Journal of Finance & Economics Research

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Manuscript Information
Submission Date: October 25, 2022
Reviews Completed: January 08, 2023
Acceptance Date: January 17 2023
Publication Date: January 23, 2023

Citation in APA Style:
Ullah, S., Ahmad, S., & Ali, A. (2023). An Empirical Analysis of the Trade Balance of Pakistan Using the Elasticities, Monetary, and Absorption Approaches. *Journal of Finance & Economics Research, 8*(1), 33-49.

DOI: https://doi.org/10.20547/jfer2308103

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Journal of Finance & Economics Research
Vol. 8(1): 33-49, 2023
DOI: 10.20547/jfer2308103

An Empirical Analysis of the Trade Balance of Pakistan Using the Elasticities, Monetary, and Absorption Approaches

Sajjad Ullah [*] Sareer Ahmad [†] Amanat Ali [‡]

Abstract: *This study attempts to estimate the trade balance of Pakistan by developing a model that incorporates the three major approaches i.e., absorption, elasticities, and monetary for a time ranging from 1971 to 2021. Autoregressive Distributed lagged (ARDL) model is used to estimate the short-run and long-run response of GDP growth, broad money growth, and real effective exchange rate to trade balance. The results show that the real effective exchange rate is negatively related to the trade balance of Pakistan both in the long run and short run. This indicates that variation in the exchange rate does not improve the trade balance. The study also does not confirm the existence of the J-Curve in Pakistan. The GDP growth has a statistically insignificant impact on the trade balance in the short run while negatively related to the trade balance in the long run. The broad money growth is negatively related to trade balance in the short run as well as in the long run. The long-run effect is higher than the short-run effect. The monetary authority should adopt an appropriate monetary policy to improve the adverse balance of payments in Pakistan.*

Keywords: J-Curve; elasticities; the trade balance; broad money; real effective exchange rate.

Introduction

The trade balance (TB) of a nation represents the difference in goods and services that a nation exports and imports. It is a key component of a country's balance of payments (BOP). For developing nations, TB typically constitutes a major portion of its BOPs, as it measures the overall exports and imports of a country. When a nation's imports exceed its exports, it is known as a trade deficit, whereas the opposite is referred to as a trade surplus (Khan, Taqqadus, & Khattak, 2022). TB reflects the economic strength of a country. A smaller trade deficit indicates greater economic strength, while larger deficits suggest a weaker economy. Many developing nations face trade deficits during their development phase. However, if trade deficits persist for an extended period, it becomes challenging for a country. Pakistan has been facing trade deficits since 1947, except for three years. The three years are when Pakistan experienced trade surpluses were 1947-48, 1950-51, and 1971-72. The trade surplus in 1947-48 was because of the high number of exports during the initial phase of the country. In 1950-51, the surplus was due to higher exports

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Received October 25, 2022; Received in revised form January 08, 2023; Accepted January 17 2023; Available online January 23, 2023

of jutes and cottons, which were further enhanced by Korean's War. The trade surplus in 1971-72 resulted from a significant and higher devaluation of Pakistani Rupee by 131%. Pakistan, being an agriculture-based country, heavily relies on exports of rice, wheat, and raw cottons, which account for roughly 70.5% of its total export earnings. To address the trade deficits, Pakistan needs to expand its exports and focus on industrial products exportation, as highlighted by the State Bank of Pakistan and other sources. This shift would help reduce reliance on agricultural exports and promote a more balanced and sustainable trade position for the country.

Pakistan has been grappling with obstinate trade deficits during the globalization period, which has raised concerns of policymakers and economists. This deficit is considered risky for an economy like Pakistan (Muhammad, 2010). Various economic tactics, modifications, and different policies to resolve these issues and enhance TB, Pakistan requires a range of economic policies to stimulate economic activities and development. These include adjusting structure of tariffs, rates of exchange, import limits, export promotions, and foreign exchange allocations. Additionally, Pakistan needs to correct its external trade policies and focuses on tightening the trade gap. This study, therefore, aims to apply the Autoregressive Distributed Lag (ARDL) approach to determine whether there is evidence of a long-run relationship between trade balance, and its determining factors such as exchange rate, GDP growth, and broad money growth. The study tests the exchange rate under the elasticity approach in the long run and short run using the data from 1971 to 2021 in the case of Pakistan. Moreover, it makes an attempt to test GDP growth plus broad money growth under absorption and monetary approaches. The study also combines all three approaches in one equational form. Economists and policymakers use different approaches to correct trade deficits. One of these is changes in the exchange rate to improve TB. Shah and Majeed (2014) have cleared that a devaluation or depreciation of domestic currency results in expenditures switching from imported goods and services to domestic goods and services, which also boosts the level of production. So domestically produced goods and provided services become inexpensive abroad leads to an increase in exports. A rise in exports and fall in imports improves TB. When the time gap is concerned, the short and long-run effects of domestic currency's devaluations/depreciations are distinct. In the beginning, TB worsens next following a depreciation/devaluation and afterward begins to improve till it reaches long-run equilibrium. Time-path that trade balances follow is a J-Curve shape.

The second process is the absorption approach to BOPs, which is to some extent alternative to the elasticity approach. This approach is based on macroeconomic concepts of BOPs and analyzes the production of output and expenditures within the economy entirely. The primary focus of the study is to examine the factors that determine trade balance of Pakistan. It investigates whether the monetary, elasticity, and absorption approaches are applicable in explaining the trade balance. Furthermore, the study seeks to analyze the existence of J-Curve in Pakistan. To achieve these objectives, the researchers employ the ARDL bounds test on yearly data for the period (1971-2021). This approach sets the study distinct from previous research on Pakistan's TB in several ways. Firstly, it exclusively concentrates on Pakistan. Secondly, it utilizes actual yearly data over a more extended period. Lastly, the study uses bounds testing approach to co-integration, which

is different from the traditional co-integration technique. As it faces challenges related to the orders of integration and needs large sample sizes. ARDL bounds test, presented by Pesaran, Shin, and Smith (1999) is suitable for this study as it allows for the inclusion of regressors that are integrated at different levels. Additionally, bounds test remains valid and applicable even when working with small sample sizes, as is the case in this study (P. Narayan, 2004).

Literature Review

The following are the most important approaches to trade balance, we present here the elasticities, (Marshal Lerner Condition), monetary, and absorption approaches to trade balance. These are also called the determinants of the trade balance.

Elasticity approach to balance of payments is based on Marshall-Lerner-Condition and some other assumptions. Firstly, this analysis can exist in a partial equilibrium case because it takes the influence of the exchange rate changes in the exports and imports market, other things hold constant, that is the location of demand curve for exports and imports are held unaffected. Secondly, this approach assumes that all the related elasticities of supply for outputs are taken infinite-elastic, as demand rises the exports' price in the domestic currency does not increase, and prices of foreigners' goods, which compete to the exports do not decrease as demand drops, the imports' prices don't decrease in foreign currency when the demand for it decreases. The prices of imported substitute goods do not increase when demand for it rises. "There are four elasticities of supply to consider: the elasticity of supply of exports; the elasticity of supply of foreign goods that compete with exports; the foreign elasticity of supply of imports; and the elasticity of supply of domestic goods that compete with imports. The basic Marshall-Lerner condition for a successful currency depreciation assumes all four elasticities of supply to be infinite". Third assumption, this approach disregards the monetary effect of exchange rate variations. Fourth and final assumption, initially the trade is in balance and the variation in the exchange rate is slight. Following the above-mentioned assumptions, the Marshall-Lerner Condition states that depreciation or devaluation improves the balance of payments if the price elasticities of demand for imports and exports are greater than one.

$$E_{im} + E_{ex} > 1$$

Where E_{im} and E_{ex} are the price elasticities of demand for imports and exports respectively.

If the total exports increase proportional to the decrease in the foreign price of exports (E_{ex}=1 exports is unit elastic), the BOP will be unchanged, and the decrease in imports due to the high price of imports in the home country ($E_{im} > 0$) so the BOPs will improve. Economic theory indicates that currency devaluation or depreciation will lead to improving the trade balance, it will take some time, and impact of devaluation/depreciation isn't instantaneous on TB. The devaluation or depreciation will deteriorate the trade balance in the short run and then start to improve in the long run. This pattern of the trade balance

after a period is similar to an English letter "J" and this is called the J-Curve phenomenon (Hameed & Kanwal, 2009; Naseem, Iqbal, Nosheen, & Wohar, 2022).

The absorption approach to the balance of payment was first introduced by Alexander in 1952. This approach up to some extent is an alternative to the elasticities approach. This approach is based on macroeconomic concepts of BOPs and analyzes the production of output and expenditures within the economy entirely. It claims that devaluation or depreciation of home currency will be more effective when the difference between the total output of a domestic country and its expenditure is larger. Salvatore (2013) presents the mathematical solution of the absorption approach, starting from national income identity as national income or output is equal to consumptions plus investment (both domestic and foreign) plus net exports (trade balance).

$$Y{-}A = B \tag{1}$$

Equation (1) shows that trade balance is the difference between total domestic production or national income and total domestic absorptions (expenditures). The trade balance (B) improves due to depreciation or devaluation when (Y) rises and/or (A) reduces. Total production or total national income (Y) will not rise if the domestic nation is at full employment. Depreciation and/or devaluation would be responsive only if the home country absorptions (A) decrease, either inevitably or due to tight monetary and fiscal policies. This approach has failed due to many reasons such as (1) this approach is only applicable when domestic economy isn't at full employment, domestic total production or total national income cannot increase father at the level of full employment (Shah & Majeed, 2014). (2) This approach does not take into account the inflationary effect of depreciation or devaluation; (3) completely disregards monetary factors in the economy; 4) it doesn't consider the effect of effect of capital flows when taking to BOPs.

The Monetary approach is different from the elasticities and absorption approaches in the sense that it considers the money market and started during end time of 1950s. This approach regards BOPs as a monetary phenomenon and shows the relationship between the nation's BOPs and its supply of money. Under the fixed exchange rate system higher supply of money results in rising expenditures which leads to rising the home country's demand for foreign commodities. Such a higher domestic demand could be financed by the sale of international reserves, thereby deteriorating the BOPs. The loss of international reserves decreases the supply of money until it becomes equal to the demand for money. So, the equilibrium in the BOPs re-established. On the other side, the higher demand does the opposite adjustment, which leads to an increase in the gain of international reserves (surplus in BOPs).

$$\Delta R = \Delta f(P, Y, I) - \Delta D \tag{2}$$

Equation (2) is the basic monetary approach to the BOPs equation. International reserves serve as a reflection of the disparity between the growing demand and growing domestic credit, and monetary consequences of BoPs taking money market into balance. These reserves play a crucial role in equalizing the variations in domestic credit, and coefficient ΔD is known as the offset coefficients, measures the degrees to which variations

in domestic credit are counterbalanced by variations in international reserves. In case of the monetary approach to BOPs, equation 1 This section reviews empirical studies on the determinants of the trade balance of Pakistan. Various studies have been undertaken and established different results and these are explained as follows. Saeedi and Rana (2021) identify the trade balance and how it influences the country imports and exports in the Selected Emerging Countries, such as India, Indonesia, Ireland, Malaysia, Mexico, and Pakistan over the period 1990-15. The findings suggest that exporting and importing help grow the country's national income and expand world trade. Azim, Amin, Aqdas, Qureshi, and Khokhar (2022) test the Marshall-Lerner-Condition (MLC) to show the effect of currency depreciation on the trade balance of Pakistan This study confirms that from 2001 to 2014 the MLC holds, indicating that the depreciation improves the trade balance. Whereas during 2015 to 2020 the MLC does not hold, implying that depreciation will not improve the trade balance of Pakistan in the present situation. The findings show that devaluation fails to improve the balance of trade. Omer, Kamal, and de Haan (2023) investigate the effect of currency depreciation on the trade balance of Pakistan, using the data from 1968 to 2019 by applying GMM. The results suggest that depreciation decreases imports and increases exports. Exports are too affected by imports; depreciation has a depressing effect on both imports and exports. The findings show that the MLC does not hold for Pakistan. Trade liberalization and the country's nuclear ambitions impacted Pakistan's trade balance.

Nga (2020) analyzes determining factors of the trade balance of Vietnam using yearly data (2005-18). Applied an OLS technique. FDI, openness of the economy, and the exchange rate are the main determinants of the Vietnam economy. The finding of the study shows that FDI and openness of the economy have a significant and negative effect on the trade balance, an increase in FDI deteriorates the trade balance. The exchange rate has contributed insignificantly to the changes in the trade balance. Similarly, Aboya, Hussain, Hassan, Saleem, and Siddiqui (2020) conducted an empirical analysis to explore different approaches to Pakistan's trade balance using annual time series data spanning from 1972 to 2016. The study specifically focused on the merchandise trade balance. and examined the stationarity of the variables. ARDL bounds testing approach for co-integration analysis to investigate short and long-run relationship among variables. The bound test outcomes indicated the presence of a stable long-run association between merchandise trade balance, broad money, real effective exchange rates (REER), and real domestic absorptions. Notably, the findings emphasized that the REER plays a significant role in determining the merchandise trade balance. Specifically, a devaluation of the exchange rate was found to increase the trade deficit in the long run. Additionally, in short-run, an increase in domestic absorption was observed to reduce the merchandise trade deficits.

Asghar, Asif, Aslam, Bahadur, and Mahmood (2020) analyzed the influences of exchange rates on Pakistan's trade balances. They use the last 30 years' data to test the relationships by applying correlation and regression. The result shows that Pakistan has an adverse trade balance and a higher negative correlation. It implies that Pakistan's economy has lower saving rates and thus trade balance is adverse. It is because of a rise in exchange rates. Iqbal, Khan, and Nosheen (2019) investigate the J-curve phenomena between Pakistan and (SAARC) counties at an aggregate level and commodity level

by using the trade data of 87 industries. The overall study shows that depreciation or devaluation is less effective to improve Pakistan's trade balance. J-curves exist at the aggregate against the rest of the world and Pakistan. Several studies use aggregate-level data to investigate J-curves in Pakistan's care (Shahbaz, Awan, & Ahmad, 2011). The following studies investigate J-Curves phenomena for Pakistan against its bilateral trade's allies, which includes (Aftab & Aurangzeb, 2002; Bahmani-Oskooee & Cheema, 2009). The above studies show diverse results. These have an aggregation problem at overall level and at mutual level. To remove the aggregation bias, Bahmani-Oskooee and Fariditavana (2016) have disaggregated the trade data at the commodity level between Pakistan and US used data of 45 major industries. Result shows that J-curve exists in 17 industries out of 45.

Bahmani-Oskooee and Fariditavana (2016) conduct a study examining the J-curves phenomenon for Pakistan and European Union on commodities level across 77 industries. The findings revealed evidence of the J-curve in 22 industries, indicating that a depreciation initially leads to a worsening of trade balance, followed by an improvement over time. Faridi and Kausar (2016) study the consequence of devaluations/depreciations on Pakistan's trade balances for the period of 1972 to 2014. ARDL technique was used for the analysis. They have shown short-term and long-run effects of the exchange rate. They have used the squared term of the exchange rate to show J-curves and to depict non-linear impact of exchange rates on the trade balances. It further confirms the presence of J-curve in Pakistan. Additionally, it concludes that GDP growth, FDIt, and rates of inflation improve trade balances in long-run.

Shah and Majeed (2014) conducted study examining long-run and short-run relationship between TB, MS, REER, and income (I) in the context of Pakistan for the period 1980-2011. The study employed the bounds testing approach, co-integration, error correction model (ECM), and autoregressive distributed lag (ARDL) techniques. The bound test revealed the presence of a stable long-run relationship between the trade balance, money supply, real effective exchange rate, and income. Results indicated that a rise in income and REER is inversely associated with TB in both long-run and short-run. MS plays a determining role in shaping TB in long-run, but its impact isn't significant in short-run. The study also utilized "variance decompositions (VDC) and impulse response functions (IRF)" to draw additional insights. However, no long-run relationship observes between TB and MS (M2). Furthermore, results suggest the Marshall-Lerner-Condition doesn't hold in this context. A similar study of Aurangzeb and Asif (2014) investigate the determinants of the trade balance of India and Pakistan by using the regression analysis and granger causality test and used the time series data from 1981-2010. The findings of this study indicated that the GDP of India and Pakistan had a noteworthy positive influence on TB of two countries. However, (FDI) and remittances had an adverse effect on Pakistan's TB, whereas they had a favorable effect on India's trade TB. Additionally, the exchange rates had a significant adverse effect on TB of the two countries. Granger causality revealed bidirectional causal relationship in Indian's model, suggesting there is mutual causality among variables. On the other side the Pakistan's model demonstrated unidirectional causal relationship.

Muhammad (2010) explores long-run and short-run determinants of the trade deficit

in the context of Pakistan by applying the Johansen Co-Integration Technique and Errors Corrections Model (ECM). Results recommend that FDI, domestic household consumptions, and REER significantly influence TB. Vector Error Correction Model (VECM) was applied to indicate the short run dynamics. The outcome of VECM also shows there exist disequilibrium in short-run that will be corrected during a year. Shahbaz et al. (2011) examined the relationship between fluctuations in Pakistan's trade balances and changes in RER. They utilized quarterly data spanning from 1980-Q1 to 2006-Q4 and employed ARDL techniques for co-integration analysis to investigate potential long-term relationships. Results indicated the presence of a long-term relationship among variables. Specifically, they found the coefficient for elasticity was negative and statistically significant. The findings didn't support the existence of J-Curves relationship, which suggests that a rise in RER didn't lead to improvement in TB.

Empirical literature concludes that Gross Domestic Product, Foreign Direct Investment, Domestic Income, Money supply, Worker Remittances, Domestic Household Consumption, and Exchange Rate are the main determinants of the trade balance of Pakistan. The existence of the J-Curve in Pakistan is inconclusive; some authors have given evidence of the J-Curve while others have shown that the existence of the J-curve does not hold in Pakistan. There is also another group of authors, who favor the weak existence of the J-curve. Various studies give different results due to time and methodology.

Data and Methodology

Data and Description of Variables

This study attempts to estimate the trade balance of Pakistan using different elasticities approaches. This study used time series data from 1971 to 2019. The data are collected from different sources such as "World Development Indicators and the State Bank of Pakistan". Definitions of variables, notations, and their measurement and data sources are explained in the following table.

Model Specification

The following model combines three approaches together. Many studies are used this model to test these approaches. Nkoro and Uko (2016) follow this model to find out empirical evidence.

$$TB = F(GDPG, BMG, REER) \tag{3}$$

$$TB_t = \alpha_0 + \alpha_1 GDPG_t + \alpha_2 BMG_t + \alpha_3 REER_t + V_t \tag{4}$$

TB = Trade Balance
GDPG = Gross Domestic Product Growth
BMG = Broad Money Growth

REER = Real Effective Exchange Rates

TB is an outcome variable that includes exports and imports of both goods and services. GDPG, BMG, and REER are independent variables. Thus, the trade balance is the function of gross domestic product growth, broad money growth, and real effective exchange rates. α_0 is the intercept term, α_1, α_2, and α_3 are the slope coefficients and V_t are the residual term.

Econometric Techniques

Unit Root Tests

Consider the following Autoregressive AR (1) model.

$$Y_t = \alpha Y_{t-1} + u_t \tag{5}$$

Where u_t is an error term and the necessary condition for stationarity is $\mid \alpha \mid < 1$. Generally, we have three possibilities.

$\mid \alpha \mid < 1$ This is the condition for stationarity.

$\mid \alpha \mid > 1$ This shows that the test is inconclusive.

α = 1 this shows that the series is non-stationary (the series contains a unit root).

There are several processes for testing the unit roots. Such as The Durbin-Watson test (DW), Dicky-Fuller test DF (1979), Augmented Dicky-Fuller test (ADF), and Philip-Perron (1988) test (PP)

Augmented Dickey-Fuller (ADF) Test

Dicky and Fuller (1981) expanded their test method by suggesting an augmented version of the test which includes additional lagged terms of the explanatory variable to vanish the autocorrelation. The lag length of the additional term is determined by the (AIC and SBC). We check whether the error term of the ADF regression is auto correlated or not, this test follows the LM test, not the DW test. The possible forms of the ADF test are given by the following equations.

$$\Delta\gamma Y_{t-1} + \sum_{i=1}^{k} \phi \Delta Y_{t-1} + u_t \tag{6}$$

$$\Delta Y_t = \delta_0 + \gamma Y_{t-1} + \sum_{i=1}^{k} \phi \Delta Y_{t-1} + u_t \tag{7}$$

$$\Delta Y_t = \delta_0 + \gamma Y_{t-1}\delta_1 T + \sum_{i=1}^{k} \phi \Delta Y_{t-1} + u_t \tag{8}$$

Where u_t is the stochastic term and ΔY_{t-1} = $(Y_{t-1} - Y_{t-2})$ etc. K is the lagged values of ΔY_t. Now we are going to test the null hypothesis against the alternatives hypothesis.

H0: $\gamma = 1$ (Series is non-stationary)
H1: $\gamma \neq 1$ (Series is stationary)
When the calculated ADF value is less than the critical value, the series is non-stationary. On the opposite side when the calculated ADF value exceeds the critical value, the series is stationary.

Autoregressive Distributed Lag Model

The study used Autoregressive Distributed Lag (ARDL) technique presented by Pesaran et al. (1999); Pesaran and Smith (1998) indicates directions and causations among variables. ARDL technique generates reliable and strong outcomes for short and long-run relationships between TB and GDPG, BMG, and REER. The inspiration toward the use of this technique is based on the advantages it has over the traditional Johnson Co integration process. The advantage of this method is it doesn't need the pre-testing of variables. It signifies that this technique is applicable irrespective of either the variables are integrated of I (0), I (1) or combination of both. ARDL is based on general to specific modeling system. The ARDL technique clearly shows the dependent and independent variable in the model. The estimation of the model is possible when the explanatory variables are endogenous (Pesaran et al., 1999). It also allows the existence of relationship or equilibrium in the long and short run dynamics, and it does not loss long run information. The ARDL techniques contains the estimating of the following equation.

$$\Delta LnTB = \alpha_0 + \alpha_1 \sum_{i=1}^{p} \Delta LnTB_{t-i} + \alpha_2 \sum_{i=1}^{p} \Delta LnGDPG_{t-i} + \alpha_3 \sum_{i=1}^{p} \Delta LnBMG_{t-i} +$$

$$\alpha_4 \sum_{i=1}^{p} \Delta LnREER_{t-i} + \beta_1 LnTB_{t-1} + \beta_2 LnGDPG_{t-1} + \beta_3 LnBMG_{t-1} + \beta_4 LnREER_{t-1} +$$

$$V_t \quad (9)$$

Where the α_0 represent the drift component, V_t is the error term, first part of the above equation with the coefficients of $\alpha_1, \alpha_2, \alpha_3$, and α_4 show short-run dynamics of a model and parameters. Whereas $\beta_1, \beta_2, \beta_3$ and β_4 are long-run relationships of ARDL model. P is the maximum lag order and chosen by the researcher.

Equation 9 can be estimated by using the OLS for the Autoregressive Distributed Lag model testing procedures, the F-statistics value is calculated from the estimated equation (3.7) and compare with the two sets of critical values calculated by S. Narayan and Narayan (2005) for testing the long-run relationship in the model. This study uses the Akaike's Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC). The values of the (AIC) and (SBC) can be calculated by the following formula as:

$$AIC = -n/2(1 + log2\pi) - n/2log\delta^2 - P$$

$$SBC = log(\delta^2) + (logn/n)P$$

δ^2 is the ML (Maximum Likelihood) estimator of the variance of regression stochastics, n is the number of parameters estimated and p is the optimal order for the selected model as P=0 ,1,2—P. Testing the non-existence of long run relationships in the model.

Null hypothesis of (no long-run relationship/ no existence of co integration) in equation 9 is:

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$$

Alternative hypothesis of (existence of long run relationship/ existence of co integration) in equation 9 is.

$$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$$

If the calculations support the evidence for the long-run relationship in the concerned model, then we must estimate the following long-run model.

$$\Delta LnTB = \alpha_0 + \alpha_1 \sum_{i=1}^{p} \Delta LnTB_{t-i} + \alpha_2 \sum_{i=1}^{p} \Delta LnGDPG_{t-i} + \alpha_3 \sum_{i=1}^{p} \Delta LnBMG_{t-i} + \alpha_4 \sum_{i=1}^{p} \Delta LnREER_{t-i} + V_t \quad (10)$$

The next step in ARDL model, estimate the short-run coefficients and the adjustment parameter for long run.

$$\Delta LnTB = \alpha_0 + \alpha_1 \sum_{i=1}^{p} \Delta LnTB_{t-i} + \alpha_2 \sum_{i=1}^{p} \Delta LnGDPG_{t-i} + \alpha_3 \sum_{i=1}^{p} \Delta LnBMG_{t-i} + \alpha_4 \sum_{i=1}^{p} \Delta LnREER_{t-i} + \gamma ECT_{t-1} \quad (11)$$

Where γ in equation 11 shows the speed of adjustment toward equilibrium in the long run after following short run shock.

Empirical Analysis

This section presents the results of different econometric techniques conducted in the study. These are data description, correlation matrix, unit root tests, autoregressive distributed lag (ARDL) framework, Breusch-Godfrey Serial Correlation LM Test, Harvey Test, ARCH, test Ramsey RESET Test, CUSUM and CUSUM of Square test.

Table 1
Data description

	TB	GDPG	BMG	REER
Mean	0.45266	4.620127	44.52747	141..2795
Standard. Dev.	0.170089	2.2953922	8.780417	96.10048
Skewness	-0.04145	-0.046603	-0.397999	1.818674
Kurtosis	1.902024	2.953957	2.250644	7.261182
Jarque-Bera	2.576402	0.346671	2.440093	64.08378
Probability	0.275760	0.846345	0.295216	0.000
Sum Sq. Dev.	1.397431	263.3229	2187.27	101198.3
Observations	51	51	51	51

Table 1 explained the descriptive statistics of the variables. Trade balance is the dependent variable while the remaining are the independent variables. The Mean, Standard Deviation, Kurtosis, probability, Jarque-Bera values are explained in the above table.

Table 2
Correlation matrix among variables

	Trade Balance	GDP Growth	BM Growth	REER
Trade Balance	1	-0.1588	0.3151.	-0.4187
GDP Growth	-0.1588	1	-0.0577	0.3559
BM Growth	0.3151	-0.0577	1	-0.2456
REER	-0.4187	0.3559	-0.2456	1

Table 2 explained the correlation of the variables. The results of correlation matrix shows that there is no multi-collinearity between explanatory variables.

Table 3
ADF test result at I(0) and I(1) without intercept and time trend

Variable	Level		First Difference	
	t-value	P-value	t-value	P-value
Trade Balance	0.7683	0.3782	-6.3751	0.000
GDP growth	-0.8336	0.3494	-10.7752	0.000
BM Growth	1.6654	0.9748	-6.2446	0.000
REER	-1.5253	0.1179	-13.0012	0.000

The p-value is greater than 0.05 at level; we accept the null hypothesis of unit root and reject the alternative hypothesis of stationarity. Thus, all variables are non-stationary at level without intercepts and time trend. However, all the variables are stationary at first difference without intercept and time trend because the p-value is less than 0.05.

Table 4
ADF test result at I(0) and I(1) with intercept and time trend

Variable	Level		First Difference	
	t-value	P–value	t-value	P–value
Trade Balance	-1.9157	0.6317	-6.6696	0.000
GDP growth	-5.2789	0.0005	-7.2285	0.000
BM Growth	-4.7386	0.0022	-4.6218	0.0033
REER	-1.2496	0.8856	-2.1119	0.5215

The results of ADF test with intercept and time trend shows that GDP growth and BM growth are stationary at level and trade balance and REER are non-stationary at level.

The trade balance, GDP growth and broad money are stationary at first difference with intercept and time trend and the REER is non-stationary at first difference with intercept and time trend. ADF test shows there exist a combination of I (0) and I (1) of regressors therefore, we further continue with ARDL.

The results show that the national income measured by growth of gross domestic product is an essential determinant of TB. The GDPG is negatively related to trade balance in the long run and a 1% increase in GDPG leads to worsen the TB by 0.023% on average. The GDPG is significance at 10% level of significance. The sign of broad money growth is negatively related to TB and reliable with monetary approach. Theory points out, an increase in domestic supply of money worsens the TB, therefore domestic residents send their money abroad to purchase more goods and services. The BMG is significance at 5% level of significance. A 1% increase in BMG leads to deteriorate TB by 0.024% on average. The REER is negatively related to TB and statistically significance. So, it recommends, the MLC (Marshall-Lerner-Condition) does not hold in long-run in Pakistan's case. Depreciation or devaluation of national currency by 1% deteriorate TB on 0.00375 on average in the long run. It shows the summation of the elasticities of import and export are smaller than one in longer run and depreciation or devaluation deteriorates the trade balance of Pakistan.

Table 5
Long run result of ARDL

Dependent Variable: TB ARDL (1,3,2,1)			
Variables	**Coefficients**	**t-Value**	**P-Value**
C	2.4251	14.1884	0.000
GDPG	-0.0234	-1.8785	0.068
BMG	-0.0249	-8.5573	0.000
REER	-0.0037	-8.6724	0.000
C = Tb - (-0.0234*GDPG-0.0249*BMG-0.0037* REER+2.4251)			

Table 6
List of South Asian Countries

Dependent Variable: d(TB)t ARDL (1,3,2,1)			
Variables	**Coefficient**	**t-Value**	**P-value**
Δ(GDPG)t	0.00162	0.4037	0.6889
Δ(GDPG)t-1	0.00205	0.3664	0.7162
Δ(GDPG)t-2	-0.0078	-1.7198	0.0943
Δ(BMG)t	-0.0098	-3.8311	0.0005
Δ(BMG)t-1	0.01004	4.0626	0.0003
Δ(REER)t	-0.0011	-1.2954	0.2037
ECMt	-0.6182	-6.9708	0.0000
R-Square = 0.7475		Akaike Info Criterion = -2.8868	
Adjusted- R^2 = 0.709		Schwarz Criterion = -2.6104	
Durbin-W- Stat = 1.99			

Difference of GDPG is highly insignificance. The GDPG growth is positively related to trade balance and does not support the Keynesian theory that a rise in domestic income will encourage residents of the nation to purchase more of imported goods and services and hence deteriorate the TB. Nevertheless, this effect would only be observed in the

short run. Difference of BMG is statistically significant and negatively related to TB. The extent of effect is less than that in long-run effect. It indicates the effect of changes in BMG are weak in short-run. Similarly, the REER has an adverse and statistically insignificance influence on TB. It implies that MLC (Marshall-Lerner-Condition) also doesn't hold in short-run in the context of Pakistan. It shows the summation of elasticities of export and import are smaller than one in short run and depreciation/devaluation deteriorates the trade balance.

The Error Correction Term (ECT) is statistically significant and indicates causality in unidirectional. Errors Correction Model (ECMt) is negative and greatly significant. The coefficient -0.6129 shows a higher convergence rates toward equilibrium, that indicates the departure from long-run equilibrium is adjusted in 61.29% every year.

Table 7
List of South Asian Countries

Breusch-Godfrey Serial Correlation LM Test			
F-statistics	1.2756	Prob. F (2, 33)	0.2927
Obs*R-suared	3.3001	Prob. Chi-Squared	0.1920

Note F (2, 33) = F (V1, V2) represent degree of freedom

Results of Coefficients Diagnostics

The Obs*R-squared value is greater than the probability of Chi-squared (2), indicating that there is no evidence of serial correlation in our model.

Table 8
List of South Asian Countries

Heteroscedasticity Test: Harvey Test			
F-statistics	1.0458	Prob. F(10, 35)	0.4277
Obs*R-suared	10.5828	Prob. Chi^2 (10)	0.3909
Scaled explained SS	13.0964	Prob. Chi^2 (10)	0.2183

Note χ^2= Chi-Squared

The Obs*R-squared value is greater than the Probability of Chi-squared (10), indicating that there is no evidence of heteroscedasticity in our model.

Table 9
List of South Asian Countries

Heteroscedasticity Test: ARCH			
F-statistics	0.5651	Prob. F(1, 43)	0.4563
Obs*R-squared	0.5837	Prob. Chi^2 (1)	0.4449

Note: ARCH= (Autoregressive Conditional heteroscedasticity)

The Obs*R-squared value is greater than the Probability of Chi-squared (1), the ARCH test also indicating that there is no evidence of heteroscedasticity in our model. The stochastic term is homoscedastic.

Stability Diagnostics of the Model

The Jarque-Bera normality test is also applied to ECM. The calculated Jarque-Bera's value is 0.8917 and 0.6403 is its probability. The probability value is greater than 0.05 which indicates that the error terms are normally distributed. The result of Ramsey RESET test is given in table 10.

Table 10
List of South Asian Countries

Test	Value	Df	Probability
t-statistics	1.4661	34	0.1518
F-statistics	2.1494	(1, 34)	0.1518

Note df= degree of freedom

The Ramsey reset test is used to check the appropriate functional form. The probability of F-statistics is 0.1518 which is greater than 0.05, suggesting that the model is stable and well specified. Two more tests (CUSUM and CUSUM of Square) are applied to check the stability of the model. Following is the results of CUSUM test.

The plots of CUSUM remained between the 5 percent critical bounds, which proves the stability of the parameters. This indicates that the model is stable and well specified. The plots of CUSUM of square also remained between the 5 percent critical bounds, which proves the stability of the parameters. This also indicates the model is stable and well specified.

Conclusion and Policy Recommendations

The existing study tests the elasticities, monetary and absorption approaches in the context of Pakistan. Elasticity and absorptions approaches assumed unemployment of resources to adjust the problems of TB. Monetary approach assumed full employment in economy and focusing on trade balances. We use the real effective exchange rate (REER) as a proxy variable for devaluation or depreciation. In this study we used the annual time series data from 1971 to 2021. We applied the bound testing approach to co-integration, developed within the autoregressive distributed lag (ARDL) model, to investigate the existence of the long run equilibrium relationship between the trade balance, income (GDP growth), money supply (broad money growth) and real effective exchange rate. These mentioned variables are also the determining factors of Pakistan's trade balance. The trade balance (TB) was used as a dependent variable for the study. The coefficient of REER is statistically significant and negatively related to trade balance of Pakistan both in the long run and short run. Which indicates that devaluation/depreciation of Pakistani's currency does not correct trade balances. The depreciation or devaluation of national currency by 1% deteriorate the TB by 0.00375 on average in the long run. The study also empirically finds out that the elasticities approach (the Marshall-Learner Condition and J-curves phenomena) doesn't hold in Pakistan. The possible reason for the non-existence of J-curve is the nature of exports of Pakistan as it is an exporter of primary goods; high import dependence (Shahbaz et al., 2011) and her interest and inflation rate (Asghar et al.,

2020). The results also shows that GDP growth and broad money growth play an important function in concluding long-run and short-run performance of TB in case of Pakistan. GDP growth is statistically significant (at 10% level of significance) and negatively related to TB in the long run. A 1% increase in GDP growth leads to worsen the TB by 0.023% on average in case of Pakistan and the study support the Keynesian theory that a rise in domestic income will encourage residents of the nation to purchase more of imported goods and services and hence deteriorate the TB. In the short run the GDP growth has statistically insignificant impact on trade balance of Pakistan. This indicates that the GDP growth does not affect the trade balance in the short run. The current study finds out that the absorption approach to BOPs holds in the long run, while no such evidence has been found in the short run. The broad money growth is statistically significant and negatively related to the trade balance both in short run as well as in long run. The long run effect is higher than short run effect. The results prove monetary approach BOPs hold in case of Pakistan in both the short run and long run. Error Correction Term (ECT) is significance and indicates causality in one direction. The Error Correction Term (ECT) is statistically significant and indicates causality in unidirectional. Errors Correction Model (ECMt) is negative and greatly significant. The coefficient -0.6129 shows a higher convergence rates toward equilibrium, that indicates the departure from long-run equilibrium is adjusted in 61.29% every year.

Based on the empirical findings of the study, it is suggested that the obstacles of trade balances cannot correct via variation in exchange rates, it isn't supportive in Pakistan's case. We require to search an alternate option of expansion in trade balances as the broadening of exports, discovery of new markets to raise the elasticity of export demand to overcome the rise in import. The government needs to promote export by using export promotion policy that boom the domestic export on the other side the government needs to produced import substitute goods by using import substitution policy the import will be reduced that will bring improvement in the trade balance. Government needs to encourage public and private sectors to enhance investment to produce exported commodities (Faridi & Kausar, 2016). The government also need to focus on monetary and absorptions approaches that can improve trade balances.

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