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# How can the Power of Leviathans be Measured?

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## Abstract

In certain respects, it seems expedient to describe a government as a homogeneous and self-interested entity, called 'Leviathan'. To optimize fiscal constraints, we need to know how powerful a Leviathan really is. This paper presents a new approach to measure the power of Leviathans. This new approach defines fiscal power in terms of income deviation. It supposes that there exists a positive connection between fiscal power and intergovernmental grants. To examine the approach empirically, we use data on U.S. counties in the period 1999-2002. Equations of fiscal power are estimated on the full and on stratified samples. Overall, the results support the new approach. Nonetheless, further research on the highly significant control variables would be needed to derive recommendations for more efficient fiscal constraints.

**Keywords:** Leviathan, measurement, income deviation, grants

**JEL Classification:** H11, H30, H72

## 1 Introduction

In a free society, markets are generally preferred to coordinate economic plans because they base on voluntary action. Under various conditions, however, markets do not seem to work properly. Then, external intervention could improve economic outcomes. The government may be permitted to use force to change the conditions. In a free society, such a permission can be given by unanimous agreement. Each member generally agrees to the governmental

force as it promises to lead to Pareto superior outcomes. The government may become established (by the constitution) as a monopolist on the legitimate use of physical force.

But when more exactly can we expect the government to improve economic outcomes? - The answers crucially depend on how we characterize the government: There are two basic categories: First, self-interested or benevolent: In the neoclassical paradigm, each individual is considered as a 'homo economicus'; which means, as rational and self-interested. She tries to optimize her own utility, profit, or analogous objective value. However, one could exclude the government from this perspective. Then, the government appears as a 'deus ex machina'; that is benevolent and optimizes the benefit of the others as a whole. Second, homogeneous or heterogeneous: The government can be composed of members from different groups, as for instance: political parties, parliaments, bureaucracies, or interest groups. The members thus may have different capacities and objectives. The extent to which we shall characterize the whole government by these differences depends on three major questions: Which type of relationship are we interested in: internal or external? Which functions are we interested in? Which degree of complexity are we willing to accept?

In a constitutional approach, we typically characterize the government as a homogeneous and self-interested entity. Such an entity is called 'Leviathan'<sup>1</sup> The use of this characterization can be justified by at least four reasons: First, it is rather simple. It reduces some complexity and thus enlarges the scope for the analysis of the government's external relationships. Second, it is rather consistent. Like households or firms, a Leviathan behaves as a 'homo economicus'. This type does not stand in conflict to the neoclassical paradigm. Third, it is rather risk-averse. A constitution is not supposed to be based on any risky assumptions. Predictions on a Leviathan's actions tend to be pessimistic. Fourth, it is long-term oriented. For a long-term evolutionary process, we can find many plausible conditions under which a Leviathan will reach higher payoffs than other types of government.

Since a Leviathan is self-interested, he might tend to misuse his physical force. Thus, the question arises: How can Leviathan's power be constrained such that his self-interest conforms to the general interest? - We distinguish two basic modes in which a government can be constrained, namely 'voice' and 'exit'. Some specification of these modes may be stipulated in the constitution. By voice, citizens seek to change political rules. They take some

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<sup>1</sup>The term 'Leviathan' is originally used in the Old Testament. Here, it describes a sea monster. Subsequently, the use of this term has often been modified. Thomas Hobbes, in particular, describes 'Leviathan' as an almighty state.

direct influence on the political decision-making process. By exit, citizens seek to avoid the consequences of political rules. They have the (legal) option to leave the respective rule's domain. - Hence, the degree to which a Leviathan can misuse his power depends on the effectiveness of these two modes. However, the two come at specific costs. These costs enter the cost-benefit analysis of governmental intervention. Therefore, we shall be interested in how powerful a Leviathan really is.

In section 2, we look at three approaches to measure the power of Leviathans. The first approach suggests that fiscal power can be constrained by fiscal competition. The degree of competition mainly depends on the federal structure. We present some specific aspects of this approach and make a general assessment. The second approach suggests that fiscal power can get apparent on the labor market. On this market, Leviathans and private firms compete for input services. A competitor is able to pay extra rents, only if he or she has extra power. Like before, we present some specific aspects and make a general assessment. The third approach is original to this article. It conceives fiscal power as deviation of a Leviathans's personal income from the average income in his jurisdiction. This deviation of incomes mainly depends on the sources of fiscal revenue; which may serve as constraints. Thus, we are going to empirically examine this approach. In section 3, we describe our data set. It encompasses more than 3000 U.S. counties in the period 1999-2002. In section 4, we describe, by our data, the specific political background. We especially deal with the income levels and the sources of fiscal revenue. In section 5, we analyze the relationships between the income deviations and the sources of fiscal revenue. The analysis bases on: correlations, OLS estimations, and sample stratifications. In section 6, we make conclusions from the above results.

## **2 Approaches to Measure the Power of Leviathans**

We define 'power' as the ability of one party to impose its choice on another party. In a complex social context, a certain ability tends to become complex, too. Thus, a Leviathan may find various ways to increase his power. One central condition for his power is information asymmetry. Such asymmetry may become especially large in a political context. In general, citizens face little incentives to invest in political information. For them, the cost-benefit relation of political action tends to be high. It becomes rational to remain ignorant. A Leviathan profits from the 'rational ignorance' of his citizens.

He increases his power by hidden action. Potential constraints on his power remain actually weak.

Hence, we seek to measure an abstract concept in a complex context. Next, we will look at how this challenge is faced by three distinct approaches. Each of them bases on a central hypothesis.

## 2.1 The Decentralization Hypothesis

In a federal system, a common constitution stipulates rules on the relationships between the included governments. There are two principle ways in which two governments can be related: horizontally or vertically. In a horizontal relationship, the two governments have reciprocal rights. These rights shall raise the gains from interaction. In a vertical relationship, one government has the right to dominate the other. Such a right shall help to overcome coordination problems to the interest of the whole federal system. Thus, a federal system defines the general scopes of the included governments. It determines their potential power.

Typically, the most extensive source of a government's power is its tax force. Taxes are coercive contributions to the government without a claim on any specific return. Basically, a government could impose a tax on any valuable object inside its territory. However, the two basic modes of constraints may also apply, here: By voice, citizens claim changes of the given tax system. Typical means for such claims are: referenda, legal actions, petitions, or demonstrations. By exit, citizens move tax objects outside the government's territory. Such moves can imply: migration, substitution, commuting, or fraud. The effectiveness of each of these constraints depends on the federal system.

Brennan and Buchanan (1980) asked to what degree migration could serve as a substitute for voice-constraints. This question refers to a seminal approach by Tiebout (1956). Tiebout suggested that migration induces a superior mechanism for the provision of (local) public goods. In his approach, he conceives the governments as 'city managers'. Each city manager seeks to maximize his profits by offering a specific package of public goods. The citizens in the whole economy have heterogeneous preferences. Each of them can choose the package that best fits her preferences by migrating to the respective jurisdiction. Hence, competition between the city managers arises. In order to persist, a city manager needs to minimize his specific costs per resident. Depending on the actual numbers of residents, he promotes entry or exit. When the optimal number is reached, he releases his package; every resident is charged the same contribution. In the whole economy's long-term equilibrium, the provision of public goods will be Pareto efficient.

Thus, migration takes up two important functions: First, it incurs some revelation of the citizens' preferences for public goods. Second, it urges the governments to adapt their policies to the citizens' preferences. - However, Brennan and Buchanan stressed that the conditions under which these functions are operated might tend to be imperfect, even in theory. They considered four major sources of imperfection:

1. the costs of mobility;
2. the potentiality for collusion;
3. spillovers;
4. economies of scale in administration.

Each of these sources is influenced by the federal system: its horizontal and its vertical structure. The total influence of one structural feature might be diverse. Nonetheless, Brennan and Buchanan found some reasoning to set up the following hypothesis; which we will call 'BBLD' (Brennan Buchanan Leviathan Decentralization): A Leviathan will reach the less (fiscal) power, the higher the degree of competition among governments is; the degree of competition will be the higher, the more homogeneous are the jurisdictions, the more jurisdictions are involved, and the more decentralized are the responsibilities.<sup>2</sup> - Based on this hypothesis, several other economists sought to measure the 'real' power of Leviathans.

A path-breaking study in this field was made by Oates (1985). He examined the relationship between government size and the public sector's degree of decentralization. One of his two samples contained the 48 contiguous states in the U.S.A. Working with this sample, Oates specified the government size by the aggregate state-local tax receipts in each state as a fraction of the aggregate personal income. As indicators for the public sector's degree of (de-)centralization, he took the state share of the state-local general revenues, the state share of the state-local total expenditure, and the number of government units in the state sector. A correlation analysis showed that each of these indicators was only weakly related to the government size variable. Oates included the following four control variables into his regression analysis: percentage of urban residents in each state, total population size of the state, state personal income per capita, and intergovernmental grants as a percentage of the state-local general revenue. - The regressions generated a

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<sup>2</sup>See Brennan and Buchanan (1980). In the related literature, we usually find the denotation 'Leviathan hypothesis'. But, this suggests that the respective hypothesis offers the only possible way to measure a Leviathan's power.

negative coefficient for each centralization variable. But, the coefficients were not significantly different from zero. Hence, the BBLD hypothesis cannot not be confirmed by the results.<sup>3</sup>

Thereafter, Oates' approach was intensely discussed; various modifications were suggested: In an early stage of the discussion, Nelson (1986) reminded that the BBLD hypothesis could implicate some constraints other than decentralization. Two major examples are: constitutional rules on the public revenue bases, and constitutional rules on the public budget structure. Hence, he included some dummy variables on constitutional rules into his regressions.

A little later, Nelson (1987) argued that Oates had not developed a sufficient concept of government structures and responsibilities. The horizontal dimension needs to be clearly distinguished from the vertical dimension. Thus, in an empirical study on the government structure of the U.S.A., it gets crucial to separate the general- from the single-purpose jurisdictions.

Eberts and Gronberg (1988) emphasized that the effectiveness of migration as a constraint depends on its specific costs. They supposed that migration costs sharply rise from one government level to the next higher level. Consequently, they suggested to test the BBLD hypothesis on the lowest possible government level.

Marlow (1988), however, argued that it is inexpedient to measure a government's power in isolation. In a federal system, power can be delegated from one level to another. What the citizens care about is the total government intrusion. Marlow thus looked at the aggregate government expenditure as a share of the GNP from a time series perspective.

Zax (1989) pointed out another reason why the horizontal and the vertical dimension of the federal structure should be analyzed separately. The reason is that the two dimensions are likely to have different impacts on scale economies. Furthermore, these impacts might be nonlinear.

As Forbes and Zampelli (1989) remarked, governments of the same level need not necessarily stand in competition to each other. They may, for example, offer different kinds of public goods; which creates different markets. The respective market structure could also have an impact on the wages of public employees. These wages are contained in the government size. Hence, this relationship should be considered in the regression analysis.

In a later stage of the discussion, Joulfaian and Marlow (1990) looked more closely at the impact of intergovernmental grants. They pointed out

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<sup>3</sup>In the same article, Oates uses another sample, with 43 countries around the world. Again, no evidence is found in favor of a negative relationship between government size and the public sector's degree of decentralization.

that this impact depends on the whole system of grants, which tends to be complex. Consequently, the regression analysis should contain the whole federal system. Otherwise, one would have to assume that all governments encounter similar constraints.<sup>4</sup>

Let us sum up: The discussion mainly dealt with the empirical relationship between 'fiscal power' and 'fiscal decentralization'. Strong controversies arose about the role of: further (constitutional) constraints; the dimensions of the federal structure; the delimitation of the relevant market; migration costs; governmental grants; and the sample choice. Hence, the related studies differ rather strongly in their results. In the course of the discussion, evidence in favor of the BBLD hypothesis might have become a little stronger. Nevertheless, it still seems very difficult to make reliable assessments of a Leviathan's power. The BBLD approach still has too many shortcomings; especially with respect to the specification of the two key terms: 'fiscal power' and 'fiscal decentralization'.<sup>5</sup>

In the related studies, fiscal power is normally specified as a fiscal budget variable in relation to a social-economic value. Major instances for such a fiscal budget variable are: tax revenue, fiscal own-source revenue, or public expenditure. Major instances for a chosen social-economic value are: population size, total personal income, or gross domestic product. - The key problem with all of these possible specifications is that they do not distinguish between the different representatives of fiscal power. In a federal system, governments of different levels can be such representatives. Furthermore, fiscal power may be kept by the citizens via the democratic order. Power is not a question of who adminstrates but of who chooses. Power implies that one party is able to impose its choice on another party. What we seek to find out is who really dominates and to what degree. For this, we need a different method to specify fiscal power, a different explained variable.

In the related studies, fiscal decentralization is normally specified as: a) the share of the lower level governments' revenue in the total public revenue; b) the share of the lower level governments' expenditure in the total public expenditure; c) the number of government units on the lower level (per resident). The specifications a) and b) refer to a federal structure's vertical dimension; c) to the horizontal dimension. But, each of these specifications rather describes the given administration structure than actual responsibility. The administration structure does not need to reflect real economic decision-making. The degree of fiscal competition may hardly depend on

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<sup>4</sup>A different approach to analyze the impact of intergovernmental grants is chosen by Grossman (1989a, 1989b, 1992).

<sup>5</sup>A more favorable recapitulation of the discussion is given by Oates (1989).



this structure. The different dimensions tend to interact. This makes it difficult to assess the impact of any difference. Therefore, what we need is a different method to specify fiscal decentralization, some different explaining variables.

## 2.2 The Partial Labor Market Hypothesis

We may assume that a Leviathan uses his power to maximize his personal income. He seeks to generate and usurp extra rents on the labor market. The 'human capital theory' may help to explain how such extra rents can be generated: In this theory, different investments in human capital lead to a diversification of labor and thus to a fragmentation of the labor market. There exist two forms of human capital: 'general' and 'specific'. The general human capital is demanded on the whole labor market. The specific human capital, however, is demanded only on a partial labor market. Typically, the latter form is generated via 'on-the-job-training'. Depending on the amount and composition of human capital, the following phenomena may occur:<sup>6</sup>

- Labor market participants invest in signaling.
- Labor suppliers and labor demanders share the cost of human capital.
- Labor demanders pay wages above the productivity level.
- Labor demanders discriminate.
- There is unemployment.
- Partial labor markets vary in structures and institutions.

A Leviathan is supposed to intervene where free market coordination fails. He thus acts as a monopolist on certain product markets. His activity on these product markets induces some specific human capital. Based on this, he becomes a monopsonist on some partial labor market. A Leviathan can (mis-)use his monopsony position in various ways to generate and usurp extra rents. Let us look at some major instances: A Leviathan does not encounter a profit constraint. Instead, the citizens may set political constraints. However, these tend to be more difficult to control. In the political decision-making process, a Leviathan may occupy central positions. First of all, he works out the proposals, especially the budget proposals. He can bring them into a 'take it or leave it' form. Furthermore, Leviathan reaches

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<sup>6</sup>The foundations of the modern 'human capital theory' were laid by Becker (1975). An introduction to this theory is given by Ehrenberg and Smith (2009), ch. 9.

advantages in knowledge. He can gather, transform and select politically relevant information, at lower costs. And finally, Leviathan sets the agenda. Via the agenda, he can influence the results of the political votes.<sup>7</sup>

Altogether, a Leviathan uses his specific human capital and his central position in the political decision-making process to generate and usurp extra rents on the labor market. The relevant partial labor market is characterized by: a more rigorous regulation; more powerful unions; longer contract terms; waiting lines; signaling of political attitude; discrimination; and so forth. We may set up the following hypothesis and call it 'LPLM' (Leviathan Partial Labor Market): The more diversified and fractionized the labor market is, the more power a Leviathan will reach.

There has been an extensive discussion on the wage differentials between the public and the private sector. The discussion is motivated by the question which payment of public sector employees can be regarded as just. The degree of justice is assessed with regard to the payment of private sector employees. It is supposed that the human capital theory allows to compare unequal profiles in the two sectors. One seeks to measure the economic rent or premium which remains after the deduction of the differences in the required job profiles. Some instances of such differences are: the specific human capital; the mobility; the wage volatility; the job loss risk; non-wage compensation; working conditions; or superior goals.

Hence, we may encounter a large number of empirical studies on public-private sector wage differentials. Within the last few years, two methodological approaches have become conventional: firstly, sample stratification in order to examine the wage distributions; secondly, wage differential decompositions in order to distinguish between the job profile components and the extra rent components. Some of the major findings are as follows:

Bender (2003) examined data on six British local labor markets from 1986. He showed that the differences in the wage distributions between the private and the public sector were much more important than the differences in the wage averages. For instance, male employees received a positive premium at the lower part and a negative premium at the higher part of the public sector wage distribution.

Disney and Gosling (2003) worked with data on a British privatization program in the 1990s. These data were regarded as suitable to avoid self-selection and measurement bias. As the two authors found out, women earned on average more in the public sector than they could in the private sector. But, no clear tendency appeared for college-educated women.

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<sup>7</sup>For an overview of the respective public choice models, see Mueller (2003).

Belman and Heywood (2004) asked to what degree public-private sector wage differentials were caused by the respective job profiles. In their empirical study on the U.S.A. in 1997 and in 1999, they found out that a detailed controlling for job profiles: a) modestly reduces the federal differential, b) very modestly increases the state differential, and c) substantially increases the local differential.

Melly (2005) claimed that estimations on wage differentials be interpreted conditional on the selected sample. He selected samples from the 'German Socio-Economic Panel (GSOEP)' for the period 1984 to 2001. It turned out that women reached positive premia in the public sector, while men reached negative ones. In addition, job experience induces higher payoffs in the public sector. All results were stable over the whole period.

Elliott et al. (2005) focused on institutional effects on wage differentials. They analyzed differentials before and after a public sector devolution and pay reform in the UK. As they found out, the public-private sector wage differentials became smaller in both England and Scotland. However, two other factors can be made responsible for this decrease: firstly, the introduction of a minimum wage rule in the private sector; and secondly, an upswing of the overall economic activity.

Altogether, the related studies find significance for several determinants of public-private sector wage differentials. The significance appears as especially high for the gender and for the wage level. However, it remains difficult to interpret the results in terms of governmental power. First of all, the labor markets appear as highly diverse. A good estimation thus demands to integrate a broad variety of control variables. Many of these variables are not available or merely in a qualitative form. Moreover, the control for diverse market structures eliminates the impact of internal labor markets. Labor markets are often characterized by 'barriers of entry' or 'ports of entry'. Therefore, internal structures could be more important for the determination of wages than external structures. And finally, the wages on the private labor markets may appear as a bad yardstick. On these markets, there also can arise distortions which are not (directly) related to governmental power. Thus, if women earn - *ceteris paribus* - more on a public than on a private labor market: How can we say where they are actually discriminated? And who got the power to discriminate? - Altogether, the related literature leaves the LPLM hypothesis widely open.<sup>8</sup>

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<sup>8</sup>For a survey of the earlier discussion, see Bender (1998).

## 2.3 The Average Income Hypothesis

We may justify the income of a Leviathan by his performance in generating Pareto superior outcomes. He may claim a share of the gain that arises from his support of Pareto superior cooperation. But here, we encounter two major questions: How can this gain be measured? And what would be a 'fair' share? - Basically, the gains from cooperation can be described in terms of welfare. But, it seems impossible to measure welfare, itself. There has been an extensive discussion about what could be the best indicator for welfare. Generally, a certain measure of the domestic product is indorsed by most scholars. Nevertheless, this indicator has at least two important drawbacks: First, the national product considers only factors which occur on official markets and are expressed in monetary units. Leisure, household production, and external effects are not explicitly included. Second, the national product does not consider the initial endowment in production factors. Hence, it does not properly help to explore the ultimate sources of welfare.<sup>9</sup>

In order to assess the fair share of a welfare gain for a Leviathan, citizens compare his performance with those of other Leviathans. There are two basic modes in which citizens can express their assessments: voice and exit. The two modes differ in their costs and their effectiveness. Anyhow, both depend on how the Leviathan claims his share. In a federal system, there are two basic modes in which he can claim his share: First, the Leviathan directly imposes a charge on his considered citizens. He thus receives revenue from own sources. Second, the Leviathan allows a higher level Leviathan to impose a charge on the considered citizens. In return, the first receives revenue from the latter by grants. Now, it seems plausible that the first 'public income mode' weakens both of the 'constraint modes' less than the second. A Leviathan will be able to reach more fiscal power by grants. Thus, we may set up the following hypothesis and call it 'LADI' (Leviathan Average Domestic Income): A Leviathan will reach the more fiscal power (measured by the deviation of his personal income from the average domestic income), the higher the relative amount of grants in his total budget is.

## 3 The Data

To examine the LADI hypothesis, we use data collected by the U.S. Bureau of the Census. This Census Bureau offers three groups of data sets which seem to particularly fit our purposes. These are entitled:

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<sup>9</sup>For an overview of the early discussion, see Moss (ed.) (1973); an important contribution of the later discussion was made by Anand and Harris (1994).

1. Census of Government: Public Employment;
2. Census of Government: Government Finances;
3. Decennial Census: Population and Housing.

In the U.S.A., a 'Census of Government' has been taken since 1957, at 5-year intervals. Each of these censuses has the following main subjects: government organization, public employment, and government finances. The censuses seek to cover all state and all local governments. The latter are of five different types: county, municipality, township, school district, and special district. In 2002, there existed 3,141 county regions. Together, they distinctively spanned the whole territory of the U.S.A. Only very few of them did not have an own government. The number of county governments in a given state ranged from 1 to 254. The Census Bureau also assigned all other local governments to their county regions. There existed: 19,429 municipal governments, 16,504 township governments, 13,506 school district governments, and 35,052 special district governments.

The 'Compendium of Public Employment: 2002' presents comprehensive data sets on government employment and payrolls in each state and county. Here, the Census Bureau defines government employees as individuals who regularly perform a public service. In order to make comparisons between employment levels easier, it calculated the 'full-time equivalent employment'. This term describes the number of full-time employees that would be needed to accomplish the same total number of hours worked. Furthermore, the Census Bureau divided the total number of full-time employment into different functions, as for instance: education, social services, transportation, public safety, environment/ housing, government administration, or utilities. The payroll numbers express gross payments; these include all salaries, wages, fees, etc. which are paid to the employees in a fixed period. The average monthly earnings represent the quotient of the full-time employee payroll to the number of full-time employees.

The 'Compendium of Government Finances: 2002' offers broad information on the state and the local government budgets in the fiscal year 2001-02. The revenues are defined as actual receipts of a government and its agencies. The following amounts are thus subtracted from gross inflows: tax refunds to citizens, receipts from the issuance of debt, the sale of securities, and taxes collected on behalf of other government units. The Census Bureau divides public revenue into four distinct classes: intergovernmental revenue, general revenue from own sources, utility and liquor store revenue, and insurance trust revenue. - The expenditures are defined as actual payments of a government and its agencies. The Census Bureau divides the public expenditure

by character/ object and by function. By character/ object, it divides into six classes: intergovernmental expenditure, current operation, capital outlay, assistance/ subsidies, interest on debt, insurance benefits/ repayments. The classes by function are the same as in the public employment case.

In the U.S.A., a 'Decennial Census' has been carried out since 1790. Since 1975, the Census Bureau is in charge of this. The latest census (for the year 2000) comprises, in particular, 171 population items and 56 housing items as 100-percent data; which are based on general questions to all people about their personal characteristics and their housing. Additionally, the Census Bureau took a large sample and asked these people more detailed questions about the same issues. Altogether, the 'Decennial Census: 2000' offers an enormous range of population and housing items; which describe for example: household structure, sources of income, educational attainment, or housing status.

Thus, the U.S. Bureau of the Census provides three groups of high quality data which match especially well with our intentions. It allows us to construct empirical variables which might highly correspond to our set of theoretical variables. It brings us into the position to confront the LADI hypothesis with a rigorous test. Nevertheless, we shall recognize the data's respective limitations. Let us briefly mention three points: First, every monetary value is measured in current US-dollars. Differences among regions or periods are not taken into consideration. Second, even governments or the same level may adopt different tasks. In agreement with the citizens or with private firms, they may contract in or out various functions. Third, the data partially refer to different periods. For example: Not every government starts its fiscal year in the same month. Generally, the Decennial Census values lag behind the Census of Government values by two to three years.

## 4 Local Policy in the U.S.A.

In our examination of the LADI hypothesis, we shall become more acquainted with the relevant empirical background by some descriptive statistics. Our sample encompasses 3105 out of 3141 U.S. counties. In the U.S.A., the counties have been designed as basic providers of local public goods. In their history, they have considerably adopted to the socio-economic progress. But still, we encounter an immense variety of county structures.

Table 1 presents some major features of the county structures: On average, there live 88662 people in one county. But, the standard deviation of POPUL1 is enormously high. Especially, there exist 30 counties with a population size greater than 1 million. Around 40% of the people live in urban

areas (POPURBp). These areas are the main destinations of intercounty migration. 20% of those who lived in a certain county in 2000 had lived in a different one in 1995 (POP5DH4p). One central aspect of our examination is the degree to which the people constrain the local governments by migration. On average, 1000 people meet with 56 local public employees (EMPLTLp); the standard deviation is 22; the distribution is skewed by some outliers to the right (with a maximum of 448).

<i>variable</i>	<b>mean</b>	<b>median</b>	<b>std. dev.</b>	<b>skewn.</b>
POPUL1	88689	25052	291733	16.6
HHTL	32458	9322	101010	14.6
POPURBp	0.3973	0.3934	0.3071	0.19
POP5DH4p	0.20	0.1888	0.0679	1.22
EMPLTL	4060	1251	13691	18.7
EMPLTLp	0.0560	0.0505	0.0223	3.75

Table 1: County structures in the U.S.A.

We assume that all individuals have identical preferences for income. They behave as income maximizers. Thus, we can use income as a welfare indicator. Table 2 offers some key insights on the income of the people, the households, and the local public employees. In 1999, the per capita income of the average county was around USD 17483 (PCAPINC). The other counties deviated from this level by USD 3895. Together, it gives an information criterion (IC) of 0.22. In the same year, the household median income over all counties was USD 35320 (HHMDINC); with a standard deviation of USD 8851, and an IC of 0.25. In 2002, the average local public employee in the average county earned around USD 32078 (EARNYFT). This value deviates by USD 6419 in absolute terms and by 0.20 in relative terms. Thus, EARNYFT appears as more equally and more symmetrically distributed than the other two variables. However, we must be careful when comparing the levels of the three variables, because they incorporate different components, as in particular: household size and capital income.

<i>variable</i>	<b>mean</b>	<b>median</b>	<b>std. dev.</b>	<b>skewn.</b>
PCAPINC	17482.57	16930.0	3894.70	1.58
HHMDINC	35320.09	33759.0	8851.49	1.34
EARNYFT	32078.02	30900.0	6418.56	1.06

Table 2: Income levels of distinctive groups

Table 3 offers some information about the importance of the local public

payrolls. If we assumed that there is strict autonomy, we could interpret the information as follows: The average county resident paid USD 1369 for his county's public payrolls. Across all counties, the values of PAYRYc varied considerably. There were thirty counties where the average resident paid more than USD 3000. In the average county, the public payrolls amounted to nearly 44% of the public expenditure (PAYRYg). The standard deviation was nearly 9. - But, we should keep in mind that some shares of the payrolls are covered by state or federal funds. Hence, the real distribution of the financial burdens might differ from the picture that is outlined by this table.

<i>variable</i>	<b>mean</b>	<b>median</b>	<b>std. dev.</b>	<b>skewn.</b>
PAYRYp	1368.69	1281.52	514.41	4.85
PAYRYg	43.52	43.26	8.97	1.29

Table 3: Relative expenditure for local public payrolls

The LADI hypothesis supposes that the power of a Leviathan can be measured by his relative personal income. Thus, we set his personal income in relation to the average income in his county. This can be justified as follows: The provision of local public goods may be regarded as the basis of productivity. Hence, local public employees are highly responsible for the overall income level in their counties. A fixation of the personal to the overall income is likely to induce a fair yardstick and positive incentives. In our examination of the LADI hypothesis, we work with two indicators for political power: OFFPCI and OFFHHMI; where:

- $\text{OFFPCI} = (\text{EARNYFT} - \text{PCAPINC}) / \text{PCAPINC}$ ;
- $\text{OFFHHMI} = (\text{EARNYFT} - \text{HHMDINC}) / \text{HHMDINC}$ .

As table 4 shows, the distribution of OFFPCI is less equal and symmetrical than the one of OFFHHM.

<i>variable</i>	<b>mean</b>	<b>median</b>	<b>std. dev.</b>	<b>skewn.</b>
OFFPCI	0.8709	0.8378	0.3484	1.70
OFFHHMI	-0.0670	-0.0824	0.1763	0.98

Table 4: Relative deviations of local officials' earnings

Our hypothesis states a certain relationship between fiscal power and the sources of public revenue. Table 5 comprises relevant information on the revenues of U.S. counties in 2002. On average, the counties earned a total revenue of USD 3253 per capita (REVTLp). The highest share of the total



revenue stemmed from intergovernmental grants; namely 42% (REVIGVTb). This share was very equally and symmetrically distributed. Clearly, the main grantors were the respective states (REVFSTb). The federal government just adopted an equalizing role. Taxes amounted to more than 30% of the total revenue (TAXTLb). The most important type was the property tax (TAXPRPb). However, its importance varies quite strongly from county to county. Another bigger source of local fiscal revenue were charges. On average, they still contributed more than 20% of the total budgets. The main features of their distribution were quite similar to those of the property tax.

<i>variable</i>	<b>mean</b>	<b>median</b>	<b>std. dev.</b>	<b>skewn.</b>
REVTLP	3252.87	2960.15	1630.03	8.32
REVIGVTp	1279.14	1165.42	566.76	2.80
REVIGVTb	0.4199	0.4173	0.1391	0.07
REVFSTb	0.3906	0.3871	0.1322	0.57
TAXTLb	0.3043	0.2888	0.1253	0.98
TAXPRPb	0.2408	0.2246	0.1229	1.27
CHARTLb	0.2014	0.1702	0.1072	1.24

Table 5: Sources of local fiscal revenue

## 5 Fiscal Power and the Sources of Fiscal Revenue

The LADI hypothesis states that intergovernmental grants positively determine fiscal power. Tables 6 and 7 may at first help us to analyze this relationship in a simple statistical form. As we can see, each of the correlation coefficients between total intergovernmental grants (REVIGVTp or REVIGVTb) and fiscal power (OFFHHMI or OFFPCI) is significantly positive. The coefficients with REVIGVTp are somewhat higher than those with REVIGVTb. With respect to fiscal power, it seems less important who the grantor is: the state or the federal government. REVFED or REVFST have lower correlations with OFFHHMI or OFFPCI than REVIGVT. Next, to assess the real importance of intergovernmental grants, we need to consider their relationships with other sources of fiscal revenue. It turns out that such relationships in per capita terms are in general very weak. But surely, such in budget share terms must be stronger, since all the shares sum up to 1. In effect, we find the highest coefficient in this context (as an absolute value) between REVIGVTb and TAXTLb. Thus, TAXTLb even surpasses REVIGVTb a little in the correlation with OFFHHMI and with OFFPCI.

	<i>OFFHHMI</i>	<i>OFFPCI</i>	<i>REVTlp</i>	<i>REVIGVTp</i>	<i>TAXTLp</i>	<i>TAXPRPc</i>
<i>OFFHHMI</i>	1.0					
<i>OFFPCI</i>	0.817	1.0				
<i>REVTlp</i>	0.089	0.127	1.0			
<i>REVIGVTp</i>	0.342	0.384	0.479	1.0		
<i>TAXTLp</i>	-0.113	-0.086	0.704	0.058	1.0	
<i>TAXPRPc</i>	-0.097	-0.066	0.678	0.060	0.978	1.0

Table 6: Correlations: deviations of officials' earnings and public revenue per capita

	<i>OFFHHMI</i>	<i>OFFPCI</i>	<i>REVIGVTb</i>	<i>REVFSTb</i>	<i>TAXTLb</i>
<i>OFFHHMI</i>	1.0				
<i>OFFPCI</i>	0.817	1.0			
<i>REVIGVTb</i>	0.317	0.313	1.0		
<i>REVFSTb</i>	0.266	0.245	0.960	1.0	
<i>TAXTLb</i>	-0.337	-0.324	-0.514	-0.482	1.0

Table 7: Correlations: deviations of officials' earnings and shares of public revenue

The impact of fiscal revenue on fiscal power may be influenced by third variables. In a next step, we look at all available third variables and select those which are highly correlated with OFFHHMI or with OFFPCI. In our sample, we have 41 third variables available. They can be assigned to the following categories: public expenditure, public employment structure, private employment structure, demography, and housing. Out of these 41 variables, we find only 8 with a correlation coefficient greater than 0.3; namely: HHPASShh, HHSEChh, HHSSIhh, HHWAGEhh, POPNATp, POP5DH4r5, RENTCTM and RENTGRM. We accept these as potential control variables in our multiple regressions.

Our regression analysis shall help to assess intergovernmental grants as a determinant of fiscal power in combination with other determinants. We base our analysis on OLS estimations and follow three steps: First, we regress our dependent variable on all eight potential control variables. We then eliminate each redundant variable via a redundancy test. Second, we insert each of the explaining variables (REVIGVTb or REVIGVTp) into the control equation. Third, we compare our estimating equations via four criteria: adjusted R-squared, Akaike information criterion, Jarque-Bera test, Ramsey's RESET test. - Altogether, the regression analysis is guided by two questions: To what degree can fiscal power be explained by this approach? What are the specific contributions of intergovernmental grants?

Table 8 presents the main results from our full sample regressions of OFFHHMI. Equation (1) consists of three control variables: HHPASShh, HHWAGE, and POP5DH4r5. All of them are highly significant and have the expected signs. Equation (2) integrates REVIGVTb as a regressor, which becomes highly significant. Equation (3) integrates REVIGVTp, which become even more so. There is no change of signs. If we compare the three equations, we may state the following: Equation (1) clearly reaches the highest explanatory power; with an (adjusted) R-squared of 0.431. Hence, REVIGVTp adds clearly more explanatory power to the control regressors than REVIGVTb. The AIC, as a measure of the goodness to fit, conforms to the R-squared results. The Jarque-Bera values indicate highly nonsymmetric distributions of the residuals. One can easily show that these values highly depend on a few outliers of OFFHHMIc. Finally, the RESET test gives no reason to suspect any misspecification.

Our regressions of OFFPCI bring about similar results (table 9). However, two differences shall be pointed out: First, POPNATp appears as a control variable instead of HHWAGEhh. And second, all these three regressions reach less explanatory power.

Each of our dependent variables is constructed out of two components. Now, we may ask how the functional relationships depend on each compo-

	(1)	(2)	(3)
c	0.5293 (17.8)	0.4747 (14.7)	0.4592 (15.8)
REVIGVTb		0.0829 (4.24)	
REVIGVTp			0.0672 (15.2)
HHPASShh	3.3020 (26.5)	3.1303 (23.9)	2.7862 (22.3)
HHWAGEhh	-0.8957 (-22.3)	-0.8628 (-21.1)	-0.9053 (23.3)
POP5DH4r5	-0.2736 (-7.03)	-0.2657 (-6.83)	-0.2291 (-6.08)
adj. R-squ.	0.389	0.392	0.431
AIC	-1.125	-1.130	-1.196
J.-Bera	6780	6299	9442
RESET	26.7	16.2	15.0

Table 8: Regressions of OFFHHMI: full sample

	(1)	(2)	(3)
c	0.7485 (35.6)	0.6262 (24.4)	0.5698 (24.7)
REVIGVTb		0.3253 (8.17)	
REVIGVTp			0.1476 (16.0)
HHPASShh	7.4920 (24.6)	6.6906 (21.1)	6.6541 (22.3)
POP NATp	0.5584 (6.41)	0.5805 (6.73)	0.4125 (4.90)
POP5DH4r5	-0.7245 (-9.23)	-0.6603 (-8.46)	-0.6181 (-8.16)
R-squ. adj.	0.317	0.331	0.369
AIC	0.349	0.328	0.271
J.-Bera	3469	3330	6528
RESET	26.3	12.4	38.6

Table 9: Regressions of OFFPCI: full sample

ment. In a next step, we will use a sample stratification method to clarify the dependency. Our preferred estimating equation is (3) from table 8. To make our results more 'traceable', we first eliminate some outliers of OFFHHMI from the sample. Then, we stratify the sample by HHMINC and by EARNYFT into quartiles. We thus get two times four subsamples; each with 775 or 776 objects. Finally, our preferred function is estimated on each of the eight subsamples. - The results look as follows:

With the stratification by HHMINC (table 10), our (main) explaining variable (REVIGVTp) gets clearly significant in all four estimating equations. The t-values are particularly high from the two inner quartiles. Two of the control variables (HHPASShh and HHWAGEhh) also get clearly significant in all equations. They are more so in (1) and (4). But the third control variable (POP5DH4r5) is just significant in (3) and (4). The constant (c) is just significant in (1) and (4). Nevertheless, each significant coefficient in this table has its expected sign. Except for equation (4), the explanatory power (the adjusted R-squared) is rather low. The AIC values do not strictly correspond to the adjusted R-squared values. Based on the Jarque-Bera test, all four equations show nonsymmetric distributions of their residuals. The RESET does not clearly indicate misspecification, at least not on a 10%-level.

	(1)	(2)	(3)	(4)
c	0.2689 (3.77)	-0.0066 (-0.10)	-0.0354 (-0.47)	0.5232 (7.74)
REVIGVTp	0.0428 (4.10)	0.0718 (9.84)	0.0967 (11.89)	0.0652 (8.78)
HHPASShh	2.3952 (11.1)	1.6898 (6.85)	2.3778 (7.16)	2.2514 (8.24)
HHWAGEhh	-0.5318 (-5.12)	-0.2906 (-2.98)	-0.2836 (-2.79)	-0.9179 (-10.4)
POP5DH4r5	-0.1296 (-1.48)	0.0234 (0.34)	-0.1984 (-3.09)	-0.4870 (-8.09)
adj. R-squ.	0.222	0.182	0.298	0.442
AIC	-0.990	-1.440	-1.479	-1.614
J.-Bera	89.2	68.2	157	83.9
RESET	8.91	3.52	11.8	24.0

Table 10: Regressions of OFFHHMI: adjusted sample, stratified by HHMINC

With the stratification by EARNYFT (table 11), REVIGVTp gets significant in all four estimating equations, at least on a 10%-level. The t-values rise with the level of EARNYFT. HHPASShh and HHWAGEhh reach enormously high t-values, all over. In contrast, the regression coefficients of

POP5DH4r5 in the third and fourth quartile are insignificant. In all these estimations, each significant coefficient gets its expected sign. The stratification by EARNYFT leads to higher explanatory power. The four equations reach R-squared values between 59% and 65%. The AIC indicates a better fit of those two equations where none of the coefficients is insignificant. Although the fit appears as being high, the Jarque-Bera values indicate non-symmetrically distributed residuals. Based on the RESET, misspecification seems the most likely for equation (1). Still, it reaches a significance level of 10%.

	(1)	(2)	(3)	(4)
c	0.6297 (12.2)	0.850 (17.9)	0.9131 (17.7)	1.1956 (22.0)
REVIGVTp	0.0167 (1.90)	0.0217 (2.87)	0.0293 (4.15)	0.0318 (4.72)
HHPASShh	3.2172 (19.2)	3.8354 (18.6)	2.9881 (15.7)	3.0470 (12.9)
HHWAGEhh	-1.1207 (-16.2)	-1.4826 (-22.5)	-1.4934 (-22.1)	-1.7452 (-25.4)
POP5DH4r5	-0.5960 (-9.26)	-0.1159 (-2.13)	0.0102 (0.18)	-0.0521 (-0.84)
adj. R-squ.	0.615	0.644	0.591	0.629
AIC	-1.780	-1.869	-1.727	-1.454
J.-Bera	153	138	396	268
RESET	2.89	4.94	33.0	12.3

Table 11: Regressions of OFFHHMI: adjusted sample, stratified by EARNYFT

## 6 Summary and Evaluations

We tried to measure the power of Leviathans via the LADI hypothesis. We took a sample of 3105 U.S. counties from the period 1999-2002. We described relevant features of local policy in the U.S.A. In particular, the description provided insights into the distributions of incomes in the public and the private sector. We looked at how fiscal power is correlated. It turned out to be more highly correlated with intergovernmental grants than with any other source of local public revenue. We ran regressions of fiscal power with the full sample. Our best estimation consisted of: the relative deviation of the local officials' earnings from the household median income (as explained

variable); the total intergovernmental revenue per capita (as explaining variable); the share of households with public assistance income, the share of households with wage or salary income, and the share of residents who were 5 years or older who had lived in a different county 5 years before (as control variables). Finally, we stratified the sample by the two components of the explained variable; we estimated our best equation with each of the quartiles. The stratification by the local officials' earnings enormously raised the explanatory power, whereas the stratification by the household median income lowered it in three quartiles. However, the significances of the intergovernmental revenue per capita and of the share of residents who had moved were partly reduced by both stratification types.

Overall, our empirical analysis provides support to the LADI hypothesis. In 2002, U.S. local officials had the more fiscal power, the higher the relative amount of intergovernmental grants in their total budgets was. Nevertheless, we shall point out some limitations of this overall result: First, the two explained variables do not correctly assign income deviation to fiscal power. This is because the per capita income as well as the household median income may include components which stem from outside the county; capital income in particular. It seems hardly justified to make the local officials responsible for such components. Second, the deviation from the household median income appears as a stronger indicator for fiscal power than the deviation from the per capita income. One reason can be that the first variable is more symmetrically distributed. Another reason can be that it has some spurious correlations with the other household variables in the estimating equations. Third, the stratification by the local officials' earnings induces a much higher explanatory power than the stratification by the household median income. This also suggests that local officials' earnings are much less flexible than private sector earnings. Fourth, total intergovernmental grants in per capita terms appear as a stronger explaining variable than in terms of budget share. Thus, fiscal power seems to be less dependent on a Leviathan's capacity to switch between different sources of local public revenue. Fifth, the estimating equations include just one variable which can clearly be assigned to 'voice' or 'exit', namely the share of residents who had lived in a different county 5 years before. This control variable gets insignificant in some of the quartile estimations. Hence, there is little information about the effectiveness of voice or exit as constraints. And sixth, the highest impact on fiscal power seems to come from the sources of private (!) income, especially public assistance, wage and salary. Still, there is little theory in the background to explain why.



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# Appendix

## List of Empirical Variables

CHARTL	local government budgets: total charges
EARN3FT	public employment: all average March earnings, full-time employees
EARNYFT	EARN3FT * 12
EARNIO	public employment: average March earnings, instructional employees only
EPLFADM	population: public employees, financial and other government administration only
EPLFIRE	population: public employees, fire protection only
EPLHLTH	population: public employees, health and hospitals only
EPLISTR	population: public employees, instruction only
EPLFT	population: public employees, full time
EPLFTE	population: public employees, full-time equivalent
EPLTL	population: public employees
EDTCAP	local government budgets: capital outlay
EDTEDUC	local government budgets: expenditure: education
EDTGEN	local government budgets: general direct expenditure
EDTHLTH	local government budgets: expenditure: health
EDTIGVT	local government budgets: intergovernmental expenditure
EDTTL	local government budgets: total direct expenditure
FAMMINC	median family income in 1999
HHINTER	households: with interest, dividends or net rental income
HHMINC	median household income
HHPASS	households: with public assistance income
HHRETI	households: with retirement income
HHSEC	households: with social security income
HHSEMP	households: with self-employment income
HHSSI	households: with supplemental security income
HHTL	total number of households
HWAGE	households: with wage or salary income
HSUNIT	number of housing units
HSVAC	vacant housing units
OFFFAMMI	$(\text{EARNYFT} - \text{FAMMINC}) / \text{FAMMINC}$

OFFHHMI	$(\text{EARNYFT} - \text{HHMDINC}) / \text{HHMDINC}$
OFFPCI	$(\text{EARNYFT} - \text{PCAPINC}) / \text{PCAPINC}$
PAYINSTR	public employment: average March payrolls, full-time employees, instructional employees only
PAYR3TL	public employment: total March payrolls, full-time employees
PAYRYED	$\text{PAYR3TL} * 12 / \text{EXPDTL}$ ;
PAYRYPC	$\text{PAYR3TL} * 12 / \text{POPUL1}$ ;
PCAPINC	per capita income in 1999
POP5DH	population: 5 years and over: different house in 1995
POP5DH4	population: 5 years and over: different house in 1995, in United States, different county
POPAS	population: Asian alone
POP NAT	population: American Indian and Alaska Native alone
POPRUR	population: percentage: rural
POPUL1	total population size
POPUL5	population size: 5 years and over in county
POPURB	population: urban
POPURB2	population: inside urbanized areas
POPWH	population: white alone
RENTCTM	median contract rent
RENTGRM	median gross rent
REVFFED	local government budgets: revenue from federal government
REVFST	local government budgets: revenue from state
REVGEN	local government budgets: total general revenue
REVIGVT	local government budgets: total intergovernmental revenue
REVOSC	local government budgets: total general revenue: from own sources
REVTL	local government budgets: total revenue
TAXPRP	local government budgets: revenue: from property taxes
TAXTL	local government budgets: revenue: from total taxes

## Abbreviations

b	budget share
ed	per total public expenditure
hh	per households
hs	per housing units
p	per capita
r5	resident: 5 years and older