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CULTURAL AND POLITICAL DETERMINANTS OF AIR QUALITY

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Cultural and Political Determinants of Air Quality

(Preliminary Version)

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Abstract

This paper investigates empirically the determinants of air quality in a large cross-section of countries. We assess air quality by sulfur emissions and, following the literature, we consider three different groups of determinants: economic, political and cultural. We confirm the existence of an EKC for sulfur (inverted-U shaped relation between wealth and pollution). Political determinants are proxied by ethnic or religious fractionalization indexes and the country's legal origin (we consider five possible legal origins: English common law, French civil law, German civil law, Scandinavian legal system and Socialist legal system). Cultural determinants are assessed by the percentage of a country's population that belongs to one of the three main religions (Catholic, Muslim or Protestant). Our goal is to establish the economic, political and cultural profile of a country that manages to be efficient in providing good air quality. We conclude that a country will provide higher air quality if it has one or more of the following characteristics: it is ethnic and/or religious homogeneous, it has a German or Scandinavian legal tradition; it is Protestant.

Keywords: Air quality, political determinants, cultural determinants, environmental efficiency.

JEL: H40, H89, Q53, Q59

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1 Introduction

Given the current debate on global warming, air quality and other serious environmental problems, a better understanding of the determinants of national environmental performance is of great relevance to policy making.

There is a vast literature on the economic determinants of environmental quality. Literature on public goods provision and institutional quality have been a starting point for addressing the implications of other determinants on the provision of environmental quality.

Alesina et al. (1999) [1] develop a theoretical model that establishes a link between heterogeneity of preferences across ethnic groups and the provision of public goods. The paper concludes that shares of spending on productive public goods are inversely related to ethnic fragmentation. Baldwin and Huber (2010) [3] also study the implications of heterogeneity across groups on public goods provision. The authors use two measures of heterogeneity - cultural and economic - and study which one is most problematic to good governance. Cultural differences are assessed by ethnic-linguistic fractionalization. The authors find no robust relation between public goods provision and this diversity index. However, between group economic inequality is found to have a large, robust negative relationship with public goods provision.

La Porta et al. (1999) [13] address similar issues, focusing on government quality. The authors assume different dimensions of government performance. Among several definitions, La Porta et al. (1999) [13] state that "Government performance of a given country should be assessed in part by evaluating the quality of public good provision such as schooling, infant mortality, literacy and infrastructure" (La Porta et al. (1999) [13], pp. 226). The authors claim that there are mainly three different theories that explain institutional performance: economic, cultural and political. They test, empirically, which group of deter-

minants is more likely to foster government efficiency. They use an extensive set of variables as proxies for government quality and several variables for each group of determinants. They conclude that government performance is partially determined by economic development and that political history is fundamental to its efficiency. The support for cultural determinants is not as strong as for the others.

In this paper, we extend the definition of government quality of La Porta et al. (1999) [13] and assess government efficiency through environmental public good provision. Nowadays, environmental quality is truly a crucial sector for sustainable development, and, therefore, a dimension of government performance that should not be neglected. Our measure of the output of public good provision is air quality.

Why are some countries more successful in the provision of air quality than others? Following La Porta et al. (1999) [13], we study economic, cultural and political determinants and study how these different theories explain different environmental performance across countries, extending the existing empirical literature. We rely on the literature on public goods provision and institutional quality cited above to support our hypotheses about the impacts of each group of determinants. We then explore the data and test the stated hypotheses.

Whitford and Wong (2008) [22] also explore several determinants of environmental quality. The authors are particularly interested in environmental sustainability more than in efficient public good provision. In this sense, we departure from Whitford and Wong (2008) [22]. Moreover, their study focuses primarily on democracy and federalism and how these political variables influence the Environmental Sustainability Index (ESI), which quantifies whether a country safeguards their resources effectively, in a cross section analysis. Following La Porta et al. (1999) [13], we study the effects of three groups of variables: economic, cultural and political.

Several other authors have focused on the implications of political variables to environmental performance. Payne (1995) [16] and Asafu-Adjaye (2008) [2] argued that democracies do a better job in safeguarding the environment as citizens are free to gather and disseminate environmental information and lobby their government for stronger environmental support and protection. Li and Reuveny (2006) [14] found empirical evidence that democracy reduces environmental degradation and supported their findings based on the arguments made by Payne (1995) [16] and Kotov and Nikitina (1995) [12], who theorize that democracies are more responsive to the environmental needs of the public than are autocracies.

Dulal et al. (2008) [9] noted that democracies tend to be associated with clear and stable property rights, which can provide greater incentives for protection of natural resources. On the other hand, Dulal et al. (2008) noted that environmental changes are often realized only after long time periods and, given that most democratic leaders are often elected for significantly shorter periods of time relative to autocratic leaders, they suggest that there is an incentive for democratic leaders to exploit and sell natural resources, as the consequences of their actions are typically not felt until after they are out of office.

Barrett and Graddy (2000) [4] also concluded that civil and political liberties improve environmental quality.

Bernauer and Koubi (2009)[5] explore empirically the impact of political institutions on air quality. The authors conclude that: (i) the degree of democracy has an independent positive effect on air quality, (ii) presidential systems are more conducive to air quality than parliamentary ones and (iii) labor union strength contributes to lower environmental quality, whereas the strength of green parties has the opposite effect.

The purpose of this paper is to look for economic, political and cultural determinants that can account for the variation in government performance

regarding the provision of environmental quality. We look for exogenous cross country variation in each of these groups that can account for the variation in the public good provision. The provision of environmental quality is assumed to be another dimension of government performance, adding the provision of other essential public goods in health or education sectors, as in La Porta et al. (1999) [13].

In the next Section we describe the theoretical framework and describe the variables which are used as proxies of each group of determinants. In Section 3 we describe the data. In Section 4 we present and comment on our main regression results. In Section 5 we conclude.

2 Developing Hypotheses

La Porta et al. (1999) [13] assume different dimensions of government performance. One of these dimensions is the efficient provision of essential public goods, which are, according to the authors, mainly in health and education sectors. Infant mortality and school attainment are used to measure the output of these public goods.

We extend this definition and consider air quality as an additional output of public good provision. More precisely, we asses government (in)efficiency in providing this public good and its determinants. We focus on sulfur emissions.

We look for economic, political and cultural determinants that can account for the variation in government performance in the provision of public goods in what the environment is concerned.

Economic theories of institutions suggest that they appear whenever their benefit surpasses their cost (North (1981) [15]). La Porta et al. (1999) [13], extend this theory considering that institutions will be efficient whenever the benefit of this efficiency is larger that its cost. In this sense, we consider that

governments will be more prone to deliver environment goods whenever this provision surpasses its costs. Because benefits and costs of public goods provision are rather difficult to assess, it is assumed that development and wealth will enhance the demand for environmental public goods.

Because we focus on environmental public goods, we cannot neglect the strong evidence according to which the environment at first worsens at low levels of income, but then improves at higher incomes. This is the so-called Environmental Kuznets Curve (EKC) hypothesis. The large body of empirical EKC literature started with the seminal work of Grossman and Krueger (1995) [10], who found an inverted U-shape relationship between per capita income and pollution concentrations for several chemicals, namely sulfur.[1] Following this literature, for example, Whitford and Wong (2008) [22] test the hypothesis that as national income increases the Environmental Sustainability Index falls, but only up to a given point. From this point onwards there is a positive relation between income and environmental sustainablilty. We assume per capita income as a measure of wealth and test the hypothesis of an inverted U-shaped relation between per capita income and pollution.

Political theories of institutions suggest that those in power will shape policies to stay in power and to collect resources for themselves. If a society is heterogeneous, more groups will be fighting for power and, therefore, its government will be less efficient. La Porta et al.(1999) [13] use ethnic heterogeneity as a measure for the existence of conflicting groups. Baldwin and Huber (2010) [3] also claim that ethnic diversity is believed to make governance more difficult. Alesina et al. (1999) [1] show that ethnic diversity is inversely related to public goods provision. We consider ethnic and religious diversity as measures of heterogeneity. Based on the arguments just presented, we expect that higher

[1] See e.g., Copeland and Taylor (2004) [7], Stern (2004) [18] and Dasgupta et al. (2002) [8] for useful surveys on the EKC literature.

diversity leads to more pollution.

La Porta et al. (1999) [13] sate that "another strategy is to look at the legal systems, which can be viewed as indicators of the relative power of the state..."(pp. 224). Whitford and Wong (2008) [22] claim that being a Common law country has impact on sustainability. Following closely La Porta et al. (1999) [13], we assume five different legal origins: Common law (English), French Civil law, German Civil law, Scandinavian law and Socialist law and test the following hypotheses:

(1) Socialist law, being a manifestation of the state intent to create institutions to maintain its power, will be detrimental to government performance;

(2) Civil law, introduced by two of the greater statesman ever, Napoleon and Bismarck, has also been an instrument for increasing the state power. However, German countries have managed to build professional bureaucracies leading to much more efficient governance.

(3) Scandinavian law has a clear interventionist dimension but, as in the German civil law, the professional bureaucracy supported in professional civil servants points to a more efficient government.

(4) Common law tradition was built as an intent from the English aristocracy to limit the power of the sovereign. Common law tradition limits rather than enhances the power of the state. We expect that this type of legal origin has a positive impact on air quality.

Summarizing, we expect that pollution, as a measure of government inefficiency in terms of public good provision, is higher in socialists countries, lower in German, Scandinavian and Common law countries and will have intermediate levels in French Civil law countries.

Cultural theories state that beliefs and ideas that are pervasive and spread across society can be called culture. In this sense, depending on the beliefs and ideas of the society, culture can lead to better or worse government. As

in La Porta et al. (1999) [13], we use as proxy for the cultural determinants which influence government performance, the percentage of the population that belongs to a different religion. We consider four religious groups: Catholic, Muslim, Protestant and All Others. Hierarchical religions (like Catholic, Muslims, Greek or Russian orthodox) tend to diminish trust among peers contrary to less hierarchical religions such as Protestants. Trust in strangers facilitates collective action and hence makes it easier to decide about public good provision. Hayes and Marangudakis [11] show that Catholics have been less efficient in protecting the environment than liberal Protestants. We expect that Protestants perform better than all other religions in terms of our dependent variable.

We control for other variables which proxy the country's level of development, besides income level, and make sure that all other impacts are robust when we introduce these development factors. If development fosters the demand for environment goods, then OECD countries should have less pollution than others. Because we are talking about a very particular type of good, environmental quality, we have to be aware of the pressure that industrialization, house appliances, urban concentration and all sort of development indicators might have on air pollution. Electricity consumption is used as a measure of environmental stress and we expect it to have a positive relation with our dependent variable. Finally, we use life expectancy, a non economic variable, as another proxy for the level of development. We want to test a non economic variable as a proxy for the level of development. We expect it to have a negative impact on pollution.

Combining the environmental, economic, political and cultural variables just described, we estimate the following model:

$$S_i = \beta_0 + \beta_1 \{Economic\ Variables\} + \beta_2 \{Political\ variables\} + \beta_3 \{Cultural\ variables\} + \\ + \beta_4 \{Other\ control\ variables\} + e_i$$

where S_i is the log of per capita sulfur emissions in country i.

3 Data

Our analysis is conducted with a data set on sulfur emissions and its determinants just described in a sample that goes from 132 to 208 countries, depending on the variable considered. Whenever possible we have used the average of the decade 2000. However, in some cases, there was not available data. In such cases, we have used information regarding the available year of the decade (always from 2000's). Table A summarizes the definitions and sources of all variables.

Table A - Data information

Variable	Definition	Source	N. obs.
S	Per capita sulfur emissions	Stern (2005)	170
$ETHFRAC$	Ethnic fractionalization: 0 to 1 (more heterogeneous society)	Alesina et al. (1999)	186
$RELFRAC$	Religious fractionalization: 0 to 1 (more heterogeneous society)	Alesina et al. (1999)	204
$LEG\ OR$	Dummies for legal origin of each country	La Porta et al. (1999)	199
$RELIGION$	Catholic, Muslim, Protestant and All Other Religions$_{(\%\ of\ population,\ 1980)}$	La Porta et al. (1999)	183
$GDPpc$	Real per capita GDP	WDI (2007)	185
$OECD$	Dummy for OECD country	OECD	208
$ELEC\ CONS$	Electric power consumption$_{(KWh\ per\ capita)}$	WDI (2007)	132
$LIFE\ EXP$	Life expectancy at birth (years) (HDI component)	United Nations (2010)	186

4 Results

Results are presented in this section. We always control for income per capita and income per capita squared. We are simultaneously controlling for economic

determinants and testing the existence of an EKC relation for sulfur emissions.

Table 1

Dep. var. ln S	(1)	(2)	(3)	(4)
ethnicalesina	.8046026**		.8190147**	
	(0.0278)		(0.020)	
religionalesina		.2279145		.7448045**
		(0.255)		(0.028)
legor_fr_lp	−.0259165	−.0151563		
	(0.448)	(0.469)		
legor_so_lp	.5159508***	.3977073*		
	(0.0039)	(0.0785)		
legor_ge_lp	−1.318967***	−1.447528***		
	(0.001)	(0.000)		
legor_sc_lp	−.6525705	−.7529763*		
	(0.122)	(0.088)		
cath80_t07			.0012873	.0038248
			(0.402)	(0.226)
musl80_t07			.0079008*	.0113813**
			(0.055)	(0.011)
nocpm_t07			.0082561*	.0085602*
			(0.063)	(0.053)
lnGDPpc	2.304799***	2.242941***	2.846218***	2.764059***
	(0.000)	(0.000)	(0.000)	(0.000)
lnGDPpc^2	−.1104762***	−.1105192***	−.1485884***	−.1470165***
	0.002	0.001	0.000	0.000
n	153	157	149	149
R^2	0.4617	0.4514	0.4291	0.4242
F-test	24.07	24.16	16.63	16.13
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Notes: Significance levels in parentheses. *** Statistically significant at 1%, ** Statistically significant at 1%, * Statistically significant at 10%.

Table 1 (cont.)

Dep. var. lnS	(5)	(6)
ethnicalesina	.7574872**	
	(0.035)	
religionalesina		.7119673**
		(0.033)
legor_fr_lp	.0741539	.1449707
	(0.366)	(0.257)
legor_so_lp	.4488797*	.3923331*
	(0.056)	(0.076)
legor_ge_lp	−1.342994***	−1.475952***
	(0.000)	(0.000)
legor_sc_lp	−.6793668	−.6212443
	(0.109)	(0.143)
cath80_t07	.0006766	.0025059
	(0.443)	(0.306)
musl80_t07	.007714**	.0107015**
	(0.047)	(0.015)
nocpm_t07	.0073947*	.0082618**
	(0.071)	(0.048)
lnGDPpc	2.400828***	2.355646***
	(0.000)	(0.000)
lnGDPpc^2	−.1135062***	−.1136126***
	(0.002)	(0.001)
n	147	148
R^2	0.4962	0.4937
F-test	15.83	16.29
	(0.0000)	(0.0000)

Notes: Significance levels in parentheses. *** Statistically significant at 1%, ** Statistically significant at 1%, * Statistically significant at 10%.

Table 1 presents the results concerning political and cultural determinants.

Our results confirm the existence of an EKC in all six regressions, confirming the existence of an inverted-U shape relationship between pollution and per capita income.

Regression (1) and (2) test the influence of political variables on sulfur emissions. We find that ethnic diversity has a positive impact on sulfur emissions, i.e., it is harmful for the environment. Also, Socialist countries perform worse than countries with English legal tradition. On the other hand, countries with German legal systems perform better than Common law ones. When we test

religious fractionalization instead of ethnic fractionalization (regression (2)), the results regarding legal systems hold but the fractionalization index is not found to be significant.

Regressions (3) and (4) test the effect of religion on sulfur emissions. We find that Muslim countries perform worse than Protestant ones in what air quality is concerned. The same holds for countries that are neither Muslim, nor Catholic nor Protestant. In both regressions, the diversity indexes hold remarkably well.

Regressions (5) and (6) test the joint effect of political and cultural variables. In regression (5) we use ethnic diversity and in regression (6) we use religious fractionalization. There is strong evidence that heterogeneous societies perform worse in terms of air quality: both ethnic and religion fractionalization indexes have a positive impact on emissions. Following our previous results and also the developing hypotheses we can confirm that countries with a Socialist legal origin perform worse than English Common law ones, but countries with a German legal tradition are more efficient in terms of environmental quality than English ones. On the other hand, both Muslim countries and countries that do not profess one of the three main religions (Catholic, Muslim or Protestant) have worse performance than Protestant countries in what sulfur emissions are concerned.

Table 2

Dep. var. ln S	(7)	(8)	(9)	(10)
ethnicalesina	.639653*		.5040491	
	(0.095)		(0.112)	
religionalesina		.9796289***		.4321211
		(0.005)		(0.140)
legor_fr_lp	−.2743564	−.1929484	.1251294	.1666132
	(0.154)	(0.235)	(0.275)	(0.2195)
legor_so_lp	.0710814	.0292752	.6775633***	.6435627***
	(0.412)	(0.462)	(0.0065)	(0.0065)
legor_ge_lp	−1.042649***	−1.131799***	−1.307256***	−1.397549***
	(0.000)	(0.000)	(0.001)	(0.000)
legor_sc_lp	−1.47232***	−1.33832***	−.6898889	−.6676788
	(0.000)	(0.000)	(0.1135)	(0.134)
cath80_t07	.00670	.0099929*	.0028608	.0040138
	(0.135)	(0.061)	(0.273)	(0.21)
musl80_t07	.0115033**	.0159349***	.0101538**	.0119654***
	(0.032)	(0.0075)	(0.013)	(0.008)
nocpm_t07	.0106673*	.0118604**	.0091293**	.0096915**
	(0.052)	(0.037)	(0.030)	(0.022)
lnGDPpc	5.272047***	5.399172***	2.70941***	2.681507***
	(0.000)	(0.000)	(0.000)	(0.000)
lnGDPpc^2	−.3086941***	−.3198537***	−.1212289***	−.1210738***
	(0.000)	(0.000)	(0.001)	(0.001)
ElectPowerCons pc	.0001294***	.0001373***		
	(0.000)	(0.000)		
LifeExpectancy			−.0371572***	−.0381068***
			(0.006)	(0.008)
OECD				
n	117	118	147	148
R^2	0.5191	0.5303	0.5179	0.5164
F-test	12.04	14.46	18.19	17.84
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Notes: Significance levels in parentheses. *** Statistically significant at 1%, ** Statistically significant at 1%, * Statistically significant at 10%.

Table 2 (cont.)

Dep. var. ln S	(11)	(12)	(13)	(14)
ethnicalesina	.7497733**		.1884604	
	(0.037)		(0.357)	
religionalesina		.7192234**		.5336611
		(0.031)		(0.118)
legor_fr_lp	.1088052	.1834366	−.1584041	−.1298109
	(0.305)	(0.198)	(0.273)	(0.309)
legor_so_lp	.4674164**	.4140147*	.3315619	.3046905
	(0.050)	(0.064)	(0.143)	(0.155)
legor_ge_lp	−1.228489***	−1.35078***	−1.006135***	−1.04293***
	(0.001)	(0.000)	(0.000)	(0.000)
legor_sc_lp	−.5040043	−.4275405	−1.580218***	−1.444607***
	(0.193)	(0.237)	(0.000)	(0.000)
cath80_t07	.0005792	.002432	.0097238*	.0114471**
	(0.450)	(0.307)	(0.0575)	(0.039)
musl80_t07	.0072369*	.0102356**	.0151375***	.0172437***
	(0.0545)	(0.017)	(0.0065)	(0.008)
nocpm_t07	.007326*	.0082059**	.0134604**	.0140436**
	(0.069)	(0.047)	(0.018)	(0.015)
lnGDPpc	2.03384***	1.965053***	5.457749***	5.529549***
	(0.001)	(0.001)	(0.000)	(0.000)
lnGDPpc^2	−.0866693**	−.084995**	−.3083885***	−.3148462***
	(0.020)	(0.018)	(0.000)	(0.000)
ElectPowerCons pc			.000137***	.0001384***
			(0.000)	(0.000)
LifeExpectancy			−.0454615***	−.0413556**
			(0.008)	(0.021)
OECD	−.4553837	−.4882819*		
	(0.111)	(0.087)		
n	147	148	117	118
R^2	0.5007	0.4988	0.5470	0.5534
F-test	15.01	15.57	19.73	18.39
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Notes: Significance levels in parentheses. *** Statistically significant at 1%, ** Statistically significant at 1%, * Statistically significant at 10%.

Table 2 shows regression results when we control for the level of electric power consumption, life expectancy and for the fact of being an OECD country. These variables can be seen as good indicators of the level of development. There is empirical evidence that electric power consumption increases sulfur emissions, higher life expectancy at birth meaning more development implies

less emissions and being an OECD country has a positive impact on air quality in terms of sulfur. In these 8 regressions we can still conclude that: (i) the EKC holds for sulfur whatever are the variables included in the regressions; (ii) Muslim countries and countries not Muslim, Catholic or Protestant are consistently less efficient in providing environmental quality; (iii) countries with Socialist legal origin are worse for environment although this result is not as robust as the previous ones; (iv) countries with a German legal tradition tend to perform better than English ones and the same holds for Scandinavian countries (although the evidence is stronger for German countries).

Table 3

Dep. var. ln S	(15)	(16)
ethnicalesina	.1848483	
	(0.36)	
religionalesina		.5461594
		(0.113)
legor_fr_lp	−.1409603	−.1071367
	(0.300)	(0.344)
legor_so_lp	.3369355	.3114747
	(0.139)	(0.150)
legor_ge_lp	−.9785618***	−1.007812***
	(0.001)	(0.000)
legor_sc_lp	−1.539847***	−1.386937***
	(0.001)	(0.001)
cath80_t07	.0095212*	.0112309**
	(0.060)	(0.040)
musl80_t07	.0148346***	.0169091***
	(0.0075)	(0.005)
nocpm_t07	.0133146**	.0138735**
	(0.018)	(0.0155)
lnGDPpc	5.306772***	5.340972***
	(0.000)	(0.000)
lnGDPpc^2	−.2979729***	−.3018604***
	(0.000)	(0.000)
ElectPowerCons pc	.0001371***	.0001384***
	(0.000)	(0.000)
LifeExpectancy	−.0451809*	−.0407902**
	(0.008)	(0.0225)
OECD	−.131891	−.1656993
	(0.354)	(0.315)
n	117	118
R^2	0.5475	0.5540
F-test	18.11	16.92
	(0.0000)	(0.0000)

Notes: Significance levels in parentheses. *** Statistically significant at 1%, ** Statistically significant at 1%, * Statistically significant at 10%.

Finally, Table 3 summarizes all variables previously considered. This allows us to describe the profile of a less efficient country in the provision of air quality. A country will produce more sulfur emissions if:

- It has several groups of interest (religion fractionalization is almost significant at 10%);

- It has a Common law tradition instead of a German or Scandinavian one (both German and Scandinavian legal origins are robustly significant with better perfomance in terms of air quality than English ones):
- It is non-protestant (all religions considered are statistically significant with worse performance than Protestants);
- It has high levels of electric power consumption;
- It has low levels of life expectancy at birth.

5 Further Work

We have found that political variables, such as legal origin, and cultural variables, such as religion, influence the provision of air quality, in particular sulfur emissions. Moreover, empirical evidence confirms the existence of an EKC for sulfur, confirming the existing literature. According to our results a country with Socialist legal origin and a high percentage of Muslims has higher levels of pollution (red EKC in Chart 1) than a country with Scandinavian legal origin and predominance of Protestants (green EKC in chart 1).

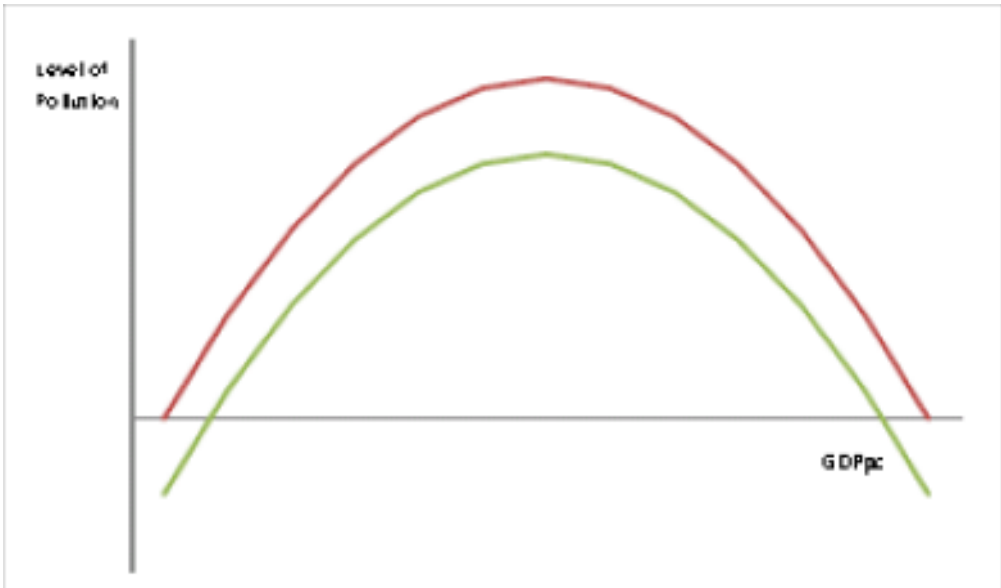

Chart 1

We will extend our work and test not only the impact of political and cultural determinants on the level of pollution but also on the turning point of the EKC. Does pollution in ethnic homogeneous countries start declining for lower levels of income than in ethnic heterogeneous countries? How does legal origin or religion influence the turning point of the EKC? What can lead a country from a red EKC to a green EKC in Chart 2?

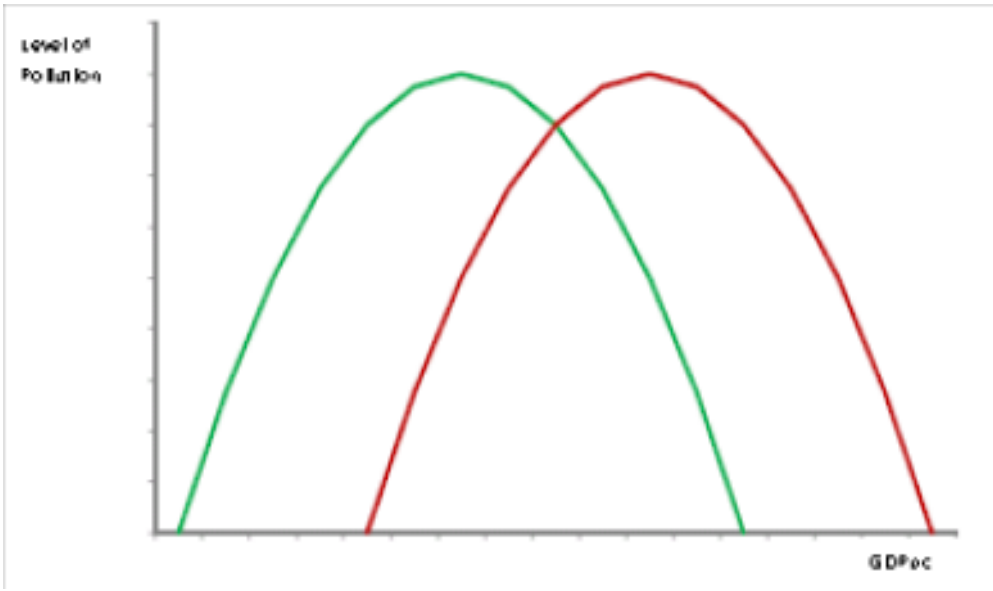

Chart 2

6 Conclusions

The literature on the determinants of pollution and on the efficiency of environmental public good provision has thus far focused on specific factors. Some of the literature explores economic variables as the main leading force behind pollution, others focus on determinants related to political conditions, such as democracy, corruption, presidential regime, etc. Finally, there is a developing branch of literature exploring the impact of religious variables on air quality or pollutant emissions. A big picture on air quality determinants is still missing.

Our first contribution with this paper is to gather all these determinants and test its robustness when the different types of determinants are considered in simultaneous. Following La Porta et al. [13], we use the level of sulfur emissions as a measure of efficiency in the provision of environmental goods and group its possible determinants into three cathegories: economic, political and cultural. Our main concern is to determine the economic, political and cultural

characteristics of an efficient country in the provision of air quality.

We use a large cross-section sample of heterogeneous countries and OLS estimation with robust standard errors. We conclude that:

- There is also a consistent and robust positive relation between ethnic diversity and environmental quality: more ethnic diversity promotes more pollution, therefore, less environmental quality. The results concerning religious fractionalization point in the same direction but are less robust.
- Countries with Scandinavian or German legal origins tend to perform better than Common law countries regarding environmental quality.
- Socialist countries or countries that descend from a Socialist tradition tend to perform worse than Common law countries.
- Muslim countries or countries that are neither Catholic, nor Muslim nor Protestant are statistically less efficient in providing environmental goods than Protestant ones.
- There is a coherent and consistent inverted U-shaped relation between wealth (measured by natural logarithm of per capita GDP) and pollution.
- If we control for the level of development we are still able to confirm the previous results and add that development is "good" for environmental quality.

References

[1] Alesina, Alberto; Baqir, Reza and Easterly, William, 1999, "Public Goods and Ethnic Divisions", *The Quarterly Journal of Economics* 114(4), 1243-1248.

[2] Asafu-Adjaye, J. (2008), "Biodiversity loss and economic growth: A cross-country analysis", *Contemporary Economic Policy* 21, 173-185.

[3] Baldwin, Kate and Huber, John D., 2010, "Economic versus cultural differences: Forms of ethnic diversity and public goods provision", *American Political Science Review* 104, 644-662.

[4] Barrett, D. B. and Graddy, K., 2000, "Freedom, growth, and the environment", *Environment and Development Economics* 5, 433-456.

[5] Bernauer, Thomas and Koubi, Vally, 2009, "Effects of Political Institutions on Air Quality", *Ecological Economics* 68, 1355-1365.

[6] Barro, Robert J. and McCleary, Rachel M., 2003, "Religion and Economic Growth", *American Sociological Review* 68 (5).

[7] Copeland, B. and S. Taylor, 2004, "Trade, Growth and the Environment", *Journal of Economic Literature* XLII: 7-71.

[8] Dasgupta, S., B. Laplante, H. Wang and D. Wheeler, 2002, "Confronting the Environmental Kuznets Curve", *Journal of Economic Perspectives* 16(1), 147-168.

[9] Dulal, H. B.; Roberto, F. and Knowles, S., 2008, "Can differences in the quality of social institutions and social capital explain cross-country environmental performance?", New Zealand Association of Economists Conference combined with the Econometric Society (Australasian region) to host

in Wellington, 9-11 July 2008, Markets and Models: Policy Frontiers in the AWH Phillips Tradition.

[10] Grossman, G.M. and A.B. Krueger, 1995, “Economic growth and the environment”, *The Quarterly Journal of Economics* 110(2), 353-377.

[11] Hayes and Marangudakis, 2000, "Religion and Environmental Issues within Anglo-American Democracies", *Review of Religious Research* 42(2), 159-174.

[12] Kotov, V., & Nikitina, E., 1995, "Russia and international environmental cooperation", In H. O. Bergesen & G. Parmann (Eds.), Green globe yearbook of international cooperation on environment and development. Oxford, UK: Oxford University Press, 17-27.

[13] La Porta, Rafael; Lopez-de-Silanes, Florencio; Schleifer, Andrei and Vishny, Robert, 1999, "The Quality of Government", *The Journal of Law Economics and Organization* 15 (1), 222-279.

[14] Li, Q. and Reuveny, R., 2006, "Democracy and environmental degradation", *International Studies Quarterly* 50, 935-956.

[15] North, 1981, Growth and Structural Change. New York: W. W. Norton

[16] Payne, R. A., 1995, "Freedom and the environment", *Journal of Democracy* 6(3), 41-55.

[17] Smith, Vinvent H.; Kehoe, Michael R. and Cremer, Mary E., 1995, "The Private Provision of Public Goods: Altruism and Voluntary Giving", *Journal of Public Economics* 58 (1), 107-126.

[18] Stern, D.I., 2004, “The rise and fall of the Environmental Kuznets Curve”, *World Development* 32 (8), 1419-1439.

[19] Stern, D.I., 2005, “Global Sulfur Emissions from 1850 to 2000”, *Chemosphere* 58, 163-175.

[20] Tabellini, Guido, 2010, "Culture and Institutions: Economic Development in the regions of Europe", *Journal of the European Economic Association* 8 (4), 677-716.

[21] Tavares, José and Wacziarg, Romain, 2001, "How Democracy Affects Growth", *European Economic Review* 45, 1341-1378.

[22] Whitford, Andrew B. and Wong, Karen, 2009, "Political and Social Foundations for Environmental Sustainability", *Political Research Quarterly* 62(1), 190-204.