Natural resources royalties and local development in Colombia

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Abstract

The purpose of this research is to evaluate the hypothesis of differentiated growth in the municipalities of Colombia which receives rents from exploitation of non-renewable natural resources in comparison with the rest of the country. A specific strategy is to estimate the empirical evidence for the producers regions of coal and oil and also use techniques related to impact evaluation, specifically the difference – in difference estimator (diff-in-diff) which compares the evolution of the economic activity into the regions affected by the royalties' source of rents with the unaffected ones. An important aspect of this assessment is the legislation based on constitutional guidelines, represented in the law No 141 of 1994, which state the main structure to capture, distribute and invest royalties' rents. This point of reference is important in terms of evaluate impact, before and after the event.

Key Words: Regional development, natural resources, impact evaluation.

JEL Clasification: C10, Q32, R10.

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1. Introduction.

The political constitution of Colombia in the article 332 and 366 states that "Colombian state" owns the subsurface and non-renewable natural resources and the beneficiaries of royalties will direct local authorities in which natural resources are exploited, as well as sea and river ports.

Following the constitutional guidelines, the law 141 of 1994 creates the structure to liquidate, distribute and use the total amount of royalties generated by all the non-renewable resources produced in Colombia. Even though, this legislation was modified with law 756 of 2002, specifically in the liquidation for direct beneficiaries, the structural change is associated to law 141, which was a radical break in the pattern of management, especially in the issue related to the importance given to basic needs as a major goal of investment to generate local development.

The goal of this article is explore the relationship between economic activity, measured as the quantity of taxes collected of industry and commerce activities, and royalties associated to the oil and coal activity, which chain of value since the production to the transport and final utilization, in theory has backward and forward linkages that generate local and regional development. To estimate this connection, difference in difference model (Diff in Diff) is used to identify the impact of this extraordinary resources over municipalities affected compared with the unaffected ones.

The findings states more questions than answers since there is no evidence to connect local development to royalties resources and if a weak relationship is accepted, the relation could be negative, having a negative impact over the local economic activity.

This document is divided into seven sections including this introduction. The second part briefly describes the guidelines of the law 141 of 1994 and Act 756 of 2002. The

third party makes a literature review of local economic development and the relationship with non-renewable natural resources. Subsequently, follow methodology, data, and results. Finally a discussion is raised as a form of concluding remarks.

2. Law of royalties in Colombia.

Following the constitutional guidelines, the law 141 of 1994, generate the legislative structure of liquidation, distribution and use of royalties Colombia. This law gets modifications with law 756 of 2002, essentially in the liquidation part.

The liquidation of the amount of resources depends on the specific product: Oil (20%), Coal (Production less than 3 tons -5%- and more than 3 tons -10 %-) and others as Nickel, Iron and Copper, Gold And Silver, Platinum, Salt, Limestones (modified by law 757 of 2002). However the scope of this discussion is related to what amount of total resources belongs to government (government take and state take) and the creation of the optimum oil contract which give incentives to private party to explore and develop while the government capture the maximum rent.

Distribution of royalties basically is divided in two branches: indirect and direct. The indirect way is related to a fund that manages a part of total amount of resources to be distributed in all the regions of Colombia: The National Royalties Fund (NRF). And the direct way is concentrated on the producers and the other participants in the distribution chain.

The resources of NRF are centralized and delivered to municipalities through projects of local investment, presented by local authorities and approved for a board at NPD (National Planning Department: Administrator of fund). The resources of NRF have a great quantity of specific issue of investment: more than 20 destinations that create low flexibility in the use (DNP, 2008, p. 60). Furthermore, the utility of the fund, in terms of generation of projects which impact local development, had been controversial. In fact, there is a huge amount of resources sub utilized, generating interest in the financial system, but that cannot be distributed at all abroad the country.

The direct royalties, has a defined structure of distribution in function of the characteristics of the product (oil, coal, nickel, gold, etc) and territorial entity (producer, port, among others). In relation with coal and oil, the rules of law 141 are the following:

Table 1: Oil Royalties distribution.

Entity	**Production less to 20,000 BPMD (%)**	**Production more to 20,000 BPMD (%)**
Producers Departments	47,5	47,5
Producers Municipalities	25,0	12,5
Ports Municipalities	8,0	8,0
National Royalties Fund	19,5	32,0

Source: Law 141 de 1994 (modified by law 756 of 2002)

Table 2: Coalroyalties distribution.

Entity	**Production less to 3 tons (%)**	**Production more to 3 tons (%)**
Producers Departments	45	42
Producers Municipalities	45	32
Ports Municipalities	10	10
National Royalties Fund		16

Source: Law 141 of 1994.

In terms of use, the law establishes that the 100% of the resources must be delivering in "priority projects related to local development plan" in municipalities and departments. But, the investments made by local authorities according to 15 Article are conditioned to achieve the minimum coverage, specifically in the fields of environmental sanitation, education, health, electricity, water and sewer. If the territorial entity doesn't accomplish this requirement, the law forces to invest a minimum of these resources to reach coverage's (See table 3).

Table 3: Legal rules to invest royalties.

DEPARTAMENTS	
Law 141 of 1994 and 756 of 2002	
100% to invest in priority projects related to local development plan.	90% Projects of investment
	5% Technical intervention
	5% Financial expenditure
Law 756 change the investment to reach minimum coverages: From 50% to 60%	

MUNICIPALITIES	
Law 141 of 1994 and 756 of 2002	
100% to invest in priority projects related to local development plan.	90% Projects of investment
	5% Technical intervention
	5% Financial expenditure
Law 756 change the investment to reach minimum coverages: From 80% to 75%	

Source: Elaborated by the author, based on laws 141 of 1994 and 756 of 2002.

Table4: Minimun coverage.

Minimun coverage	**Percent**
Higest infant mortality	1
Poor healt	100
Basic education	90
Safe Drinking water	70
Sewerage	70

Source: National Planning Department (2008)

To summarize, the law 141 of 1994 create a strategy to guarantee, through the resources of royalties, the complete coverage in basic public services. If a territorial entity achieves the goal in coverage, the law authorizes the use or resources in other issues included in the local development plan.

Following the conditions and scope of the law, its important now proceeds to evaluate this strategy of investment in terms of economic activity.

3. Literature review: Resource – dependence, local economic development.

The nonrenewable natural resources and their use have been cause of many discussions around management to local and national level. The literature identified two contradictory positions: the first about the resources dependence and the second about endowment of natural resources. As, many studies have founded a negative relation between the economic growth and the resources dependence, on the contrary, a positive relation with the endowment´s resources. This discussion was proposal by Innis (1956) and Mackintosh (1964), it means, generally exist academics whose think that mineral resources are strategies and basis to achieve a high level of economic development, an alternative view is the skepticism about the natural resources benefits.

Initially, Sachs and Warner (1997), consider that the economies with a wide endowment of natural resources tend to growth slower than economies which don't have ones; it means, that they identified this phenomenon like "natural resources curse", but even, the evidence indicate that; the more dangerous resources to the economic growth are the minerals and the petroleum. Under the same line of investigation, Auty (2001), consider that natural resources generates a false sense of security; his evidence showed that in natural resources abundance economies exist a interest groups which slow the economic reforms and therefore the economic growth.

After that, Ross (1999) argued that: natural resources abundance economies have low technology levels, therefore this countries are attractive to the foreign investment, in order to exploit the natural resources as oil, petroleum, coal, etc., as well as, increasing the level of international reserves and generate additional incomes for the government without affecting the tax burden to society.

Some authors identified the natural resources curse with the Dutch Disease theory was developed in the 1970's to explain economic difficulties the Netherlands had to face after the discovery of natural gas in the North Sea. At the time this phenomenon generated a Dutch currency appreciation and a loss of international competitiveness, according to Lederman and Maloney (2007), further increase the relative prices of tradable goods, compromising investment and growth rates.

According to the literature review of natural and mineral resources, these affect the processes of local development, specifically the Economic sector, according with Desai (2003), the unearned resources by some local authorities have encouraged tax laziness and have generated interest conflicts on the capture of them, Voracity - Effect.

Furthermore, economic theory suggests that the mineral resources encourage the process of local economic development (LED). It means, through exploitation of mineral resources, the welfare level of a community can be raised, given the productive structures and characteristics of each territory. According to Barquero (2000) this welfare is increased if exist a production structure able to generate scale economies, through the use of available resources and the introduction of innovation.

Among explanations of Stöhr (1985), the endogenous local development give an important role to companies, organizations, local institutions and the civil society in the structural changes and economic growth process. It means, exist integration between the political, social and economic process in the society, finally it´s important to add that LED can generate higher economic growth given the ability of areas to reduce transaction costs and generate scale economies.

Based on the theories about the Local Economic Development (LED), in the case of Colombia Perry and Olivera (2010) discussed, the economic growth of oil and Coal

producing departments, through the analyze of impact with the non receptors royalties departments, they founded: firstly that oil and coal production have presented a positive and significant impact on the municipalities' economics development levels, besides a positive impact of the coal production in the economic development of departments , in contrast a negative relation with the oil production.

They used five indicators of institutional quality; in addition, to the municipalities exist only one datum of GDP per capita for 2002, it means they results are based on cross sectional data.

Moreover, Valdés (2008) identifies four issues related with the resources from the royalties, those are: the Inequality and concentration of resources, low impact and results with respect to the minimum coverage as well as a high degree of dependence royalties and a low level of taxation and sustainable development, besides institutional weakness, and finally the low transparency in the use of the royalties, the author proposes to increase the resources of NRF, in order to have a major control in the royalties received by the municipalities.

4. Methodology.

An empirical evaluation aims to identify the change in economic activity as a result of an increase in the amount of resources associated with royalties from coal and oil. This measurement is performed before and after the law of royalties in the year 1994. Of course, the law is considered an exogenous event, which change the pattern of distribution of these resources, from the point of view of regional distribution (departments and municipalities) as well as the sectors concerned (priority to basic services).

To perform this evaluation is used an estimator DIF and DIF, which compares the effect of the event on a group called "treatment group" with the performance of those who were not affected. In this case we compare the effect on economic activity, measured as the change in the collection of the tax on industry and commerce, of municipalities with oil and coal royalties to those who are not receiving any of the above. This is done by comparing the effect before and after the law 141 of 1994. The empirical strategy used to identify this pattern takes two ways: binary and non binary.

4.1.Binary strategy

We performed a simple impact estimation through DIF and DIF estimator in the fol lowing model:

$$\Delta y_i = y_{i1} - y_{i0} = \beta_0 + \beta_1 D_1 + (\varepsilon_{i1} - \varepsilon_{i0}) \quad (1)$$

$$\Delta y_i = \beta_0 + \beta_1 D_1 + (\varepsilon_i - \varepsilon_i) \quad (2)$$

Y_{it} is the rate of growth of industry and commerce tax per capita in the municipality i for period t, with a window $t = 0$ before the law 141 (1985 - 1995) and $t = 1$ after treatment (1996 - 2006). D_1 is a variable dummy to differentiate municipalities with oil

and coal ($D_1 = 1$) from the remaining ($D_1 = 0$). β_1 is the impact of the program given that is the difference between the means of each group. (Bernal and Peña, 2011, p. 76)

The estimator DID and DIF seeks to isolate the effect of treatment group on the variable and as a panel, controlling a large proportion of unobserved characteristics.

4.2.Strategy No Binary

The empirical strategy that is developed is based on a binary NO treatment (Slaibe, 2009), focusing not only on the effect per se, but also the size of the treatment: that is, the amount of royalties per capita delivered to each municipality. Following Slaibe (1999) to implement the DIF and DIF estimator we have the nextregression model structure:

$$y_{it} = \alpha_0 + \alpha_1 d_t + \alpha_1 d^j + \beta d_t^j x_i + \varepsilon_{it}(2) \quad (3)$$

Y_{it} is the rate of growth of industry and commerce tax per capita in the municipality i for period t. d_t is a time dummy variable, if the municipalities is observed after the treatment (t=1) (window t = 0 before the law 141 (1985 - 1995) and t = 1 after treatment (1996 - 2006)); d^j is a dummy for eligible municipalities equals to cero if the municipality i belong to the treatment group (j = T) and cero if belong to control group (j = C). $d_t^j$is a dummy variable for t=1 and j = T.

Taking the first difference to eq. 2 we have:

$$\Delta y_{it} = y_{i1} - y_{i0} = \alpha_1 + d_t^j \beta x_i + \varepsilon_{it} \quad (4)$$

Equivalently, and point out that δ_t^j =1 if and only if $X_i > 0$

$$\Delta y_{it} = \alpha_1 + \beta x_i + \varepsilon_{it} \quad (5)$$

The constant α_1 shows the possible changes in the pattern of growth of industrial and commercial tax for the full sample (t = 0, t = 1).$x_i$is the cumulative royalties per capita transferred to municipalityi from 1996 to 2006. β measures whether the amount of royalties have a significant impact on local economic activity. Taking other factors that affect the growth of local economic activity, the exercise includes an important resource of local governments that is the General System of Participations (GSP). The SGP is transference of Central National Government (CNG) to entity territorial's in order to give financial support to local administrations. In small municipalities which also are producers of oil and coal, the royalties and SGP is the only one option to finance investment in local development projects.

5. Data.

Colombia has 1103 municipalities distributed in 32 departments. The fiscal data of local government used in this exercise is collected by the National Planning Department (DNP). One problem to construct the database is the absence of information, especially when is a municipality in a remote area in the decade of the eighties. Also, there is 39 municipalities that doesn't exist before 1996, so it`s impossible the evaluation. After the filter, the local databasefor the estimations is of 948 municipalities. (Data related to education, infrastructure of roads and other indicators filter the database until 600 municipalities).

The data is estimated in local currency with constant prices of 2010. The table 5 summarizes the principal information of database, pointing out the enormous variability in royalties revenues among the municipalities.

Table 5: descriptive statistics (Millions of pesos)

Municipal statistic	#Observations	Average	Standard deviation	Minimum	Maximum
Growth rate Municipal industry and commerce tax (1985-1995)	948	0.2690168	0.450032	-0.4303527	2.916517
Growth rate Municipal industry and commerce tax (1996-2006)	948	0.3659187	0.5673798	-0.4193281	2.973155
Difference (1996 - 2006) to (1985 - 1995)	948	0.0969019	0.6985494	-2.685258	3.403508
Royalties (1996 - 2006)	226	0.1145461	0.3414309	5.12E-07	3.598128

Source: authors' calculations

The municipalities that receive the major portion of royalties resources are concentrated in the region of the eastern plains (Departments of Casanare, Meta, Arauca) and Atlantic coast (Cesar y Cordoba). From top ten, just one of the municipalities is coal producer (La jaguar de Ibirico), and other is a port municipality (Cartagena). The remaining are oil producers. The per capita distribution of royalties is concentrated in the regions of eastern plains, Atlantic coast and also on the region of big Tolima (Tolima and Huila departments) (See tables 6 and 7).

Table 6: Top 10 municipalities benefiting from royalties in Colombia from 1996 to 2006 (Millions of pesos)

Department	Municipalities	Royalties 96 - 06	%
Casanare	Aguazul	50,219.54	6.66%
Arauca	Arauca	38,984.38	5.17%
Bolivar	Cartagena	33,125.85	4.39%
Casanare	Tauramena	29,636.28	3.93%
Huila	Neiva	26,774.72	3.55%
Meta	Villavicencio	23,631.96	3.13%
Meta	Castilla la Nueva	23,250.54	3.08%
Santander	Barrancabermeja	20,889.00	2.77%
Cordoba	San Antero	18,388.67	2.44%
Cesar	La Jagua de Ibirico	17,683.39	2.35%
Suma		282,584.32	37.48%
Otros		471,425.01	62.52%
Total		754009.3262	100.00%

Source: authors' calculations

Table 7: Top 10 municipalities benefiting from royalties in Colombia (Average from 1996 to 2006, Millions of Pesos Per Capita)

Department	Municipalities	Royalties 96 - 06
Meta	Castilla la Nueva	3.598
Casanare	Tauramena	2.072
Casanare	Aguazul	1.958
Casanare	Orocue	1.088
Tolima	Yaguara	0.914
Bolivar	Cantagallo	0.824
Cesar	La Jagua de Ibirico	0.801
Cordoba	San Antero	0.754
Casanare	Mani	0.733
Huila	Aipe	0.696

Source: authors' calculations

It's necessary point out that although the law was approved in 1994, the fiscal accounts of municipalities began to receive resources since 1996. For that reason, the year 1996 is the watershed.

6. Preliminary Results

When looking at some statistics described in the control group and treatment before intervention it shows pre-existing differences (significant at 1%) (See table 8). Therefore it's important the use of DIF and DIF estimator to avoid this bias.

Table 8: Mean comparison test.

Group	Observations	Average	Standard Deviation	t_statistic
Control	722	0.2362949	0.0158274	-4.1444**
Treatment	226	0.3785658	0.0347708	

** 1% significant

Source: Source: authors' calculations

6.1.Binary strategy

Table 9 shows the results for equation 1: it shows that the variable dummy D is not significant to explain thedifferences of growth of industry and commerce tax,among the periods 85-95 y 96-06. On the other hand, the SGP is significant (1%)

Table 9: results with independent variable "dummy".

Estimates coefficients (Eq. (1))	OLS		P>|T|
Constant (β_0)	-0.1306073**	(0.0462698)	0.005
D	-0.760254	(0.0523203)	0.147
SGP	0.7779122**	(0.1215261)	0.000
R-Squared	0.0420		
Significance *F(k,M-k)*	21.65**		0.000
# total observations	948		
# observations control group	722		
# observations treatment group	226		

White´s robust standard deviations in parenthesis

** 1% significant

* 5% significant

Source: authors' calculations

6.2.Strategy No Binary.

Table 10 shows the results for equation 3: it shows that the cumulative royalties per capita transferred to municipality i from 1996 to 2006 it's not a significant variable to explain the differences of growth of industry and commerce tax, among the periods 85-95 y 96-06. On the other hand, the SGP is significant (1%)

Table 10: The impact of royalties on municipal economic activity: Strategy No binary. OLS results.

Estimates coefficients (Eq. (2))	OLS		P>|T|
Constant (β_0)	-0.1558165**	(0.0446328)	0.001
Royalties per capita	-0.1997194	(0.1312252)	0.128
SGP	0.8175523**	(0.1240016)	0.000
R-Squared	0.0420		
Significance *F(k,M-k)*	21.76**		0.000
# total observations	948		
# observations control group	722		
# observations treatment group	226		

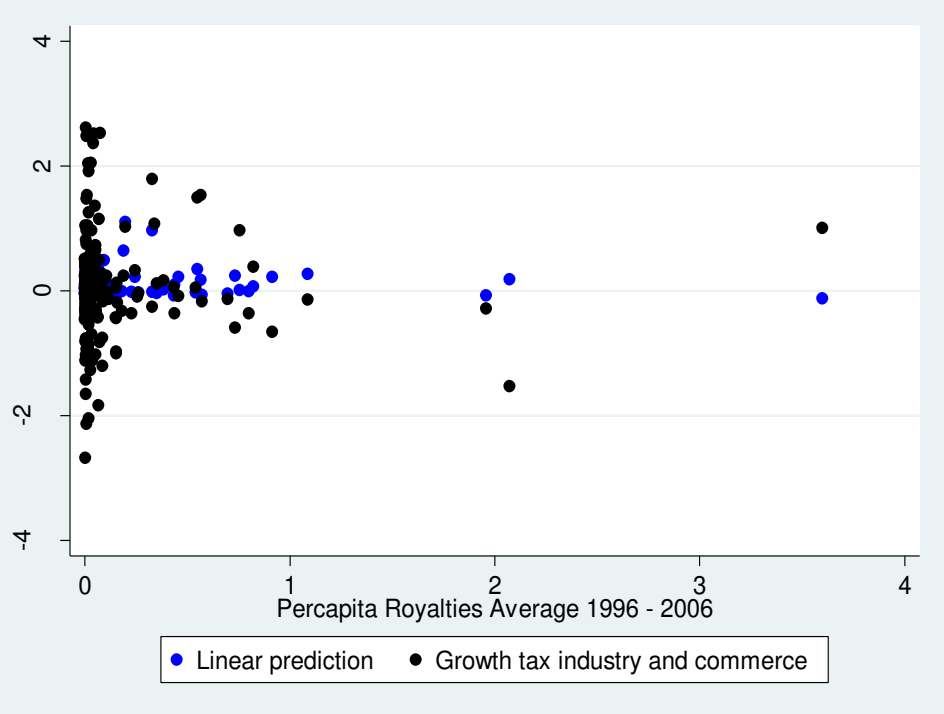
White´s robust standard deviations in parenthesis
** 1% significant
* 5% significant
Source: authors' calculations

This weak relationship between tax of industry and commerce and royalties per capita can be supported by the Graph1, where it's difficult describes an association.

This pattern could be explicated by the great dispersion of differences of growth of industry and commerce tax, especially in municipalities with small royalties per capita. So, if this is the case, it's interesting asses the behavior by segments of the distribution in the differences of growth of industry and commerce tax. The table 11 shows, the results for quartiles of distribution, finding that the result are the same: the cumulative royalties per capita transferred to municipality i from 1996 to 2006 it's not a significant

variable to explain the differences of growth of industry and commerce tax, among the periods 85-95 y 96-06, trough different segments of the distribution of the last variable.

Graph 1: OLS prediction.



Source: authors' calculations

Table 11: The impact of royalties on municipal economic activity: Strategy No binary. Results by quartiles.

Quartiles	Estimates coefficients (Eq. (2))	OLS		P>|T|
q25	Constant (β_0)	-0.2715307**	(0.043304)	0.000
	Royalties per capita	-0.2945187	(0.296866)	0.321
	SGP	0.3881698**	(0.1356758)	0.004
q50	Constant (β_0)	-0.1636245	(0.022899)	0.000
	Royalties per capita	-0.2520502	(0.247956)	0.310
	SGP	0.6400558**	(0.089468)	0.000
q75	Constant (β_0)	-0.111524**	(0.047247)	0.018
	Royalties per capita	0.0327157	(0.176776)	0.853
	SGP	1.348352**	(0.125212)	0.000

Bootstrap standard deviations in parenthesis.

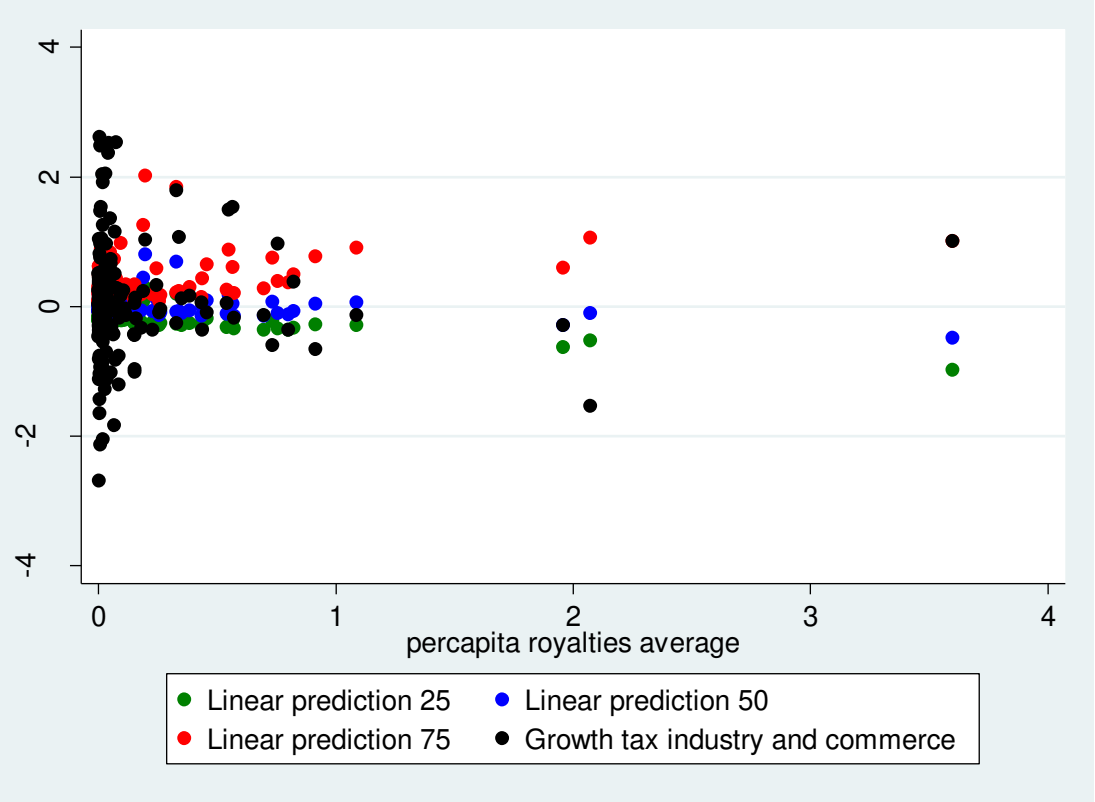
** 1% significant

* 5% significant

Source: authors' calculations

The Graph 2 shows the weak relationship between differences in growth of industry and commerce taxes and royalties per capita, by different segments of distribution of the taxes.

Graph 2: Prediction by quartiles.



Source: authors' calculations

7. Discussion

The extraction of oil and coal is a temporary source of revenues. This activity must find a replacement in the medium and long term to generate new resources for the local development. Realizing the assessment, the royalties seemingly has not a relationship with local economic activity.

The inevitable question is ¿Why the royalties doesn't have an impact on the local economic activity? The answer comes from different hypothesis associated to institutional weaknesses, corruption and rent seeking, etc. Therefore, an extension of the model it's important,with the inclusion of other variables that can capture this behavior, which depends on the data available and the cost in terms of number of municipalities included in the sample.

However, this kind of approach not recognize the value of other indicators of human development, that could be improved with the important amount of resources directed to accomplish minimum coverage's in Poor health, Basic education, Safe Drinking water, Sewerage, etc.

It's also important identify the characteristics of SGP in contrast to royalties resources to identify the reasons of SGP impact in terms of economic activity.

The assessment of impact of law 141 of 1994 it's not associated with local economic activity. The objectives of the law, was connected to reach certain levels in human needs, but this cannot be related to industry and commerce, at least in the short term. Variables as education and health, could impact the economyin the medium and long term.

References

1. Auty, R. (1998). Resource Abundance and Economic Development.
2. Barquero, A. (2000) La política del desarrollo económico local. Comisión económica para América Latina y del Caribe.
3. Bernal, R., Peña, X. (2011). Guía práctica para la evaluación de impacto. Ediciones Uniandes.
4. DNP (2008). Cartilla de las regalías en Colombia. Departamento Nacional de Planeación.
5. DIng, N. Field, B. (2005).Natural Resource Abundance and Economic Growth.University of Wisconsin Press.
6. Gunton, T. (2003). Natural Resources and Regional Development: An Assessment of Dependency and Comparative Advantage Paradigms. Clark University
7. Innis, A. (1950) The fur trade in Canada: An introduction to the Canadian Economic History. Toronto: University os Toronto Press.
8. Lederman, D., Maloney, W. (2007). Trade structure and growth: Natural resources: neither curse nor destiny. Washington: The World Bank and Standford University.
9. Mackintosh, W. A. 1964.The economic background of dominion-provincial relations. Toronto: McClelland and Stewart.
10. Neumayer, E. (2004). Does the "resource curse" hold for growth in genuine income as well?.London School of economics (LSE).
11. Perla, C. (2005). ¿Cuál es el destino de los países abundantes en recursos minerales? Ponfificia Universidad Católica de Perú. Documento de trabajo 242.

12. Perry, G., Olivera, M. (2010). El impacto del petroleo y la minería en el desarrollo regional y local en Colombia. Working Paper No 51.Fedesarrollo.
13. Ross, M. (1999).The political economy of the resource curse. Cambridge UNIVERSITY Press
14. Sachs, J., Warner, A. (1997). Natural Resource abundance and economic growth Harvard Institute for International Development.
15. Slaibe, F. (2009).Petroleoum royalties and regional development in Brazil: The economic growth of recipient towns. ResourcesPolicy 34. p. 205–213.
16. Valdés, N. (2008). El control fiscal de las regalías en Colombia. Auditoria general de la República.

List of tables Pág.

List of figures

Pág.