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Methodological Framework for the Metropolitan Power Diffusion Index

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OVERVIEW

Efforts to provide some comparative analysis of governmental power or diffusion in metropolitan areas in the United States fall broadly into one of two methodological approaches. The first methodology is a simple process of counting the governments, either in absolute terms or on some per capita basis. The second approach applies a methodology from the business sector as it relates to market share of firms in a competitive arena and is often referred to as the Hirshmann-Herfindal Index (HHI).

Generally, these methods assert that they are trying to measure fragmentation. However, fragmentation is too value-laden a term. It presumes that something is broken and ought to be repaired. Such prescription is not the intent. The methodology introduced here, the Metropolitan Power Diffusion Index (MPDI), is a third approach that addresses the limitations of the count and market share approaches.

METHODOLOGICAL APPROACH 1: COUNT OF GOVERNMENTS

Dolan (1990: 28) defines local government fragmentation as the proliferation of government units that may exist within a given region. This work is built on the earlier work of Goodman (1980), who identified four types of fragmentation – two of which were 1) counts of incorporated municipalities and 2) counts of special districts, public authorities, and school districts.

Hill (1974), in an effort to assess inequality among residents of metropolitan areas, used the number of municipalities and the number of municipalities per capita as measures for comparative purposes. Bollens (1986) was also interested in inequality in metropolitan areas and used the number of non-center city municipalities over 10,000 population per 100,000 non-center population as a measure. Zeigler and Brunn (1980) use the number of local governments per 100,000 in their effort to distinguish geo-political patterns of the frost-belt regions (Northeast and Midwest)

from the sun-belt regions (south and west). Hawkins (1971) developed a measure of fragmentation as total governments per 100,000 population in an effort to determine the impact of that fragmentation on the cost of government. Parks and Oakerson (1992) use governments per 10,000 as a "fragmentation score."

The idea that the more governments there are, either in absolute or per capita terms, the more power diffused in the region has merit. Creating a government puts in play another actor with political power and rights of entry into the decision-making process. However, one significant problem is that a count of these governmental entities fails to provide a measure of the role each government plays in or contributes to the region. As such, having a significant number of governments that exist "on paper" can over-inflate that statistic as a meaningful indicator.

Indeed, several of the works cited above attempted to address this weakness. Dolan tried to compensate by introducing the concept of "fiscal dispersion fragmentation," defined as "the standard deviation of the per capita expenditures of the governments in the region under study." Bollens added the percentage of non-central city population that live in incorporated municipalities with over 10,000 population as a measure. Zeigler and Brunn attempt to reduce several dimensions into a single index by using the number of governments as a direct proportion and the percentage of the population living in the center city as an inverse proportion.

Regardless of the efforts of these authors to add a political dimension, none of the studies added a time dimension. This generally can be understood in that the authors were using their measure of fragmentation to explain some other condition in metropolitan areas of the United States. As such, they fail to assess how power is changing over time.

METHODOLOGICAL APPROACH 2: MARKET SHARE

The Hirshmann-Herfindal Index (HHI) approach also has a simple premise – power is market share. If one firm has 90 percent of the market, whether 50 players or 5 players share the remaining 10 percent is of marginal interest. These small players have little "political power." Indeed, Scherer and Ross (1990: 72; see also, Shepherd, 1985) observe, "The HHI weights more heavily the

value for large firms than for small." The methodology employed is to use the squared percentage of each player's share of the market. As that applies to local governments in a metropolitan area, some measure of expenditures on some array of public services usually substitutes for sales by the firm.

Lewis (1996) employs a variation of this approach in his political fragmentation index. Using the sum of the squared percentages of total expenditures in relation to the degree of expenditures, this index creates a single number that is more sensitive to the total level of expenditures than to the distribution of those expenditures within the metropolitan area.

AN ALTERNATIVE: THE MPDI

Although both methodologies capture important principles – the first a measure of political power and the second a measure of economic power – they need to be combined so that both may make a contribution to the resulting scale. As such, the problem has now been boiled down to a mathematical one. How does one mathematically represent these two perspectives on a single scale? A colleague of mine suggested that the square root of the squared contributions could be substituted for the square of the contributions. Whereas the square of the percentage contributions has the impact of exaggerating the contribution of the larger players, the square root of the percentage contribution has the impact of giving greater mathematical value to the smaller units. Basing the scale on the percent contribution of each player serves to reflect the economic dimension while using the square root of that contribution serves to reflect the political dimension of power derived from the semi-sovereignty of political jurisdictions in a metropolitan environment.

In the process of using the squared-percentage approach (HHI), the resulting scale ranges from 0 to 1. As the scale approaches 1, the greater is the concentration of market power. Hence, a low score represents a more diffused system. By switching to the square root, the scale starts at 1 and goes, theoretically, to infinity. Like the first scale, 1 represents pure concentration or one player with 100 percent of the market. Higher numbers, however, represent diffusion.

The table in Box 1 presents a numerical example of the three approaches to measuring power diffusion.

Box 1: Numeric Example of the Three Methodological Approaches to Measuring Power Diffusion

Suppose there are two regions, A and B. In Region A there are 6 governments and 12 governments in Region B. Total local government expenditures in both regions are $1,000,000 of which $900,000 (or 90 percent) is spent by the largest government in each region. In Region A, there are 5 smaller governments that each spend $20,000 while in Region B there are 11 smaller governments that each spend $9,091.

Theoretical Comparison of the Diffusion of Power Measures in Two Regions

Region A		***Region B***	
Government 1A	$900,000	Government 1B	$900,000
Government 2A	$20,000	Government 2B	$9,091
Government 3A	$20,000	Government 3B	$9,091
Government 4A	$20,000	Government 4B	$9,091
Government 5A	$20,000	Government 5B	$9,091
Government 6A	$20,000	Government 6B	$9,091
		Government 7B	$9,091
		Government 8B	$9,091
		Government 9B	$9,091
		Government 10B	$9,091
		Government 11B	$9,091
		Government 12B	$9,091
Total	$1,000,000		$1,000,000
Method 1 (Count)	***6***		***12***
Method 2 (HHI)	***0.812***		***0.811***
Method 3 (MPDI)	***1.656***		***1.997***

A comparison of the three common measures of diffusion, results in three different conclusions about the distribution of power within those regions. Method 1 is to simply count heads. Region A has 6 and Region B has 12. However, to conclude that Region B is twice as diffuse as Region A would be erroneous. In both regions, one government makes 90 percent of the expenditures.

Method 2, the Herfindal approach (HHI), is the square of the percentage contribution of each government. That computation generates an index score of 0.812 for Region A and 0.811 for Region B – a virtual tie. However, to conclude that Region B and Region A are equivalent would also be erroneous. One region has twice as many governments as the other.

Method 3, the Metropolitan Power Diffusion Index (MPDI), is the square root of the percentage contribution of each government. That computation generates an index score of 1.66 for Region A and 2.00 for Region B – a 21 percent difference. Because Region A's score is closer to 1, it can be said to have a greater concentration of power and, because Region B's score is higher, it can be said to be more diffuse than Region A.

The MPDI has been tested against other measures of diffusion. Paytas (2001) assessed its validity compared to other measures of the diffusion of power within a metropolitan region including the absolute and proportional measures mentioned earlier as well as the more sophisticated Lewis model. He concluded that the MPDI was

the best measure available for comparative analysis.

Developing diffusion scores for each metropolitan region requires a data source that has information on each governmental jurisdiction within each region. Every five years the Census of Governments develops a summary of expenditures, revenues, and intergovernmental transfers for virtually every local government in the United States. Included in the analysis are all general-purpose governments such as counties, cities, boroughs, towns and townships. Also included are all single purpose governments such as school districts, utility authorities, and special districts. The ability to group the census data into the appropriate Metropolitan Statistical Area (MSA) is possible, at least back to 1972.

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