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Title: Metropolitan governance structure and growth-inequality dynamics in the United States

Abstract: While much scholarly attention has long been paid to ways in which metropolitan areas are politically structured and operated to achieve a dual goal, economic growth and equality, relatively less is known about the complex relationship between metropolitan governance structures and growth-inequality dynamics. This study investigates how and to what extent metropolitan governance structures shape regional economic growth and inequality trajectories using the data for 267 US metropolitan areas from 1990 to 2010. The findings from a two-stage least squares regression analysis suggest that economic growth is associated with governance structures in a nonlinear fashion with relatively more rapid growth rates in both highly centralized and decentralized metropolitan areas. However, these regions are also found to experience a larger increase in income inequality, indicating an important tradeoff to be considered carefully in exploring ways to reform existing governance settings. These findings further suggest that the so-called growth-inequality tradeoff may exist not only in their direct interactions but through their connections via governance or other variables.

Key words: political fragmentation, growth-inequality dynamics, regional economy

1 Introduction

Although the economy has begun to rebound from the late 2000s recession in many countries, the question of whether the benefits of economic growth are distributed equitably throughout the society is still controversial. Also, rapid integration of the world economy has raised serious concerns about widening income disparities across countries that pose a significant challenge to policymakers with regard to both economic prosperity and distributional justice. In the U.S., where globalization has allowed manufacturers to move offshore, uneven growth across sectors has threatened the economic well-being of a growing number of middle-class households, while the top one percent's share has increased rapidly (see, e.g., Reich, 2008; Alvaredo et al., 2013). Similar problems have been reported in many other developed nations, although the situation varies from country to country.

Attempts have been made to explore ways to effectively attain both economic growth and equality at various scales. More specifically, a great deal of scholarly attention has been paid to the need for fundamental reforms that can enable countries to achieve these dual goals. In particular, there has been growing concern in recent years regarding the way in which contemporary metropolitan areas are politically structured and operated as well as the trends of fragmentation, decentralization, or devolution (see, e.g., Dreier et al., 2001; Lessmann, 2009; Xu and Warner, 2016). Institutional reforms, often labeled 'New Regionalism', have been proposed as a way to achieve equity and sustainability as well as economic growth through collaboration across sectors, issues, and boundaries (see, e.g., Foster, 2001; Norris, 2001), but the literature is quite equivocal about the merits and limitations of such initiatives (Kim and Jurey, 2013).

It is important to note that the structure of local and regional governance has long been considered a key contextual factor that shapes the performance of local/regional economies. While public choice theorists underscore the merits of local autonomy and the interjurisdictional competition that can occur with a large number of jurisdictions in a region, political fragmentation has also been viewed as a significant barrier to economic growth due to a lack of administrative consistency and/or difficulties taking advantage of economies of scale in the provision of public services (Foster, 1993). In addition, a highly fragmented governance structure has often been regarded as a cause (or accelerator) of central city-suburb disparities, racial/economic segregation, and other equity issues (see e.g., Hill, 1974; Morgan and Mareschal, 1999; Jimenez, 2016).

Governance structure reform must be discussed with due consideration of its growth and equality implications and their relationship with each other. While it has been claimed that inequality will decrease at a later phase of industrialization, economic growth does not always ensure a more equitable distribution of wealth. Growth without an adequate mechanism of wealth (re)distribution can deepen income inequality and eventually lead to a slower rate of growth due to increases in demand for social assistance (Alesina and Rodrik, 1994). In the literature, such dynamics have mainly been examined at the country level, but less attention has been paid to growth-inequality interactions on a regional scale, where urban/metropolitan politics and governance settings play a significant role. Moreover, empirical investigations of local/regional governance structures have been conducted from a narrow perspective—i.e., economic growth and inequality separately, even though the three factors (growth, inequality, and governance structure) are systematically interrelated.

This study attempts to fill this gap in the literature. More specifically, it examines the association between regional economic growth and inequality and the ways in which the growth-inequality nexus responds to different forms of regional governance by employing a simultaneous equations model using data on 267 U.S. metropolitan statistical areas (MSAs). The remainder of this article is organized as follows. Section 2 reviews several branches of the relevant literature. Section 3 presents the model, the variables, and the data used for the empirical analysis. The results are shown in section 4, and the key findings and their implications are then discussed in Section 5.

2 Literature review

It has been widely acknowledged that the performance of a regional economy is largely shaped by the way its governance system is structured, and many studies have examined the consequences of governance restructuring from various perspectives. A sizable number of studies have analyzed the implications of political fragmentation or decentralization for the fiscal efficiency and economic competitiveness of a region, although their findings are equivocal. Although relatively less abundant, the literature also includes studies on the distributional consequences of political fragmentation in local/regional governance. However, little effort has been exerted to investigate the implications of governance structures in a more comprehensive manner by examining economic growth and inequality together. Meanwhile, the relationship between growth and inequality has been extensively studied, but that branch of the literature has paid little attention to growth-inequality interactions on a sub-national scale or the importance of

governance structures. The following subsections provide a brief review of these bodies of literature, which have not been well informed by one another.

Governance structure and growth

There are two competing views on the role of governance structures in spurring local or regional economic growth. One group of scholars advocate a high degree of local autonomy and interjurisdictional competition, which can lead to allocative and fiscal efficiencies (Nelson and Foster, 1999). This perspective traces its origin to the work of Tiebout (1956), who demonstrated that the existence of many municipalities can allow mobile residents to choose the community that best serves their interests. Although Tiebout did not extend his analysis to economic growth per se, it has often been assumed that a more efficient provision of customized public goods and services can boost the vitality of regional economies.

Brennan and Buchanan (1980) provided another important theoretical basis in support of this perspective. Their well-known Leviathan hypothesis posited that centralized government units tend to have a strong motive to expand their revenue and thus to generate growing tax burdens, which can in turn deter economic growth. Such a centralized system, when combined with excessive bureaucracy, can also negatively affect fiscal health, which is essential for local/regional economic prosperity (Jimenez, 2017). These claims have been supported by empirical studies examining the association between fiscal decentralization and growth rates. For instance, using data from all U.S. states between 1992 and 1996, Akai and Sakata (2002) assessed the net effect of fragmented governance on per capita gross state product, and they found that fiscal decentralization substantially contributed to the economic growth rate. Stansel (2005) also examined the association with the use of a more comprehensive dataset covering

more than 300 U.S. metropolitan areas. Specifically, he employed a central-city concentration index and count metrics, which utilized the number of local government entities per 100,000 residents as a measure of fragmentation, and he reported findings that support the contention that decentralization can promote regional economic performance.

More recently, Grassmueck and Shields (2010) raised concerns about existing measures that these metrics do not perfectly reflect the heterogeneous capabilities and legal responsibilities of government units; thus, to measure interjurisdictional fragmentation. In order to address this issue, they applied the Hershman-Herfindahl Index (HHI), which indicates the market share of local jurisdictions within a metropolitan area. Their empirical study employed three simultaneous equations to test whether governance structures contribute to changes in employment, population, and per capita income, and the results showed a positive impact of metropolitan fragmentation measured in HHI on income and employment growth.

In contrast to the above perspective, another group of scholars have advocated for a more consolidated form of governance. It is contended that a more consolidated structure of governance can lower administrative costs through economies of scale, while also allowing strategic planning and regulatory consistency to increase regional economic competitiveness (Foster, 1993; Swanstrom, 2001). Some empirical studies on developing countries have provided evidence to bolster this argument of the advocates of consolidated governance. Zhang and Zou (1998), for instance, showed that fiscal decentralization hindered regional economic growth in China in the late 1970s and suggested that public investment by the central government might more effectively stimulate provincial economic growth with economies of scale. Davoodi and Zou (1998) also found a detrimental effect of fiscal decentralization on economic growth using panel data from 27 developing countries for the period of 1970-1989. According to the authors,

excessive spending on welfare other than capital and infrastructure by local governments might lead to slower economic growth.

However, the association between governance structure and economic growth can be more complicated as some studies have pointed out. Nelson and Foster's analysis (1999) showed a negative association between the central-city share of the metropolitan area population and income growth implying that decentralization can have beneficial effects on economic growth in the U.S. metropolitan areas. At the same time, however, the authors suggested that metropolitan income would be able to grow rapidly if central cities could expand their land area commensurate with their growth. In addition, Hammond and Tosun (2011) examined whether fragmentation was associated with population, employment, and real income growth using counties as the unit of analysis, and the authors found that the impacts of decentralization differed between metropolitan and nonmetropolitan counties.

Governance structure and inequality

The governance structure can also have significant implications for social equity. Rising inequality within metropolitan areas is known to be associated with racial/income segregation, poverty concentration, and spatial mismatches (see, e.g., Kain, 1992; Reardon and Bischoff, 2011). In the U.S., the massive relocation of middle-class households to suburban areas has facilitated the incorporation of new jurisdictions, and this trend of political fragmentation has often been viewed as a cause of residential exclusion and various forms of disparity (see, e.g., Weiher, 1991; Dreier et al., 2001).

Several empirical studies have examined the equality implications (or distributional consequences) of governance structures, but the findings have been mixed and have not reached

a strong consensus. On the one hand, using multiple regression analysis with data from sixty-three MSAs in 1960, Hill (1974) reported that political fragmentation (measured as the number of local jurisdictions per capita) was significantly associated with the degree of MSA-level income inequality. On the other hand, a group of studies with varying contexts and measures did not find a sizable impact of political fragmentation on inequality. Specifically, Logan and Schneider (1982) examined the effects of political fragmentation (measured as the number of suburbs per 1,000 residents) on inequality in the U.S. and found that the relationship between fragmentation and income disparity at the MSA level (measured as the ratio of median incomes in the suburbs to those in the central city) had no statistical significance. Additionally, using 1990 data, Morgan and Mareshal (1999) investigated the relationship between political fragmentation and income disparity with three different measures of fragmentation: (1) the number of government entities per million people in each MSA, (2) the percentage of the central city's population in the MSA, and (3) the area growth rate of each central city over the past two decades; however, none of these three variables showed a statistically significant association with income inequality.

There are studies examining other indicators of inequality in relation to political fragmentation or local/regional governance structure more broadly. For instance, Lewis and Hamilton (2011) investigated whether fragmentation was associated with racial segregation. The authors found that their political fragmentation variables, measured as the number of local governments and the degree of fiscal power decentralization, increased racial segregation in MSAs. Bischoff (2008) examined how school district fragmentation influenced racial segregation. The findings emphasized that fragmentation was positively associated with racial segregation among districts; that is, more fragmented regions had higher degrees of segregation.

It is important to note that some recent studies have paid explicit attention to the rise of special districts and resultant vertical fragmentation of governance structures. In the U.S., the proliferation of single-purpose governments has taken place at a rapid rate over the last half century or so (see e.g., Berry, 2009; Mullin, 2009). While these units can make a meaningful contribution through policy specialization and their geographical adaptability/flexibility (Foster, 1997; Mullin, 2007), “overlapping governments share the authority to tax and provide services to the same residents, [and] this vertical layering of functionally specialized governments with concurrent tax authority sets the conditions for a fiscal common-pool problem.” (p.805, Berry, 2008).

Vertical fragmentation can have significant implications for the way governments function and thus generate distributional consequences. In his study in which horizontal and vertical dimensions of fragmentation were distinguished from each other, Jimenez (2016) tackled this issue, while the analysis results did not provide strong evidence for association between political fragmentation and spatial separation of economic classes. Deslatte (2017) demonstrated the possibility of significant effects through an empirical analysis of Florida counties, suggesting that development policy shifts were associated with both horizontal and vertical fragmentation. In another study, Deslatte et al. (2017) hypothesized that vertical fragmentation would be inversely associated with social equity policy innovations and found evidence supporting the hypothesis. According to the authors, this finding – i.e., relative shortage of inclusionary social services in vertically fragmented metropolitan areas – can be attributed not only to the provision of such services via special districts, but also to “social stratification reducing the desire for inclusionary policies and draining general-purpose governments of the resources” (p.719).

Growth and inequality

The studies discussed above investigated how local/regional governance structures can influence economic growth or inequality dynamics. However, economic growth and inequality are not separate from each other; rather, these processes are systematically interrelated, as shown in another stream of the literature discussed below. It must be noted, however, that these studies on the interactions between economic growth and inequality were carried out without explicit consideration of the role of governance structures.

In his pioneering study, Kuznets (1955) provided a theoretical foundation for understanding the nexus between growth and inequality. He hypothesized an inverted U-shaped curve (the so-called Kuznets curve) suggesting that economic growth tends to be positively associated with income inequality at an early stage of development because of income concentration in the upper-income brackets and earning gaps between urban and rural populations. However, the level of inequality is likely to decline in later stages as the earnings growth of low-income households accelerates.

A number of studies that have examined the relationship between growth and inequality have provided support for Kuznets' theory. Papnek and Kyn (1985) assessed the validity of the Kuznets hypothesis using panel data from 83 countries over 26 years, from 1952 to 1978, and the results provided some evidence of the Kuznets curve, although the variation in income inequality was largely shaped by other socio-political factors. Bourguignon and Morrisson (1998) also found support for Kuznets theory with consideration of a relative productivity of agricultural to non-agricultural sectors, which is Kuznets' central idea of growth-inequality dynamics.

In contrast to Kuznets' theory, an ordinary U-shaped curve was found in Garofalo and Fogarty's study (1979), in which the authors analyzed the association between median household

income and the Gini coefficient among U.S. metropolitan areas with a population over 250,000 in 1970. Their findings suggested that the level of inequality continued to decline before reaching a turning point and then rebounded back. Anand and Kanbur (1993) suggested that the empirical relationship between growth and inequality may be sensitive to the functional forms selected and the data employed, implying that Kuznets' hypothesis may not always hold true. Cloutier (1997) also detected a U-shaped association between income and inequality by examining family income -inequality dynamics during the 1980s in the U.S. Partridge et al. (1996) analyzed trends in income inequality in the U.S. using a panel dataset from the 48 contiguous states and reported that advanced stages of economic development could have an adverse impact on equality.

Meanwhile, some scholars have explored possible reverse causality, namely, how inequality influences growth. Barro (1999) provided a theoretical basis to assess the impact of inequality on growth. Specifically, high inequality tends to increase redistributive policies, which usually have lower return rates and in turn reduce economic growth. Additionally, a society with high and continuous inequality can motivate the poor to engage in anti-social activities (e.g., crime and rioting). As uncertainty in society increases, the productivity of the economy will decrease. This negative association between inequality and growth has been widely supported by empirical studies, such as Alesina and Rodrik (1994), Perotti (1996), and Castells-Quintana (2014).

However, empirical studies carried out at the subnational level have reported mixed results. Panizza (2002) analyzed state-level data and found that increases in the Gini coefficient reduced annual per capita income growth rates between 1940 and 1980. Rajaram (2012) also reached a similar conclusion that a high level of inequality can hinder economic growth, even at

the county level. On the other hand, based on empirical results from U.S. and European contexts, some scholars have argued that inequality can accelerate economic growth at the regional level in the long run by promoting entrepreneurship, innovation, risk-taking and/or competition among laborers in the economy (see e.g., Partridge, 2005; 2006; Fallah and Partridge, 2007; Perugini and Martino, 2008).

3 Methodology and data

Data and variables

For an empirical investigation of growth-inequality dynamics with explicit consideration of the role of governance structures, data from 267 U.S. metropolitan areas were retrieved based on the 1990 U.S. Census (geographic) definition of MSAs. All information was collected from individual counties and then was aggregated up to the MSA level to minimize disturbances due to MSA delineation changes. To facilitate the process of data collection and aggregation, this study used the New England County Metropolitan Area boundaries instead of the ordinary MSA boundaries for those regions. It should also be noted that each consolidated metropolitan statistical area (CMSA) was used as the unit of analysis, as opposed to the primary metropolitan statistical areas (PMSAs), which are smaller units than CMSAs. One notable difference in this study from previous studies is its temporal scope. While previous research typically focused on a single year, this study's time-wise design allowed consideration of the dynamics of growth and inequality over the last two decades, from 1990 to 2010.

To measure the growth and inequality dynamics (i.e., our dependent variables), this study used changes in per capita income and changes in the income decile ratio (80-20) in each metropolitan area, respectively. More specifically, the difference in logged per capita income between 1990 and 2010 was employed to measure regional economic growth using the county-level statistics provided by the U.S. Bureau of Economic Analysis. The inequality measure, namely, the 80-20 income ratio, compares the total amount of annual income earned by the top quintile of households (i.e., the top 20%) to that of the bottom quintile group (i.e., the bottom 20%) in each metropolitan region. It must be noted that this index is different from another type of 80-20 ratio that compares two cutoff points: the lowest value for the top 20% group and the highest value for the bottom 20% income group.

There are some practical advantages of using the 80-20 ratio in the form used in this study (aggregating the total amount of household income in each quintile group). First, detailed income quintile (each 20% income group) data for each county are readily available; hence, no assumptions or arbitrary modifications were required to calculate the value of this inequality measure. While having the advantage of data availability, the measure was also found to yield consistent outcomes with alternative metrics calculated based on a narrower income group comparison, such as the 90-10 ratio (Daly et al. 1998). Although consideration was also given to the Gini index, the index calculation at the county or metropolitan scale requires an assumption about the household income distribution, and it was also challenging to address the top income group, which is open-ended (i.e., over \$200,000) in the data sources. Due to these potential measurement errors, this study chose the 80-20 ratio instead of the Gini index.

With its merits mentioned above, the 80-20 ratio was computed based on county-level, (quintile) group-specific income information from the 1990 U.S. Census and the American

Community Survey (ACS) 2008-2012. The variable was constructed to measure changes in inequality by aggregating the county-level data while considering the uneven distribution of households across counties in each metropolitan area and then dividing the top quintile value by the value of the bottom quintile. Overall, the results showed that income inequality measured in this manner increased by about 12% between 1990 and 2010, and a majority of the metropolitan regions (220 out of 267) reported increased inequality.

Additionally, each metropolitan area's governance structure was measured using the following three indicators: The first metric (*PCGOV*) is the total number of government units per capita in each metropolitan region, which has been widely used in other empirical studies on political fragmentation and its implications (e.g., Hawkins and Dye, 1970; Ulfarsson and Carruthers, 2006; Kim et al., 2015). A greater value of this variable (i.e., a higher number of government agencies per resident) means that each government unit covered fewer residents, indicating a higher degree of political fragmentation. Specifically, the calculation is as follows:

$$PCGOV = \frac{\text{Number of local government units} \times 1000}{\text{Total MSA population}}$$

The second indicator is the so-called Hirschman-Herfindahl Index (*HHI*), which has been employed in some recent studies (see e.g., Grassmueck and Shields, 2010; Hendrick et al., 2011; Hendrick and Shi, 2015; Kim et al., 2015). Public expenditure information from the Census of Governments was used for this measure; therefore, this index represents the degree of fiscal concentration/decentralization within an MSA, as shown below.

$$HHI = \sum_{i=1}^n \left(\frac{\text{Expenditures of local government } i}{\text{Total MSA expenditures}} \right)^2$$

HHI has a value ranging from $1/n$ (n denotes the number of local government units in a region) to 1.0, where $1/n$ represents a perfectly even distribution of public spending among local

government units, and 1.0 represents the opposite extreme, which indicates the highest level of concentration in government spending patterns.

Finally, to capture vertical fragmentation (the degree of overlapping governmental units), this study employed an additional variable (*RSGOV*) that quantifies the ratio of the number of single-purpose governments to the total number of government units in each MSA, as follows. As done in Deslatte et al. (2017) and some other studies using this metric, a higher ratio was regarded as an indication of a more vertically fragmented structure of governance or public service delivery.

$$RSGOV = \frac{\text{Number of single purpose government units}}{\text{Number of all types of government units}}$$

To control for the influences of other factors, this study considered a variety of potential determinants that have been assumed to have effects on metropolitan economic growth and/or inequality dynamics. For instance, each region's population size, educational attainment (the percentage of the population aged 25 and over with a bachelor's degree or above), unemployment rate (percentage of unemployed among the labor force that is 16 years of age and older based on place of residence), home ownership (percentage of owner-occupied homes among the total occupied housing units), and housing vacancy rate (percentage of vacant homes among total housing units) were included in the growth-change model because these variables represent the regional labor and housing market conditions that can play a significant role in shaping growth trajectories in subsequent years. For the changes in inequality, this study considered educational attainment, home ownership, and other socio-demographic factors, such as the shares of the non-white population, Hispanic population, and female-headed households, which have been found in the literature to have sizable impacts on inequality. Table 1 summarizes all of these variables and the data sources used in the empirical analysis of this study.

<< Table 1 about here >>

Model

This study employed a simultaneous equation model (SEM) to investigate the dynamics of regional economic growth and inequality. The SEM approach has advantages in addressing two or more endogenous variables (in this case, growth and inequality) that are jointly determined and thus cannot be properly analyzed through conventional linear regression models. A similar model design was used by Lundberg and Squire (2003) for their country-level analysis of the interactions between economic growth and income inequality. Unlike Lundberg and Squire (2003), however, this study focused on regional-level growth-inequality interactions.

Furthermore, it attempted to develop a model that explains changes in inequality over two decades (between 1990 and 2010), as opposed to inequality levels at a single time point.

The model used the following system of two equations: 1) the metropolitan areas' per capita income growth rates during the study period (1990-2010) in logarithmic form, $\Delta \ln Y$; and 2) changes in the 80-20 income ratio (the ratio of the annual income earned by the top quintile of households to the annual income earned by the bottom quintile of households in each region), $\Delta INEQ$, over the same period of time. Both of which were assumed to be determined by the characteristics of the regional governance structure (GS) and other socio-economic factors related to changes in regional income growth and inequality (X and Z).

$$\Delta \ln Y_{i,(t-1,t)} = \alpha \cdot GS_{i,t-1} + \beta \cdot \Delta INEQ_{i,(t-1,t)} + \theta \cdot X_{i,t-1} + u_{i,t} \quad (1)$$

$$\Delta INEQ_{i,(t-1,t)} = \gamma \cdot GS_{i,t-1} + \delta \cdot \Delta \ln Y_{i,(t-1,t)} + \lambda \cdot Z_{i,t-1} + v_{i,t} \quad (2)$$

where i denotes each MSA; $(t - 1)$ and t denote the beginning and end points of the study period; α and γ are the two sets of coefficients that represent the effects of the governance

structure variables on growth and inequality dynamics, respectively; β and δ are the coefficients for the (reciprocal) interactions between changes in income growth and inequality; θ and λ represent the coefficients for the exogenous factors, X and Z ; and $u_{i,t}$ and $v_{i,t}$ are error terms.

Once estimated using two-stage least squares (2SLS) or another appropriate technique, the SEM should reveal the dynamics of changes in economic growth and income inequality in U.S. metropolitan areas over the two decades analyzed. Additionally, the governance structure variables are expected to show how governance structures (e.g., political fragmentation) were associated with changes in income growth and inequality after considering the effects of other explanatory variables.

Furthermore, this study expanded its focus to potential non-linear relationships between governance structures and growth/inequality dynamics. A similar idea was suggested and examined by Lessmann (2012), who employed an interaction variable for governance structure and development stage (i.e., fiscal decentralization \times GDP per capita) and reported that the effect of decentralization on inequality had an inverted-U shape. In this study, a squared form of each governance structure variable was added to the SEM to check for the possibility of non-linear relationships, as shown below.

$$\Delta \ln Y_{i,(t-1,t)} = \kappa \cdot (GS_{i,t-1})^2 + \alpha \cdot GS_{i,t-1} + \beta \cdot \Delta INEQ_{i,(t-1,t)} + \theta \cdot X_{i,t-1} + u_{i,t} \quad (3)$$

$$\Delta INEQ_{i,(t-1,t)} = \rho \cdot (GS_{i,t-1})^2 + \gamma \cdot GS_{i,t-1} + \delta \cdot \Delta \ln Y_{i,(t-1,t)} + \lambda \cdot Z_{i,t-1} + v_{i,t} \quad (4)$$

The literature suggests that the association between governance structures and growth and inequality is not straightforward but instead is extremely complex. A more centralized governance structure could be beneficial because it can induce economies of scale in public service delivery and prevent duplicate investments or intergovernmental conflicts. On the other hand, a decentralized governance structure may create a more competitive environment where

jurisdictions interact with each other in a constructive manner, which in turn can increase the overall efficiency of the regional economy. With regard to inequality, a decentralized governance structure could result in an increase in inequality due to the lack of mechanisms for redistribution. However, higher fragmentation may not necessarily be associated with a decreased degree of equality. Using the above quadratic model specification, this study attempted to examine the complex patterns of association between governance structures and growth/inequality dynamics more effectively than previous research.

4 Results

The SEM was estimated using the two-stage least squares (2SLS) technique, and the results are presented in tables 2 and 3, which include eight models. The first two models (#1 and #2) employed each governance structure variable, that is, *PCGOV* and *HHI*, respectively. In the next three models, from #3 to #5, squared values of the governance structure measures were additionally included to check for possible non-linearity. Models #6 through #8 additionally considered vertical fragmentation measured in terms of *RSGOV*.

<< Tables 2 and 3 about here >>

Growth and inequality

By taking advantage of SEM, this study was able to examine the dynamics between growth and inequality in the estimation results, specifically the coefficients for $\Delta \ln Y$ and $\Delta INEQ$. The 2SLS results indicated that both coefficients showed negative associations, meaning that higher

economic growth reduced inequality, while less inequality promoted economic growth. This result suggests a virtuous circle between growth and inequality, that is, growing economies induce better income equality, and the economies' growth can be further accelerated by the positive impacts of reduced income inequality.

However, the evidence for this virtuous circle was not strong statistically. The effects of $\Delta \ln Y$ on $\Delta INEQ$ were not significant, while $\Delta INEQ$ was found to have a modest impact on $\Delta \ln Y$ with significance at the 10% level in models #1, #3, #5, #6, #7, and #8. But, this finding at least appears to suggest that decreased inequality had a beneficial influence on economic growth, and increased inequality can reduce the efficiency of regional economic systems, as argued by Barro (1999) and empirically supported by Panizza (2002) and Rajaram (2012).

Impacts of the governance structure on growth and inequality

In models #1 and #2 which assumed a linear relationship between the tested governance structure and growth/inequality, respectively, the association showed limited statistical support.

Specifically, the effect of *PCGOV* on economic growth was found to be positive and significant (+0.049 at the 10% level; 95 percent confidence interval: 0.000, 0.099), meaning that MSAs with more governmental units per resident tended to have higher growth rates than more consolidated MSAs. However, *PCGOV* and the change in inequality showed a negative association (i.e., more fragmented areas were likely to decrease inequality), although the coefficient was not statistically significant. *HHI* was found to have no linear relationship with growth or inequality, but the directions of the coefficients were consistent with those for *PCGOV*.

This result appears to buttress the public choice theorists' supposition. In other words, the results support the argument that decentralized governance settings may enable many small local

governments to compete with each other and thereby induce a higher level of allocative efficiency (Akai and Satata, 2002; Stansel, 2005), which contrasts with the criticism that political fragmentation leads to disadvantages in economic performance due to the loss of economies of scale. A possible explanation for this result is that large public investments on the regional scale might be less effective in increasing economic growth in the U.S. because sufficient public investment has already occurred, unlike developing countries, where the national-level infrastructure plays a more important role in economic performance (Zhang and Zou, 1998). Thus, with a previously established decent economic backbone, free-market competition better provides incentives and motivations for agents in a regional economy, resulting in higher economic performance.

Non-linear effects of the governance structure on growth and inequality

As suggested in the previous section, this study's focus was extended to the non-linear relationship between the governance structure and growth/inequality, which was examined in models #3, #4, and #5 using the squared values of *PCGOV* and *HHI*. Further, models #6 through #8 additionally included a vertical fragmentation variable (*RSGOV*) to check its possible impacts on the growth and inequality dynamics.

All of the estimation results showed U-shaped impacts of the first two governance structure variables (*PCGOV* and *HHI*) on changes in economic growth and inequality, except for the growth equation in model #3 and #6 (i.e., association between *PCGOV* and $\Delta \ln Y$), while the vertical fragmentation variable turned out to have insignificant effects in the sample of this study. For instance, Model #5 suggests that a quadratic function better explains the relationship between *PCGOV* and income growth dynamics with a negative coefficient for *PCGOV* (-0.119,

95 percent confidence interval: -0.256, 0.018) and a positive coefficient for $PCGOV^2$ (+0.141, 95 percent confidence interval: 0.032, 0.249). HHI was found to have a similar pattern showing a negative coefficient for itself (-0.439, 95 percent confidence interval: -0.835, -0.043) and a positive coefficient for its squared term (+0.810, 95 percent confidence interval: 0.156, 1.464). Figure 1 presents the associations between the governance structure variables (i.e., $PCGOV$ and HHI) and changes in economic growth and inequality using the estimates in models #5.

<<Figure 1 is about here>>

Regarding the relationship between $PCGOV$ and economic growth based on the estimates in model #5, the curves' vertex (i.e., the lowest point in the U-shaped curves) was where the value for $PCGOV$ was 0.42. This result means that economic growth can be significantly reduced where the number of residents per government unit is about 2,380. On the other hand, highly fragmented or consolidated governance structures were found to have higher economic performance. For instance, MSAs with a $PCGOV$ value of 0.02 (50,000 residents per government unit) had approximately 2.3% higher per capita income growth, and those with a $PCGOV$ value of 0.90 had 3.2% higher growth than MSAs located around the vertex. Although the $PCGOV-\Delta \ln Y$ graph in figure 1 shows an asymmetric shape with considerably higher values on the right side, implying relatively greater benefits for growth from higher levels of fragmentation, it should be noted that 98% of the sample (261 out of 267) was located below 0.9; therefore, the outliers beyond 0.9 should be considered carefully.

The relationship between $PCGOV$ and the change in inequality showed a similar pattern. The change in inequality between 1990 and 2010 seems to decline until the value of $PCGOV$ reaches 0.55 (or 1,820 residents per government unit). This result means that a proper level of fragmentation can alleviate widening income disparities; for instance, an MSA with

approximately 3,000 residents per government unit had a 0.55 lower increase in the 80-20 ratio than an MSA with 50,000 residents per government unit. Furthermore, it is interesting that there is a range between the two vertexes (0.42 for the *PCGOV*-growth graph and 0.55 for the *PCGOV*-inequality graph) where the marginal effect of fragmentation on economic growth starts to increase, while the marginal effect on inequality is still negative. This result implies that MSAs within these levels of fragmentation are more likely to achieve both economic growth and equality by increasing the number of governments. However, outside of this range, changes in political fragmentation were found to create a tradeoff between growth and inequality (e.g., an increase in fragmentation can promote growth but at the expense of inequality).

HHI was also found to have a significant U-shaped relationship with both growth and inequality. This result implies that a high degree fiscal decentralization or centralization can promote regional economic growth, but again at the expense of income disparity in the US metropolitan areas. For instance, the San Francisco-Oakland-San Jose MSA had a relatively low *HHI* (0.037) and its per-capita income increased by 27%, which is approximately 3.8 percentage points higher than the average, but at the same time, the 80-20 ratio in the area also rose substantially from 11.27 to 15.66 (+4.39, where the mean is +1.41). Fayetteville, NC, which is on the other side of spectrum with a much higher *HHI* (0.537), showed a similar trend for changes in growth and inequality, although the magnitude of economic growth was somewhat higher.

As mentioned above, *RSGOV*, a variable included to capture vertical fragmentation, did not show significant impacts on growth or inequality dynamics. However, this result does not necessarily indicate that the vertical structure of governance does not matter at all. While no significant evidence was detected here maybe because the present analysis primarily focuses on

aggregated income growth and inequality measures, vertical fragmentation can alter the way development takes place within a region and have impacts on specific parts, such as social inclusion policies and land uses (Jimenez, 2016; Deslatte 2017, Deslatte et al. 2017).

Control variables

The explanatory variables included in the estimation models yielded the expected outcomes with consistent directions, with minor exceptions for the significance levels. Because this study used the changes in growth and inequality as the dependent variables, the so-called convergence effect could occur. In other words, metropolitan areas with higher levels of per capita income tended to experience smaller changes, whereas regions that were initially positioned at a lower level were likely to shift up more. The results for initial per capita income ($\Delta \ln Y_{t-1}$) confirmed this idea by showing significantly negative coefficients, meaning that highly developed MSAs had relatively lower growth rates on average. In the same vein, the convergence effect in income inequality was also tested with $INEQ_{t-1}$, and the results showed that MSAs with wider income disparities had slower increases in inequality.

The estimated coefficient for educational attainment had a positive impact on growth and inequality, suggesting that the availability of a well-educated labor force is essential for regional productivity, and it was positively associated with regional income disparities as well. As discussed in Barro (2000), education is crucial for the accumulation of human capital, which in turn pushes economic growth processes forward in various ways. In terms of inequality, education has long been regarded as an effective way to promote economic mobility and reduce disparity (see e.g., Abdullah and Doucouliagos, 2015), but it has also been suggested that higher

education as measured in this study can be associated with an increase in inequality by forming a ‘winner-take-all’ environment (Brown, 2008).

As expected, the unemployment rate variable had a negative coefficient, implying that a lower unemployment rate in the initial condition can be associated with rapid economic growth, which is similar to the findings of Glaeser (1995) that long-run income growth was positively related to education and negatively related to unemployment in the initial stage. The influence of home ownership rates on economic growth turned out to be negative. This result may indicate that the availability of rental units played an important role, such as promoting an influx of young, creative people. The coefficient for housing vacancy rates can also be explained in a similar manner, that is, growth can be facilitated in a region with more available housing accommodating labor force growth or circulation (see e.g., Head and Lloyd-Ellis, 2012). The home ownership variable, however, showed a negative association with changes in inequality, suggesting that a higher percentage of owner-occupied housing, as opposed to rental units, was more favorable for alleviating inequality. Regarding the demographic variables, the share of the Hispanic population showed a significantly negative association with inequality dynamics, indicating that MSAs with a higher Hispanic population tended to have a slower pace of increases in inequality between 1990 and 2010.

5 Conclusion

Decades of research suggest that the organizational structure of local/regional governance does matter. It has long been assumed to fundamentally shape the way a metropolitan region works

and evolves over time by (re)distributing authority and altering interjurisdictional relations. Furthermore, a growing number of empirical studies have focused on identifying the circumstances under which a contemporary metropolis can achieve fiscal efficiency, economic growth and higher equality more effectively based on the governance setting.

Building on the prior research, this study investigated how and to what extent metropolitan governance structures have influenced economic growth and inequality dynamics in U.S. metropolitan areas from 1990 to 2010. While the existing research tended to examine growth and inequality implications separately, this study provided a more integrated analysis in which explicit consideration was given to the systematic connections between the two important variables. By doing so, it attempted to identify the tradeoffs that are essential for evaluating various forms of governance and to obtain deeper insights into the complex mechanisms by which growth, inequality, and governance structures are intertwined.

The results showed some conditions under which regional economic growth is more likely to be stimulated. The U-shaped curve of the governance variables' effect on income growth rates implies that regional economies can perform well either in a highly centralized or decentralized governance setting. However, these (somewhat extreme) conditions were found to exacerbate income inequality, thus indicating a tradeoff (i.e., a more significant contribution to growth but at the expense of equality) that must be considered carefully when exploring ways to reform existing governance structures. These findings further suggest that the so-called growth-inequality tradeoff may exist not only with regard to their direct interactions but also through their association with governance or other contextual factors. For instance, a change in the governance structure that favors economic growth can aggravate income inequality, or a structural reform that supports income equality may hinder economic growth.

The present study is not without limitations. Governance structure metrics employed in this study may not perfectly capture all nuances of regional governance settings or reflect some contextual elements that could make a difference. The list of control variables could be expanded, if consideration were given to a smaller number of metropolitan regions. While widely accepted, it is also debatable whether the true meaning of economic inequality can be effectively measured by a single income-based indicator. Nevertheless, the findings of this study shed some light on the long-standing debate between the proponents of localism and those advocating regionalism (see, e.g., Nelson and Foster, 1999; Kim and Jurey, 2013), although the results of the analysis do not fully support one over the other. Over the two decades between 1990 and 2010, both highly centralized and decentralized governance structures were found to spur income growth, but neither was effective in narrowing the persistent income gap. In other words, there seems to be no panacea that ensures economic growth and equality at the same time. As noted above, tradeoffs certainly exist, and in this vein, it is more beneficial to seek a balance between the extreme sides of growth- and equality-oriented approaches.

These results call for further research on the complex implications of metropolitan governance structures and the detailed mechanisms through which governance settings, growth, and inequality dynamics interact with one another. Future studies could focus on nuanced variations in governance schemes that can make a meaningful difference by refining the governance metrics and/or employing alternative methodological approaches. Moreover, it is also important to understand how the growth-inequality nexus varies with other spatial and temporal scopes and contextual factors.

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