

Corruption and South American Public Health Governance: A Panel Data Analysis

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Abstract:

This paper investigates high income South American countries and their Corruption Perception Index ranking compared to their public health economic variables alongside other macroeconomic variables. The study takes into account that each country is different by means of economic nature due to geographic location. Countries with a natural resource curse are different from traditionalist economic countries. The model examines the implications of a corruption ranking along with health and macroeconomic data that is strongly correlated with decreasing or increasing returns to scale.

JEL Classification: B22, D73, I15, I18

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1.0 Introduction

Corruption has plagued country governance throughout all of South America from past, present, and future as it is a trickle-down effect in the region from one leader to the next. Corruption can be small in nature as it may happen in developed nations such as North America and Europe while taking small effect on the population within their borders. Meanwhile in developing countries governments will take advantage of their position to exploit their population in return for financial benefit, as a result the population will receive decreasing medical benefits and social economic status.

This study aims to enhance understanding the results from corruption and public governance in Latin American countries from health and macroeconomic data. From a policy perspective, this analysis is important to understand the recent trends of health in the South American population because the standard of living must be upheld on a global scale. The relevance of this study is that South American country economies are being exploited for small percentages of the population at the expense of the majority in self-absorbed schemes to live a life that was obtained through criminal networks.

South American countries have a historic past within each country to exploit their economic systems to develop regimes that breed government leaders to become corrupt. The newly elected leaders will sway the public in their favor by offering social benefits and prolonged economic success without data to establish their future endeavors. Countries that fall into these corruption traps are those with an abundance of natural resources or high crime rates that a country has control over. Recent trends in South America have worsened as political leaders are willing to go to extremes to keep their reigns intact.

Health epidemics have become increasingly abundant among the world population as countries cannot afford to import medication and vaccinations. South America is no stranger to world diseases becoming widespread across the continent as medical availability for diseases is increasing at a slow to standstill rate. In 2018 the reintroduction of measles to the continent has called for a higher demand in vaccinations across the country, unlike developed countries South American populations do not all live within reasonable distance to a hospital or medical professionals.

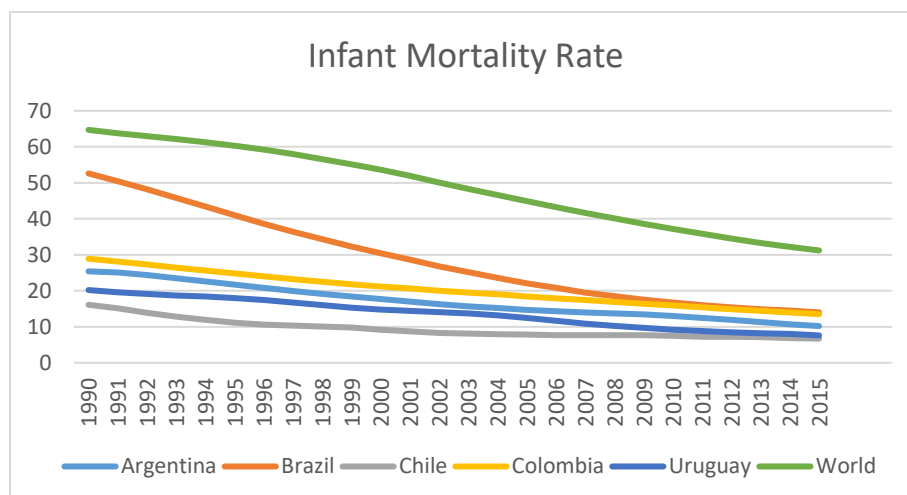
This paper was guided by three research objectives that differ from other studies: First it investigates the possibility that corruption is a zero sum game by analyzing the GNI per capita and symmetric expenditures on health related goods and services on the high income countries in South American region using panel data. Second, it incorporates broad macroeconomic data into an integrated model to test regression correlation. Last, it will analyze the current state of matters within the top five income countries in the South American region to test if corruption plays a role of a helping hand or a hand in the pocket.

The rest of the paper is organized as follows: Section 2 gives a literature review. Section 3 outlines the empirical mode. Data and estimation methodology are discussed in section 4. Finally, section 5 presents and discusses the empirical results. This is followed by a conclusion in section 6.

2.0 Trend

Figure 1 shows the top five highest income per capita South American countries and their infant mortality rates compared to the world average through 20 years. As modern medicine and improved living conditions in South America it is noted that there are signs of conversion despite levels of corruption in the area. Brazil has an increased deceleration rate in infant mortality while Chile has experience the slowest decline in infant mortality rates due to slow increases in living conditions as both countries experienced different development patterns.

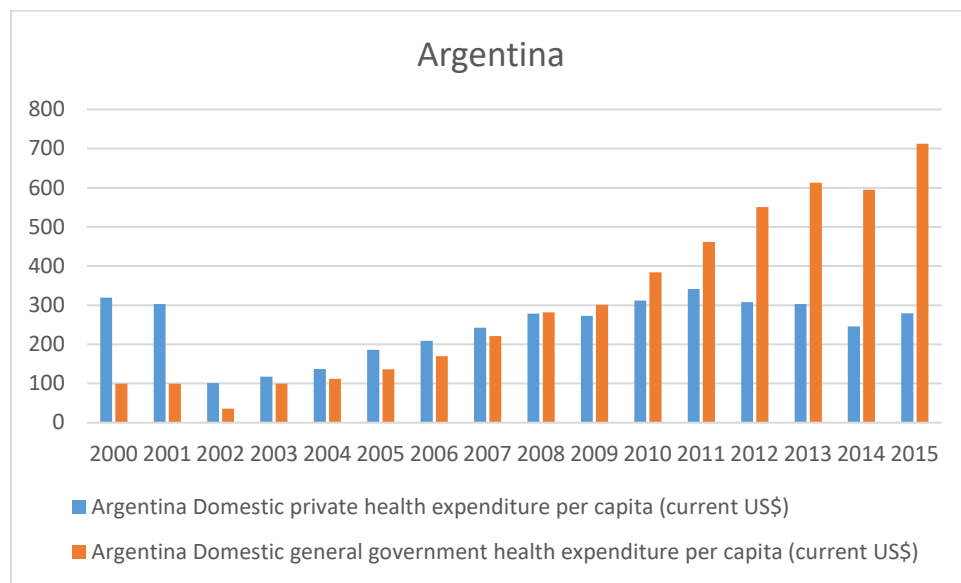
Figure 1: Infant Mortality Rate



Source: World Bank Development Indicators Database

Figure 2 shows the relationship between private and public health expenditures per capita in Argentina from the years 2000 to 2015. The key development indicator for population health expenditures highlights the reliability of governments to be able to provide care for their people and not be reliant upon outside foreign aid. For Argentina, Chile, Colombia, and Uruguay this trend of flipping from private to public health expenditures is consistent for the top five income per capita countries besides Brazil.

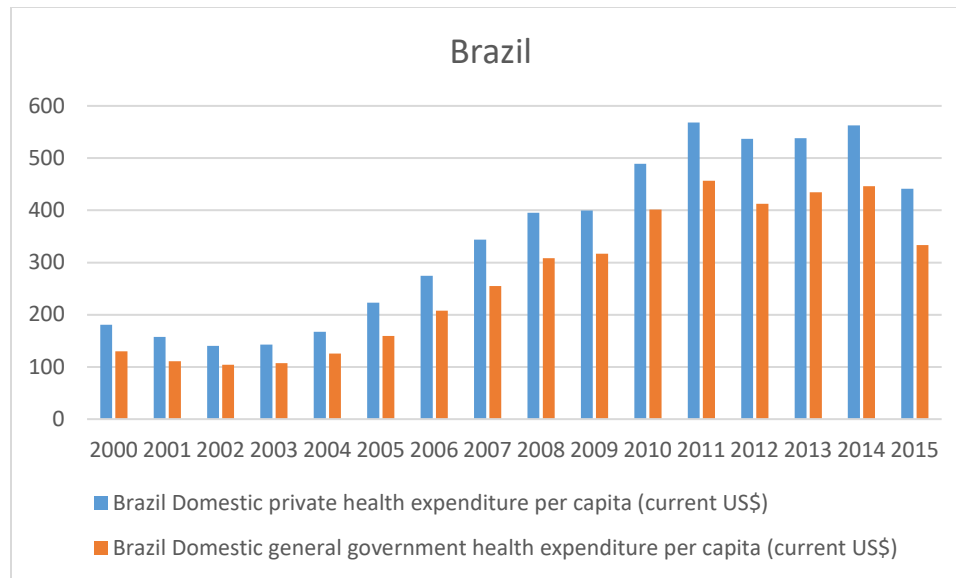
Figure 2: Private vs Public Health Expenditures Per Capita (\$)



Source: World Bank Development Indicators Database

Figure 3 shows an inverse relationship amongst the rest of the top five income per capita countries for Brazil. Brazil having the highest population amongst the top five countries explains the need for a private healthcare system to provide the necessary means as government expenditures cannot support the public as a whole. Inferring the relationship between private and public health indicates that the government expenditures is being released in a fashion that does not cater to the public and implies corruption as not all Brazilians can afford private healthcare.

Figure 3: Brazil Private vs Public Healthcare Expenditures Per Capita (\$)



Source: World Bank Development Indicators Database

3.0 Literature Review

Throughout the entirety of the world there are continents that experience more developed nations than others as well as pockets of developing nations. South America is not exception to this criteria of continent cross platform economies as there are suppressed nations, developing nations, and upper developing nations. Countries that lay within the borders of South America are subject to heavy government reliance and cannot produce markets that are able to trade while producing economic gains due to government corruption. As corruption flourishes in different natures there is no outcome that benefits human capital in the long run. Public health care governance effects a country's population by increasing mortality rates and fertility rates (Akimoto, 2018). The tradeoff between accountable public health expenditure and personal financial gains through government intervention by individuals in control holds a consistent relationship no matter the country. Classification of countries can be described into three categories of low level, medium-high level, and "grey area" which consists of combinations of both low and medium-high levels of corruption (Ortega et al. 2015). The classification system employs an ideology that development is dependent upon the amount of corruption prevalent, which explains the reason no South American countries are a fully developed nation.

Within many economies whether their nature of developed or developing in classification develop shadow economies that are unaccounted for in national Gross National Income.

Economic data proves that shadow economies are growing in size depending on the size of corruption a country experiences currently no shadow economy is expanding faster than that of Venezuela (Forbes, 2017), the crippling economy allows for black market activity to become the go to transaction center. Civilians of these corrupt countries will turn to shadow economies for everyday goods such as pharmaceuticals, decentralization in Brazil of municipal governments hold minimal accountability to spend a mandatory fifteen percent on public health expenditures (Peixoto et al. 2012). Accountability of governments to fulfill requirements on public health expenditure is a common type of corruption that takes effect on the general population that cannot afford private care. Sufficient evidence across the world in Italy shows similar symptoms to that of South American countries that corruption is in fact uniform with decentralization of government bodies and health care governance (Lagravinese and Paradiso, 2012). As decentralization is an ambiguous part of many countries health care policies it allows for government officials to infiltrate the system and exploit the flaws for personal gain. This uncanny coincidence is highlighted by the cross country study looking into macro and microeconomic data correlation by Li et al. (2017), which imply that if a exploitation is available to be reaped of benefits then it will in fact be used for financial gain.

Although pharmaceuticals are in fact important to physical health there is also another aspect that cannot be bypassed, mental health. Poor living conditions, imposed government sanctions, and widespread embezzlement plague countries which in turn reduces outlook on life in South America. Corrupt leaders will go to extreme lengths to prove their strength and control over the populations. A direct study on a similar region of corrupt grouped countries in Sub-Saharan Africa proves that mental health is directly correlated to corruption and governance over the health sector displaying decreasing returns to human capital (Gillanders, 2011). Living conditions although provided in different environments between South America and Sub-Saharan Africa provides a reinforced link that mental health is just as important to development as is physical health.

Empirical studies on physical health, mental health, and monetary sustainability showcases that corruption in fact reduces human capital through a multitude of channels which can create disastrous effects no matter the region of the world, more importantly South America in this study.

4.0 Data and Empirical Methodology

This study is divulging into the macroeconomic and health data to correlate a relationship between variables to test for impairment on behalf of governments that strive for economic gain on a personal level as opposed to serving the people. Looking into health variables to determine whether growing population sizes along with preexisting healthcare systems can show a relationship that if a healthcare system is established but not constantly growing then as a result the population will suffer. This relationship by looking into the years 1995 to 2015 for the lead indicators is key as population booms have occurred at a rapid pace for these countries during this time period.

4.1 Data

This study uses annual data from 2001-2015. Data was obtained from the World Bank Development Group database using their World Development Indicators. World Bank data is available to the public and provides data on all 193 countries and multiple provenances, along with continent and regional specific cumulative data.

Table 1 Summary Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Inf_Mort	75	13.69	5.06	6.7	28.6
Pu_Hlt_Expen	75	350.48	226.28	35.98	988.71
DPT	75	93.77	3.90	80	99
Measles	75	94.78	2.81	88	99
Pr_Hlt_Expen	75	260.13	141.70	22.30	567.99
Urban	75	5.00e+07	7.76e+07	3071016	1.77e+08
Rural	75	9530045	1.15e+07	170033	3.28e+07
Wtr_San	75	2.64e+08	6.63e+08	3164000	4.57e+09
Hspl_1k	75	1.04	1.04	1	5.1
GNI_Per_Cap	75	2492.82	2492.82	4667.32	14501.97

4.2 Empirical Model

Following Li et. al (2018) this study adapted and modified the original model that consisted of four variables that were coefficients obtained through data modeling or fixed variable effects through the Corruption Perception Index by the Transparency Index that was made to fit a one size fits all scale. In modification to the latter's model we have decided to remove the Corruption Perception Index, $D_t\delta$, and eit as this is a sole continent study as well as the variables Neonatal mortality, Under-5 mortality, Religious, Ethnic, and Linguistic. The variables have been removed due to insufficient significance to this sole continent study, also the variables in the latter's study of Improved water and Access to sanitation have been combined to a singular variable. One variable has been added which is Hospital beds per 1000 people for the purpose of showing increased medical facilities for the selected countries populations.

The model could be written as follow:

$$\begin{aligned} Life_exp_{YI} = \beta + \alpha + inf_mort_{YI} + pu_hlt_expen_{YI} + dpt_{YI} + measles_{YI} + pr_hlt_expen_{YI} + \\ urban_{YI} + rural_{YI} + wtr_san_{YI} + hspl_lk_{YI} + gni_per_cap_{YI} \end{aligned} \quad (1)$$

Life_exp is the amount of years that an individual is expected to live *Y*. *Life_exp* is used as an endogenous variable. It represents the nature of South American governments unable to uphold their required minimal expenditure on healthcare expenditures to improve life quality within their borders. All independent variables are factors that affect the ways of life in South America that can be seen to be correlated with life expectancy.

Independent variables in this study consist of ten variables obtained from a single source, the World Bank. Appendix A and B provide data source, acronyms, descriptions, expected signs, and justifications for using the variables. First, *inf_mort_{YI}* (year *Y* for country *I*) represents the infant mortality rate of a country. Second, *pu_hlt_expen_{YI}* is amount spent by governments in the public sector for a country *I* at year *Y*. Third, *dpt_{YI}* is the rate of immunization for Diphtheria, Pertussis, and Tetanus for a country *I* at year *Y*. Fourth, *measles_{YI}* is the rate of immunization for Measles for a country *I* at year *Y*. Fifth, *pr_hlt_expen_{YI}* is the amount spent in the private sector for healthcare for a country *I* at year *Y*. Sixth, *urban_{YI}* is the amount of the people in the population who live in an urban sector for a country *I* at year *Y*. Seventh, *rural_{YI}* is the amount of people in the population who live in a rural sector for a country *I* at year *Y*. Eight, *wtr_san_{YI}* is

the amount of money spent by a country's government on clean water and sanitation for a country I at year Y . Ninth, $hspl_1k_{YI}$ is the amount of hospital beds per 1000 people for a country I at year Y . Lastly, $gni_per_cap_{YI}$ is the amount of Gross National Income per capita for a country I at year Y .

5.0 Empirical Results

The empirical estimation results are presented in Table 2. The empirical estimation results show that decentralization and poor accountability by governments along with the lackluster laws of each country can allow for short term benefits to human capital but will regress in the medium term. DPT and Measles immunization rates are key to the study as it involves the importance of public health and how for DPT they are temporary cures for a set amount of years that would diminish over time due to the need of additional vaccination. Measles is a one-time vaccination that would prevent an individual so it is only natural to see that over time it would improve health. Current levels of public health expenditure will increase life expectancy over time as the need for public access to medicine and treatment is of importance to these countries. Private healthcare expenditure is a link towards corruption as it implies that a country who does not prioritize public health expenditure will fall victim to capital flight from the public to those in power of budgets, which explains the decrease over the quantile regression.

Table 2: Regression results for Top 5 South American countries by GNI Per Capita

	Life Expectancy		
	.50	.75	.90
CONSTANT	80.56	77.58	76.97
INF_MORT	-.2633	-.2448	-.2403
DPT	.0143*	.0212**	.01
MEASLES	-.0619*	-.042	-.0264**
PR_HLT_EXPEN	-.0025	-.0025	-.0033
PU_HLT_EXPEN	-.0017	-.0016	-.0015
URBAN	3.21e-08	2.50e-08	2.32e-08
RURAL	-1.97e-07	-1.70e-07	-1.57e-07
WTR_SAN	1.37e-11	-2.14e-11	-3.62e-11

HSPL_1K	-.2085	-.2288	-.2197
GNI_PER_CAP	.0005	.0005	.0005
R ²	.7843	.9035	.9106
WLS Sum	6.77	6.13	5.15
Number of obs.	75	75	75

The expected outcome from the regression is that the amount of care provided to the public is inexplicitly decreasing in South American countries. Although variables that link corruption and public health decline such as private health expenditure, DPT immunization, water and sanitation access, hospital beds per one-thousand people, and urban population percentage there is one variable that has no significant impact, GNI per capita. The variable of GNI per capita does not show significance due to the inability to access goods in a country if the supplies are not readily available and or are overpriced to obtain. Interpreting these results in terms of change in the independent variable leads to two points. First, the amount of public healthcare expenditure in a country is needed to exceed private healthcare expenditure on a per capita basis because of the inability by the population to afford the necessary medical supplies. Second, if a country's private healthcare expenditure exceeds public healthcare expenditure then there is a higher probability that the accountability of a government to expense a required amount of capital on public healthcare is being dismissed and is costing the population of such countries their overall health resulting in decreasing returns to human capital.

6.0 Conclusion

In summary, South American life expectancy is varied across the continent yet show similarities in the fact that their governments do not properly expense their capital accounts on public healthcare. Human life expectancy is a key independent variable as the need for proper and appropriate availability to medication and doctor visits is necessary to extending human life expectancy not just in specific countries but also for the continent as a whole. As government laws allow for manipulation of government expenditures it is clear that the private sector of healthcare cannot care for the population as a whole. Limitations to the study that further predict that the public healthcare expenditure of countries is not as wholesome is the varied expenses on clean water and sanitation expenditures. Furthermore, this concludes that the ability of countries

to distort their reporting is constant across all countries and then raises the concern of legitimacy when interpreting these results. To better understand the decline in human capital life expectancy it is important to note that governments of South American countries are held less accountable as their governments are decentralized and development in the region's growth is stagnant in most areas due to capital corruption.

Appendix A: Variable Description and Data Source

Acronym	Description	Data source
Inf_Mort	Infant mortality rate per country	World Bank
DPT	Foreign Direct Investment flows manufacturing by country in millions of dollars	World Bank
Measles	Measles immunization rate per country	World Bank
Pr_Hlt_Expen	Private Healthcare expenditure per country	World Bank
Pu_Hlt_Expen	Public Healthcare expenditure per country	World Bank
Urban	Number of individuals who live in an urban area per country	World Bank
Rural	Number of individuals who live in a rural area per country	World Bank
Wtr_San	Amount of public expenditure towards clean water and sanitation per country in U.S. dollars	World Bank
Hspl_1k	Hospital beds per 1,000 people	World Bank
GNI_Per_Cap	Gross National Income per individual per country	World Bank

Appendix B- Variables and Expected Signs

Acronym	Variable Description	What it captures	Expected Sign
Inf_Mort	Infant mortality rate per country	Decreasing returns to human capital	+/-
DPT	Foreign Direct Investment flows manufacturing by country in millions of dollars	Amount of healthy individuals in a population	+/-
Measles	Measles immunization rate per country	Amount of healthy individuals in a population	+
Pr_Hlt_Expen	Private Healthcare expenditure per country	Gross domestic spending in private healthcare systems	-
Pu_Hlt_Expen	Public Healthcare expenditure per country	Gross domestic spending in public healthcare systems	-
Urban	Number of individuals who live in an urban area per country	Increasing amount of individuals in urban areas	-
Rural	Number of individuals who live in a rural area per country	Decreasing amount of individuals in rural areas	-
Wtr_San	Amount of public expenditure towards clean water and sanitation per country in U.S. dollars	Highlight of capital corruption	+/-
Hspl_1k	Hospital beds per 1,000 people	Decreased spending in public healthcare	+/-
Constant	Life expectancy through quantile regression	Decreasing returns to human capital overall	+

Bibliography

Akimoto, K., 2018. Corruption, Mortality and Fertility Rates, and Development. *Discussion Papers In Economics And Business* , 18(10). Available at: <http://www2.econ.osaka-u.ac.jp/library/global/dp/1810.pdf> [Accessed April 15, 2019].

Friesen, G., 2018. The Path To Hyperinflation: What Happened To Venezuela? *Forbes*. Available at: <https://www.forbes.com/sites/garthfriesen/2018/08/07/the-path-to-hyperinflation-what-happened-to-venezuela/#18f4de7d15e4> [Accessed April 15, 2019].

Gillanders, R., 2011. The mental health cost of corruption: evidence from Sub-Saharan Africa. *UCD CENTRE FOR ECONOMIC RESEARCH* , pp.1–23. Available at: https://researchrepository.ucd.ie/bitstream/10197/3680/1/WP11_26.pdf [Accessed April 15, 2019].

Lagravinese, R. & Paradiso, M., 2012. Corruption and health expenditure in Italy. *Munich Personal RePEc Archive*. Available at: https://mpra.ub.uni-muenchen.de/43215/1/MPRA_paper_43215.pdf [Accessed April 15, 2019].

Li, Q. et al., 2017. Corruption costs lives: evidence from a cross-country study. *Eur J Health Econ*, 19, pp.153–165. Available at: [file:///C:/Users/student/Documents/Corruption Costs Lives.pdf](file:///C:/Users/student/Documents/Corruption%20Costs%20Lives.pdf) [Accessed April 15, 2019].

Ortega, B., Casquero, A. & Sanjuan, J., 2015. Corruption and Convergence in Human Development: Evidence from 69 Countries During 1990–2012. *Social Indicators Research*, 127, pp.691–719.

Peixoto, S. et al., 2012. Decentralization and corruption: evidence from primary health-care programmes. *Applied Economic Letters*, 19, pp.1885–1888. Available at: <http://dx.doi.org/10.1080/13504851.2012.671918> [Accessed April 15, 2019].