IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 22, Issue 5. Ser. V (May. 2020), PP 19-24
www.iosrjournals.org

Empirical Research on The Impacts of The Structure of Exported Goods on Vietnam's Economic Growth Based on The Expanded Cobb-Douglas Production Function Model

Vu Thi Oanh[1], Dam Thanh Huyen[2], Pham Hoang Linh[3]
[1, 2, 3]*Faculty of Marketing, Trade and Tourism, Thai Nguyen University of Economics and Business Administration, Vietnam*

Abstract: *The paper uses the expanded Cobb-Douglas production function model to study and assess the impact of exported commodity structure on Vietnam's economic growth in the period 1986 - 2018. The research results show that diversifying the structure of export goods horizontally and vertically both brings about positive effects on Vietnam's economic growth. Regarding the relationship between horizontal and vertical diversification of exports, it shows that both vertical and horizontal export structure diversification has implications for the growth strategies of Vietnamese economy. The two forms are not opposites or mutually exclusive, but can be conducted simultaneously to yield the best effects to the economy.*

Key words: *Cobb - Douglas production function, export structure, GDP growth.*

Date of Submission: 12-05-2020 Date of Acceptance: 24-05-2020

I. Introduction

In the complex context of the global economy, Vietnam has gained remarkable achievements regarding economic growth. In particular, GDP in 2018 witnessed the largest growth in the last fifty years (Figure 1). Contributing to that growth are great strides in exports. 2018 marked many records of Vietnam's import and export of goods. According to the General Department of Customs, the total value of imports and exports of the country reached a record level of 480.17 billion USD, an increase of more than 52 billion USD in absolute terms, compared with the results of the previous year. This result is still lower than the absolute increase of 76.75 billion USD in 2017 compared to 2016. However, the achievement in terms of turnover has not really reflected the benefits that this activity brings to our economy. One of the remaining issues is the "quality" of the export basket. According to the guidance of the Government's export activities, it can be seen that, development plans are also set for each specific export range in addition to the goals related to turnover and the market. That partly shows the importance of this problem. The paper studies the impact of export commodity structure on economic growth using Vietnam's economy data for the period 1986 - 2018.

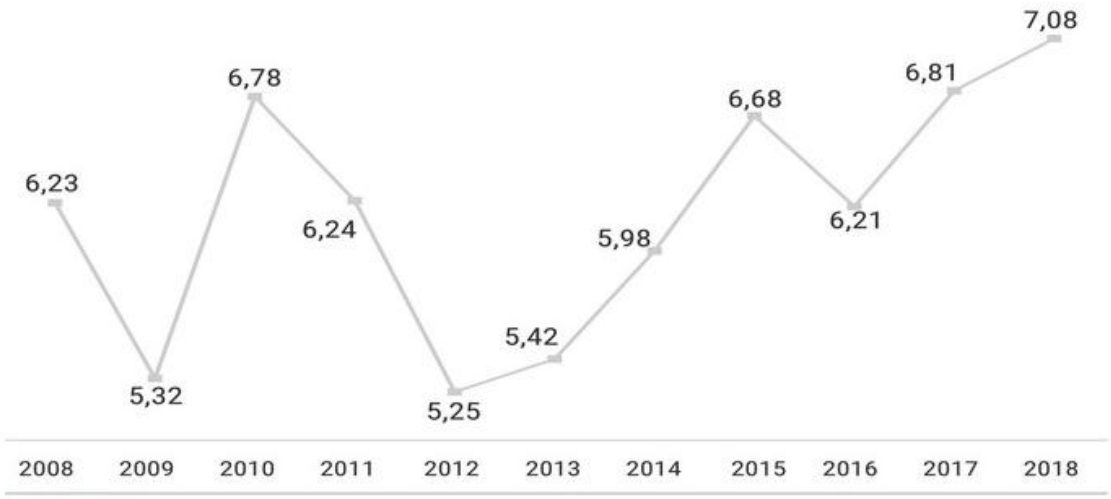

Figure 1. Vietnam's GDP growth in the years between 2008 and 2018 (Measured by %)
Source: General Statistics Office of Vietnam

II. Literature Review

Researching the impact of export structure on economic growth, scholars around the world focus on three key issues: (i) The level of export diversification in general (Hesse, 2008; Hodey et al., 2015). These studies have shown the U-shaped relationship between centralization of exported commodity structure and economic growth; (ii) The impact of manufactured goods (Levin & Raut, 1997; Matthee & Naudé, 2007). The case studies of Spain (Balaguer & Cantavella-Jordá, 2004) and Chile (Herzer et al., 2006) agree that the increase in the proportion of manufactured goods will have an extremely positive impact on the economy; (iii) Impact of increasing exported commodity ranges (Javed and Munir, 2016). The empirical studies of Nigieria (Olaleye et al., 2013; Nwankwo, 2015) provide conflicting conclusions about the choice between commodities related to or not related to crude oil to bring positive effects to the country's economy. Although a lot of research has been done on this issue, scholars have yet to share a common voice. Moreover, given the situation of each country, the impact of export structure on economic growth will not be exactly the same. On the limited scale of this article, the author will provide empirical evidence on the impacst of exported commodity structure on Vietnam's economic growth based on the expanded Cobb - Douglas production function model.

III. Research model and data source

The paper carries out an empirical assessment by building two separate research models based on the expanded Cobb - Douglas production function model in order to test the following two hypotheses:

- Hypothesis 1: Horizontal diversification of exported goods has a positive impact on Vietnam's economic growth.
- Hypothesis 2: Diversification of exported goods structure has a positive impact on Vietnam's economic growth.

For horizontal diversification of structure:

$$lnY_t = \alpha_0 + \alpha_1 lnK_t + \alpha_2 lnL_t + \alpha_3 lnN_t + \varepsilon_1 \ (1)$$

For vertical diversification of structure:

$$lnY_t = \beta_0 + \beta_1 K_t + \beta_2 2L_t + \beta_3 LW_t + \varepsilon_2 \ (2)$$

In which:

- *ln* is natural logarithms, *t* is year *t;*
- Y_t is economic growth, measured by Vietnam's real GDP according to data of the General Statistics Office of Vietnam (GSO) in year *t*;
- K_t is capital accumulated in the economy, measured by accumulation of fixed assets in Vietnam's economy in year *t*. The data has been compiled from the General Statistics Office's issue of Statistical Data of Vietnam in the 20th century in the period from 1999 backwards and in the Statistical Yearbook for the remaining years;
- L_t is labor force in year *t*, measured by the number of people currently working in the economy, cited from the Statistical Yearbook of the General Statistics Office of Vietnam;
- N_t is horizontal diversification of export structure in year *t*, measured by the number of Vietnam's export varieties to the global market, calculated by the HS 6-digit code. The data was aggregated from World Bank's Integrated Trade Solution (WITS) website of World Bank (WB);
- LW_t is degree of vertical structure diversification of exports in year *t*, measured by the proportion of manufactured goods in the total export turnover of Vietnam. In particular, commodity groups coded from 5 to 8 according to the 1-digit SITC classification are considered manufactured and processed goods.

$$LW = \frac{(value\ of\ SITC\ exports\ 5-8)}{Total\ value\ of\ exports}$$

- ε_1 and ε_2 are errors.

Table 1. Description of variables in the model

Variable		Description Variables	Source	Expected direction
Independent variable	Y	Economic growth - Natural logarithm of real GDP at constant prices in 2010	GSO	
Dependant variable	K	Capital - Natural logarithm of fixed assets accumulation GSO	GSO	+
	L	Labor - Natural logarithm of the number of GSO workers	GSO	+
	N	Horizontal diversification - The natural logarithm of export ranges according to the 6-digit HS code WITS +/-	WITS	+/-
	LW	Vertical diversification - Natural logarithm of processed goods proportion (SITC 5-8) GSO +	GSO	+

Source: Compiled by the author

IV. Research results

4.1. Testing the stationery of data chains

The unit root test results of all variables in this study are summarized in the following table 2:

Table 2. Unit root test results

Variable	Level		Level -1 Difference	
	ADF	PP	ADF	PP
Y	-2.14	-3.62(*)	-4.51 (**)	
K	-0.56	-0.93	-3.49(*)	-3.5(**)
L	-1.89	-1.52	-3.43(*)	-3.41(*)
N	-3.82 (**)	-6.1(***)		
LW	-3.89(**)	-2.28		-3.69(**)

Source: Empirical results

Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

For two variables K and L: These two chains stop after the calculating of differential level 1 and the results of ADF and PP being consistent.

For variable N: is the stationery chain when the authors reject the unit root hypothesis.

For Y and LW variables: unit root test results for these two variables show inconsistencies between the ADF and PP methods. In particular, as for the economic growth variable, while the PP unit test method confirms this is a stationery chain, the ADF shows that this data chain only stops after only one time of difference. For longitudinal diversification variables, the ADF test shows that LW is a stationery data chain. However, when PP method is applied, the results show that this is an level -1 combinative chain- I (1).

4.2. Research results for each model

4.2.1. Research model of the effects of horizontal diversification (Model 1)

The research model of the effects of horizontal diversification of exports on Vietnam's economic growth is shown as equation (1).

The unit root test result mentioned above shows that the time series data in model 1 do not have the same stationery level. Specifically, the results of ADF and PP agree that K and L are sequences I (1) and N is a stationery sequence I (0). However, these two testing methods do not match on whether or not Y is a stationery chain or a level-1 combinative chain. Therefore, the conditions to apply the co-connection test according to Johansen method are not met. The author chooses the ARDL approach to learn about the co-connection between variables in the model 1. This approach allows the authors to exclude the classification of data chains into which is I (0) and which is I (1) and is applicable to the combinations of the two types of time data mentioned above. In this paper, the ARDL model and tests follow the following procedure:

First, the maximum latency will be determined for the dependent variable and the independent variable. In this paper, because the number of observations is small, to ensure a sufficient number of observations for the model, the maximum latency set for the variables will be 5 (from 1 to 5) for the dependent variable and from 4 (from 0 - 4) for independent variables. Thus, we will have 25 combinations of maximum latencies to consider. The author selected Aikaike's Information Criteria (AIC) to determine the optimal latency for variables in the model.

Next, when 25 combinations of maximum latencies are considered, models with the lowest AIC and meeting those conditions such as no correlation, no variance change, and normal distribution residuals) will be selected. Therefore, the chosen model is ARDL (4, 1, 2, 0) corresponding to the latency for the variables Y, K, L, N which are 4, 1, 2, 0. The ARDL estimation results for the Model 1 are shown in each of the following tables:

Table 3: ARDL estimation for Model 1

Variable	Coefficient	t-statistic
Y (-1)	0.798	5.02 (***)
Y (-2)	-0.236	-2.326(**)
Y (-3)	-0.116	-2.105(*)
Y (-4)	0.160	2.941(**)
K	0.106	3.565(***)
K(-1)	-0.047	-1.453
L	-0.076	-0.292
L(-1)	0.180	0.455
L(-2)	0.567	1.993(*)
N	0.047	2.303(**)
C	-2.576	-3.228(***)

Source: Empirical results

Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

Last, after the ARDL model is available, we continue to perform the Bounds Test to determine whether there are long-term relationships between the independent variables and the dependent variables. The Bounds Test results give statistical value F greater than the bound values on the Peseran table at 5% significance level. Therefore, we conclude that the variables in model 1 have a long-term relationship with each other at the 5% significance level. Capital (K), Labor (L) and Horizontal Export Diversification (N) variables have a long-term impact on economic growth (Y) from 2-4 periods.

Table 4. Results of bound tests in Model 1

Statistical value F	Comparision	Upper bound	Lower boud	Weight of the smallest factor
5.46	>	3.77	2.72	10%
	>	4.35	3.23	5%
	<	5.61	4.29	1%

Source: Compiled by the author.

Table 5. Long-term coefficients of variables in model 1

Variable	Coefficient	t-statistic
K	0.151	2.058(*)
L	1.783	10.560(***)
N	0.122	2.208(**)
C	-6.521	-5.696(***)

Source: Empirical results
Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

$$Y = - 6.5211 + 0.1512K + 1.7833L + 0.1223N$$

The long-term coefficients of the variables show that, in the long run, all variables Capital (K), Labor (L) and horizontal structure diversification of export goods (N) positively impacted Vietnam's economic growth. Thus, the positive impacts from the horizontal diversification of export goods structure based on the results from Model 1 strengthens the theoretical understanding of this form of diversification. Accordingly, expanding the structure of exports to entirely new categories will contribute to the dispersion of risks, ensuring the stability of revenue from export activities of a country as well as bringing about positive external effects. Specifically, in this research model, when the number of export ranges increases by 1%, this will lead to a growth of 0.119% in the economy. In addition to the long-term coefficients, the adjustment error variable (ECT) should be considered. In model 1, the ECT variable had a negative coefficient with a value of 39.5%. Thus, for this model, the speed of adjustment is back to equilibrium in the long term with the figure being 39.5%. The short-term coefficients of the variables are shown in the following Table 6:

Table 6. Short-term coefficients of variables in Model 1

Dependent variable: D(Y)

Variable	Coefficient	t-statistic
D(Y (-1))	0.192	1.662
D(Y (-2))	-0.044	-0.628
D(Y (-3))	-0.16	-2.941(**)
D(K)	0.106	3.565(***)
D(L)	-0.076	-0.292
D(L(-1))	-0.567	-1.993(*)
D(N)	0.047	2.303(**)
ECT(-1)	-0.394	-4.643(***)

Source: Empirical results
Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

4.2.2. Research model of the impacts of vertical diversification (Model 2)

The model studying the effects of diversifying the structure of exports vertically on economic growth is shown by equation (2). Similar to Model 1, the unit root test results of the variables in the model do not enable the continuation of Johansen method. Therefore, the ARDL approach with the advantage of eliminating the need for prior unit testing (Akinlo, 2006) will be applied. In addition, since there is no data chains in model 2 which is I (2), the conditions for applying ARDL are met. Model 2 will be estimated and relevant tests will be performed following the procedure for Model 1. Regarding maximum latency, the author specifies the maximum latency for the dependent variable 5 (from 1-5) and 4 (from 0-4) for the independent variable, and also has in total 25 combinations of maximum latency to consider just as in Model 1. The selected model results are ARDL (5,2,3,3) corresponding to a latency of 5 for the dependent variable of GDP and 2, 3, 3 for the independent variables K, L, LW respectively. Bound tests continue to be applied to understand the long-term

relationship between variables in the model with the hypotheses H0 and H1 corresponding to the absence or the existence of co-association links between variables. The statistical F value calculated from the ARDL model (5,2,3,3) was greater than the upper boundary value at 1% significance level, allowing us to reject the hypothesis H0 at this significance level. . Thus, we can affirm that the independent variables Capital (K), Labor (L) and the degree of vertical diversification of export structurev(LW) have a long-term effect on economic growth (Y). Model 2 has achieved the expectation level that the author gave in the beginning of research. In particular, the variables Capital (K) and Labor (L) will bring positive effects to economic growth (Y). This is consistent with the results from Model 1. Therefore, every 1% increase in the diversification degree in depth of the export basket will result in an increase of 0.077% in the scale of the economy.

Table 7. ARDL estimation for Model 2

Dependent variable: GDP - maximum latency 5
Independent variables: K, L, LW - maximum latency 3
Selected model: ARDL (5,2,3,3)

Variable	Coefficient	t-statistic
Y(-1)	0.532	3.058(**)
Y(-2)	-0.527	-3.442(**)
Y(-3)	-0.241	-2.762(**)
Y(-4)	0.203	4.537(***)
Y(-5)	0.178	3.374(**)
K	0.109	5.708(***)
K(-1)	0.085	2.831(**)
K(-2)	0.021	0.956
L	-0.411	-1.688
L(-1)	0.621	2.435(*)
L(-2)	0.504	2.22(*)
L(-3)	0.593	2.781(**)
LW	0.042	2.511(**)
LW(-1)	0.008	0.521
LW(-2)	-0.03	-1.531
LW(-3)	0.046	3.269(**)
Cont	-4.351	-3.877(***)

Source: Empirical results
Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

Table 8. Results of bound tests in Model 2

Statistical value F	Comparision	Upper bound	Lower bound	Singificance level
12.56	>	3.77	2.72	10%
	>	4.35	3.23	5%
	>	5.61	4.29	1%

Source: Compiled by the author.

Table 9. Long-term coefficients of variables in Model 2

Variable	Coefficient	t-statistic
K	0.249	8.421(***)
L	1.459	15.489(***)
LW	0.081	4.581(***)
C	-5.075	-7.421(***)

$$GDP = -5.0753 + 0.2491K + 1.459L + 0.0811LW \quad (2)$$

Source: Research results
Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

The estimation results of short-term coefficients show the coefficient of the error adjustment variable with negative signs with the value of 85.5%. As analyzed, this coefficient represents the speed of adjustment of the long-term balanced relationship. Therefore, the better it is, as this value is closer to 1. The above model has an ECT coefficient with negative sign and the value of 85.5% shown in the variables in the model is adjusted to long-term equilibrium at a very fast speed.

Table 10. Short-term coefficients of variables in Model 2

Dependent variable: D(Y)

Variable	Coefficient	t-statistic
D(Y(-1))	0.381	3.275(**)
D(Y(-2))	-0.135	-1.991(*)
D(Y(-3))	-0.374	-5.253(***)
D(Y(-4))	-0.181	-3.336(**)

D(K)	0.112	5.708(***)
D(K(-1))	-0.030	-0.962
D(L)	-0.399	-1.697
D(L(-1))	-0.494	-2.120(*)
D(L(-2))	-0.585	-2.782(**)
D(LW)	0.051	2.509(**)
D(LW(-1))	0.031	1.533
D(LW(-2))	-0.039	-3.275(**)
ECT(-1)	-0.855	-6.013(***)

Source: Empirical results

Note: Statistical significance at 1% (***), 5% (**), 10% (*) levels.

V. Conclusion

Regarding the impact of horizontal diversification of export structure, research results from Model 1 show that the horizontal diversification of export structure has a positive impact on economic growth of Vietnam. Specifically, when the quantity of our country's exports to the world market increases by 1%, the size of the economy in terms of real GDP will increase by 0.119%.

Regarding the impact of vertical diversification of export structure, research results from Model 2 support the views on the positive impacts of vertical export structure diversification on the economic growth. As for Vietnam, an increase of 1% of the proportion of manufactured and processed goods in the export basket will lead to an increase of 0.08% in the size of the economy.

Regarding the relationship between the horizontal and vertical diversification of export structure, the results from both models show that the process of diversifying the structure of exports vertically and horizontally both have implications for Vietnam's economic growth strategies. The two forms are not opposites or mutually exclusive, but can be conducted simultaneously to bring forth the best effects to the economy. In particular, horizontal structure diversification should be conducted on the basis of longitudinal diversity.

References

[1]. Balaguer, J., & Cantavella-Jordá, M. (2004). Export Composition and Spanish Economic Growth: Evidence from the 20th century. *Journal of Policy Modeling, 26*(2), 165-179.

[2]. Herzer, D., & Nowak-Lehnmann D., F. (2006). What does Export Diversification Do for Growth? An Econometric Analysis. *Applied Economics, 38*(15), 1825-1838.

[3]. Hesse, H. (2008). Export diversification and economic growth. Washington. *World Bank. Working paper, 21*.

[4]. Hodey, L. S., Oduro, A. D., & Senadza, B. (2015). Export diversification and economic growth in sub-Saharan Africa. *Journal of African Development, 17*(2), 67-81.

[5]. Levin, A., & Raut, L. K. (1997). Complementarities between Exports and Human Capital in Economic Growth: Evidence from the Semi- industrialized Countries. *Economic Development & Cultural Change, 46*(1), 155-174.

[6]. Nwankwo, O. (2015). Diversification of non-oil export product as a precondition for accelerated real economic growth in Nigeria. *International Journal of Managerial Studies and Research, 3*(7), 104-112.

[7]. Olaleye, S. O., Edun, F., & Taiwo, S. B. (2013). Export Diversification and Economic Growth in Nigeria: An Empirical Test of Relationship Using a Granger Casualty Test. *Journal of Emerging Trends in Economics and Management Sciences, 5*(1), 70-79.

[8]. Zanib Javed, & Munir, K. (2015). Impact of Export Composition on Economic Growth in South Asia. *MPRA Paper 71519.*

Vu Thi Oanh, et. al "Empirical Research on The Impacts of The Structure of Exported Goods on Vietnam's Economic Growth Based on The Expanded Cobb-Douglas Production Function Model." *IOSR Journal of Business and Management (IOSR-JBM)*, 22(5), 2020, pp. 19-24.