Corruption, Inequality, and the Informal Economy: Evidence from Eastern Europe

(Preliminary and Incomplete)

November 2021

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Abstract

It is a well-established result in the literature that more corruption leads to more income inequality. However, the relationship is not necessarily this simple and can depend on the size of the Informal sector in an economy. In this paper, I use panel data spanning from 2005-2015 on eight Eastern European countries and utilize threshold regression techniques from Hansen (1999) to test that. The findings suggest that when the size of the informal economy in Eastern Europe exceeds a specific threshold point, there exist a tradeoff between corruption and inequality. The policy importance of the result lies in suggesting that measures established to fight corruption might amplify income inequality in countries with large enough informal sector. For robustness checks, different measures of inequality were used.

i. Introduction

Previous literature and common sense lead most policy makers to simply adopt the line of thinking that more corruption in an economy necessarily lead to more inequality. While this statement has its merit, it does not reflect the full picture. In this paper, I try to empirically demonstrate how the corruption-inequality relationship can be affected by the size of the informal sector in an economy and how a tradeoff between corruption and inequality might exist due to that. In this early iteration of the paper, I use data from 8 Eastern European countries for the years 2005-2015. I plan to expand the panel dataset to include more economies that have prominent share of informal sector present.

The logic of my null hypothesis in this paper follows the theoretical arguments from Okumu and Forgues Puccio (2014) theoretical paper. Their argument goes as follows:

"The poorest individuals lack the personal characteristics required to find work in the formal economy, while discrimination and institutional barriers also restrict work opportunities. The informal sector therefore provides jobs and a source of income. Policies aimed at reducing corruption impose labor market (and other) regulations and have an adverse impact on employment and welfare in the informal sector." (Okumu et al, 2014)

This paper uses threshold regression techniques developed by Hansen in his 1999 seminal paper. To the best of my knowledge, this is the first work that uses threshold regressions to study this problem and optimal informal sector size threshold for anti-corruption policies. It is also the first paper that test the corruption-inequality-informality relationship for the Eastern European block.

ii. Literature Review

Studying Income inequality related policy questions is for great importance. This is because the existence of high levels of income inequality leads to distorting investments in physical and human capital[1] and can lead to social, political upheaval resulting in negative investment flows.[2] Moreover, studies like Barro (2000) and Easterly (2007) show a negative relationship between economic growth and inequality in developing countries. This is troublesome because an increase in growth constraints reduces the velocity by which a country can reduce poverty[3]

One way income inequality can be increased in an economy is through the corruption channel. The most common result in the literature is that more corruption leads to higher income inequality. For example, in the theoretical literature, Blackburn and Forgues-Puccio (2007) show using DSGE modelling that corruption can increase income inequality through bureaucrats colluding with taxpayers to evade taxes reducing the effectiveness of the central government redistribution policy. Similarly, empirical papers like Gupta et al. (2002) and de Camacho et al (2006) quantify a positive relationship between the level of corruption and income inequality in a panel of OECD, African, Asian, and Latin countries.

The most relevant strand of literature to the topic of this research paper is the one that explore the effect of the size of the informal economy on the relationship between corruption and income inequality. An example is the theoretical model developed by Okumu and Forgues Puccio (2014) which shows that in equilibrium with corruption, the informal economy mitigates the extent of income inequality. Empirical work on the topic includes mainly the two papers by Dobson and Ramlogan-Dobson (2012 and 2010) that uses panel data from Latin American countries to show that the effect of corruption on income inequality is dampened when the presence of the informal

[1] Galor and Zeira (1993); Banerjee and Newman (1993); Person and Tabellini (1994); Alesina and Rodrik (1994); Galor and Moav (2006); and Galor, Moav and Vollrath (2006)

[2] Alesina and Perotti (1996); Bourguignon and Verdier (2000); and Gradstein (2007).

[3] Galor and Zeira (1993), Alesina and Rodrik (1994), Person and Tabellini (1994), Alesina and Perotti (1996), Bourguignon and Verdier (2002), and Gradstein (2007)

sector in these countries is taken into consideration. The rationale given behind their findings is that countries with weaker institutions and larger informal sectors usually have looser employment regulations leading to more opportunities for the unskilled and semi-skilled workers, and hence, policies aimed at reducing corruption and strengthening institutions lead to reducing the size of the informal sector and consequently to higher income inequality. This is related to multitude of studies that demonstrates how the size of the informal economy can be affected by economic reforms and fighting corruption.[4]

This paper uses threshold regression techniques developed by Hansen in his 1999 seminal paper. To the best of my knowledge, this is the first work that uses threshold regressions to study this question and optimal informal sector size threshold for anti-corruption policies. Moreover, it is the first paper that studies the corruption-inequality-informality relationship for the Eastern European block. The choice of Eastern European countries is motivated by the fact they are plagued with corruption and income inequality and have a sizeable informal sector.

iii. Data

Panel data set was assembled using data coming mostly from the world bank development database and Transparency International. Data is annual for the years 2005-2015. The countries included are Russia, Bulgaria, Czech Republic, Hungary, Poland, Ukraine, Romania, and Belarus. The variables collected are Gini coefficient (proxy for inequality), TI corruption index (proxy for corruption), self-employment as % of total employment (proxy for size of the informal sector), Trade as % of GDP (proxy for openness), real GDP per capita, FDI, primary school enrollment, domestic credit to private sector as % GDP, and inflation.

iv. Methodology

The standard control variables used in the economic literature were used in this paper as well: Trade as % of GDP (proxy for openness), real GDP per capita, FDI, primary school enrollment, domestic credit to private sector as % GDP, and inflation. I resort to Hansen (1999) threshold

[4] Ulyssea, 2010; Dabla-Norris et al, 2008; De Soto, 2000; Dixit, 2004; Marjit, 2003; Marjit, Ghosh and Biswas, 2006

regression model as a methodological base for this study. Consider a following simple regression equation:

$$y_{it} = \mu_i + \beta_1 x_{it} I[q_{it} \leq \gamma] + \beta_2 x_{it} I[q_{it} > \gamma] + e_{it} \quad (1)$$

where y_{it} is the dependent variable for country i at time t;
x_{it} is a vector of predictor variables for country i at time t;
q_{it} is a threshold variable for country i at time t;
γ is a threshold value;
$I[q_{it} \leq \gamma]]$ is an indicator function that is equal to 1 when $q_t \leq \gamma$ and equals 0 otherwise;
$I[q_{it} > \gamma]]$ is an indicator function that is equal to 1 when $q_t > \gamma$ and equals 0 otherwise.

The null hypothesis of the test is $H_0 : = \beta_{1i} = \beta_{2i} \, for \, i = 0, 1, 2, 3$. If the null hypothesis has been rejected, then the threshold effect has been established. The threshold value γ can be found by estimating equation (1) though finding the minimum one of the sums of squared errors in a threshold variable. Under the null hypothesis, the distribution of the *p*-value statistic is uniform, and this transformation can be calculated through bootstrap.

v. Results of the Empirical Models

As we mentioned previously, the threshold variable in this analysis is the size of the informal economy proxied by self-employment as a percentage of total employment.

The primary setup of an empirical model we estimate is as follows:

$$\begin{aligned} GINI_{it} = \mu_i &+ \delta_1 Inflation_{i,t-1} \\ &+ \delta_2 Openness_{i,t-1} + \delta_3 \Delta RGDP_{i,t-1} + \delta_4 FDI_{i,t-1} + \delta_5 DCPS_{i,t-1} + \delta_6 IS_{i,t-1} \\ &+ \beta_1 C_{i,t-1} I[IS_{t-1} \leq \gamma_1] + \beta_2 C_{i,t-1} I[\gamma_1 < IS_{t-1} \leq \gamma_2] + \beta_3 C_{i,t-1} I[IS_{t-1} > \gamma_2] \\ &+ e_{it} \quad (2) \end{aligned}$$

You can notice that in equation (2) that we are using a two-threshold setup. This choice can be supported by the results of the test for threshold effects reported in Table 1 below. The p-values for the single-threshold and double-threshold tests show low p-values (below 5%), supporting the existence of two thresholds. We run similar test using the Palma ratio as our dependent variable (as a robustness check). We find that in this case a single-threshold exist with statistical significance (p-value below 10%). Palma ratio is calculated by dividing the share of income for the top 10% of income earners by the share of income for the bottom 40% of the population.

Table 1. Test for Threshold Effects (P-Values)

	Single Threshold	Double Threshold	Triple Threshold
GINI coefficient as the dependent variable	0.026	0.016	0.853
Palma ratio as the dependent variable	0.076	0.603	N/A

The robustness check model set up is as follows:

$$PALMA_{it} = \mu_i + \delta_1 Inflation_{i,t-1} + \delta_2 Openness_{i,t-1} + \delta_3 \Delta RGDP_{i,t-1} + \delta_4 FDI_{i,t-1} + \delta_5 DCPS_{i,t-1} + \delta_6 IS_{i,t-1} + \beta_1 C_{i,t-1} I[IS_{it} \leq \eta] + \beta_2 C_{i,t-1} I\left[IS_{i,t-1} > \eta\right] + e_{it} \quad (3)$$

Table 2 below shows the estimated threshold point for both cases using the GINI and the Palm ratio. Chan (1993) and Hansen (1999) recommend estimation of the thresholds by least squares. This is easiest to achieve by solving the optimization problem to find the thresholds that minimize the concentrated sum of squared error. The threshold variable as noted before is the size of the informal economy (proxied by self-employment as % of total employment). The thresholds for the GINI case are 12.21% and 18.48% and the unique threshold for the Palma ratio case is the 12.23%.

Table 2. Threshold Estimates

	Estimate
$\hat{\gamma}_1$	12.21
$\hat{\gamma}_2$	18.48
$\hat{\eta}$	12.23

Table 3 below shows the coefficient slopes estimates for the main variables of interest (corruption) above and below threshold points.

In the first case, there exist three different effects depending on if we are below the first threshold γ_1 (estimated at 12.21%), between γ_1 *and the second threshold* γ_2, or above γ_2 (estimated a 18.4%). We see that, an increase in the corruption is strongly positively related to an increase in Inequality (measured by the GINI coefficient). The coefficient stays positive and statistically significant but gets smaller between γ_1 *and* γ_2 , followed by and inversion of the sign of the coefficient (and statistical significance) when the size of the informal sector exceeds γ_2. This goes hand in hand with the hypothesis mentioned in section (I) of this paper regarding the inverse-U relationship between corruption and inequality.

For the second case (Palma ratio as a measure of inequality), we find no meaningful effect in the low Informal regime, but we find a negative and statistically significant effect of corruption on Inequality when the size of the informal sector exceeds η ($estimated\ at\ 12.22\%$).

Table 3. Main Coefficients Estimations

Regressor	**GINI Coefficient**			**Palma Ratio**	
Regime	$IS_{t-1} \leq \gamma_1$	$\gamma_1 < IS_{t-1} \leq \gamma_2$	$IS_{t-1} > \gamma_2$	$IS_{t-1} \leq \eta$	$IS_{t-1} > \eta$
Corruption Index, lagged 1 period	0.982*** (0.270)	0.490* (0.256)	-0.703*** (0.216)	0.011 (0.009)	-0.014* (0.008)

White-Adjusted Standard errors are given in parentheses.
*Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1*

Meanwhile, table 4 shows the estimated regression coefficients for the control variables. When the Gini coefficient is in use, FDI seems to have a statistically significant negative effect on inequality while the measure of the size of the informal economy (self-employment %) seems to have a statistically significant positive effect on inequality. When we run the regression with Palma ratio, we notice a statistically significant negative effect of Trade openness on Inequality and a statistically significant positive effect of economic growth on Inequality.

Table 4. Controls Coefficients Estimations

Regressor	**GINI**	**Palma**
Inflation, lagged 1 period	-0.0354 (0.0122)	0.0004 (0.0005)
Trade Openness, lagged 1 period	-0.0058 (0.0094)	-0.0013*** (0.0004)
Δ Real GDP, lagged 1 period	0.0152 (0.0182)	0.0020*** (0.0007)
FDI, lagged 1 period	-0.0215*** (0.0037)	-0.0003 (0.0002)
Direct Credit to Private Sector, lagged 1 period	-0.0001 (0.0151)	0.0003 (0.0006)
Self-Employment Share, lagged 1 period	0.2771* (0.1603)	0.0075 (0.00074)

White-Adjusted Standard errors are given in parentheses.
*Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1*

vi. Conclusion and Policy Implications

In this paper, I used a panel data spanning from 2005-2015 on eight Eastern European countries and utilized threshold regression techniques from Hansen (1999) to further explore the relationship between corruption and income inequality. The findings suggest that when the size of the informal economy in Eastern Europe exceeds a specific threshold point, there exist a tradeoff between corruption and inequality. The policy importance of the result lies in suggesting that measures established to fight corruption might amplify income inequality in countries with large enough informal sector. For robustness checks, different measures of inequality were used.

Anti-corruption measures introduced by governments and advocated by organizations such as the World Bank may exacerbate inequality. One implication of this result is that it may be beneficial to allow corruption to grow in countries with weak institutions and where the informal sector is large. However, this is not the first best solution since the persistence of corruption can lead a country to be confined in a downward spiral of informality and weak institution.

The first would be the existence of anti-corruption policies that go hand in hand with measures that help absorb the workers displaced from the informal sector.

References

Alesina, A. and D. Rodrik, 1996. Distributive politics and economic growth. Quarterly Journal of Economics,109, 465-490.

Alesina, A. and R. Perotti, 1996. Income distribution, political instability and investment. European Economic review, 40, 1203-1228.

Banerjee, A. and A. Newman, 1993. Occupational choice and the process of development. Journal of Political Economy, 101, 274-298.

Blackburn, K. and G. F. Forgues-Puccio, 2007. Distribution and development in a model of misgovernance. European Economic Review, 51, 1534- 1563.

Bourguignon, F., and T. Verdier, 2000. Oligarchy, democracy, inequality and growth. Journal of Development Economics, 2, 285-313.

Chan, K.S., 1993. Consistency and limiting distribution of the least squares estimator of a threshold autoregressive model. The Annals of Statistics 21, 520-533.

Dabla-Norris, E., M. Gradstein and G. Inchauste 2008, What Causes Firms to Hide Output? The Determinants of Informality, Journal of Development Economics 85, 1–2, 1–27.

De Soto, Hernando 2000: The Mystery of Capital. USA: Basic Books.

Dixit, A 2004: Lawlessness and Economics: Alternative Modes of Governance, NJ: Princeton University Press.

Dobson, Stephen and Carlyn Ramlogan-Dobson 2012, Inequality, corruption and the informal sector, Economics Letters, 115, 104–107

Dobson, S.M., C Ramlogan-Dobson 2010, Is there a trade-off between inequality and corruption? Evidence from Latin America, Economics Letters, 107, 102–104.

Dobson, Stephen and Carlyn Ramlogan-Dobson 2012, Why is Corruption Less Harmful to Income Inequality in Latin America? World Development, 40, 8, 1534–1545.

Galor, O. and J. Zeira, 1993. Income distribution and macroeconomics. Review of Economic Studies, 60, 35-52.

Galor, E., and Moav, O., 2006. Das Human Kapital: a theory of the demise of the class structure. Review of Economic Studies, 73, 85-117.

Galor, E., Moav, O. and Vollrath, D., 2006. Land inequality and the emergence of human capital promoting institutions. Manuscript, Brown University.

Gradstein, M. 2007. Inequality, democracy and the protection of property rights. Economic Journal, 117, 252-269.

Hansen, B.E., 1996. Inference when a nuisance parameter is not identi"ed under the null hypothesis. Econometrica 64, 413}430

Hansen, B. E. 1999. Threshold effects in non-dynamic panels: Estimation, testing, and inference. Journal of Econometrics, 93(2), 345–368

Marjit, S. (2003): Economic reform and Informal wage – A General Equilibrium Analysis, Journal of Development Economics, 72, 1, pp 371-378.

Marjit, S., S. Ghosh and A Biswas (2007), Informality, Corruption and Trade Reform, European Journal of Political Economy, 23, 777-789

Okumu, I.M. and Forgues-Puccio, G.F. 2014 “Is the informal sector a window of hope? Corruption, Informal Sector and Income Inequality

Persson, T. and G. Tabellini, 1994. Is Inequality Harmful for Growth? American Economic Review, 84, 600-621.

Ulyssea, G 2010, Regulation of entry, labor market institutions and the informal sector. Journal of Development Economics 91, 87–99