International Journal of Education, Modern Management, Applied Science & Social Science (IJEMMASSS)
ISSN :2581-9925, Impact Factor: 7.150, Volume 06, No. 04(II), October - December, 2024, pp. 187-194

ANALYZING TRADE-GROWTH RELATIONSHIP BETWEEN INDIA AND THE NETHERLANDS USING ARDL MODEL

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ABSTRACT

Trade between India and the Netherlands has consistently grown and reached to touch an all-time high of USD 27.58 billion in the year 2022-23. Both sides have invested immense political capital to strengthen their economic partnership to achieve a win-win in pursuit of their self-interests. For India, the Netherlands is the gateway to Europe and the Netherlands views India as a big market and a safe investment destination. In line with the China plus one strategy, Dutch investments continue to grow in India which further boost economic relationship between Indian and Dutch corporates. With the potential to further strengthen bilateral trade, India and the Netherlands continue to collaborate in innovative fields. This paper employs Autoregressive Distributed Lag (ARDL) modelling to analyze the impact of India's trade with the Netherlands on Indian GDP as well as to examine the impact of Indian GDP on India's trade with the Netherlands. The paper uses historical data for the period 1995-2022. The paper concludes that while, Indian GDP is not cointegrated with either Indian exports to the Netherlands or with Indian imports from the Netherlands in the long-run, India's imports have a causal relationship both with its exports and its GDP in the long-run.

Keywords: *ARDL, Exports, Imports, GDP, India, Netherlands.*

Introduction

India and the Netherlands have much in common and their relationship has deepened over the years. Trade between India and the Netherlands peaked in 2022-23 and reached an amount ofUSD 27.58 billion[1].It is therefore not surprising that India's largest trading partner in the EU is the Netherlands, overtaking traditional trading partners like Germany.

Historically, Dutch traders came to India in the early 17th century. Records show that the Dutch East India Company was trading with India actively trading in spices, textiles and other commodities, especially in southern India. While the Dutch influence in India can still be noticed in architectural and historical sites, the Indo-Dutch relations were hinged on trade. These relations and the early traders are said to have laid the foundations for a long and strong commercial engagement between the two countries.

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[1+2] https://www.commerce.gov.in/about-us/divisions/foreign-trade-territorial-division/foreign-trade-europe/

Modern Day ties between India and the Netherlands were established shortly after India's independence in 1947. The ties between India and the Netherlands are firmly rooted in the shared values and commitments to democracy, pluralism and respect for international law. These shared values serve as a guiding principle for the strong political and diplomatic engagement between India and the Netherlands.

Trade ties between India and the Netherlands have continued to grow and have reached an amount of USD 27 billion. India exports goods worth USD 21 billion to the Netherlands, while its imports from the Netherlands amount to USD 6 billion[1]. The involvement of Indian firms, including leading IT giants like TCS, HCL, Wipro, and Infosys, as well as companies from industries such as pharmaceuticals and steel, has significantly contributed to strengthening India's trade relations with the Netherlands. Similarly, Dutch global brands like Philips, Akzo Nobel, Signify, Heineken, KLM etc. have established their offices in India. Whereas Indian exports include machinery, chemicals, textiles and agricultural products, imports from the Netherlands feature high-tech goods, machinery and electronic equipment.

Academic literature still has not yet analyzed the bilateral trade relationship between India and the Netherlands. While there exists a plethora of research between India and the EU (European Union), there exists a wide gap in understanding the developments between India and EU member countries at the bilateral level. Agarwal (2023) examined the connection between India's GDP and its trade with the UK employing the Autoregressive Distributed Lag (ARDL) technique, revealing a two-way relationship between India's exports (both goods and services) to the UK and its economic growth.

Given the growing trade ties between India and the Netherlands, it is important to understand if there exists a causal relationship between exports and economic growth, imports and economic growth or is India's rising economic growth causing exports and/or imports. There could also be a relationship between imports and exports or vice-versa that may be pushing trade between the two partners. This study examines the cause-and effect relationship between India's exports with the Netherlands, India's imports with the Netherlands and the country's economic growth.

Literature Review

The vast research available on the topic of trade-growth relationship can either be analysed using the cross-country approach or using the time series techniques. Various cross-country methods such as rank correlation, the OLS technique, 2SLS, and the random effects estimation approach have been employed to investigate the relationship between exports and economic growth. A strong positive correlation between exports and economic growth has been widely recognised, indicating that an increase in exports drives economic growth (McNab & Moore, 1998; Amirkhalkhali& Dar, 1995; Yaghmaian & Ghorashi, 1995; Coppin, 1994; Sprout & Weaver, 1993; Sheehey, 1992; De Gregorio, 1992; Alam, 1991; Dodaro, 1991; Otani & Villaneuva, 1990).

Employing the time series technique, researchers were unable to verify the export-led growth and growth-led export hypothesis (Bahmani-Oskooee et al., 1991; Ahmad & Kwan, 1991; Ram, 1987; Jung & Marshall, 1985). The cointegration properties in these estimations were not taken into account. Engle and Granger (1987) suggest the inclusion of the error-correction term to establish causality. Subsequent research incorporating the error correction term, such as the study by Bahmani-Oskooee and Alse (1993), identified a bidirectional relationship between exports and GDP in nine developing economies. Similarly, Ahmad and Harnhirun (1995) found a bidirectional causal relationship between exports and economic growth in five Asian countries by applying cointegration and error correctio modelling techniques.

Other scholars have applied various cointegration methods such as the Johansen-Juselius (JJ) cointegration approach, vector error correction model (VECM), and ARDL approach to examine the relationship between trade (exports and imports) and economic growth. Ramos (2001) explored the relationship between exports, imports, and economic growth in Portugal using the multivariate Johansen-Juselius approach. His findings revealed two-way causality between GDP and exports, as well as GDP and imports. Awokuse (2005) analysed quarterly data from Korea and identified factors such as capital changes, terms of trade, and foreign output shocks in relation to trade. Using the VECM and augmented VAR methods, his results showed bidirectional causality between exports and economic growth, with terms of trade, capital and foreign output shocks influencing economic growth. In a later study, Awokuse

(2007) employed Granger causality approach and found a bidirectional relationship between export-led growth and growth-led exports in Bulgaria.

Using the ARDL and JJ methodologies, Tang (2006) found no evidence of cointegration between exports, economic growth and imports in the context of China's export led growth hypothesis. Herrerias and Orts (2011) studied the connection between imports, investments, output, and productivity in China. Their analysis showed that in the long term, both imports and investment have a positive impact on output and labour productivity. However, they found no evidence of causality between investment and imports.

The hypothesis of import-led growth, export-led growth, and sustainability of foreign deficits for Tunisia revealed that there is export led growth as well as import led growth. At the same time, there is a bidirectional relationship between exports and imports, implying that the foreign deficit is weakly sustainable (Hye & Boubaker, 2011).

Export led growth hypothesis for India have also been undertaken. Love and Chandra (2005) have used cointegration and error-correctio modelling, which showed that India's exports played a role in country's economic growth. Nain and Ahmad (2010) used quarterly data for the period 1996-2009 and applied granger causality test along with forecast error variance decomposition within the VAR framework to explore the short-run and long-run causal relationships between exports, imports, exchange rates, and economic growth. The results found no causality in the export led growth hypothesis while there exists a causal relationship between growth and exports. Dar et al. (2013) employed wavelet-based correlation and cross-correlation methods to analyse a causal link between GDP and exports, finding a positive association. This relationship strengthens over longer time horizons, eventually becoming bidirectional at higher time scales. Devkota (2019) investigated the connection between India's exports, imports and GDP through cointegration and a vector error correction model, identifying a causal relationship between GDP and imports in the Indian context.

Research Methodology

The current study uses secondary data from World Bank the UN Comtrade data source. The empirical analysis is done for the annual time series data taken for the period 1995-2022. The variables used are India's GDP representing its economic growth (Y), Exports to the Netherlands (X), Imports from the Netherlands (M).The current study takes trade data to include only merchandise trade. For econometric modelling, the data set for all series is transformed into natural logarithm form so that India's Gross Domestic Product is represented as LY, India's Exports to the Netherlands are represented as LX and India's Imports from the Netherlands are represented as LM. The data analysis has been done using Eviews-12 software.

The study employs ARDL technique (Autoregressive Distributed Lag)as proposed byPesaran et al. (2001), to analyse time series data and examine the causal relationship between exports (LX), imports (LM), and economic growth (LY). The choice of the ARDL method over other cointegration models is based on its ability to treat all the variables as endogenous and its applicability regardless of whether the variables are integrated at order one I(1), or at order zero I(0).Additionally, the ARDL technique allows for the simultaneous estimation of both short-run and long-run parameters of the model.

Prior to performing the ARDL modelling, the data was tested for stationarity. The Augmented Dicky-Fuller (ADF) test results indicate that all variables are stationary at I(1).

Empirical Results

Figure 1 shows logarithm values of Indian GDP along with exports from India to the Netherlands as well as imports to India from the Netherlands. It can be seen that while Indian GDP has grown consistently over the years, the exports from India to the Netherlands have seen fluctuating trends especially during the COVID-19 period, which shows a dip in the value of exports. On the contrary, imports from the Netherlands have followed a consistent upward trend though the increase is seemingly gradual.

Figure 1: Graphical Representation of Indian GDP and India's trade with the Netherlands (Logarithm values)

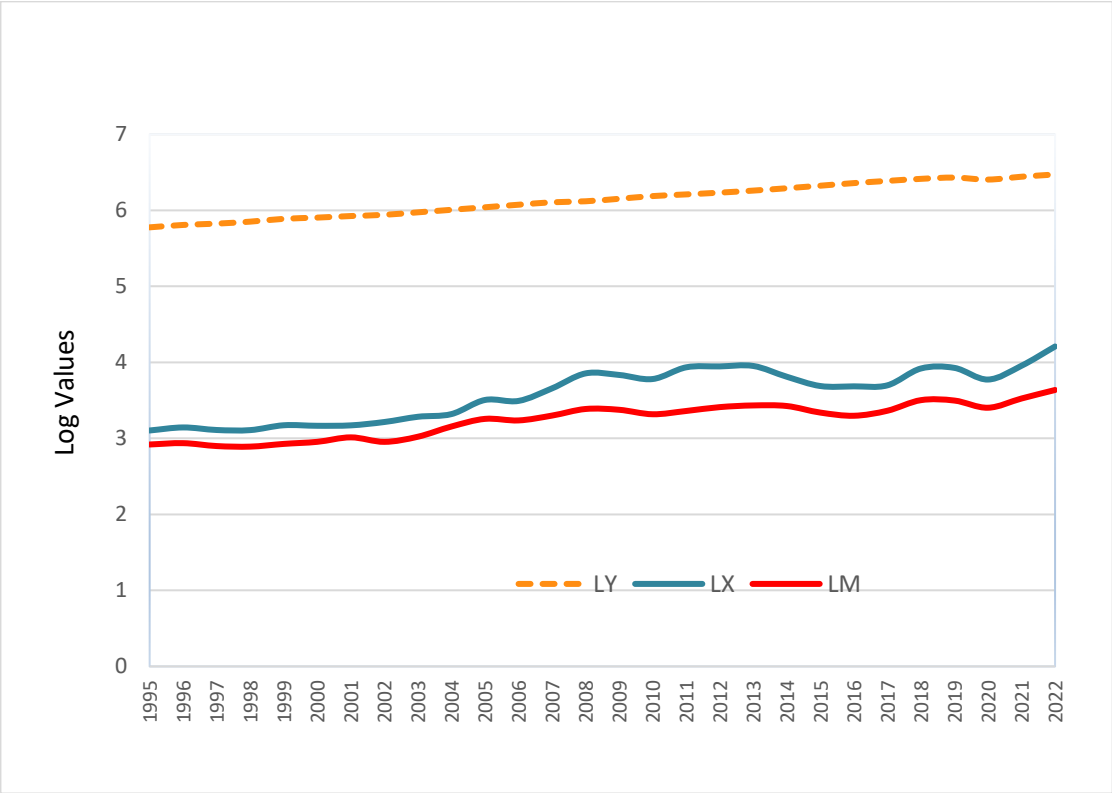

Table 1 presents the descriptive statistics, revealing that the variables LY, LX and LM have similar distributions, as indicated by their closely aligned mean and median values. This suggests that their distributions are nearly symmetrical. The distributions are platykurtic, indicting fewer extreme values compared to a normal distribution.

This observation is further supported by relatively low standard deviation values, reflecting minimal data variability. Additionally, the Jarque-Bera test results show no significant deviation from normality for any of the variables, as their p-values > 0.05. Overall, the data exhibits consistent and stable characteristics with no substantial deviation from normality, making it suitable for time series modelling.

Table 1: Descriptive Statistics

	LY	LX	LM
Mean	6.134805	3.585942	3.240326
Median	6.134508	3.686088	3.308159
Maximum	6.470554	4.208166	3.636035
Minimum	5.775289	3.103267	2.891209
Std. Dev.	0.220843	0.341547	0.227094
Skewness	-0.045152	-0.154576	-0.292977
Kurtosis	1.682025	1.629521	1.750631
Jarque-Bera	2.036083	2.302754	2.221642
p-value	0.361302	0.316201	0.329289
Observations (N)	28	28	28

Table 2 indicates that none of the series is stationary at level. However, at the first difference, the series becomes stationary at constant as well as constant-and-trend cases. Consequently, the differenced values of the variables LY, LX and LM are used for further analysis.

Table 2: Unit Root Test: Using Augmented Dickey Fuller (ADF)

		At Level			At First Difference		
		LY	LX	LM	D(LY)	D(LX)	D(LM)
Constant	t-Stat	-0.764	-0.391	-0.7643	-4.91	-3.9527	-5.7818
	Prob.	0.813	0.897	0.8119	0.0006***	0.0057***	0.0001***
Constant and Trend	t-Stat	-1.8068	-1.791	-1.3145	-4.8532	-3.8617	-5.6727
	Prob.	0.673	0.680	0.8605	0.0033***	0.029**	0.0005***
Without Constant & Trend	t-Stat	10.45	1.922	2.8478	-0.7605	-3.5278	-2.0567
	Prob.	1.000	0.984	0.9981	0.3762	0.0011***	0.0403***

Significant at the 5%; (***) Significant at the 1%"

ARDL Model

In Table 3, in the multivariate regression analysis, each variable is alternately treated as the dependent variable, with the other two serving as independent variables.

Table 3: Results of ARDL Model Estimation

	ARDL Lags	R-square	Adjusted R-square	F-statistic	Durbin-Watson stat
LY/LX,LM	(1,2,0)	0.9972	0.9965	1429.5 (0.0000)***	2.11
LX/LY,LM	(1,1,0)	0.97205	0.96697	191.344 (0.0000)***	1.9
LM/LY,LX	(2,0,1)	0.97919	0.97399	188.235 (0.0000)***	1.93

"(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant"

All the three models exhibit very high R-square and adjusted R square values indicating that the models explain most of the variability in their respective dependent variable, LY, LX and LM respectively. The p-value of the F-statistics for all the models are significant at one percent level. The Durbin-Watson Statistics at close to 2 indicates no significant auto-correlation in the residuals.

Table 4 gives short-run relationship between the variables. LX and LM exhibit significant short-run effects on each other. In the case, that LY is the dependent variable, the p-values of LX and LM are greater than 0.05 and hence are not significant. LX as a dependent variable, the p-value of LM is significant. This denotes that a 1 per cent change in LM will bring about 1.36 per cent change in LX, ceteris paribus. When LM is considered the dependent variable, both LY and LX are statistically significant. This suggests that, holding other factors constant, a 1 per cent change in LY results in a 0.29 per cent change in LM, while a 1 per cent change in LX leads to a 0.47 per cent change in LM.

Table 4: Short-run Relationship Using ARDL Model

	Exogeneous Variables			
	β (p-value)			Short-run Causality
	LY	LX	LM	
LY/LX,LM		-0.018501 (0.5909)	0.095839 (0.1532)	--
LX/LY,LM	-0.18295 (0.2819)		1.36351 (0.000)***	**LM→ LX**
LM/LY,LX	0.2965 (0.0094)***	0.47538 (0.0000)***		**LY → LM** **LX → LM**

"(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%"

Table 5 represents the results of ARDL Long Run Form and Bounds Test for cointegration. Cointegration refers to the long-term equilibrium relationship between two or more time series. Since the number of observations is fewer than 30, t-statistics is a better parameter and is used for analysis at 5 per cent significance level instead of f-statistics.The t-statistics < I(0) for LY and LX and is less than the critical value of the lower bound at 5 per cent significance level. This indicates the absence of cointegration between LY on LX and LM and LX on LY and LM. For LM, a long-term relationship with

both LY ad LX is evident, as the t-statistics>I(1) and is greater than the critical value of the upper bound at the 5 per cent significance level.

Table 5: Long Run Form and Bounds Test

		At 5% Significance Level			
	t-statistic	**I(0)**	**I(1)**		**Results**
LY/LX, LM	-2.070177	-2.86	-3.53	t-stat < I(0)	No Cointegration
LX/LY, LM	-2.744502			t-stat < I(0)	No Cointegration
LM/LY, LX	-3.671744			t-stat > I(1)	Cointegration

Table 6 reveals the absence of long run cointegration between GDP and both exports and imports. Likewise, when exports are taken as dependent variable, no cointegration is present. However, long-term relationship is present when imports on GDP and exports are regressed. Any short-run disequilibrium in LM will be corrected at the rate 73.87% in the next period.

Table 6: Estimates of Long Run Form and Error Correction Model

	Exogeneous Variables				
	β (p-value)			**Long-run causality**	**Error Correction Coefficient (p-value)**
	LY	**LX**	**LM**		
LY/LX, LM	--	-0.243298 (0.5920)	1.2603 (0.0738)	Independent	No cointegration
LX/LY, LM	1.8779 (0.0000)***	--	-0.3925 (0.0112)**	Independent	No cointegration
LM/LY, LX	0.401371 (0.0017)***	0.4053 (0.0000)***	--	LY→ LM LX→ LM	-0.7387 (0.0008)***

"(*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant"

Conclusion

Indian GDP is not cointegrated with either India's exports to the Netherlands or with India's imports from the Netherlands indicating that Indian GDP does not have a long-term relationship with either its exports (to the Netherlands) or its imports (from the Netherlands). Any short term changes in either exports or imports do not translate into long-term growth in the domestic economy.

There exists a mutually reinforcing trade relationship as imports (from the Netherlands into India) are cointegrated with exports (from India to the Netherlands) and Indian GDP. A stable, long run equilibrium exists between the variables and the relationship appears to persist over time, which means that exports and GDP are likely to drive imports.

Imports and exports exhibit a symbiotic complementary relationship as when exports increase, the demand for raw materials and intermediate goods pushing imports too. A growing economy often leads to a higher demand for goods, services and raw materials which is clear from this analysis as well.

India imports a wide range of capital goods and technology-intensive products which are critical for industrial development and economic modernisation. These imports play a vital role in enhancing India's manufacturing capabilities, infrastructure, healthcare systems and adoption of sustainable technologies. Import of technology intensive goods from the Netherlands will continue to remain a key part of India's trade relationship with the country.

Exports from India promote and facilitate the import of goods from the Netherlands in several ways. The dynamic trade relationship is a reciprocal arrangement that fosters bilateral trade between the two countries.

Recommendations for Future Research

While this paper provides insights into the economic relationship between the two partner countries, further sectoral-level analysis could help identify and promote specific sectors where both nations demonstrate comparative strengths.

Similar research can be conducted at the bilateral level with other countries to better understand the impact of trade on economic growth between India and its various trading partners. Further research may include more variables such as foreign exchange, terms of trade, capital, etc. to understand the impact of growth on Indian economy with other countries.

Academic debate and literature will be further enriched by evidence based outcomes that will contribute to policy framework aimed towards greater growth

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