Depreciation to correct trade deficit- a misdirected policy: Empirical evidence from Pakistan

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ABSTRACT

A favorable trade balance is a positive indicator for emerging economies, and rectifying trade imbalances is paramount for every country. However, fixing trade deficits by depreciating the currency is a misguided policy approach. This study refutes this myth by computing the elasticity of Pakistan's exports, imports, and trade balance using the real exchange rate. It also examines the degree to which trade elasticities respond to changing trade regimes and exchange rate policies in Pakistan from 1982 to 2019. The structural break cointegration technique is used for empirical analysis. The vector error correction model (VECM) is also employed in the study to establish long-run and short-run relationships. The findings show that depreciation boosts import demand rather than export demand, hence worsening the trade balance. As a result, the study dismisses the presence of the J-curve in the case of Pakistan. According to this analysis, the exchange rate policy has little bearing on the economy's structure, and the necessity for a devaluation results from economic structural inefficiencies rather than trade-enhancing policies. The government and policymakers should reform the economy rather than let the currency depreciate.

1. INTRODUCTION

Exchange rate variation is a dominant endogenous factor that affects not only the current account balance but also economic performance (EP) due to its influence on macroeconomic variables such as outputs, imports, export prices, interest rates, and inflation rates (Frenkel, 2004; Iyoboyi & Muftau, 2014; Jin, 2008). A plausible exchange rate (henceforth ER) policy and a suitable ER are essential for enhanced EP (Chong & Tan, 2008). However, free-floating ER systems or those wholly determined by market forces are uncommon. In a managed floating regime, monetary authorities occasionally intervene in the foreign exchange market to achieve strategic objectives (Mordi, 2006).

In trade literature, Currency depreciation (appreciation) has been widely studied as a policy tool to improve a country's trade balance (TB), particularly for countries with persistent trade deficits (TD) (Aftab & Aurangzeb, 2002;
Agenor, 1991; Alexander, 1952; Brahmasrene & Jiranyakul, 2002; Galebotswe & Andrias, 2011; Iyoboyi & Muftau, 2014; Rawlins & Praveen, 1993; Xin, Chibsah, & Garti, 2020. Alexander (1952) suggests that the trade balance improved because consumers switched from foreign to domestic goods after currency devaluation. According to Krugman and Taylor (1978), nominal devaluation increases expenditure switching, which boosts tradable goods production, exports, and the foreign sector. However, there could be a causal relationship running from a current account deficit or surplus to currency deprecation or appreciation, so that currency deprecation does not improve a current account deficit. The Marshall-Lerner (ML) condition and the J curve effect are the main topics of research in this field (Bano, Raashid, & Rasool, 2014; Demirden & Pastine, 1995; Hacker & Hatemi-J, 2003; Narayan, 2004; Rose, 1991; Saeed & Hussain, 2013). According to the ML condition, deprecation improves TB if the sum of export elasticity and import elasticity is greater than one.

Although there is a well-established theoretical connection between currency deprecation (CD) and current account balance, especially in the developed world, the global trade imbalances in 2000 triggered considerable interest and debate (Bernanke, 2005; Blanchard & Milesi-Ferretti, 2012). Several empirical studies on the impact of ERs on the balance of payments (BOP) have yielded contradictory results. While some studies have discovered a deleveraging effect of ER depreciation on domestic output, which has a negative effect on the BOP position (e.g., (Agenor, 1991; Alejandro, 1963; Kandil, 2004)), others have discovered stimulating effects of ER depreciation on output and trade balance (Bahmani-Oskooee & Kandil, 2007; Balassa, Voloudakis, Fylaktos, & Suh, 1989; Narayan, 2004; Rahman & Islam, 2006; Reis Gomes & Senne Paz, 2005; Soleymani, Chua, & Saboori, 2011). Alawattage (2009) demonstrated that the real effective ER had little effect on Sri Lanka's TB, particularly in the short run.

In order to validate the ML condition, Boyd, Caporale, and Smith (2001), Onafowora (2003), and Bahmani-Oskooee, Harvey, and Hegerty (2014) used the BOP approach to evaluate the TB function. This approach is misleading because it only considers the net change in the TB and does not account for the active responsiveness of each export and import function to an ER shock (Xin et al., 2020).

Several empirical studies have shown that CD improves TB and that export and import demand change in response to changes in ER (Anju & Uma, 1999; Bahmani-Oskooee & Zhang, 2013; Balassa et al., 1989; Goldstein & Khan, 1978; Musawa, 2014; Narayan, 2004; Rahman & Islam, 2006; Reis Gomes & Senne Paz, 2005; Soleymani et al., 2011). However, several empirical studies have also refuted the efficiency of deprecation in addressing the TD problem (Ayen, 2014; Bahmani-Oskooee & Gelan, 2012; Bahmani-Oskooee & Kutan, 2009; Galebotswe & Andrias, 2011; Miles, 1979; Rose, 1991; Yazici, 2006).

Sengadjie and Montenegro (1999) and Wang and Lee (2012) directly determined the price elasticity (PEX) of each sector using the elasticity approach. Elasticities reflect the economic structure. This method permits the calculation of each sector's PEX, which facilitates policymaking for each sector. This study calculates the elasticity of exports, imports, and TB to Pakistan's real ER to disprove the myth that correcting trade deficits through ER depreciation is a suitable policy tool. The findings indicate that devaluation increases import demand, not export demand, worsening the TB. This study refutes the existence of the J-curve in Pakistan.

This study adds to the empirical literature on Pakistan in four ways: (1) It calculates the short-run and long-run elasticities of the import demand function based on three variables: real imports, real ER, and real domestic income; (2) It calculates the export demand function based on three variables: real exports, real ER, and real foreign income; (3) It uses the Johansen et al. (2000) structural break cointegration technique to estimate the long-run and short-run relationships; and (4) It investigates the responsiveness of trade elasticities under different trade regimes and ER policies in Pakistan.

The remaining sections of the paper are structured as follows: Section 2 examines empirical literature on foreign trade and ERs to document exports and imports' responses to income, relative prices, and ER. Section 3 discusses Pakistan's different trade regimes and trade liberalization strategies and measures. Sections 4 and 5 discuss the
2. REVIEW OF EMPIRICAL STUDIES

The conventional theory of international trade holds that the nominal depreciation or appreciation of a country’s currency has a direct and unremitting influence on its trade balance (Aftab & Aurangzeb, 2002; Bahmani-Oskooee, 2001; Bahmani-Oskooee & Malixi, 1992; Bahmani-Oskooee & Ratha, 2004; Musila & Newark, 2003; Rawlins & Praveen, 1993; Shahbaz, Awan, & Ahmad, 2011; Tochitskaya, 2007). Some empirical evidence supports the currency depreciation-trade balance improvement hypotheses in the long run, as well as the J-curve occurrence in shorter time periods (Aftab & Aurangzeb, 2002; Baharumshah, 2001; Bahmani-Oskooee, 2001; Brahmasrene & Jiranyakul, 2002; Lal & Lowinger, 2002; Onafowora, 2003; Rincón-Castro, 1999; Stucka, 2004; Sučka, 2003; Tochitskaya, 2007).

In contrast to the previous argument, some studies have tested the weak empirical impact of CD on long-run TB and J-curve significance in the short run (Buluswar, Thompson, & Upadhyaya, 1996; Duasa, 2007; Mahdavi & Sohrabian, 1993; Narayan, 2004; Wilson, 2001; Wilson & Tat, 2001). There is also evidence that CD has negatively impacted trade balances in Greece, India, Korea, and Thailand (Bahmani-Oskooee, 1985), eight developing countries in Asia, Europe, Africa, and Latin America (Upadhyaya & Dhalak, 1997), Turkey (Kale, 2001), and Pakistan (Aftab & Khan, 2008; Shahbaz et al., 2011). Halicioglu (2008) found that CD improves Turkish TB in the long-run but has an insignificant short-run J-curve.

Employing the autoregressive distributed lag (ARDL) approach on Ghana’s quarterly data from 2000 to 2017 to ascertain both the long-run and short-run relationships, Xin et al. (2020) showed that depreciation increases exports while appreciation increases imports. Thus, CD in Ghana will improve the country’s TB. For the cases of Ghana and South Africa, Agbola (2004) and Keshab and Mark (2013) showed that there is no J-curve and that CD has a long-run positive impact on TB. Similarly, Aftab and Aurangzeb (2002) find an ML condition in the long-run and a J-curve in the short-run for Pakistan. Aftab and Khan (2008) and Shahbaz et al. (2011) found no proof for a standard J-phenomenon in Pakistan. Rena, Chani, Irfan, and Shahabz (2011) revealed that there is a long-run relationship among TB, CD, real income, and money supply and that any CD in Papua New Guinea will worsen its TB.

Using the trade balance approach, empirical studies have evaluated the effect of currency devaluations and depreciations on the TB and confirmed the existence of the ML condition (Bahmani-Oskooee & Brooks, 1999; Bahmani-Oskooee et al., 2014; Boyd et al., 2001; Onafowora, 2003). Some studies have used the elasticity approach to BOP, in which export and import demand elasticities are separately modeled by two equations. Senhadji and Montenegro (1999) and Wang and Lee (2012) used the elasticity approach to determine the price elasticity of each sector. This method enables the determination of the price elasticity of each sector, making it easier to formulate policies for each sector.

Demirden and Pastine (1995); Hacker and Hatemi-J (2003); and Narayan (2004) have also provided evidence that a J curve exists. However, studies like Bahmani-Oskooee and Ratha (2004), Rose (1991), and Rose and Yellen (1989) found no empirical support for the J curve. Alawatage (2009) examined the effectiveness of Sri Lanka’s ER policy in achieving external competitiveness since the liberalization of the economy in 1977 and concluded that the real effective ER has no significant impact on improving the trade balance, particularly in the short run.

Some empirical studies in Pakistan have examined the influence of ERs on TB, explicitly aggregating and disaggregating exports and imports in terms of country, commodity, and industry. In this section, we examine studies that measure aggregated elasticities. The import, export, and balance of trade elasticities of ER, price, and income are displayed in Tables 1–3. They vary according to their sample period, data frequency, empirical methods, and macroeconomic variables that are modeled. The findings of these studies indicate that ERs play no consistent role in determining trade flows. Among the studies that support devaluation are Hasan and Khan (1994); Khan (1999); Bahmani-Oskooee (1998); Aftab and Aurangzeb (2002); Rehman and Afzal (2003); Kemal and Qadir (2005); Baluch
and Bukhari (2012); Saeed and Hussain (2013); Bano et al. (2014); Faridi and Kausar (2016); Khan, Azam, and Emirullah (2016); Khan, Khattak, Amjad, and Ashar (2016); and Ishtiaq, Qasim, and Dar (2016). They argued that depreciation would lead to a shift in consumer spending from imports to domestically produced goods. Consequently, the composition of national expenditures changed. Therefore, devaluation seems to be a realistic approach to boosting a nation’s TB over time. Alternatively, Akhtar and Malik (2000), Atique and Ahmad (2003), Felipe, McCombie, and Naqvi (2010), Chaudhary and Amin (2012), Shahbaz, Jalil, and Islam (2012), Saleem, Khan, and Zaman (2013), Shah (2014), Khan et al. (2016), Shahzad, Nafees, and Farid (2017), and Yasmeen and Hafeez (2018) argued that the government’s deliberate cheapening of its country’s currency further worsens the TB.

Except for the empirical analysis of Ishtiaq et al. (2016), the value of real ER elasticity for export demand in Pakistan ranges between -0.80 and -0.30. This indicates that when the ER falls, export demand in Pakistan does not increase significantly. In contrast to the findings of Afzal and Ahmad (2004), Pakistan’s trading partners’ incomes have a positive influence on its export demand. With the exception of the studies of Khan (1999) and Yasmeen and Hafeez (2018), the range of real ER elasticity for import demand in Pakistan is -0.24 to -0.78. This indicates that the depreciation of the real ER has a negligible effect on import demand. Increasing domestic income would also increase the demand for foreign goods. Consequently, with a real ER elasticity value ranging between -1.51 and -0.02, depreciation will not improve the TB.

<table>
<thead>
<tr>
<th>Author(s), Years</th>
<th>Data period</th>
<th>Yd or Yf</th>
<th>RER or REER</th>
<th>NER</th>
<th>PM/PD</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khan (1999)</td>
<td>1983Q1 - 1993Q3</td>
<td>2.13</td>
<td>0.78</td>
<td>-0.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afzal and Aurangzeb (2002)</td>
<td>1980Q1 - 2000Q4</td>
<td>0.91</td>
<td>-2.27</td>
<td>-5.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afzal and Ahmad (2004)</td>
<td>1960-2003</td>
<td>3.19</td>
<td>-0.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemal and Qadir (2005)</td>
<td>1981-2003</td>
<td>0.91</td>
<td>-0.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Felipe et al. (2010)</td>
<td>1971-2009</td>
<td>1.22</td>
<td>-0.53</td>
<td>0.710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bano et al. (2014)</td>
<td>1980-2010</td>
<td>0.69</td>
<td>-0.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khan et al. (2016)</td>
<td>1981-2010</td>
<td>1.40</td>
<td>-0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ishtiaq et al. (2016)</td>
<td>1970Q1-2012Q4</td>
<td>1.22</td>
<td>-0.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khan and Majed (2018)</td>
<td>1978-2016</td>
<td>2.16</td>
<td>-1.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yasmeen and Hafeez (2018)</td>
<td>1980-2016</td>
<td>1.13</td>
<td>0.23</td>
<td>-0.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Bold figure represents the insignificant coefficient.

**Source:** Where Yd is real GDP of Pakistan, Yf is real GDP of USA, RER is real exchange rate, NER is nominal ER, PM is price-level of imports, Pf is foreign price-level, PX is price-level of exports, and PD is domestic price-level.

<table>
<thead>
<tr>
<th>Author(s), Years</th>
<th>Data period</th>
<th>Yf</th>
<th>RER or REER</th>
<th>NER</th>
<th>Pf/Px</th>
<th>Px</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khan (1999)</td>
<td>1983Q1 - 1993Q3</td>
<td>1.63</td>
<td>-0.32</td>
<td>-0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afzal and Aurangzeb (2002)</td>
<td>1980Q1 - 2000Q4</td>
<td>2.11</td>
<td>-0.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atique and Ahmad (2003)</td>
<td>1972-2000</td>
<td>2.93</td>
<td>-3.78</td>
<td>0.04</td>
<td>2.92</td>
<td></td>
</tr>
<tr>
<td>Afzal and Ahmad (2004)</td>
<td>1960-2003</td>
<td>-3.78</td>
<td>-0.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemal and Qadir (2005)</td>
<td>1981-2003</td>
<td>1.41</td>
<td>-0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Felipe et al. (2010)</td>
<td>1980-2007</td>
<td>1.28</td>
<td>-0.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saleem et al. (2013)</td>
<td>1980-2010</td>
<td>0.96</td>
<td>-0.30</td>
<td>0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bano et al. (2014)</td>
<td>1982-2015</td>
<td>1.11</td>
<td>-0.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khan et al. (2016)</td>
<td>1970Q1-2012Q4</td>
<td>1.73</td>
<td>0.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ishtiaq et al. (2016)</td>
<td>1980-2016</td>
<td>2.23</td>
<td>-0.80</td>
<td>-0.44</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Bold figure represents the insignificant coefficient.

ER policies cannot correct the persistent trade imbalance due to other factors. These factors include: 1) Pakistan imports mostly capital and intermediate goods. Import demand is inelastic and less responsive to ER policies due to

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this reliance. 2) Pakistan exports most agricultural goods, which have an inelastic supply. Export demand may be less price-sensitive, and global income and depreciation policies may not affect export volume. 3) Pakistan's exports have low value due to low industrial development and a lack of technology-intensive products.

### Table 3. Pakistan balance of trade elasticities.

<table>
<thead>
<tr>
<th>Author(s), Years</th>
<th>Data period</th>
<th>Yf</th>
<th>Yd</th>
<th>RER or REER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehman and Afzal (2003)</td>
<td>1972Q1-2002Q4</td>
<td>2.86</td>
<td>-1.82</td>
<td>-0.89</td>
</tr>
<tr>
<td>Chaudhary and Amin (2012)</td>
<td>1980-2008</td>
<td>3.03</td>
<td></td>
<td>-0.31</td>
</tr>
<tr>
<td>Shahbaz et al. (2012)</td>
<td>1980Q1-2006Q4</td>
<td></td>
<td></td>
<td>-1.02</td>
</tr>
<tr>
<td>Saeed and Hussain (2013)</td>
<td>1985-2010</td>
<td>3.45</td>
<td>-2.42</td>
<td>-0.02</td>
</tr>
<tr>
<td>Faridi and Kausar (2016)</td>
<td>1972-2014</td>
<td></td>
<td></td>
<td>-0.09</td>
</tr>
<tr>
<td>Khan et al. (2016)</td>
<td>2005Q1-2014Q4</td>
<td>-0.01</td>
<td>-0.97</td>
<td>0.024</td>
</tr>
<tr>
<td>Ishtiaq et al. (2016)</td>
<td>1970Q1-2012Q4</td>
<td>1.68</td>
<td></td>
<td>0.92</td>
</tr>
</tbody>
</table>

### 3. HISTORY OF TRADE REGIMES IN PAKISTAN

Different Pakistani governments have implemented several trade policies over the last 73 years. These trade policies aim to reduce the TD, guarantee the availability of essential goods, and safeguard national priorities. Different ministries and departments are in charge of Pakistan's trade policies, which include exchange control, import licensing, export promotion, and tariff policies.

This study aims to examine the degree of responsiveness of imports and exports to ERs under different trade systems. In flexible ER systems, these elasticities are associated with currency appreciation and depreciation. Consequently, this study will focus on trade policies carried out after the introduction of flexible ERs in 1982. Trade policies after 1982 are separated into three episodes (i.e., the 1980s, 1990s, and 2000s). The data on trade and ER policies comes from Zafar (1997), Bader and Riazuddin (2006), and Hina and Qayyum (2019), as well as various trade policies and FBR yearbooks.

#### 3.1. Trade Policy in the 1980s

The first step in Pakistan's economic liberalization was the adoption of a flexible ER policy. In 1982, the Pakistani rupee was unpegged from the US dollar. Previously, the rupee/dollar ER was pegged, and the 1980s-81 increase in the value of the dollar diminished Pakistan's export competitiveness on the international market. Because market forces determined the ER, the floating ER policy facilitated import liberalization by letting the government remove restrictions without risking BOP problems. In 1986, import restrictions on 122 products were lifted, and a negative list was compiled. In 1987-88 and 1988-89, 124 and 162 products, respectively, were removed from the blacklist. The blacklist included items prohibited for religious or safety motives, luxury goods, and products prohibited to shield specific industries. The government has begun ratification, which replaces quantitative restrictions with tariffs for many imported goods. Quantitative restrictions remained the most prevalent form of protection.

#### 3.2. Trade Policy in the 1990s

During this time period, the nation experienced extreme political instability with frequent government changes. The liberalization of trade continued despite the pressure from various donors and international financial institutions. In the late 1980s and 1990s, decentralization and deregulation of state-owned enterprises and national financial institutions, liberal export and export policies, private sector participation in domestic markets and import and export businesses, market distortions, agricultural input subsidies (fertilizers, insecticides, agricultural machinery, etc.), and easing foreign investment restrictions were favored. Due to the country's economic situation, the private sector was allowed to export rice, raw cotton, fruits, and vegetables. Fresh fruit, vegetables, cut flowers, and seafood exporters received a 25% freight subsidy and duty limitation opportunity. The Export Financing Schedule was restructured.
and expanded. This schedule included Basmati rice, fruits, vegetables, animal casings, and mushrooms among its edible components. In July 1993, licensing requirements for non-negative list imports were eliminated. Pakistan's central government's dependence on customs revenue prevented it from meeting this goal and reducing its budget deficit. The tariff structure was further modified to comply with World Trade Organization (WTO) 1995 regulations. In 1995-96, the maximum tariffs were set at 65%, significantly higher than the initial target of 45%, and remained unchanged in 1996-97. Pakistan decreased the number of prohibited import categories from 215 in 1990 to 68 in 1996 (Ul-Haq, Khanum, & Raza Cheema, 2020; Ul-Haq, Wajid, Visas, Cheema, & Abbas, 2022; Wu, Ul-Haq, Zafar, Sun, & Jiang, 2019).

Dry ports, export processing zones, and new industrial zones were created. Despite this, the government kept setting support prices for a number of agricultural products that were not subject to market forces. Between 1991 and 1998, the value of the Pakistani rupee fell four times. The first episode happened in July 1993, followed by episodes two through four in October 1995, October 1997, and June 1998.

When the Indian government opted to devalue the rupee in May 1993, Indian textile exports soared by 30.2% in rupee terms and 19.5% in dollar terms, triggering the first devaluation in Pakistan. In order to maintain price parity with Indian goods, Pakistani textile exporters desired a minimum 10% currency devaluation. This depreciation had an immediate impact on the price of gasoline. From Rs. 11.31 per liter to Rs. 14.40 per liter, the price increased by 27.32%. The government then used the 14% devaluation of India's currency to support a second devaluation. The government asserted that if Pakistan does not adopt the same strategy, it will lose out on international markets. By making exports more affordable and competitive, devaluation would also increase export volume and foreign exchange transaction revenue. As Pakistan had consistently imported more than it exported, the government was once again unable to reach its objectives. Several exporters asserted that a 25% to 30% increase in import prices could encourage smuggling.

The third devaluation was due to the fact that Pakistan's exports to Europe fell by about 10%, to Japan by 20%, and to Southeast Asian countries by 55%. Pakistan's exports fell due to the rupee's appreciation against the European and Japanese currencies as a result of its being pegged to the dollar.

The government's main reason for a fourth devaluation was that a nuclear test on May 28th hurt the economy as foreign accounts were suspended, which eroded public trust in the government. This devaluation harmed capital goods, industrial raw materials, and military equipment imports.

3.3. Trade Policy during 2000- 2019

Since 2000, trade policy has prioritized trade openness and industrial growth. The government eliminated the five-year restriction on machinery imports, lowered the maximum tariff rate to 25%, and created a Pakistan export finance guarantee agency to help private sector small and medium enterprises (SMEs). The government gradually reduced tariffs on intermediate inputs and raw material imports by lowering the top rate. At the request of international financial institutions, tariff reforms were initiated in the early 1990s (Ul-Haq, Ashraf, Cheema, Hye, & Visas, 2023; Ul-Haq et al., 2020; Ul-Haq et al., 2022; Wu et al., 2019). The total number of tariff slabs decreased over time; in the 1980s, there were 42, but in 1993, there were 10, in 2015, there were 6, in 2016, and in 2017, there were 4. The average tariff rate decreased from 65% in 1989-90 to 45% in 1997-98, 17 percent in 2002-03, and 15% in 2015-2016. The Trade Policy for 2006-07 altered several import regulations, such as allowing government agencies to import directly without consulting the Ministry of Commerce.

To boost exports, Pakistan eliminated tariffs on several products in 2007-08. Manufacturing tariffs were eliminated. Chicken and stainless-steel welded pipes were taxed to protect domestic producers from foreign competition. Strategic protection and competitive import substitution guided the 2019-24 National Tariff Policy (NTP). Strategic protection will reduce business costs in the early stages of the industry's development and be phased out to encourage competition. NTP 2019-24 encouraged cost-effective import substitution. The NTP simplified tariff
slabs and gradually reduced tariffs on raw materials, intermediate goods, and machinery to eliminate tariff discrepancies. A cascading tariff structure, where duties increase with product processing, was also implemented.

In July 2000, Pakistan experienced a policy change in the exchange rate (ER) system. This change intensified ER volatility, and the PKR depreciated from Rs. 57.5 to Rs. 60.9 per US dollar. The nominal ER (measured against the US dollar) increased by 6% between 2001 and 2003, while foreign exchange reserves increased by 398%, from $2,146 million to $10,693 million. This was partly due to worker remittances made through official banking channels. To manage liquidity, the SBP purchased $8.3 billion in foreign currency. The global financial crisis of 2007–2008 had a negative impact on Pakistan's economy, affecting capital inflows, trade gaps, and remittances. The Pakistani rupee lost 14% of its value against the U.S. dollar in 2008, moving from Rs. 68.28 to Rs. 78.03 per US dollar. To increase its foreign exchange reserves, the elected government borrowed heavily from international financial institutions and friendly countries, resulting in a 7% appreciation of the rupee in 2014. As a result of the International Monetary Fund’s (IMF) market-based ER mechanism, which limited state bank participation, there was a massive depreciation in 2018 and 2019.

This study estimates trade elasticities for three distinct trade regimes on the basis of the information given above: the restricted trade regime of the 1980s, the moderate trade regime where trade liberalisation begins in the 1990s, and the outstandingly liberalised trade regime of the 2000s. Trade regimes are determined by the maximum tariff rate, the simple average tariff rate of all products, and a number of slabs. The information is displayed in Table 4.

<table>
<thead>
<tr>
<th>Period</th>
<th>Top tariff rate</th>
<th>Simple average rate (%)</th>
<th>Slabs</th>
<th>Trade regime</th>
<th>Exchange rate regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 1980s</td>
<td>120</td>
<td>65</td>
<td>42</td>
<td>Restricted</td>
<td>The flexible but managed regime</td>
</tr>
<tr>
<td>The 1990s</td>
<td>90</td>
<td>47</td>
<td>10</td>
<td>Process of liberalization starts</td>
<td>The flexible but managed regime</td>
</tr>
<tr>
<td>The 2000s</td>
<td>30</td>
<td>18</td>
<td>5</td>
<td>Liberalized</td>
<td>Flexible regime</td>
</tr>
</tbody>
</table>

4. THEORETICAL FRAMEWORK

Import and export demand functions analyze how devaluation affects trade deficits and surpluses. It is well known that changes in real disposable incomes at home (Yd) and the real exchange rate affect goods volume (RER). The Cobb-Douglas functional form for the import demand function is given as:

\[ IM = A_1 RER^{\alpha_1} Y_d^{\alpha_2} e^u \] (1)

Taking logarithmic transformation to linearize Equation 1 as follows:

\[ \ln IM_t = \ln A_1 + \alpha_1 \ln RER_t + \alpha_2 \ln Y_d + u \] (2)

Where \( \alpha_1 \) and \( \alpha_2 \) represent the ER and income elasticities, respectively. The expectation is that currency depreciation will reduce import demand (i.e., \( \alpha_1 < 0 \)) while an increase in domestic income will increase the demand for imported products (i.e., \( \alpha_2 > 0 \)).

Correlating changes in export volume to variations in foreign income (Yf) and the real ER is a common method for estimating export demand. The export demand function is formulated in the following Cobb-Douglas functional form:

\[ EX = A_2 RER^{\beta_1} Y_f^{\beta_2} e^v \] (3)

Taking logarithmic transformation to linearize Equation 3 as

\[ \ln EX_t = \ln A_2 + \beta_1 \ln RER_t + \beta_2 \ln Y_f + v \] (4)

In Equations 3 and 4, the elasticities of the ER and income are denoted by the \( \beta_1 \) and \( \beta_2 \), respectively. As the value of a country’s currency falls, its exports should rise (i.e., \( \beta_1 > 0 \)), and as foreign income rises, the demand for domestic exports should rise, therefore, \( \beta_2 > 0 \).
Analyzing the Marshall-Lerner (ML) condition helps determine if the real depreciation improves the trade deficit balance or makes it worse. According to the ML condition, a depreciation improves the trade balance if the total export and import elasticities is greater than one. Additionally, it has been discovered that even when the conditions are met in the long run, for most countries, the PEX and import demand are inelastic in the short run; this may be one of the factors explaining the J-curve.

Estimating the effect of the real ER on the trade balance is typically done by regressing the TB on the RER, the real income of the trading partner country, and the real income of the importing country; that is,
\[
\ln TB_t = \ln A + \gamma_1 \ln RER_t + \gamma_2 \ln Yf_t + \gamma_3 \ln Yd_t + \varepsilon
\]  
(5)

Where \( \gamma, \gamma \), and \( \gamma \) are the ER and income elasticities. Currency depreciation is expected to improve the trade balance, so we expect \( \gamma \) to be positive. We also expect \( \gamma \) to have a positive and \( \gamma \) to have a negative if the trade balance improves as a result of an increase in foreign income and a decrease in domestic income, respectively.

5. ECONOMETRIC METHODOLOGY

To avoid spurious analysis, the long-run elasticities are estimated using a cointegration method. If all variables are integrated in the same order, the Johansen and Juselius (1995) cointegration analysis method is preferable. An alternative choice for explanatory variables is the bound test that Pesaran, Shin, and Smith (2001) developed based on the ARDL model. These approaches are ineffective in addressing the structural break. Therefore, in the presence of a structural break in the series, Johansen and Juselius (1990) use structural break cointegration.

5.1. Cointegration Approach with Structural Breaks

The cointegrated vector autoregressive model with no breaks under Johansen's specification is presented as follows:
\[
\Delta z_t = \Pi z_{t-1} + \mu + \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \varepsilon_t
\]  
(6)

Where \( Z_t \) is a \((k \times 1)\) dimension vector of \( I(1)\) variables, \( \mu \) is a deterministic component, \( \varepsilon_t \sim N(0, \Sigma) \) is \((k \times 1)\) a vector of normally distributed random error terms and \( i \) is the lag length. \( \Gamma_i = -(I - A_1 - \ldots - A_i) \) is short-run dynamic coefficients, while \( \Pi = -(I - A_1 - \ldots - A_j) \) is a \((k \times k)\) matrix describing equilibrium cointegration vectors in the long run.

The rank of the matrix determines the number of cointegrating vectors \( r \). If \( 0 < \text{rank}(\Pi) < k - 1 \) then, it is further decomposed into two matrices: i.e. \( \Pi = \alpha \beta' \), with \( \alpha \) representing a \((k \times r)\) matrix containing the error correction coefficients measuring the speed of adjustment to equilibrium, and \( \beta' \) is a \((r \times k)\) matrix of \( r(\Pi) \) cointegrating vectors. The rank of \( \Pi \) (a matrix in Johansen and Juselius (1990) cointegration methodology) is measured by the likelihood ratio trace and maximum eigenvalue statistics. The cointegration relationship among the variables occurs only when \( 0 < \text{rank} \Pi < k \).

The deterministic part \( \mu \Pi \) plays an essential role in cointegration analysis. It consists of \( \mu_1, \Pi_1, t \) constant and trend terms in the long-run cointegration equation and \( \mu, \Pi, t \) are drift and trend of short-run vector autoregressive (VAR) model. According to the deterministic components, five distinct specifications along critical values have been discussed (Johansen, 1995). If the series have a quadratic trend, then reduced rank involves the combine matrix \((\Pi, \Pi_1) = \alpha (\beta', \gamma')'\) of the following, in Equation 7, cointegrated VAR model.
\[
\Delta z_t = \Pi z_{t-1} + \Pi_1 t + \mu_1 + \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \varepsilon_t
\]  
(7)
The sample is divided at each structural break point if there are q number of structural breakdowns. The VAR(p) model, in Equation 8, is picked for each sub-sample such that:

$$\Delta z_t = \Pi z_{t-1} + \Pi_j t + \mu_{1j} + \sum_{i=1}^{k-1} \lambda_i \Delta z_{t-i} + \varepsilon_t \tag{8}$$

The parameters of the stochastic components, i.e., $\Pi, \Pi_j$, and $\Sigma$ are the same for all sub-samples, whereas the parameters of deterministic trend $\Pi_j$ and $\mu_{1j}$ may change between sub-samples. A cointegration hypothesis is then formulated based on the rank of either $\Pi$ alone or in combination with $\Pi_1, \ldots, \Pi_q$. That is;

$$H_l(r): rank (\Pi, \Pi_1, \ldots, \Pi_q) \leq r \quad \text{or} \quad (\Pi, \Pi_1, \ldots, \Pi_q) = \alpha \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_q \end{bmatrix}$$

When there is no linear trend, but there is a broken constant level, a related hypothesis arises.

$$H_c(r): rank (\Pi, \mu_1, \ldots, \mu_q) \leq r \quad \text{and} \quad (\Pi, \Pi_1, \ldots, \Pi_q) = 0$$

In the presence of a structural break, the trace test's asymptotic distribution changes. The break location $(\lambda = T / T)$ and $(k - r)$, where $k$ is the number of variables and $r$ is the cointegrating rank being tested. Estimation is performed on JMulti and Eviews Software.

5.2. Vector Error Correction Model (VECM)

In this study, we employed a VECM. As no explicit a priori functional form relation between the variables is required, the VECM is helpful as it eliminates errors in model specification. When a shock or innovation occurs, a VECM and the cointegration equation allow dynamic adjustment in the short run as all variables revert to their long-run values. A compacted version of the VECM is presented as follows:

$$\begin{bmatrix} \Delta IM_t \\ \Delta RER_t \\ \Delta Y_{dt} \end{bmatrix} = \begin{bmatrix} a \\ b \\ c \end{bmatrix} \begin{bmatrix} 1 \\ \beta_1 \\ \beta_2 \end{bmatrix} \begin{bmatrix} IM_t \\ RER_t \\ Y_{dt} \end{bmatrix} + \begin{bmatrix} \lambda \\ 1 \end{bmatrix} \begin{bmatrix} D1998_{t-1} \\ c \end{bmatrix} + \begin{bmatrix} \varphi_1 & \varphi_2 & \varphi_3 \\ \psi_1 & \psi_2 & \psi_3 \end{bmatrix} \begin{bmatrix} \Delta IM_{t-1} \\ \Delta RER_{t-1} \\ \Delta Y_{d_{t-1}} \end{bmatrix}$$

The associated t-values are given as

$$\begin{bmatrix} \Delta IM_t \\ \Delta RER_t \\ \Delta Y_{dt} \end{bmatrix} = \begin{bmatrix} a \\ b \\ c \end{bmatrix} \begin{bmatrix} t_{\beta_1} & t_{\beta_2} \\ \vdots & \vdots \end{bmatrix} \begin{bmatrix} IM_t \\ RER_t \\ Y_{dt} \end{bmatrix} + \begin{bmatrix} t_\lambda & t_1 & t_2 \end{bmatrix} \begin{bmatrix} D1998_{t-1} \\ c \end{bmatrix} + \begin{bmatrix} t_{\varphi_1} & t_{\varphi_2} & t_{\varphi_3} \\ t_{\psi_1} & t_{\psi_2} & t_{\psi_3} \end{bmatrix} \begin{bmatrix} \Delta IM_{t-1} \\ \Delta RER_{t-1} \\ \Delta Y_{d_{t-1}} \end{bmatrix}$$

5.3. Data and Construction of Variables

This study used annual data from 1982 to 2019. The data are obtained from International Financial Statistics (IFS). Table 5 provides a detailed description and measurements of the variables.

Figure 1 shows nominal and real PKR/USD ERs. Depreciating nominal and real ERs raises NER and RER. Both lines moved the same way from 1980–2001. After 2001, NER and RER diverged as the SBP fixed the ER during crises. Domestic prices outpace foreign prices, offsetting NER depreciation. RER rose despite nominal depreciation. Only in extreme short-term disorderly should the SBP fix the ER with reserves. Currency crises or attacks occur if the SBP uses reserves to maintain the ER against the market.\(^1\)

As illustrated in Figure 2, the flawed ER policy has also impacted Pakistan’s trade balance. While Pakistan had a small deficit trade balance as a developing country, as ER policy became more anti-market, imports began to rise while exports remained stagnant, resulting in a broadening deficit TB. Imports rose faster than exports and remained above exports.

\(^1\) For more details, see Ul-Haq and Hina (2020).
Table 5. Description of variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>Real imports measured in billion Rs.</td>
<td>The nominal import value is deflated by the domestic price index of imports (2010=100)</td>
<td>IFS</td>
</tr>
<tr>
<td>EX</td>
<td>Real exports measured in billion Rs.</td>
<td>The nominal export value is deflated by the domestic price index of exports (2010=100)</td>
<td>IFS</td>
</tr>
<tr>
<td>TB</td>
<td>Trade Balance</td>
<td>It is the difference between real exports and real imports divided by real gross domestic product (GDP) to control scale effects. The figures are transformed by adding 1 minus the minimum value for log transformation to avoid logs with null values.</td>
<td>IFS</td>
</tr>
<tr>
<td>Yd</td>
<td>Real GDP of Pakistan</td>
<td>The GDP deflator deflates the nominal GDP to obtain the real GDP</td>
<td>IFS</td>
</tr>
<tr>
<td>Yf</td>
<td>The real GDP of the USA is used as a proxy for foreign countries income</td>
<td>The nominal GDP of the US is deflated by its GDP deflator to obtain the real GDP of a foreign country</td>
<td>IFS</td>
</tr>
</tbody>
</table>
| RER       | Real exchange rate | \[
RER = \frac{NER \cdot P_f}{P_d}
\]

Where NER is the nominal ER of Pakistan rupee (PKR) per unit of US dollar (US $), Pf and Pd are the price levels in a domestic and foreign country measured by using CPI of the respective countries. | IFS |

Note: Pf is domestic price level, whereas Pf stands for foreign price level.

All series follow a random walk model with drift, and each series has a break between 1998 and 2000.
6. **EMPIRICAL RESULTS**

In order to estimate elasticities, the regression model applies a logarithmic transformation to all variables denoted by lowercase letters. Cointegration analysis focused on determining each series' order of integration. The existence of a unit root is tested using statistics from the augmented Dickey and Fuller (1981) (ADF) and Zivot and Andrews (2002) tests. The unit root test compares the null hypothesis of unit root against the break-stationary alternative hypothesis and chooses the break period endogenously. Tables 6a and 6b show the results of the ADF and Zivot and Andrews (2002) unit root tests. Both tests recommend that all variables are stationary at the first difference, and each series breaks around 1998.

### Table 6a. Unit root test at level of series.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Lags</th>
<th>ADF test statistic</th>
<th>Zivot and andrews test</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>$IM$</td>
<td>0</td>
<td>-1.90</td>
<td>-3.78</td>
<td>I(1)</td>
</tr>
<tr>
<td>$EX$</td>
<td>0</td>
<td>-0.86</td>
<td>-3.55</td>
<td>I(1)</td>
</tr>
<tr>
<td>$Yd$</td>
<td>0</td>
<td>-2.17</td>
<td>-4.16</td>
<td>I(1)</td>
</tr>
<tr>
<td>$Yf$</td>
<td>1</td>
<td>-1.23</td>
<td>-1.23</td>
<td>I(1)</td>
</tr>
<tr>
<td>$RER$</td>
<td>0</td>
<td>-2.36</td>
<td>-3.53</td>
<td>I(1)</td>
</tr>
<tr>
<td>$TB$</td>
<td>2</td>
<td>-2.20</td>
<td>-3.73</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

### Table 6b. Unit root test at first difference of series.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Lags</th>
<th>ADF test statistic</th>
<th>Zivot and andrews test</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta IM$</td>
<td>0</td>
<td>-6.575***</td>
<td>-6.542***</td>
<td>I(0)</td>
</tr>
<tr>
<td>$\Delta EX$</td>
<td>0</td>
<td>-7.312***</td>
<td>-9.359***</td>
<td>I(0)</td>
</tr>
<tr>
<td>$\Delta Yd$</td>
<td>0</td>
<td>-6.537***</td>
<td>-8.113***</td>
<td>I(0)</td>
</tr>
<tr>
<td>$\Delta Yf$</td>
<td>0</td>
<td>-4.086***</td>
<td>-4.863***</td>
<td>I(0)</td>
</tr>
<tr>
<td>$\Delta RER$</td>
<td>0</td>
<td>-3.001***</td>
<td>-3.517***</td>
<td>I(0)</td>
</tr>
<tr>
<td>$\Delta TB$</td>
<td>1</td>
<td>-8.073***</td>
<td>-8.722***</td>
<td>I(0)</td>
</tr>
</tbody>
</table>

Note: *** denotes 1% significance level.

The structural break cointegration method that Johansen et al. (2000) came up with is a good way to estimate both the long-term and short-term relationships between the variables. While we did establish two structural breaks in 1998 and 2000, the latter initially appeared to be very insignificant. Breakpoint 1998 dummy variables are thus introduced as:

$$D_{1998/} = 0 \ (t = 1982, ..., 1998); = 1 \ (t = 1999, ..., 2019)$$ and $D_{2000/2}$ will be introduced in VECM.

7. **ESTIMATES OF TRADE ELASTICITIES**

To begin, we present the long- and short-run estimates of the import-export demand function for the entire sample, covering the years 1982 through 2019, and then we present the appropriate elasticities.

7.1. **Results of the Import Demand Function**

As shown in Equation 2, real imports ($\ln IM$), real ER ($\ln RER$), and real domestic income ($\ln Yd$) are the three variables that determine both the long-run and short-run elasticity of the import demand function. According to the AIC, SIC, HQ, and FPE information criteria, one period is the optimal lag time for the VAR model. At the 5% significance level, the VAR (1) residual shows heteroscedasticity and the absence of serial correlation.

In the cointegration and VAR parts of the vector error correction model (VECM), it is important to deal with random parts like drift and trend terms. This must be done after the lag length of the VAR model has been set. The majority of our series exhibit linear trends. The intercept component is freely added in cointegration analysis in both the long-run (cointegration portion) and short-run (VAR) models, according to Hina and Qayyum (2015). The trace
statistic is shown in Table 7 after being adjusted by the ratio $\frac{\tau-k^2}{\tau}$ to account for the bias caused by the limited sample size.

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Alternative hypothesis</th>
<th>$H_0(\tau)$</th>
<th>0.05 Critical value ($\lambda = 0.5, q = 2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r = 0$</td>
<td>$r &gt; 0$</td>
<td>111.468*</td>
<td>36.990 12.850 42.850</td>
</tr>
<tr>
<td>$r \leq 1$</td>
<td>$r &gt; 1$</td>
<td>24.913</td>
<td>21.930 26.440 27.170</td>
</tr>
<tr>
<td>$r \leq 2$</td>
<td>$r &gt; 2$</td>
<td>7.672</td>
<td>11.050 43.460 16.690</td>
</tr>
</tbody>
</table>

Note: * Indicates the rejection of the null hypothesis.

The null hypothesis of no cointegration ($r=0$) is rejected by the trace test at the 5% level, but the null hypothesis of a single cointegrating vector is not. As a result, the import demand function is cointegrated with one cointegrating vector. The result of the VECM is shown as:

$$\begin{bmatrix} \Delta im_t \\ \Delta rerr_t \\ \Delta y_{dt} \end{bmatrix} = \begin{bmatrix} 0.073 \\ 0.051 \\ 0.170 \end{bmatrix} \begin{bmatrix} 1 & -0.465 & -2.210 \\ \tau & 0.701 & 4.813 \end{bmatrix} \begin{bmatrix} D\\1998_t \\ c \end{bmatrix}$$

The associated $t$ – values are given as:

$$\begin{bmatrix} \Delta im_t \\ \Delta rerr_t \\ \Delta y_{dt} \end{bmatrix} = \begin{bmatrix} 1.101 \\ 0.847 \\ 9.063 \end{bmatrix} \begin{bmatrix} -3.140 & -23.631 \\ \tau & 6.613 & 7.348 \end{bmatrix} \begin{bmatrix} D\\1998_t \\ c \end{bmatrix}$$

The residual of VECM satisfied the diagnostic tests of Breusch-Godfrey LM test (Proposed by Breusch (1978) and Godfrey (1978)) of no serial correlation with one lag ($\chi^2 = 2.012$, $p-value = 0.158$), Engle (1982) no autocorrelation conditional heteroskedasticity (ARCH) LM test with one lag ($\chi^2 = 0.101$, $p-value = 0.760$) and Jarque-Bera normality test ($\chi^2(2) = 0.971$, $p-value = 0.623$) at 5% level of significance.

From the above representation the long run estimates for import demand function is:

$$im_t = -4.813 - 0.701D1998_t + 0.465rerr_t + 2.210 y_{dt}$$

Contrary to theoretical expectations, the results indicate that a one percent depreciation of the real ER increases real imports by 0.47 percent over the long term. However, depreciation has little effect on import demand in the short term. A percentage increase in domestic income increases import demand significantly over the long and short terms. These findings align with those of Khan (1999) and Yasmeen and Hafeez (2018). The import market is insensitive to changes in the real ER. Pakistan’s primary import are machinery and petroleum products, which are considered essential manufacturing inputs. Inelastic import demand indicates that no progress has been made in developing energy-saving technologies and that the country is still highly dependent on imported energy.

### 7.2. Results of the Export Demand Function

Equation 4 specifies the export demand function in terms of the three underlying variables: real exports (lnEX), real ER (lnRER), and real foreign income (lnYf). In the case of the VAR model, the Akaike information criterion
(AIC), Hannan-Quinn information criterion (HQ), and final prediction error (FPE) all recommend a lag of two periods, while the Schwarz information criterion (SIC) recommends a lag of only one period. The residual of the VAR (2) passes the diagnostic tests for no serial correlation and no heteroscedasticity at the 5% level, but not the residual of the VAR (1). Therefore, lag two is considered an optimal lag length.

For cointegration analysis, we introduce the unrestricted intercept terms and the $D_{1998}$ dummy variable in both the long-run (cointegrating part) and short-run (VAR) models. The trace statistic is provided in Table 8 after adjustment by a factor $(T-kl)/T$ to correct for small sample bias.

### Table 8. Johansen et al. (2000) cointegration test results.

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Alternative hypothesis</th>
<th>$H(r)$</th>
<th>0.05 Critical value ($\lambda = 0.5, q = 2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r \geq 0$</td>
<td>$r &gt; 0$</td>
<td>89.554</td>
<td>36.990 12.850 42.850</td>
</tr>
<tr>
<td>$r \leq 1$</td>
<td>$r &gt; 1$</td>
<td>25.210</td>
<td>21.930 26.440 27.170</td>
</tr>
<tr>
<td>$r \leq 2$</td>
<td>$r &gt; 2$</td>
<td>8.643</td>
<td>11.050 43.160 16.690</td>
</tr>
</tbody>
</table>

Note: * indicates the rejection of the null hypothesis.

The trace test shows one cointegrating vector among the variables of export demand function at a 5% level of significance. The result of VECM for export demand function is presented as below.

\[
\begin{bmatrix}
\Delta \text{ex}_{t} \\
\Delta \text{rer}_{t} \\
\Delta \text{yf}_{t}
\end{bmatrix} = \begin{bmatrix}
-0.070 \\
-0.013 \\
-0.017
\end{bmatrix} \begin{bmatrix}
1 & -1.392 & -1.411 \\
-0.255 & 0.532 & -1.783 \\
-0.153 & 0.077 & 1.375 \\
-0.019 & -0.021 & 0.251
\end{bmatrix} \begin{bmatrix}
\text{ex}_{t} \\
\text{rer}_{t} \\
\text{yf}_{t}
\end{bmatrix} + \begin{bmatrix}
0.130 \\
0.100 \\
-0.033
\end{bmatrix} \begin{bmatrix}
\text{D}1998 \\
\text{rer}_{t-1} \\
\text{yf}_{t-1}
\end{bmatrix}
\]

The associated $t$ – values are given as

\[
\begin{bmatrix}
\Delta \text{ex}_{t} \\
\Delta \text{rer}_{t} \\
\Delta \text{yf}_{t}
\end{bmatrix} = \begin{bmatrix}
-3.390 \\
-0.777 \\
-4.902
\end{bmatrix} \begin{bmatrix}
\text{ex}_{t} \\
\text{rer}_{t} \\
\text{yf}_{t}
\end{bmatrix} + \begin{bmatrix}
0.262 \\
0.100 \\
-0.033
\end{bmatrix} \begin{bmatrix}
\text{D}1998 \\
\text{rer}_{t-1} \\
\text{yf}_{t-1}
\end{bmatrix}
\]

The residual of VECM satisfies the diagnostic tests of Breusch-Godfrey LM test of no serial correlation with one lag ($\chi^2 = 0.313, p - value = 0.579$), Engle (1982) no autocorrelation conditional heteroskedasticity (ARCH) LM test with one lag ($\chi^2 = 0.557, p - value = 0.460$), and Jarque-Bera normality test ($\chi^2(2) = 3.777, p - value = 0.147$) at 5% level of significance.

The long run estimates for the export demand function derived from the above compact representation are presented as follows:

\[
\text{EX}_t = -4.241 - 0.130\text{D}1998_t - 1 + 1.392\text{RER}_t + 1.411\text{YF}_t
\]

(0.891) (0.257) (1.283) (1.210)

Similar to the findings of Felipe et al. (2010), the results indicate that a 1% depreciation of the real ER increases export demand by 0.53 percent in the short-run but has no effect on export demand in the long-run. In contrast, a one percent increase in foreign income reduces export demand by 1.78 percent in the short run but has no effect on export demand in the long-run. This indicates that Pakistan continues to export goods under its own brand names. A lot of our staple foodstuffs, including basmati rice, are shipped overseas under foreign labelling. Products benefit from brand loyalty on the global market. The following sections, which examine the effect of a depreciating currency and rising foreign and domestic incomes on the TB, further corroborate the accuracy of this result.
7.3. Results of the Trade Balance

To investigate the impact of real ER on trade balance, as shown in Equation 5, the AIC, SIC, HQ, and FPE information criteria suggest an optimal lag length of one for the VAR model. The residual of the VAR (1) satisfies the prerequisites of no serial correlation and no heteroscedasticity at a 5% level of significance. For cointegration analysis, we introduce the unrestricted intercept terms in both the long run (cointegrating part) and short-run (VAR) models, along with the $D_{1998}$ dummy variable. The trace statistic is provided in Table 9 after adjustment by a factor $(T-kl)/T$ to correct for small sample bias.

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Alternative hypothesis</th>
<th>$H_1(\hat{\tau})$</th>
<th>0.05 Critical value ($\lambda = 0.5, q = 2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r = 0$</td>
<td>$r &gt; 0$</td>
<td>146.770</td>
<td>55.980, 58.240, 62.660</td>
</tr>
<tr>
<td>$r \leq 1$</td>
<td>$r &gt; 1$</td>
<td>39.782</td>
<td>36.990, 38.960, 42.850</td>
</tr>
<tr>
<td>$r \leq 2$</td>
<td>$r &gt; 2$</td>
<td>23.207</td>
<td>21.930, 23.670, 27.170</td>
</tr>
<tr>
<td>$r \leq 3$</td>
<td>$r &gt; 3$</td>
<td>7.832</td>
<td>11.050, 12.840, 16.690</td>
</tr>
</tbody>
</table>

Note: * indicates the rejection of the null hypothesis.

The trace test shows two cointegrating vectors among the variables of the TB model at a 5% level of significance. The result of VECM is reported below.

$$
\begin{bmatrix}
\Delta tb_t \\
\Delta rer_t \\
\Delta y_{ft} \\
\Delta y_{dt}
\end{bmatrix} =
\begin{bmatrix}
-0.081 \\
-0.970 \\
2.832 \\
0.201
\end{bmatrix} +
\begin{bmatrix}
1 & 0.087 & -0.054 & 0.281 \\
200 & y_{ft} & y_{dt}
\end{bmatrix} +
\begin{bmatrix}
-0.030 & -0.364 \\
1998_t & c
\end{bmatrix}
$$

The associated $t$-values are

$$
\begin{bmatrix}
\Delta tb_t \\
\Delta rer_t \\
\Delta y_{ft} \\
\Delta y_{dt}
\end{bmatrix} =
\begin{bmatrix}
-0.172 \\
-2.160 \\
4.970 \\
1.940
\end{bmatrix} +
\begin{bmatrix}
3.725 & -2.230 & 2.554 \\
400 & y_{ft} & y_{dt}
\end{bmatrix} +
\begin{bmatrix}
-2.200 & -3.562 \\
1998_t & c
\end{bmatrix}
$$

The residual of VECM satisfied the diagnostic tests of Breusch-Godfrey LM test of no serial correlation with one lag ($\chi^2 = 0.310, p-value = 0.578$), Engle (1982) no autocorrelation conditional heteroskedasticity (ARCH) LM test with one lag ($\chi^2 = 0.55, p-value = 0.456$) and Jarque-Bera normality test ($\chi^2(2) = 3.767, p-value = 0.150$) at the 5% level of significance.

From the above compact representation, the long run estimates for import demand function are presented below as follows:

$$
TB_t = 0.364 + 0.030D_{1998\, t-1} - 0.087RER_t + 0.054Y_{ft\, t} - 0.281Y_{dt}
$$

130
The depreciation of the real ER by 1% reduces the trade balance by 0.09 percent in the long-run but has no significant effect in the short-run. This result confirms our previous findings that depreciation will not reduce import demand or increase export demand in Pakistan in the long run. According to the theory, changes in domestic and foreign income have favorable effects on TB.

As a result, we reject the J-curve phenomenon and conclude that ER policy has no effect on the structure. The need for a devaluation stems from inefficiencies in the structure of the economy.

7.4. Regime-wise Trade Elasticities

We can use the estimated trade elasticities for each trade regime to determine if depreciated ERs improve our trade balance. Table 10 shows that real ER depreciation increases import demand regardless of ER policy. The degree of ER elasticity means that import demand grows more slowly (0.40%) under a floating ER policy with liberalised trade policies than under restricted trade and managed float regimes (0.74%). A trade-restricted system makes import demand more currency-sensitive.

The elasticity of demand for exports is shown Table 11 indicates that currency depreciation does not lead to a rise in export demand. So, relating export promotion to currency depreciation is irrational. In order to make its exports globally competitive, a country should focus on diversifying its exports, adding value to them, and reducing the cost of raw materials through tariff reduction. Other than that, depreciation will only increase the cost of imported raw materials, which will in turn raise the unit price of exported goods. The majority of Pakistan's imports consist of raw materials, and estimates indicate that between 20 and 30 percent of all inputs used in Pakistani manufacturing have actually come from elsewhere (Ali, 2014).

Therefore, a weakening currency would hurt Pakistan's exports rather than help them. Elasticities in the trade balance lend credence to these claims. Table 12 shows that a 0.07 percentage point increase in the trade deficit is attributable to real ER depreciation. So, we can confidently conclude that Marshall Lerner's condition does not apply to Pakistan and that it will continue to be a net importer.

<table>
<thead>
<tr>
<th>Trade regime</th>
<th>Exchange-rate policy</th>
<th>Data period</th>
<th>Yd</th>
<th>RER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted</td>
<td>Managed float</td>
<td>1980-1989</td>
<td>1.030***</td>
<td>0.740*</td>
</tr>
<tr>
<td>The process of liberalization started</td>
<td>Managed float</td>
<td>1990-1999</td>
<td>2.550***</td>
<td>0.500</td>
</tr>
<tr>
<td>Liberalized</td>
<td>Flexible</td>
<td>2000-2018</td>
<td>1.770***</td>
<td>0.400*</td>
</tr>
<tr>
<td>Complete sample period</td>
<td></td>
<td>1980-2018</td>
<td>2.210***</td>
<td>0.470***</td>
</tr>
</tbody>
</table>

Note: *** *, are the significance level at 1% and 10%.

<table>
<thead>
<tr>
<th>Trade regime</th>
<th>Exchange-rate policy</th>
<th>Data period</th>
<th>Yf</th>
<th>RER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted</td>
<td>Managed float</td>
<td>1980-1989</td>
<td>3.210***</td>
<td>0.500</td>
</tr>
<tr>
<td>The process of liberalization started</td>
<td>Managed float</td>
<td>1990-1999</td>
<td>2.530***</td>
<td>0.760</td>
</tr>
<tr>
<td>Liberalized</td>
<td>Flexible</td>
<td>2000-2018</td>
<td>3.190***</td>
<td>-0.560</td>
</tr>
<tr>
<td>Complete sample period</td>
<td></td>
<td>1980-2018</td>
<td>1.410</td>
<td>1.390</td>
</tr>
</tbody>
</table>

Note: *** is the significance level at 1%.

<table>
<thead>
<tr>
<th>Trade regime</th>
<th>Exchange-rate policy</th>
<th>Data period</th>
<th>Yd</th>
<th>Yf</th>
<th>RER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted</td>
<td>Managed float</td>
<td>1980-1989</td>
<td>-0.120***</td>
<td>-0.120***</td>
<td>-0.070***</td>
</tr>
<tr>
<td>The process of liberalization started</td>
<td>Managed float</td>
<td>1990-1999</td>
<td>0.190</td>
<td>-0.240***</td>
<td>-0.070</td>
</tr>
<tr>
<td>Liberalized</td>
<td>Flexible</td>
<td>2000-2018</td>
<td>0.020</td>
<td>0.330***</td>
<td>-0.080*</td>
</tr>
<tr>
<td>Complete sample period</td>
<td></td>
<td>1980-2018</td>
<td>-0.280***</td>
<td>0.05***</td>
<td>-0.090***</td>
</tr>
</tbody>
</table>

Note: *** *, are the significance level at 1% and 10%.
8. CONCLUSION AND RECOMMENDATIONS

Using Pakistan's different trade regime data from 1982–2019, this study demonstrates that fixing TD through Depreciation is a misguided policy. The study estimates the long-run and short-run relationships between the variables using the Johansen et al. (2000) structural break cointegration technique and the VECM. It also explored the sensitivity of Pakistan's trade elasticities to various trade regimes and ER policies.

Export demand elasticity indicates that export demand is less sensitive to real ER fluctuations. This indicates that Pakistan continues to export goods under the Pakistan brand. For instance, the majority of its primary goods, such as basmati rice, are exported under foreign brand names. Brand loyalty protects goods on the global market, and exporters must be educated about product branding. Import demand is unaffected by real ER changes. Pakistan imports mostly machinery and petroleum, which are production inputs. Pakistan's inability to develop energy-saving technologies and import demand inelasticity show its dependence on imported energy. ER policy does not affect the structure of the economy. Trade-enhancing policies do not cause depreciation; rather, economic inefficiencies and reserve losses do. The government and policymakers should reform the economy rather than let the currency depreciate.

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