



# AN ANALYSIS OF OIL ROYALTIES IMPACTS ON THE SOUTHEASTERN MUNICIPALITIES PER CAPITA GDP: A SPATIAL ECONOMETRIC APPROACH FOR THE NATURAL RESOURCE CURSE

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## Overview

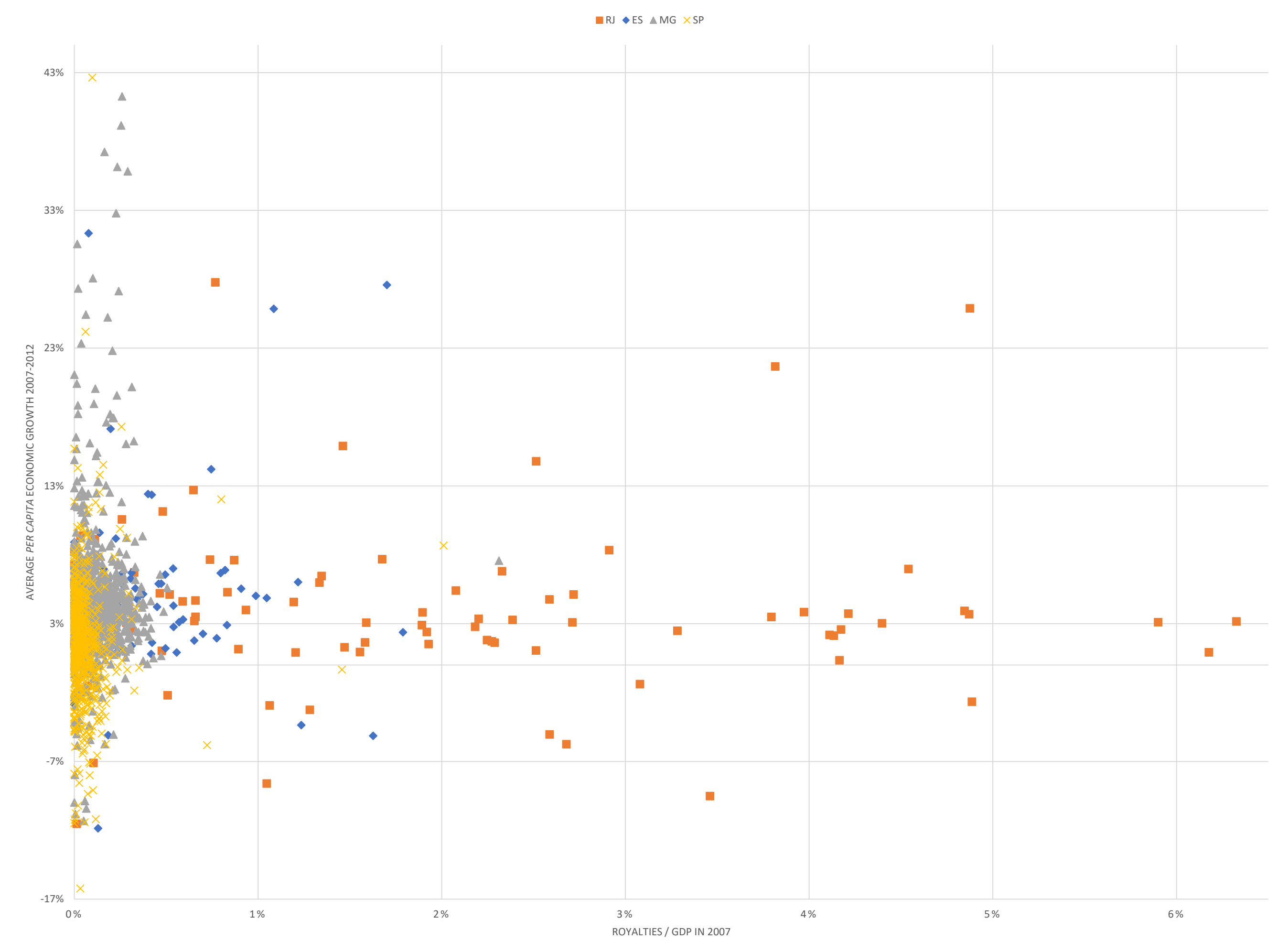
The Brazilian Southeastern region is the most important oil producer region in the country concentrating both the biggest producers of continental platform and those of the Pre-Salt layer. Due to the great oil production, the Southeastern municipalities received almost 80% of the oil royalties paid to Brazilian municipalities between 2007 and 2012, meaning approximately US\$ 6.3 billion.

Nevertheless oil royalties have not been boosting economy as it was expected. Graph 1 shows the relation between *per capita* economic growth and oil dependency.

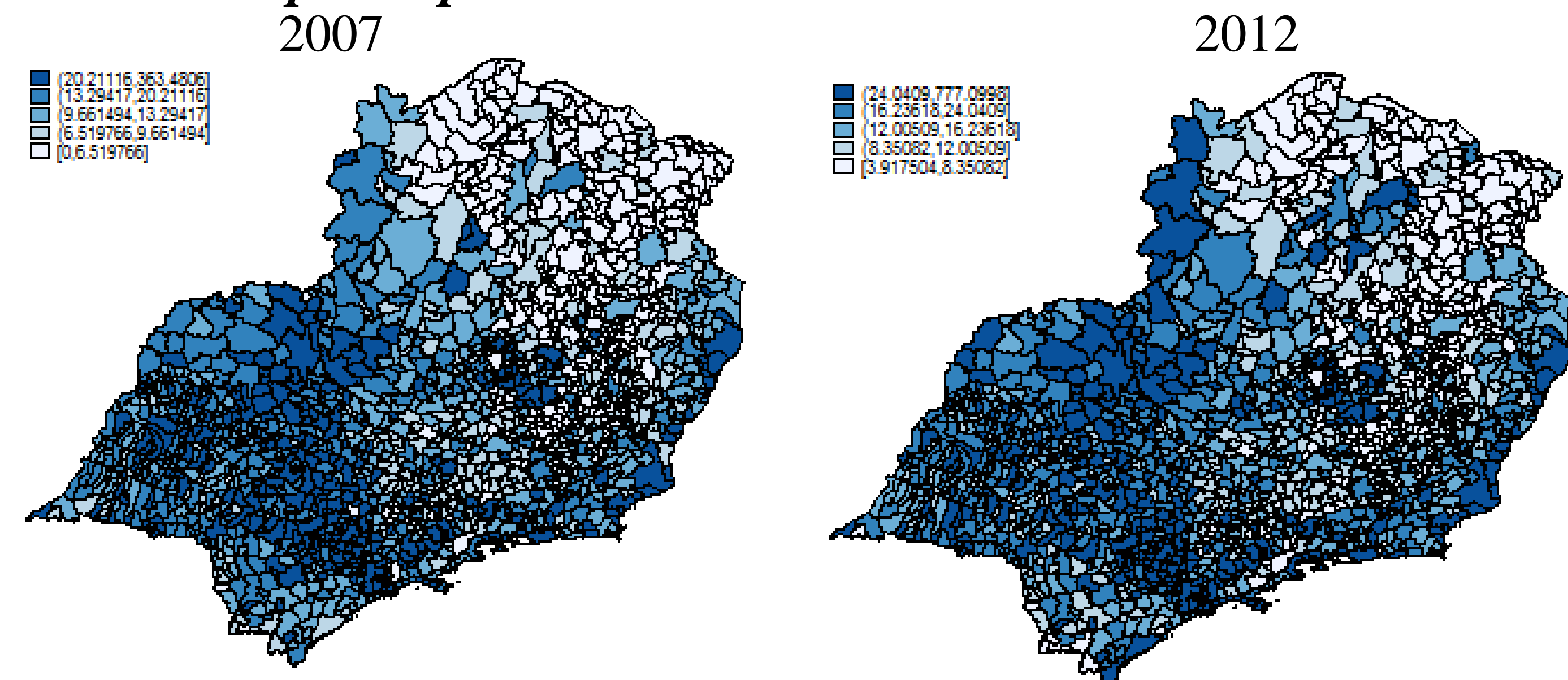
According to Graph 1 the higher the oil dependency the lower economic growth the municipality has. This apparently negative relation between oil royalties and economic growth is known as a “natural resource curse”. Besides evidences of the “curse” the most dependent municipalities are located in the state of Rio de Janeiro which indicates that the curse is worse in the most important oil producer state.

Recent academic papers showed that the natural resource curse is not just a country level issue since there is also local negative effects. For instance, in Brazil Postali (2009) showed the royalties lowered the economic growth of dependent municipalities by 0.002% in comparison to the non-beneficiary municipalities between 1995 and 2005. James and Aadland (2011) also found evidences of the natural resource in American municipalities.

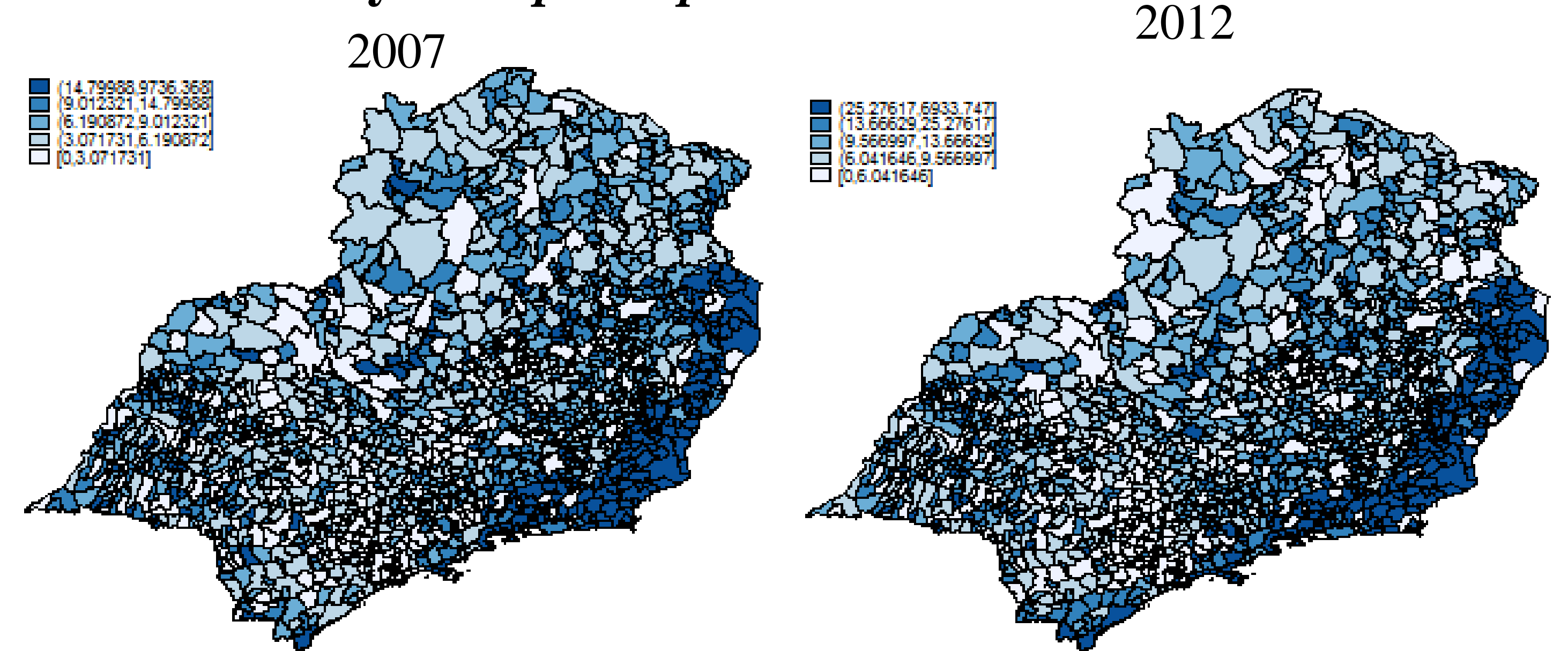
Most papers, however, ignore the interaction between municipalities and only analyze the effects of resources on the ones that receive or have them. James and Aadland (2011) considered the spatial components in their estimations. but they only estimated the impact of natural resource dependency over the GDP of a referenced city.



### Brazilian *per capita* GDP



### Brazilian oil royalties *per capita*



## Main Results

**Table 1 - Econometric models main results for Southeastern cities**

Variables	SDM	SAR	SEM	SAC	SDEM	SLX
<b>Direct effect</b>						
Dependency	-0.002*** (0,001)	-0.002*** (0,001)	-0.002*** (0,001)	-0.002*** (0,001)	-0.002*** (0,001)	-0.003*** (0,001)
Dependency <sup>2</sup>	0.038*** (0,002)	0.038*** (0,002)	0.038*** (0,002)	0.038*** (0,002)	0.038*** (0,002)	0.039*** (0,002)
Dependency <sub>t-1</sub>	-1E-04 (0,001)	-1E-04 (0,001)	-2E-04 (0,001)	-2E-04 (0,001)	-2E-04 (0,001)	-3E-04 (0,001)
<b>Spillover Effect</b>						
Dependency	-0.012 (0,011)	-0.0004*** (0,000)		1E-04 (0,000)	-0.002 (0,002)	-0.004* (0,002)
Dependency <sup>2</sup>	0.048*** (0,008)	0.007*** (0,002)		-0.002 (0,002)	0.004** (0,002)	0.009*** (0,002)
Dependency <sub>t-1</sub>	0.013 (0,011)	-3E-05 (0,000)		7E-07 (0,000)	8E-04 (0,002)	2E-04 (0,002)
<b>Total Effect</b>						
Dependency	-0.014 (0,011)	-0.003*** (0,001)		-0.002*** (0,001)	-0.005 (0,002)	-0.006 (0,002)
Dependency <sup>2</sup>	0.086*** (0,008)	0.045*** (0,003)		0.036*** (0,003)	0.042 (0,003)	0.047 (0,003)
Dependency <sub>t-1</sub>	0.013 (0,012)	-1E-04 (0,001)		-2E-04 (0,001)	0.001 (0,002)	0.000 (0,002)

Std. Errors are below their coefficients  
\*, \*\* and \*\*\* mean 10%, 5% and 1% statistical significance

**Table 2 - Econometric models main results for Rio de Janeiro state cities**

Variables	SDM	SAR	SEM	SAC	SDEM	SLX
<b>Direct Effect</b>						
Dependency	0,00975 (0,012)	0,00798 (0,014)	0,0131 (0,017)	0,0142 (0,012)	0,00804 (0,015)	0,00786 (0,018)
Dependency <sup>2</sup>	-0,00881* (0,005)	-0,00761 (0,006)	-0,00907* (0,005)	-0,00903* (0,005)	-0,00818* (0,005)	-0,00885 (0,006)
Dependency <sub>t-1</sub>	0,0221** (0,011)	0,0237** (0,010)	0,0200** (0,009)	0,0190** (0,010)	0,0200** (0,010)	0,0199* (0,010)
<b>Spillover effect</b>						
Dependency	-0,190* (0,109)	0,00703 (0,012)		-0,00597 (0,005)	-0,0839 (0,067)	-0,130*** (0,047)
Dependency <sup>2</sup>	0,0238 (0,035)	-0,00649 (0,005)		0,00374* (0,002)	-0,0286 (0,028)	-0,0111 (0,021)
Dependency <sub>t-1</sub>	-0,0109 (0,071)	0,0192** (0,009)		-0,00809* (0,004)	0,00886 (0,056)	-0,0519 (0,057)
<b>Total Effect</b>						
Dependency	-0,181* (0,110)	0,015 (0,026)		0,00826 (0,007)	-0,07586 (0,061)	-0,12214 (0,054)
Dependency <sup>2</sup>	0,0149 (0,036)	-0,0141 (0,010)		-0,00528* (0,003)	-0,03678 (0,026)	-0,01995 (0,023)
Dependency <sub>t-1</sub>	0,0112 (0,077)	0,0428** (0,018)		0,0109** (0,005)	0,02886 (0,052)	-0,032 (0,059)

Std. Errors are below their coefficients  
\*, \*\* and \*\*\* mean 10%, 5% and 1% statistical significance

## Conclusions

- There are weak signs of a natural resource curse presence in Southeastern cities
- The oil royalties non-linear impacts per capita GDP of Southeastern municipalities
- There are strong signs of natural resource presence in Rio de Janeiro cities, because of the total effect negative coefficient
- There is a sign of regional oil royalties curse in Rio de Janeiro municipalities
- The oil royalties have both positive and negative effects over per capita GDP, indicated by the square dependency coefficient significance

## Policy suggestions

- Brazil should follow the Norwegian and Malaysian examples of natural resource income Management by restricting the expenditures and fostering the public saving rate with these resources
- Brazilian government should review the current law, because the new model creates a lot of government restrictions in this sector and the resources are not fostering the development of that region

