirect tax rates and personal income tax rates in each country tend to be equal or higher over the past 10 years (Fig.2 and 3).[i] France is an example of exceptions; the personal income tax rate was 40 percent in 2007, but it became zero in 2017 in France (Fig.4).[j]

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[g] In addition to the federal corporate tax, companies have to pay state corporate taxes. Therefore, the total corporate tax rate in the United States is 35 percent or above.

[h] In the United States, there is a system called Check-the-box Classification Regulations that has been in effect since 1997. This is a system that allows corporations to select whether they pay corporate tax or personal income tax of their owners on federal taxes by submitting Form 8832. However, companies' status for state taxes might be different.

[i] KPMG, op.cit.

[j] KPMG, op.cit.
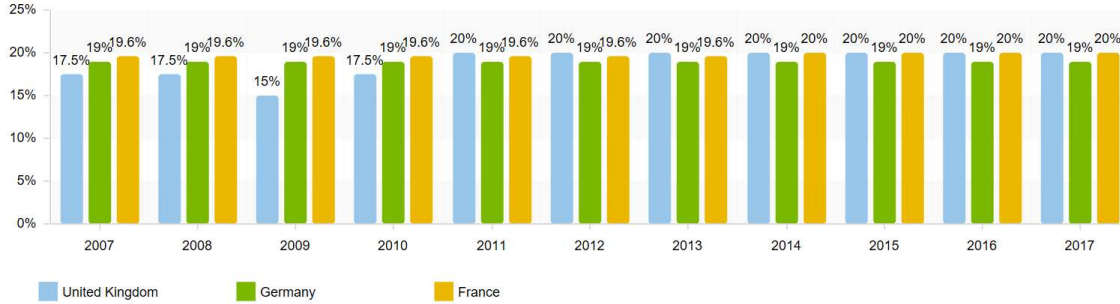
Figure 2. Indirect Tax Rates from 2007 to 2017

Figure 3. Personal Income Tax Rates from 2006 to 2017 (the United States and OECD)
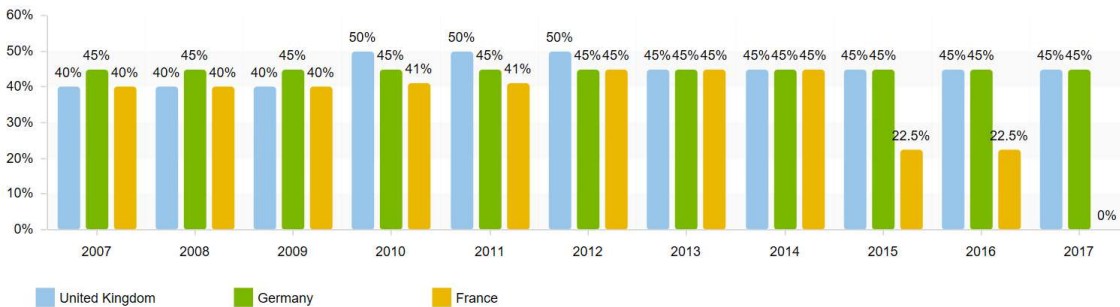
Figure 4. Personal Income Tax Rates from 2007 to 2017 (Major Countries in the EU)

Each state's sales tax rate in the United States varies from 0 percent in Delaware, Montana, New Hampshire, and Oregon, to 7.25 percent in California. Furthermore, personal income taxes and property taxes in each state vary much more in terms of their rates and taxable items. Therefore, the proportion of these tax sources in total tax revenues also varies by state.

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Lowering the tax rate is a double-edged sword. Each country or state can attract new companies and people coming into the state by a low tax strategy. This influx may revitalize the domestic economy and possibly contribute to fiscal consolidation due to increasing certain types of tax revenue. On the other hand, the policy may not work due to a mismatch between needs and incentives. Even if a state government succeeds in increasing the number of companies and its population, total tax revenue might decrease because of the low tax rate or limited taxable items, which leads to further deterioration in fiscal conditions.

I next turn to a review of the literature related to my study.

III. LITERATURE REVIEW

(1) Fiscal condition

It is so difficult to evaluate the fiscal condition in each state because each state has a multitude of factors to take into account. Most importantly, the setting of the time frame has a great influence on the evaluation. Groves, Groves, Godsey, and Shulman (1981) proposed a model known as the International City/County Management Association (ICMA) model (Arnett, 2014). Groves et al. (1981) created a model for monitoring the change of fiscal condition and identifying existing problems. The model associates 12 major causes of financial condition with 36 variables to be monitored. The variables are categorized into four types of indices: cash, budget, long-run, and service-level solvency indices.

Groves et al. (1981) explains that the cash solvency indicates a government's capacity to generate enough cash or liquidity to pay its bills. Therefore, according to Arnett (2014), the cash solvency has a short time frame (from 30 to 60 days) and reflects the liquidity of a state government and the effectiveness of its cash management system. The article also introduces budget solvency as a government's ability to generate sufficient revenues to meet its expenditure and not trigger deficits. Arnett (2014) determines this solvency as a mid-range time frame (often one fiscal year). The long-run solvency, as the name suggests, means the long-term ability to pay all the costs of doing a government's business not only for each year but also for several years (Groves et al., 1981). The article raises pension costs as an example of this type of solvency. In addition, Groves et al. (1981) applies one more index which is a little bit different from other indicators: service-level solvency. The index shows a government's ability to provide the level and quality of services required for the general health and welfare of a community.

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Many articles that evaluate fiscal conditions refer to this model (Kamnikar, Kamnikar, & Deal, 2006; Hendrick, 2011; Jacob & Hendrick, 2013). Xiaohu, Lynda, and Tu (2007) find that a measure of financial condition required by GASB Statement No. 34, which was introduced in 1999 as a financial reporting model for state and local governments in the United States and consisted of the above four types of indices, is reliable and valid.

There are also some efforts to creates a reliable single index of fiscal condition from the four indexes. Arnett (2011) and Arnett (2014) create such a single index from the cash, budget, long-run, and service-level solvency indices using fiscal year 2012 data and concluded that the highest-ranked states in terms of fiscal condition were Alaska, South Dakota, North Dakota, Nebraska, and Wyoming. They acquire data from state and local CAFRs, which contain many financial indicators. On the other hand, Norcross and Olivia (2015) add one more indicator (trust fund solvency) and create a single indicator out of the five indicators. They find that the highest ranked states are Florida, South Dakota, North Dakota, Utah, and Wyoming. This difference of the results may be due to the differences of weighting of each element and data source. Actually, Arnett (2014) mentions the importance of setting the correct weights on the underlying components in order to create a reliable single index of fiscal condition out of several indexes.

These rankings change in each type of solvency. Arnett (2014) composes a budget solvency index from both operating ratio (total revenues/total expenditures) and surplus (deficit) per capita (change in net assets/population). The results showed Alaska, North Dakota, Wyoming, Wisconsin, and Utah as the highest ranked states,[k] which was a little bit different from the result of Norcross and Olivia (2015).

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[k] Most of them rely on mining industry. The average proportion of mining in GDP is 33.7 percent for

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In fact, some articles focus on one dimension to evaluate fiscal condition. In particular budget solvency index is used for various purposes. Chaney, Mead, and Schermann (2002) simply compare the fiscal position between Alexandria, VA and Corona, CA. Rubin, Rubin, and Willoughby (2009) investigate the correlation between the budget solvency and financial management grades awarded by the Government Performance Project (GPP), and they found a positive correlation between them. Jimenez (2009) uses balance in the general fund as one of the fiscal stress indicators and revealed that fiscal stress decreases a state's expenditure.

There are also papers focusing on the actions that each state takes for financial improvement rather than fiscal condition itself. Shi (2016) investigates each state's strategy for dealing with budget shortfalls in the fiscal years between 2009 and 2013 after the great recession. The paper finds that each state selects various strategies which relates to revenue, expenditures, program design, or personnel expenses. The strategies for increasing revenue are the most popular ones.

(2) Tax system and GDP

The studies for estimating the determinates of GDP have a long history. Various analytic methods and variables have been used with inconsistent results. Many of these studies examine the growth experience at the country level (e.g., the "cross-country approach") and some studies have focused on the growth experiences of states in the United States (the "cross-region approach") (Alm & Rogers, 2011). For example, Xavier Sala-i-Martin, Doppelhofer, and Miller

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Wyoming, 33.1 percent for Alaska, and 7.6 percent for North Dakota, respectively between 1997 and 2016. However, there are also other mining-dependent states not at the highest fiscal condition such as West Virginia (15.2 percent), Oklahoma (13.4 percent), and New Mexico (13.2 percent). See Appendix A.

(2004) use the endogenous growth model to examine the robustness of GDP factors with cross-country data. They find that various variables including the initial level of real GDP per capita, primary school enrollment, initial level of income, residential region, and life expectancy are statistically significant determinants of GDP.

On the other hand, Reed (2008) and Reed (2009) use the United States' state panel data and estimated the relationship between taxes and economic growth between 1970 and 1999. The studies find that productivity of the labor force, industrial compositions, and taxation systems are important determinants for GDP.

As mentioned above, many factors can affect state GDPs. Canto and Webb (1987) use cross-region annual data in the United States with variables correlated with both federal and state governments. They include real state personal income, real state spending, and federal or state tax revenues. They show that relative tax burden has a negative effect for economic growth, and that reductions in tax rates do not always lead to an increase in tax revenues.

Alms and Rogers (2011) use more than 130 variables in 48 states of the United States to comprehensively investigate economic factors. They consisted of the following five categories:

1. Revenue variables (e.g. individual or corporate income tax revenue, sales tax revenue);

2. Expenditure variables (e.g. expenditures on education);

3. Demographic variables (e.g. population and political orientation);

4. Geographic variables (e.g. natural resources); and

5. Variables for the overall United States (e.g. US growth rate and US inflation rate).

They find that revenues from all state tax revenues (personal income tax, corporate tax, sales tax, and property tax) are positively correlated with GDP growth. However, the effects are

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quite sensitive to other variables and time periods. They also mention that state expenditure and a "conservative" political orientation is associated with lower rates of economic growth.

Expenditure also has a possibility of promoting economic growth. Mofidi and Stone (1990) examine the correlation between tax revenue and expenditure in detail. They find that state and local taxes have a negative effect when revenues are devoted to transfer-payment programs and have a positive effect when used for health, education, and public infrastructure.

(3) My contribution

My contribution to the literature is explaining the fiscal condition of each state in the United States with the state tax systems and financial and economic factors including GDP. As mentioned above, there are studies about indicator of fiscal condition itself, and the relationship between tax systems and GDPs. However, it is rare that fiscal condition was scrutinized from both aspects of tax system and other factors such as GDP. Elucidation of these relationships will answer what kind of taxes a government should pay attention to.

There are also a limited number of previous studies that gathered data for the recent years. In this study, I collected all related data from 2000 to the latest year. This vast amount of data enables to investigate not only effect of each factor but also that of yearly situational changes such as the financial crisis in 2008.

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IV. THEORETICAL MODEL

The purpose of this paper is to determine the critical factors determining the fiscal condition by focusing on tax systems, political factors, and economic factors. Therefore, the theoretical model is:

$$F = f(T, P, E, Y, e) \tag{1}$$

where F is fiscal condition, T is tax systems, P represents political factors, E is economic factors, Y is year, and e is the random error. What type of tax source a state should rely on is an important policy judgement. Therefore, decision making for tax policy, the independent variables in Equation (1), may affect the state's fiscal condition, the dependent variable. Also, other variables should be also considered as controls because each state has a different background and situation. For example, a state with high GDP may tend to have good fiscal conditions because economic activity increases the amount of taxes paid by companies and individuals. Therefore, the equation should include other economic and political control variables as well. Also, it is valuable to verify the effect of each year-specific factors in addition to the above control variables.

I now turn to the empirical model I use to implement Equation (1).

V. EMPIRICAL MODEL

There were several indicators to show state's fiscal condition in past literature. Out of them, the following models use two variables as dependent variables; Operating Ratio and Surplus (Deficit) per Capita. Both the variables are categorized as the budget solvency indices in previous studies and indicate the difference between revenue and expenditure in each year. The Operating Ratio equals "total revenues / total expenses" and Surplus (Deficit) per Capita is calculated by "(total revenue – total expenses) / population."

Furthermore, the independent variables are also two types; the revenue proportion of each tax source and the revenue amount of each tax source. The former variables include property tax, sales tax, personal income tax, and corporate tax. Their units are percent. On the other hand, the latter variables are composed of the above four tax resources and total tax revenue and debt value. These units are thousand dollars per capita.

There are also many economic control variables, which will contribute to reveal the true relationships between the dependent and independent variables. This type of variables includes real GDP per capita, GDP proportion of each industry, average income, and having a big city (top-10 city) or not. In addition, I include a political control variable which shows the Republican control level in each state's executive and legislative branch.

Taking these variables together, the empirical models are as follow;

<1. Operating Ratio - revenue proportion of each tax source>

$$OperatingRatio = \beta_0 + \beta_1 PropertyTaxRate + \beta_2 SalesTaxRate + \beta_3 PersonalIncomeTaxRate + \beta_4 CorporateTaxRate + \beta_5 GDP + \beta_6 AverageIncome + \beta_7 RepublicanControl + \beta_8 Agriculture + \beta_9 Trade + \beta_{10} Mining + \beta_{11} Manufacturing + \beta_{12} Information + \beta_{13} Finance + \beta_{14} Professional + \beta_{15} Top10 + \varepsilon \qquad (2)$$

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<2. Operating Ratio - revenue amount of each tax source >

$$OperatingRatio = \beta_0 + \beta_1 TotalTaxRevenue + \beta_2 PropertyTaxRevenue + \beta_3 SalesTaxRevenue + \beta_4 PersonalIncomeTaxRevenue + \beta_5 CorporateTaxRevenue + \beta_6 Debt + \beta_7 GDP + \beta_8 AverageIncome + \beta_9 RepublicanControl + \beta_{10} Agriculture + \beta_{11} Trade + \beta_{12} Mining + \beta_{13} Manufacturing + \beta_{14} Information + \beta_{15} Finance + \beta_{16} Professional + \beta_{17} Top10 + \varepsilon \qquad (3)$$

<3. Surplus per Capita - revenue proportion of each tax source>

$$SurplusPerCapita = \beta_0 + \beta_1 PropertyTaxRate + \beta_2 SalesTaxRate + \beta_3 PersonalIncomeTaxRate + \beta_4 CorporateTaxRate + \beta_5 GDP + \beta_6 AverageIncome + \beta_7 RepublicanControl + \beta_8 Agriculture + \beta_9 Trade + \beta_{10} Mining + \beta_{11} Manufacturing + \beta_{12} Information + \beta_{13} Finance + \beta_{14} Professional + \beta_{15} Top10 + \varepsilon \qquad (4)$$

<4. Surplus per Capita - revenue amount of each tax source >

$$SurplusPerCapita = \beta_0 + \beta_1 TotalTaxRevenue + \beta_2 PropertyTaxRevenue + \beta_3 SalesTaxRevenue + \beta_4 PersonalIncomeTaxRevenue + \beta_5 CorporateTaxRevenue + \beta_6 Debt + \beta_7 GDP + \beta_8 AverageIncome + \beta_9 RepublicanControl + \beta_{10} Agriculture + \beta_{11} Trade + \beta_{12} Mining + \beta_{13} Manufacturing + \beta_{14} Information + \beta_{15} Finance + \beta_{16} Professional + \beta_{17} Top10 + \varepsilon \qquad (5)$$

For dependent variables, the *OperatingRatio* is operating ratio (total revenues / total expenses), *SurplusPerCapita* is surplus (deficit) per capita ((total revenue – total expenses) / population). The first types of independent variables are *PropertyTaxRate* (tax revenue proportion of property tax), *SalesTaxRate* (tax revenue proportion of sales tax), *PersonalIncomeTaxRate* (tax revenue proportion of personal income tax), and *CorporateTaxRate* (tax revenue proportion of corporate tax). The second types of independent variables are *TotalTaxRevenue* (total tax revenue per capita), *PropertyTaxRevenue* (property tax revenue per capita), *SalesTaxRevenue* (sales tax revenue per capita), *PersonalIncomeTaxRevenue* (personal income tax revenue per capita), *CorporateTaxRevenue* (corporate tax revenue per capita), and *Debt* (the amount of debt per capita).

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As for economic variables, *GDP* is states' real GDP per capita, *AverageIncome* is average income per capita, *Agriculture* is GDP proportion of the agriculture industry, *Trade* is GDP proportion of the trade industry, *Mining* is GDP proportion of the mining industry, *Manufacturing* is GDP proportion of the manufacturing industry, *Information* is GDP proportion of the information industry, *Finance* is GDP proportion of the finance industry, *Professional* is GDP proportion of the professional industry, and *Top10* is an indicator variable that equals one if the state has a big (top-10) city and zero otherwise. Also, *RepublicanControl* is a political control variable and works as an indicator which shows the Republican control level in each state's executive and legislative branch.

Based on the hypotheses mentioned in the Introduction, I anticipate the sign of each of the following variables' coefficients is positive.

Independent Variables: *PropertyTaxRate*, *SalesTaxRate*, *PersonalIncomeTaxRate*,
TotalTaxRevenue, *PropertyTaxRevenue*, *SalesTaxRevenue*,
PersonalIncomeTaxRevenue, *CorporateTaxRevenue*

Control Variables: *GDP*, *AverageIncome*, *Mining*, *Manufacturing*, *Information*, *Finance*,
Professional, *Top10*, *RepublicanControl*.

There is one more type of model in this study; it adds year variables to each model above. This type of model will control for the effect of yearly conditional change.

<5. Adding year variables >

[dependent variable] = β_0+β_1[independent variables] +β_2[economic and political control
variables] + [year variables (2000, 2002, and 2004-2015)] + ε (6)

A fixed effect model is applied to verify these equations above. Without state fixed effects, the regressions would have omitted variable bias because samples for a state tend to contain similar characteristics and invisible factors.

I now describe the data I use to estimate these equations.

VI. DATA AND METHOD

The paper uses various variables to find measures of "good fiscal condition." Most of the data in this study are derived from three valid data sources; the United States Census Bureau,[l] the Bureau of Economic Analysis in the United States Department of Commerce (BEA),[m] and Ballotpedia.[n] I gather available observation data from 1990 to 2017. As a result, because of lacking data in several sources, data become a panel for 2000, 2002, and from 2004 to 2015 with 714 observations. These data are enough to analyze because each state has no less than 14 observations which cover the same number of fiscal years.

The United States Census Bureau discloses detailed financial data for each state, including detailed revenue sources, expenditure items, and debt outstanding. It also provides population of each city which enables me to identify big top-10 cities. The BEA publishes a broad range of economic data from the international level to the state level. The variables such as GDP, income, and population came from the state datasets. Lastly, the Ballotpedia provides historical party control status for each state. Descriptive statistics for all variables are shown in Table 1.

(1) Fiscal Condition (Dependent Variables)

The dependent variables in this study are Operating Ratio and Surplus (Deficit) per Capita which are indicators of fiscal conditions. These variables are constructed by the data derived from the United States Census Bureau. They cover from 1992 to 2015 except 2001 and 2003

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[l] the United States Census Bureau. https://www.census.gov/govs/local/historical_data.html.
[m] the Bureau of Economic Analysis in the United States Department of Commerce. https://www.bea.gov/regional/index.htm.
[n] Ballotpedia. https://ballotpedia.org/State_Politics. Ballotpedia is the online encyclopedia of the United States politics and elections in local, state and federal level. It is sponsored by the Lucy Burns Institute, a nonpartisan and nonprofit organization.

because of limitations of data availability. Table 2 ranks states by the level of Operating Ratio which is the proportion of total revenue over total expenditure. The means of Operating Ratio range from 97.4 (District of Columbia) to 119.5 (Wyoming). The values above 100 show good fiscal conditions, and the values below 100 imply bad fiscal situations. Generally, states in the Central region have relatively good fiscal condition, while the fiscal conditions of the Northeastern states are comparatively worse. However, there are many exceptions and sometimes adjacent states are in quite different conditions (e.g. North Carolina and South Carolina, or Ohio and Pennsylvania).

Table 3 shows the fiscal condition ranking based on Surplus (Deficit) per Capita, total surplus or deficit divided by population. The positive values are surpluses and the negative values are deficits. Most of the time, Table 3 has similar trends as Table 2. However, these indicators are not the same. For example, the ranking of New York drastically changes from 36th in Table 2 to 21st in Table 3. This is because the latter indicator includes an additional element: population.

Table 1: Descriptive Statistics for Each Variable

	name	meaning	unit	mean	median	SD	min	max	N	year	states
Dependent Variable A	**OperatingRatio**	operation ratio (total revenue / total deficit)	%	105.13	106.25	11.31	44.07	187.81	1122		51
Dependent Variable B	**SurplusperCapita**	surplus (deficit) per capita (total revenue - total expense) / population	thousand $ / person	0.34	0.37	1.12	-7.23	8.99	1122		51
Independent Variables A	**PropertyTax Rate**	revenue from property tax / total tax revenue	%	30.18	29.98	9.48	10.64	67.43	1122	1992-2015 (except 2001 & 2003)	51
	SalesTaxRate	revenue from sales tax / total tax revenue		35.12	34.00	12.56	0.00	65.11	1122		51
	PersonalIncome TaxRate	revenue from personal income tax / total tax revenue		20.43	23.31	10.86	0.00	44.40	1071		51
	CorporateTax Rate	revenue from corporate tax / total tax revenue		3.79	3.36	2.62	0.00	29.54	1071		51
Independent Variables B	**TotalTax Revenue**	total tax revenue / population	thousand $ / person	3.50	3.25	1.43	1.32	14.61	1122		51
	PropertyTax Revenue	property tax revenue / population		1.07	0.95	0.56	0.17	3.36	1122		51
	SalesTax Revenue	sales tax revenue / population		1.18	1.14	0.50	0.00	3.18	1122		51
	PersonalIncome TaxRevenue	personal income tax revenue / population		0.73	0.71	0.51	0.00	2.80	1071		51
	CorpoprateTax Revenue	corporate tax revenue / population		0.14	0.11	0.15	0.00	1.89	1071		51
	Debt	debt / population		6.46	5.90	2.99	1.81	20.77	1071		51
Control Variables	**GDP**	real state total GDP / population	thousand $ / person	42.34	41.21	18.19	17.39	170.69	1377	1990-2016	51
	AverageIncome	average income		32.84	31.81	10.84	13.29	76.11	1377		51
	Republican Control	Republican control level index (Governor, Senate, and House of Representative)	-	1.48	1.00	1.14	0	3	1326	1992-2017	51
	Agriculture	state GDP for agriculture, forestry, fishing, and hunting / total state GDP	%	1.57	0.96	1.76	0.00	10.29	1018	1997-2016	51
	Trade	state GDP for trade / total state GDP		14.02	14.39	2.54	3.02	19.57	1020		51
	Mining	state GDP for mining / total state GDP		3.65	0.66	7.31	0.00	52.43	1018		51
	Manufacturing	state GDP for manufacturing / total state GDP		14.00	13.42	6.55	0.27	36.32	1020		51
	Information	state GDP for information / total state GDP		4.14	3.52	2.05	1.17	13.82	1020		51
	Finance	state GDP for finance, insurance, real estate, rental, and leasing / total state GDP		21.19	20.46	5.63	11.38	48.96	1020		51
	Professional	state GDP for professional and business services / total state GDP		12.21	11.88	4.72	4.13	39.14	1020		51
	Top10	having top 10 cities	-	0.12	0.00	0.33	0	1	867	2000-2016	51

Table 2: Fiscal Condition Ranking by States (Operating Ratio)

	state	mean	st.dev.		state	mean	st.dev.
1	Wyoming	119.5	18.3	27	Indiana	104.6	5.2
2	Alaska	117.9	21.8	28	Michigan	104.5	9.0
3	North Dakota	116.5	11.8	29	Colorado	104.3	11.5
4	Idaho	109.8	10.4	30	Iowa	104.2	7.5
5	South Dakota	109.2	13.2	31	Texas	104.1	8.8
6	Ohio	109.2	14.5	32	Arizona	103.9	8.1
7	Montana	108.4	8.2	33	Kansas	103.7	6.9
8	Arkansas	108.4	9.1	34	California	103.7	14.4
9	Missouri	108.2	11.6	35	New Hampshire	103.1	5.9
10	Oklahoma	107.8	8.2	36	New York	102.9	11.3
11	Wisconsin	107.6	18.9	37	Louisiana	102.7	9.0
12	Oregon	107.5	16.7	38	Kentucky	102.5	10.2
13	North Carolina	107.1	9.0	39	Rhode Island	102.2	10.3
14	West Virginia	106.9	6.4	40	Tennessee	102.2	6.6
15	Nebraska	106.3	7.0	41	Georgia	102.1	8.1
16	Minnesota	105.8	11.3	42	Connecticut	101.8	8.3
17	Mississippi	105.6	8.3	43	Washington	101.6	10.5
18	Virginia	105.6	11.0	44	New Jersey	101.3	9.2
19	Maine	105.1	9.3	45	Pennsylvania	100.9	11.0
20	Florida	104.9	9.5	46	Illinois	100.8	11.4
21	Utah	104.9	10.4	47	Hawaii	100.6	11.0
22	Nevada	104.9	10.7	48	South Carolina	100.4	7.4
23	Vermont	104.9	5.8	49	Alabama	100.0	7.8
24	New Mexico	104.8	12.2	50	Massachusetts	99.4	8.7
25	Maryland	104.8	10.8	51	District of Columbia	97.4	8.2
26	Delaware	104.8	10.2				

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Table 3: Fiscal Condition Ranking by States (Surplus (Deficit) per Capita)

	state	mean	st.dev.		state	mean	st.dev.
1	Alaska	2.49	3.59	27	Indiana	0.27	0.37
2	Wyoming	1.96	1.71	28	California	0.26	1.57
3	North Dakota	1.45	1.34	29	Colorado	0.26	0.96
4	Ohio	0.56	1.22	30	New Mexico	0.25	1.10
5	Montana	0.54	0.66	31	Delaware	0.24	0.82
6	South Dakota	0.53	0.97	32	Maryland	0.23	0.86
7	Idaho	0.52	0.68	33	Arizona	0.21	0.61
8	Oregon	0.51	1.53	34	Texas	0.20	0.59
9	West Virginia	0.49	0.49	35	Kansas	0.20	0.55
10	Nebraska	0.47	0.65	36	New Hampshire	0.17	0.41
11	Oklahoma	0.46	0.56	37	Rhode Island	0.14	0.92
12	Arkansas	0.44	0.59	38	Connecticut	0.12	0.78
13	Wisconsin	0.44	1.56	39	Tennessee	0.11	0.49
14	North Carolina	0.43	0.66	40	Louisiana	0.09	0.81
15	Minnesota	0.42	1.04	41	Georgia	0.08	0.55
16	Missouri	0.41	0.82	42	Washington	0.08	1.01
17	Mississippi	0.33	0.66	43	Hawaii	0.06	1.06
18	Vermont	0.33	0.49	44	Kentucky	0.03	0.69
19	Maine	0.32	0.71	45	New Jersey	0.00	0.80
20	Nevada	0.31	0.81	46	South Carolina	-0.01	0.62
21	New York	0.31	1.55	47	Illinois	-0.02	1.03
22	Virginia	0.29	0.79	48	Pennsylvania	-0.03	0.94
23	Iowa	0.29	0.65	49	Alabama	-0.05	0.59
24	Florida	0.28	0.72	50	Massachusetts	-0.07	0.91
25	Utah	0.28	0.83	51	District of Columbia	-0.56	1.57
26	Michigan	0.27	0.67				

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(2) Tax Systems (Independent Variables)

This paper also analyzes tax revenues in states. They are independent variables and candidates for critical factors for determining the fiscal condition of each state. These data are acquired from the United States Census Bureau. The sales tax contains both general sales tax and selective taxes such as taxes for motor fuel, alcohol, and tobacco. As mentioned in Table 1, there are two groups of independent variables. The group A is revenue proportion of each tax; each variable is proportion of each tax source's revenue over total tax revenue. On the other hand, variables in group B are each tax source's revenue (or debt) divided by population. Both independent variable groups indicate that on average, states mainly rely on revenues from property taxes and sales taxes, followed by personal income taxes. In fact, the three tax sources explain over 85 percent of total tax revenue. The contribution of corporate tax is relatively small in this respect.

Table 4 shows a breakdown of Group A (the proportion of each tax revenue source) by states. This table reveals the tax strategies of each state. For example, Nevada, Tennessee and Washington heavily rely on Sales tax, while New Hampshire's major tax source is property tax. There are some states with zero personal income taxes and/or corporate taxes. Interestingly, in Alaska and Delaware, the shares of the four tax resources are dramatically smaller than the other states (53 percent for Alaska and 65 percent for Delaware). This fact implies that the two states have extra important tax resources.

Table 5 shows the detailed data for Group B variables. Overall, the differences of each state population enable Table 5 to reveal another aspect that is different from Table 4. The District of Columbia and New York have both high property tax revenues, personal income tax

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revenues, and corporate tax revenues per capita. Also, their total tax revenue and debt are higher than most other states.

Table 4: The Proportion of Each Tax Revenue Source in Each State

State	Property	Sales	Personal Income	Corporate Income	State	Property	Sales	Personal Income	Corporate Income
Alabama	15.3	48.3	22.1	3.1	Montana	39.7	14.7	24.0	4.1
Alaska	28.4	11.0	0.0	14.0	Nebraska	35.2	32.3	21.7	2.9
Arizona	30.2	46.2	15.1	3.5	Nevada	25.6	58.7	0.0	0.0
Arkansas	16.5	49.7	23.8	3.9	New Hampshire	63.4	16.5	1.8	9.2
California	26.6	32.6	28.1	5.5	New Jersey	45.8	24.1	20.2	4.3
Colorado	31.4	35.9	24.5	2.2	New Mexico	15.1	49.4	16.6	3.6
Connecticut	38.1	27.7	25.8	3.4	New York	31.0	25.3	31.1	7.2
Delaware	15.9	11.7	29.4	7.9	North Carolina	23.4	35.1	30.5	4.3
District of Columbia	30.1	27.9	26.7	6.9	North Dakota	24.9	35.7	10.2	4.2
Florida	36.6	49.8	0.0	3.0	Ohio	28.9	31.5	30.2	2.0
Georgia	29.7	37.6	25.7	2.9	Oklahoma	16.8	40.7	23.0	2.7
Hawaii	16.8	51.6	24.0	1.5	Oregon	33.7	9.6	40.6	3.6
Idaho	27.2	34.3	26.2	3.8	Pennsylvania	28.9	29.6	25.1	4.5
Illinois	38.2	32.1	18.6	4.7	Rhode Island	42.3	28.9	21.5	2.6
Indiana	31.3	34.2	25.8	4.7	South Carolina	31.0	35.0	23.0	2.4
Iowa	33.8	31.8	23.8	2.6	South Dakota	36.4	50.9	0.0	2.1
Kansas	32.0	36.5	22.2	3.4	Tennessee	24.5	57.9	1.2	5.2
Kentucky	18.6	36.5	31.2	4.3	Texas	40.4	47.3	0.0	0.0
Louisiana	17.7	53.5	15.2	2.8	Utah	25.2	39.5	26.6	3.2
Maine	39.5	28.5	23.3	2.8	Vermont	42.9	27.6	19.6	2.8
Maryland	26.6	24.8	38.1	2.7	Virginia	32.1	27.3	29.8	2.3
Massachusetts	35.2	20.3	34.0	5.6	Washington	29.9	60.2	0.0	0.0
Michigan	35.5	31.9	21.4	5.5	West Virginia	19.8	39.0	22.4	5.5
Minnesota	27.7	31.5	29.4	4.2	Wisconsin	35.7	28.2	26.9	3.6
Mississippi	25.3	48.0	15.5	4.0	Wyoming	36.5	33.1	0.0	0.0
Missouri	26.0	38.8	26.1	2.2	Total	30.2	35.1	20.4	3.8

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Table 5: Tax Revenue per Capita in Each State

State	Total	Property	Sales	Personal Income	Corporate Income	Debt	State	Total	Property	Sales	Personal Income	Corporate Income	Debt
Alabama	2.37	0.37	1.15	0.53	0.08	4.61	Montana	2.83	1.11	0.43	0.70	0.12	4.84
Alaska	6.00	1.46	0.59	0.00	0.80	12.96	Nebraska	3.46	1.22	1.11	0.77	0.10	5.70
Arizona	2.87	0.86	1.34	0.44	0.10	5.84	Nevada	3.25	0.85	1.91	0.00	0.00	7.77
Arkansas	2.67	0.44	1.34	0.65	0.11	3.65	New Hampshire	3.19	2.02	0.52	0.06	0.31	7.02
California	3.94	1.05	1.27	1.16	0.21	7.70	New Jersey	4.77	2.18	1.13	1.00	0.21	8.25
Colorado	3.29	1.03	1.18	0.82	0.08	7.62	New Mexico	2.97	0.46	1.46	0.50	0.11	5.54
Connecticut	5.21	1.99	1.42	1.42	0.17	8.97	New York	5.77	1.78	1.45	1.84	0.42	12.28
Delaware	3.60	0.58	0.43	1.06	0.28	7.58	North Carolina	2.94	0.70	1.04	0.91	0.12	4.31
District of Columbia	6.94	2.11	1.90	1.86	0.49	13.00	North Dakota	4.27	0.90	1.44	0.42	0.17	4.99
Florida	2.97	1.10	1.48	0.00	0.09	6.21	Ohio	3.31	0.96	1.05	1.01	0.06	4.95
Georgia	2.87	0.86	1.08	0.75	0.08	4.36	Oklahoma	2.71	0.46	1.11	0.63	0.08	3.92
Hawaii	4.19	0.71	2.18	1.00	0.06	7.71	Oregon	3.03	1.02	0.30	1.25	0.11	6.48
Idaho	2.65	0.72	0.91	0.70	0.10	2.98	Pennsylvania	3.49	1.02	1.05	0.90	0.16	7.53
Illinois	3.81	1.45	1.22	0.74	0.19	7.83	Rhode Island	3.83	1.63	1.11	0.83	0.10	8.64
Indiana	3.02	0.93	1.06	0.78	0.13	5.15	South Carolina	2.55	0.80	0.89	0.59	0.06	6.29
Iowa	3.27	1.11	1.05	0.79	0.09	4.03	South Dakota	2.65	0.96	1.37	0.00	0.05	5.24
Kansas	3.34	1.07	1.23	0.76	0.11	6.34	Tennessee	2.47	0.61	1.43	0.03	0.13	4.62
Kentucky	2.79	0.53	1.03	0.89	0.13	7.31	Texas	2.94	1.20	1.39	0.00	0.00	6.90
Louisiana	2.95	0.53	1.58	0.47	0.08	5.90	Utah	2.79	0.71	1.09	0.76	0.09	6.15
Maine	3.70	1.46	1.06	0.89	0.11	5.21	Vermont	3.86	1.65	1.09	0.77	0.11	5.74
Maryland	4.02	1.07	1.00	1.56	0.11	5.90	Virginia	3.31	1.07	0.89	1.01	0.08	5.74
Massachusetts	4.31	1.53	0.87	1.49	0.24	11.07	Washington	3.55	1.06	2.15	0.00	0.00	8.40
Michigan	3.22	1.15	1.04	0.69	0.17	5.88	West Virginia	2.87	0.57	1.11	0.67	0.16	4.69
Minnesota	4.08	1.12	1.30	1.23	0.17	6.89	Wisconsin	3.68	1.32	1.04	1.00	0.14	5.98
Mississippi	2.53	0.65	1.21	0.40	0.10	3.62	Wyoming	4.53	1.63	1.50	0.00	0.00	4.04
Missouri	2.78	0.73	1.07	0.74	0.06	5.21	Total	3.50	1.07	1.18	0.73	0.14	6.46

(3) Control Variables

The GDP data come from the dataset provided by the BEA. The values are real state GDP from 1990 to 2016. Also, there are several variables which indicates each industry GDP proportion by state for the period between 1997 and 2016. They include the following fields:

Agriculture: agriculture, forestry, fishing, and hunting, etc.;

Trade: wholesale trade and retail trade;

Mining: oil and gas extraction, mining, and support activities for mining;

Manufacturing: durable goods and nondurable goods;

Information: publishing, broadcasting, and data processing, etc.;

Finance: finance, insurance, real estate, rental, and leasing; and

Professional: technical and administrative services and management of companies, etc.

The *AverageIncome* variable is total personal income divided by population in each state from 1990 to 2016. The *Top10* variable is a dummy variable for having a top-10 city. The cities are New York (New York), Los Angeles (California), Chicago (Illinois), Houston (Texas), Phoenix (Arizona), Philadelphia (Pennsylvania), San Antonio (Texas), San Diego (California), Dallas (Texas), San Jose (California, 2003-2016), and Detroit (Michigan, 2000-2002).

The *RepublicanControl* variable is about the degree of Republican control for creating policies as Governor, the majority of state Senate, or the majority of state House of Representatives. The variable varies from 0 to 3. The zero value means that Governor and both majority of Senate and House of Representatives are all Democrats. On the contrary, the degree of three indicates Republican sweeps the three positions. Thus, for example, if the Governor and

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the majority of the state are Republican and the majority of House of Representatives are Democrats, the variable's value is two. The exceptions are Nebraska and District of Columbia which have one-house parliaments. All the parliament members in Nebraska are independent (not Democrats or Republicans). Therefore, the value of Nebraska is zero when the Governor is Democratic (1992 to 1998) and the value is one when the Governor is Republican (1999 to 2017). The variable's values for District of Columbia are always zero because both Governor and the majority in the parliament are Democrats all the time. In some sense, a higher value for this variable can be interpreted as a state's politics leaning more toward conservative values.

In the next section, I present the results for my estimated equations.

VII. RESULTS

I use two types of dependent variables ("operating ratio" and "surplus per capita") and two groups of independent variables ("tax revenue proportion by each tax source" and "tax revenues per capita for each tax source"), therefore, I present four regressions in total.

Both regressions with operating ratio and those with surplus per capita as dependent variables are good because they are overall statistically significant.

(1) The Effect of Tax Revenue Proportion on Operating Ratio (Table 6)

The result of several regressions for the effect of the proportion of each types of tax revenue on operating ratio are shown in Table 1. Overall, all regressions are statistically significant at the 1 percent level. Also, the values of R^2 vary from 0.14 for the regression without any control variables to 0.21 for the regression with all control variables. The numbers of observations decrease according to the addition of control variables because there are some missing data. Finally, the regression with all control variables covers the years of 2000, 2002, and 2004 to 2015. All regressions include available data for the 50 states and the District of Columbia.

All regression results show for each unit change in *CorporateTaxRate*, the *OperatingRatio* increases by about 1.5 percent. On the other hand, a one percent increase of *PropertyTaxRate* corresponds to a decrease of *OperatingRatio* by about 1.3 percent. Both tax revenues' coefficients are consistent in all regressions and statistically significant at the 1 percent significance level.

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The coefficients for *SalesTaxRate* and *PersonalIncomeTaxRate* are statistically insignificant and their absolute values are smaller than one tenth those of *CorporateTaxRate* and *PropertyTaxRate* (one tenth or less). The sign of *SalesTaxRate* is consistently negative and that of *PersonalIncomeTaxRate* also finally becomes negative.

The *RepublicanControl* is one of the more meaningful control variables: The coefficient is always statistically significant at the 1 percent significance level. It has positive relationship with *OperatingRatio*: For each unit change in *RepublicanControl*, the *OperatingRatio* increases by around 2 percent.[o]

The variable *Top10*, on the contrary, shows a completely opposite result. A state with a top-10 city on average has a 12 to 16 percent lower value in *OperatingRatio*. The coefficient is highly significant.[p]

Of the several variables that show industry shares, the coefficients for *Information* are constantly negative and statistically significant at certain levels. The *Finance* variables have a negative relationships with *OperatingRatio* although its coefficient is sometimes insignificant. Conversely, the *Trade* variables have constantly positive relationships with *OperatingRatio*. The signs of *Mining, Manufacturing,* and *Professional* are not consistent over the regressions.

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[o] I also tried several other dummy variables which can partly explain the Republican control level in the executive or legislative branch. The dummy variables are as follow; Republican Governor (*GovRep*), Republican majority in Senate (*SenateRep*), Republican majority in House of Representatives (*HouseRep*), Republican trifectas in Governor and both chambers (*RepTrifectas*), and Democrats trifectas (*DemTrifectas*). The coefficients for first four variables in a regression without any other control variables are positive and are statistically significant at the 1 percent level in *HouseRep*, at the 5 percent level in *SenateRep* and *RepTrifectas*, and at the 10 percent level in *GovRep*, respectively. On the other hand, the *DemTrifectas* has negative relationship with *OperatingRatio* and the coefficient is statistically significant at the 5 percent level. See Appendix B.

[p] I tried other two variables as well; population density (*PopulationDensity*) and having top-20 cities (*Top20*). When the regression without any other control variables adds each variable separately, the coefficients for both variables are statistically insignificant. As a result, I dropped them because they do not add any explanatory power. See Appendix C.

It is difficult to understand the coefficient for *GDP*. It changes the sign and significance in accordance with addition of other variables. Finally, in regression (5) in Table 1, it is positive and statistically significant at the 5 percent level. It is clear that there is multicollinearity between *GDP* and *AverageIncome*. As a result, the coefficient of *GDP* becomes insignificant in regression (6) although *AverageIncome* is significant.

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Table 6: Fixed Effect Model on the Effect of Tax Revenue Proportion on Fiscal Condition (Operating Ratio) in Each State

	(1) No Control	(2) +GDP	(3) +Republican Control	(4) +Industry	(5) +Top 10 Cities	(6) +Average Income
PropertyTaxRate	-1.19***	-1.23***	-1.28***	-1.06***	-1.32***	-1.37***
	(0.086)	(0.083)	(0.099)	(0.11)	(0.18)	(0.17)
SalesTaxRate	-0.0024	-0.13	-0.14	-0.14	-0.023	-0.014
	(0.18)	(0.13)	(0.13)	(0.18)	(0.22)	(0.23)
PersonalIncome TaxRate	0.0015	0.040	0.037	-0.038	-0.20	-0.43
	(0.18)	(0.19)	(0.20)	(0.26)	(0.33)	(0.33)
CorporateTax Rate	1.41***	1.24***	1.26***	1.56***	1.43***	1.47***
	(0.24)	(0.23)	(0.23)	(0.32)	(0.32)	(0.32)
GDP		-0.11***	-0.12***	-0.068	0.48**	0.0097
		(0.030)	(0.029)	(0.16)	(0.20)	(0.22)
AverageIncome						0.54***
						(0.15)
Republican Control			1.43***	1.72***	2.05***	1.91***
			(0.37)	(0.43)	(0.45)	(0.45)
Agriculture				0.080	-0.53	-1.44
				(0.70)	(0.88)	(0.93)
Trade				1.63**	1.77	1.24
				(0.79)	(1.07)	(1.06)
Mining				0.65	-0.90	-1.57**
				(0.59)	(0.72)	(0.71)
Manufacturing				0.71	0.40	-0.10
				(0.44)	(0.54)	(0.56)
Information				-1.08*	-1.22*	-2.28***
				(0.56)	(0.65)	(0.72)
Finance				-0.68*	-0.55	-1.52**
				(0.36)	(0.66)	(0.70)
Professional				-0.071	0.52	-1.24*
				(0.49)	(0.62)	(0.69)
Top10					-16.2***	-12.1***
					(1.86)	(2.15)
Constant	135.7***	145.6***	146.2***	121.8***	103.2**	175.9***
	(6.92)	(7.25)	(7.50)	(23.4)	(47.1)	(47.7)
Observations	1,071	1,071	1,071	867	714	714
R-squared	0.14	0.15	0.16	0.21	0.20	0.21
Number of State	51	51	51	51	51	51

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(2) The Effect of Tax Revenue per Capita on Operating Ratio (Table 7)

Table 7 shows the regression results for the effect of tax revenue per capita in each tax source on operating ratio. The regressions overall are statistically significant and the values of R^2 vary from 0.14 to 0.20. The number of observations and states are the same as in Table 6.

First, there are some similar trends with Table 6. A one thousand dollar increase in *CorporateTaxRevenue* corresponds to an increase of *OperatingRatio* by about 40 percent. On the contrary, for a unit change in *PropertyTaxRevenue,* the *OperatingRatio* decreases by 9 to 18 percent. These coefficients are strongly statistically significant.

In addition, *SalesTaxRevenue and PersonalIncomeTaxRevenue* have positive relationships with *OperatingRatio* in most cases. Notably, the coefficient of *PersonalIncomeTaxRevenue* is statistically significant at the 5 percent level. On the contrary, *Debt* and *OperatingRatio* have a negative relationship. Interestingly, *TotalTaxRevenue* has no effect on *OperatingRatio.*

For control variables, as with Table 6, the relationship of *RepublicanControl*, *Top10*, and *Information* with OperatingRatio are statistically significant, respectively, and the signs of each coefficient are also the same. Additionally, the coefficient of *Finance* is negative and insignificant like in Table 6.

Interestingly, although the coefficient of *AverageIncome* is positive and statistically significant, *GDP* is insignificant in all regressions. The sign of *GDP* is positive in most regressions. The signs of *Trade* and *Manufacturing* are positive, and notably, *Trade* becomes statistically significant in these regressions.

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Table 7: Fixed Effect Model on the Effect of Tax Revenue per Capita on Fiscal Condition (Operating Ratio) in Each State

	(1) No Control	(2) +GDP	(3) +Republican Control	(4) +Industry	(5) +Top 10 Cities	(6) +Average Income
TotalTaxRevenue	-0.03	-0.19	-0.11	-0.84	0.98	0.32
	(0.58)	(0.58)	(0.60)	(0.98)	(1.15)	(1.29)
PropertyTax Revenue	-11.6***	-11.8***	-11.4***	-8.85**	-14.5**	-17.5***
	(2.38)	(2.40)	(2.49)	(3.52)	(6.48)	(6.04)
SalesTaxRevenue	7.12***	6.37***	5.58**	5.11	4.40	-0.10
	(2.04)	(2.12)	(2.22)	(4.22)	(5.20)	(5.47)
PersonalIncome TaxRevenue	7.97***	7.17**	7.54**	10.8***	12.2***	8.07**
	(2.91)	(3.11)	(3.18)	(2.76)	(3.77)	(3.99)
CorporateTax Revenue	33.1***	33.3***	33.5***	43.2***	36.9***	40.8***
	(5.13)	(5.04)	(5.15)	(6.21)	(7.83)	(7.98)
Debt	-1.65***	-1.65***	-1.66***	-1.01**	-0.057	-0.23
	(0.32)	(0.31)	(0.31)	(0.47)	(1.02)	(1.05)
GDP		0.078	0.073	-0.019	0.46*	0.29
		(0.056)	(0.056)	(0.17)	(0.23)	(0.24)
AverageIncome						0.66***
						(0.19)
Republican Control			0.70*	1.42***	1.97***	1.58***
			(0.37)	(0.46)	(0.51)	(0.51)
Agriculture				0.47	-0.57	-1.18
				(0.63)	(0.69)	(0.81)
Trade				1.97**	2.05**	1.94*
				(0.94)	(0.99)	(1.03)
Mining				0.95	-0.95	-1.13
				(0.68)	(0.79)	(0.82)
Manufacturing				0.80	0.24	0.022
				(0.54)	(0.62)	(0.65)
Information				-1.74**	-2.38***	-2.60***
				(0.69)	(0.85)	(0.84)
Finance				-0.65	-0.79	-1.23*
				(0.47)	(0.59)	(0.67)
Professional				0.043	-0.20	-1.04
				(0.64)	(0.68)	(0.72)
Top10					-11.1***	-9.95***
					(1.86)	(1.97)
Constant	109.4***	108.2***	107.4***	80.1**	74.0**	100.5***
	(1.28)	(1.44)	(1.51)	(32.6)	(34.5)	(37.4)
Observations	1,071	1,071	1,071	867	714	714
R-squared	0.14	0.14	0.14	0.20	0.20	0.20
Numbert of State	51	51	51	51	51	51

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(3) The Effect of Tax Revenue Proportion on Surplus per Capita (Table 8)

Table 8 has the same independent variables and a different dependent variable (*SurplusperCapita*) compared with Table 6. In this table, the regressions overall are statistically significant and the values of R^2 vary from 0.19 to 0.27. The number of observations and states are the same as in Table 6.

For the independent variables, not only the coefficient of *PropertyTaxRate* and *CorporateTaxRate* (like in Table 6), but also *SalesTaxRate* and *PersonalIncomeTaxRate* become statistically significant. The signs of the coefficients are the same as in Table 6.

There are similar trends as in Table 6 for some control variables (*RepublicanControl, Top10, Trade,* and *AverageIncome*) in terms of their signs and significances. The coefficient of *GDP, Information*, and *Finance* become insignificant.

Table 8: Fixed Effect Model on the Effect of Tax Revenue Proportion on Fiscal Condition (Surplus per Capita) in Each State

	(1) No Control	(2) +GDP	(3) +Republican Control	(4) +Industry	(5) +Top 10 Cities	(6) +Average Income
PropertyTaxRate	-0.16***	-0.16***	-0.17***	-0.17***	-0.21***	-0.22***
	(0.020)	(0.020)	(0.019)	(0.032)	(0.041)	(0.041)
SalesTaxRate	-0.060**	-0.063**	-0.066***	-0.071**	-0.074*	-0.073*
	(0.023)	(0.024)	(0.024)	(0.035)	(0.042)	(0.042)
PersonalIncome Tax Rate	-0.050*	-0.050*	-0.050**	-0.068	-0.092*	-0.12**
	(0.026)	(0.025)	(0.025)	(0.042)	(0.055)	(0.057)
CorporateTax Rate	0.078**	0.074**	0.076**	0.11**	0.12**	0.12**
	(0.034)	(0.034)	(0.034)	(0.050)	(0.051)	(0.055)
GDP		-0.0025	-0.0036	-0.015	0.027	-0.024
		(0.0050)	(0.0048)	(0.023)	(0.020)	(0.023)
AverageIncome						0.058***
						(0.015)
Republican Control			0.16***	0.17***	0.20***	0.18***
			(0.031)	(0.037)	(0.045)	(0.044)
Agriculture				0.066	-0.0030	-0.10
				(0.11)	(0.12)	(0.11)
Trade				0.24***	0.18*	0.12
				(0.084)	(0.10)	(0.10)
Mining				0.10*	-0.063	-0.14
				(0.054)	(0.087)	(0.085)
Manufacturing				0.12**	0.064	0.0091
				(0.049)	(0.046)	(0.050)
Information				0.021	-0.028	-0.14*
				(0.080)	(0.072)	(0.085)
Finance				0.036	0.018	-0.086
				(0.046)	(0.059)	(0.067)
Professional				0.052	0.085	-0.11
				(0.043)	(0.056)	(0.065)
Top10					-1.86***	-1.42***
					(0.34)	(0.32)
Constant	8.03***	8.27***	8.34***	2.43	4.88	12.8*
	(1.70)	(1.84)	(1.76)	(1.85)	(6.35)	(6.99)
Observations	1,071	1,071	1,071	867	714	714
R-squared	0.19	0.19	0.20	0.24	0.26	0.27
Number of State	51	51	51	51	51	51

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

(4) The Effect of Tax Revenue per Capita on Surplus per Capita (Table 9)

In this part, the dependent variable is *SurplusPerCapita* like in Table 8 and the independent variables are tax revenues per capita for each tax resource like in Table 7. All regressions overall are statistically significant. The values of R^2 range from 0.17 to 0.28. The number of observations and states are the same as in Table 6.

The results for the independent variables are quite similar as for Table 7. *CorporateTaxRevenue, SalesTaxRevenue*, and *PersonalIncomeTaxRevenue* are all positive, and *PropertyTaxRevenue* and *Debt* show a negative relationship with *SurplusPerCapita*. The difference is *TotalTaxRevenue*: Its coefficient is consistently positive and statistically significant at the 1 percent significance level.

As for control variables, *RepublicanControl, Top10, Trade, Manufacturing, GDP*, and *AverageIncome* have the same trend of their coefficients' signs and significances. On the other hand, *Information* becomes insignificant although its sign is the same as Table 7 (constantly negative).

Table 9: Fixed Effect Model on the Effect of Tax Revenue per Capita on Fiscal Condition (Surplus per Capita) in Each State

	(1) No Control	(2) +GDP	(3) +Republican Control	(4) +Industry	(5) +Top 10 Cities	(6) +Average Income
TotalTaxRevenue	0.32***	0.33***	0.33***	0.32***	0.49***	0.42***
	(0.056)	(0.061)	(0.066)	(0.077)	(0.095)	(0.093)
PropertyTax Revenue	-1.53***	-1.53***	-1.49***	-1.47***	-2.04***	-2.33***
	(0.34)	(0.33)	(0.34)	(0.39)	(0.64)	(0.63)
SalesTaxRevenue	0.60***	0.61***	0.52***	0.19	0.13	-0.32
	(0.16)	(0.18)	(0.19)	(0.27)	(0.40)	(0.44)
PersonalIncome TaxRevenue	0.43	0.44	0.49	0.74**	0.80**	0.39
	(0.29)	(0.34)	(0.34)	(0.29)	(0.39)	(0.36)
CorporateTax Revenue	3.15***	3.15***	3.17***	4.51***	4.61***	5.00***
	(0.60)	(0.60)	(0.61)	(1.08)	(1.12)	(1.01)
Debt	-0.14***	-0.14***	-0.14***	-0.11***	-0.039	-0.056
	(0.034)	(0.034)	(0.035)	(0.034)	(0.074)	(0.076)
GDP		-0.0011	-0.0017	-0.016	0.026	0.0088
		(0.0071)	(0.0071)	(0.018)	(0.020)	(0.019)
AverageIncome						0.066***
						(0.022)
Republican Control			0.079**	0.13***	0.18***	0.14***
			(0.032)	(0.038)	(0.048)	(0.051)
Agriculture				0.15*	0.037	-0.024
				(0.083)	(0.079)	(0.083)
Trade				0.30***	0.23***	0.22**
				(0.11)	(0.083)	(0.084)
Mining				0.16*	-0.046	-0.064
				(0.085)	(0.073)	(0.071)
Manufacturing				0.15**	0.062	0.040
				(0.062)	(0.050)	(0.050)
Information				-0.054	-0.14	-0.16*
				(0.081)	(0.099)	(0.096)
Finance				0.047	0.012	-0.032
				(0.060)	(0.060)	(0.065)
Professional				0.064	0.024	-0.060
				(0.052)	(0.058)	(0.057)
Top10					-1.32***	-1.20***
					(0.20)	(0.21)
Constant	0.26**	0.28	0.20	-8.07**	-5.77*	-3.11
	(0.13)	(0.21)	(0.22)	(3.84)	(3.10)	(3.18)
Observations	1,071	1,071	1,071	867	714	714
R-squared	0.17	0.17	0.17	0.24	0.27	0.28
Numbert of State	51	51	51	51	51	51

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(5) The Effect of Year Control Variables on Each Set of Regressions (Table 10)

Table 10 is the result when I add year variables 2000, 2002, and 2004 to 2015 to each regression (6) in Table 6 to Table 9. Overall, these regressions are statistically significant. The R^2s are around 0.80 which are quite a bit higher than those of the regressions without year variables.

CorporateTaxRate (or *CorporateTaxRevenue*) and *PropertyTaxRate* (or *PropertyTaxRevenue)* show the same trends: Corporate tax revenue shows positive and property tax shows negative relationships with the dependent variables. However, the coefficients of *CorporateTaxRate* become insignificant. The signs of sales tax revenue and personal income tax revenue are similar to the regressions without year variables. The coefficients of *TotalTaxRevenue* are positive and statistically significant, while those of *Debt* are statistically insignificant.

The year control variables affect the other control variables as well. The coefficients of *RepublicanControl*, which are strongly statistically significant and positive in the previous regressions, become insignificant in many regressions and the signs are negative. The *Top10*'s contributions for dependent variables are still negative although they become statistically insignificant in most regressions in Table 10. The year variables may be taking significance from these variables.

The coefficients for the industry GDP proportion variables become statistically insignificant except *Agriculture*, which is not significant in any previous regressions. Both *GDP* and *AverageIncome* are also insignificant most of the time, again, perhaps due to the fact that these variables show yearly trends that are already controlled for by the year variables.

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The year variables show yearly changes in economic and political situations. For example, year 2007 and 2014 have statistically significant positive correlation with fiscal conditions. On the other hand, the years 2002, 2008, and 2009 have significantly negative relationships, especially reflecting the Great Recession in 2008.

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Table 10: The Effect of Year Control Variables on Each Set of Regressions

Dependent Variable	(1)	(2)	(3)	(4)	Dependent Variable	(1)	(2)	(3)	(4)
	Operation Ratio		Surplus (Deficit) per Capita			Operation Ratio		Surplus (Deficit) per Capita	
Independent Variables	Proportion	per Capita	Proportion	per Capita	Independent Variables	Proportion	per Capita	Proportion	per Capita
Total Tax Revenue		3.36***	-	0.65***	**Year2002**	-19.6***	-21.0***	-1.07***	-1.29***
		(0.55)		(0.064)		(1.54)	(1.74)	(0.20)	(0.17)
Property Tax Revenue	-1.09***	-12.2***	-0.19***	-1.76***	**Year2004**	-0.34	-1.94	0.38	0.17
	(0.17)	(3.59)	(0.042)	(0.34)		(1.94)	(2.00)	(0.27)	(0.25)
Sales Tax Revenue	-0.42*	2.99	-0.11**	0.26	**Year2005**	-1.64	-3.84*	0.24	-0.039
	(0.22)	(3.03)	(0.044)	(0.28)		(2.01)	(2.11)	(0.25)	(0.26)
Personal Income Tax	-0.51	2.80	-0.12**	0.099	**Year2006**	0.81	-2.11	0.45	0.075
	(0.31)	(2.85)	(0.054)	(0.35)		(2.54)	(2.56)	(0.28)	(0.30)
Corporate Tax Revenue	0.38	21.1***	0.061	3.74***	**Year2007**	6.59**	2.54	1.03***	0.50
	(0.26)	(4.36)	(0.059)	(1.13)		(3.18)	(3.11)	(0.35)	(0.35)
Debt	-	0.66	-	-0.0089	**Year2008**	-11.3***	-16.6***	-0.44	-1.16***
		(0.80)		(0.058)		(3.82)	(3.43)	(0.46)	(0.37)
GDP	0.14	0.066	-0.0034	-0.016	**Year2009**	-29.2***	-34.6***	-2.28***	-2.95***
	(0.19)	(0.26)	(0.018)	(0.018)		(3.42)	(3.92)	(0.41)	(0.42)
AverageIncome	-0.60*	-0.62*	-0.062**	-0.056	**Year2010**	-1.07	-6.49*	0.59	-0.089
	(0.33)	(0.33)	(0.030)	(0.036)		(3.51)	(3.74)	(0.45)	(0.42)
Republican Control	-0.11	-0.0061	-0.0088	-0.0063	**Year2011**	7.01*	1.04	1.39**	0.62
	(0.31)	(0.32)	(0.036)	(0.036)		(4.15)	(4.45)	(0.54)	(0.51)
Agriculture	0.64	1.51**	0.047	0.20***	**Year2012**	-4.72	-10.9**	0.24	-0.59
	(0.60)	(0.68)	(0.083)	(0.066)		(4.85)	(4.98)	(0.60)	(0.55)
Trade	0.14	0.39	-0.065	0.0096	**Year2013**	4.51	-2.03	1.11*	0.23
	(0.82)	(0.73)	(0.096)	(0.081)		(4.69)	(4.77)	(0.56)	(0.51)
Mining	-0.25	0.18	-0.076	0.0095	**Year2014**	9.50*	2.91	1.68***	0.75
	(0.60)	(0.57)	(0.087)	(0.055)		(5.22)	(5.31)	(0.61)	(0.58)
Manufacturing	-0.20	0.15	-0.056	0.016	**Year2015**	0.50	-6.95	0.79	-0.31
	(0.55)	(0.51)	(0.061)	(0.044)		(5.97)	(5.91)	(0.70)	(0.61)
Information	0.62	0.62	0.066	0.088	Constant	184.9***	95.1***	18.2**	-0.14
	(0.55)	(0.62)	(0.077)	(0.079)		(50.3)	(33.7)	(8.00)	(3.56)
Finance	-0.11	0.36	-0.020	0.062	Observations	714	714	714	714
	(0.61)	(0.52)	(0.065)	(0.052)	R-squared	0.79	0.80	0.75	0.78
Professional	-0.34	0.21	-0.12	-0.0078	Numbert of State	51	51	51	51
	(0.58)	(0.53)	(0.090)	(0.062)	Robust standard errors in parentheses				
Top10	-1.40	-1.35	-0.54*	-0.458**	*** p<0.01, ** p<0.05, * p<0.1				
	(2.21)	(1.63)	(0.29)	(0.19)					

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(6) Considerations

Total tax revenue per capita is positively correlated with fiscal condition in Table 9 and 10. This result makes sense because the tax revenue is one of the biggest revenue sources for state governments.

Unlike my hypothesis, corporate tax revenue has a positive relationship with fiscal condition in every group of regressions without yearly variables. Therefore, although the proportion of corporate tax revenue is relatively smaller than other tax resources, this tax source seems to contribute to improve states' fiscal condition as the amount and the proportion of corporate tax revenue increase. On the other hand, the correlation between fiscal condition and corporate tax revenue become insignificant when I add yearly variables to the regressions. This result indicates that yearly control variables capture changes in economic situations. For example, *Year2008* and *Year2009* seem to capture the effect of the financial crisis in 2008. Also, the negative sign in *Year2002* is most likely due to the deterioration resulting from the dot-com bubble in 2001. Thus, the fiscal condition can be explained by either corporate tax revenue or yearly differences both of which are affected by changes in economic situations each year.

However, these results might imply another possibility. If year variables indicate the trends throughout the United States, these results mean that corporate tax revenue in each state is not a factor for fiscal condition of the state. Instead, only the national trends affect the fiscal condition.

The result for property tax is also unexpected. I did not expect that a lower proportion or less revenue per capita of property tax revenue would lead to a better fiscal condition. Some states might decrease the property tax burden to energize the economy, which increases other types of tax revenue. There is a possibility, adversely, that a state with an unhealthy fiscal

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condition tends to raise the property tax rate to improve its condition. It is understandable that adding yearly variables does not affect the significance of property tax revenues in the regressions because the property tax amount tends to be relatively stable against changes in the economic situation.

Sales tax revenue and personal income tax revenue do not always show statistically significant relationships with state fiscal conditions in my regressions. However, there are some trends: the signs of the coefficients for tax revenue proportion tend to be negative, while those for tax revenue per capita tend to be positive. These results imply that although increased sales tax or personal income tax might improve a state's fiscal condition, heavily relying on the policy is not an appropriate way to solve budget problems.

As expected, the states that the Republican party controls have better fiscal conditions than those that Democrats control. This result suggests that Republican pro-business policies are good not only for the business sector but also for the public sector.

On the other hand, the relationship between having top-10 cities and fiscal conditions is constantly negative. The states with top-10 cities are New York, California, Illinois, Texas, Arizona, Pennsylvania, and Michigan (2000 to 2002). According to Table 5, tax revenues per capita in these states are not markedly lower than average. Rather, some states such as New York have considerably higher revenues. Therefore, one of the possible reasons for this negative result might be expanded expenditures for dealing with inequality and poverty, which are typical problems for big cities. Further research concerning the expenditures will help explain these results.

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The result for industrial structure is thought-provoking. Only *Trade* has a positive correlation with fiscal condition; the other secondary and tertiary industries show no or a negative relationship with fiscal condition. This result might indicate that policy makers should think about not just development in specific industries, but how to get tax revenue from each industry effectively to improve fiscal conditions.

The sign of *GDP* is positive in the regressions with all control variables except *AverageIncome*. Also, the sign of *AverageIncome* is always positive. Therefore, in general, the more GDP or average income increase, the more a state's fiscal condition improves. This shows the importance of revitalization of the economy inside each state.

VIII. LIMITATIONS

(1) Data Acquisition

Each variable is derived from many sources. Some sources have data from the early 20th century, others provide data for a much shorter and more recent time period. Critically, the United States Census Bureau lacks tax revenue data in 2001 and 2003. Also, the Bureau supplies historical city-level population data only from 2000. These two data acquisition restrictions lead to a decrease in the number of observations although the number is still enough to analyze.

(2) Long-run Relationship

In this study, the dependent variables are *OperatingRatio* or *SurplusPerCapita*, both of which were constructed by revenue and expenditure data from each fiscal year. Therefore, the regressions with such dependent variables cannot consider the long-term effect of tax systems. For example, Alaska tends to keep good fiscal condition according to Table 2 and Table 3. However, it has huge debt which is twice as much as the average. Therefore, if a researcher uses different dependent variables which indicate longer term fiscal conditions, the results might be different from this study.

(3) Multicollinearity

There are some multicollinearity problems. As shown in the Results section, *CorporateTaxRate* and yearly control variables have similar roles to explain the fiscal condition, dependent variables. To some extent, multicollinearity is within the scope of the assumption because factors contributing fiscal condition are sometimes clearly related with each other. The

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problem decreases the efficiency of the regressions: *GDP*, for example, become insignificant when I add *AverageIncome* to regressions.

(4) Interpretation of Year Variables

As mentioned in the Results section, there are several ways to interpret the results of year variables. It is not clear whether the year variables imply national trends of the United States or just capture changes of economic situations in each state.

In the next section, I conclude and offer policy recommendations.

IX. CONCLUSIONS AND POLICY RECOMMENDATIONS

In this study, I aimed to determine the factors which contribute to improvement in a state's fiscal condition. The independent variables are tax revenue proportions for each tax source or tax revenue per capita for each tax source. Also, the regressions include political and economic control variables. I used historical data in 50 states in the United States and the District of Columbia mainly after 2000.

For the dependent variables, both operating ratio and surplus (deficit) per capita works well because the regressions with these variables are always statistically significant overall.

I expected that the regressions would show a positive relationship of property tax, sales tax, and personal income tax with fiscal condition, and no relationship of corporate tax with fiscal conditions. However, the results are completely different: The corporate tax is positive, property tax is negative, the other taxes have no consistent statistical relationship with fiscal condition.

As for control variables, the Republican control indicator always correlates positively with state fiscal condition, while having top-10 cities is negative all the time. Although GDP and average income have positive correlations with fiscal conditions, the breakdown of the sources of GDP has different trends: generally, trade industry is positive; information and finance industries are negative; and other industries have no correlation.

Based on these results, the following five recommendations follow:

(1) Recommendations

(a) Using both the dependent variables as indicators for successful tax systems.

As mentioned in the Data and Method section, the fiscal condition ranking change in accordance with several indicators. This study shows that both operating ratio and surplus (deficit) per capita work well as indicators for calculating a "good tax system." Although the results of regressions with each variable are similar, they have some differences, which might come from the consideration of population factor in surplus (deficit) per capita. For example, even if the values of the indicator are the same in two states, those implications would be different when one of the states has a huge population and the other has a tiny population. Therefore, each state should use both operating ratio and surplus (deficit) per capita to evaluate the past policies and think about tax reform in the future.

(b) Pursuing ways to increase corporate tax revenue.

One of the most meaningful results in this study is the positive relationship between corporate tax revenue and fiscal condition. Therefore, each state should make plans on how to increase the amount and proportion of corporate tax revenue. Simply raising tax rates is not a good option because it hurts economic activity and some companies can leave the jurisdiction to seek a better business environment. Rather, as executed in many countries in the world, a corporate tax cut might be effective for improving fiscal conditions, which would enhance economic activity and increase the taxable profit amount of each company. Revitalizing the economy is extremely important because the study also indicates that GDP and average income have positive correlations with fiscal conditions. In 2011, the Federal government started a

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project named 'Select USA' which aimed to invite foreign investments into the United States.[q] These kinds of public relations activities will also be effective to improve state's fiscal condition.

There is another option; decreasing the property tax rate to revitalize business and invite new companies to the jurisdiction. This policy makes sense because the regressions show that as property tax revenue proportion or property tax revenue per capita decrease, a state's fiscal condition improves.

(c) Analyzing Republican's typical policies which are effective for fiscal conditions.

This study implies the huge differences in policies that Republican and Democrats tend to apply. For a healthier fiscal condition, the Republican approach appears better than the Democrats' in general. Therefore, further study is needed to investigate what kind of policies in Republican-controlled executives and legislatures help fiscal conditions improve.

(d) Analyzing typical expenditures in top-10 cities.

Surprisingly, a state with a top-10 city tends to have worse fiscal conditions. I suspect that this is not caused by insufficient revenue, but because of higher expenditures. Therefore, policy makers in such a state should scrutinize some expenditure items which are typical to big cities (e.g. expanded expenditures for dealing with inequality and poverty). The identified items might be the cause of worse fiscal conditions.

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[q] Select USA. https://www.selectusa.gov/welcome.

(e) Aiming for an industrial structure under which the trading industry is central.

Minerals' distribution is uneven and tertiary industry may generate high added value, so mining, information, finance, and professional industries are expected to contribute to improved state fiscal conditions. However, the results show that relying heavily on such industries can have no meaning or even cause worse effects on states' budgets. On the other hand, the larger share the trading industry occupies, the better a state's fiscal conditions become. Therefore, policy makers in each state should enhance the trading business (both wholesale and retail trade). Manufacturing industry also has a potential to contribute to the fiscal condition.

This study revealed the validity of operating ratio and surplus (deficit) per capita as indicators of determining ideal tax systems, and the importance of corporate tax revenue, which contribute to improve states' fiscal condition. To find other factors that explain fiscal situations, future study should focus on analyzing states' expenditures, detailed business factors (e.g. investment, company function), and policies which Republicans tend to choose.

APPENDIX A. THE PROPORTION OF EACH INDUSTRY GDP IN STATES

State	Agriculture	Trade	Mining	Manufacturing	Information	Finance	Professional	State	Agriculture	Trade	Mining	Manufacturing	Information	Finance	Professional
Alabama	1.4	16.0	2.2	19.8	3.1	18.0	10.6	Montana	3.7	15.0	6.7	7.3	2.8	19.7	8.2
Alaska	1.3	8.6	33.1	3.9	2.8	13.2	7.5	Nebraska	5.7	14.3	0.3	13.9	3.3	20.2	10.5
Arizona	0.8	15.9	2.4	10.1	3.3	24.0	12.6	Nevada	0.2	12.4	3.9	4.5	2.5	20.9	11.1
Arkansas	3.0	16.1	1.9	20.0	4.1	15.5	10.1	New Hampshire	0.3	17.7	0.1	13.2	4.0	23.3	12.5
California	1.4	13.9	0.9	12.1	7.8	24.1	14.8	New Jersey	0.2	16.1	0.1	11.6	4.8	25.3	16.2
Colorado	0.9	13.2	4.3	8.2	8.2	22.6	15.4	New Mexico	1.7	12.9	13.2	8.0	4.1	18.5	12.8
Connecticut	0.2	12.5	0.1	15.1	4.4	30.7	13.3	New York	0.2	11.5	0.1	7.0	7.9	33.0	15.2
Delaware	0.6	9.0	0.0	9.1	2.0	46.0	12.9	North Carolina	1.1	13.1	0.3	25.0	3.5	19.8	11.8
District of Columbia	0.0	3.3	0.0	0.4	8.8	17.9	37.0	North Dakota	6.7	17.4	7.6	9.2	3.4	17.3	6.6
Florida	0.9	16.4	0.3	5.8	4.9	24.2	14.2	Ohio	0.6	14.3	0.9	20.7	3.4	20.6	12.5
Georgia	0.9	16.1	0.6	14.1	8.2	20.7	13.1	Oklahoma	1.6	13.9	13.4	12.9	3.1	16.2	9.9
Hawaii	0.7	13.4	0.2	2.4	3.1	27.4	11.1	Oregon	2.3	13.9	0.3	21.9	3.7	21.0	11.6
Idaho	5.3	16.8	1.6	12.6	2.5	19.8	12.5	Pennsylvania	0.5	13.1	1.6	16.1	5.6	19.9	13.4
Illinois	0.7	14.3	0.4	15.0	3.8	23.9	14.7	Rhode Island	0.3	13.4	0.1	10.9	3.9	26.2	12.7
Indiana	1.1	13.0	0.7	30.7	2.3	16.3	8.4	South Carolina	0.7	15.7	0.3	21.2	2.8	18.7	11.2
Iowa	4.6	13.4	0.3	22.5	3.2	22.8	6.8	South Dakota	7.8	16.7	0.7	11.3	2.8	25.5	6.7
Kansas	3.0	15.7	1.7	18.5	5.5	17.4	10.5	Tennessee	0.9	16.5	0.5	19.0	3.2	17.4	11.6
Kentucky	1.4	14.7	4.0	22.2	2.9	16.2	8.9	Texas	0.7	15.1	11.3	15.2	4.1	15.8	11.6
Louisiana	0.8	12.7	11.7	22.3	2.4	14.2	8.8	Utah	0.6	14.7	3.3	13.4	4.6	22.7	12.1
Maine	1.8	16.5	0.0	12.6	2.6	22.4	10.4	Vermont	1.4	15.2	0.9	12.8	3.4	21.1	10.2
Maryland	0.3	13.3	0.2	7.6	5.1	26.2	16.6	Virginia	0.4	12.1	0.8	12.3	5.3	22.1	20.6
Massachusetts	0.2	11.8	0.1	11.4	5.6	25.6	17.8	Washington	1.7	14.9	0.2	15.5	10.6	20.2	12.3
Michigan	0.6	14.4	0.4	21.7	2.9	19.1	14.7	West Virginia	0.5	14.2	15.2	13.2	2.6	14.5	7.9
Minnesota	1.8	14.3	0.8	15.4	4.0	21.8	14.1	Wisconsin	1.5	13.8	0.3	23.0	3.3	20.7	9.8
Mississippi	2.5	16.2	1.7	19.3	2.5	16.8	8.2	Wyoming	1.5	11.0	33.7	6.2	1.6	13.4	4.9
Missouri	1.2	14.6	0.5	16.0	4.8	19.9	13.8	Total	1.6	14.0	3.7	14.0	4.1	21.2	12.2

APPENDIX B. THE EFFECT OF OTHER REPUBLICAN CONTROL LEVEL CONTROL VARIABLES ON FISCAL CONDITION (OPERATING RATIO) IN EACH STATE

	(1) No Control	(2) +GovRep	(3) +SenateRep	(4) +HouseRep	(5) +Rep Trifectas	(6) +Dem Trifectas
PropertyTaxRate	-1.19***	-1.18***	-1.24***	-1.24***	-1.21***	-1.21***
	(0.086)	(0.092)	(0.093)	(0.10)	(0.097)	(0.092)
SalesTaxRate	-0.0024	-0.014	-0.015	0.040	-0.022	-0.0053
	(0.13)	(0.13)	(0.13)	(0.14)	(0.13)	(0.13)
PersonalIncomeTaxRate	0.0015	0.014	-0.00071	0.030	-0.0028	0.0064
	(0.18)	(0.19)	(0.19)	(0.19)	(0.19)	(0.19)
CorporateTax	1.41***	1.43***	1.40***	1.48***	1.44***	1.39***
Rate	(0.24)	(0.25)	(0.24)	(0.24)	(0.24)	(0.24)
GovRep		1.46*				
		(0.76)				
SenateRep			2.22**			
			(0.95)			
HouseRep				2.82***		
				(0.81)		
RepTrifectas					2.10**	
					(0.86)	
DemTrifectas						-2.25**
						(1.04)
Constant	135.7***	134.9***	136.9***	133.5***	136.6***	136.9***
	(6.92)	(6.89)	(7.64)	(7.15)	(7.09)	(7.15)
Observations	1,071	1,071	1,071	1,029	1,071	1,071
R-squared	0.14	0.14	0.14	0.15	0.14	0.14
Number of state_num	51	51	51	49	51	51

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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APPENDIX C. THE EFFECT OF OTHER URBANIZATION LEVEL CONTROL VARIABLES ON FISCAL CONDITION (OPERATING RATIO) IN EACH STATE

	(1) No Control	(2) +Population Density	(3) +Top 20 Cities
PropertyTaxRate	-1.19***	-1.18***	-1.39***
	(0.086)	(0.088)	(0.12)
SalesTaxRate	-0.0024	-0.014	0.16
	(0.13)	(0.13)	(0.22)
PersonalIncomeTaxRate	0.0015	-0.0060	-0.11
	(0.18)	(0.19)	(0.27)
CorporateTax *Rate*	1.41***	1.41***	1.83***
	(0.24)	(0.24)	(0.32)
PopulationDensity		-0.0018	
		(0.0024)	
Top20			3.46
			(2.68)
Constant	135.7***	136.8***	134.5***
	(6.92)	(7.14)	(12.6)
Observations	1,071	1,071	714
R-squared	0.14	0.14	0.15
Number of state_num	51	51	51

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

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