Is Diamond a Resource Curse for Africa?

Karli Hamrick
West Virginia Wesleyan College

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Abstract

This paper investigates the resource curse in diamond exporting industry in African countries. The empirical evidence about the "resource curse" is mixed in literature and almost none has been done regarding diamond. Our study aims to bridge that gap. The results suggest that diamond export is positively correlated with well-being in a group of African countries. In other words, the "resource curse" may not occur in diamond mining industry after the Kimberly Process (KP) was put in place in 2002. We argue that the KP serves as a good institution and has created good incentives for firms in the industry. In return, these firms may have created better jobs and increased well-being in these countries.

Keywords

Diamond Export, Resource Curse, Economic Growth, Africa

Cover Page Footnote

1. Introduction

This study examines if diamond abundant countries in Africa are experiencing the "resource curse". Empirical evidences suggest there is a negative relationship between natural resources abundance and economic growth in most African countries. In this study, we want to investigate if this remains true.

There have been significant changes in those African countries regarding political and economic environment since 1990s. During the time between 1990 and 2002, civil wars and corruption were prevalent. As a result, diamond mining was often blamed for creating domestic conflict and violence. However, after 2002, most of these countries began cooperating with the Kimberly Process (KP), which regulates and controls the exporting of diamonds from rebel groups, in hopes to eliminate civil conflict and reduce corruption and political instability. It forbids trade with non-participants of the KP. There are fifty-four participants, representing 81 countries in the KP. The requirements of the KP are that participants' rough diamonds are shipped in sealed containers and exported with KP Certificate that verifies that the rough diamonds have not benefited a rebel movement. We argue that this KP was a positive shock to diamond industry and may have provided diamond exporting firms with good incentives. As a result, diamond may become a clean industry and contribute effectively to economic growth for these African nations. In this study, we collect data for a group of 11 African countries from 2006 to 2014. These countries are rich in diamond endowment and participate in KP.

2. Literature Review

There is rich literature on the "resource curse". Auty (1993) first coined that term to refer to a negative relationship between rich natural resource endowment and economic growth. Since then, handful empirical studies have been done to either prove or disprove the theory. The evidence is, however, mixed. Several results showed the "resource curse" does exist (Sachs and Warner, 1995, 1999, 2001). Mehlum *et al*. (2006) echoed Sachs and Warner and showed correlation between development failures and highly dependent natural resource countries. Apergis and Payne (2014) also found evidence of "resource curse" in oil abundance countries in the Middle East and North Africa area. However, there are studies that challenge the "resource curse" argument. Van der Ploeg (2011) argued that the "resource curse" does not necessarily happen in all countries and the ultimate impact of rich natural resources will depend on the quality of existing institutions in each nation. In fact, Lederman and Maloney (2007) and James (2015) found no evidence for the adverse relationship between natural resource abundance and economic growth. Cavalcanti *et al.* (2011) even found a positive correlation between oil abundance and income and economic growth.

Although oil and gold are the most important natural resources to many African countries, diamond becomes more and more important. They discovered diamond in Africa between 1866 and 1867 on the south bank of the Orange River in South Africa. Since then, the production of diamonds increased tremendously (Johnson, 2002). Unfortunately, some of the world's most diamond abundant countries are also the poorest ones. They have also experienced decades of war and civil conflicts. Thorsson (2007) studied 11 diamond abundance African countries and found that there was a negative relationship between diamond exports and GDP per capita in those countries. He attributed the result to three main factors such as the Dutch Disease, the volatility effect, and the voracity effect. Lack of transparency in the diamond industry has also caused negative economic growth in diamond exporting countries (Tamm, 2002).

Surprisingly, we did not find many studies that explore the impact of diamond exports on economic growth in the literature. Given the mixed evidence about the "resource curse" and the lack of study on the impact of diamond export on economic growth in the literature, this study aims to provide more evidences that may fill the gap.

3. Data

This section describes sources of data that we use in this study. Since this paper investigates the "resource curse" in African countries with diamond abundance, we use number of control variables that have been tested in the literature.

The main dependent variable is GDP per capita. We use HDI as dependent variable for robustness check. Our control variables are economic freedom score, labor force participation rate (LFPR), political stability, and capital investment. The data collected were from 2006 to 2014 and covered 11 countries such as Sierra Leone, Angola, Liberia, Tanzania, Zimbabwe, South Africa, Guinea, Ghana, Namibia, Democratic Republic of the Congo, and Central African Republic.

Data for economic freedom, labor force participation rate, political stability, capital investment, and HDI came from World Bank and the Organization for Economic Co-operation and Development (OECD). Data for diamond export were compiled from the Kimberly Process orginazation.

There are 71 observations in our dataset.

4. Empirical Strategies and Results

Our hypothesis is that the "resource curse" still exists in African countries that are abundant in diamond. In other words, countries that rely significantly on exporting diamond may experience slow growth in well-being. However, the Kimberly Process may mitigate the negative impact or even help diamond industry contribute

better to economic growth. To measure well-being we use GDP per capita. The main explanatory variable will be diamond export. Our control variables are economic freedom score, labor force participation rate, political stability, and capital investment.

These variables are chosen due to their known impact on GDP per capita and their relevance to Africa's economy.

Our main specification is as follows:

$Real\ GDP\ per\ capita = \beta_o + \beta_1\ Diamond\_Export_{it} + \beta_2\ Economic\_Freedom_{it} + \beta_3\ LFPR_{it} + \beta_4\ Political\_Stability_{it} + \beta_5\ Capital\_Investment_{it} + \varepsilon_{it}$

$$(1)$$

We also include (Diamond export)^2 as one explanatory variable to see if diamond export has any second degree effect on GDP per capita.

Our second model is as follows:

$Real\ GDP\ per\ capita = \beta_o + \beta_1\ Diamond\_Export_{it} + \beta_2\ (Diamond\_Export)^2{}_{it} + \beta_3\ Economic\_Freedom_{it} + \beta_4\ LFPR_{it} + \beta_5\ Political\_Stability_{it} + \beta_6\ Capital\_Investment_{it} + \varepsilon_{it}$ (2)

In this study, we expect the Economic Freedom Score to have a positive relationship with GDP per capita. This variable is measured from 0 to100; 100 meaning the most free and 0 is the least free. It includes measure about rule of law, regulatory efficiency, government size, and open markets.

The Labor Force Participation Rate is measured by the proportion of the population, age 15 and older, that are economically active. We expect to see a positive relationship between this variable and GDP per capita.

Political stability is measured from -2.5 (weak) to 2.5 (strong) to exhibit the perception of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. We expect a positive correlation between political stability and GDP per capita. If a country has a more stable political environment foreign and domestic companies might invest more in the economy and results in higher GDP per capita.

Capital Investment is the gross capital formation of a countries fixed assets plus inventories. It is measured in billion of U.S. dollars. Due to corruption in Africa, investment typically does not occur, especially during time of war because resources are being used for weapons. Lack of investment leads to lack of opportunity and a lack of economic growth. Therefore, this variable is expected to have a positive relationship with GDP per capita. If a country has a higher amount of capital assets and inventories, the higher their GDP per capita might be.

Diamond export is measured in millions of U.S. dollars (USD). In line with the literature about "resource curse", we expect diamond export to have a negative relationship with GDP per capita. A natural resource that has been exploited and

used to fuel greed and corruption is likely going to have a negative impact on the economy.

Table 1 summarizes all sources of data used in this study. Table 2 presents some descriptive statistics for the main variables. Table 3 shows a correlation matrix for those variables. Table 4 consists of our main findings.

As shown in column 1 of table 4, our prime interest variable, diamond export, has a positive coefficient and it is statistically significant at the 1% level. It is an interesting result since it provides evidence that perhaps, the "resource" curse does not exist in certain industry in a group of African countries. This result seems to support Van der Ploeg (2011)'s argument that the "resource curse" may not occur in all countries and the ultimate effect will depend on the quality of existing institutions in each nation. So what institutions have changed in the group of countries in this study? We argue that the Kimberly Process, which was put in place in 2002, has changed fundamentally how the diamond mining industry works in these countries. In other words, mining firms and local governments have become more transparent and followed fair rules in conducting their businesses. As a result, diamond exporting might contribute better to the economic development and well-being in these countries. In addition, other control variables such as economic freedom and political stability both have expected signs and significant at the 10% and 1% level, respectively.

According to the second column of table 4, both main interest variables' coefficients, diamond export and (diamond export)^2, are statistically significant at the 1% level. Although diamond export still has positive sign, (diamond export)^2 has a negative sign. It suggests that diamond export may have a second-degree effect on GDP per capita. In other words, diamond exporting industry may contribute at a slower pace as it grows. However, the coefficient of (diamond export)^2 variable is close to 0 and we argue that a positive effect from diamond industry is dominant in these countries.

5. Robustness Check

To test if these results still hold in different scenarios, we use log(GDP per capita) and HDI as alternative measurements of GDP per capita.
The alternative specifications are as follows:

$Log(Real\ GDP\ per\ capita) = \beta_o + \beta_1\ log(Diamond\_Export_{it}) + \beta_2\ Economic\_Freedom_{it} +$

$\qquad \beta_3\ LFPR_{it} + \beta_4\ Political\_Stability_{it} + \beta_5\ log(Capital\_Investment_{it}) + \varepsilon_{it}$
$\qquad$ (3)

$HDI = \beta_o + \beta_1\ log(Diamond\_Export_{it}) + \beta_2\ Economic\_Freedom_{it} + \beta_3\ LFPR_{it} +$

$\qquad \beta_4\ Political\_Stability_{it} + \beta_5\ log(Capital\_Investment_{it}) + \varepsilon_{it}$
$\qquad$ (4)

Table 5 and 6 show the results for robustness checks. According to those two tables, the results are consistent with our main finding. Table 5 suggests that, *ceteris paribus*, one percent increase in the amount of diamond export is associated with 0.25% increase in GDP per capita. Additionally, other main control variables such as economic freedom, political stability and capital investment have the expected signs and are significant at 10% or 1% level. Results in table 6 suggest that, *ceteris paribus*, one percent increase in the amount of diamond export is correlated with 0.011 points increase in HDI. Furthermore, other main control variables such as political stability and capital investment have the expected signs and are significant at 1% level.

6. Conclusion

Our study shows that the "resource course" may not occur in the last ten years in Africa, at least with diamond mining industry. The better business practice, namely Kimberly Process, was put in place in 2002 and may have changed the incentives of firms and local governments in the area. We argue that the new process has created a more transparent and less corrupt economic environment in diamond producing sector. As a result, diamond markets become more competitive, diamond-exporting firms become more efficient and rent-seeking activities are less prevalent. In return, that contributes more effectively to economic growth. With the Kimberly Process in place, there is hope for these countries that have experienced years of exploitation, greed, corruption, and civil conflict.

This study also has policy implications, suggesting that governments of rich resource- endowment countries should be aware of the quality of their existing institutions. The argument of the "resource curse" does not necessarily hold. If a country has good institution in place natural resources may be beneficial to its economic development. The Kimberly Process in diamond mining industry is an example.

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Table 1: **Variables and Sources**

Variables	Sources
GDP per capita	World Bank
Economic Freedom	World Bank
Labor Force Participation Rate	World Bank
Political Stability	World Bank
Capital Investment	World Bank
HDI	World Bank
Diamond Export	Kimberly Process

Table 2: **Overall Summary Statistics**

	Observations	Mean	S.D	Minimum	Maximum
GDP per capita	71	2081.40	2278.46	291.69	7967.68
Economic Freedom	71	51.10	10.14	21	64
Labor Force Participation Rate	71	69.06	10.36	52.31	83.48
Political Stability	71	-0.56	0.86	-2.21	1.2
Capital Investment	71	12.66	21.65	0.09	1.2
HDI	71	0.47	0.10	0.32	0.66
Diamond Export	71	420.0	555.41	7.43	2148.29

Table 3: **Correlation Matrix of total dataset**

	Econ. Freedom	LFPR	Poli. Stability	Cap. Investment	HDI	Diamond Export
Economic Freedom	1					
LFPR	-0.440	1				
Political Stability	0.537	-0.255	1			
Capital Investment	0.372	-0.306	0.246	1		
HDI	0.514	-0.175	0.745	0.626	1	
Diamond Export	0.235	-0.352	0.383	0.775	0.686	1

Table 4: **Regression Results**

(Dependent Variable: GDP per capita)

Independent Variables/Model	1 (OLS)	2 (OLS)
Constant	94.80	-1396.37
	(1285.91)	(843.1)
Diamond Export$_t$	2.45***	5.16***
	(0.60)	(0.47)
(Diamond Export$_t$)^2		-0.002***
		(0.0003)
Controls		
Economic Freedom$_t$	25.94*	48.11***
	(13.14)	(10.82)
Labor Force Participation Rate$_t$	-4.33	-7.29
	(9.99)	(6.98)
Political Stability$_t$	573.38***	322.21***
	(144.86)	(93.6)
Capital Investment$_t$	24.06	30.04***
	(14.96)	(7.75)
N	71	71
R^2	0.8966	0.9441

*** $p<0.01$, **$p<0.05$, *$p<0.1$ Numbers in parenthesis are robust standard errors.

Table 5: **Robustness Check**

(Dependent Variable: Log(GDP per capita))

Independent Variables/Model	1 (OLS)
Constant	5.35
	(0.81)
Log(Diamond Export$_t$)	0.25***
	(0.04)
Controls	
Economic Freedom$_t$	0.014*
	(0.007)
Labor Force Participation Rate$_t$	-0.003
	(0.006)
Political Stability$_t$	0.43***
	(0.08)
Log(Capital Investment$_t$)	0.21***
	(0.04)
N	71
R^2	0.835

*** p<0.01, **p<0.05, *p<0.1   Numbers in parenthesis are robust standard errors.

Table 6: **Robustness Check**

(Dependent Variable: HDI)

Independent Variables/Model	1 (OLS)
Constant	0.32
	(0.08)
Log(Diamond Export$_t$)	0.011***
	(0.003)
Controls	
Economic Freedom$_t$	0.0012
	(0.0008)
Labor Force Participation Rate$_t$	0.0005
	(0.0006)
Political Stability$_t$	0.062***
	(0.008)
Log(Capital Investment$_t$)	0.022***
	(0.004)
N	71
R^2	0.7881

Table 7: **List of African Countries in the Study**

Angola	Namibia
Central African Republic	Sierra Leone
Democratic Republic of the Congo	South Africa
Ghana	Tanzania
Guinea	Zimbabwe
Liberia	