International Journal of Development and Economic Sustainability
Vol.4, No.1, pp.21-33, February 2016
Published by European Centre for Research Training and Development UK (www.eajournals.org)

DETERMINANTS OF TIMBER EXPORTS IN CAMEROON

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ABSTRACT: *With the fall in the international market prices of petroleum, timber has become a major source of foreign earnings in Cameroon. Timber exports have grown in volume over time, constituting largely of unprocessed and semi-processed logs, with little added value. However, the success of a strategy to increase timber exports depends, among others on the knowledge of factors affecting it. It is on the basis of this that this study is designed to investigate the determinants of timber exports in Cameroon over 35 years, from1980 to 2014 inclusive using time series data from the World Bank, United Nations Conference on Trade and Development statistics and the Food and Agricultural Organization database. Employing the Ordinary Least Squares technique, findings reveal that the volume of round wood export, total labour force, foreign direct investment inflows, foreign earnings from timber, total debt service on external debt, exchange rate and trade openness have a positive but insignificant effect on timber exports in Cameroon while inflation rate and gross fixed capital formation have negative effects on Cameroon's timber exports, with only the effect of gross fixed capital formation being significant. We recommend that value should be added to timber exports through the creation of manufacturing industries which can transform wood from its raw form to its finished form.*

KEYWORDS: Export Trade, Foreign Earnings, Logs, Primary Commodity, Round Wood

INTRODUCTION

The exports promotion strategy has often been considered by most countries as a means to stimulating growth and development. While most industrialized countries are highly engaged in manufactured exports, for most countries in Africa, a great volume of trade is centered on agricultural exports. This is due partly to the fact that Africa is very rich in natural resources and partly because the technological knowledge needed to transform these resources in to finished products is inadequate. Generally, the idea of international trade is embedded in the traditional classical trade theories of absolute cost advantage and comparative cost advantage, which was also embraced by modern theorists. According to Majeed and Ahmad (2006), the basis of the exports promotion strategy is the comparative cost advantage principle, which holds that countries should specialize in products which they can produce competitively. This is expected to extend markets, make goods cheaper in the world market, increase internal and external scale economies, increase income and employment, hence development and growth.

Many studies have investigated in to the determinants of agricultural exports in Africa. Some of these include studies by Majeed and Ahmad (2006) for developing countries, Samad et al. (2009), as cited in Malaysis, Tesfaye (2014) for 47 sub-Saharan African countries, Yusuf and Edom (2007), Abolagba et al. (2010) all in Nigeria, Gbetnkom and Khan (2002), Ngouhouo and Makolle (2013) in Cameroon, Boansi (2014) in Chad, Agasha (2007) in Uganda, Maugu et al. (2013) in Kenya and Hatab et al. (2010) in Egypt. One main weakness in most of the studied reviewed, apart from the study carried out by Yusuf and Edom (2007) is that none of them is based on timber trade. Most studies have largely explored agricultural crops such as

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cocoa, rubber, banana, and cotton, with the exception of timber. In Cameroon, no study has examined the determinants of timber exports. These are important gaps which are addressed in this study. Again, most empirical studies have adopted the Ordinary Least Squares (OLS) estimation technique, on the basis of its BLUE properties. A few other studies have adopted the cointegration and error correction modelling approach as well as panel data techniques (in the case of cross-country studies). Like many studies, this study adopts the OLS estimation technique in determining the extent to which some identified factors affect timber exports in Cameroon. This method is not only adopted because of its BLUE properties, but also because it forms the foundation for most estimation techniques. Despite the fact that its computational method is simple, the method is still effective as along as its underlying assumptions are met.

Timber emerged as a main export commodity in Cameroon in the late 1980s after agriculture and oil. Agriculture sustained the economy from the early 1960's to 1977, where it employed about 80% of the labour force, provided 85% of exports and contributed about 34% to gross domestic product (GDP). The annual real gross domestic product averaged 4.8% within this period. From 1978 to 1985, economic growth was realized from petroleum production, with growth rates being as high as 12% (Amin, 2002). On average, oil rents as share of GDP were about 13% within this period (World Development Indicators, 2014). In 1986, economic crisis set in because of the fall in international market prices of Cameroon's main agricultural exports and poor economic policies. This resulted to the fall in oil rents as a share of GDP to approximately 7% from 1986 to 1989 (World Development Indicators, 2014). The Cameroon economy went in to a deep recession, despite the high economic growth rates realized in the previous decades. Due to the structural adjustment policies of the late 1980s, Cameroon had to broaden its narrow export base in order to secure a favourable balance of trade and reverse the high deficit in balance of payments. And since revenues from oil exports were declining, timber was now regarded as a foreign earner that could support the economy (Njimanted and Nkwetta, 2015). Timber's contribution to GDP therefore increased steadily from about 3.5% in 1989 (Atyi, 1998) to 6.7% in 1995 and finally reached 12% of GDP in 2000 (Ekoko, 1999; Brown and Schreckenberg, 2001 in Siebock, 2002, cited in Njimanted and Nkwetta, 2015). During the 1994/95 fiscal year, the need to service the external debt and create employment to the country's increasing population was a driving force for timber harvesting in Cameroon (Siebock, 2002).

Cameroon's timber is consumed in most countries around the World. Cameroon has a foreign market for timber in Europe, Asia, America and other parts of Africa. In 1970, the volume of total round wood exported was estimated at about 511,200 m^3, contributing about $15 million to export revenue and representing about 1.3% of GDP. In 1980, the export of all round wood contributed about $113 million to export revenue and 1.7% to the GDP. The shares of round wood exports to GDP in the years 1990, 2000, 2010 and 2012 are respectively 1.6%, 1.1%, 1.1% and 0.9% respectively. In 2012, the export quantity was estimated at about 514068 m^3, with a corresponding export value of about $214 million. Averagely, annual exports of round wood stood at about 634 m^3 for the period, with a monetary value of approximately $106 million, representing about 1.2% of GDP from 1980 to 2014 (Njimanted and Nkwetta, 2015). From the above, it is observed that the contribution of timber exports to GDP is decreasing in value over time, despite the fact that quantities exported have been increasing. Considering the potential of timber in sustaining economic growth in the midst of highly volatile prices of oil and other agricultural commodities, we find it necessary to understand the factors which influence its exports. The success of a strategy to increase timber exports will depend, among others, on the knowledge of the factors which affect it. In this regard, Ngouhouo and Makolle

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(2013) opine that Cameroon's export trade has fluctuated over time and unfavourable terms of trade and declining agricultural output are the main factors contributing to such fluctuating and poor export performances. Export supply, according to them, also responses to monetary variables such as exchange rates, inflation and interest rate coupled to balance of payments, budget deficit and debt crisis. A review of literature also reveals that factors such as output of the commodity in question, labour force, openness of the economy, foreign direct investment, just to name a few are potential determinants of agricultural exports.

The main objective of this study therefore is to analyse the factors affecting timber exports in Cameroon from 1980 to 2014. Specifically, we determine the extent to which lagged one year volume of timber exports, total labour force, gross fixed capital formation, inflows of foreign direct investment, foreign earnings from timber, inflation rate, foreign income, debt service on external debt, exchange rate and trade openness affect timber exports in Cameroon.

The rest of this paper is organized as follows; section two comprises the review of literature relevant to the study. The analytical methodology employed is discussed in the third section. Findings are presented and discussed in section four. Section five brings the study to a logical end by presenting the policy suggestions and conclusion.

LITERATURE REVIEW

Gbetnkom and Khan (2002) investigate the determinants of three agricultural exports from Cameroon; cocoa, coffee and banana between 1971 and 1996 by specifying the export supply functions for the crops. Estimates obtained from the ordinary least squares (OLS) estimation procedure indicate that relative changes in price, changes in the nature of the road network and more credit to crop exporters has a significant and positive influence on the export supply of all three crops. Rainfall was found to influence only cocoa and coffee exports. Structural adjustment dummies equally exerted a positive effect on the export supply of crops.

Neumayer (2005) investigated whether high indebtedness increases the exploitation of natural resources by empirically and comprehensively testing the debt-resource hypothesis using 23 natural resources and cash crops. Using first differencing, period-specific time dummies and a lagged-dependent variable to control and to solve the problem of omitted variables bias, the findings showed no evidence to support the debt-resource hypothesis. Apart from the level of indebtedness, other variables identified as determinants of natural resources extraction were total reserve stock, quality of mineral ore, fossil fuel deposit, or productivity of land, capital and labour costs, the state of extraction technology, size of the domestic market, the costs of transportation to foreign markets, real effective exchange rate, existence of producer cartels such as Organization of Petroleum Exporting Countries (OPEC), taxation and subsidies and the type of ownership (government or private, domestic, or multinational), amongst others.

The empirical results from a study conducted by Agasha (2007) on the determinants of export growth rate in Uganda from 1987 to 2006 reveal that foreign price and terms of trade have a significant positive effect on export growth rate. Also, the export growth rate of the previous quarter was found to have a significant effect on export growth rate. The GDP of the current period, lagged GDP and foreign direct investment had insignificant effects on export growth rate.

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Abolagba et al. (2010) examined the factors affecting agricultural exports in Nigeria from 1970 to 2005 with reference to cocoa and rubber. The Ordinary Least Squares (OLS) method was used in estimating the parameters of the model. The results revealed that rubber export is affected significantly by domestic rubber production, producer price, exchange rate, domestic consumption and interest rate. In the case of cocoa, it was realized that the output of cocoa, domestic consumption and rainfall influenced cocoa exports significantly. The researchers recommended that more value should be added to the cocoa exported.

Prasad (2010) carried out a study to find out the determinants of exports in Figi using time series data from 1968 to 1998. Employing the cointegration and error correction modelling approach, results show that in the long run, the income of trading partners is the main driver of Fiji's exports. In the short run, exports are mainly determined by changes in factors which affect the output capacity of agricultural production such as weather conditions and industrial disputes, as well as relative prices and changes in foreign demand

Ngouhouo and Makolle (2013) analyzed the determinants of export trade in Cameroon from 1970 to 2008. Using the Two Stage Least Square (2SLS) method to estimate the models, the results show that the main determinants of export trade are exchange rate, trade openness and export lag one period. Contrary to most results in developing countries, the level of foreign direct Investment was found not to be significant in determining export trade in Cameroon.

Tesfaye (2014) theoretically explained and empirically assessed the demand and supply side factors affecting agricultural exports in 47 Sub-Saharan African (SSA) countries from 2000-2008 using a panel data set with fixed effects estimation technique. On the supply-side, the estimation result shows that factors such as real GDP, real GDP (lagged) of exporting country and lagged agricultural input use positively and significantly affects agricultural export of the SSA countries. The study also found that on the demand side, the effect of per capita GDP of the United States (US) and the major trading partners of the SSA countries positively and significantly affect agricultural exports. Import tariffs imposed on agricultural products from SSA countries by the US was also found negative and significant. In sum, the supply side and demand side factors were found to be equally important in determining the agricultural export performance of SSA countries.

Boansi (2014) investigated in to the determinants of agricultural export trade in Chad using cotton lint as a case study. The Johansen full information maximum likelihood test was used to identify and estimate the magnitude and effects of key determinants of exports from the country. Findings showed that cotton production, competitiveness of the country in exports of the commodity, volume of world exports of the good and the country's export price faced by the country are the key determinants of export growth.

ANALYTICAL METHODOLOGY

The determinants of timber exports in Cameroon can be modelled within the framework of an endogenous growth model in which fundamental determinants of timber exports enter in to the model as inputs. Such a model is of the form $Y = (L, K)$ where Y is the output, which in this case is the volume of timber exports, L is the total labour force and K is capital stock. On the basis of this, and from empirical works like those of Yusuf and Edom (2007), Majeed and Ahmad (2006) and Ngouhouo and Makolle (2013), the following model is specified for this study;

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$$lnY_t = \beta_0 + \beta_1 \Delta nL_t + \beta_2 \Delta K_t + \beta_3 \Delta lnZ_t + \mu_t \quad (1)$$

A priori expectation; $\beta_1 > 0;\ \beta_2 > 0; \beta_3 > 0$

In equation (1), t is the time, ln is the natural logarithm of the variables, Δ is the difference operator and μ is the disturbance term. The rest of the variables are defined as follows;

Y is the volume of timber exported, proxied by the volume of total round wood exported. It involves all the round wood produced or manufactured domestically and shipped out of the country. It is measured or reported in cubic metres of solid volume. It includes re-exports and excludes "in-transit" shipments and its values are normally recorded as free-on-board. Data is obtained from the Food and Agricultural Organization database, 2014.

L is the total labour force, comprising people of age 15 and above who meet the International Labour Organization definition of the economically active population. It includes both the employed and the unemployed (World Development Indicators, 2014). Only those employed in the primary sector are considered. Data is obtained from the United Nations Conference on Trade and Development (UNCTAD) statistics data base, 2014.

K is the capital stock, proxied by gross fixed capital formation. Gross fixed capital formation includes land improvements, plant, machinery and equipment purchases; and the construction of roads, railways, schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Data are in current local currency.

Z is a vector of other important potential factors affecting timber exports including;

$\boldsymbol{Y_{t-1}}$ is the lagged value of the volume of timber exported.

FDI is foreign direct investment inflows: This is defined as the net inflows of investments to acquire lasting management interest (of about 10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, other long term capital, earnings reinvested and short-term capital as shown in the flow chart of the balance of payments (World Development Indicators, 2014).

$\boldsymbol{GDP_{t-1}}$ is the lagged value of GDP at factor cost, defined as the sum of gross value added by all resident producers in the economy plus any product taxes minus subsidies not included in the value of products. It is computed without subtracting depreciation of fabricated assets or for depletion and degradation of natural resources.

INFLA is the inflation rate. Inflation, as measured by the consumer price index reflects the annual percentage change in the cost of acquiring a basket of goods and services to average consumers that may be fixed or changed at specified intervals such as yearly. Inflation in this case is measured using the Laspeyres price index (World Development Indicators, 2014).

FY is the foreign income of countries which consume most of Cameroon timber, proxied by the GDP of these countries.

EXDST is the total external debt stock: Total external debt is the debt owed to nonresidents of the country, repayable in currency, goods, or services. It is the sum of publicly guaranteed, public and private nonguaranteed long-term debt, use of International Monetary Fund credit, and short-term debt (World Development Indicators, 2014).

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EXCR is the exchange rate. It is the rate determined by national authorities or rate determined in the legally sanctioned exchange market. It can equally be considered as the pegged rate set by government. It is calculated as an annual average based on monthly averages, measured as local currency units relative to the U.S. dollar (World Development Indicators, 2014).

TO is trade openness: Trade openness is the degree of globalization of the economy, that is, the degree to which the economy is open to the outside world. It is measured as the ratio of trade (exports and imports) to GDP.

Variables have logged to permit the interpretation of their coefficients as elasticity. It is only gross fixed capital formation (*K*), inflation rate (*INFLA*) and trade openness (*TO*) which have not been logged because they are in a form that can allow its coefficients to be interpreted as elasticity. Foreign direct investment inflows are not also logged since it has negative values. Apart from exchange rate and inflation which are expected to have negative effects on timber exports, all other variables are expected to have positive effects. This study covers 35 years (1980 to 2014 inclusive), with secondary data obtained from the World Bank Group, United Nations Conference on Trade and Development statistics and the Food and Agricultural Organization database. Data sources are therefore complementary.

The model specified is estimated using the OLS technique, as it has the properties of the best linear unbiased estimator. The OLS technique is a technique for fitting the best straight line to the sample of dependent and independent observations. It therefore involves minimizing the sum of the squared deviations of points from the line. Furthermore, it forms the foundation of most estimation techniques. Before carrying out regression analyses, variables were tested for stationarity. A time series is stationary if its mean and variance are constant over time and the covariance value between the two time periods depends on their lag and not on the actual time at which their covariance is computed (Gujarati, 2004). To formally test for stationarity, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used after a time series plot of each variable. These tests were carried out by testing the null hypothesis of no unit root ($H_0 = \delta = 0$) against the alternative of a unit root ($H_1 = \delta < 0$). These tests compute the tau statistic τ at 1%, 5% and 10% levels of significance which is compared with its critical values. If the calculated values of the ADF and PP test statistic are more negative than test critical values at a chosen percent significant level, the null hypothesis of no unit root is rejected otherwise it is accepted. The PP unit root test is a confirmatory test.

The results were validated using first, the economic or a priori test, meant to verify whether or not the signs of the estimated coefficients conform to economic theory. Second, statistical (1st order) tests were used. These tests use statistical measures like the multiple coefficient of determination (adjusted R^2), t-statistics and F-statistic test to verify how reliable estimated coefficients are. The value of adjusted R^2 depicts the percentage of the total variation in the dependent variable which is accounted for by the joint variation of explanatory variables. The t-statistic test was also employed in testing for the significance of the estimated regression coefficients. The F-ratio test was used to test for the overall significance of the adjusted R-squared. It measures the degree of reliability of adjusted R-Squared (Koutsoyiannis, 1997). Autocorrelation was tested using the Breusch-Godfrey (B-G) Serial Correlation LM Test under the null hypothesis of no autocorrelation, given that the lagged dependent variable is among the independent variables. The correlation matrix table was employed to detect multicollinearity, after stationarity tests. Heteroskedasticity was tested using the White's test. All results are computed using E-views 8 statistical package.

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RESULTS AND DISCUSSION

We first tested for unit roots in the data set and results are presented on table 1.

Table 1: Augmented Dickey-Fuller and Phillips-Perron Unit Root Test Results

Variables	ADF Test			PP Test		
	Test Statistic	P-Value	Remark	Test Statistic	P-Value	Remark
lnY	-4.959521	0.0000*	I (1)	-4.963147	0.0000*	I (1)
lnTLF	-7.598324	0.0000*	I (2)	-7.369723	0.0000*	I (2)
K	-6.611148	0.0000*	I (1)	-6.516162	0.0000*	I (1)
FDI	-2.593840	0.0112**	I (0)	-2.519828	0.0135**	I (0)
lnFEARN	-7.081548	0.0000*	I (1)	-7.134852	0.0000*	I (1)
INFLA	-3.284016	0.0018*	I (0)	-3.172963	0.0025*	I (0)
lnFY	-7.598324	0.0000*	I (2)	-15.31504	0.0000*	I (2)
lnTDBTS	-6.779336	0.0000*	I (1)	-6.786796	0.0000*	I (1)
lnEXCR	-4.924655	0.0000*	I (1)	-4.916947	0.0000*	I (1)
TO	-5.411016	0.0000*	I (I)	-5.541205	0.0000*	I (1)

*** = significant at 1%, ** = significant at 5%**

The results of the ADF and PP unit root test (table 1) show that apart from total labour force (*lnTLF*) and foreign income *(lnFY*) which achieved stationarity after second difference, that is I (2) and inflation and foreign direct investment inflows (*lnFDI*) which are level stationary; I (0), all other variables were stationary after first difference, meaning they are integrated of the first order, I (1). The p-values of the ADF and PP test statistic show that all unit root test results are significant at 1%, with the exception of *lnFDI* that is significant at 5% level. After testing for stationarity, the correlation matrix table results, not presented due to space (shown on appendix, table 2) reveal the absence of multicollinearity between explanatory variables in the model. This is due to the fact that the correlation coefficients between all the independent variables are sufficiently low (far below the threshold value of 0.8). The absence of a strong correlation coefficient among the explanatory variables implies that the true effect of each of the independent variables on the dependent variable can be measured. With this satisfactory result, we present the empirical results (table 3) based on the OLS estimation technique. From the results presented on table 3, it is observed that the lagged one year volume of round wood export, total labour force, foreign direct investment, foreign earnings from timber, total debt service on external debt, exchange rate and trade openness have a positive but insignificant effect on timber exports in Cameroon. On the contrary, gross fixed capital formation and rate of inflation have negative effects on Cameroon's timber exports, with only the effect of gross fixed capital formation being significant.

Table 3: Ordinary Least Squares (OLS) Results

Dependent Variable: D (lnY)
Method: Least Squares
Sample (adjusted): 1982-2012
Included Observations: 31 after adjustments

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Variable	Coefficient	Std. Error	t-statistic	P-Value
D(lnY(-1))	0.229592	0.196449	1.168707	0.2563
D(D(lnTLF))	18.79008	30.80966	0.609876	0.5488
D(K)	-0.128687	0.053267	-2.415857	0.0254**
FDI	0.000499	0.000525	0.950643	0.3531
D(lnFEARN)	0.572738	0.433890	1.320006	0.2017
INFLA	-0.008068	0.019837	-0.406739	0.6885
D(D(lnFY))	0.217860	6.133055	0.035522	0.9720
D(lnTDBTS)	1.117231	0.990648	1.127777	0.2728
D(lnEXCR)	1.133383	1.004332	1.128494	0.2725
D(TO)	0.422448	1.824881	0.231493	0.8193
C	-0.110594	0.162646	-0.679965	0.5043
Diagnostic Tests				
Adjusted R-squared	0.187888			
F-statistic	1.694074			0.151464
B-G LM Test (Obs*R^2)	2.371199		Prob. Chi Square(1)	0.3056
White's Test (Obs*R^2)	7.724574		Prob. Chi-Square(1)	0.6557

**** = significant at 5%**

The value of the multiple coefficient of determination, adjusted R-squared is 0.187, implying that only about 19% of the total variations in timber exports are accounted for by variations in the lagged one year period volume of total round wood export, total agricultural labour force, foreign direct investment inflows, foreign earnings from timber, total debt service on external debt, exchange rate, trade openness, gross fixed capital formation and rate of inflation, with about 71% accounted for by other factors. The adjusted R-squared is insignificant, given the p-value of the F-statistic. Under the null hypothesis of no autocorrelation, the p-value of the Chi-Square statistic for the serial correlation LM test (0.3056) shows that autocorrelation is absent in this model. The results of the Whites heteroskedasticity test also suggest absence of heteroskedasticity. Under the null hypothesis that there is no heteroskedasticity, the p-value of 0.6557 is insignificant. From the forgoing, the OLS estimates from this study are therefore validated.

Based on the OLS results, the positive effect of the lagged one year period volume of exports, foreign direct investment inflows and trade openness in affecting timber exports in Cameroon is in accordance with our a priori expectation and in conformity with the studies carried out by Ngouhouo and Makolle (2013), Agasha (2007) and Tesafe (2014). All these variables are insignificant except lagged one year volume of exports as Tesafe (2014) found. Furthermore, Maugu et al. (2013) and Hatab et al. (2010) found a positive insignificant effect of lagged one year volume of exports and trade openness on export trade. The positive effect of exchange rate on timber exports is contrary to studies conducted by Agasha (2007), Abolagba et al. (2010), Tesafe (2014), Maugu et al. (2013), Hatab et al. (2010) and Ngouhouo and Makolle (2013) which found a negative relationship between exchange rate and exports. In line with our study, Samad et al. (2009), Majeed and Ahmad (2006) and Neumayer (2005) noticed a positive but significant effect of exchange rate on exports. We found that the debt service on external debt has a positive effect on timber exports in Cameroon. This implies developing countries exploit and exports more timber, the more they are indebted. Neumayer (2005) also found this to be true using 23 natural resources. The positive and insignificant effect of total

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labour force on timber exports also confirms findings of Majeed and Ahmad (2006). As the general price level increases, it is expected that exports will fall. Similar to the result of this study, Ngouhouo and Makolle (2013) came out with the finding that inflation impacts exports negatively. Lastly, foreign income had a positive and insignificant effect on timber exports, which conforms to the study of Prasad (2004) but contradicts that of Hatab et al. (2010) who rather finds a negative relationship between foreign income and timber exports. By the results of this study, we observe that the dependence of Cameroon economy on primary commodity could be problematic, as external shocks impact negatively on the economy.

POLICY SUGGESTIONS AND CONCLUSION

This study analyses the determinants of timber exports in Cameroon over 35 using the OLS technique. Based on the findings, we recommend first that there is need for value addition to exported timber through the creation of manufacturing industries which can transform wood from its raw form to its finished form. In this regard, local technicians in the wood processing value chain ought to be trained for absorption by the industries. The Cameroon government should also ensure that the margin between producer prices and world price of timber is small so that the activity can be more beneficial to the economy. Again, government should ensure that only manufactured wood products are exported so as to escape from low fluctuations in prices of primary products in the world market. These measures would go a long way towards increasing the quality of wood and furniture exports hence foreign earnings. As earnings are increased, local consumption would rise, more labour, capital, and inflows of foreign direct investment will be attracted to the timber sector. Adding value to timber will also go improve upon the demand of the commodity by foreigners.

Based on the findings of this study, it can be concluded that the lagged one year volume of round wood export, total agricultural labour force, foreign direct investment, foreign earnings from timber, total debt service on external debt, exchange rate and trade openness have a positive and insignificant effect on timber exports in Cameroon while inflation rate and gross fixed capital formation have negative effects on Cameroon's timber exports, with only gross fixed capital formation being significant.

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APPENDIX

Table 2: Correlation Matrix Results

	D(LNY(-1))	D(D(LNTLF))	D(K)	FDI	D(LNFEARN)	INFLA	D(D(LNFY))	D(LNTDBTS)	D(LNEXCR)	D(TO)
D(LNY(-1))	1.000000	0.083136	-0.025697	-0.334260	-0.003584	0.044272	-0.125414	-0.345227	-0.002488	0.141863
D(D(LNTLF))	0.083136	1.000000	0.203471	-0.126584	-0.249742	0.143996	-0.158549	-0.112113	-0.118787	-0.323186
D(K)	-0.025697	0.203471	1.000000	-0.074549	-0.216146	0.019941	-0.055379	0.104850	-0.096141	0.072917
FDI	-0.334260	-0.126584	-0.074549	1.000000	-0.062850	-0.128324	0.131606	-0.088061	-0.009269	-0.193907
D(LNFEARN)	-0.003584	-0.249742	-0.216146	-0.062850	1.000000	0.068854	0.579477	0.194789	-0.011822	0.214086
INFLA	0.044272	0.143996	0.019941	-0.128324	0.068854	1.000000	0.037186	-0.021851	0.647567	0.111947
D(D(LNFY))	-0.125414	-0.158549	-0.055379	0.131606	0.579477	0.037186	1.000000	-0.065666	-0.014270	0.073437
D(LNTDBTS)	-0.345227	-0.112113	0.104850	-0.088061	0.194789	-0.021851	-0.065666	1.000000	-0.220902	-0.026731
D(LNEXCR)	-0.002488	-0.118787	-0.096141	-0.009269	-0.011822	0.647567	-0.014270	-0.220902	1.000000	0.411961
D(TO)	0.141863	-0.323186	0.072917	-0.193907	0.214086	0.111947	0.073437	-0.026731	0.411961	1.000000

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Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.745431	Prob. F(2,18)	0.4886
Obs*R-squared	2.371199	Prob. Chi-Square(2)	0.3056

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/15/15 Time: 11:14
Sample: 1982 2012
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNY(-1))	0.129180	0.322424	0.400652	0.6934
D(D(LNTLF))	-6.149605	31.84459	-0.193113	0.8490
D(K)	0.000258	0.054805	0.004710	0.9963
FDI	0.000162	0.000590	0.274370	0.7869
D(LNFEARN)	-0.114983	0.465428	-0.247048	0.8077
INFLA	-0.001976	0.020797	-0.095030	0.9253
D(D(LNFY))	0.909037	6.638866	0.136927	0.8926
D(LNTDBTS)	0.129593	1.014134	0.127787	0.8997
D(LNEXCR)	-0.006194	1.018159	-0.006083	0.9952
D(TO)	-0.023007	1.848668	-0.012445	0.9902
C	-0.005104	0.178615	-0.028573	0.9775
RESID(-1)	-0.065903	0.414348	-0.159052	0.8754
RESID(-2)	-0.323061	0.266822	-1.210772	0.2416

R-squared	0.076490	Mean dependent var	-1.72E-17
Adjusted R-squared	-0.539183	S.D. dependent var	0.429618
S.E. of regression	0.533001	Akaike info criterion	1.874506
Sum squared resid	5.113614	Schwarz criterion	2.475855
Log likelihood	-16.05484	Hannan-Quinn criter.	2.070531
F-statistic	0.124238	Durbin-Watson stat	2.012433
Prob(F-statistic)	0.999649		

Heteroskedasticity Test: White

F-statistic	0.663754	Prob. F(10,20)	0.7439
Obs*R-squared	7.724574	Prob. Chi-Square(10)	0.6557
Scaled explained SS	9.163857	Prob. Chi-Square(10)	0.5166

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares

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Date: 08/15/15 Time: 11:46
Sample: 1982 2012
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.083562	0.193740	0.431308	0.6709
D(LNY(-1))^2	0.039152	0.113143	0.346039	0.7329
D(D(LNTLF))^2	-1567.103	3707.901	-0.422639	0.6771
D(K)^2	0.043186	0.021785	1.982338	0.0613
FDI^2	4.25E-07	7.53E-07	0.563686	0.5792
D(LNFEARN)^2	0.130959	0.510561	0.256500	0.8002
INFLA^2	-0.000862	0.001554	-0.554232	0.5856
D(D(LNFY))^2	36.04454	172.6603	0.208760	0.8367
D(LNTDBTS)^2	-5.060155	6.086836	-0.831328	0.4156
D(LNEXCR)^2	2.368516	4.271158	0.554537	0.5854
D(TO)^2	-9.664604	12.45305	-0.776083	0.4468

R-squared	0.249180	Mean dependent var	0.178618
Adjusted R-squared	-0.126230	S.D. dependent var	0.433504
S.E. of regression	0.460052	Akaike info criterion	1.556469
Sum squared resid	4.232962	Schwarz criterion	2.065303
Log likelihood	-13.12527	Hannan-Quinn criter.	1.722336
F-statistic	0.663754	Durbin-Watson stat	2.470726
Prob(F-statistic)	0.743939		

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