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Evaluation of the Causal Relationship between Export and GDP in the Northern Region of Vietnam

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Abstract:

Exports and GDP (Gross Domestic Product) are important factors to help create jobs, reduce poverty, increase budget revenues, develop markets, promote economic restructuring towards positively and contributing to economic development in general and in Northwest Vietnam in particular. Meanwhile, there is a close relationship between export and GDP. In order to improve export efficiency and GDP, the causal assessment of these two factors is absolutely necessary. This paper will analyze the status of exports and GDP, and then use the Granger causality test to test the causal relationship between exports and GDP. Also consider causality in the short or long term or both in the short and long term. From that result to confirm whether exports really affect GDP.

Keywords: Growth, export, northern region of Vietnam, international integration, trade relations

1. Research Problem

Export has been regarded as one of the important drivers of economic growth for a long time, playing a particularly important role in the process of promoting international cooperation between countries and accelerating the process of global economy integration. Exports have a positive impact on the economic growth of each country around the world, especially for developing countries. The relationship between exports and GDP has been interpreted through research works, typically research on "The East Asian miracle" World Bank (1993) concludes that: Export promotion strategy is generally the most successful choice of export-oriented Asian economic HPAs, not industrial policy, which is the main driver of increasing productivity in Japan and South Korea. But the study "Reflecting on the East Asian miracle" (2004) argued that export is not a factor promoting Japan's productivity growth, whereas productivity growth is a factor promoting exports. [4]. Although the views and arguments about the relationship between exports and GDP have not been completely unified, researchers basically agree that the export-oriented economic growth strategy is important in the context. international economic integration and interactions in the causal relationship between exports and GDP.

In Vietnam, in recent years, export development has made great contributions to GDP growth. Export has become one of the main drivers of economic growth, contributing to social and economic stability such as limiting trade deficit, balancing the international payment balance and increasing foreign currency reserves, creating jobs, increasing income, reducing poverty for the whole country in general and the Northwest in particular.

The Northwest region is the western mountainous region of northern Vietnam, sharing the border with Laos and China. The Northwest is a particularly important strategic area for Vietnam's economy, society, defense - security and foreign affairs. Commodity exports in the Northwest have achieved many important achievements in terms of size and growth, infrastructure development, creating an important material premise, increasing budget revenue, playing an active role for growth. Regional GDP. But to achieve high efficiency both in terms of exports and GDP, it is necessary to clearly assess the situation and interplay to clarify the growth trend in order to propose the most feasible solution for Northwest Vietnam. The causal relationship of exports to economic growth needs to be assessed both in the short and long term through a number of important attributes, in order to contribute to filling the gap in research on this relationship..

This article will analyze the causal relationship between commodity exports and GDP in the Northwest period 2000-2017 both in the short and long term. In order to evaluate successes and limitations, propose feasible solutions to accelerate economic growth.

2. Method of Research

2.1. Methods of Data Collection

The data used in the project are collected from basic sources such as the General Statistics Office, annual economic reports, commercial development plans of provinces and ministries. sectors related to export of goods and GDP of provinces, books, textbooks and related documents.

Methods of data analysis:

- General statistical methods: Summary of data and use of comparison, analysis, synthesis to evaluate and represent export value of goods, GDP.

- Comparison method: comparing the fluctuation of the value of exports, GDP over the years, the level of export contribution to economic growth contributing to a more comprehensive assessment of research.
- Qualitative analysis method: qualitative analysis of the attributes of commodity exports and clarifying the nature of the relationship of exports with GDP, increasing persuasion and value of arguments through export value and price GDP value.
- Quantitative analysis method: using Granger causality test method. This study uses Granger causality analysis method to test the causal relationship between exports and GDP. Also consider causality in the short or long term.

3. Development Status of Exports and GDP in Northwest of Viet Nam

The Northwest region consists of 6 provinces: Hoa Binh, Son La, Dien Bien, Lai Chau, Lao Cai, Yen Bai with an area of 5.64 million ha, which is a low starting point of Vietnam. But the North West is a place favored by nature with a large amount of mineral and forest resources, which is considered as a potential for natural conditions to develop export goods. In order to exploit effectively the potential advantages of the Northwest region in economic development, in the past years, our Party and State have spent a large budget for investing in this area. According to the Ministry of Planning and Investment data, in 2014 alone, the total development investment capital from the state budget for the Northwest is over VND 15,472 billion, accounting for 12.53% of the whole country and equal to 99, 8% compared to 2013. In which, domestic capital is over 14,130 billion VND, and official development assistance (ODA) is over 1,430 billion VND. In addition, the North West also allocated over VND 9,705 billion of government bonds. If counting from 2008 to November 2013, ODA capital was signed to develop Northwest with USD 2,064.99 million, the field of agriculture and rural development, poverty reduction was the highest priority with 731, 82 million USD, accounting for 35.44% of the total ODA capital of the country. The gross national product of 6 provinces in the Northwest region has always increased over the years in the research period.

Year	Dien Bien	Lai Chau	Yen Bai	Son La	Lao Cai	Hoa Binh
2000	1.956,75		1.670,19	1.837,35	1.417,26	5.231,28
2001	2.455,61		1.828,42	1.976,98	1.584,59	5.533,14
2002	2.637,55		2.089,33	2.133,16	1.817,66	5.719,98
2003	2.860,72		2.325,95	2.865,43	2.150,29	6.166,39
2004	1.875,63	2.687,99	2.687,99	3.428,42	2.530,52	6.655,29
2005	2.008,14	1.058,07	3.118,88	4.090,84	2.944,96	7.171,21
2006	2.400,33	1.358,00	3.731,05	5.094,47	3.327,81	6.938,33
2007	2.862,54	1.809,61	4.483,07	6.128,08	4.501,82	8.811,73
2008	3.654,45	1.988,13	5.664,79	8.565,47	6.878,00	10.674,93
2009	4.187,25	2.574,39	6.801,15	11.345,86	7.958,20	11.767,37
2010	5.237,65	3.023,81	11.160,82	14.386,14	12.358,83	15.999,68
2011	7.042,35	4.073,46	12.611,72	18.333,70	13.709,65	16.712,34
2012	8.743,14	5.138,83	15.246,99	19.766,45	18.440,58	18.542,55
2013	9.465,35	6.252,56	17.113,88	22.854,42	21.235,58	20.961,62
2014	10.473,90	7.189,36	19.094,48	26.390,21	24.603,82	24.592,63
2015	11.327,39	7.859,06	20.035,83	27.861,15	27.069,26	26.665,27
2016	12.217,99	9.883,03	22.258,39	29.979,01	30.045,92	28.382,31
2017	13.084,25	10.970,16	23.638,41	32.853,99	32.092,05	37.94,99

Table 1: GDP Value According to the Actual Prices of 6 Provinces in the Northwest Region of Vietnam

Unit: Billions Dongs

Source: Statistical Yearbook 6 Provinces, the Author's Calculations [Error! Reference source not found.]

From the data, it can be seen that Hoa Binh province has reached the highest GDP value in the region, in 2000 Hoa Binh province only reached VND 5,231.28 billion, up to VND 37,394.99 billion by 2017 after 18 years. The second highest level is Son La and Lao Cai provinces, in 2000 Son La province reached 1,837.35 billion VND and achieved significant increases in the following years, 2010 increased to 14,386.14 billion and in 2017 is VND 32,853.99 billion. The lowest in the region is Lai Chau province, the GDP value in 2000 reached VND 1,956.75 billion, by 2017 it reached VND 10,970.16 billion, the increase is also the lowest in the region. Border trade is an integral part of a country's trading system, not only playing a major role in the local and regional socio-economic development, but also contributing to expanding the Economic-trade cooperation between countries sharing borders [6]. In the general border of Vietnam, it can be said that Northwest is the most difficult area. In particular, this region converges 3 elements: mountainous, highland and border areas. Border trade in the Northwest region plays an important role because the mountainous provinces in this region occupy a large and rich area of the potential and advantages of developing agriculture, forestry, hydropower, minerals, tourism and economy of export. Therefore, the Foreign Trade Management Law No. 05/2017 / QH14, dated 12/6/2017 of the National Assembly, clearly stipulates that it should soon build and issue a Government Decree on managing border trade, in There are separate preferential policies on goods to develop border trade in the Northwest. These products do not have to fully meet the current regulations on international goods trading activities and goods trading and agent agency activities with foreign countries. In the period of 2000-2017, the export of the North West region has prospered, the export value increased every year in the research period, the highest in 2017 reached the export value of the region reaching USD

987.075 million. However, the export value of the provinces in the region is uneven, even in each province there is an unstable increase and decrease between years in the study period.

Year	Dien Bien	Lai Chau	Yen Bai	Son La	Lao Cai	Hoa Binh	Total
2000	275		3,296	2,809	7,177	6,355	19,912
2001	689		3,937	3,976	15,146	12,971	36,719
2002	988		4,021	4,863	19,732	5,444	35,048
2003	690		4,947	3,655	12,100	9,635	31,027
2004	325	258	7,593	3,860	16,472	16,940	45,448
2005	674	634	9,228	2,046	17,144	15,129	44,855
2006	764	366	10,752	4,849	22,956	24,478	64,165
2007	754	1,628	12,578	4,207	23,408	23,231	65,806
2008	3,186	1,929	13,772	5,653	73,863	24,928	123,331
2009	5,200	3,081	17,951	4,677	74,829	27,800	133,538
2010	8,500	3,964	29,332	2,333	134,930	36,976	216,035
2011	10,327	4,117	34,796	6,464	173,829	50,309	272,445
2012	13,885	5,927	46,858	5,481	205,556	65,243	342,950
2013	18,641	4,641	53,704	15,737	407,781	78,850	579,354
2014	24,101	5,584	55,089	104,303	341,274	119,640	649,991
2015	22,815	6,225	68,176	86,387	387,724	249,290	820,617
2016	30,272	5,350	75,853	40,377	296,411	287,460	735,723
2017	39,000	10,300	105,600	68,875	258,300	505,000	987,075

Table 2: Export Value of 6 Provinces Northern Region of Viet Nam

Unit: Mill. Dongs

Source: Statistical Yearbook 6 Provinces, the Author's Calculations [Error! Reference source not found.]

From the table of data, it can be seen that the region's export value has significantly increased over the years in the research period, in 2000 reached 19,912 million USD, in 2010 reached 216,035 million USD, increased 196,123 million USD, at the end of 2017 reached 987,075 million dollars. In the North West provinces, it can be seen that Hoa Binh and Lao Cai provinces have better export potential and higher export value than other provinces. Hoa Binh province in 2000 achieved an export value of USD 6.355 million, in 2010 reached USD 36,976 million, by 2017 the highest export value with USD 505,000 million. Lao Cai province in the year 2000 reached 7,177 million USD by 2017 to reach 258,300 million USD, increasing 251,123 million USD.

Year	GDP	Export	Proportion of export value /GDP
2000	12.112,83	299,88	2,48
2001	13.378,74	559,09	4,17
2002	14.397,67	539,81	3,75
2003	16.368,78	522,88	3,19
2004	18.165,73	727,41	4,00
2005	20.392,10	713,42	3,50
2006	22.849,99	1.024,39	4,48
2007	28.596,85	1.060,53	3,71
2008	37.425,77	2.037,06	5,44
2009	44.634,22	2.395,81	5,36
2010	62.166,93	4.373,84	7,03
2011	73.055,96	5.525,73	7,56
2012	85.878,54	7.142,96	8,31
2013	97.883,40	12.187,29	12,45
2014	112.344,40	13.809,71	12,29
2015	120.817,96	18.009,26	14,91
2016	132.766,65	16.884,84	12,72
2017	150.033,85	22.970,22	15,31

Table 3: Proportion of Export Value /Gdp northern Region of Viet Nam

Unit: Billions Dongs

Source: Statistical Yearbook 6 Provinces, the Author's Calculations [Error! Reference source not found.]

From the table, it can be seen that the export /GDP proportion is quite low but it tends to increase in the last years of the study period. In 2000, only accounted for 2.48%, 7.03% in 2010 and the highest in 2017 with 15.31%. This proves

that exports have played an important role in GDP growth of the Northwest Region. But to achieve a higher rate, there are solutions to increase exports both in size and quality of exports.

4. Conclusions on the Causal Relationship between Commodity Exports and GDP in Northwest Vietnam

Experimental studies often use causal analysis methods to consider the relationship between two or more economic variables. This study uses Granger causality test, to test the causal relationship between exports and GDP, and consider causality in the short or long term or both. Short-term and long-term, first need to check the stop of the observed data series with the unit root test. The commonly used test is the extended Dickey and Fuller test (ADF) proposed by Dickey and Fuller (1981). The equation for stopping calculation (ADF test) of the time series is as follows:

$$\Delta y_t = \alpha_0 + \beta y_{t-1} + \sum_{i=1}^k \delta_i \Delta y_{t-i} + \varepsilon_t$$

n which $\Delta y_t = y_t - y_{t-1}$; y_t is the time series of study variables, k is the length of the delay, ε_t is the white noise

Hypothesis

Hypothesis H0: $\beta = 0$ (y_t is a non-stop data string)

Hypothesis H1: $\beta \neq 0$ (y_t is a stop data series)

The latency length k is not optimal for the selected variables based on information indicators such as FPE, AIC, HQIC, SBIC, LL, LR In the study of using Akaike information index (Akaike Information Criterion - AIC) to select the optimal delay k . The optimal k value is chosen so that the AIC index is the smallest.

In the ADF test, the ADF test value does not follow the normal distribution but the estimated t-value of the coefficients in the model will follow the probability distribution (tau statistic). If the absolute value is verified $|\tau|$ The calculation is greater than the value $|\tau|$ critical (built by Mackinnon, 1996) rejects the null hypothesis H0, meaning that the data series is stationary and vice versa.

hypothesis of co-integration

According to Engle and Granger (1987), two non-stop time series with co-integration, the linear combination between the two-time series may be stopped. Integrated copper test to show that the research variables are not stopped, there must be co-integration at least level 1. After checking the stop of the data series and determining the optimal k delay, homogeneity test Combined with two types of tests proposed by Johanse - Juselius (1990), it is a matrix trace test (Trace) and a maximum value of the matrix (Maximum Eigenvalue) is tested. If the co-integration result indicates that there is at least 1 co-integration, the combination of the two uninterrupted time series will be a series of time stops and guarantees required in the Engle - Granger test. Co-integration testing is performed on Eview software 8.

Testing Engle - Granger two stages

Stage 1: Verify whether or not the causal relationship from exports to GDP. In this case, the Var model is estimated as follows:

$$Y_t = \alpha_0 + \sum_{i=1}^k \beta_i Y_{t-i} + \sum_{i=1}^k \delta_i X_{t-i} + \mu_t \quad (1)$$

$$X_t = \gamma_0 + \sum_{i=1}^k \varphi_i X_{t-i} + \sum_{i=1}^k \phi_i Y_{t-i} + v_t \quad (2)$$

And go to test hypothesis H₀: $\delta_{-1} = \delta_{-2} = \delta_{-3} = \delta_{-4} = \dots = \delta_{-k} = 0$, for equation (1) with k is the optimal delay determined by the information index above. If hypothesis H0 is rejected, it means that variable X has a causal effect on Y and vice versa. Similarly, for equation (2), test hypotheses:

H0: $\phi_{-1} = \phi_{-2} = \phi_{-3} = \dots = \phi_{-k} = 0$, and if the hypothesis H0 is rejected, it means that the variable Y has a causal effect on X.

Another goal of this step is to calculate residuals of equations (1) and (2) to be used for testing of causality above long-term or short-term.

Phase 2: Implementation of causal impact testing is short and long term. If there is really a causal relationship between exports and GDP, the research continues to test whether the relationship is short-term, long-term or both. To do this, phase 2 of the Engle - Granger test is carried out. The regression model in the second stage Granger causality test on the relationship between the variable Y and the variable X

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^k \beta_i Y_{t-i} + \sum_{i=1}^k \delta_i X_{t-i} + \alpha_1 \mu_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta X_t = \gamma_0 + \sum_{i=1}^k \varphi_i X_{t-i} + \sum_{i=1}^k \phi_i Y_{t-i} + \gamma_1 \mu_{t-1} + v_t \quad (2)$$

In which: X_t, Y_t are Logarithm respectively of variables X and Y; μ_t is the delay correction error obtained from the co-affinity relationship in the previous step.

Testing the parameters δ_i and ϕ_i indicates a temporary (short-term) causality between the variable X and the variable Y and testing the parameters α_i and γ_i will allow to determine the causal relationship between variables X and Y long term. If $\delta_i = 0$ for $i = 1, 2, \dots, k$, the variable X does not affect the variable Y in the short term and if $\phi_i = 0$ for all $i = 1, 2, \dots, k$ the variable Y does not affect the variable X in short term When $\alpha_i = 0$ means that X has no effect on Y in the long run and vice versa $\alpha_i \neq 0$ then X will affect Y in the long run. Similar to the case of γ_i .

It is possible to use Engle - Granger testing to see if exports affect GDP.

This section continues to examine the causal relationship between exports and GDP. Conduct research on this relationship, in turn the unit root tests (stop test), consider the optimal time, test the co-integration of the export time series and GDP. Then, research using Granger Causality test to determine this causal relationship. Next, the study used the two-stage Granger Causality Verification to determine whether the relationship between exports and GDP is in the short or long term.

The unit root test results show that the FDI series and industrial output are both stop time series 1. This means that the first difference of GDP is the time series. The results of this test are described below.

Variable / False Differential	T-Statistic (τ)	τ_α ($\alpha = 1\%$)	ValueProb*	Conclude
D(LGDP)	-5.353622	-4.667883	0.0031	Stop level 1
D(LXK)	-6.116634	-4.667883	0.0009	Stop level 1

Table 4: Results of Unit Root Tests of Exports and GDP
Source: According To the Author's Calculation Data

Because the first link exists between the two research variables, the next step is to test whether the relationship is a long-term relationship. Use Akaike information index (AIC) to determine the optimal delay for variables.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	62.04448	NA	1.89e-06	-7.505560	-7.408986	-7.500614
1	73.63177	18.82934*	7.37e-07*	-8.453971*	-8.164250*	-8.439135*

Table 5: Determine the Optimal Delay
Source: According to the Author's Calculation Data

The results show that, according to the AIC standard, the lowest value at latency is 1. Therefore, the maximum delay of the model is 1.

Hypothesized No. of CE(s)	Eigenvalue	Trace statistic	0.05 Critical Value	Prob**
None*	0.621916	17.95167	15.49471	0.0209
At most 1	0.200797	3.362105	3.841466	0.0667
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen statistic	0.05 Critical Value	Prob**
None*	0.621916	17.95167	14.26460	0.0444
At most 1	0.200797	3.362105	3.841466	0.0667

Table 6: Verification of Co-Integration
Source: According to the Author's Calculation Data

The author uses the Johansen test to verify co-integration with a 5% significance level. The results show that: Trace statistical value = 17.95167 > Critical value = 15.49471 and statistical value Max-Eigen = 17.95167 > Critical value = 14.26460. Therefore, at the 5% significance level there exists a co-relation between the variables in the model.

Next, the study conducted a regular and two-stage Granger test to determine the causal relationship between exports and GDP to determine causality as either short-term or long-term or both, and the two-stage Granger estimation model takes the form

$$\Delta D(LGDP)_t = \alpha_0 + \sum_{i=1}^k \beta_i D(LGDP)_{t-i} + \sum_{i=1}^k \delta_i D(XK)_{t-i} + \alpha_1 u_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta D(XK)_t = \gamma_0 + \sum_{i=1}^k \varphi_i D(XK)_{t-i} + \sum_{i=1}^k \phi_i D(LGDP)_{t-i} + \gamma_1 u_{t-1} + v_t \quad (2)$$

In which, u_{t-1} is the delay correction error obtained from the co-integration relationship in the previous step. If for all, Export does not affect GDP in the short term; if for all, GDP does not affect exports in the short term. Carry out verification of parameters and indicate a temporary (short-term) causality, while verifying parameters and allowing to determine a long-term causal relationship (in the long run). The estimated results are shown in the table below

	Test Granger - Wald	Test Engle – Granger two phases	
		Short-term	Long-term
Exports decide to GDP	4.8519** (0.0463)	1.173383*** (0.000)	-0.886575*** (0.004)
GDP impacts on Export	3.2130* (0.0963)	0.816479*** (0.000)	-1.052668*** (0.001)

Table 7: Granger Test Results
*** Is Statistically Significant at 1%, ** At 5%, and * at 10%. The Number in Parentheses Is the Value P
Source: According to the Author's Calculation Data

The results of the Granger-Wald test show that there is a causal relationship in which exports affect GDP at a statistically significant 5% level. This result confirms the existence of export causal relationship and GDP. The opposite test shows the impact of GDP on exports with a 10% significance level during the same period.

To determine whether this relationship is causal in the short or long term, the F-test for the delay variable and the t-test for the delay in equation (1) and (2) is conducted in turn. Using the AIC information index, the optimal number of hysteresis steps is defined as one ($l = 1$), the estimation results show that exports affect GDP both in the long and short term. GDP affects exports both in the short term and in the long term.

5. Policy Implications

Export development strategy is associated with the general strategy of GDP growth both in the short and long term. The export strategy should be linked to the exploitation of strengths in agriculture and industrial achievements, thereby making efforts to increase export growth, create jobs, and collect foreign currency, contributing to GDP growth. Of the area. Focusing on the export development strategy following the model of sustainable and rational growth between the width and depth, between the quantity and quality, optimal use of export-oriented resources and sustainable GDP growth, ensure both short and long term effectiveness.

Enhancing the competitiveness of export enterprises to improve the competitiveness of the economy. Improving the ability and competitiveness of export enterprises in the context of international economic integration is a completely urgent issue. Export enterprises need to actively capture information, prepare many scenarios to adapt to the context. Take advantage of domestic and international laws as well as requirements and standards on customs practices, trade practices and corporate social responsibility, enlist the support of embassies and agencies. Vietnamese standing agency in foreign countries. Develop business associations and industries both in the region and outside the region.

Completing mechanisms and policies to boost exports positively increase GDP. Facilitate export, expand legal business rights, follow the direction of multilateralism and diversify economic and trade relations and reduce the protection of inefficient business sectors to overcome the natural situation. unfavorable deviation for export. Effectively use financial tools to support exports, improve access to formal credit both investment credit and working capital credit. Harmonizing the policy of promoting export with environmental protection. Policies and measures need to be implemented synchronously, while ensuring divergence and key focus. More importantly, effective and sustainable quality must always be emphasized in export-oriented economic growth strategies in any context and phase.

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