Journal of
Risk and Financial Management

MDPI

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Exports and Imports-Led Growth: Evidence from a Small Developing Economy

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Abstract: This paper examines equilibrium relationships and dynamic causality between economic growth, exports, and imports in Nepal using time-series data between 1965 and 2020. This research examines the impact of exports and imports on the economic growth of Nepal and documents empirical evidence in exports-led growth, imports-led growth, growth-led exports, and growth-led imports hypotheses in both the short and long run. The test results show no evidence favoring the exports-led growth and growth-led exports hypotheses in both the short and long run. However, the study finds evidence supporting the imports-led growth hypothesis in the short term and the growth-led imports hypothesis in the long term. Overall, this paper finds no evidence in favor of the notion that foreign trade supports the economic growth of Nepal in the long run. The research findings may have important implications for policymakers in Nepal. The paper contributes to trade and economic growth literature by investigating the relationship between exports, imports, capital, and gross domestic products in a small economy such as Nepal, where exports make a minimal and imports make an extensive contribution to gross domestic products by using cointegration and the vector error correction model.

Keywords: exports; imports; economic growth; cointegration; VECM

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Citation: Panta, Humnath, Mitra Lal Devkota, and Dhruba Banjade. 2022. Exports and Imports-Led Growth: Evidence from a Small Developing Economy. *Journal of Risk and Financial Management* 15: 11. https://doi.org/10.3390/jrfm15010011

Academic Editor: Thanasis Stengos

Received: 10 December 2021
Accepted: 24 December 2021
Published: 1 January 2022

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1. Introduction

The role of foreign trade on economic growth has been a critical discussion among economists for decades. Classical economists view the relationship between foreign trade and economic growth optimistically. For instance, Smith (1977) see international trade as an essential element in creating an opportunity for a country through specialization, the division of labor, and surplus production efficiencies.

The impact of exports and imports on economic growth has been a topic of critical discussions and research among academicians and policymakers for decades. Most studies demonstrate the theoretical relation between trade and economic development, disagreeing with the magnitude of effects and causal direction (Bhagwati 1988; Edwards 1998). Most of the prior studies focus solely on the role of exports on economic growth and use bivariate causal models that ignore contributions of imports (Rahmaddi and Ichihashi 2011). Imports may play a crucial role in economic development in the long run since significant export growth is usually associated with rapid imports growth (Rodrik 1999). Empirical results on the link between exports and economic development may be spurious, resulting in misleading conclusions if the model excludes imports (Esfahani 1991; Riezman et al. 1996; Thangavelu and Rajaguru 2004). Moreover, the role of exports on economic growth analysis that excludes imports may suffer from omitted variable biases, leading to an overstatement of the dynamic relationship between exports and economic growth. Therefore, this study

includes imports in our analysis to address the omitted variable bias problem in the study, which is ignored in most studies exploring the role of trade in economic growth.

Nepal, a small developing economy in South Asia, has been facing real challenges in its economic development amid its people's high appreciation for economic growth. Nepal's foreign trade was limited only to India and Tibet before 1951. With the advent of democracy in 1951, Nepal's foreign trade expanded to other countries, namely the United States of America, Japan, Germany, France, Spain, Malaysia, Singapore, Thailand, and Bangladesh. During the fiscal year 2018/19, Nepal exported to 113 countries and imported from 149 countries (MoF 2019). Nepal had initially focused on the exports of agricultural goods in the 1980s, although its focus profoundly shifted to manufacturing products after the 1990s. However, Nepal's exports volume has been decreasing steadily over time compared to the rapid growth of imports. As a result, Nepal's imports and trade deficit have been increasing rapidly in recent decades. For example, exports were 52.78% of Nepal's imports in 1965, whereas exports were only 6.64% of Nepal's imports in 2020. Indeed, Nepal's trade deficit was USD −9.98 billion in 2020, which was 29.32% of Nepal's GDP in 2020. Thus, Nepal is unable to take advantage of globalization in foreign trade.

Most of the prior research focuses on large economies in which data is readily available. As Awokuse (2006) argues, as more data becomes available, the trend to study only one country using time-series data has increased. We believe that a smaller economy such as Nepal may have a higher reliance on foreign trade for its economic development. Nepal has been experiencing increasingly rapid imports-led growth in recent decades; therefore, it is worth examining the impact of exports and imports on Nepal's economic growth jointly. Consequently, we believe Nepal is an ideal example of testing hypotheses for exports-led growth (*ELG*), growth-led exports (*GLE*), imports-led growth (*ILG*), and growth-led imports (*GLI*).

Nepal adopted liberalized economic policies, including privatization, liberalization of markets, and trade liberalization, starting around the mid-1980s. It gained momentum with the introduction of democracy in 1990. Nepal initiated a trade liberalization process on a unilateral and regional basis in the early 1990s (Gilbert 2008; Sapkota and Cockburn 2008) by introducing tariff reduction, duty drawbacks, and import licensing ease (Acharya et al. 2012). Nepal's participation in the WTO since 23 April 2004 has further led to the creation of a new international trading system aiming to liberalize its market through further reduction of tariff and non-tariff barriers. The imbalance between exports and imports has widened rapidly, especially after 2005, abolishing Nepal's quota system. Therefore, it is very relevant to analyze the impact of trade, specifically exports and imports, on Nepal's economic development. Nepal provides an excellent example of an empirical study on exports, imports, and economic growth because of its significant dependence on imports.

The paper's main objective is to empirically investigate the *ELG*, *GLE*, *ILG*, and *GLI* hypotheses using time-series data from Nepal. Therefore, motivated by the disparity in exports and imports growth and unbalanced rapid growth of imports in Nepal, this paper investigates the causality among exports, imports, capital, and economic growth using the time-series data from 1965 to 2020. Using the vector error correction model (VECM), we test the dynamic relationship among economic growth, exports, imports, and capital. The results do not favor the *GLE* and *ELG* hypotheses in both the short and long term. However, this study finds proof favoring the *ILG* in the short term and the *GLI* in the long term. Overall, this paper finds that foreign trade does not support the economic growth of Nepal in the long run.

This paper contributes to the existing literature in many ways. First, this study focuses on a small country experiencing rapid imports growth, employing the traditional neoclassical growth model by estimating the impact of both exports and imports on economic growth. Second, this study uses total merchandise imports, whereas most previous studies use total imports of goods and services in their analysis. As Islam (1998) points out, the imports of intermediate goods are more relevant to a country's economic growth. Moreover, as Xu (1998) notes, empirical results using causality are sensitive to unit roots and lag.

Therefore, we use the widely used methodology by specifying a causal model based on a vector error correction model. Finally, this study examines short-term and long-term dynamic relations among the relevant variables within an error-correction framework.

The remainder of this paper's organization is as follows: Section 2 describes the role of exports and imports in the Nepalese economy and presents a review of past empirical research. A brief description of the data and the variables used in the study and research design are presented in Section 3. Section 4 contains the empirical results, and their interpretations, while the last part, Section 5, sums up the discussion with concluding remarks and policy implications.

2. Background and Literature Review

2.1. Background

Nepal's foreign trade has been dominated mainly by imports in recent decades. Figure 1 presents Nepal's exports and imports graphically from 1965 to 2020. A close-up analysis of the Figure 1 shows that the imbalance between exports and imports in Nepal was minimal until 1990. However, the imbalance between exports and imports started widening after 1980, and the trade imbalance started expanding extensively after 1994. Nepal's imbalance between exports and imports further widened after Nepal joined the WTO in 2004. In the past two decades, exports of Nepal have been stagnant or decreased, whereas imports growth has exploded in an unsustainable manner.

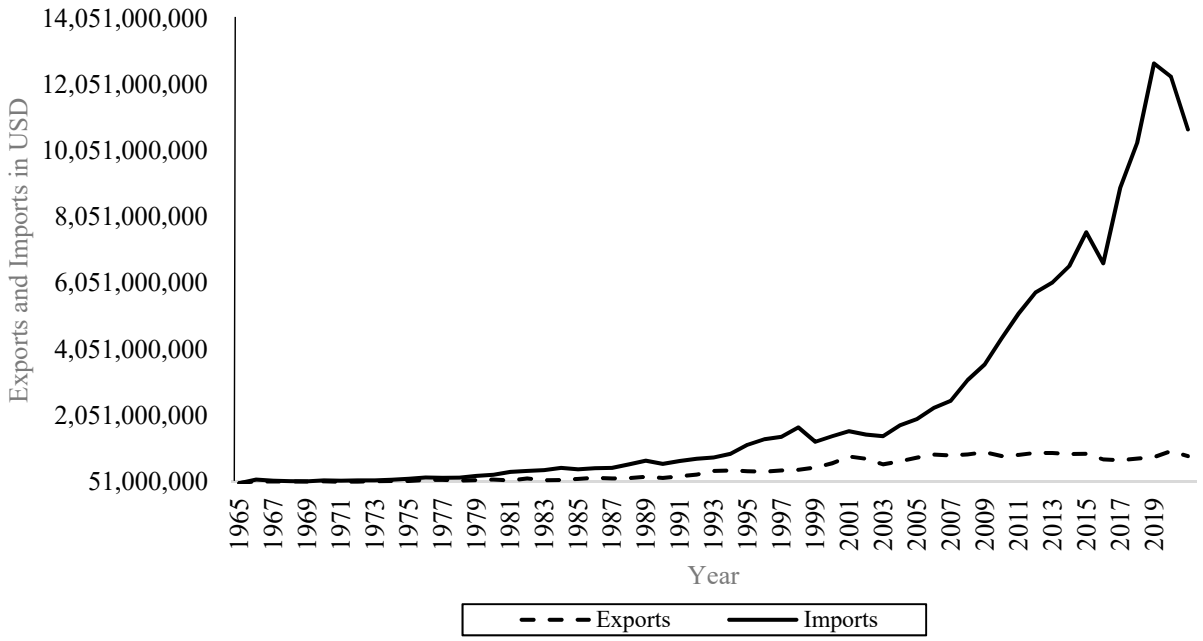

Figure 1. Exports and imports of Nepal. This figure depicts exports and imports of Nepal from 1965 to 2020. The solid and dashed lines represent exports and imports, respectively. This graph is generated using data available through the World Bank.

Nepal adopted an economic liberalization policy in the mid-1980s, which accelerated in the early 1990s immediately after the advent of democracy in 1990. With the advent of economic liberalization, Nepal privatized several government-owned enterprises. As Nepal implemented economic liberalization policies, the gap between exports and imports as a GDP ratio in the Nepalese economy started widening rapidly. The uptrend in imports continued even after adopting the liberalization policy. However, as shown in Figure 2, the contribution of exports to GDP started decreasing rapidly since the year 2000. As a result, the gap between exports and imports has become widespread, leading to Nepal's large trade deficit.

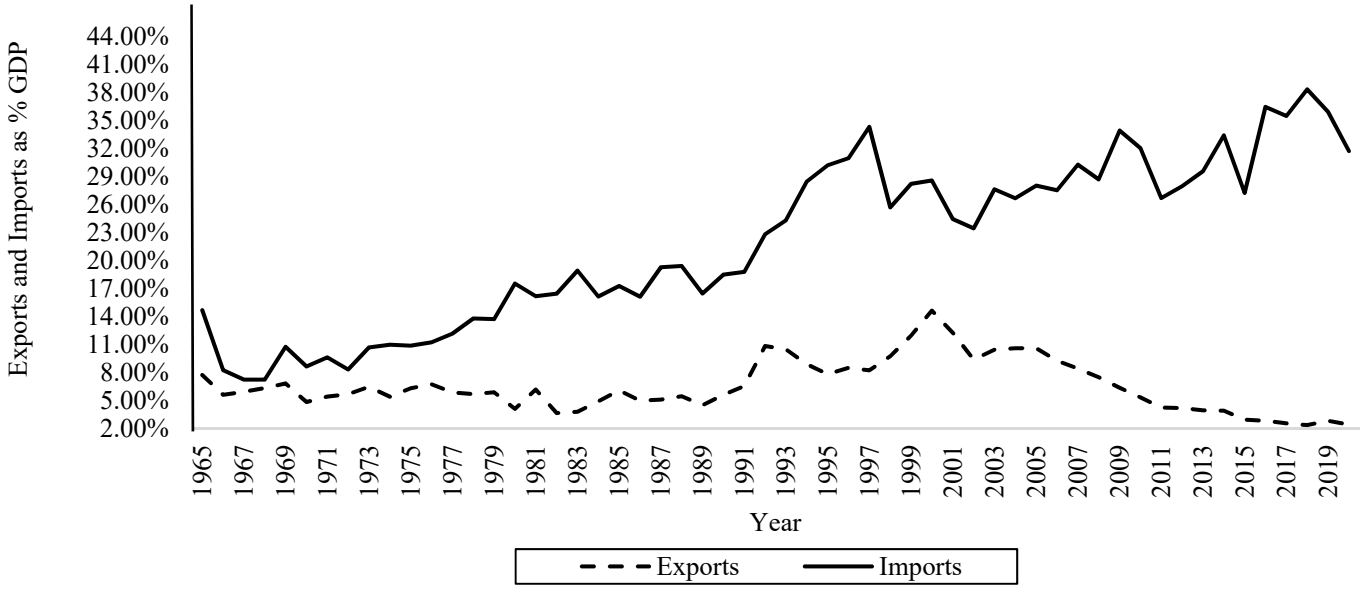

Figure 2. Percentage of exports and imports to GDP. This figure presents Nepal's exports and imports as a percentage of GDP from 1965 to 2020. The solid and dashed lines represent exports and imports, respectively. This graph is generated using data available through the World Bank.

Figure 2 presents exports and imports as a percentage of the GDP from 1965 to 2020 in Nepal. The ratio of imports to GDP has continuously increased during the analysis period. However, the proportion of exports to GDP has exhibited a downward trend since 2000. During the analysis period, exports' cumulative annual growth rate was 5.26%, compared to 9.24% of imports' cumulative annual growth rate. The ratio of exports and imports to Nepal's GDP was 6.11% and 17.29%, respectively, in 1985. The ratio of exports to GDP increased to 10.85% in 1992, whereas imports to GDP increased to 22.82%. The Figure 2 shows that the contribution of exports to GDP increased moderately during 1990 and 2000. The contribution of exports to Nepal's GDP reached 14.64% in 2000, which was the highest contribution ever. Although the ratio of exports to GDP increased from 1990 to 2000, the gap between exports to GDP and the imports to GDP ratio started widening rapidly after 1992. Therefore, the trade liberalization policy initially seemed to be a primary source contributing to Nepal's exports growth. After 2000, the contribution of exports to Nepal's GDP started decreasing steadily, whereas the contribution of imports began increasing rapidly. In 2020, the contribution of exports to Nepal's GDP was only 2.43%, whereas the contribution of imports was 31.75%. Indeed, the contribution of exports to the Nepalese economy in 2020 (2.43%) was less than its contribution in 1965 (7.76%). If the current trend continues, Nepal will be entirely reliant on imports soon. Therefore, given Nepal's foreign trade statistics, Nepal is a great candidate for empirical analysis of the *ELG*, *GLE*, *ILG*, and *GLI* hypotheses.

2.2. Literature Review

The relation between trade and economic growth has been examined extensively using theoretical as well as empirical frameworks. Prior research has documented that open economies grow faster than closed economies (Edwards 1998; Rani and Kumar 2016). Financial openness is often associated with higher economic growth (Bekaert et al. 2011; Quinn and Toyoda 2008). Thus, trade stimulates economic growth (Awokuse 2007) through increased domestic output due to increased efficiency, better resource allocation, capacity utilization, and increased foreign currency reserve. Using data from Organization of the Petroleum Exporting Countries (OPEC) and middle-income economies, Tyler (1981) concluded that growth in manufacturing exports leads to technological advances, which increases absorptive capacity that results in economic development. Using Japanese,

Korean, Turkish, and Yugoslavian data, Nishimizu and Robinson (1984) found that growth in exports raises total factor productivity by increasing completeness and economies of scale, while imports growth impedes growth in total factor productivity. A thriving export benefits a country through efficient resource allocation, higher capacity utilization, economies of scale, and increased technological innovation (Helpman and Krugman 1987). The literature on trade and economic growth can be organized into four main categories, namely, exports-led growth (*ELG*), growth-led exports (*GLE*), imports-led growth (*ILG*), and growth-led imports (*GLI*) hypotheses.

Most empirical research explores exports' role in economic growth, also known as the export-led growth hypothesis. The *ELG* hypothesis is a development strategy that aims to grow productive capacity by focusing on foreign exports. The *ELG* hypothesis entails adopting policies to promote exports and acquire foreign currency reserves to import high-tech goods and services to achieve economic growth. Exports are likely to drive economic growth through increasing skilled labor and technology in the domestic market (Bhagwati 1988). Therefore, exports are viewed as a tool for economies of scale that lead to improved efficiencies and productivity in the long run.

Prior research on exports-led growth includes countries that are developed (Awokuse 2006; Jin and Yu 1996; Kónya 2006; Shan and Sun 1999); newly industrialized Asian (Awokuse 2005; Dhawan and Biswal 1999; Ghatak et al. 1997; Khalafalla and Webb 2001; Kwan et al. 1999; Siliverstovs and Herzer 2006); central and eastern European (Hagemejer and Mućk 2019); South American (Siliverstovs and Herzer 2006; Arteaga et al. 2020) including Mexico (Thornton 1996); African (Ahmad and Kwan 1991; Foster 2006); gulf (Al-Yousif 1997); and developing (Balassa 1978; Kavoussi 1984; Love and Chandra 2005; Vohra 2001). Thus, exports-led economic growth research is not only confined to developing economies but all countries. Similarly, the role of trade and economic growth is an ongoing research topic.

Several researchers have found evidence in support of the *ELG* hypothesis. For instance, Balassa (1978) examined the relationship between exports and economic growth using data from 11 developing countries and found further evidence supporting the *ELG* hypothesis. Fajana (1979) documented exports as an important engine of economic growth in Nigeria. Onafowora et al. (1996) found evidence supporting the *ELG* for Kenya, Pakistan, Sri Lanka, Cameroon, Ivory Coast, Ghana, Madagascar, and Senegal from 1960 to 1991. Using data from Saudi Arabia, Kuwait, UAE, and Oman from 1973 to 1993, Al-Yousif (1997) found a positive and significant association between exports and economic growth. Using the bound testing approach for 44 countries, Bahmani-Oskooee and Oyolola (2007) found evidence supporting the *ELG* hypothesis in 60% of the countries included in the analysis. Using data from Sri Lanka, Islam (1998) found results consistent with the *ELG* hypothesis. Narayan et al. (2007) found evidence supporting the *ELG* in the long run for Fiji; however, only for the short run for Papua New Guinea. Rani and Kumar (2018) documented the long-run relationship between exports, imports, gross capital formation, and economic growth. Hagemejer and Mućk (2019) found that exports significantly improved economic development in Central and Eastern Europe from 1995 to 2014. In recent research, Arteaga et al. (2020) examined the relationship between exports to China and economic growth in Latin America. They found that exports to China enhanced economic growth in South American countries.

However, several studies documented mixed, weak, or no support for the *ELG* hypothesis. For instance, Jung and Marshall (1985) found weak support for the *ELG* hypothesis using the Granger causality test in 37 developing countries. They performed causality tests between exports and growth for 37 developing countries and shed substantial doubt on the legitimacy of the *ELG* hypothesis. Darrat (1986) found no relationship between exports and economic development for Hong Kong, South Korea, Singapore, and Taiwan. Similarly, Oxley (1993) did not find evidence supporting *ELG* in Portugal's case. Dreger and Herzer (2013) found weak evidence for the *ELG* hypothesis. Khemka et al. (2017) found no support in favor of the *ELG* hypothesis. In contrast to Hye et al. (2013), in a recent study

that excluded imports, Devkota and Panta (2019) found no evidence supporting the *ELG* hypothesis in Nepal.

Using data from 15 Asian countries between 1976 to 1991, Islam (1998) found cointegration between exports and growth only in 5 countries. Using Chinese data from 1979 to 2001, Mah (2005) found bidirectional causality between exports expansion and economic development. Awokuse (2007) found empirical evidence consistent with both the *ELG* and *GLE* hypotheses for Bulgaria. However, he found evidence supporting both the *ELG* and *ILG* hypotheses for the Czech Republic, and the results were consistent with the *ILG* hypothesis for Poland. Hye and Boubaker (2011) found evidence for both exports-led growth and imports-led growth for Tunisia. Zang and Baimbridge (2012) found evidence consistent with the *ELG* hypothesis in the case of Japan but a negative effect of economic growth on exports growth for South Korea. Using Latin American data, Kristjanpoller and Olson (2014) documented evidence supporting the *ELG* hypothesis for eight countries and evidence consistent with the *ILG* hypothesis for five countries. They found evidence supporting both the *ELG* and *ILG* hypotheses for one country but failed to find evidence supporting both the *ELG* and *ILG* for another country. Therefore, they argued that, in theory, *ELG* and *ILG* might not exist simultaneously in a country.

The growth-led exports hypothesis suggests that economic growth is a significant driver of exports growth. Ahmad and Harnhirun (1995) found the *GLE* hypothesis right for Malaysia, Philippines, Indonesia, and Singapore using data from 1967 through 1988. Arnade and Vasavada (1995) also found a similar conclusion for South Korea, Taiwan, North Korea, and Malaysia using the data from 1961 through 1987. Reppas and Christopoulos (2005) examined the relationship between exports and output growth for 22 less-developed Asian and African countries using data from 1969 to 1999. Their findings supported the *GLE* hypothesis but not the *ELG*.

The imports-led growth hypothesis suggests that imports are essential sources of economic growth. The imports-led growth hypothesis shows that imports can be a channel for long-run economic growth. Imports are likely to boost long-run economic growth through access to intermediate factors and foreign technology to domestic firms (Coe and Helpman 1995) and transfer of growth-enhancing R&D knowledge from developed to developing countries (Lawrence and Weinstein 1999; Mazumdar 2001). There was a significant shift in exports-led growth in the 1970s, and thus a new paradigm of imports-led growth became popular in economic literature.

Hanson (1982) was the leading proponent of the imports-led growth hypothesis. According to Hanson (1982), imports of capital goods and infrastructure development result in economic growth. There is extensive literature on the imports-led growth hypothesis as well. Hye et al. (2013) examined *ELG*, *GLE*, *ILG*, and *GLI* hypotheses for six South Asian economies except for the Maldives. They showed that the *ELG* hypothesis is relevant for all countries except Pakistan, and the *ILG* hypothesis is appropriate for all six South Asian countries. Hye et al. (2013) also documented that the *GLE* hypothesis is applicable for all countries except Bangladesh and Nepal, while the *GLI* model is relevant for all the nations. Kristjanpoller and Olson (2014) documented mixed results on the *ELG* and *ILG* using Latin American countries' data. They concluded that, in theory, both the *ELG* and *ILG* do not exist simultaneously. Mishra et al. (2010), using Pacific Island nations, found results consistent with the *ILG* hypothesis. They found bidirectional causality between imports and economic growth.

Awokuse (2007) studied the impact of the expansion of exports and imports on the economic growth of three transition economies, namely Bulgaria, the Czech Republic, and Poland, and documented that trade stimulates economic growth. He found a bidirectional causal relationship between exports and growth in Bulgaria and causality from imports to economic growth in the Czech Republic and Poland. Awokuse (2008) found mixed results for the *ELG*, *ILG*, and *GLE* hypotheses in the case of Argentina, Colombia, and Peru. Mahadevan and Suardi (2008) found no evidence of cointegrating relations among South Korea's economic growth and trade but found evidence supporting the *ILG* hypothesis

for Japan. Narayan et al. (2007) found results consistent with the *ELG* and *ILG* for Fiji, but found exports and GDP cause imports in Papua New Guinea.

To conclude, prior research findings on *ELG*, *GLE*, *ILG*, and *GLI* are inconclusive. For instance, using Italian data from 1863 to 1913, Pistoresi and Rinaldi (2012) found strong evidence for *ILG* and *GLE*. However, they documented weak support for *ELG* and *GLI* for the period of 1951 to 2004. They also found weak support for *ELG* and *GLI* for Italy's post World War II period. The empirical results on the relationship between exports and economic growth may be misleading (Awokuse 2008; Esfahani 1991; Riezman et al. 1996; Thangavelu and Rajaguru 2004) and may present spurious test results if we do not include imports on the model. For example, Riezman et al. (1996) examined the *ELG* hypothesis using 126 developing countries' data and found spurious test results when imports were not included in the analysis. Therefore, while exploring the impact of trade on Nepal's economic growth, this research includes both exports and imports, including the capital, in our empirical analysis.

3. Data and Methodology

3.1. Data

This study is based on yearly time-series data for Nepal from 1965 to 2020. The data were obtained from the World Development indicators 2020 (World Bank 2021). Following Hye et al. (2013) and Awokuse (2007), this article defines the gross domestic product as a proxy for economic growth (G), merchandise exports (X), and merchandise imports (M) as explanatory variables. Introducing additional variables in the equation may turn the estimated coefficient of economic growth previously significant to insignificant (Dodaro 1993). Therefore, this study also includes gross capital formation as a proxy for capital (C) in our analysis to ensure that our results are not driven by omitted variable bias. All the variables are converted to real value using the GDP deflator. Following prior literature (Bahmani-Oskooee and Economidou 2009; Hye et al. 2013), all variables used in this study are transformed into natural logarithmic scales before the empirical analysis.

3.2. Methodology

Following prior studies (e.g., Awokuse 2007; Hye et al. 2013), this study hypothesizes that trade plays a vital role in the economic growth of a country. Therefore, the *ELG*, *GLE*, *ILG*, and *GLE* hypotheses are tested in the case of Nepal. We expect that both exports and imports are vital in Nepal's economic growth. Particularly, this research hypothesizes that *ELG* and *ILG* are valid for Nepal in both the short and long terms.

To investigate the relationship between our variables of interest, we first tested each variable's stationarity. This research conducted the Augmented Dickey-Fuller (Dickey and Fuller 1979) and Phillip–Perron (Phillips and Perron 1988) unit root tests to test the stationarity of the variables of interest. After establishing each variable's stationarity, we determined the lag lengths of the vector autoregressive system. Next, we employed Johansen (1988, 1991, 1992) and Johansen and Juselius's (1990) maximum likelihood cointegration technique to test the long-run equilibrium relationship among the GDP, exports, imports, and capital. This technique determines the number of cointegrating vectors and is based on Granger (1981) ECM representation. Finally, we determined the direction of both long- and short-run Granger causality among our variables of interest. The VECM is useful to detect the short- and long-term Granger causality when the variables are cointegrated (Ratanapakorn and Sharma 2007). Therefore, we estimated the following VECM model for each of the variables of interest to find the short and long-term Granger casualty:

$$\Delta Y_t = \mu_1 + \theta_1 ECT_{t-1} + \sum_{i=0}^{n} \gamma_1 \Delta X1_{t-1} + \sum_{i=0}^{n} \delta_1 \Delta X2_{t-1} + \sum_{i=0}^{n} \omega_1 \Delta X3_{t-1} + \varepsilon_t \quad (1)$$

where ETC_{t-1} is the error correction term obtained from the cointegrating vector, γ, δ, and ω are the parameters to be estimated, n is the lag length, ε is the error term. The error terms

are assumed to be a stationary random process with zero mean and constant variance. Similarly, the models for *X* terms can be rewritten as shown in Equation (1).

4. Empirical Results

4.1. Unit Root Tests

First, this study examines the time-series properties of the data using the Augmented Dickey-Fuller (Dickey and Fuller 1979) and Phillip–Perron (Phillips and Perron 1988) unit root tests. Both unit root test techniques test the null hypothesis of non-stationarity in the data. Table 1 presents the results of the ADF and Phillip–Perron unit root tests for levels and the first differences. The results suggest that the variables are non-stationary in their levels but stationary in their first differences. In other words, the time series used for the study are integrated of order 1 or *I*(1). Therefore, the results imply the possibility of cointegrating relationships in our variables.

Table 1. Unit Root Test Results.

Panel A: ADF Unit Root Test Results				
Variables		ADF		
		C	CT	None
G	Level	−1.760	−1.208	−1.184
	Δ	−5.130 ***	−5.344 ***	−4.982 ***
X	Level	−0.364	−1.489	−1.528
	Δ	−6.427 ***	−6.462 ***	−6.108 ***
M	Level	−1.697	−2.610	0.630
	Δ	−5.597 ***	−5.419 ***	−5.538 ***
C	Level	−1.993	−1.888	0.937
	Δ	−4.727 ***	−4.711 ***	−4.657 ***
Panel B: Phillip–Perron Unit Root Test Results				
Variables		Phillip-Perron		
		C	CT	None
G	Level	−1.484	−1.085	−1.110
	Δ	−6.693 ***	−6.843 ***	−6.575 ***
X	Level	−0.876	−2.063	−1.572
	Δ	−9.797 ***	−9.785 ***	−9.538 ***
M	Level	−2.028	−3.765 **	0.095
	Δ	−8.909 ***	−8.730 ***	−8.924 ***
C	Level	−1.781	−1.888	0.668
	Δ	−7.896 ***	−7.841 ***	−7.841 ***

The table reports ADF and Phillip–Perron test results. *** and ** denotes statistical significance at 1% and 5% level, respectively.

4.2. The Johansen's Multivariate Cointegration Test

Once we determined the order of integration, we explored the existence of a long-run relationship between the series. Based on final prediction error (FPE), Akaike's information criteria (AIC), Hannan–Quinn information criterion (HQC), and the Schwarz information criterion (SBIC), we determined the lag length of one. Using a lag length of one, we employed the Johansen (Johansen 1988, 1991; 1988; Johansen and Juselius 1990) maximum likelihood cointegration technique to test the short- and long-run equilibrium relationship between exports, imports, capital, and the GDP.

Table 2 provides the results for the Johansen cointegration test using an optimal lag length of one. Results from both the λ-trace and λ-max tests indicate that the variables in the system are cointegrated. As shown in Table 2, both λ-Trace (64.97 > 61.21) and λ-Max (46.46 > 35.68) statistics are statistically significant at a 1% significance level. Thus, this research found that both the test statistics identify one cointegrating relationship between the GDP, capital, exports, and imports.

Table 2. Johansen Cointegration Test Results.

Null Hypotheses	λ-Trace Statistic	1% Critical Value	λ-Max Statistic	1% Critical Value
$r = 0$	64.97 ***	61.21	46.46 ***	35.68
$r \leq 1$	18.50	40.49	13.11	28.83
$r \leq 2$	5.40	23.46	4.16	21.47
$r \leq 3$	59	6.40	1.23	6.40

This table reports Johansen Cointegration test results. r is the hypothesized number of cointegrating equations. *** denotes rejection of the null hypothesis of no cointegration at a 1% significance level.

4.3. Vector Error Correction Model (VECM) and Causality

The Vector Error Correction Model (VECM) is useful for detecting the short- and long-run Granger causality when variables are cointegrated (Ratanapakorn and Sharma 2007). The VECM also distinguishes between the short- and long-term Granger causality as it captures both short-run dynamics between time series and long-run equilibrium relationships (Masih and Masih 1996). The lagged error correction term(s) in the VECM captures the long-term cointegrating relationship(s). In contrast, the joint significance of the differenced explanatory variables' coefficients capture the short-run Granger causality.

Using Equation (1), we tested the long-run causality through the statistical significance of each of the error correction terms (*ECT*) using *t*-tests and the short-run Granger causality through the significance of the lags of each explanatory variable using Wald χ^2 tests. A variable X_t is said to cause another variable Y_t in the Granger sense if the one step ahead forecast of Y_t in the regression model improves the quality of the model and or forecasts by considering the historical values of X_t (Osińska 2011). Table 3 presents the results for both the long-run and short-run Granger causalities quantitatively in Panel A and qualitatively in Panel B.

Considering the GDP equation in Panel A of Table 3, statistically significant Wald χ^2 test statistic (χ^2 *test statistic* = *7.73*, *p-value* < *0.01*) for ΔM indicate that imports Granger cause the GDP in the short run. However, statistically insignificant Wald χ^2 test statistics for ΔX and ΔC suggest that exports and capital do not Granger cause the GDP in the short term. Similarly, the statistically insignificant t-statistic of the *ETC* indicates that, in the long term, none of the variables Granger cause the economic growth. Considering the exports equation, statistically insignificant t-statistics for the *ETC* and Wald χ^2 test statistics for GDP, imports, and capital suggest that none of the variables Granger cause exports in both short and long term.

Considering the imports equation in Panel A of Table 3, a statistically significant Wald χ^2 test statistic (χ^2 *test statistic* = *3.34*, *p-value* < *0.10*) for exports but insignificant test statistics for GDP and capital indicate that only exports Granger cause imports, but the GDP and capital do not Granger cause imports in the short term. The results show that the *t*-statistic of the *ETC* corresponding to the target variable, ΔM, is positive (*t-stat* = *15.86*, *p-value* < *0.01*) and statistically significant at a 1% level of significance. Therefore, we concluded that there are long-run Granger causalities from ΔG, ΔX, ΔC to ΔM. Turning to the capital equation, we found imports (χ^2 *test statistic* = *11.33*, *p-value* < *0.01*) Granger cause the capital in the short run, but the GDP and exports do not Granger cause the capital in the long term.

Table 3. VECM and Granger Causality Test Results.

Panel A: VECM and Granger Causality Test Results					
Response	**χ^2 Statistics**				***t*-Statistics ECT_{t-1}**
	G	**X**	**M**	**C**	
G	-	2.12 (0.15)	7.73 *** (0.00)	0.03 (0.85)	0.07 (0.79)
X	0.61 (0.43)	-	0.16 (0.69)	0.23 (0.63)	0.38 (0.34)
M	0.83 (0.36)	3.34 * (0.07)	-	1.12 (0.29)	15.86 *** (0.00)
C	1.37 (0.24)	2.47 (0.12)	11.33 *** (0.00)	-	0.06 (0.81)

Panel B: Direction of Causality				
Causality		**Long-Run**	**Short-Run**	**Direction of Causality**
From	**To**			
ΔX	ΔG	No	No	None
ΔG	ΔX	No	No	
ΔM	ΔG	No	Yes	Feedback
ΔG	ΔM	Yes	No	
ΔC	ΔG	No	No	None
ΔG	ΔC	No	No	

Panel A in this table reports VECM and Granger causality tests results. Panel B reports the qualitative summary of the direction of causality. ΔG, ΔX, ΔM, and ΔC denote the first differences of the logarithmic values of the GDP, exports, imports, and capital, respectively. *** and * denote statistical significance at 1% and 10% levels, respectively.

The qualitative summary of the test results is presented in Panel B of Table 3. The results of short- and long-run Granger causality tests suggest one bidirectional (feedback) relationship between imports and GDP. Thus, the causal relationship runs from the GDP to imports in the long run and imports to GDP in the short and long run. Therefore, the VECM test results support the *GLI* hypothesis in the long run and the *ILG* hypothesis in the short run in the case of Nepal, which is consistent with Hye et al. (2013). However, we did not find evidence in favor of the *ILG* hypothesis in the long run, whereas Hye et al. (2013) found evidence consistent with the *ILG* hypothesis in the long run. We also tested the long- and short-term relationship between exports and economic growth. However, the test results showed no evidence favoring the *ELG* and *GLE* hypotheses in both the short and long run. In contrast, using the ARDL approach, Hye et al. (2013) found results consistent with the *ELG* and *GLE* hypotheses in the long term but not in the short term for Nepal.

This research also used the GDP per capita as the measure of economic growth to test the robustness of the analysis. The untabulated test results were still consistent with our main findings. In a nutshell, the empirical findings suggest that excluding imports in the previous studies that document exports as an engine of growth may be misleading in the context of heavily import-dependent countries such as Nepal. Imports represent most of Nepal's foreign trade. Therefore, testing the *GLE*, *ELG*, *GLI*, and *ILG* hypotheses using Nepal's data may shed light on the role of foreign trade, mainly imports for a small, heavily imports-dependent country such as Nepal.

The test results are robust. The LM tests for residual autocorrelation indicate that our VECM model is free from autocorrelation. The Jarque–Bera test was conducted to test the normality of residuals. The untabulated test results indicate that the residuals are normally distributed in all models. The stability test for the model also did not find any issue with the model. Therefore, our test results are robust.

5. Conclusions

This research employs widely used econometric methodologies such as the ADF and Phillip–Perron unit root tests, Johansen's cointegration test, and the VECM to test the *ELG*, *GLE*, *ILG*, and *GLI* hypotheses using Nepal's data from 1965 to 2020. The ADF and Phillip–Perron unit test results suggest that the time-series data for the GDP, capital, exports, and imports are nonstationary at their levels but stationary at their first differences. Johansen's cointegration test results show a cointegrating relationship between Nepal's GDP, exports, imports, and capital.

This paper documents no evidence supporting the *ELG* and *GLE* hypotheses in both short and long terms, contrary to previous research findings of Hye et al. (2013). The research also documents the causality from growth to imports in the long term but not in the short term, supporting the *GLI* hypothesis in the long term. Similarly, this study also finds causality running from imports to growth in the short term but not in the long term, supporting only the *ILG* hypothesis in the short run. Overall, our findings do not support the notion of trade-led growth in the long run for Nepal, whereas prior studies using a different sample found that imports play as much of a role as exports in stimulating economic growth (e.g., Awokuse 2007). The paper contributes to the literature by using a nonclassical growth framework and multivariable VECM approaches to explore the role of exports and imports in economic growth in a country where imports are substantial relative to exports. The paper also contributes to the literature by documenting that the *ELG* and *GLE* hypotheses may not be applicable in a country where the contribution of exports to the GDP is minimal, and the imbalance between exports and imports is extensive.

Our study results may have important implications for national policymakers to design macroeconomic and trade policies to establish a long-run equilibrium between exports and imports. The research results indicate an indispensable need to implement a short- and long-term strategy to address the problems of foreign trade in Nepal. A long-term equilibrium can be sustained between exports and imports by carefully analyzing trade and industry policies, including exports and imports policies, before implementing them. The government must prioritize diversifying exports to achieve economic growth through industrialization. The government should also develop imports substitution industries and promote industrial production. If the government implements policies to import capital goods and improve its production capacity, Nepal can enhance exports and reduce imports to improve the excessive trade imbalance.

This research has some limitations. Mainly, this study does not explore the *GLE*, *ELG*, *ILG*, and *GLI* hypotheses at a sectoral level. Similarly, this research is based on data from a single country. Therefore, future research could contribute to the existing literature on the role of trade on economic growth by investigating the role of trade using data from multiple countries with similar characteristics, including major economic sectors.

Author Contributions: Conceptualization, H.P.; methodology, H.P. and M.L.D.; software, H.P.; validation, H.P., M.L.D., and D.B.; formal analysis, H.P. and M.L.D.; investigation, H.P. and D.B.; resources, D.B.; data curation, H.P.; writing—original draft preparation, H.P.; writing—review and editing, H.P., M.L.D. and D.B.; visualization, H.P.; supervision, H.P.; project administration, H.P.; funding acquisition, H.P. All authors have read and agreed to the published version of the manuscript.

Funding: The authors do not obtain any internal and external funding to complete this project.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The authors primarily use World Development Indicators (WDI) data which is publicly available through the World Bank.

Acknowledgments: We would like to thank the anonymous referee for valuable comments and suggestions and Arpita Panta for reviewing the paper extensively and correcting errors. The views expressed herein belong to the authors. We did not receive any funding for this research. We also want to thank the editor for support during the paper revision process.

Conflicts of Interest: The authors declare no conflict of interest.

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