O 18. HOW DOES ECONOMIC GROWTH AFFECTS DEFORESTATION: EVIDENCE FROM ALBANIA

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ABSTRACT: This paper examines the relationship between environment and economic development in Albania. We use macroeconomic data for the period 2000-2018 in order to give answer to the research question on the relationship between deforestation trends and economic growth. According to the literature, there is a "U" shaped relationship between GDP and environment. This is called the environmental Kuznets curve (EKC), and shows a hypothesized relationship between environmental quality and economic development. So, various indicators of environmental degradation tend to get worse as modern economic growth occurs until average income reaches a certain point over the course of development. The dependent variable is used deforestation as a proxy for environment degradation. Moreover, deforestation is analysed in relation with the following set of control variables; GDP growth rate, energy consumption, trade openness, and population during the period of study. Time series data obtained from the Albanian Institute of Statistics, Albanian Ministry of Environment and Tourism, and World Bank Development Indicators were fitted using econometric techniques such as Autoregressive Distributed Lag (ARDL), Granger causality test, Johansen co-integration test and Vector Error Correction Method (VECM).
The empirical results of our analysis are in part consistent with similar studies focused on developing countries. The results confirmed the existence of co-integration among the variables both in long- and short-run paths.

Keywords: Deforestation, Economic Growth, Granger Causality, Developing Countries

1. INTRODUCTION

Deforestation is the removal of a forest or stand of trees from land which is then converted to a non-forest use. This process is affected as a result of broad climate changes or catastrophes such as fire and landslides; growing populations that need expanding food supplies, so forests are cleared by shifting cultivators for annual or permanent crops; commercial logging operations that deplete forest stocks; using wood fuels for local populations. Also, deforestation leads to changed habitat, the release of carbon to the atmosphere, soil degradation, and flooding.
Deforestation facilitated development was also the experience in middle-ages Europe and Japan, pre-European Easter Island, and in post-European North America (Diamond, 2005). Presently, high rates of deforestation are found in lower income countries in the tropical belt (Chomitz et al., 2007).
In addition to agricultural benefits, deforestation has external costs. These costs are global: tropical deforestation accounts for approximately 12 per cent of total global emissions (Van der Werf et al., 2009).
The environmental Kuznets curve describes the environmental impact of economic growth in differently sized economies. In theory, the curve suggests pollution and other environmental problems will rise as less developed economies grow. But at a certain point, a growing economy matures enough that the environmental consequences of economic growth slow and begin to reverse.
One important question which is still at stake, even more in an economic crisis context is whether environmental and economic objectives are compatible subjects. This question gets high resonance in the literature devoted to the Environmental Kuznets Curve (EKC) for deforestation which is a subject of confrontation between optimistic and pessimistic views of development (Carson 2010). This literature has gained considerable expansion in economics as well as in natural sciences (Mather et al. 1999).

From the 1990s onwards, numerous studies following the idea of (Grossman & Krueger 1995) tested an EKC for deforestation. Thus there seems to be a discrepancy between, on the one side, researchers who dismiss EKCs and, on the other side, scientists who consider that EKCs are relevant. Among the latter, the EKC is still presented as one of the hypotheses explaining the forest transition process (Barbier et al. 2010; Rudel et al. 2005; Mather 1992).
From the 1990s onwards, numerous studies following the idea of (Grossman & Krueger 1995) tested an EKC for deforestation. The EKC is still presented as one of the hypotheses explaining the forest transition process (Barbier et al. 2010; Rudel et al. 2005; Mather 1992). The EKC story will not fade until theoretical alternatives will be provided (Choumert, 2012).
Scientists say more needs to be done to mitigate the impact of economic development on forests. Economic activities if pursued without environmental considerations will in the long run limit the scope for growth and overall economic development, more so when the resources derivable from it are economic necessities.
According to the Statistical Office, forest area in Albania is 1.052 Millions of hectare (covering about 36% of the whole territory). Forest coverage in Albania has incurred many changes during the last 25 years. Albanian Forest Cadastre is the main information system which contains quantitative data about forest area and stocking volume. The current stocking volume according to forest cadastre is 55.2 Million cubic meter (INSTAT, 2017). Over the 1990 - 2000 periods, stocking volume has been increased with 123 thousand cubic meters. Thereafter a significant decrease accounted to 32% in stocking volume was noted during the 2006-2015 period. Figure 1 shows a similar trend in the stocking volume of high forests, shrubs and an opposite trend for coppice forests.

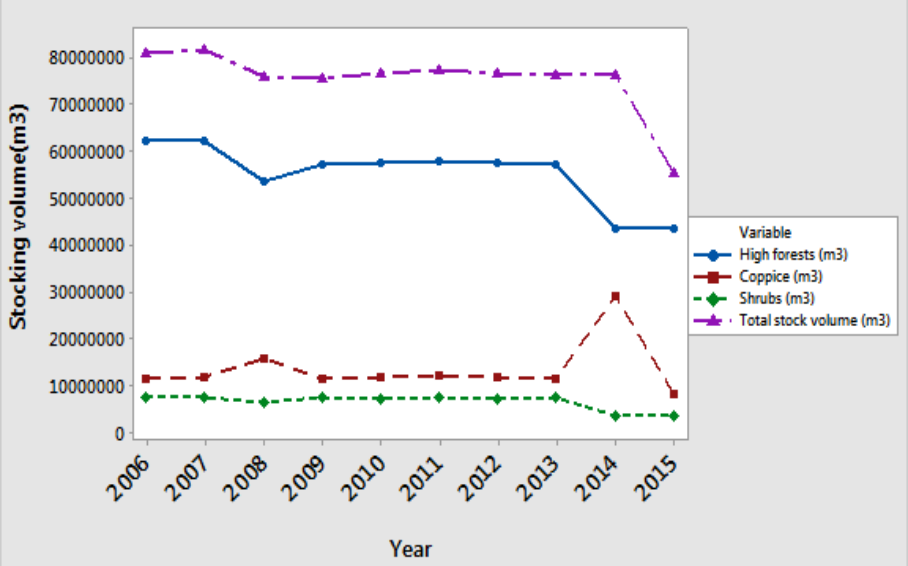

Fig. 1. Trend of stocking volume change from 2006 to 2015 (INSTAT, 2017)

What is seen in the figure is the result of the wrong way performed in the forest resources management during the transition period in Albania, which is related with a negative annual volume balance from 2007 to 2009 as well as from 2012 to 2015.
The forest sector in Albania has been constantly subject to frequent changes, which evidences the lack of a sustainable strategy and a proper analysis of this sector, but also the need for deep and long-term reform. Forests and their role in society, environment and the economy have not been given in these 25 years the proper attention. Despite the fact that it has been part of all government programs, the forestry sector has never been part of strategic priorities, as other natural resources water, or land.
The stocking volume felled during the 1990-2015 period, shows variability among years having a decreasing trend. The decrease of the harvested volume after 90' is a complex problem which is related to many reasons. Lack of the state financial funds to invest in opening of new forest roads and limited interventions in many forest parcels in remote areas have affected the forest area and volume obtained by final cutting operations. Meanwhile many private timber processing companies invested a lot of

money in manufacturing and this increased the demand for round wood. Firewood, round wood and wood for construction has been the most demanded commodities by the market. Firewood is an important wood fuel and the main source for heating especially in rural areas and in some public institutions such as schools, kindergarten etc. Firewood is an important source of heat that is used throughout Albania, especially in rural areas due to poverty and high costs of alternative energy sources, which makes the pressure towards the forest even higher. So, 85% of households in rural areas use firewood for heating, while the rest use gas, electricity, and very little coal and oil.
Forest ownership has changed drastically in Albania during the last 27 years. Until 90' all forest area were state owned but later the ownership changed as result of privatization and decentralization. According to the Forest Cadastre, 50% of the total forest area (522,607 ha) are owned by Municipalities, 47% (500,866 ha) by state and 3 % (28,780 ha) are private owned.
This fact has effected the situation of forest in Albania, and the deforestation of course. The dynamic change of the ownership in forestry sector is closely related to the process of decentralization. Table 8 shows that ownership structure changed since 2006 when the decentralization process started. The biggest change exists between two main forms of ownership which are linked closely with public forest areas. Thus, from 2006 to 2017 the state forest ownership is decreased around 27%, whereas the municipality forest area is increased with 55.6%.

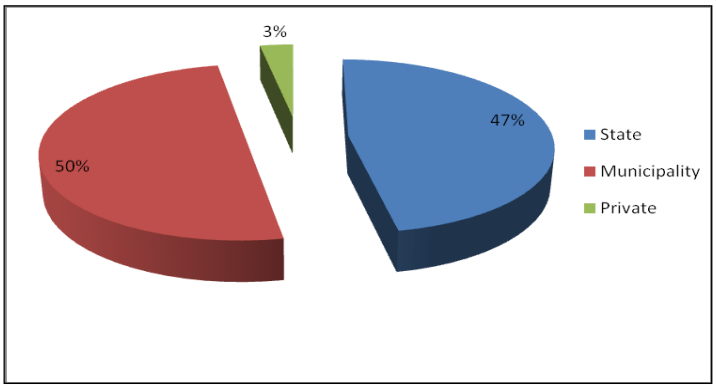

Fig. 2. The percentage of forest ownership in Albania

Another issue to highlight is the relationship between export and import of wood. Referring to the customs data on the export and import of wood for the period 2016-2017, noted that there is a positive difference in favor of the import of wood, mainly due to the forest moratorium, but again the export is 10 times higher than imports. This is a consequence of allowing exports to concession companies as well as high import costs due to VAT and other barriers to the import of firewood from the countries of the region.
The aim of this paper is that using macroeconomic data for the period 2000-2018, we will give answer to the research question on the relationship between deforestation trends and economic growth in Albania.
The dependent variable is used deforestation as a proxy for environment degradation. Moreover, deforestation is analysed in relation with the following set of control variables; GDP growth rate, energy consumption, trade openness, and population during the period of study.

2. MATERIAL AND METHOD

The data on the variables used in this study are taken from the World Development Indicators, database of World Bank; Institute of Statistics of Albania, reports and statistics; Albanian Ministry of Environment and Tourism.
The time span of the data is from 2000 to 2018. We use econometric techniques such as Autoregressive Distributed Lag (ARDL), Granger causality test, Johansen co-integration test and Vector Error Correction Method (VECM).

The dependent variable is used deforestation as a proxy for environment degradation. Moreover, deforestation is analysed in relation with the following set of control variables; GDP growth rate, energy consumption, trade openness, and population during the period of study.
Irrelevant econometric methods are also put forward. Early estimates relied on cross-section data which imply restrictive hypotheses (Dinda 2004; Koop & Tole 1999). More recent studies thus implemented panel data or more generally pooled cross sectional time series data. It may be worth to examine whether improvements made in econometric devices had an impact on the existence of an EKC for deforestation.

3. RESEARCH FINDINGS

The model of the study uses Granger Causality Test to analyze the direction of the causality between GDP growth and deforestation. Since carrying out regressions on non stationary time series data would lead to spurious regressions outcomes, we employ different tests. Moreover a linear regression model as represented below was evaluated.

$$\mathrm{DEF} = f\ \left(EUSE, GDP, GDP^2, OPEN\ \right)$$

$$\mathrm{DEF}_t = \beta_0 + \beta_1 EUSE_t + \beta_2 GDP_t + \beta_3 GDP^2{}_t + \beta_4 OPEN_t + \varepsilon_t$$

where: DEF is a proxy for deforestation, EUSE is the energy use per capita, GDP real and the square of GDP, OPEN is the degree of openness of the economy, expressed as follows:

$$OPEN = \frac{(X + M)}{Y}$$

Bellow are presented two regression results. The first one is used to prove if the series were or not stationary, and the second one, has used Johansen Test for Co-Integration. After these is used Granger causality test to analyze the direction of the causality between GDP growth and deforestation. Let see the results:

Regression results (1):
Table 1. Unit root test result: (1) Level; (2) First difference
(1)

Variables	Constant	
	ADF test	
	Statistics	P-Value
EUSE	-1.018858	0.7384
GDP	-1.911148	0.3243
GDP squared	-3.254350	0.0234
OPEN	0.414861	0.9814

(2)

Variables	Constant	
	ADF TEST	
	Statistics	P-Value
EUSE	-3.926992	0.0041
GDP	-5.839043	0.0000
GDP squared	-3.940616	0.0039
OPEN	-3.801779	0.0057

As we can notice from the first panel of table 2, p-values show that the series were non-stationary but in the second panel they become stationary after taking the first difference. This means that all the variables are integrated of the order of two.

Regression results (2)

Table 2. Johansen Test for Co-Integration

Hypothesized	Trace			Maximum Eigen		
No. of CE(s)	Statistic	Critical Value	Prob.**	Statistic	Critical Value	Prob.**
None *	61.57900	47.85613	0.0016	36.88080	27.58434	0.0024
At most 1	24.69820	29.79707	0.1725	15.14773	21.13162	0.2787
At most 2	9.550471	15.49471	0.3169	8.943504	14.26460	0.2909
At most 3	0.606967	3.841466	0.4359	0.606967	3.841466	0.4359

After proving that all variables are integrated the same order, a Johansen test for co-integration is conducted as shown in table 2. Results obtained in table 2 show that both the trace and eigenvalues are greater than 5 percent meaning that a long-run relationship exist and the series are co-integrated.

Table 3. Granger causality

Null hypothesis	Obs	F-Statistic	Prob.
EUSE does not Granger Cause DEF	18	9.16634	0.0001**
DEF does not Granger Cause EUSE		5.76134	0.0025**
GDP does not Granger Cause DEF	18	1.52817	0.2238
DEF does not Granger Cause GDP		0.28670	0.8347
OPEN does not Granger Cause DEF	18	0.31555	0.8140
DEF does not Granger Cause OPEN		0.90874	0.4464

Table 3 represents results from the Granger causality test. Empirical results show that causation between deforestation and economic growth could not be established in the Albanian context. The null hypothesis cannot be rejected in both directions. As causality cannot be established, changes in forestation cannot be predicted with changes in real GDP.

There is a positive and bidirectional causal effect of energy used per capita and deforestation. Energy use growth has caused the deforestation to increase.

4. CONCLUSIONS AND DISCUSSION

Deforestation is one of the major environmental problems that the world is facing. During the last 30 years in Albania is noticed a wrong way performance in the forest resources management. Sector development policies, strategies, and programs highlight the negative trend of forest development, with the urgent need to curb degradation to bring development in the right direction.

Based on the tragic figures in the last twenty years, where the national forest fund has been reduced by about 30 million m3, or by 40%, wood cutting for firewood is about 2-2.5 times more than their annual growth and also about two-thirds of the forests being cut (for firewood) are burned inefficiently, contributing essentially to their degradation, are needed strong government policies for a higher forestry control and also to offer other energy alternatives.

Empirical results show that causation between deforestation and economic growth could not be established in the Albanian context. There is a positive and bidirectional causal effect of energy used per capita and deforestation. Energy use growth has caused the deforestation increase.

Sector finance analysis highlights low funding, despite the measurable or immeasurable contribution that the forest sector provides to the economy and society as a whole. An important source of funding that has not been used up to date, not only for Albania but also for the countries of the region is funding from various international funds and institutions focusing on the environment and climate change. It is

necessary to attract donor funds and contribute to climate change, including the creation of a Balkan mechanism for maximizing funding, increasing the potential for attracting these funds (The document for forestry policies in Albania, 2019-2030).

The government should also make the people aware that the forests need to be maintained in order to contribute realistically to Albania's GDP by increasing the benefits from them, where, apart from other above-mentioned uses, need to pay attention to the importance of their exploitation for tourism and fun and also to the conservation of flora and wild fauna.

So, is good to recommend use of forest resources steadily and in function of the development of the country by optimizing its use and value, balancing the different uses to the maximum value that can take against the opportunities that the forests have to give without compromising the continuity of life and forest cycle, and also the future of generations.

REFERENCES

Andreoni, J. & Levinson, A., 2001. The simple analytics of the environmental Kuznets curve. Journal of Public Economics, 80 (2), p.269–286.

Arrow, K. et al., 1996. Economic Growth, Carrying Capacity, and the Environment. Environment and Development Economics, 1(01), p.104–110.

Barbier, E.B., Burgess, J.C. & Grainger, A., 2010. The forest transition: Towards a more comprehensive theoretical framework. Land Use Policy, 27(2), p.98–107.

Carson, R.T., 2010. The Environmental Kuznets Curve: Seeking Empirical Regularity and Theoretical Structure. Review of Environmental Economics and Policy, 4(1), p.3 –23.

Chomitz, K., Buys, P., Luca, G. D., Thomas, T. and Wertz-Kanounnikoff, S.: 2007, At Loggerheads? Agricultural Expansion, Poverty Reduction and Environment in the Tropical Forests, Technical report, The World Bank.

Council of Ministers Decision, no 814, date 31.12.2018, "Approved of Document for forest policy in Albania".

Diamond, J.: 2005, Collapse: How Societies Choose to Fail or Succeed, Viking Press.

Dinda, S., 2004. Environmental Kuznets Curve Hypothesis: A Survey. Ecological Economics, 49(4), p.431–455.

Doupé_P, January 2014, Reduced deforestation and economic growth.

Grossman, G.M. & Krueger, A.B., 1995. Economic Growth and the Environment. The Quarterly Journal of Economics, 110(2), p.353–377.

INSTAT, 2017, Trend of stocking volume change from 2006 to 2015.

Mather, A.S., Needle, C.L. & Fairbairn, J., 1999. Environmental Kuznets Curves and Forest Trends. Geography, 84(1), p.55–65.

Mather, A.S., 1992. The Forest Transition. Area, 24(4), p.367–379.

Merko F, 2017, Statistical and environmental evaluations on some potential air pollution in the city of Tirana,

Albania, Abstract book, *International Congress of Health and Environment*, October 23-25, 2017, Adana, Turkey.

Johanna Choumert, Pascale Combes Motel, K Hervé Dakpo. The environmental Kuznets curve for deforestation: a threatened theory? A meta-analysis. 2012. halshs-00691863

Koop, G. & Tole, L., 1999. Is there an environmental Kuznets curve for deforestation? Journal of Development Economics, 58(1), p.231–244.

Rudel, T.K. et al., 2005. Forest transitions: towards a global understanding of land use change. Global Environmental Change, 15(1), p.23–31.

Pigou, Arthur C., 1920. T*he Economics of Welfare*, London: Macmillan.

Van der Werf, G. R., Morton, D. C., DeFries, R. S., Olivier, J. G., Kasibhatla, P. S., Jackson, R. B., Collatz, G. J. and Randerson, J.: 2009, CO2 emissions from forest loss, Nature Geoscience 2(11), 737–738.

URL: http: // www. nature. com/ ngeo/ journal/ v2/ n11/ full/ ngeo671. Html

Wilfred Beckerman, 1992, Economic Development and the Environment Conflict or Complementarily?, *World Development Report*, 1992.