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CAUSAL NEXUS BETWEEN IMPORTS AND ECONOMIC GROWTH IN PAKISTAN: EVIDENCE FROM TODA-YAMAMOTO CAUSALITY TEST

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ABSTRACT

Growth in the level of imports shows a strong domestic demand and a rising economy, particularly when these imports are productive and useful assets. However, there is a dearth of research carried on the relationship between GDP growth and imports. This research used Toda-Yamamoto Causality to investigate how imports affect Pakistan's economic growth. The years 1972 through 2020 are covered by yearly time series data. The study's findings suggest a long-run equilibrium relationship with bidirectional causality between imports and real GDP growth in Pakistan. Thus, it is proven that increasing imports will spur GDP growth in the long run. Whereas, in the short run true economic growth may result in an increase in the country's import demand. For a growing country like Pakistan, these two findings are very significant given the current scenario.

Keywords: Import, Export, Economic, Growth

INTRODUCTION

International trade is seen as a key tool for economic growth. International trade is seen as a key tool for GDP growth. Both imports and exports have the potential to promote economic growth. However, the majority of the available literature on economic growth and trade views exports as a mean of stimulating growth (Afzal & Hussain 2010 ; Ali & Li, 2018 : Kim et al 2020) while imports receive little attention. Two opposing perspectives exist regarding how imports affect economic growth. First, imports are considered as leakages in income streams which causes a transfer of purchasing power to other country there by causes an inverse impact on economic growth and employment (Liu et al., 1997: Jawaid, 2014). On other hand, imports are considered important for GDP growth because imports provide raw materials, technology and capital goods that are not available at domestic level and help to boost economic efficiency and production. Imports of technology and raw materials contribute to increase economic growth and research and development spillover. When compared to domestic counterparts, imported foreign machinery is more efficient, powerful, and durable. Furthermore, as people's incomes improve because of increased investments, foreign trade supports the import of important consumer items to meet their rising demands. As a result, imports help to boost economic growth. Hence, import demand occurs naturally in developing countries because of economic growth.

Pakistan has a long history of maintaining a trade deficit. For instance, imports and exports amounted to 7,029,819 million rupees and 3,369,782 million rupees, respectively, in 2020 (SBP, 2020). Researchers and policymakers are now looking into the effects of imports on GDP growth as a result of this enormous gap. Policy makers must examine the causal relationship between imports and GDP growth. For instance, if imports do not contribute towards economic growth, then the government should follow

import substitution policy. Similarly, if imports are found helpful for economic growth, then the government should adopt aggressive trade openness policies as many Asian and African developing economies followed the same strategy[1].

The primary goal of this study is to look at the long- and short-term effects of import on GDP growth in Pakistan. The study applies Toda Yamamoto granger causality approach. This technique uses vector autoregressive equation which reduces risks related to wrong identification of order of integration and co-integration among the model's variables. The causal relationship between imports and GDP development in Pakistan has rarely been discussed in the past. Mostly, the studies examine the relationship between trade and GDP growth and draw contradictory results (Siddiqui et al 2008, Afzal & Hussain 2010; Ali & Li, 2018). In addition, most of the studies used panel data series to examine how imports affect economic growth for a group of economies. Such analysis is appropriate for understanding a phenomenon on average because it does not explain the effect on individual economy (Jawaid, 2014). Therefore, such findings cannot be used to formulate policies for an individual country.

In light of this, the current study seeks to explore the complicated relationships between imports and Pakistan's GDP growth.

LITERATURE REVIEW

The relationship between trade openness and GDP growth has widely been discussed in Pakistan's context. The researchers explain this relationship by taking export led growth proposition. However, there has not been much research on the relationship between imports and GDP growth. Four hypotheses growth led import, import led growth, neutrality and feedback hypothesis—are used to explain the causal relationship between imports and GDP growth (Aluko, & Adeyeye, 2020).

The import-led growth theory posits that since imports spur economic growth, they are related. On the other side, the growth-led import theory claims that GDP growth influences import demand and that imports are an outcome of GDP growth. The direction of causality, according to this idea, claims that imports follow economic growth. It also claims that imports and GDP growth have bidirectional causality.

According to the import led growth hypothesis, a nation's imports determine how quickly its economy grows. It implies that imports are a direct cause of economic growth. Grossman and Helpman (1991) suggested that importers had access to more intermediaries when analyzing how imports affect economic growth. The use of these intermediaries increases the competitiveness of domestic enterprises and, as a result, boosts economic growth. Using data on the Japanese economy from 1964 to 1973, Lawrence and Weinstein (1999) found that imports have a favorable impact on growth. The study claims that imports contribute to competition rather than just output of intermediate goods. Thus, confirming import led growth hypothesis Rana (2002) conducted research on the effect of imported and domestic technology on domestic firms, finding that there is a considerable influence of imported technologies on productivity in Indian firms. Awokuse (2007) used quarterly data from 1995-2004 to test import led and export led growth hypothesis for Poland, the Czech Republic, and Bulgaria. According to the Granger causality results, imports and GDP growth in these countries have a statistically significant long-term causal relationship. Islam et al. (2011) examined annual data from 40 countries to test the import-led growth hypothesis. The study classified the economies into large, upper and low-income countries. Except for Japan, they found proof of long-run bidirectional causation in high-income nations, with conflicting results in other areas. Similarly, Kogid et al. (2011) investigated the relationship between Malaysia imports and GDP growth. The study used annual

1 For details see (Nguyen, 2011: Aluko and Adeyeye , 2020).

data from 1970 to 2007. The causality path between variables was tested using Granger's causality test and the Toda-Yamamoto causality test. Economic growth and imports were found to have a bidirectional causal connection in both tests. According to the report, studies conclude that Malaysian imports contribute to the country's economic development. Thereby, confirming feedback hypothesis. Hye, Wizarat, Lau (2013) and Bakari and Krit (2017) also found a similar type of results when they applied granger causality in their research.

Apart from that, some studies confirm neutrality hypothesis. For instance, Deme (2002) tested the relationship between import and Nigeria's GDP growth. The established long run and causal relationship between import and GDP growth using Johnson co-integration and vector autoregressive (VAR) techniques too. The estimates fail to establish a long run relationship between imports and GDP growth thereby confirmed neutrality hypothesis. Gossel & Biekpe (2014) and Aluko, & Adeyeye (2020) found similar relationship for most of the African economies. Similarly, Sato & Fukushige (2011) observe the neutrality hypothesis for North Korea.

Hye,Wizarat, and Lau (2013) examined the connection between trade and GDP growth by using annual data of six South Asian economies. In order to investigate the long-term and causal relationship in the member countries, the study used the ARDL and Modified Granger causality tests.

Using time-series data from 1980 to2011, Tsaurai (2012) examined the dynamic connection between GDP growth and imports in Zimbabwe. The imports-growth relationship was examined using the autoregressive distributed lag (ARDL) bounds testing method, and both the short- and long-term changing elements were investigated using an error-correction-based causality test. This study discovered a short- and long-term unidirectional causal connection between GDP growth and imports.

Bakari and Krit (2017) used the VECM Granger causality test to investigate how trade and GDP growth are related in Mauritania. Estimates based on data from 1960 to 2005 show a bidirectional connection between GDP growth and imports. Therefore, the study also confirms the existence of feedback hypothesis in Mauritania.

Furthermore, there are very few studies that include Pakistan's economy. Recent research has failed to produce proper findings in favor of imports and GDP growth in Pakistan. Some studies confirms the existence of feedback hypothesis in Pakistan (Hye,Wizarat, and Lau ,2013 ; Rahman and Shahbaz 2013) while the other confirms import led growth hypothesis (Saima Siddiqui et al 2008 ; Nooreen et al 2019) Therefore, further research on the impact of imports on GDP growth is required.

This research is particularly interesting and significant for Pakistan since imports account for most of the the country's foreign trade. Therefore, more research is required that may provide useful findings into this important economic problem that has yet to be resolved.

Empirical studies have documented evidence to support the above hypotheses. Apart from a few studies, Granger causality test is a common methodological technique used in the literature. Therefore, we follow the same method and use Toda Yamamoto Causality Test which is more appropriate than the other causality techniques.

Data and Methodology

In order to study the causal connection between imports and GDP growth, a simple model is constructed, and real GDP is added on left side of the model as a dependent variable and imports on the right side as an independent variable.

$$Y_{GDPi} = \beta_0 + \beta_1 IMP_i + e_i \quad \text{..... (1)}$$

Where Y_{GDPi} = the value of real GDP at time i, β_0 is constant variable, $\beta_1 IMP_i$ is the value of imports and e_i is the error term.

To see the impact of imports on GDP growth in Pakistan yearly time series data is used for the period 1972–2020. The World Bank's World Development Indicators (WDI) is used as a data source to collect all essential data for the sample period.

In order to study the above stated relationship, Toda-Yamamoto approach to Granger causality proposed by Toda and Yamamoto (1995) is applied. This test is based on the vector

autoregressive VAR (p+dmax) framework which is a contemporary approach for determining the causative link between two variables. In the model, the causal connection between imports and GDP growth is examined using an apparently unrelated regression model with two variables. A causal link between two time series is expected if imports and economic growth both share a common stochastic tendency. Using the estimate of an augmented VAR model (k+dmax), Toda and Yamamoto (1995) provided a method for evaluating Granger causality (1961), where k is the ideal time lag on the initial VAR model and dmax is the system's variables' maximum integrated order (VAR model).

The causality VAR model proposed by Toda and Yamamoto is as follows:

$$y_t = \mu_0 + \left(\sum_{i=1}^{k} \alpha_{1t}\, y_{t-i} + \sum_{i=k+1}^{d_{max}} \alpha_{2t} y_{t-i}\right) + \left(\sum_{i=1}^{k} \beta_{1t}\, X_{t-i} + \sum_{i=k+1}^{d_{max}} \beta_{2t} X_{t-i}\right) + \varepsilon_{1t} \quad [2]$$

$$X_t = \emptyset_0 + \left(\sum_{i=1}^{k} \gamma_{1t}\, X_{t-i} + \sum_{i=k+1}^{d_{max}} \gamma_{2t} X_{t-i}\right) + \left(\sum_{i=1}^{k} \delta_{1t}\, y_{t-i} + \sum_{i=k+1}^{d_{max}} \delta_{2t} y_{t-i}\right) + \varepsilon_{2t} \quad [3]$$

Where the maximum integration order on the variables system (VAR model) is dmax and the optimal time lag on the initial VAR model is k.

The present study uses Toda and Yamamoto's (1995) dynamic Granger causality test to examine the impact of imports on GDP growth in Pakistan. Here are some reasons explaining that why Toda and Yamamoto (1995) causality test is used:

- Granger testing on functions with temporal lags on integrated variables might produce specious regressions.
- Only when variables are cointegrated can the F statistic be utilized.
- Toda and Phillips (1993) claimed that combining Granger causality with the error correction model can result in inaccurate results due to parameter dependence that can be asymptotic in some cases.

Empirical Analyses

The major purpose of this research is to analyze the impact of imports on economic growth, as well as any possible causality between them. To do this, Toda and Yamamoto (1995) causality test is used, which offers information of the lag length (p) and maximum order of integration of the two variables (dmax).

To prevent false causality or the lack of causality, it is critical to determine the order of integration of the series (dmax) and the appropriate lag length k before doing any causality testing. Using unit root tests (ADF), we observed that the variables are non-stationary at their order one integration levels (1).

The next step is to investigate the optimal lag length (p) chosen by AIC, FPE, SB, and HQ. The lag length used in the Ganger causality test is quite important. If the selected lag length is shorter than the real lag length, the removal of critical lags might cause bias. If the chosen lag length is longer, the estimates will be inefficient due to the irrelevant lags in the equation.

This stage requires testing each of the time-series to evaluate their integration order. Augmented Dickey-Fuller (ADF) (1979) unit root test is applied to check for stationarity of the time-series variables; lngdp and lnimportr. Tables 1-4 show the results of unit root testing.

Table: 1
Selection-order criteria, Sample: 1978 – 2020,
Number of Obs = 43

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-35.5528				.320544	1.70013	1.71524	1.74109
1	113.196	297.5*	1	0.000	.000332	-5.17189	-5.14168*	-5.08997*
2	114.289	2.1868	1	0.139	.000331*	-5.17623*	-5.13092	-5.05336
3	114.372	.16577	1	0.684	.000345	-5.13357	-5.07316	-4.96974
4	114.607	.46951	1	0.493	.000358	-5.09798	-5.02246	-4.89319
5	114.679	.14437	1	0.704	.000374	-5.05483	-4.9642	-4.80908
6	115.214	1.071	1	0.301	.000383	-5.03322	-4.92749	-4.74652

Augmented Dickey-Fuller test for unit root — Number of obs = 45

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-1.548	-4.196	-3.520	-3.192

MacKinnon approximate p-value for Z(t) = 0.8123

Table No. 2
Selection-order criteria, Sample: 1979 – 2020, Number of Obs = 42

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	104.07				.000432	-4.90811	-4.89295	-4.86674
1	108.331	8.5212*	1	0.004	.00037*	-5.06338*	-5.03305*	-4.98063*
2	108.905	1.1477	1	0.284	.000378	-5.04309	-4.99759	-4.91897
3	108.905	.00014	1	0.990	.000397	-4.99547	-4.93481	-4.82998
4	108.965	.12022	1	0.729	.000415	-4.95071	-4.87489	-4.74385
5	109.154	.37765	1	0.539	.000432	-4.91209	-4.8211	-4.66385
6	110.814	3.3211	1	0.068	.000419	-4.94354	-4.83739	-4.65393

Augmented Dickey-Fuller test for unit root — Number of obs = 45

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-2.251	-3.614	-2.944	-2.606

MacKinnon approximate p-value for Z(t) = 0.1884

Table No. 3
Selection-order criteria, Sample: 1978 – 2020, Number of Obs = 43

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-20.993				.162848	1.02293	1.03803	1.06389
1	33.0807	108.15*	1	0.000	.013795*	-1.44562*	-1.41541*	-1.3637*
2	33.2458	.33011	1	0.566	.014344	-1.40678	-1.36147	-1.28391
3	34.5017	2.5119	1	0.113	.014179	-1.41869	-1.35827	-1.25485
4	34.5155	.02756	1	0.868	.014852	-1.37281	-1.29729	-1.16802
5	36.2513	3.4717	1	0.062	.014363	-1.40704	-1.31641	-1.16129
6	36.2661	.02958	1	0.863	.015053	-1.36122	-1.25549	-1.07451

Augmented Dickey-Fuller test for unit root — Number of obs = 45

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-4.491	-4.196	-3.520	-3.192

MacKinnon approximate p-value for Z(t) = 0.0016

Table No.4
Selection-order criteria, Sample: 1979 – 2020, Number of obs = 42

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	31.448				.013735*	-1.44991*	-1.43474*	-1.40853*
1	31.5131	.1302	1	0.718	.014362	-1.40539	-1.37506	-1.32264
2	32.9952	2.9641	1	0.085	.014038	-1.42834	-1.38285	-1.30422
3	32.9996	.0089	1	0.925	.014725	-1.38093	1.32027	-1.21544
4	34.8937	3.7882	1	0.052	.014119	-1.42351	-1.34769	-1.21665
5	34.9465	.10548	1	0.745	.014782	-1.3784	-1.28741	-1.13017
6	37.1219	4.3508*	1	0.037	.013994	-1.43438	-1.32822	-1.14476

Augmented Dickey-Fuller test for unit root — Number of obs = 45

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-4.321	-3.614	-2.944	-2.606

MacKinnon approximate p-value for Z(t) = 0.0004

The final step is to confirm the direction of causality between imports (Imp) and economic growth (dgpr) using the Toda and Yamamoto causality test. Table No. 5 summarizes results of the test based on Toda and Yamamoto approach.

Table No.6 shows if the VAR model can account for serial correlation in residuals.

Table No.5
Selection-order criteria, Sample: 1982 – 2020,

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	2.26861				.003381	-.013775	.016834	.071536
1	147.052	289.57	4	0.000	2.5e-06	-7.23346	-7.14163	-6.97753
2	156.515	18.925	4	0.001	1.9e-06*	-7.51359*	-7.36054*	-7.08703*
3	157.867	2.7048	4	0.608	2.2e-06	-7.37781	-7.16355	-6.78064
4	160.098	4.4619	4	0.347	2.4e-06	-7.28709	-7.01161	-6.5193
5	162.324	4.4513	4	0.348	2.7e-06	-7.1961	-6.8594	-6.25768
6	165.975	7.3016	4	0.121	2.8e-06	-7.17819	-6.78028	-6.06915
7	168.34	4.7295	4	0.316	3.1e-06	-7.09433	6.6352	-5.81467
8	173.982	11.285*	4	0.024	3.0e-06	-7.17856	-6.65821	-5.72827
9	178.289	8.6148	4	0.071	3.1e-06	-7.19432	-6.61275	-5.57341
10	180.535	4.492	4	0.344	3.6e-06	-7.10437	-6.46159	-5.31284

Number of obs = 39

Table No. 6
Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	4.9534	4	0.29211
2	0.8888	4	0.92616

H0: no autocorrelation at lag order. The results show that, at 1% significance level there is no serial correlation in residuals for our VAR model.

Results of Granger Causality Test

(1) [lnimportr]L.lngdpr = 0
(2) [lnimportr]L2.lngdpr = 0

(1) [lngdpr]L.lnimportr = 0
(2) [lngdpr]L2.lnimportr = 0

According to equations 2 and 3, the findings of Toda and Yamamoto causality testing are presented in Table 2.2. According to test estimates, the test result follows a four-degree-of-freedom chi-square distribution with the proper lag time and probability. The findings show that both variables are correlated. The results show that the hypothesis that imports do not cause growth in GDP is accepted, but the hypothesis that GDP growth does not lead to imports is rejected at the 5% level of significance.

Therefore, it can be concluded that an increase in imports in the long run will eventually result in an increase in economic growth. True economic growth may raise the country's demand for imports over the long and short terms. For a growing country like Pakistan, these two findings are very significant.

Theoretically, for a growing economy like Pakistan, imports are very important. As a result, pinpointing the reasons for imports' negative influence on economic growth is very difficult. Considering the import composition will be useful. Imports' impact on economic growth is highly dependent on their quality; for example, if the host country imports eatable goods, they don't seem to increase economic activity in that country; however, if the country imports new technologies and capital goods, they can boost the growth process of that country.

Pakistan imports a variety of commodities and services, including petroleum, technology, equipment's, petroleum, and items. All these things directly contribute to the country's long-term growth by improving macroeconomic factors. This explains the country's long-term import-led growth. The Pakistan economy has been rapidly growing and developing over the last few decades, demanding the import of machinery, fertilizers, petroleum products, industrial inputs, and other major inputs. Furthermore, economic growth demands the import of consumer goods to boost labor productivity. All of this leads to higher total factor productivity and, as a result, faster GDP growth. Hence, the finding of two-way causality

between imports and GDP growth in Pakistan economy is not surprising.

CONCLUSION

The current study looks at the dynamics of the impact of imports on GDP growth in Pakistan. The research examined the direction of causation between two variables: imports and GDP growth using yearly data from 1972 to 2020. To find empirical findings, this research uses the Toda-Yamamoto test to check causality between the two variables.

According to the Toda-Yamamoto test, imports and real GDP growth in Pakistan show a long-run equilibrium relationship. It's an interesting result that implies a two-way causal relationship. Imports of consumer goods, raw materials, and technology help Pakistan, a developing nation, reach its full productive potential. This increases national income and well-being. Money growth promotes trade, which increases consumer demand for imports. All these things directly improve the long-term growth of a country by improving macroeconomic factors.

The Pakistan economy has been rapidly growing and developing over the last few decades, demanding the import of intermediaries, technological products, fertilizers, plants and machinery, and other industrial inputs. Furthermore, the country demands the import of consumer products to boost labor productivity and economic growth. The result is increased total factor production and, as a result, faster economic growth.

This finding also indicates that Pakistan continues to rely on imports for its export industry. The study's primary policy implication is that Pakistan cannot reduce capital goods imports because this will result in lower manufacturing production and lower exports. Therefore, Pakistani policymakers should take this conclusion into account and implement further structural changes to boost the manufacturing and industrial sector's export capacity and productivity.

The most critical issue is from where the import is financed. Increased GDP cannot always be relied upon to fund imports. It's feasible that rising imports may have a multiplier impact on government spending, which will be supported by external flows like emigrant remittances. Therefore, more research is required to resolve such points by including external flows in the study. Adding external flows in the framework could be a good notion for future research.

The policy implications based on the research findings are Pakistan should pursue policies of extensive trade liberalization. There should be no trade restrictions in the form of import quotas, tariffs, or other restrictions. Imports of Pakistan should be based on more capital items, which will help to increase overall production. To improve its manufacturing capacity and diversify exports, Pakistan's government should direct its policies toward importing better technology, additional capital, and intermediate goods.

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