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# Local Government Taxing, Spending and Economic Growth: New Evidence for Wisconsin

**By**

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# Local Government Taxing, Spending and Economic Growth: New Evidence for Wisconsin

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# Local Government Taxing, Spending and Economic Growth: New Evidence for Wisconsin

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## Executive Summary

Wisconsin is generally viewed as a high tax state. Depending on how one measures tax burdens, Wisconsin's rankings range from either the top five, or right in the middle of the national average. While these rankings have always been a source of discussion in Wisconsin, the state's current budget deficit, and the proposed solutions, has renewed the public debate about Wisconsin's fiscal policies with a vengeance. Accusations of duplication of services, higher costs inherent to the small scale of operation and a general tendency to be "big spenders" have created a firestorm of controversy. Further, a range of business support organizations has renewed yet again the call for tax reductions in the name of economic growth.

Unfortunately, beyond the political rhetoric, little is known about the true impact of Wisconsin municipal fiscal policy on local economic well-being and growth. In one previous study we asked the direct question, "are Wisconsin local taxes too high?"[1] Using the general economic notion of capitalization rates, we systematically tested two hypotheses. First, if taxes and corresponding spending is too high, this will reflected in local property values. Second, if local property tax rates are too high, the ability of local governments to generate additional tax revenues should be hindered. The latter hypothesis was popularized as the "Laffer curve" in the supply-side economic policies of the Reagan Administration of the 1980s. Using 1995,1996 and 1997 data for 554 Wisconsin cities and villages we were able to rigorously conclude "no, Wisconsin city and village taxing and spending levels are not systematically too high."

In this applied research study we again ask the fundamental question "are Wisconsin local taxes too high" but we address the research question from a slightly different direction. Rather than looking at local property values and corresponding tax generating abilities, we measure the influence of local spending and taxation decisions on local economic growth. If local spending and taxation levels are indeed too high, we should see a dampening affect on local economic growth rates.

To answer this question it is important to note that local government provide services that are important to not only the quality of life of local residents, such as quality parks and libraries, but also goods and services that are important to the proper functioning of the local economy. Public services such as transportation services reflected in the investment in and maintenance of the local road system, protective services offered by the police and fire department, and environmental services such as municipal water and sewer, solid waste collection and disposal have become vital to local economic growth. Clearly a balance exists between too little public service provision with its corresponding low taxes and service provision levels that are too high.

To test our central hypothesis we specify a simple neo-classical model of regional economic growth. Data are annual for Wisconsin counties, cities and villages for the period 1990 to 1998. We construct a regional "super" unit of local government where we combine all cities

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1. Steven Deller and Victor Lledo, "Local Public Sector Performance: Are Wisconsin City and Village Taxes Too High?" Department of Agricultural and Applied Economics Staff Paper No. 440. University of Wisconsin-Madison. May, 2001.

and villages within a county with that county government. In other words, all cities and villages that are in a given county are aggregated into a county level municipal government. County government itself is then added to this constructed county level municipal government to form a regional super local unit of government. Justifications for this approach, and its corresponding shortcomings, are detailed in the study itself.

After removing Shawano and Menominee Counties for missing data problems, we are left with 70 regional super units of government and eight of annual data for a total sample of 560 observations. Note that because of the growth nature of the model, one year of data is effectively lost due to lags. Local government data comes from various issues of the Wisconsin Department of Revenues report "County and Municipal Revenues and Expenditures." Unemployment rates were collected from the Wisconsin Department of Workforce Development "Local Area Unemployment Statistics Historical Files." Remaining data was collected from Woods and Poole, Inc a private vendor of enhanced BEA-REIS based socioeconomic data. Again, all data are annual.

Findings that are not central to this study but warrant mentioning include:

- The data point to a pattern of divergence in regional income levels across Wisconsin. Regions with higher levels of income grew faster then lower income regions.

- Regions with faster population growth rates tended to experience faster growth in per capita income.

- Regions more highly dependent on farming tend to grow slower than the state average.

- Surprisingly regions with higher unemployment rates tend to have higher growth rates in per capita income.

Findings of direct interest to this study include:

- Higher levels of local spending are associated with higher growth rates in per capita income.

- Higher levels of taxation, particularly local taxes specifically the property tax, are ***not*** associated with slower or declining growth rates in per capita income.

- Road maintenance and health and human service expenditures are associated with higher growth rates in per capita income.

- Higher levels of spending on public safety, cultural and amenity services such as libraries and general administrative expenditures are found to have little if any affect on income growth.

- There is evidence that there is an upper limit to the positive influence local government spending has on local economic growth rates. But, few if any Wisconsin local governments are located near the maximum.

While this study is not definitive it does provide one additional step in our understanding of the economics of Wisconsin local public finance policy and its affect on economic growth and development and overall economic well-being.

# Local Government Taxing, Spending and Economic Growth: New Evidence for Wisconsin

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## Introduction

Can the economic growth rate of a locale be affected by the fiscal policies of the local governments within that locale? This question is particularly relevant in federal countries like the United States where local governments play an active role in the provision and delivery of essential public goods and services, such as road maintenance, police and fire protection services, and a range of recreational and cultural services. This role has substantially increased over the past few decades following a trend towards the devolution of traditional federally funded functions to states and local governments and with the substantial decrease of federal grants and transfers to those governments. While there is a large literature developed by theoretical and applied researchers in the fields of macroeconomics, public finance and regional science that attempts to address this fundamental policy question, the issue remains unresolved.

By the late eighties and early nineties there had already been a large number of empirical analysis conducted by local public finance and regional scientist scholars trying to understand the effects of local policies on regional development in the U.S. (see Bartik 1991 for a comprehensive survey of this literature). This topic has gained a more global interest throughout the nineties when macro and development economists started to address this subject by looking at cross-country and panel data samples of developed and developing countries (Kneller et al 1998 summarizes the main studies and their key results). Besides their disciplinary and geographical scope, there is an important difference between the empirical literature before and after the nineties, which is related to the theoretical framework used to conduct such empirical analysis.

The main purpose of the empirical analysis presented here is to revisit some of these paths, first, by framing our analysis on a simple endogenous growth model and testing some important results in this literature and second, by using a new dataset comprising public finance and socioeconomic variables for 70 regions in Wisconsin that correspond to counties. Our empirical analysis attempts to go beyond simply replicating others with a new dataset which, given the reduced number of intrastate analysis of the effects of local public policies on regional growth, would seem to bring already some value-added. It is also our intention to pay a closer attention to the specification adopted in our econometrical model for reasons that will be clear below.

The late eighties and early nineties saw a reemergence in interest on growth theory with the advent of the new endogenous growth theory pioneered by Romer (1988). Contrary to the

traditional neoclassical growth theory (Solow 1956, Swan 1956) those models advocated that the rate of income growth over the long run could be explained by factors other than exogenous changes in technology. Fiscal policy emerged as a potential candidate with their theoretical channels being formulated in Barro (1990) model. It was under this new theoretical framework and their testable results that most of the empirical analysis trying to understand the dynamic effects of fiscal policy centered their attention. By contrast, there was no unified theoretical framework in the pre-1990 empirical literature (again Bartik 1991). That led to a multitude of empirical specifications as well as criteria for the measurement of the fiscal variables selected. Perhaps, a result of that was the wide disparity in the conclusions regarding the direction and size of the effects of fiscal variables on measures of economic development for a given region. However, post-1990 analysis based on empirical growth models seems to refute this idea.

Even though econometric specifications seemed to gain in uniformity, the absence of robust fiscal variables elasticities for similar samples still persisted. Some have pointed this problem as a result of the dependence of specifications upon the set of conditioning variables and initial controls, a criticism not only addressed to empirical tests of public finance growth models but also to the new empirical growth literature as a whole (Levine and Renelt (1992), Brock and Durlauf (2000)). Others have argued that most of the analysis have not been careful enough in matching their real fiscal variables with those defined in the theoretical models (Mendoza et al 1997). Some also add to that the relevancy the linear dependency among fiscal variables imposed by the budget constraint in influencing the results (Helms 1985, Mofidi and Stone 1990 and Kneller et al 1999).

While trying to incorporate some of these issues in our analysis, our focus will be on another understated specification issue: the non-linear relationship predicted by public finance growth models. This paper represents a preliminary attempt to tackle this potential non-linearity by including a set of selected local fiscal variables under a quadratic specification and using panel data regression models to account for potential omitted effects.

The paper is composed of five parts beyond the introduction. First we provide a brief review of the literature examining the role of local fiscal policy in economic growth. The theoretical and empirical specification of our model is then outlined followed by a discussion of the empirical results. We close the paper with a discussion of the policy ramifications of our results.

## Current Thinking

The literature examining the role of local fiscal policies at the local level on regional economic growth has tended to be dominated with the documentation, both theoretical and empirical, on taxation policy. Within the literature local government expenditures have been implicitly assumed to have positive impacts on growth levels. More spending tends to be equated

with better services which in turn positively influence growth levels. The focus of the literature has been on how those services are paid for and the distortionary affects, if any, on the local economy.

Following Ladd (1998) there are considered five benchmarks studies documenting the progression in the thinking about local taxes and their impact on economic growth: Due (1961), Oakland (1978), Wasylenko (1981), Newman and Sullivan (1988) and Bartik (1991). Due in his 1961 survey of the literature on firm location Due concluded that: "While the statistical analysis and study of location factors are by no means conclusive, they suggest very strongly that the tax effects cannot be of major importance" (1961, p.170). Due based his conclusion that taxes are inconsequential on firm location decisions on the pretext that taxes account for such a small percentage of operating costs. He concluded that other costs associated with labor, land and transportation dominated the affects of any small variation in taxes across locales. In his update of Due's earlier work Oakland (1978) accepted without question the conventional wisdom founded by Due that taxes have little effect on interstate or interregional locations decisions.

Wasylenko (1980, 1981) expanded the discussion of taxation and local economic growth by explicitly examining the notion of intraregional competition for firms. While the interpretation of the literature by Due and later by Oakland concluded that taxes account for little in a firm' decision to locate in one state or a metro area over another, they did not address the role of taxes in the selection of one locale within a metro area, for example, over another. Citing a limited number of statistical studies Wasylenko concludes that statistical evidence identifying a marginal role taxes play in intraregional firm location is outweighed by other more relevant factors. Wasylenko suggests that the limited role taxes may play is due to the limited variation in taxes across regions. While Wasylenko attempts to address this latter issue, he concludes that our thinking about and measuring relative tax burden needs to be refined.

As noted by Ladd (1998), the 1980s witnessed a proliferation of statistical studies challenging the conventional wisdom advanced by Due and reaffirmed by Oakland. Newman and Sullivan's (1988) attempt to summarize this newer work found three distinct approaches: general equilibrium, partial equilibrium adjustments, and dynamic adjustment models. Because of the escalation of studies and approaches Newman and Sullivan conclude that the impact of local fiscal policy, taxes in particular, on economic growth through firm location "should be treated as an open rather than a settled question" (p.232) and are encouraged by the introduction of new theoretical approaches, empirical data and sophistication of econometric methods.

Perhaps the most influential review of this literature was conducted by Bartik (1991, 1992). Using a modified delphi method summarizing 57 empirical interregional and 25 intraregional studies conducted since 1979 Bartik provides compelling evidence that taxes do matter in economic growth. While previous reviews of the literature discussed individual studies, Bartik's use of delphi methods allows for systematic "averaging" of results across studies. While

individual studies may have limitations, there would have to be serious systematic error cutting across all studies for the consensus results to be invalid. In striking contrast to the previous reviews of the literature, Bartik concluded that taxes have quite large and significant effects on economic activity. Of the 57 interregional studies reviewed, 70 percent reported at least one statistically significant negative effect of taxes on one measure of economic activity such as employment, output or business capital. Ladd argues "this observation alone suggests that the conventional wisdom that taxes do not matter deserves to be questioned" (1998 p. 92)

White (1998) suggests that Due's conventional wisdom and Bartik's challenge may both be right. She argues that the idea of firms becoming more sensitive to taxes over the past 30 or 40 years is intuitively appealing. According to White, first-order effects, such as labor, land and transportation costs, vary less across regions now than they did in the past. Because firms have become more footloose, second-order effects, such as taxes, probably have become more important. Thus, both Due and Bartik may be correct. Perhaps more important is the increased incident of tax incentives at the local level to influence firm locations. Municipalities are more willing today to "go to war" to attract, retain and promote economic growth with tax incentives as a primary tool of war.

Theoretical Foundations

Public policy growth models are consensual in their diagnostic of the channel through which fiscal policy (taxes and public expenditures) affect growth. Both neoclassical as well as endogenous growth models recognize that fiscal policy affects growth by altering the incentives to save or to invest in new capital. Their basic differences reside on the persistency of such effects. In public policy neoclassical growth models (see Judd 1985 and Chamley 1986), fiscal policy is only capable of affecting the income growth over short periods during the transition between steady states. In the long run, fiscal policy only affects the income level. On the other hand, the public policy endogenous growth models of Barro (1990), Barro and Sala-I-Martin (1992, 1995) and Mendoza et al (1997) provide mechanisms by which fiscal policy can determine the income growth rate both in the short and in the long run.

Apart such differences, public finance growth models share the similar position that the effects of fiscal policy on growth are contingent on the distortionary nature of their taxes as well as on the productive nature of expenditures such taxes are directed to finance.[2] Distortionary taxes are defined as those which affect agents individuals and corporate investment decisions with respect to physical and or human capital) creating tax wedges and distortorting the rate of growth. Productive government expenditures are those related to the provision of public or publicly provided goods and services, which acts as complements in the production of private

[2] In neoclassical public policy growth models the results from Barro (1990) will certainly hold around the steady state. See Zou (1996).

goods. They are modeled as arguments in the aggregate production function affecting positively the private rate of return of those private goods and thus affecting positively the output growth rate.

Having those concepts in mind, those models should predict an increase in the growth rate resulting from (i) a shift in the tax system away from distortionary forms of taxation and towards non-distortionary forms, (ii) a reapropriation of the budget from unproductive towards productive government expenditures, (iii) financing productive public expenditures with non-distortionary tax sources. On the other hand, a decrease in growth should follow if non-productive expenditures are financed by a distortionary tax, whereas no change in the growth rate should be expected if non-distortionary taxes are used instead. Finally, productive expenditures financed by distortionary taxes should present an ambiguous effect on growth. This is a central result in several public finance growth models, one that deserves some extra intuition.

Barro (1990) obtains a functional form relating growth to taxes/expenditures by solving a dynamic general equilibrium in a closed economy inhabited by identical individuals and firms operating in a competitive environment. A government imposes a flat tax on income using the revenues to finance the public provision of productive goods, as defined in the main text, under a balanced budget as described in eq.(1):

$$T = \tau y = g \qquad (1)$$

The representative, infinite-living household seeks to maximize a CES utility in eq.(2) subject to her budget constraint in eq.(3):

$$U = \int_0^{\infty} [c^{1-\sigma} - 1/1-\sigma\ ]\ e^{-\rho t} \qquad (2)$$

$$c + dk/dt = y - T \qquad (3)$$

Where c is consumption and dk/dt, savings. The solution to this problem is well know and results in a growth rate for consumption given by:

$$\gamma_c = [\ (1-\tau)r - \rho]\ \sigma^{-1} \qquad (4)$$

Firms, which are owned by households, are assumed to rent capital and hire labor at every point in time in order to maximize profits in a static form and given a production function which presents constant returns to scale in capital (k) and government expenditures (g):

$$y = \Psi(k,g) = k\,\Psi\left(\frac{g}{k}\right) \qquad (5)$$

Profit maximization delivers the common result where the private rate of return on capital equals its marginal productivity:

$$r = \Psi\left(\frac{g}{k}\right) - \Psi'\left(\frac{g}{k}\right) \qquad (6)$$

Where $\Psi'()$ is the derivative of $\Psi$ wrt to k.

Under a balanced growth path, the growth rate in consumption equals the growth rate in output ($\gamma$), which in equilibrium implies:

$$\gamma = \frac{1}{\sigma}\left[(1-\tau)\,\Psi\left(\frac{g}{k}\right)(1-\Psi'\tau) - \rho\right] \qquad (7)$$

Isolating $\tau$ in (1) we have that $\tau = g/y$. Dividing both sides of (5) by g we can obtain $g/y = (g/k)/\Psi\left(\frac{g}{k}\right)$. Thus, the derivative of the growth rate with respect to equals:

$$d\gamma/d(g/y) = \frac{1}{\sigma}\,\Psi\left(\frac{g}{k}\right)(\Psi'-1) \qquad (8)$$

Hence, for g/k small enough, $\Psi'>1$ and the growth rate increases with g/y. For g/k large enough, $\Psi'<1$ and the growth rate decreases with g/k, which shows the existence of a non-linear relationship between $g/y = \tau$ and $\gamma$

Behind this ambiguity lies a non-linear relationship between tax rates (expenditures shares) and per capita income growth. Suppose that distortionary taxes assume the form of a flat income tax.[3] This tax has the immediate effect of reducing the private return to capital (both physical and human) and, hence, investment. At the same time, the revenue proceeds from this tax will be used to finance the public supply of productive goods and services with positive effects to the marginal productivity in the production of private goods, which in equilibrium results in a higher return to capital. For small tax rates (small expenditure shares), the productivity-enhancing effect of additional expenditures dominates the productivity reducing effect of the distortionary tax. Private investment and income grows as a result of that.

[3] Alesina and Rodrick (1994) show the same result in a much more straightforward way with a tax on capital income.

For large tax rates (small expenditure shares), the after tax return to capital falls as the tax rate is raised further, reverting the initial dominance relation. The relationship between the economy's growth rate and the income tax is thus represented by an inverse-U curve, as depicted in Figure 1, with the growth rate first increasing and then decreasing as the tax rate is progressively raised. The optimal taxation, and corresponding expenditure level, is at point B. Taxation and expenditure levels to the right of B, such as point C, are sufficiently high to hinder economic growth. Spending and taxation levels to the left of B, such as at A, can be said to be sub-optimal and economic growth could be spurred by spending and taxing at higher levels.

Even though, the non-linearity effects of taxes on growth emerge as one of the most clear cut results in the literature, it is surprising that has not been a more systematic attempt to include this non-linearity in empirical models trying to account for the effects of fiscal policy on growth. The case for explicitly accounting for the non-linear effects of taxes could be emphasized even further given the lack of consensus on how to apply the definitions above to classify taxes and expenditures in the real world.

This problem is the result of the generality of the definitions which, if at one hand facilitates its widely acceptance, on the other it is open to very different interpretations. Take for instance the task of classifying expenditures between productive and unproductive. If expenditures on public infrastructure and education seem to have irrefutable effects on the productivity of the private sector, the same cannot be said of expenditures on public safety or health expenditures. One could always argue that while some minimum level of provision of health and human services is essential for a productive labor force, it is not clear whether increasing expenditures above some level will necessarily continue to increase worker's productivity.[4]

The problem is compounded even further by the fact that the same category of tax or expenditure can be classified in totally different ways by different public finance models depending on how they affect individual preferences or firm's production functions. Zou (1996), for instance, extends Barro (1990) model to include two layers of government in order to look at the effects of local taxes and federal grants to local economic growth. One of his main findings is that the non-distortionary nature of a local consumption tax depends on whether local public capital is also valued by individuals in their utility functions (Arrow-Kurz utility function). If that is the case, a tax on consumption, which usually only crowds out private consumption in favor of public consumption with no changes in savings, will now start affecting the private rate of return on capital and, hence, the level of income on the steady-state.

[4] Of course higher public expenditures on health may be desirable for other reasons other than simply the enhancement of the productivity of the public sector and there would always be reasons for providing it above the level would maximize an individual's productivity in case such level exists.

Devarajan et al (1994) also shows that with more than one productive expenditure, the nature of tax used to finance its provision is not a sufficient condition to identify the direction of their relationship anymore. A crucial determinant in this case will be the allocation of expenditures in between all productive categories with the signal of the effect varying with respect to different budgetary compositions. Therefore for a given level, of productivity expenditure the effect of the other on economic growth should depend on its own level, resulting in another non-linear relationship.

The point we are trying to make here is that (i) if every type of tax can be seen as presenting at least some degree of distortion and (ii) if every category of spending can always be argued to affect private productivity to some extent then, rather than trying to go back and forth giving enough arguments to classify them, it would be easier to assume a non-linear relationship between such variables and income growth and let the data speak. After all our major goal is not to find the correct taxonomy for the set of public instruments available but, instead, to determine whether such instruments are being used at an appropriate level.

This point seems to be particularly pertinent when trying to measure the effect of local fiscal policy on regional growth in the U.S., since the majority of revenues comes from property taxes whose distortionary nature is not clear-cut and where most of the expenditures is used in the provision of public goods and services which are expected to be productive at least to some degree.[5]

Empirical Specification and Data

Based on the considerations raised in the previous section, we decided to estimate the effects of local taxes and expenditures on regional growth following the specification

$$\gamma_{it} = \alpha + \beta_1 f_{it-1} + \beta_2 f_{it-1}^2 + \delta\ y_{t-1} + \sum_{j=1}^{m} \lambda_j x^j_{it-1} + \mu_{it} \qquad (9)$$

This model could be seen as an approximation around the steady state for Barro (1990) model being valid for shorter period of times as well. All right hand side variables are lagged one period in order to minimize potential endogeneity or reverse causality effects.

[5] One way to look at the dynamic effects of property taxation would be to assume that property is an also an input in the production function which firms have to rent at every period from landlords. Property could be seen as a combination of land and improvements on the land. The former being a fixed input while the other being a reproducible input. If real estate markets are competitive, the cost of renting property should reflect the flow of benefits stemming from its use, which in equilibrium would reflect its marginal productivity. An increase in the property tax would be distortionary depending on which component of property is taxed. If only the land value of the property is taxed, taxing property would not affect intertemporal decisions given that higher taxes would be capitalized in lower land values to offset the additional flow of taxes keeping the after tax rate of return on property identical. In this case a property tax could be reduced to a lump-sum tax on the landlord. On the other hand, if property improvements are also taxed, a higher property tax may affect future decisions to create new improvements in the property by decreasing the marginal productivities of the activities taken place within the property boundaries.

Per capita income growth rate between periods t and t-1 in region i ($\gamma_{it}$) is determined non-linearly as a function of the expenditure share of all local public sector within that county, which, under a balanced budget is equivalent to the average income tax rate imposed by the overall local public sector in its regional economy. Following, Kneller et al (1999), we refrain from including expenditure and tax variables simultaneously in eq.(9) given the linear dependency implied by the local public sector budget.[6] Variable $f_{it}$, therefore, may represent either the revenue or the expenditure side of the budget.

The effects of local fiscal variables on regional growth will be controlled by the log of per capita income in period t-1 ($y_{it-1}$) in order to account for any possible convergence patterns. An additional group of variables ($x^j$ j =1,...,m) are included to control for other potential factors affecting regional growth recognized in the growth and regional science literature such as population growth, demographic profile, unemployment rates, economic structure and income distribution.

Barro's inverted-U relationship between growth and local fiscal policy will be supported by a positive $\beta_1$ and a negative $\beta_2$. Eq.(9) will be estimated using five different panel data techniques: pooled OLS, one-way (county) and two-way (county and time) fixed (by OLS) and random (by GLS) effects. By allowing the inclusion of potential omitted variables, one-way fixed effect models should deliver a better estimator than the pooled OLS whenever such effects are significantly different than zero. The same rationale should apply between one-way and two-way fixed effect models whenever time effects are significant.

The choice between random and fixed effect estimates involves a trade-off between consistency and efficiency of their respective estimators. Fixed effect estimators being OLS estimators inherit their consistency quality. On the other hand, since they are calculated by looking just at average differences within each county over time, they tend to be less efficient than random effect estimators, given that the later also incorporates differences across individual periods as well as across different time periods. The problem with random-effects is that they are consistent only if the random effects (county and time) are uncorrelated with all the other explanatory variables. A Hausman specification test can evaluate whether this assumption is satisfied.

Finally, the choice between a two-way over a one-way random effect estimators would depend basically on their log-likelihood given that the Hausman test failed to reject the null hypothesis of uncorrelation between the random effects and the remaining explanatory variables. With that in mind, model selection was based on the joint significance (F-statistic) of county and time dummies when choosing between the pooled OLS and the fixed effect models (both one-

[6] However, differently from Kneller et al (1999), we were concerned not only with the presence of perfect multicolinearity induced by the government budget constraint but also with the presence of near multicolinearity among fiscal variables categories. More on that on the next section.

way and two-way error models), on the Hausman test for the choice between the random and the fixed effect models and on the adjusted $R^2$ for the one-way versus the two-way random effect model.

Data are annual for Wisconsin counties, cities and villages for the period 1990 to 1998. We construct a regional "super" unit of local government where we combine all cities and villages within a county with that county government. In other words, all cities and villages that are in a given county are aggregated into a county level municipal government. The county government itself is then added to this constructed county level municipal government to form a regional super local unit of government.

We construct this super local government for several reasons. First, we wanted to take advantage of the annual nature of our revenue and expenditure data. Given that detailed municipal level socioeconomic data, such as education and age profiles, are available only for the decennial census years, we lacked quality data at the municipal level. At the county level, however, detailed annual socioeconomic data are more widely available. Second, previous research results suggest that the benefits of locally provided public goods and services do not stop at the municipal boundaries. For example, residents living in surrounding communities can enjoy an exceptional city parks system. By aggregated up to a regional super unit of local government, we capture what economists call positive spillover effects (Deller 1988). Third our experience with the Wisconsin Economic Impact Modeling System (WEIMS) suggests that policy analysis at the level of a regional super unit of local government can be effective (Shields and Deller 1998; Shields, Stallmann and Deller 1999; Shields, Deller and Stallmann 2001).

This approach does not, however, come without its shortcomings. First, while cities and villages could be described as being somewhat homogenous, they are fundamentally different than county governments in terms of jurisdictional responsibilities. To a limited extent, aggregating municipalities with counties is mixing apples and oranges. Second, institutional decisions and responsibilities are at the individual municipal and county level, not the constructed regional super local government. In the end, one could view the study reported here as one step in a longer line of applied research.

After removing Shawano and Menominee Counties for missing data problems, we are left with 70 regional super units of government and eight of annual data for a total sample of 560 observations. Note that because of the growth nature of the model, one year of data is effectively lost due to lags. Local government data comes from various issues of the Wisconsin Department of Revenues report "County and Municipal Revenues and Expenditures". Unemployment rates were collected from the Wisconsin Department of Workforce Development "Local Area Unemployment Statistics Historical Files". Remaining data was collected from Woods and Poole, Inc., a private vendor of enhanced BEA-REIS based socioeconomic data. Again, all data are annual.

County income ($y_i$) is proxied by total personal income earned by county residents. The dependent variable, county per capita income growth rate ($\gamma_i$) is calculated by dividing county personal income by the county resident population and taking differences in their logs between subsequent years. In order to compute local fiscal variables ($f_i$) we started by classifying the revenue and the expenditure side of local governments (county, city, village and township government) within each county in Wisconsin in similar categories. On the revenue side local fiscal budgets were divided between taxes (basically property taxes and other revenues from tax bases under the jurisdiction of local governments) and non-taxes (transfers from state and federal governments and user fees). On the expenditure side total expenditures were divided between expenditures, defined as the total amount of current and capital expenditures observed in a fiscal year, and debt, corresponding to payments of principal and interest of any past liabilities. Operating and capital expenditures, on its turn, were subdivided according with the following functions: roads (highway construction, maintenance of road facilities and any other transportation related services), health (collection of solid waste, provision of sewage systems and any other health and human related services), safety (law enforcement, firefighting and any other public safety related services), life (culture, parks and recreation, conservation and development), admn (general government expenditures for board clerk, treasurer, accounting, election, municipal court, municipal buildings and other administrative functions of local governments).

Local fiscal variables for each category in a given county have been computed first by summing up this category across the fiscal budget of all local governments within that county jurisdictional boundary, and then by dividing this outcome by that county total personal income. For instance, the variable *taxes* for Dane County will correspond to the sum of the category taxes for Dane County government and all city, village and township governments within Dane County jurisdictional boundaries divided by Dane County aggregate personal income.[7] On the revenue side the variable *disposable revenues* was also created by aggregating the categories taxes and non-taxes.

Besides the log of per capita income ($y_i$), the remaining set of conditioning variables ($x^j$ j =1,...,m) includes population growth rate, percentage of employment on agriculture (farm and agriculture services), percentage of employment on services (transport, commerce and public utilities, wholesale and retail trade, finance, insurance and real estate, federal,state and local government), an entropy index for income distribution, the ratio of active to inactive population (population with 20 to 64 years old/population with less than 20 and more than 64) and the

[7] Local fiscal variables will be written in italic to differentiate from their respective category.

unemployment rate.[8] Population growth rate was used as a proxy for the labor force growth rate along with initial income, these are variables commonly found in growth regressions.[9] The percentage of employment in agriculture and services were used to proxy the economic structure of a given county. The ratio of active to inactive population was included as a proxy for county demographic structure. Finally, the entropy index is commonly used to measure regional income distributions. We obtain this index by summing across different income categories the square of the percentage of households within them.[10] According to these measure, a region income distribution will be less equal, the higher is the entropy index.

Other things equal we should expect county per capita income growth to increase as population growth rate, percentage of employment in service, ratio of active to inactive population, the unemployment rate increases. It should decrease as the log of per capita income and the percentage of employment in agriculture increases. The effect of income inequality on growth is still an unresolved theoretical and empirical issue. Neverthless, it was included given their robust significance in several empirical analyses.[11]

Empirical Results

As pointed out by Kneller et al (1999), the presence of perfect multicollinearity imposed by the fiscal budget constraint should prevent us from including all different expenditure and revenue categories of local governments fiscal budget simultaneously in equation (1). However, the presence of rules matching the volume of transfers local governments receive from state and federal governments with the amount of taxes raised locally along with some rules predetermining the allocation of expenditures among different categories common among U.S. local governments should push this issue even further by inducing strong collinearities among subgroups of revenues and expenditures categories as well.

For that reason, our first step was to test for the presence of multicollinearity among different categories of the budget before attempting to estimate any of the proposed models. We did that in the simplest possible way by looking at the pairwise correlation among all possible combinations of revenue and expenditure categories (Table 1). It is clear from the pairwise

[8] Originally we have also included the percentage of employment in industry as an additional control for economic structure. However, the indication of strong multicolinearity between all measures led us to exclude this variable based on the fact that a decrease in the variance inflation factor resulting from its exclusion was higher than the decrease observed when the other economic structure proxies were excluded from the model.

[9] Investment ratio and human capital measures also common conditioning variables in the empirical growth literature were unavailable for Wisconsin counties.

[10] Overall, there are seven different household income categories: 1) less than $ 10,000; 2) $ 10,000 to $ 20,000; 3) $ 20,000 to $ 30,000; 4) $ 30,000 to $ 40,000; 5) $40,000 to $ 50,000; 6)$ 50,000 to $ 60,000; 6)$ 60,000 to $ 70,000; 7) $ 70,000 or more

[11] Forbes (2000) reviews the empirical literature on the effects of income inequality on growth and presents some new results using panel data techniques.

correlations that there are strong statistical linear dependency among all fiscal budget categories. Based on that we decided to estimate the effects of each fiscal budget category on income growth individually without including any subgroup of the remaining categories as controls.

Since the Hausman test rejects the null hypothesis of no correlation amongst the individual effects and the error terms for every fiscal budget category, our estimates from both the one-way and two-way random effects were not reliable and we continued by looking at fixed effect and pooled OLS models. For every fiscal budget category the two-way fixed effect model received the greatest support from the diagnostics (large F-statistics indicating the joint statistically significance of both county and time dummies). Their regressions estimates are reported here.

Let's start by looking at the overall effect of local governments on county per capita income growth captured both by the revenue and expenditure side of their budgets (Tables 2 and 3). In model A, county per capita income growth is regressed onto the variable *disposable revenues* and its square. *Disposable revenues* aggregates both tax and non-tax revenue categories in order to obtain a measure of the overall size of the government measured from its revenue stance. The relationship is clearly linear and positive. The absence of a non-linear effect from this variable should not come as a surprise given that increasing the provision of expenditures, productive or not, should not necessarily come at the cost of higher distortionary taxes if local governments can make use of transfers or user fees to prevent the productivity reducing effects of taxes to dominate the productivity increasing effects of expenditures for every desired budgetary level. Wisconsin local governments seem to be finding this right mix in such way that larger local governments are not compromising the economic growth of the regions under their jurisdictions but rather promoting it.

This argument is further supported by the results obtained in Model B where the effects of *total expenditures,* the expenditure side equivalent of disposable revenues*, on* county growth where also found to be linear and positive. It is also supported by Model D where non-tax sources present no statistically significant relationship with county growth. The results for Model C seems to support the hypothesis that all taxes are distortionary to some extent, given the statistically significant non-linear relationship between local taxes and growth. If an increase in expenditures is necessarily financed by an increase in taxes, there will be a point where the distortionary effect of taxes will mine county income growth. As a matter of fact there seems to be some counties where this point has already arrived.[12]

If local taxes as a whole present a non-linear effect on growth, what can be said with respect to the government activities their revenues are used to finance? Does the effect varies from one function to another? Part of the answer has already been given in Model B where *total*

[12] This result is robust to the inclusion of non-tax in Model B to control for non-tax revenue sources, although one has to keep in mind the problems imposed by multicolinearity explained above.

*expenditures* was found to present a positive effect on growth with transfers playing a key role to offset the distortionary effects of taxes. Puzzling enough, this positive result is not replicated when expenditures in individual functions are raised. This point is illustrated in Table 3, which reports the estimated effects of changes in expenditures for different government functions. Once the debt service is excluded, local government expenditures present a non-linear effect on growth as shown by Model E. This result may indicate that contrary to *total expenditures* increases in operating and capital *expenditures* may be more connected with increases in local taxes.

The effects of expenditures on growth also vary depending on the government function responsible for this expenditure. Local government expenditure increases in transportation (*road*), health and human services (*health*) and in general government services (*admn*) affects growth quadratically according with Models F, G, J, respectively. On the other hand, an expenditure increase in public safety (*safe*) and publicly provided amenities (*life*) do not affect county growth in a statistically significant way as presented by models H and I. This result seems to corroborate the idea that the productive enhancing effects of transportation, health and general goverment services are certainly limited by the productivity reducing effects of distortionary taxation just as predicted by the Barro (1990) model. The absence of a relationship between public safety and amenities may be an indication of their inability to improve the productivity of economic activities within each Wisconsin county despite their irrefutable impact on the welfare of the population.

Consistent results throughout the different models estimated were found regarding the conditioning variables. Initial income was found to be positive and statistically significant rejecting any convergence trend among Wisconsin counties and even suggesting a divergence pattern. Population growth, as predicted by the neoclassical growth, presented a positive albeit marginally significant signal. Unemployment rate presented a positive and statistically significant coefficient. The percentage of employment in agriculture also presented a consistent negative relationship with county growth corroborating Deller et al (2001). The remaining variables were not significant.

Stronger insights of the effects of local government can be obtained by computing the elasticities of county growth with respect to changes in their fiscal stances (Table 4). All elasticities when evaluated at the mean present themselves positive. On the revenue side, it should be noted the particularly high elasticity from local taxes. On the expenditure side, increases in public health services brings the large bang for the buck. As a final exercise we calculated for each of the fiscal categories, the level under which county growth would be maximized. We have done that in two different ways. First, analytically by using the coefficients from the linear and quadratic terms to compute the exact optimal level. Second, numerically by finding the fiscal category level at which a change in county growth would be at most five percent. The smaller is the curvature of the quadratic form estimated the smaller should be the second optimal level in comparison with the first. Those estimates reveal the surprising result that on

average, local government taxes and expenditures across Wisconsin counties are much smaller than their growth maximizing levels.

## Conclusions

Through the examination of a panel of Wisconsin counties (combine county and within county municipalities) the analysis reported in this paper found evidence that local government fiscal policies do affect regional growth in a non-linear manner as predicted by Barro's public finance growth model and summarized by Bartik's interpretation of the more recent relevant literature. This non-linearity seems limited to specific fiscal categories both on the revenue as well as on the expenditure side of the budget. The overall size of Wisconsin local government looked both from its revenue or expenditure stance presented a linear and positive effect on their respective counties. This result seems to indicate that there are still margin for an increasing local government role in regional development by increasing its local taxes and expenditures. We have identified some particular sectors where larger expenditures seem to be particularly welcomed. Further analysis should try to use other non-linear econometric models and look in more detail the effects of other budget categories. An important extension would be to incorporate the composition of government expenditures as an additional fiscal variable following Devarajan et al (1996).

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Table 1 : Pairwise Correlation between fiscal budget categories

| | Local Taxes | Non-Tax Revenues | Total Expenditures | Road Maintenance | Health and Human Services | Cultural and Amenities | Public Safety | Administration | Debt Service |
|---|---|---|---|---|---|---|---|---|---|
| Local Taxes | 1.000 | | | | | | | | |
| Non-Tax Revenues | 0.978 | 1.000 | | | | | | | |
| Total Expenditures | 0.989 | 0.994 | 1.000 | | | | | | |
| Road Maintenance | 0.969 | 0.968 | 0.980 | 1.000 | | | | | |
| Health and Human Services | 0.976 | 0.988 | 0.992 | 0.971 | 1.000 | | | | |
| Cultural and Amenities | 0.973 | 0.978 | 0.979 | 0.931 | 0.962 | 1.000 | | | |
| Public Safety | 0.960 | 0.970 | 0.974 | 0.935 | 0.958 | 0.952 | 1.000 | | |
| Administration | 0.965 | 0.959 | 0.972 | 0.965 | 0.960 | 0.932 | 0.928 | 1.000 | |
| Debt Servicing | 0.891 | 0.889 | 0.882 | 0.853 | 0.869 | 0.864 | 0.868 | 0.868 | 1.000 |

Table 2: Effects of Government Spending and Taxes on Local Economic Growth

| Variables | Model A | Model B | Model C | Model D |
|---|---|---|---|---|
| Intercept | -2.469 | | -2.893 | -2.399 |
| | (-6.18) | | (-7.01) | ( -6.02) |
| Total Revenues | 0.282 | | | |
| | (2.37) | | | |
| Total Revenues Squared | -0.123 | | | |
| | (-1.34) | | | |
| Total Expenditures | | .256 | | |
| | | (2.01) | | |
| Total Expenditures Squared | | -.100 | | |
| | | (-1.24) | | |
| Local Taxes | | | 2.944 | |
| | | | (4.21) | |
| Local Taxes Squared | | | -5.27 | |
| | | | (-3.51) | |
| Non-Tax Revenues | | | | 0.201 |
| | | | | (1.65) |
| Non-Tax Revenue Squared | | | | -0.097 |
| | | | | (-0.67) |
| Log Per Capita Income Lagged | 0.265 | 0.268 | 0.311 | 0.260 |
| | (6.79) | (6.82) | (7.69) | ( 6.64 ) |
| Annual Population Growth Rate | 0.249 | 0.259 | 0.242 | 0.256 |
| | (1.77) | (1.85) | (1.75) | ( 1.81) |
| Income Distribution (Entropy) | 0.145 | 0.139 | -0.022 | 0.126 |
| | (0.60) | (.58) | (-0.10) | ( 0.52) |
| Percent of Employment in Farming | -0.432 | -0.437 | -0.491 | -0.437 |
| | (-3.16) | (-3.20) | (-3.65) | ( -3.18) |
| Percent of Employment in Services | -0.042 | -0.043 | -0.056 | -0.041 |
| | (-0.60) | (-.61) | (-0.80) | (-0.57) |
| Ratio of Non-Employed Population | -0.085 | -0.084 | -0.108 | -0.089 |
| to Total Population | (-1.11) | (-1.1) | (-1.44) | (-1.16) |
| Unemployment Rate | 0.003 | 0.003 | 0.003 | 0.003 |
| | (2.86) | (3.03) | (3.12) | ( 2.88) |
| F statistic - model | 48.91 | 48.79 | 50.85 | 48.44 |
| F statistic - county effects | 1.64 | 1.64 | 1.92 | 1.55 |
| F statistic - time effects | 25.09 | 25.33 | 25.83 | 25.22 |
| Overall R Squared | 0.119 | 0.117 | 0.102 | 0.1257 |

Notes :

1) Dependent variable is $\ln(y_t/y_{t-1})$, t=1990-98 (T=8).

2) Total Number of Observations is 560 (70 counties over 8 years)

3) t-statistics in parenthesis

Table 3: Effects of Expenditure side categories on County-based Economic Growth

| Variables | Model E | Model F | Model G | Model H | Model I | Model J |
|---|---|---|---|---|---|---|
| Intercept | -2.631 | -2.52 | -2.445 | -2.358 | -2.338 | -2.448 |
| | (-6.59) | (-6.28) | (-6.17) | (-5.82) | (-5.87) | (-6.13) |
| Total Expenditure | 0.648 | | | | | |
| | (3.88) | | | | | |
| Total Expenditure Squared | -0.392 | | | | | |
| | (-2.72) | | | | | |
| Road Maintenance | | 1.171 | | | | |
| | | (2.53) | | | | |
| Road Maintenance Squared | | -3.312 | | | | |
| | | (-1.70) | | | | |
| Health and Human Services | | | 1.265 | | | |
| | | | (3.14) | | | |
| Health and Human Services Squared | | | -4.783 | | | |
| | | | (-2.69) | | | |
| Public Safety | | | | 0.95 | | |
| | | | | (0.19) | | |
| Public Safety Squared | | | | -0.192 | | |
| | | | | (-0.15) | | |
| Cultural and Amenities | | | | | 0.319 | |
| | | | | | (1.01) | |
| Cultural and Amenities Squared | | | | | -0.707 | |
| | | | | | (-0.45) | |
| Administration | | | | | | 1.123 |
| | | | | | | (2.16) |
| Administration Squared | | | | | | -7.801 |
| | | | | | | (-1.59) |
| Log Per Capita Income Lagged | 0.275 | 0.273 | 0.264 | 0.258 | 0.256 | 0.265 |
| | (7.09) | (6.94) | (6.80) | (6.55) | (6.54) | (6.78) |
| Annual Population Growth Rate | 0.233 | 0.289 | 0.221 | 0.25 | 0.229 | 0.271 |
| | (1.68) | (2.06) | (1.59) | (1.77) | (1.61) | (1.94) |
| Income Distribution (Entropy) | 0.232 | 0.137 | 0.03 | 0.06 | 0.078 | 0.086 |
| | (0.97) | (0.58) | (0.13) | (0.25) | (0.33) | (0.36) |
| Percent of Employment in Farming | -0.399 | -0.44 | -0.413 | -0.459 | -0.458 | -0.421 |
| | (-2.94) | (-3.23) | (-3.03) | (-3.35) | (-3.35) | (-3.11) |
| Percent of Employment in Services | -0.041 | -0.031 | -0.051 | -0.037 | -0.0473 | -0.038 |
| | (-0.59) | (-0.44) | (-0.73) | (-0.51) | (-0.66) | (-0.53) |
| Ratio of Non-Employed Population | -0.068 | -0.109 | -0.791 | -0.098 | -0.094 | -0.095 |
| to Total Population | (-0.90) | (-1.43) | (-1.03) | (-1.27) | (-1.23) | (-1.25) |
| Unemployment Rate | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |
| | (2.96) | (2.65) | (2.84) | (2.98) | (3.02) | (3.12) |
| F statistic - model | 50.43 | 49.01 | 49.58 | 47.26 | 48.1 | 48.44 |
| F statistic - county effects | 1.79 | 1.6 | 1.66 | 1.59 | 1.58 | 1.63 |
| F statistic - time effects | 25.89 | 25.19 | 26.34 | 25.76 | 25.94 | 25.61 |
| Overall R Squared | 0.108 | 0.133 | 0.134 | 0.123 | 0.125 | 0.129 |

Notes :

1) Dependent variable is $\ln(y_t/y_{t-1})$, t=1990-98 (T=8).

2) Sample includes 70 Wisconsin counties (N=70). Total Number of Observations is 560 (N*T=560).

3) t-statistics in parenthesis

Table 4: Magnitude of the Effects of Local Public Sector Size and Scope on Local Economic Growth

| Variable | Mean Value | Elasticity | Maximum | 5% from Max |
|---|---|---|---|---|
| Total Revenues | 0.084 | 1.159* | 1.143 | 0.234 |
| Local Taxes | 0.028 | 3.846* | 0.279 | 0.207 |
| Total Expenditures | 0.073 | 2.274* | 0.828 | 0.573 |
| Road Maintenance | 0.018 | 0.999* | 0.177 | 0.121 |
| Health and Human Services | 0.020 | 1.129* | 0.132 | 0.103 |
| Public Safety | 0.015 | 0.070 | 0.249 | 0.209 |
| Cultural and Amenities | 0.010 | 0.156 | 0.225 | 0.158 |
| Administration | 0.010 | 0.513 | 0.072 | 0.068 |

Notes :

1) Let $G_t = \ln(y_t/y_{t-1})$. Estimated model corresponds to $G = a + bx + cx2$ .

Where x corresponds to the proxy for government size or scope.

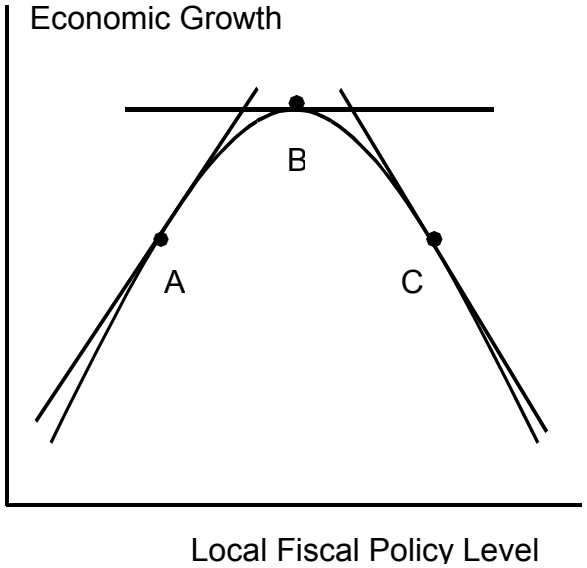
2) Elasticity = $\partial G/\partial x * x/G$

3) Elasticity is also measured at x = mean. Star denotes elasticity significant at 5% level

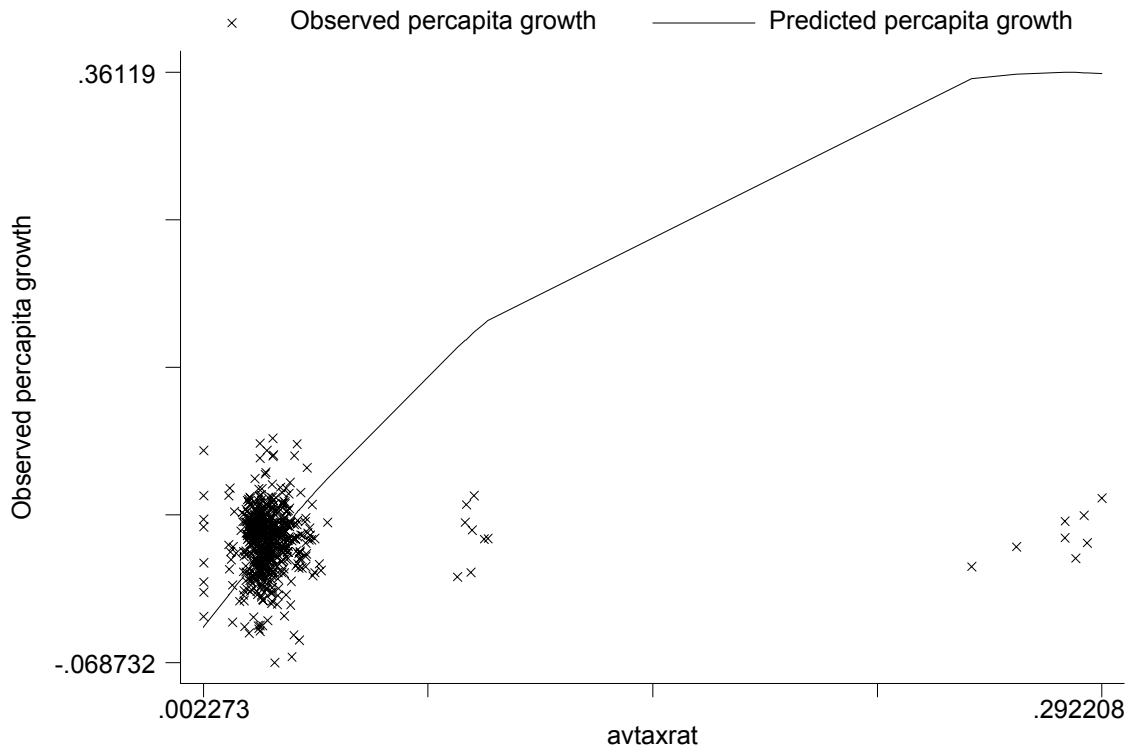
4) Maximum corresponds to arg max G reached at $x = -b/2c$.

5) 5% from Max corresponds the value of x such that $\partial G/G = 0.05$

Figure 1: Fiscal Policy – Economic Growth Hyper-surface

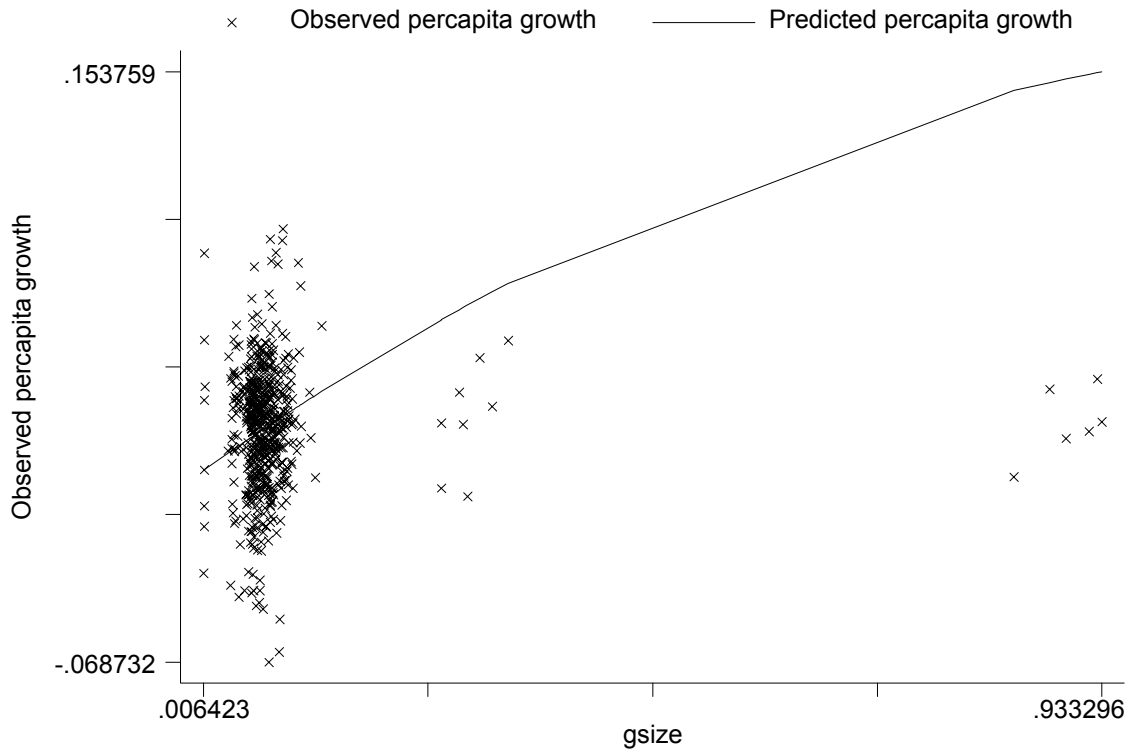


**1) Taxes (avtaxrat)**



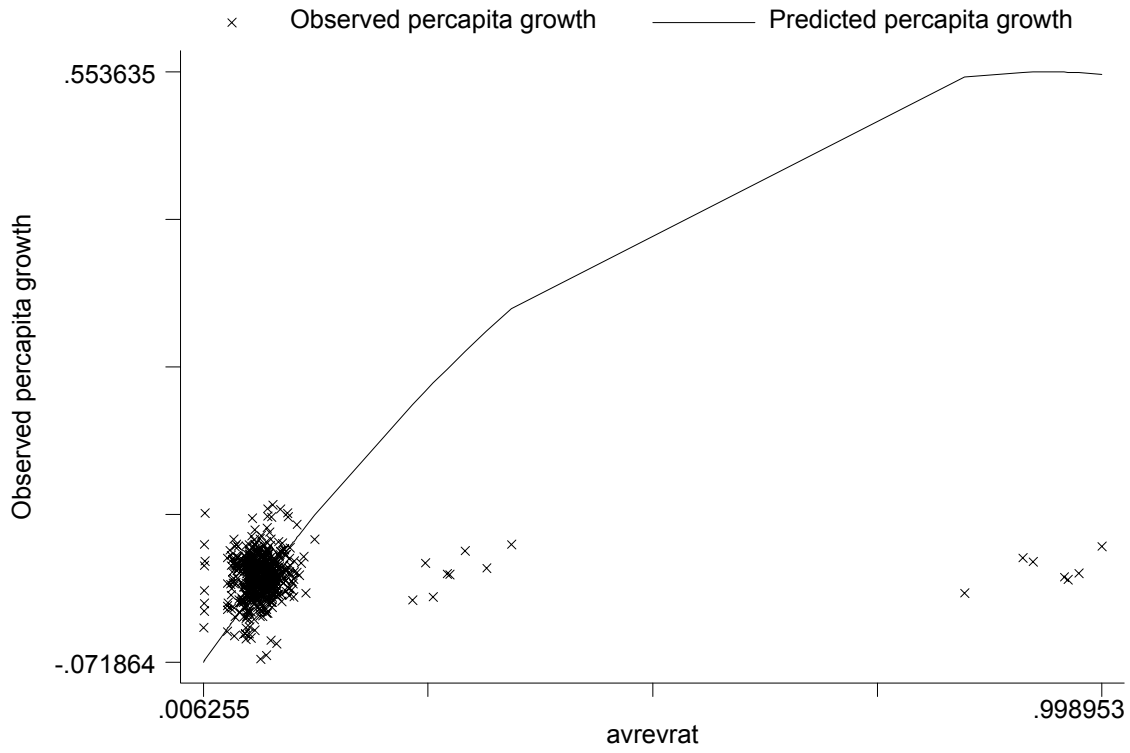

***avtaxrat = Tax Revenues collected by county and local governments/ County income***

## 2) Total Expenditures (gsize)



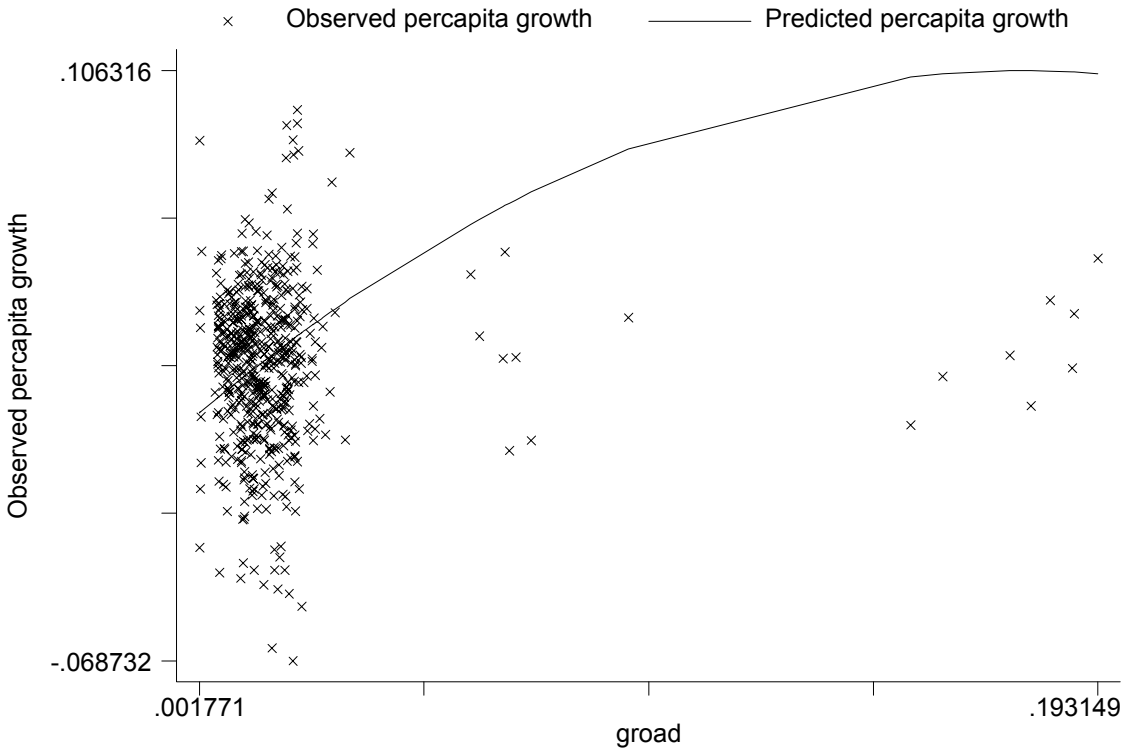

***gsize =Total county and local government expenditures/ County income***

**3) Disposable Revenues (avrevrat)**



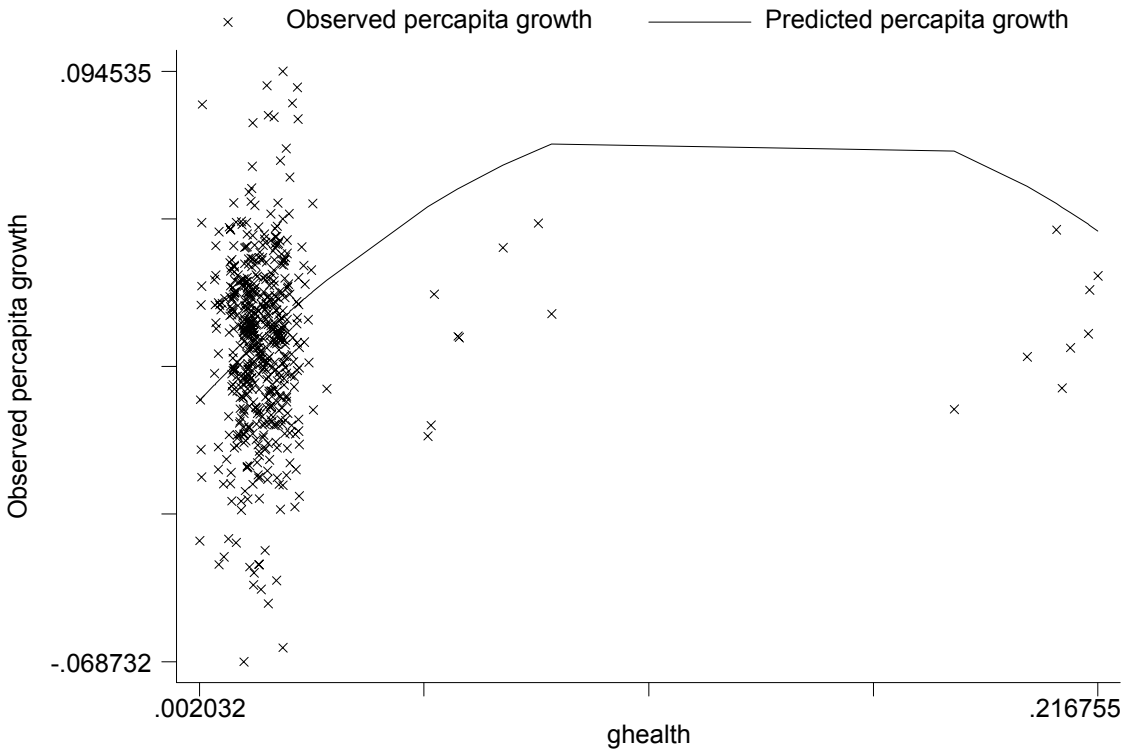

***avrevrat = ꝛotal revenues available to county and local governments/ County income***

**4) Roads (groad)**



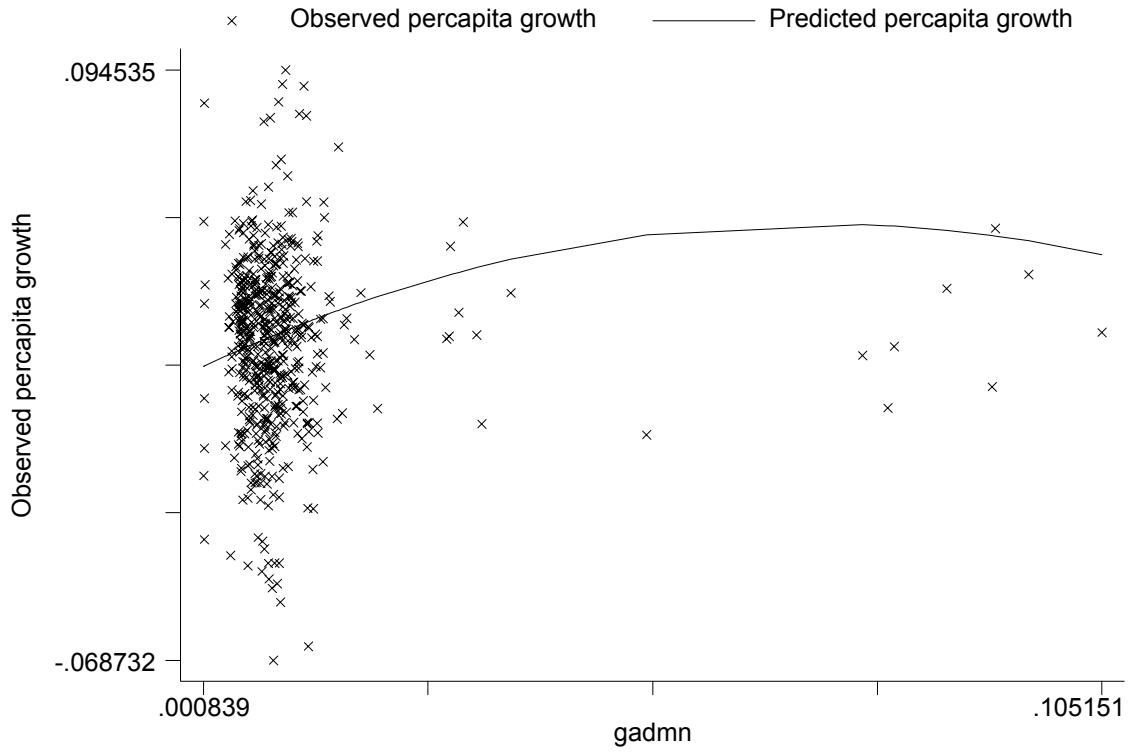

groad = County government expenditures with highway construction, maintenance of road facilities and any other transportation related services/ County Income

## 5) Health (ghealth)



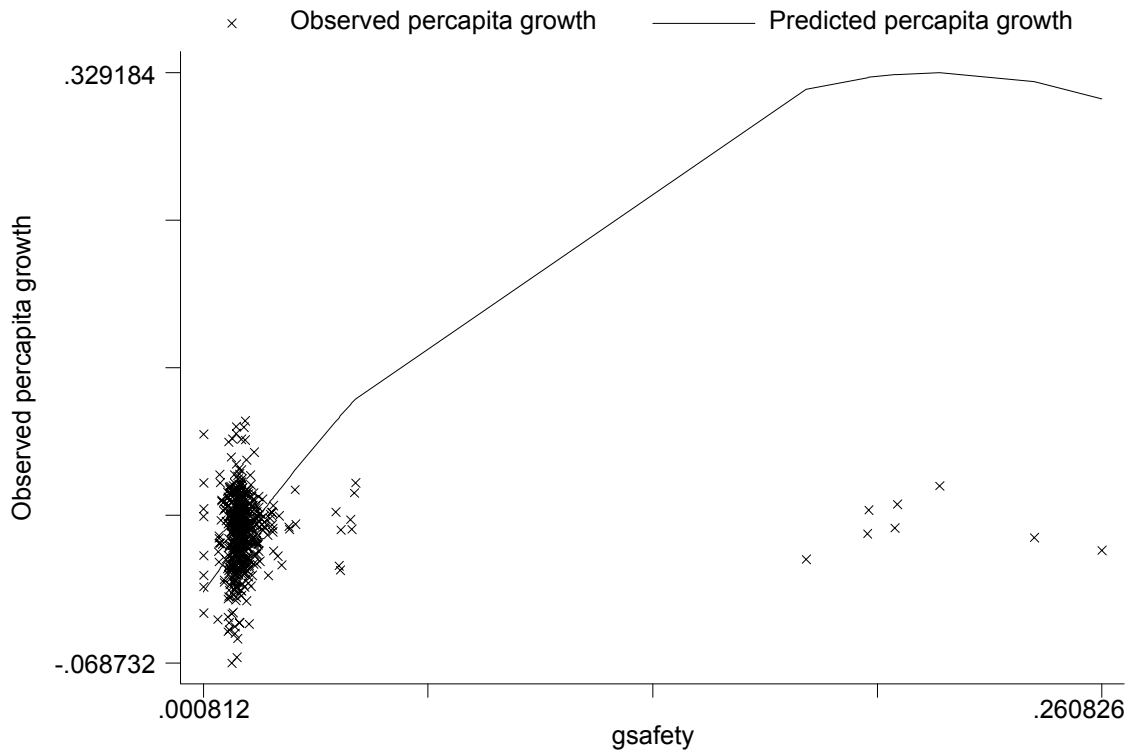

ghealth = County government expenditure with collection of solid waste, provision of sewage systems and any other public health and human related services/ County Income

**6) Administration (gadm)**



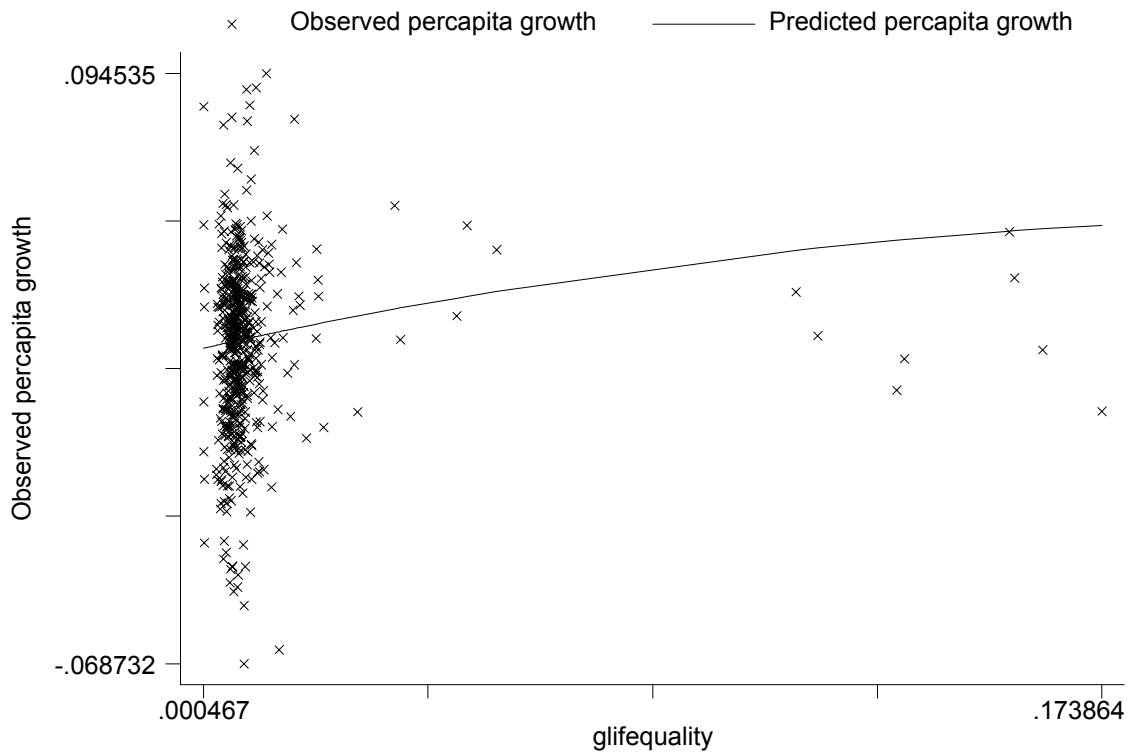

gadm = County government general expenditures for board clerk, treasurer, accounting, election, municipal court, municipal buildings and other administrative functions/ County Income

## 7) Safety (gsafety)



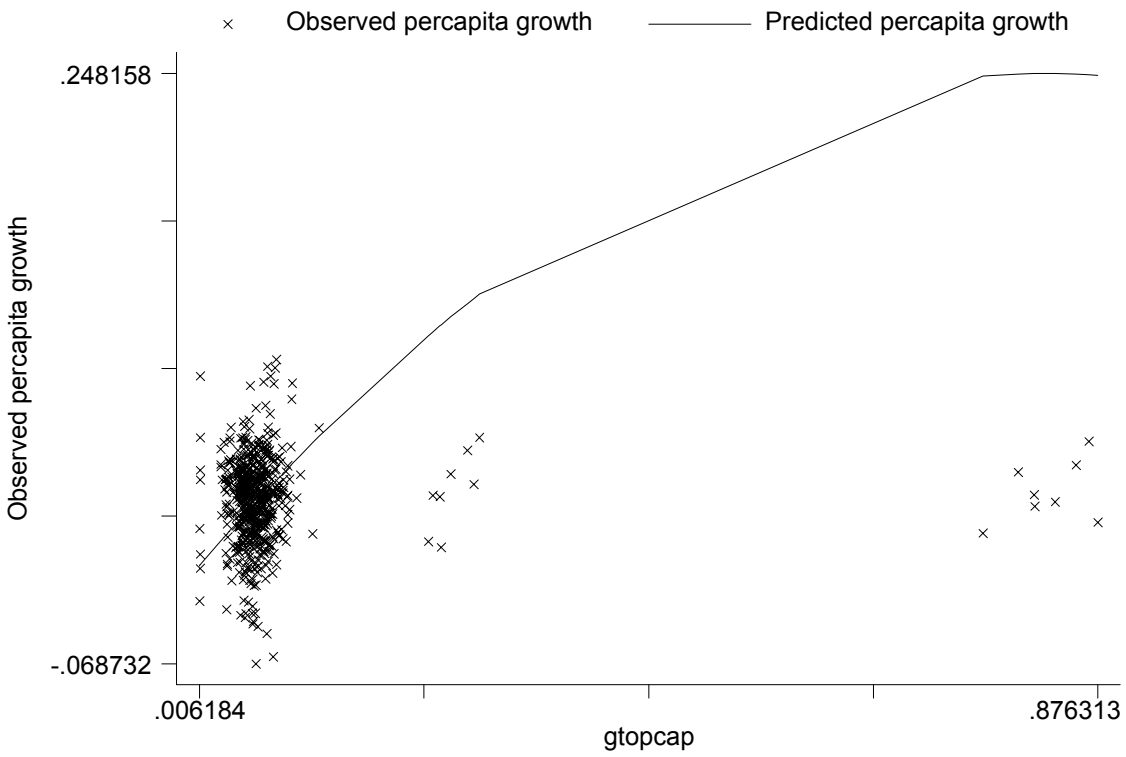

gsafety = County government expenditures on law enforcement, firefighting and any other public safety related services/ County Income

*8) Life (glifequality)*




glifequality= County governemnt expenditures culture, parks and recreation, conservation and development/County Income

*9) Expenditures (gtopcap)*




gtopcap= County government operating and capital expenditures/County in