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Corruption and inequality of income in Madagascar: study of canal effects of economic growth

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Abstract
The objective of this work is to study the direct and indirect effects of corruption on income inequality in Madagascar from the 2002-2014 period. For direct effects, we used a two-stage model. First, a construction of a simple linear regression model where GDP per capita is an independent variable and corruption (rank of the country) the explanatory variable. The result of the model showed that a drop in ranking rank (relatively linked to a downgrade in the CPI) means a decrease in growth in GDP per capita. Next, we sought to estimate the indirect effects of corruption on income inequality. The introduction of other explanatory variables into this model, including spending on education and health and the ratio of tax revenue to GDP, confirmed that corruption is a negative contributor to economic growth. In other words, corruption negatively affects growth in GDP per capita.

Keywords: Corruption – GDP – income inequality – Madagascar

Introduction

In recent years, the study of exploding global income inequality has become a battleground for economists. Many studies converge on the result that if inequalities decrease between countries, they increase within countries.

This reduction is due to the growth of emerging countries, notably China and India. The very rapid growth in individual living standards in China (8% per year), India (4% per year) and several other Asian countries (Indonesia, Bangladesh, Vietnam, etc.), compared to the growth of wealthy countries (2% per year), explains a relative gap and a decreasing inequality between the population of rich countries and the population of poor countries (François Bourguignon, 2012).[1]

Historically, despite a drop in these inequalities between the world population (inequality between countries), they experienced a historic reversal from the 1980s. According to the textbooks (Milanovic, 2016 [2]; Atkinson, 2016 [3], this increase is the "price to pay" of globalization and trade opening. For Bourguignon, globalization plays an essential role in this development, in particular for developed countries, by contributing to the widening of the gaps between capital income and labor income, and between income from skilled labor and income from unskilled labor. North-South competition, which is a source of deindustrialization, off shoring and reallocation of jobs to services in developed countries, has a negative impact on the wages and jobs of workers with low and medium qualifications. Conversely, at the top of the distribution, the most qualified workers and wealth holders benefit from international labor mobility, the globalization of business activity and financial liberalization, which translates into a surge in very high incomes (managers and shareholders of large companies, traders, stars, internationally renowned researchers, etc.). The remuneration of the big bosses is proportional to the size of the companies they manage, that of traders or sports and cinema stars to the gains or profits they generate, pushing up the salaries of executives and lawyers coaches or agents who work for them. It is clear that globalization plays a role in these scale effects, but also in the imposition of new social standards in terms of remuneration

In 2016, the wealthiest 1% in the United States received an average of 20% of national

income before tax compared to 10% for the poorest 50%. It is largely explained by the unprecedented rise in wage inequality, and in particular by the emergence of extremely high wages at the top of the salary hierarchy, especially among the executives of large companies (Piketty, 2013) [4]

It seems then that in developed countries, income inequality is the result of a choice of society. It is capitalism that the country chooses as a model of society is at the origin. A system that minimizes state intervention and this weak state intervention promotes inequality (Cahuc and Algan, 2007).[5].

However, globalization and capitalism are not the determinants of the rise in income inequality in developing countries. In 2017, Fakir and his colleagues challenged the fundamental capitalism law proposed by Thomas Piketty (r> g) as a factor in the explosion of income inequality. They conclude that corruption affects inequality in a non-linear fashion. However, the effect of r-g is not as strong as that of corruption and is insignificant in very unequal countries (Fakir et al. 2017) [6].

In this work, we will analyze the causal relationship between corruption and income inequality in developing countries like Madagascar.

The goal is to find out whether corruption affects economic growth or not. If so, which is (are) the explanatory variable (s) or by which transmission channel (s) corruption has a direct or indirect effect on income inequality through economic growth.

The hypothesis that we seek to test is as follows. Corruption Affects Income Inequality Through Decreased Economic Growth (Mauro, P., 1997) [7]

Material and Methodology

For the measurement of corruption, we took the corruption perception index as an indicator. Traditionally, the Gini index has been one of the indicators used to measure inequality between groups of individuals. But the data for this index are not available in time series for the case of Madagascar, we cannot use it. The study period spanned from 2002 to 2014, so an observation of 15 years. We start from the 2000s because despite the fact that Transparency International had published the CPI in 1996 but it only started in 2002 for Madagascar. In addition, from the point of economic policy, the year 2000 marked after the golden decades of international institutions (World Bank) and Madagascar to engage in the fight against poverty and inequality through the Millennium Development Goals. For the sake of statistical representativeness, we stretch out until 2014 to have a fairly long study series.

The approach consists of estimating the indirect effects of corruption on income inequality through economic growth. On that, we estimate the equation of gross domestic product per capita given by the relation (1) below:

$GDP_t = A + \sum \beta_i X_{it} + \varepsilon$ (1)

With the gross domestic product (dependent variable), At the constant parameter, β the coefficients of the explanatory variables, X set of vectors of the explanatory or exogenous variables, t the year and i the exogenous variable considered.

The estimation process is carried out in two stages. First, we estimate the direct impact of corruption on growth through a simple regression model where GDP per capita as the dependent (endogenous) variable and corruption as the exogenous variable. The model to be estimated is presented by relation (2) below.

On this, we will follow the previous works on this relation among others (Mauro, 1995[8]; (Lambsdorff 2006) [9]; (Cabral & al.2017). [10]

Model I: $GDP_t = A + \beta C_t + \varepsilon$ (2)

Next, we will integrate other variables considered as main transmission channels on the indirect effects of corruption on income inequality. These variables are tax revenue, education spending (in% GDP), health spending (% GDP).

Model II: $GDP_t = A + \beta_0 C_t + \beta_1 (T/GDP)_t + \beta_2 GEdu_t + \beta_3 GHealth_t + \varepsilon$ (3)

where C, corruption, (T / GDP) ratio of tax revenues to overall GDP, GEdu education spending as a percentage of GDP, GHealth, public health spending as a percentage of GDP. We use the rank of the country as indicators.

The choice of these last three variables is not random. It is based on a wealth of theoretical and empirical evidence that states' actions in these three areas (education, health, and taxation) have played a key role in narrowing the gap between the rich and the poor. Piketty proposes progressive taxes as a more effective instrument for reducing inequalities.

Also, the social spending that funds public services, such as education, health and social protection, has a crucial impact on inequalities, especially those that affect the poorest women and girls, who are those who depend the most of these services.

Results

Data presentation

Table I presents the descriptive statistics of our interest variables. Between 2002-2014, the average GDP per capita of Malagasy is estimated at 414,172 dollars. This income varies by a standard deviation of $ 9.788 during the study period. Next, the government spends on average 3% of GDP in the education sector and 2,860% of GDP in the health sector.

The corruption perception index ranges from 0 (high corruption) to 100 (low corruption). For 12 consecutive years, Madagascar has recorded an average score of 28.692 points.

Finally, tax revenue represents 2.751% of GDP.

Table I: Statistic variable.

	GDP per capita (USD)	Education spending (% GDP)	Health spending (en % GDP)	Tax revenue to GDP Ratio
Average	414,172	3,005	2,860	2,751
Stand.dev	9,788	0,422	0,120	0,953
Min.	398,901	2,082	2,7	1,067
Max.	435,7170	3,848	3,05	3,815

Sourcing: Own calculation from World bank and INSTAT data

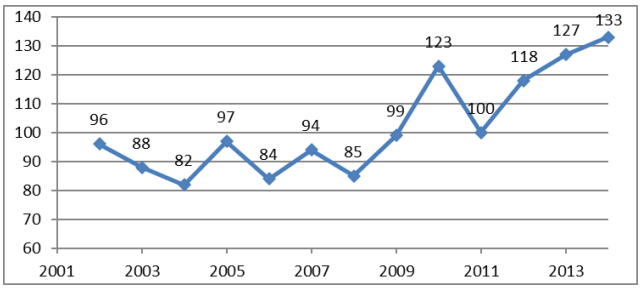
Popular perception of corruption

Corruption affects all parts of the administration and the political sphere. If we refer to a statistic given by the 2015 Afro barometer, the Malagasy security forces, notably the gendarmes and the police are among the most corrupt men in the country (Table II).

Table II: Perceptions of corruption within certain institutions by economic class.

Institutions	Poors	Middle class	Richs
Tax officers	81	73	61
Member of government	82	72	66
National Assembly	82	72	64
Judges and et Magistrates	84	77	67
Police/Gendarmes	88	81	66

Sourcing: Afro barometer 2015

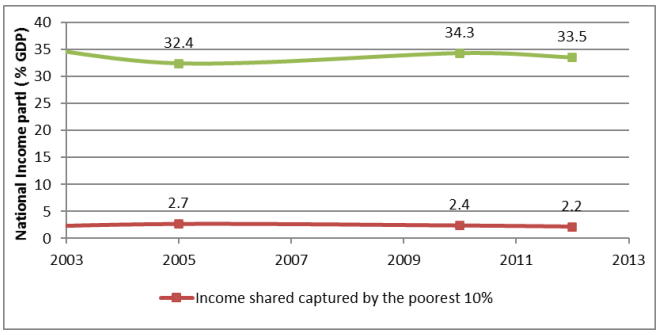


Graph 1: Evolution of the rank of Madagascar in the world ranking

Sourcing: Transparency international

Between 2002-2014, Madagascar lost 37 places on the International Transparency ranking. If the country was 96th in 2002, Madagascar is 133rd in 2014.

Dynamics of income inequality in Madagascar



Graph 2: Income share captured by the wealthiest 10% and the poorest 10% between 2005-2012

Sourcing: Own calculation from POVCAL – World Bank

Overall, the share of high-end retailers (top 10% richer) increased by 32.4% in 2005 to reach a threshold of 34.3% in 2010. On the other hand, the share captured by the poorest 10% decreases. If this group earns 2.7% of national income in 2005, their share of the pie decreased to reach 2.2% only in 2012. Indeed, the gain of Top 10% richest is 14 times higher than that by the poorest 10%.

Direct and indirect effects of corruption on income inequality: econometric results

According to estimation by the OLS Method, we have the results presented in the two tables below (econometric test and correlation between the variables). Tables III and IV show the results of parameter estimation on the direct effects of corruption on economic growth while the second on the indirect effects.

Tableau II: Estimation of the parameters of model I.

Regression Statistic				
Multiple of coefficient determination	0,398			
Coefficient of détermination R^2	0,158			
Adjusted coefficient of determination R^2	0,082			
Standard error	14,074			
Observations	13			
Variance analysis				
	Degree of freedom	**Sum of squares**	**Average of squares**	**F**
Regression	1	410,997	410,997	2,0747
Residues	11	2179,001	198,091	
Total	12	2589,998		
	Coefficients	Standard error	Statistic t	Probability
Constant	450,376	24,145	18,652	1,127E-09
Corruption	-0,336	0,234	-1,440	0,178

Sourcing: Autors

Table IV: Estimation of parameter of model II.

Regression statistic				
Multiple of coeffcient determination	0,683			
Coefficient of détermination R^2	0,467			
Coefficient of détermination R^2	0,201			
Standard error	13,126			
Observations	13			
Variance analysis				
	Degree of freedom	**Sum of squares**	**Average of squares**	**F**
Regression	4	1211,468	302,867	1,757
Residues	8	1378,529	172,316	
Total	12	2589,998		
	Coefficients	Standar error	Statistic t	Probability
Constant	-43,618	829,794	-0,053	0,959

Corruption	-0,186	0,529	-0,352	0,734
Education spending	18,352	10,813	1,697	0,128
Health spending	127,524	249,160	0,512	0,623
Tax revenues /GDP ratio	21,334	26,046	0,819	0,436

Sourcing: Autors

Tableau V: Coefficients de corrélation Pearson entre les variables.

	GDP per capita	Corruption	Education spending	Health spending	Tax revenues GDP ratio
GDP per capita	1				
Corruption	-0,398	1			
Education spending	0,524	-0,535	1		
Health spending	0,131	-0,786	0,504	1	
Tax revenues GDP ratio	-0,024	0,667	-0,467	-0,975	1

Sourcing: Autors

Discussions

Poor pay and victims of bribe demand

We see in Table II that perceptions of corruption decrease the more the economic class increases. On average, 80% of the poor believe that political institutions are mostly corrupt in Madagascar. This result also allows us to say that it is the poor who feel more victims than the rich.

On the other hand, the perceptions of the rich class are less important than those of two lower classes (poor and middle). In Madagascar, those close to power, better informed, have also sought to take advantage of the opportunities created by trade liberalization, the possibilities of exemptions, subsidies, and large public investments diverted in a more or less illicit manner. In addition, wealthy people impose public images of their success as proven paths to development (Mandrara, 2018) [11]. The rich will use corruption as a means to preserve and promote their own status, privileges and interests, while the poor will be vulnerable to extortion at higher levels of inequality (Sanjeev, K and Y, Jong-Song, 2003).[12]

The way corruption manifests itself in a group of people is not the same. While the wealthy use their social position to influence people to take advantage of it, the poor pay money for the services they need; in one service, the poor pay twice. There is money obligatorily to pay, but also the bribe. If corruption reduces the distribution of income, it does not affect the incomes of the wealthy.

On the other hand, in Madagascar, those close to power, who are better informed, have also sought to take advantage of the opportunities created by trade liberalization, the possibilities of exemptions, subsidies, and large public investments diverted in a more or less illicit manner. In addition, wealthy people impose public images of success as proven paths to development.

The income distribution result (Graph 1) shows that, despite the increase in corruption during the period 2000-2014, it does not affect the share of income of the wealthiest 10% which has an increasing tendency.

Corruption indirectly affects income inequality through the distribution of education and health resources

The result presented in Table III shows that corruption has negative effects on economic growth. If the country loses a place in the ranking (relatively linked to the CPI rating), GDP per capita decreases by around 0.336 US dollars. We can then conclude that corruption is significantly negative for the growth of the standard of living of the population. All other things being equal, the probability of corruption lowering the population level is 0.178 (or 17.8%). However, the significance of corruption on GDP per capita growth remains mixed. Because in the estimated model, the value of multiple coefficient of determination is low (0.158).

Then, in the second model (Table IV), despite the introduction of other variables, we still have the same result for corruption. It decreases the growth in the standard of living of the population with an elasticity of -0.186. In the vector set of explanatory variables, only corruption has a negative coefficient. With a probability of 0.734; GDP per capita has a high chance of decreasing the more the extent of corruption increases. Expenditure on education, health expenditure and the tax revenue ratio are significantly positive for the increase in the standard of living of the population with respective coefficients of 18.352; 127.524 and 21.334.

The interest of this second model is that by introducing other variables with corruption, the quality of our regression becomes better with a coefficient of multiple determination of 0.467 against 0.158 for the first model.

Conclusion

Corruption is a global phenomenon that weighs heavily on poor countries. It was concluded that by reducing economic growth, corruption contributes to the widening of income inequality in Madagascar. Through its indirect effects, the drop in spending allocated to basic social services, including health and education, is the main channel of transmission between corruption and income inequality. In reality, the holders of major responsibilities take advantage of their powers to increase their incomes vertiginously while the poor only receive crumbs. In addition, the poor pay more bribes than the wealthy with the already low income. In view of these results, it turns out that the fight against corruption must be included in the priorities of development policies and the fight against income inequality in poor countries.

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