Articles

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Pro-Cyclicality of Pakistan's Monetary Policy Under Global Financial Uncertainty

ABSTRACT

The study investigates the impact of external factors on the macroeconomic indicators of Pakistan and checks the cyclicality of monetary policy (MP) under global financial uncertainty and its factors. This study employed monthly data from January 2005 to December 2024. First, the study estimates the reaction function to check the cyclical behavior of monetary policy, and whether Pakistan exhibits fear of free fall through VAR and then by impulse response function found the impact of external shocks on key macroeconomic variables. Finally, through variance decomposition, we assess, if is there any external dominance. The result of the study shows that Pakistan's monetary policy initial response is counter-cyclical in the face of global financial risk but also exhibits fear of free fall behavior because SBP increases the policy rate when the currency depreciates. The variance decomposition analysis shows that about 62 percent of variation is explained by inflation in interest rate and 28 percent of variation is explained by its own lagged value. SBP does not response to output gap despite its importance in Taylor rule. SBP should incorporate the output gap more explicitly in monetary policy formulation to ensure balanced economic stabilization.

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1. INTRODUCTION

"When the US sneezes, the rest of the world catches a cold."

Clemens von Metternich

This emphasizes that the US economy plays an essential role in the global financial system; disturbances in the US economy, such as financial crises or policy changes, often have an impact on other countries, impacting their trade, capital inflows, and investments. Emerging countries, like Pakistan, are vulnerable to global spillover due to their reliance on external financing, trade dependencies, and fragile economic structure. The increasing significance of spillovers from shocks in other economies has prompted both academics and practitioners to intensify their efforts in comprehending the pertinent transmission channels.

Researchers extensively studied external shocks as a significant source of macroeconomic fluctuations, given their implications for central bank decisions. These uncertainties are regarded as external monetary restraints imposed by developed countries on developing countries such as Pakistan (Younas, 2018). These foreign shocks significantly affect developing countries. Significant external shocks such as oil prices, variations in world gold prices, exchange rate volatility, and changes in global food prices affect the macroeconomic performance of a country like Pakistan (Rizwan, 2019).

According to Horvath and Zhong (2019), external shocks significantly influence macroeconomic variations in developing economies, with a significant percentage of this effect conveyed through the domestic stock market. A decline in external demand, a rise in external interest rates, and heightened uncertainty result in increased unemployment, diminished stock market returns, and devaluation of the domestic currency in developing market economies. The 1MP of emerging market economies actively responds to external shocks, mitigating their effects on domestic economic activity.

Monetary policy takes two forms: contractionary monetary policy and expansionary monetary policy. Decreasing the money supply and increasing interest rate is known as contractionary monetary policy while increasing money supply and decrease the interest is referred to expansionary monetary policy. On the other hand, cyclicality is the movement of interest rate with the business cycle. The policy is pro-cyclical when the central bank increases interest rate when the output gap is below potential (recession), Counter-cyclical when the central bank decreases the interest rate when the output gap is above potential (expansion), and a-cyclical when the interest rate does not respond to the business cycle. Literature argues about two potential rationales about the cyclicality.

- External Dominance
- Fear of Free Fall

Fraga et al. (2003) emphasize the external dominance influence on the developing economy rate-setting process, as their economies are susceptible to abrupt disruptions in capital flows as a result of outside shocks. The authors contend that these disruptions decrease the value of developing countries' currencies, which in turn increases inflation. Consequently, the developing countries authorities are compelled to raise their policy rate in order to mitigate these pressure of inflation. They explain this occurrence as an example of external control over monetary policy conduct, telling that monetary policy of developing countries usually tighten up in reaction to outside disturbances.

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[1] Monetary Policy

While Calvo and Reinhart (2002), underline the existence of fear of free fall on monetary policy in EMs[2]. EM policymakers dread currency depreciation, especially following external shocks, which undermines their credibility. As a result, they respond by raising interest rates. Fear is especially prevalent in financially weak economies with distinctive structures such high level of liability dollarization, deprived institutional integrity, and lack of credibility and independence of the central bank (Vegh & Vuletin, 2012). Currency depreciation may be costly for macroeconomic and financial stability, prompting central banks to prioritize exchange rate stability.

The volatility of the global economy often leads to fluctuations in the business cycle, affecting nations worldwide. Developing countries, which have liability dollarization, poor institutional quality, are particularly vulnerable to such economic shifts. Global economic imbalances can exacerbate these challenges, with policy decisions in major economies influencing economic activities in financial vulnerable economies.

This study investigates whether Pakistan's monetary policy exhibits cyclicality in response to global financial risks, while previous research has examined monetary policy using domestic factors and methodologies such as OLS and 2SLS; these studies are limited by their reliance on annual or quarterly data. Additionally, they overlook the role of global influences in shaping policy decisions. To address this gap, this study incorporates global financial factors and utilizes monthly data to identify the key drivers behind Pakistan's monetary policy cyclicality. Grounded in the concepts of external dominance and the fear of free fall, this study explores how the State Bank of Pakistan responds to external shocks in order to examine the cyclicality of monetary policy and identify the factors influencing its behavior.

2. LITERATURE REVIEW

2.1 Exploring the global spillovers to emerging market economies

Maćkowiak (2007) estimated the structural vector autoregressive model for eight countries, assuming that each country is a small open economy. This allows them to estimate the extent to which external shocks affect emerging markets' macroeconomic fluctuations, and their findings indicate that emerging economies' interest rates and exchange rates are quickly impacted by changes in US MP. If there is a contraction in the US MP, the emerging markets currency depreciates and cause inflation after sometime. MP shocks in the US have a greater impact on the changes in the aggregate price level and real aggregate production in emerging countries compared to their impact on the changes in the aggregate price level and aggregate output in the US.

Magud (2023) addresses movements in the distribution of the Real Effective Exchange Rate of SOE, using panel quantile regressions to put more emphasis on tail events rather than average changes. Global uncertainty, captured by the VIX, as well as U.S. monetary policy shocks, significantly influence the tails of the REER distribution. These effects are more pronounced in economies where foreign exchange markets are relatively less developed, central banks have lower credibility, and there is higher credit risk, thereby reflecting weaker macro fundamentals.

The author points out that foreign exchange intervention can dampen some of these shocks, particularly large depreciation events (left tail of the distribution), and the effectiveness of foreign exchange intervention is greater where the fundamentals are poorer and interventions are sparingly used. However, over-dependence on FXI may also aggravate pre-existing structural weaknesses, such as expanding FX markets, increasing central bank credibility, and macroeconomic fundamentals. Another relevant conclusion of the study is that, although capital flow management measures are quite ineffective in

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[2] Emerging Market Economies

preventing significant REER movements, they might augment the effectiveness of FXI right after the external shocks. This would indicate dynamic trade-offs in policy responses to external shocks.

Azad and Serletis (2022) explores the role of inflation targeting (IT) as a monetary policy framework in emerging economies, focusing on 26 European and Central Asian nations between 1997 and 2019. The research utilizes dynamic panel modeling and propensity score matching to assess IT influence on inflation control, GDP growth, and macroeconomic stability. A particular emphasis is placed on the post-2008 period, allowing for an evaluation of IT resilience during times of economic uncertainty. The empirical findings of this study indicate that IT has played a significant role in reducing inflation levels and minimizing inflation volatility. The impact appears particularly pronounced in the period following 2008, where IT-adopting nations demonstrated greater inflation stability compared to those using alternative monetary strategies. Furthermore, the study provides evidence that IT is associated with reduced macroeconomic volatility, particularly in GDP fluctuations, suggesting its role in fostering a more predictable economic environment. However, the research does not establish a strong link between IT adoption and GDP growth, indicating that while IT is effective in maintaining price stability, it does not inherently drive economic expansion.

A key aspect of the study is its acknowledgment of the challenges faced by emerging economies in implementing IT. High financial dollarization, exposure to external shocks, and underdeveloped financial markets remain barriers to its effectiveness. Despite these hurdles, the findings suggest that IT remains a viable policy tool, even in economies that do not fully satisfy the traditional prerequisites for its successful implementation.

Ma et al. (2022) explores the monetary policies of major Asian economies in response to the economic dislocations caused by the COVID-19 pandemic. As a frame of reference, the study looks at the responses to the global financial crisis of 2007–2009, setting the stage for the previously unseen and seemingly very different financial shock that occurred in 2020. The authors analyze eight major Asian economies — China, India, Indonesia, Pakistan, Bangladesh, Japan, the Philippines and South Korea. The countries were chosen based on their population size and the severity of the pandemic's economic impact. By applying the Autoregressive Distributed Lag (ARDL) approach to quarterly data from 2005Q3 to 2020Q3 the study facilitates the comparison of the monetary policy responses to the financial crisis and the pandemic.

The study finds that monetary authorities are less aggressive in their interest rate cuts during the global financial crisis era. During the COVID-19 pandemic, however, central banks adopted more flexible, expansionary policies, with sustained cuts in policy rates and greater liquidity injections to ease financial market tensions. Evidence from this paper that the pandemic recession led to larger than financial crisis cuts to interest rates by central banks. Central banks of many Asian countries like the Reserve Bank of India, State Bank of Pakistan, and People's Bank of China had made moderate rate cuts and open market operations to bolster financial stability.

Mosser (2020) examines the swift and large-scale actions taken by central banks worldwide to counteract the economic disruptions caused by the COVID-19 pandemic. The paper explores various monetary policies, liquidity provisions, and targeted credit initiatives implemented to stabilize financial markets and sustain economic activity.

One of the key observations of the study is that, unlike previous financial crises such as the 2007–2009 global financial crisis, the COVID-19 shock originated from a combination of sudden supply and demand disruptions rather than financial sector instability. As a result, central banks had to act quickly to prevent a deeper economic downturn. The paper emphasizes that the Federal Reserve introduced a range of

emergency measures within a short period in March 2020 comparable in number to those launched over the entire 2008 crisis—highlighting the urgency of the response.

2.2 Exploring the cyclicality of monetary policy

In the past 25 years, extensive research has explored how macroeconomic policies behave throughout economic cycles, especially across different countries. This includes understanding how central banks adjust their measures in response to these cycles. Monetary policy can either be pro-cyclical or countercyclical. Pro-cyclical policies see interest rates move inversely to the output gap, lowering during expansions and rising during recessions. Conversely, countercyclical policies move in tandem with the output gap, raising rates during expansions and lowering them during downturns. Policies that don't show clear correlation are deemed a-cyclical. Countercyclical monetary policy is widely seen as beneficial for stimulating economic growth and stabilizing economies. It's believed to soften both the peaks and troughs of economic cycles. Since 1994, there's been growing agreement on the importance of countercyclical measures in stabilizing the South African economy (Wu, 2021).

According to Carneiro and Garrido (2015), some developing countries have been able to shift away from pro-cyclical fiscal policies, but many are still characterized by fiscal behavior that amplifies the effects of economic fluctuations. Compared to industrialized economies, developing nations are more likely to adopt fiscal policies that intensify business cycle volatility during both booms and downturns. The "when-it-rains-it-pours" phenomenon is supported, as documented before (Kaminsky et al., 2004). The inference holds well for different methods of smoothing fiscal policy cyclicality and across country-specific structural break tests in groupings economies for comparative analysis. Institutional quality is a factor significantly influencing cyclicality in fiscal policy. Countries with stronger institutions are better positioned to implement counter-cyclical policies, as they can save during economic growth and set aside fiscal buffers for use in downturns. The study holds that efforts at reducing the pro-cyclicality of fiscal policy must be complemented with institutional reforms.

The covid-19 was a major shock all over the world and slowed down the economic and social progress of most countries. The Chinese government put in place several macroeconomic policies to deal with this shock. To help the real economy, the People's Bank of China decrease interest rates, reserve requirements, and lending fees. M2, loans, and social finance capital all grew as a result, giving businesses important liquidity and timely support during the pandemic. By the end of 2020, China's GDP had increased by 0.7% year over year, along with fixed asset investment and retail sales of consumer products. The third quarter saw significant growth in the service sector as it recovered as well. The following is the monetary policy effect transmission pathway for the countercyclical adjustment: The central bank increases the money supply rises, the interest rate, more money is invested in the real economy (I increases), and more money is earned nationally (y increases) (Wu, 2021).

Lane (2003) empirical study reveals a fundamental vulnerability of emerging market economies to economic cycles compared to industrial economies. The study provides verification of countercyclical fiscal policy in OECD countries, contrasting with evidence of pro-cyclical policy tendencies in developing countries. Additionally, loose monetary policy, as suggested by (De Leo et al., 2022) can bolster domestic liquidity, potentially offsetting weaknesses in the domestic financial sector and restricted access to foreign capital markets.

Those countries which have strong institutions usually adopt countercyclical macroeconomics policies and vice versa. According to (Calderón, 2016) findings institutional quality plays a predominant role in the execution of countercyclical macroeconomics policies. Clarida et al. (1998) found that the inflation coefficient was above 1 which means that with an increase in expected inflation, central banks in for US, Japan, and Germany raised the nominal interest rates which elevated real interest rates. Except US the coefficient of output gap was positive for other countries, which indicates that Japan and Germany

adopted countercyclical monetary policy, adjusting interest rates decreases during bad times and increases during good times.

However, US post-1997 period monetary policy was described as cyclical. Macroeconomic cycles and capital flow cycles reinforce each other in the context of emerging nations, especially those with middle-high income status. This reinforcement is comparable to the "when it rains, it pours" phenomenon. When money enters a nation, the economy expands, encouraging spending and development. On the other hand, decreased capital inflows during economic downturns aggravate downturns. Positive or negative trends in capital flows and macroeconomic cycles reinforce one another because of this interaction, which adds to the cyclicality and interdependence of a country's economic trajectory (Kaminsky et al., 2004).

In OECD countries, macroeconomic policies aim to stabilize the business cycle, with interest rates decreasing during contractions and increasing during expansions (Kaminsky et al., 2004). However, in developing countries, macroeconomic policies tend to exacerbate the cycle, with interest rates decreasing during expansions and increasing during contractions, leading to extreme economic fluctuations ("Turning sunny days into scorching infernos and rainy days into torrential downpours").

Many countries have shifted away from pro-cyclical policies due to overcoming the fear of free-falling. Historically, during currency depreciations, policymakers raised interest rates to defend the currency, fearing further capital outflows and widespread bankruptcy among firms with dollar-dominated debts. However, as many emerging markets adopted market-friendly reforms and improved macroeconomic policies, policymakers have become more inclined to adopt countercyclical monetary policies (Vegh & Vuletin, 2012).

The literature also argues about what kind of policies were adopted by the countries during the (2007-2008) financial crisis, (Ghalayini, 2018) and reveals that one of the key determinants of counter-cyclical monetary policy during the crisis is the enforcement of inflation targeting before the crisis. Inflation targeting does serve as a stand-in for the credibility and transparency of central banks. During the 2008-2009 financial crisis, emerging market economies (EMEs) significantly eased monetary policy to act as buffer against the global financial shock and promote economic recovery. This is a significant change from prior crisis experiences when EMEs were often forced to hike interest rates to enhance monetary policy credibility, preserve the value of their currencies, and restrict capital flight (Coulibaly, 2012).

Before the Great Financial Crisis, the United States economy went through 25 years of "Great moderation". The new systemic Approach keeps the US economy always one step ahead when risks caused by inflation or recession by keeping its effort on contractionary monetary policy during expansion and expansionary monetary policy when the situation is reversed (Fischer, 2021).

2.3 Exploring Pakistan's literary landscape
Monetary policy in Pakistan has been a critical tool in the country's economic landscape, much like the ebb and flow of a river. It has changed over time to meet the changing demands of a growing country. Pakistan's monetary policy path shows the country's search for stability and prosperity, from the days of fixed exchange rates to the more recent adoption of flexible inflation targeting. As the country's central bank, the State Bank of Pakistan has played a critical role in defining this narrative. It must strike a difficult balance between managing inflation, promoting economic growth, and preserving currency stability.

The literature on monetary policy in Pakistan is filled with arguments on its efficiency, transmission mechanisms, and influence on economic well-being. Hussain et al. (2022) tried to evaluate the transmission mechanism efficiency by autoregressive took data from 1991 to 2019 and concluded that the

monetary policy credit channel is more effective as compared to the exchange rate and asset price channel.

Younas, (2018) explores the constraints imposed by external shocks on the monetary policy in Pakistan. It analyzes the impact of global food prices, oil prices, and foreign interest rate changes on the macroeconomic variables and highlights challenges created by these shocks for a central bank in achieving its monetary policy objectives of stable inflation and full employment. The study employed a SVAR model, along with IRF and variance decomposition the study showed that global oil and food prices exert significant inflationary pressure. Production costs are increased by these shocks, specifically in the industrial sector which results in higher domestic prices and makes it difficult for the SBP efforts to stabilize inflation and support growth. Additionally, the foreign interest rate has a significant impact on exchange rates and inflation but minimal impact on macroeconomic variables.

In the realm of Pakistani monetary policy, there are studies that explore different channels of monetary policy, a pro-cyclical monetary policy by employing OLS and 2SLS method, only considering the domestic variables and using annual or quarterly data, there remains a dearth of investigation into what the factors are behind it, which is causing it. Consequently, our study seeks to address this gap by identifying and analyzing the drivers influencing the cyclical nature of monetary policy in Pakistan by utilizing monthly data, also incorporating the global factor.

3. THEORETICAL FRAMEWORK

The Taylor-type rule is one method of characterizing a country's monetary policy, which suggests that the policy rate should be raised when the output gap exceeds the target, and it should be lowered when recession appears to be a greater concern. The Taylor rule operates under the presumption that the interest rate channel of monetary policy is highly effective (Taylor, 1993).

The Taylor rule's success relies on the interest rate channel, which follows a new Keynesian framework for monetary policy transmission. The Taylor rule can be derived using the new Keynesian framework, which involves three equations: the central bank's loss function, the IS curve, and the Phillips curve.

3.1 Reaction Function
Given that the central bank complies with an interest rate-based reaction function, the standard reaction function is as follows:

$$i_t = f(\pi_t, X_t) \tag{1}$$

The reaction function represents positive relationship between inflation and output gap. It is obtained by minimizing the loss function in relation to the IS curve and the Phillips curve. This reaction function shows that the central bank establishes its policy rate in accordance with the inflation and output gap.

3.2 External Shocks and their Transmission to Developing Countries
This transmission mechanism based on the literature (Bhattarai et al., 2021), holds that the flight to quality channel collapses the global risk appetite and creates a risk-off environment with capital outflows, thus transmitting the global financial risk shocks to the financial markets of developing countries. As a result, the flight to quality mechanism increases the realized volatility and EM sovereign risk. This is because it not only changes investors' perceptions of developing economies' risk but also affects capital flows, which causes a significant depreciation in currency values.

During the second phase of transmission, the exchange rate risk-taking channel starts to become active. The devaluation of currencies compels central banks in emerging markets to confront a challenging decision between maintaining financial stability and achieving macroeconomic stabilization, all while handling global financial shock. This situation poses a risk to financial stability via the channel of increased risk-taking.

The procedure is outlined as follows: global financial risk creates currency devaluation, which has a negative impact on the financial balance sheets of both developing economies borrowers and foreign lenders. The valuation impacts have two outcomes. For starters, they boost the former's perceived riskiness, reducing their creditworthiness. Second, they eventually lead to increased sovereign risk, resulting in a drop in capital inflows and extra devaluation pressure.

Conversely, these consequences diminish the ability of the latter to borrow money, compelling them to reduce the amount of credit they provide, and thus leading to a further decrease in the amount of money coming into the country. Consequently, the increased cautiousness of global investors, which arises internally from currency devaluations, leads to a significant increase in the risk faced by governments and a substantial decrease in the amount of money flowing into the country. This presents an immediate danger to the stability of the financial system by additional weakening of the local currency and intensifying financial strain (Carstens & Shin, 2019).

Due to global financial risk uncertainty increase, and investors seeks safe heaven assets so it declines capital inflow.

$$\text{Global Financial Risk increase} \uparrow \rightarrow \text{Capital Inflow} \downarrow$$

Decline in capital inflow cause the domestic currency to depreciate, which affect real effective exchange rate reducing external competitiveness.

$$\text{Global Financial Risk} \uparrow \rightarrow \text{Capital Inflow} \downarrow \rightarrow \text{Exchange rate} \uparrow \rightarrow \text{REER} \downarrow$$

Depreciation in domestic currency increases the cost of imports, which worsen the trade deficit due to higher risk global demand may decline further deteriorate the trade balance.

$$\text{Global Financial Risk} \uparrow \rightarrow \text{ER} \uparrow \rightarrow \text{Cost of Imports} \uparrow \rightarrow \text{Trade Balance} \uparrow$$

Depreciation of currency leads to higher cost of imports, fueling cost push inflation and higher inflation increase the cost of living.

$$\text{ER} \uparrow \rightarrow \pi \uparrow$$

When inflation increase it raises the interest rate to control the inflation, due to tight monetary policy borrowing cost increases, which reduce the private and aggregate demand.

$$\pi \uparrow \rightarrow i_t \uparrow \rightarrow \text{Investment} \downarrow \rightarrow \text{AD} \downarrow$$

Higher interest rate increase lending rates which reduce the investment and consumption so the lower aggregate demand leads to negative output gap.

$$i_t \uparrow \rightarrow \text{lending rate} \uparrow \rightarrow \text{Investment} \downarrow \rightarrow \text{AD} \downarrow$$

3.3 Inclusion of Exchange rate in Reaction Function

The channel that connects the domestic and global economies is the exchange rate channel. For example, when domestic interest rates rise, local currency financial assets like bonds and deposits denominated in rupees become comparatively more appealing than those denominated in foreign currencies. It raises the relative demand for local currency relative to foreign money, which could result in either a rise in local currency value or less pressure on it to depreciate. Because local goods are now more expensive than foreign goods due to the relative increase in the value of the home currency, net exports and, consequently, aggregate demand decline. Additionally, by affecting the costs of imported products and services, interest rate fluctuations may directly affect inflation.

Fabris and Lazić (2022) stated that the increased levels of exchange rate pass-through, recent hyperinflation episodes and crises, and, consequently, less stable inflation expectations all support the significance of the exchange rate in the monetary policy reaction function of emerging market countries. However, it is anticipated that the strengthening of monetary policy credibility and anchoring inflation expectations will be positively impacted by the positive trend of inflation targeting adoption and experience gained following the transition period (South-Eastern European countries) or economic and financial turmoil.

4. METHODOLOGY

The Vector Autoregressive model is broadly used in time series analysis due to its ability to capture the dynamic relationships among multiple variables simultaneously. Unlike traditional single-equation models, each variable in the vector autoregressive model is a function of both its own lagged values and the lagged values of the other variables. This feature makes VAR particularly valuable when studying macroeconomic indicators, where variables such as GDP, inflation, interest rates, and exchange rates are often interconnected.

VAR models are effective in assessing the impact of economic shocks through tools like IRF, which trace the effects of a one-time disturbance in one variable on the rest of the system over time. They also allow for variance decomposition, which helps identify the proportion of fluctuations in a variable that can be attributed to shocks in other variables. This makes VAR particularly useful for policy analysis, enabling economists to evaluate how changes in monetary or fiscal policy influence various aspects of the economy. Moreover, by accounting for the interdependencies between variables, VAR models help mitigate issues related to simultaneity and endogeneity that can bias results in traditional regression models. Chushman and Zha (1997) and (Maćkowiak, 2007) has utilized Vector Autoregressive (VAR) models to identify and analyze the dynamic effects of external shocks.

To examine the impact of external shock, consider the seven variable structural where GFR is the global financial risk, Y_t is the output gap, π_t is the inflation, tb_t is the trade balance, ci_t represents the capital inflows, i_t is the call money rate and ER_t shows the exchange rate.

$$gfr_t = \beta_{10} - \beta_{12}y_t - \beta_{13}\pi_t - \beta_{14}tb_t - \beta_{15}ci_t - \beta_{16}i_t - \beta_{17}ER_t + \alpha_{11}gfr_{t-i} + \alpha_{12}y_{t-i} + \alpha_{13}\pi_{t-i} + \alpha_{14}tb_{t-i} + \alpha_{15}ci_{t-i} + \alpha_{16}i_{t-i} + \alpha_{17}ER_{t-i} + \varepsilon_{gfr} \tag{2}$$

$$y_t = \beta_{20} - \beta_{21}gfr_t - \beta_{23}\pi_t - \beta_{24}tb_t - \beta_{25}ci_t - \beta_{26}i_t - \beta_{27}ER_t + \alpha_{21}gfr_{t-i} + \alpha_{22}y_{t-i} + \alpha_{23}\pi_{t-i} + \alpha_{24}tb_{t-i} + \alpha_{25}ci_{t-i} + \alpha_{26}i_{t-i} + \alpha_{27}ER_{t-i} + \varepsilon_y \tag{3}$$

$$\pi_t = \beta_{30} - \beta_{31}gfr_t - \beta_{32}y_t - \beta_{34}tb_t - \beta_{35}ci_t - \beta_{36}i_t - \beta_{37}ER_t + \alpha_{31}gfr_{t-i} + \alpha_{32}y_{t-i} + \alpha_{33}\pi_{t-i} + \alpha_{34}tb_{t-i} + \alpha_{35}ci_{t-i} + \alpha_{36}i_{t-i} + \alpha_{37}ER_{t-i} + \varepsilon_\pi \tag{4}$$

$$tb_t = \beta_{40} - \beta_{41}gfr_t - \beta_{42}y_t - \beta_{43}\pi_t - \beta_{45}ci_t - \beta_{46}i_t - \beta_{47}ER_t + \alpha_{41}gfr_{t-i} + \alpha_{42}y_{t-i} + \alpha_{43}\pi_{t-i} +$$
$$\alpha_{44}tb_{t-i} + \alpha_{45}ci_{t-i} + \alpha_{46}i_{t-i} + \alpha_{47}ER_{t-i} + \varepsilon_{tb} \tag{5}$$

$$Ci_t = \beta_{50} - \beta_{51}gfr_t - \beta_{52}y_t - \beta_{53}\pi_t - \beta_{54}tb_t - \beta_{56}i_t - \beta_{57}ER_t + \alpha_{51}gfr_{t-i} + \alpha_{52}y_{t-i} + \alpha_{53}\pi_{t-i} +$$
$$\alpha_{54}tb_{t-i} + \alpha_{55}ci_{t-i} + \alpha_{56}i_{t-i} + \alpha_{57}ER_{t-i} + \varepsilon_{ci} \tag{6}$$

$$i_t = \beta_{60} - \beta_{61}gfr_t - \beta_{62}y_t - \beta_{63}\pi_t - \beta_{64}tb_t - \beta_{65}ci_t - \beta_{67}ER_t + \alpha_{61}gfr_{t-i} + \alpha_{62}y_{t-i} + \alpha_{63}\pi_{t-i} +$$
$$\alpha_{64}tb_{t-i} + \alpha_{65}ci_{t-i} + \alpha_{66}i_{t-i} + \alpha_{67}ER_{t-i} + \varepsilon_i \tag{7}$$

$$ER_t = \beta_{70} - \beta_{71}gfr_t - \beta_{72}y_t - \beta_{73}\pi_t - \beta_{74}tb_t - \beta_{75}ci_t - \beta_{77}ER_t + \alpha_{71}gfr_{t-i} + \alpha_{72}y_{t-i} + \alpha_{73}\pi_{t-i} +$$
$$\alpha_{74}tb_{t-i} + \alpha_{75}ci_{t-i} + \alpha_{76}i_{t-i} + \alpha_{77}ER_{t-i} + \varepsilon_{ER} \tag{8}$$

The equations 2 to 8 cannot be estimated by OLS when contemporaneous effect is present between variables, the OLS estimated would be biased due to simultaneous equation bias because the explanatory variables and error terms becomes correlated, violating the basic assumption of OLS. It is possible to convert the system of equations into a more usable form. we can write the system in the compact form using matrix algebra.

$$
\begin{bmatrix} 1 & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} \\ \beta_{21} & 1 & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} & \beta_{27} \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\ \beta_{41} & \beta_{42} & \beta_{43} & 1 & \beta_{45} & \beta_{46} & \beta_{47} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & 1 & \beta_{56} & \beta_{57} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & 1 & \beta_{67} \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & \beta_{75} & \beta_{76} & 1 \end{bmatrix}
\begin{bmatrix} gfr_t \\ y_t \\ \pi_t \\ tb_t \\ Ci_t \\ i_t \\ ER_t \end{bmatrix}
=
\begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \\ \beta_{71} \end{bmatrix}
+
\begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} & \alpha_{17} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} & \alpha_{27} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} & \alpha_{37} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} & \alpha_{47} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} & \alpha_{57} \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} & \alpha_{67} \\ \alpha_{71} & \alpha_{72} & \alpha_{73} & \alpha_{74} & \alpha_{75} & \alpha_{76} & \alpha_{77} \end{bmatrix}
\begin{bmatrix} gfr_{t-i} \\ y_{t-i} \\ \pi_{t-i} \\ tb_{t-i} \\ ci_{t-i} \\ i_{t-i} \\ ER_{t-i} \end{bmatrix}
+
\begin{bmatrix} \varepsilon_{gfr} \\ \varepsilon_y \\ \varepsilon_\pi \\ \varepsilon_{tb} \\ \varepsilon_{ci} \\ \varepsilon_i \\ \varepsilon_{ER} \end{bmatrix}
$$

or

$$\beta X_t = \beta_0 + \alpha X_{t-i} + \varepsilon_t$$

Where,

$$
\beta = \begin{bmatrix} 1 & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} \\ \beta_{21} & 1 & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} & \beta_{27} \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\ \beta_{41} & \beta_{42} & \beta_{43} & 1 & \beta_{45} & \beta_{46} & \beta_{47} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & 1 & \beta_{56} & \beta_{57} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & 1 & \beta_{67} \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & \beta_{75} & \beta_{76} & 1 \end{bmatrix}, X_t = \begin{bmatrix} gfr_t \\ y_t \\ \pi_t \\ tb_t \\ Ci_t \\ i_t \\ ER_t \end{bmatrix}, \beta_0 = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{61} \\ \beta_{71} \end{bmatrix},
$$

$$
\alpha = \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} & \alpha_{17} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} & \alpha_{27} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} & \alpha_{37} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} & \alpha_{47} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} & \alpha_{57} \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} & \alpha_{67} \\ \alpha_{71} & \alpha_{72} & \alpha_{73} & \alpha_{74} & \alpha_{75} & \alpha_{76} & \alpha_{77} \end{bmatrix}, \varepsilon_t = \begin{bmatrix} \varepsilon_{gfr} \\ \varepsilon_y \\ \varepsilon_\pi \\ \varepsilon_{tb} \\ \varepsilon_{ci} \\ \varepsilon_i \\ \varepsilon_{ER} \end{bmatrix}
$$

The co-efficient matrix (β) captures the contemporaneous effect of variables on each other, while $\beta0$ is the intercept matrix. The coefficient matrix (α) measures the lagged effects of variables on each other, and structural errors (ε_t) include zero mean, constant variance, serially and cross-uncorrelated innovations. Pre-multiplication of β^{-1} allows us to obtain the VAR model in standard form:

$$X_t = A_o + A_1 X_{t-i} + e_t \tag{9}$$

Where, $A_o = \beta_0\beta^{-1}$, $A_1 = \beta^{-1}\alpha$, and $e_t = \beta^{-1}\varepsilon_t$ with the assumption that E $(e_{jt}) = 0$, Var $(e_{jt}) = 0$, and Cov $(e_{jt}, e_{jt-1}) = 0$, but Cov (e_{jt}, e_{jt-1}) may or may not be equal to zero.

4.1 Recursive identification
According to (Sims et al., 1990) one way to identify the model is to use the type of recursive system. The identification of the structural form requires at least $n(n-1)/2$ restrictions so our model contains seven variables; the minimum number of restrictions required is 21. This study used a recursive Cholesky decomposition method with the order of global and domestic variables to find shocks and their impact on our domestic variables. So, the order of the variables is very important and could change the dynamics of the model.

4.2 Ordering of variables
The study's particular arrangement of the global and domestic variables is predicated on the presumptions drawn from the literature, as stated in (Maćkowiak, 2007). In a SOE, the financial stress index responds to its shock and domestic variables do not affect the financial stress index. Therefore, domestic variables do not enter the global variable equation, either with a lag or instantaneously. The sequencing of variables is predicated on this assumption; the domestic variables are positioned after the global variables. Comparatively, domestic macroeconomic indicators respond slower than domestic financial variables. As a result, changes in the macroeconomic aggregates quickly affect the financial variables, including exchange rate and interest rate. However, the macro aggregates don't respond to financial shocks contemporaneously. Moreover, central banks set the short-term interest rate, which is used as an instrument for policy. Hence, the other financial variable's exchange rate responds more quickly than the interest rate. The ordering of the variables is consistent with the recent work of (Yildirim, 2022).

4.3 Data source and variables
This study relies on secondary data obtained from reliable sources. We gathered monthly statistics from January-2005 until Decmeber-2024.

Table 1: Description of Variables

Variables	Measuring	Sources
Global Financial Risk	Financial Stress Index	FRED
Policy Rate	Call Money rate	SBP
Output Gap	Large Scale Manufacturing	SBP
Inflation	Inflation rate	SBP
Capital Inflows	FDI inflows + Private Portfolio Investment + other investment	SBP
Trade Balance	Export minus Imports	SBP
Exchange rate	Rupee/US dollar	SBP

4.4 Key variables
This study used six variables some of which are observed and their data is available while some variables are unobserved and created for the analysis.

Global Financial Risk: According to the definition of Office of financial research,3 the financial stress index measures financial market stress by incorporating 33 financial market variables which include yield spread, volatility, credit spreads, etc. It incorporates five categories, credit, equity valuation, funding, safe assets, and volatility. The index shows stress contribution by United States, Euro Zone, Japan, and other emerging economies as well. The index provides policymakers, central banks, and financial institutions with a real-time, forward-looking measure of financial conditions to allow them to track systemic risk.

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[3] OFR Financial Stress Index | Office of Financial Research

The FSI is used as a proxy for global financial risk because it captures shocks and vulnerabilities that have the potential to affect financial stability worldwide. As the data is available on daily basis this study aggregates it to a monthly frequency by taking averages of each month.

Interest Rate: This study utilized the call money rate, the short-term interest rate used as a tool for MP. One key advantage of using this variable over the discount rate is that the discount rate is just one policy tool to reach operating goals for the instrument, which can also be accomplished through other policy tools such as open market operations and adjustments in the required reserve ratio. According to the SBP, the call money rate denotes the overnight interest rate at which financial institutions extend and receive loans of funds from each other. Our choice of variable is consistent with many recent literature such as (Malik, 2007).

Output Gap: This Study utilized large scale manufacturing as a proxy for gross domestic product because the monthly data of GDP is not available. Large-scale manufacturing has a significant contribution to the industrial sector, which is a core component of GDP in many economies. LSM encompasses large, formal industrial enterprises producing high-volume goods such as textiles, chemicals, steel, and automobiles. In the existing literature, annual data of GDP is used to determine the output gap, researchers used different methods such as the HP-filter and Quadratic trend to find the output gap. HP-filter separates the cyclical component of the time series from raw data, providing smooth representation that is more sensitive to long-term trends and Quadratic trends capture the same idea as linear trends, with a fluctuating component around them, but it uses a quadratic function fitted to the GDP data to pick up the underlying trend. Since the data used in this study is monthly and it exhibit seasonal patterns, to remove these patterns we introduced dummies and regress the actual variable (LSM) by trend, square o trend and seasonal dummy variables. This helps to isolate the effects of seasonality and trend allows us to analyze the variation in the data.

$$\text{lsm} = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 D_1 \dots + \alpha_{13} D_{11} + \varepsilon_t \tag{10}$$

Where t shows the trend and D shows the dummy variables.

Inflation: This study used inflation rate in our analysis because the state bank adjusts interest rate keeping inflation rate in target to maintain the price stability.

Exchange Rate: The price of one currency in relation to another is known as the exchange rate. The data of exchange rate is Rupee/US dollar and utilized from the official website of the State bank of Pakistan. This study used the deviation of the exchange rate which is computed through HP-filter which separates the series into its cyclical and trend components. After applying HP-filter we subtract the actual exchange rate from its trend and use it in the analysis because it provides a clear measure of exchange rate volatility and its impact on variables. Engel and West (2005) argues that deviation provides better insights into short-term exchange rate behavior and speculative movements.

Capital Inflow: The total flow of financial capital to a country is referred to as capital inflows. In our analysis, capital inflow is the sum of foreign private investment which include foreign direct investment (FDI) inflow, foreign portfolio investment (FPI) which includes equities securities and debt securities, and other investment includes foreign public investment consist of equity securities and debt securities.

Trade Balance: The balance of trade is the gap between what a country sells to other countries (its exports) and what it buys from other countries (its imports), during a certain time, generally a year.

5. RESULTS

5.1 Unit Root Test

The purpose of the augmented Dickey-Fuller test is to decide whether variables are stationary or not. Many pertinent studies and the textbook method would advise us to eliminate non-stationarity by modeling the co-integrating connection or by differencing the variables. However, we have calculated the VAR system in levels by adhering to (Sims et al., 1990), They have proposed that determining the relationships between the variables should be the primary goal of a VAR model. Variable differentiation could lead to model misspecification and the omission of crucial details about the co-movements in the data (Enders, 2008).This is the method used in most empirical literature. The following are the causes. First, it might be challenging to ascertain whether or not there is a co-integrating connection between variables in small samples. Second, incorrect inference is likely to result from improperly imposing the co-integration limitations. Our primary focus is on the short-term impact of shocks on other variables; we are not particularly interested in the structure of co-integration; instead, we will assume it implicitly between the variables in level without explicitly modelling it (Jawadi et al., 2016).

5.2 Lag length selection criteria

Second lag is optimal so this study selected AIC because of its minimum value.

Table 2: Lag Length Criteria

Lag	Log-L	LR	FPE	AIC	SC	HQ
0	-3932.827	NA	1147523.	33.81826	33.92193	33.86006
1	-2785.304	2216.246	92.19675	24.38888	25.21831*	24.72334
2	-2691.082	176.3115	62.60320*	24.00071*	25.55590	24.62783*
3	-2648.953	76.30240	66.58609	24.05969	26.34063	24.97946
4	-2606.814	73.78967	70.98832	24.11857	27.12527	25.33101
5	-2545.600	103.5122*	64.46065	24.01373	27.74618	25.51882
6	-2505.614	65.21327	70.52105	24.09110	28.54931	25.88885

Note: * indicates to select maximum lags

5.3 Stability condition

A VAR model must satisfy the stability condition; all the Eigenvalues must be inside the unit circle. If this condition is violated, the model may exhibit explosive behavior misleading impulse response function, may diverge instead of converging, and unreliable inferences. Results are shown in table 3, which shows no roots outside the unit circle, so the VAR model satisfies the stability condition.

Table 3: VAR Stability Test

Root	Modulus
0.943142	0.943142
0.932343 - 0.062376i	0.934428
0.932343 + 0.062376i	0.934428
0.891134	0.891134
0.217478 - 0.493402i	0.539205
0.217478 + 0.493402i	0.539205
-0.449381	0.449381
0.393246 - 0.123674i	0.412234
0.393246 + 0.123674i	0.412234
0.410478	0.410478
-0.071367 - 0.207160i	0.219109
-0.071367 + 0.207160i	0.219109
-0.010790 - 0.085712i	0.086388
-0.010790 + 0.085712i	0.086388

5.4 Empirical results

As the objective of the study is to check cyclical behavior of monetary policy and its response to global financial risk therefore the study only presents the results of reaction function here from the estimated reduced form VAR.

Table 4: Results of Reaction Function

Variables	Co-efficient	t-statistics
Gfrt-1	-0.136	-3.407
It-1	0.78	12.33
Yt-1	-0.0025	-0.368
πt-1	0.068	1.91
Ert-1	0.04	2.69
Cit-1	-0.035	-0.26
Tbt-1	-0.05	-0.48
Adjusted R-Squared	0.965	

Table 4 shows the results of the reaction function. Here, all the parameters except for the output gap, capital inflows, and trade balance are statistically significant. The effects of global financial risk, lagged interest rate, inflation, and exchange rate are significant at the 5% level. Global financial risk has a negative effect on the short-term interest rate it means that SBP follows expansionary monetary policy. The effect of lagged interest rate is positive and the coefficient is quite high (0.78) which shows significant inertia these findings show a strong resemblance to the findings of (Saghir et al., 2017) suggesting similar conclusions. The coefficient of output gap is negative which shows pro-cyclicality but statistically insignificant. Inflation has a positive effect and statistically significant coefficient but its magnitude is small, similar to the findings of (Malik, 2007). According to Taylor's rule if the coefficient is less than 1 the system will be unstable it happens only if the central bank responds pro-cyclically to inflation deviation from the target.

The exchange rate has also a significant and positive effect on the interest rate SBP follows tight monetary policy whenever the exchange rate depreciates, these findings answer the research question of our study does Pakistan exhibit fear of free fall as developing countries fear currency depreciation after any financial risk due to this fear they increase the interest rate to defend their currency which is according to the transmission mechanism discussed in theoretical framework. Capital inflows and trade balance have negative co-efficient and are statistically insignificant.

5.5 Impulse response function

Any systematic and dynamic response of any variable in the reaction due to some change in external shock refers to the IRF. Additionally, the impulse response function enables us to understand how variables respond after giving one standard deviation shock in any variable.

The impulse response of output gap to GFR is positive and sharply decline after third month and starting moves towards zero, by 12 months it reach its equilibrium state. The impact of Global Financial Risk on monetary policy occurs with a lag because financial shocks take time to transmit through the economy. When global risk increases, it initially affects investor sentiment, capital flows, and exchange rate volatility. Over time, these effects tighten credit conditions, slow economic activity, and influence inflation expectations, prompting the central bank to adjust interest rates with a delayed response. The response of inflation is insignificant initially and then begins to increase after 6 months but stays stable and positive with no major fluctuations and shows convergence in the twenty-fourth month. The response of trade balance is negative for first two months and shows positive and sharp increase after 2nd month

but then start decreasing and moves towards equilibrium in twenty-fourth month. Capital inflows shows highly negative response in first three months after sixth month it converge to equilibrium and stabilize. Given one standard deviation shock in GFR, the response of call money rate is positive for the first two months but after the second month it starts decreasing and the negative effect is persistent for ten months after eleven months the decline slows and starts converging towards the equilibrium. The exchange rate also shows a positive response for the first two months then stabilizes between 4th months and then again shows an increasing pattern which indicates that the value of the Pakistani Rupee decreased against the US dollar.

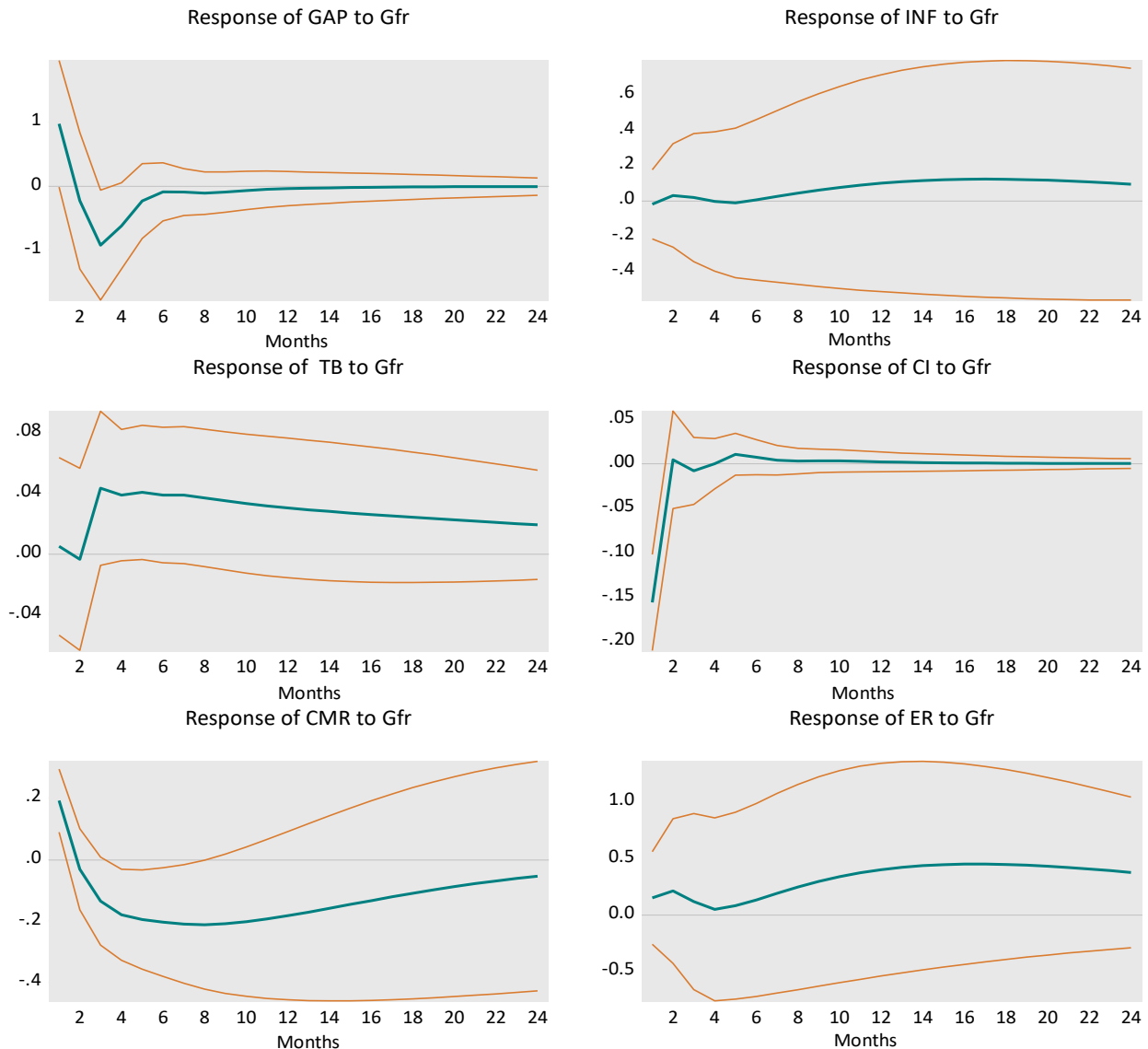Response to Structural VAR Innovations ± 2 S.E.

Figure 1: Impulse Response Function

In the case of an external shock, this usually leads to capital flight as investors repatriate to safer markets. This outflow creates pressure on the local currency, causing it to depreciate. Imports therefore become more expensive, and as the currency weakens, key imports from fuel, machinery, and raw materials also

become expensive, increasing the overall import bill. Countries like Pakistan, which rely entirely on these types of imports, result in a sharp increase in trade deficit.

5.6 Variance decomposition

Finally, to determine the percentage explanation for each variable in the system, we decomposed the forecast error variance of interest rate. The study used the same Cholesky ordering of data as the impulse response.

Table 5: Variance Decomposition of Interest Rate

Period	S.E.	GFR	GAP	INF	TB	CI	CMR	ER
1	1.393	5.716	0.459	0.855	1.912	6.267	86.701	0.000
2	2.138	3.524	0.577	4.013	0.051	5.199	84.884	1.749
3	2.599	3.759	1.311	10.88	0.079	4.161	77.823	1.978
4	2.918	4.583	1.695	18.67	0.079	3.279	69.716	1.973
5	3.150	5.298	1.566	26.44	0.064	2.652	62.089	1.877
6	3.329	5.820	1.331	33.83	0.071	2.196	55.033	1.711
7	3.476	6.188	1.129	40.53	0.110	1.851	48.667	1.513
8	3.601	6.420	0.969	46.42	0.181	1.586	43.102	1.317
9	3.708	6.531	0.842	51.46	0.284	1.380	38.347	1.146
10	3.799	6.541	0.743	55.73	0.411	1.218	34.330	1.017
11	3.877	6.476	0.667	59.31	0.556	1.092	30.948	0.945
12	3.946	6.359	0.609	62.27	0.713	0.993	28.102	0.940

The result shows that much of the variation is explained by its own lagged value (86.7 percent), the second variable is capital inflows which explain 6.2 percent variation in the first month, and the third global financial risk is 5.7 percent. Interestingly the variation of interest rate decreased with time and reached 28.10 percent. But the percentage of inflation and GFR increased with time and reached 62.2 percent and 6.3 percent in the last period.

In conclusion, the organization of variables in the explanation of the utmost variation is the lagged interest rate, global financial risk, and inflation. Inflation has the most explanatory power for the interest rate these findings are also similar to (Malik, 2007).

5.7 Response of interest rate to domestic variables

To check the impact of domestic variables on the interest rate we give shock in the output gap, inflation, and exchange rate. After giving one standard deviation shock in the output gap the interest rate responds negatively but after the second month this effect dies out after the sixth month this shows the pro-cyclical behavior as well because when there is expansion State Bank of Pakistan decreases the interest.

Response to Structural VAR Innovations ± 2 S.E.
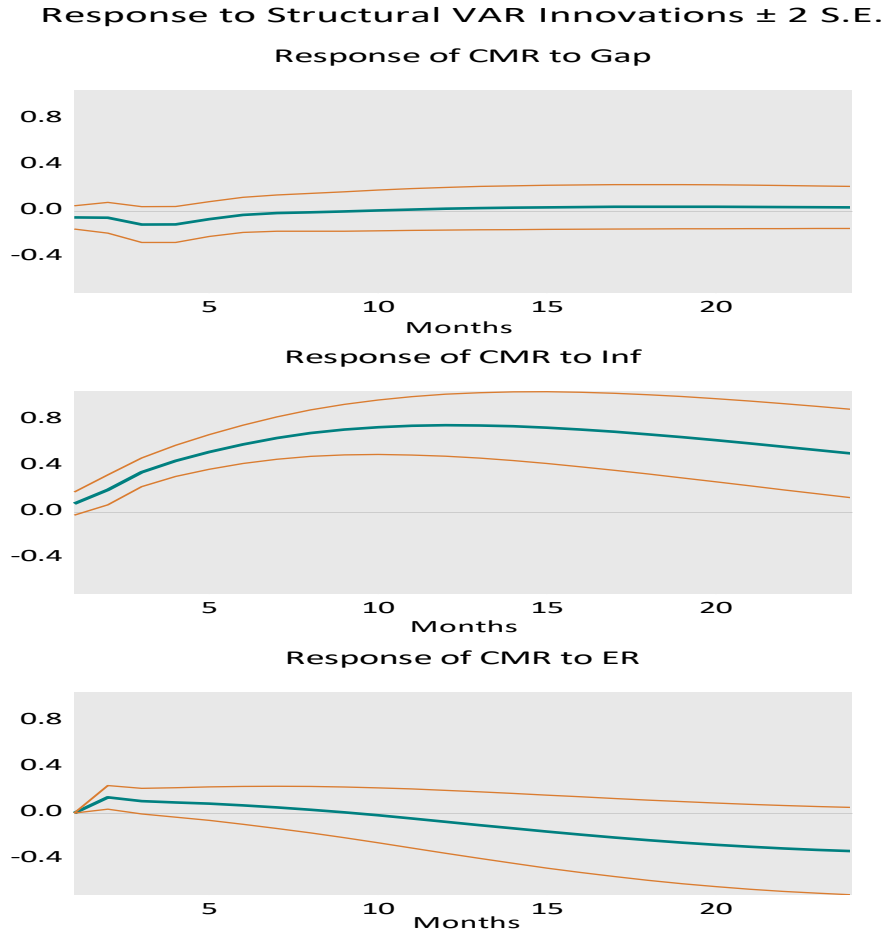
Figure 2: Response of Interest Rate to Domestic Variables

Giving one standard deviation shock to inflation the interest rate immediately increases and shows stable pattern between tenth and fifteenth month and moves towards equilibrium after twenty-third month. Therefore, inflation forces the monetary authority to alter its policy position for an extended length of time.

The response of interest rate is positive and significant after giving shock to exchange rate it means SBP adopt tight monetary policy when exchange rate depreciate which is consistent with the literature also that developing countries exhibits fear of free fall. The effect becomes zero in the tenth month. In conclusion we can say that monetary policy responds pro-cyclically to output gap and counter cyclically to inflation and exchange rate. All the results are in accordance with economic theory except the output gap because Taylor rule says that central bank should increase interest rate when the economy is performing above its potential and decrease the interest rate when economy is below its potential.

6. CONCLUSION AND POLICY IMPLICATIONS

This study provides a comprehensive analysis of the interplay between external shocks and monetary policy in relation to exchange rate fluctuations. The study utilized the vector auto-regressive (VAR) model, which is frequently used in monetary policy analysis and takes care of endogeneity issues as well, analysis indicates that external shocks exert significant effects on key economic variables.

First the study presented the reaction function which shows that, lagged interest rate, inflation and exchange rate has positive and significant effect on the policy rate, as SBP consider all these variables in their objective, global financial risk has negative effect in, which shows that the monetary policy is counter-cyclical in the face of global financial risk because it initially decreases the interest rate. How these shocks effect the macroeconomic variables of Pakistan the study computed the impulse response function the results show that interest rate, output gap, Inflation and exchange rate respond positively to external shock, while the capital inflows decrease immediately. The study performed forecast error variance decomposition to check external dominance which shows that at first most of the variation in inflation is explained by lagged interest rate, global financial risk and inflation.

The study also checked how interest rate responds to the output gap, inflation, and exchange rate. The interest responds negatively to shock in the output gap after two months which indicates the pro-cyclical nature of monetary policy as well, there is immediate increase in response to inflation and exchange rate but the effect of exchange rate vanishes after tenth month. Our results confirm that SBP does care about global financial risk, lagged interest rate, inflation and exchange rate but do not respond to output gap which is the important variable in Taylor rule. Policy implication: SBP does not response to output gap despite its importance in Taylor rule. SBP should incorporate the output gap more explicitly in monetary policy formulation to ensure balanced economic stabilization.

Notwithstanding the solidity of the findings, some limitations are to be noted. First, the Large-Scale Manufacturing (LSM) index serves as a proxy for aggregate economic activity, which, though convenient, would not necessarily capture all variations in the overall economy. Second, the Cholesky identification scheme, though extensively used, is based on binding assumptions that could impose biases on the ordering of the shocks. Future studies can overcome these limitations by using alternative indicators of the output gap, e.g., capacity utilization or structural models, and by checking results' sensitivity for various identification strategies. Further, the extension of the analysis by cross-country comparisons with other emerging countries would be highly informative regarding the overall applicability of Pakistan's experience.

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Appendix A: Variance Inflation Factor

Variable	Coefficient	Un-centered	Centered
	Variance	VIF	VIF
GAP	0.000916	1.079131	1.079107
INF	0.004023	10.82843	3.239541
TB	1.26E-07	12.86144	1.194238
CI	3.56E-07	21.97473	1.061797
CMR	0.010181	20.71861	2.817495
ER	0.001147	1.564864	1.564708
C	2.475433	40.10830	NA

Kashmir Economic Review

Higher Education Expansion, Graduate Unemployment, and Brain Drain: An Economic Analysis of Pakistan's Labor Market

ABSTRACT

This paper analyzes the paradoxical increased education growth of Pakistan and the consequences of the same in brain drain and graduate unemployment. This is one of the reasons why the results of a Cost Benefit Analysis (CBA) have shown that the economic cost of graduates' production exceeds the returns. The structural dynamics of two frameworks graduate unemployment and brain drain were tested using the Auto-Regressive Distributed Lag (ARDL) model. The results demonstrate that even with less growth of GDP, and lower marginal productivity, employment creation, graduate output raises unemployment in the short and long-term significantly. The concept of brain drain shows that the remittances and graduates are important elements of migration that may be regarded as the push-pull forces in the labor market. Stability and diagnostic test entail model reliability. Overall, this evidence suggests that the absence of labor absorption and the uncontrolled expansion of affiliated colleges increases domestic unemployment and migration abroad. According to the study findings, to transform human capital into a sustainable driver of development, one should harmonize higher education policies with the labor market requirements, encourage employment intensive development, and limit uncontrolled institutional proliferations.

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1. INTRODUCTION

In Pakistan, higher education has been developed at a very high rate over the past two decades, and this can be attributed to the increase in institutions that are related to the state universities. Similar gains in the absorption of labor have not been matched by this quantitative growth which is observed as a substantial rise in the output of graduates annually. Nevertheless, human capital theory proposes that increased exposure to postsecondary education should lead to increased salary and productivity. According to an empirical study by (Becker, 1975), returns to education are severely conditional on the capacity of the economy to offer skilled jobs; in case the supply surpasses the demand, then wage premiums fall, and in cases where there are more degree-holders than skilled workers, it is possible that underemployment or even unemployment can occur (Psacharopoulos & Patrinos, 2018). The lack of fit between degree production and labor demand has become a recent policy concern in Pakistan: associated colleges have gained more access, yet with scarce resources, industry contacts, and poorly matched curricula, they end up producing graduates with skills poorly suited to local employment opportunities (Aziz et al., 2008; Pakistan Bureau of Statistics, 2022).

This lack of match between education and work has both social and economic consequences. On the one hand, underemployed graduates provide a perfect illustration of inefficiency: when graduates cannot apply their skills to productive activity, the resources invested in the development of human capital, both state and private, have lower paybacks. However, with degree graduates seeking superior employment opportunities and higher wages in foreign countries, endemic graduate joblessness has become a push factor towards skilled emigration, or brain drain (Docquier & Rapoport, 2012). A combined economic measure that weighs the social benefits of higher education against the benefits of remittances and productivity of hired graduates needs to be conducted to conclude whether remittances and migratory externalities offset domestic labor-market failure.

These concerns are urgent but the literature on Pakistan remains scattered. Although research on migration reveals the growing outflows of skilled and semi-skilled human resources (Bureau of Emigration & Overseas Employment, 2023), the available literature indicates the growing unemployment of graduates and identifies the lack of skills or poor connections between industries and colleges (PIDE, 2019; Mohammad, 2000). There are however, not many studies that systematically relate graduate labor-market outcomes, skilled emigration, and higher education growth specifically the proliferation of linked colleges in a coherent empirical model that incorporates both welfare (cost-benefit) and dynamic economic processes. This gap complicates the task of policymakers trying to find out whether the net social payoff of postsecondary education has decreased or whether additional expansion in the number of degree-granting capacity is socially desirable without any labor-market remedies.

This study brings together two complementary approaches to address such a gap. To compare the cost of the government spending per graduate, the economic cost of unemployed graduates versus that of remittance gain, and the contribution of productive graduates, it first conducts a cost-benefit analysis of the tertiary growth in Pakistan in the year 2000 to 2024. Second, it estimates Autoregressive Distributed Lag (ARDL) models after controlling on macroeconomic factors (GDP growth, inflation, trade openness, and remittances) to estimate the short- and long-term relationship between graduate supply, affiliated-college share, graduate unemployment, and skilled emigration. Combining CBA and time-series econometrics, the study quantifies both whether the growth in higher education has generated net social benefits and not and whether graduate unemployment is a significant contributor to brain drain. The results have direct implications to the labor market programs in Pakistan, higher education policy and management of migration.

This study has five major sections. The introductory part gives some background, highlighting the rapid development of higher education in Pakistan and the emerging problems of brain drain, unemployment of graduates, and the multiplication of affiliated colleges. The second section tries to position the situation of Pakistan in the regional and global contexts by reviewing the literature on human capital theory, migration, education-employment disjuncture, cost-benefit analysis. The third part explains the research methodology, which incorporates the application of ARDL bounds testing strategy to test the short-term and the long-term dynamics of the graduate unemployment and brain drain, and the application of Cost-Benefit Analysis (CBA) to determine the net returns of higher education expansion. The fourth section discusses the empirical findings and begins by the CBA findings and proceeds to the ARDL estimation of models, stability, and diagnostic tests. The final part is devoted to the implications of the findings, conclusions, and particular policy propositions to alleviate brain drain and align the results of higher education to the needs of the job market.

2. LITERATURE REVIEW

Over the last years, discussion of the role of higher education in promoting economic growth in Pakistan has received a new impetus. Empirical evidence based on the time series analysis suggests a positive effect of higher education on long-term economic growth, and short-term effects remain weak due to structural labor market inefficiencies (Ahmed et al., 2025). The imbalance that results as the difference between the sink and the source worsens with the inability of the employment markets to absorb the increasing number of graduates. It is perceived that curriculum innovation is the key instrument that can be used to align the requirements of the labor market with the outputs of higher education (Khattri et al., 2023). Although, these works prove that although education can trigger economic growth, its benefits are scarce when job systems fail to leverage on the development of human capital.

The education-employment gap has broader impacts notably through brain drain. Economic uncertainties reduce economic prospects in Pakistan, attributable to limited employment, expatriate workers, who are highly skilled, are continuously moving out of the country as shown by Ahsan (2024). Khan (2024) supports this argument by providing statistics indicating that brain drain effect the economic growth of Pakistan and reduces the returns on national investments on education. As Azizullah and Mughal (2024) argue, the educated people are forced to seek opportunities abroad because of the push factors like low research capacity, poor governance, and inability to find favor in the job market. These findings validate the argument which states that graduate unemployment is depriving Pakistan of its prime human capital by serving as an instrument of international migration but not merely an issue with the national labor market.

These interrelated issues are not limited to Pakistan, and they reveal a tendency in the region of migration pressures and youth unemployment pressures. Although Kaluarachchi and Jayathilaka (2024) reveal that macroeconomic instability in Sri Lanka has also contributed to increased outward migration in a similar manner, Achakzai et al., (2023) reveal that the primary reasons behind youth unemployment in Balochistan are structural imbalances and industry lack of diversification. Such comparative remarks suggest that the problems of Pakistan belong to broader South Asian dynamics of the labor market rather than being unique to the nation. The growth of higher education systems of inadequate market transformation leads to a cycle of unfulfilled dreams, increased unemployment and outbound migration. In this way, the literature highlights the urgent need to implement holistic solutions to education and employment that bridge the gap between education and employment, enhance governance, and offer incentives to retain talented young people in the country.

3. DATA AND METHODOLOGY

By combining the Autoregressive Distributed Lag (ARDL) modeling with the Cost-Benefit Analysis (CBA) as a mixed-method quantitative study, this paper assesses the association between graduate unemployment, brain drain and the expansion of higher education in Pakistan between the years 2000 and 2024. The annual time-series data is obtained through the Higher Education Commission of Pakistan (HEC), the Bureau of Emigration and Overseas Employment (BEOE), the Pakistan Bureau of Statistics (PBS), the State Bank of Pakistan (SBP), and the World Bank, the World Development Indicators (WDI).

3.1 Variables and Data
Dependent variables:
- The percentage of unemployed graduates in the labor force is known as the graduate unemployment rate.
- Skilled emigration, the yearly departure of professionals is a stand-in for brain drain.

Independent Factors:
- Total graduates, a stand-in for the growth of higher education.
- The percentage of graduates from associated institutions is a gauge of the quality and speed of the institution.
- A proxy for education investment is the amount of money the government spends on higher education per student (in constant US dollars).

Variables under control:
- GDP growth rate (percentage per year), skilled labor's economic absorption capacity.
- Macroeconomic distortions, yearly inflation rate (percentage).
- Benefit of skilled emigration, remittance inflows (as a percentage of GDP).
- Globalization and labor mobility are correlated with trade openness (as a percentage of GDP).

3.2 Cost-Benefit Analysis
The CBA framework considers both local and global factors to assess whether increasing access to higher education in Pakistan results in net social benefits:
- ➢ **Costs**
  - Per-student public spending on higher education.
  - Income lost from graduates who are unemployed or underemployed.
  - Financial burden of brain drains (productivity leakage, loss of domestic tax base).
- ➢ **Benefits**
  - Marginal productivity of domestically retained skilled workers.
  - Contribution of remittances per overseas graduate (remittances divided by skilled emigrants).
  - Spillover effects on GDP growth and innovation.
  - Long-term implications of diaspora (international networks, knowledge transfer).

Calculated the net benefit for each graduate in the year t by using equation:

$$NBG_t = RCG_t + MPG_t - PCG_t - UC_t \qquad (1)$$

Where, NBG_t represents net benefits for each graduate, RCG_t represents remittance per migrant graduate and calculated as the ratio of total remittances from migrants to total of migrant graduates., MPG_t represents marginal productivity gain and calculated as the ratio of GDP growth attributable to skilled labor to total graduates employed, PCG_t represents public cost per graduate and calculated as the ratio of total public spending on higher education to total number of graduates, UC_t represents unemployment cost and calculated as product of graduate unemployment rate and average graduate wage.

According to Psacharopoulos (1995), the Net Present Value (NPV) and Benefit–Cost Ratio (BCR) as aggregate computed with:

$$NVP = \sum_{t=2000}^{2024} \frac{Benefits - Costs}{(1+r)t} \tag{2}$$

$$BCR = \sum \frac{Benefits}{(1+r)^{t-2000}} / \sum \frac{Costs}{(1+r)^{t-2000}} \tag{3}$$

Our CBA formula takes into consideration the cost of public and opportunity costs due to unemployment, and integrates remittance inflows (as returns to human capital) and productivity gains by educated labor (as in returns to education literature). In spite of the fact that the specific structure of this paper is unique, it is founded on the popular CBA and human capital models (Becker, 1993; MCC Education CBA advice, 2023), returns-to-education theory (Psacharopoulos & Patrinos, 2018), and the remittance-as-return logic (Docquier & Rapoport, 2012).
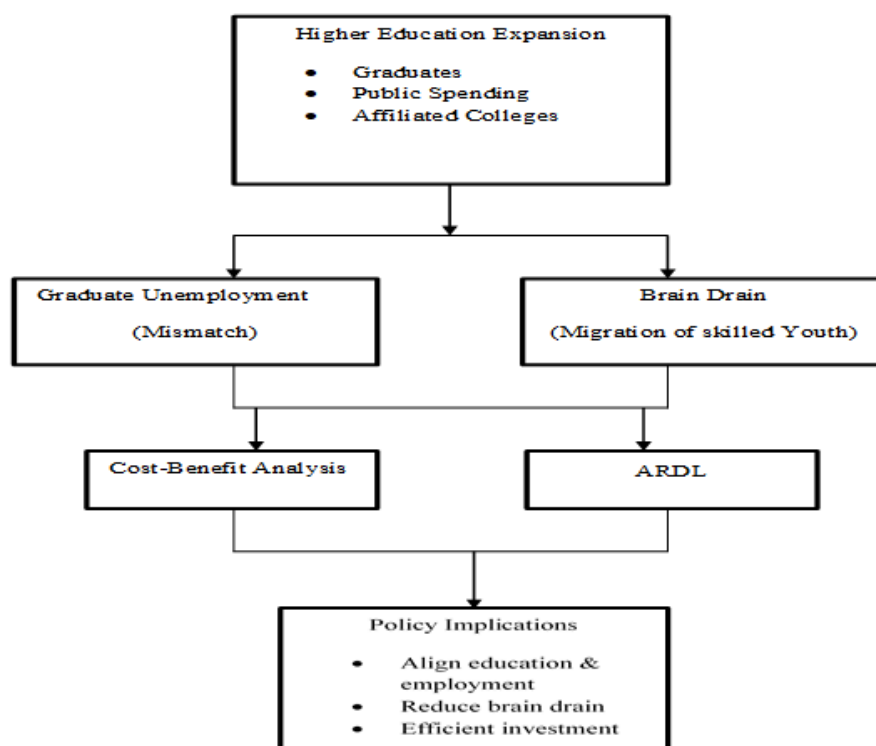
3.3 Conceptual Framework

Figure 1: Conceptual Framework

3.4 Auto-Regressive Distributed lag Model (ARDL) and Bounds Test
In this study two model used under ARDL-ECM to find out both short-run dynamics and long-run equilibrium.

Model A (Graduate unemployment):

Graduate Unemployment=f (Graduate, Affiliated college share, GDP growth, Inflation)

$$\Delta UNEMP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \Delta UNEMP_{t-i} + \sum_{j=0}^{q1} \beta_{1j} \Delta GRAD_{t-j} + \sum_{j=0}^{q2} \beta_{2j} \Delta ACSH_{t-j} +$$
$$\sum_{j=0}^{q3} \beta_{3j} \Delta GDPG_{t-j} + \sum_{j=0}^{q4} \beta_{4j} \Delta INF_{t-j} + \Phi ECM_{t-1} + \varepsilon_t \qquad (4)$$

$$ECM_{t-1} = UNEMP_{t-1} - \gamma_0 - \gamma_1 GRAD_{t-1} - \gamma_2 ACSH_{t-1} - \gamma_3 GDPG_{t-1} - \gamma_4 INF_{t-1} \qquad (5)$$

Model B (Brain drain):

Brain Drain= f (graduate, unemployment, remittances, trade openness)

$$\Delta BDRAIN_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \Delta BDRAIN_{t-i} + \sum_{j=0}^{q1} \beta_{1j} \Delta GRAD_{t-j} + \sum_{j=0}^{q2} \beta_{2j} \Delta UNEMP_{t-j} +$$
$$\sum_{j=0}^{q3} \beta_{3j} \Delta REM_{t-j} + \sum_{j=0}^{q4} \beta_{4j} \Delta TO_{t-j} + \mu_t \qquad (6)$$

$$ECM_{t-1} = BDRAIN_{t-1} - \delta_0 - \delta_1 GRAD_{t-1} - \delta_2 UNEMP_{t-1} - \delta_3 REM_{t-1} - \delta_4 TO_{t-1} \qquad (7)$$

3.5 Diagnostic and stability
In this study, Serial Correlation checked through LM serial correlation, heteroscedasticity diagnostic through Breusch–Pag and normality find out by Jarque–Bera. CUSUMSQ used to check stability of models.

3.6 Anticipated signs (long term)
- $\gamma_1 > 0$ in Model A (if absorption is poor, more graduate's equal higher unemployment)
- $\gamma_2 > 0$ (a larger percentage of connected colleges show mismatch effect)
- $\gamma_3 < 0$ (more earnings lower unemployment; if pay disparities overseas predominate, it might be + for BDRAIN)
- $\delta_2 > 0$ in Model B (emigration is pushed by increasing unemployment)
- δ_3 impact remittances could be unclear (income cushioning causes to increase migration)

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis
The descriptive statistics presented in table 1 show an overview of the key factors that will be included in the analysis including affiliated college share, public spending on higher education, graduate unemployment, graduate, inflation, remittances, brain drain and trade openness.

Table 1: Descriptive Statics

Statistic	ACS	GDP G	GUNE	GRAD	CPI	R	BD	TO
Mean	55.52	4.01	14.73	240000	9.63	5.54	318800	31.05
Median	56	4.26	15	240000	8.60	5.57	320000	30.70
Maximum	68	7.67	17.90	430000	29.20	9.36	600000	38.60
Minimum	42	-0.94	9.20	50000	2.500	1.31	20000	24.80
Std. Dev.	7.99	2.20	3.28	116530	6.45	2.57	182055	3.67
Sum	1388	100.24	368.20	6000000	240.80	138.51	7970000	776.20
Observations	25	25	25	25	25	25	25	25

Source: Authors' calculation

4.2 Cost-Benefit Analysis
Increase in higher education in Pakistan is inefficient as per the cost benefit analysis, net gain was -18,9851647.50 PKR/graduate. Table 2 lists the elements of the analysis.

Table 2: Results of CBA

Component	Formula	Estimated Value	Interpretation
Remittance Contribution per Graduate (RCG)	TR / NMG	0.0875	Contribution of migrant graduates through remittances
Marginal Productivity Gain (MPG)	ΔGDP_skill / TGE	0.04693	Productivity gain from skilled employment
Public Cost per Graduate (PCG)	HE_spend / TG	0.1099	Government expenditure per graduate
Unemployment Cost (UC)	GUR × Avg. Wage	189851647.50	Loss due to unemployment of graduates
Net Benefit (NB)	RCG + MPG – PCG – UC	–18,9851647.50	Negative (mismatch costly)

Haque (2013) says that graduate unemployment stands at critical levels in Pakistan, decreasing the rate of education investment payoff. Their results are consistent with this finding. Similarly, the World Bank (2023) pointed to the issue of brain drain and underutilization of skills and their impact on higher education as a threat to the financial sustainability of higher education. The adverse finding stresses the fact that the gains of remittances and productivity expansion are not as high as the expenses of unemployment and governmental expenditures. This observation proves that, even though the higher education system generates higher graduates, it is not giving it equivalent financial benefits in the country of Pakistan. Instead, it is the lack of fit between education and employment in which graduates are ineffective to be absorbed by the household labor market.

4.3 Auto-Regressive Distributed Lag Model (ARDL)

Unit root testing was done by first using the Augmented Dickey Fuller test. The short-term dynamics are estimated using the error correction model. The error correction term (ECM_{t-1}) was huge and was also forecasted to have a negative value, of which it is reasonable to assume a stable adjustment mechanism but with a moderate rate of correction of a deviation of long-run equilibrium. The long-run coefficients also supported the existence of cointegration since they indicated that significant factors significantly and theoretically influenced the dependent variable. The results of the diagnostic tests showed that the residuals were normally distributed, and not a sign of serial correlation or heteroskedasticity was present. The stability of the ARDL specification during the sample period was confirmed by the CUSUMSQ tests, which confirmed the stability of the estimated parameters and maintained them within the 5% critical boundaries.

The Augmented Dickey-Fuller (ADF) unit root tests were used to investigate the stationarity properties of the variables. The results indicated in table 3 which reveal the order of integration of the series varies. Since they were significant at the 1 or 5 percent level, they conclude that some variables (inflation, trade openness, brain drain) are stationary at level [I(0)], which rejects the null hypothesis of a unit root. It implies that such series can be employed in estimation without transformation as well as require no differencing. Rejection of the unit root hypothesis at the first difference with 1 percent or 5 percent significance, conversely, means that other variables (affiliated college share, GDP growth, remittances) are non-stationary at level but after first differencing [I(1)]. As per these findings, discussed variables are integrated of order one and required to be differencing in order to become stationary. As the ARDL model permits integrating regressors with differing integration degrees, so long as none of the regressors is integrated two or more times the mixed order of integration (a mix of I(0) and I(1) variables) confirms the use of the ARDL bounds testing model of cointegration.

Table 3: Unit Root Test

Variables	ADF	
	C	**T & C**
Affiliated College Share	-10.8427 (1)***	-10.5478 (1)***
Inflation	-5.6728 (0)***	-5.6830 (0)***
Trade Openness	-3.6697 (0)***	-3.6683 (0)**
GDP Growth	0.0726 (1)*	-0.2655 (1)*
Remittances	0.7565 (1)**	-5.6198 (1)***
Brain Drain	-0.0568 (0)**	-0.0673 (0)*

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.
Source: Author calculation

Table 4: Autoregressive distributed lag bounds test

Statistics	Value	K	Statistics	Value	K
Model A: F-Statistic	5.412875	5	Model B: F-Statistic	2974.418	4
Critical Value Bounds			**Critical Value Bounds**		
Significance	**Lower Bound**	**Upper Bound**	**Significance**	**Lower Bound**	**Upper Bound**
10%	2.08	3	10%	2.2	3.09
5%	2.39	3.38	5%	2.56	3.49
1%	3.06	4.15	1%	3.29	4.37

Source: Authors' calculations

The results of ARDL bounds testing procedure confirm that both the models are related long term associated with a co-integrating factor. The calculated F-statistic value of 5.412875 at k = 5 in above table 4 shows that the null hypothesis of no long-term relationship is certainly rejected and thus graduate unemployment is significantly affected by higher education expansion and the related variables in the long-term.

Meanwhile, F-statistic of 2974.418 with k = 4 of the brain drain model is considerably greater than the upper bound critical value of 3.49 at the 5th percentile providing strong evidence of the existence of a high-level consistency, long-run relationship between brain drain and the factors that explain it. These findings indicate that brain drain and unemployment at graduate levels are structural concerns embedded in the education to employment nexus in Pakistan that require policy responses at long term level and not separately.

The long-term ARDL estimates indicate the structural nature of the education-employment gap in Pakistan according to the migration and human capital theories. In the table 5 A (Graduate Unemployment), the coefficient of graduates is positive and significant which indicates that the expansion of higher education in the absence of labor market participation raises the unemployment. This is in line with the job-competition theory, which holds that over supply of skilled labor leads to underemployment. Economic growth affects it in a weakly negative manner thus showing that there is a limit to the number of graduates that can be absorbed by economic growth. Although inflation (CPI) and marginal productivity have adverse impacts (i.e. increased costs and low productivity reduce the creation of jobs), the positive impact of affiliated colleges implies that the improvement in quality and institutional growth contributes to workforce pressure. The highest long-term determinants in Model B (Brain Drain) are graduates and remittances, which conforms to the neoclassical migration theory, which considers wage differences and opportunities outside a country as important pull factor. The trade openness strengthens the brain drain further by exposing workers to international job markets, but graduate unemployment also

produces a positive effect. In general, the results indicate that the institutional quality, higher education development and economic dynamics are integrally related to both brain-drain and unemployment, which require education-labor market changes together.

Table 5: Long Run Coefficient of ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Model A: Graduate Unemployment				
Graduated	0.000403	0.000426	0.945092	0.0005
GDP Growth	-1.120938	0.535318	-2.093966	0.0627
Affiliated School Share	1.571843	1.084877	1.448868	0.0780
CPI	-0.715304	0.357629	-2.000129	0.0734
Marginal Productivity	-0.015944	0.012790	-1.246581	0.0410
C	-18889.42	15331.77	-1.232044	0.0246
Model B: Brain Drain				
Graduate	0.625302	0.005130	121.9025	0.0000
Graduate Unemployment	6.924897	4.132720	1.675627	0.1145
Remittances	42569.11	229.3175	185.6340	0.0000
Trade Openness	18.71113	3.129683	5.978603	0.0000
C	-385885.8	264694.6	-1.457853	0.1655

Table 6: Short Run Coefficient of ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Model A: Graduate Unemployment				
D(Graduated)	0.278118	0.033448	6	0.0000
D(GDP Growth)	-0.191234	0.035713	-5.354764	0.0003
D(CPI)	-0.047565	0.017545	-2.711051	0.0219
D(Affiliated School Share)	0.060668	0.014815	4.095040	0.0022
D(Marginal Productivity)	-0.003484	0.001039	-3.353627	0.0073
CointEq(-1)*	-0.232652	0.027980	-8.315001	0.0000
Model B: Brain Drain				
D(Graduate)	38.74863	2.366223	16.37573	0.0000
D(Graduate Unemployment)	4.62497	4.124710	1.657627	0.1152
D(Remittances)	43835.42	209.0522	209.6865	0.0000
D(Trade Openness)	7.605695	6.848370	1.110585	0.2842
CointEq(-1)	-1.899031	0.117880	-16.10980	0.0000

Model A: $R^2 = 0.81$, Adj. $R^2 = 0.78$, DW=2.91   Model B: $R^2 = 0.87$, Adj. $R^2 = 0.79$, DW= 2.04
Source: Author calculation

The ARDL short-term results (table 6) confirm the dynamic adjustment processes, which are the basis of migration and unemployment. The education-employment mismatch hypothesis suggests that high graduates will immediately rise in unemployment as observed by the positive and significantly high coefficient of D (Graduated) in Model A (Graduate Unemployment) (0.2781, $p<0.01$). Conversely, the impact of D (GDP growth) (-0.1912, $p<0.01$) is negative and it is as expected given that the Keynesian and Okun law predict that expansion in the short-term stimulates labor absorption. On the same note, D(CPI) (-0.0476, $p<0.05$) upholds the Phillips Curve trade-off, showing that moderate inflation reduces unemployment, but D(Affiliated School Share) (0.0607, $p<0.01$) highlights the effect of institutional expansion which creates short-term discrepancies. The negative contribution of D(Marginal Productivity)

(-0.0035, p<0.01) is a sign of the short-run acceleration of the unemployment pressures. More importantly, the error correction (-0.2326, p<0.01) value indicates that there is a stable adjustment path and the error is corrected almost 23 percent in one period. Model B (Brain Drain) short-run dynamics reveal that migration is strongly determined by D(Graduates) (38.74, p<0.01) and D(Remittances) (43,835.42, p<0.01), as expected within the framework of NELM and the push-pull migration theory, whereas D(Trade Openness) and D(Graduate Unemployment) are very insignificant, meaning that their role is more structural than direct. The highly significant negative error correction term (-1.8990, p<0.01) indicates a very rapid adjustment to the long-run equilibrium in response to the short-term shock in the production and remittance incentives of the brain drain process. All these results are indicative of the volatility of skilled labor movement in Pakistan in the sense that the brain drain is responding to shocks with much more short-term dynamics compared to the unemployment which is responding to shocks slowly.

Table 7: Test for Diagnosis

Tests	F-Statistic	d.f.	Prob.	F-Statistic	d.f.	Prob.
Model A: Graduate Unemployment				**Model B: Brain Drain**		
Breusch-Pagan-Godfrey	4.251050	F (2,8)	0.0552	0.834353	F(2,13)	0.7155
Breusch–Godfrey	0.864011	F (11,11)	0.7459	0.732052	F(7,16)	0.7232

The diagnostic tests confirm the accuracy of the estimated ARDL models (table 7). The test result on whether the series is autocorrelated (Breusch-Godfrey serial correlation LM test, F = 0.864, p = 0.7459) demonstrates that no autocorrelation is present and the results are significant and do not exhibit severe heteroscedasticity problems, with the Breusch-Pagan-Godfrey test giving an F-value of 4.251 (p = 0.0552) in Model A (Graduate Unemployment), slightly greater than the 5% level. In Model B (Brain Drain), the result of the Breusch-Pagan Godfrey test (F = 0.834, p = 0.7155) shows homoscedastic residuals and the result of the Breusch-Godfrey test (F = 0.732, p = 0.7232) confirms the absence of serial correlation. All these diagnostics allow concluding that there are no serious econometric issues concerning either of the models, which increases the validity of the short- and long-term conclusions of the study.

Figure 2: Stability (CUSUM of squares)
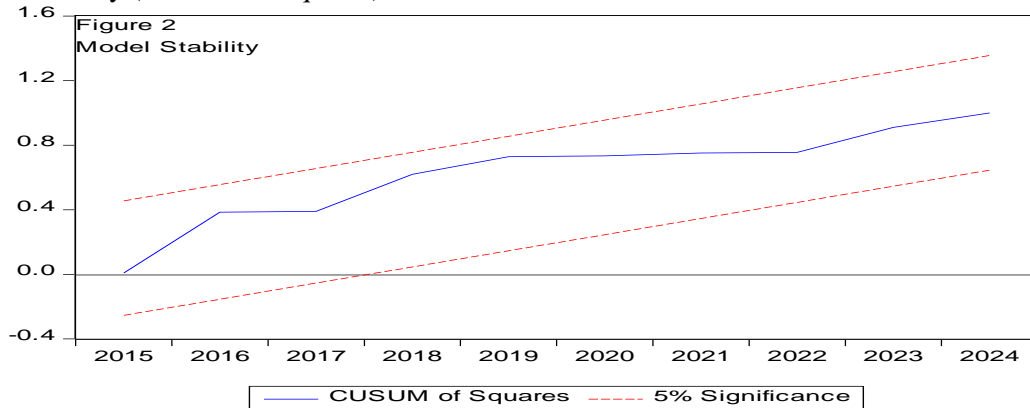
The blue line remains within the 5 percent significance limits throughout the period as per the CUSUM of Squares test plot. This implies that the parameters of the ARDL model do not change with time. The parameters are stable and there are no structural fractures evident in the model. Due to the recursive residuals approach, the plot begins in 2015 despite the data ranging between 2000 and 2024. In sum, the model is robust and can support a short- and long-term study.

5. CONCLUSION AND POLICY IMPLICATIONS

Strong evidence that Pakistan's development of higher education has not resulted in comparable economic and social gains may be seen in the combined Cost–Benefit Analysis (CBA) and ARDL estimates. With a negative net benefit of –18,9851647.5000, the CBA finding makes it abundantly evident that the costs of generating graduates exceed the benefits that are actually achieved, highlighting the substantial financial burden that the education–employment mismatch places on society. The results of the ARDL further support this structural weakness: in the graduate unemployment model, deteriorating marginal productivity and poor GDP growth restrict labor absorption capacity, whereas an increase in the number of graduates directly increases unemployment.

The brain drain model also demonstrates that large-scale emigration is driven by strong remittance flows and increased graduate output, suggesting that domestic markets are unable to retain competent people capital. Together, our findings demonstrate that the misalignment of education with labor market demands reduces the long-term developmental benefits of expanding higher education by increasing both internal unemployment and external migration.

In short, there is a continual mismatch between education and employment since Pakistan's development of higher education has produced more graduates than the economy can handle. In addition to being economically costly, the graduation output greatly contributes to unemployment and brain drain. Thus, the findings are warranted as, although migrating becomes a reasonable response for educated young with limited possibilities, graduate unemployment becomes a structural problem at home. This issue is made worse by the unrestrained growth of affiliated colleges, which produce a huge number of graduates without matching their curricula to the demands of the job market. This reinforces both internal mismatch unemployment and foreign migration. These results highlight the urgent need for policies that combine labor market demands with higher education planning in order to ensure that human capital fosters sustained economic growth rather than unemployment and out-migration.

This study supports the need for a number of policy initiatives to alleviate Pakistan's education-employment gap and its impact on brain drain. In order to improve the quality and market relevance of programs offered, higher education policy must first move from expansion to alignment. This is especially important for affiliated colleges, which today bear a disproportionate amount of the burden of unemployable graduates. Second, to guarantee that graduates have employable skills, industry-academia cooperation, skill-oriented curriculum, and technical/vocational paths should be implemented to strengthen labor market ties. Third, economic policy needs to assist startups, SMEs, and industry diversification in order to absorb educated workers locally. Employment-intensive growth must be given priority. Fourth, incentives for return migration and the efficient use of remittances in innovation and enterprise should be established in addition to competitive local possibilities in high-skilled industries to counteract brain drain. In order to ensure that human capital development becomes an asset for sustained growth rather than a cause of unemployment and outmigration, a national education–employment framework is necessary to align higher education planning with long-term labor market projections.

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Kashmir Economic Review

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Factors Behind Low Saving Rates in Pakistan: Insights and Policy Recommendations

ABSTRACT

Savings are extremely important for driving an economy, its financial stability and economic growth. In this connection Pakistan faces various challenges as saving culture lacks in country and investment levels are low. The current study is a review study and it aims to pinpoint factors behind citizen's low saving behavior and lesser adaptability to save. To highlight the link between savings, investment and economic growth, key models are taken into discussion. Harrod-Domar model, the permanent income hypothesis and Solow growth model highlight the key links. Results of the review reveals the saving behavior is influenced by GDP, inflation, interest rate, fiscal policies, remittances, demographic aspects and faith beliefs. The initiatives needed to improve savings must be introduced in the short run and also cover the long run. They include encouraging financial literacy, raising consciousness about saving instruments, offering incentives about tax while ensuring macroeconomic stability. Building consumers' confidence to save and ensuring their trust in financial institutions has become necessary. As monitoring inflation remains a key policy objective of Uraan project and this study indicates that higher savings are possible with decline in inflation in Pakistan. Consequently, an increase in savings is expected as inflation decreases. Moreover, higher savings can support the government in achieving its economic growth targets.

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Author's contribution in the article: 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Savings being an essential component of economic growth as they provide resources for investment bring financial stability and enable individuals and households to deal with financial shocks. Pakistan like many developing economies is currently witnessing a low savings rate and slow economic growth. In FY 2024, the saving to GDP ratio is recorded at 13.0% as compared to 13.2% in FY2023 (Finance Division, 2024).

Within Pakistan, there exists an obvious disparity in savings rates across different provinces. The country's scarce savings levels pose a significant challenge in financing its current account deficit, which floats around 5-6% of GDP. The current account deficit as a percentage of GDP, as mentioned by (Mukhtar & Khan, 2016) ranged from 0.83% to 5.8% between the fiscal years 2004-05 and 2008-09. However, it declined to 2.13% in 2009-10. The current account turned into a surplus in 2010-11 but returned to a deficit in the subsequent years. For sustainable economic development, Pakistan requires a savings rate of 22-25%, a target that seems far away given the current economic conditions.

In contrast, countries like China, India, and Bangladesh have shown higher savings rates of 45%, 32%, and 37% of GDP, respectively. In 2022, Pakistan's gross savings rate was around 10.6% while India and Bangladesh were 30% and 34%, respectively. Observing the world and South Asian average for the saving rate remained 28% and 26.3%, respectively.

1.1 Significance of the study

A vast variety of literature exists to address savings, Investment, capital accumulation which is important for capital accumulation and economic growth. Savings are fundamental to economic growth because they finance investment, support capital formation, and enhance productivity. Growth models like Harrod–Domar and Solow to modern endogenous theories consistently show that higher savings enable greater investment in physical capital, human capital and technology, which drive long run development. Savings also help household's smooth consumption, manage uncertainty and maintain living standards, contributing to overall economic stability. Understanding this significance is essential for designing policies that strengthen savings and support sustained growth.

1.2 Savings Assessment Approaches

Numerous analytical approaches are being used in the literature to study savings. They provide a comprehensive understanding of the factors influencing savings behavior. Intertemporal analysis studies individuals' allocation of savings over time while considering future needs and income. Causality tests, including Toda-Yamamoto and Granger non-causality tests, help to identify causal relationships between savings and other important economic variables (Afzal, 2013; Sajid & Sarfraz, 2018). Cointegration techniques, such as Johansen's long run (LR) and short-run (SR) relationships and autoregressive distributed lag (ARDL) models analyze the long term equilibrium associations among variables. Likewise, some studies used the Vector Error Correction Model (Asghar & Nadeem, 2016) and unrestricted vector autoregression (VAR) with error correction mechanisms (ECM) to discover short and long term dynamics.

Some more techniques like Ordinary least squares and multiple regressions are adopted in various studies and explain basic estimations, while two-stage least squares (2SLS) and generalized least squares (GLS) have been used to address potential endogeneity and heteroscedasticity matters. It has also been observed that fixed effect models have been adopted to control unobserved heterogeneity. The residual approaches are also tried to analyze savings by examining data discrepancies. It was interesting to find dynamic regression models with autoregressive moving average (ARMA) specifications capture complex temporal patterns. Some surveys based studies and comparison type methodologies also provide empirical support

to theoretical representations. These diverse methodologies enable a well-meaning analysis of savings determinants, helping policymakers in designing effective strategies to lift savings rates in economy.

1.3 Pakistan Specific Saving Structure and Outlook

Pakistan's savings structure is a mix of formal and informal saving systems. Commercial banks, National Savings and Stock Market are the formal channels. Commercial banks regularly offer several savings accounts (savings accounts, fixed deposits schemes, and Islamic banking schemes). The National Savings Directorate provides saving schemes with returns (Prize bonds and certificates). Stock market is another channel but shows relatively low participation. Pakistanis invest in stocks and mutual funds for long-term savings and capital appreciation.

Informal Savings channels include ROSCAs (Rotating Savings and Credit Associations), borrowing from friends and family and buying of real estate. ROSCAs are a predominant informal saving mechanism in Pakistani markets with low financial inclusion ratios. ROSCAs usually count on social networks; facilitate credit and financing needs for individuals and small businesses. Its popular among low-income groups, allowing members to pool their savings and access lump sums periodically. Borrowing from family, friends and social networks are common for large purchases and emergencies. Investment in Real Estate (land and property) is another attractive way to save. Foreign, domestic and national savings of Pakistan showed clear fluctuations while national savings showed downward trend in the last three decades (Azam et al., 2010).

Keeping in view the savings scenario, the research question is "what are the primary determinants of low savings rates in Pakistan, and what policy measures can be executed to enhance savings behavior among households and businesses?" In this backdrop, this review paper examines the existing literature on the structure of savings in Pakistan, exploring the factors that influence saving behavior and the existing saving instruments in Pakistan.
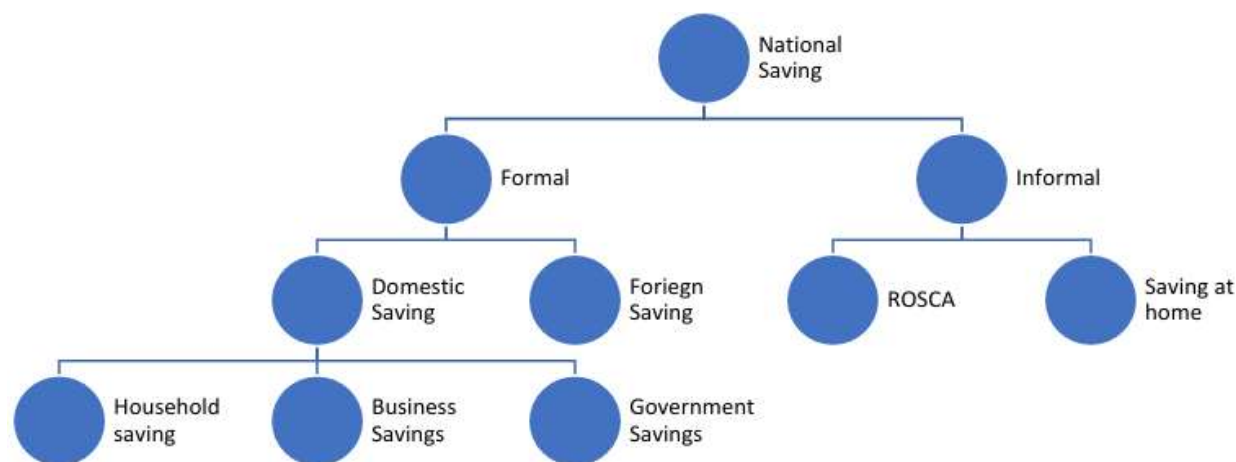
Source: Author's Contribution

Figure 1: Flow Chart of Savings

As shown in flow chart (Figure 1) the saving functions reviewed covers: national saving functions; domestic saving functions; foreign saving functions; private saving functions and public saving functions. In literature, the main objective in estimating these functions is to identify the most important determinants which influence the saving behavior of overall or sector wise (financial sector, portfolio investments, rural industry, HH) and testing hypotheses of saving behavior.

The rest of the paper is organized as follows: Section 2 presents comparative analysis of Pakistan with other countries; section 3 highlights public sector initiatives, section 4 sets out determinants of savings as extracted from literature. Main findings are reported in section 5, section 6 gives important critique, section 7 comes up with conclusion and recommendations. The final section gives future research direction.

2. COMPARATIVE ANALYSIS: PAKISTAN STANDS LOW IN SAVINGS

To offer a wide-ranging understanding of the broader trends, this section offers the results at the regional saving patterns highlighting key patterns across neighboring countries. The review covers regional saving patterns and provincial saving picture about factor influencing these variations.

2.1 Regional Savings Patterns

A comparative analysis of national saving rates among South Asian countries is suitable to understand Pakistan's position in South Asian region. The analysis shows that Pakistan lags behind other countries due to its low rates of savings and investment (Hussain, 1995). Six countries are taken into account: Sri Lanka, Nepal, Pakistan, Bangladesh, India, and Bhutan. It was observed that inflation, tax, and gross domestic product (GDP) have shown statistically significant positive effects on gross domestic savings. This advocates that higher inflation rates, effective tax systems, and robust GDP growth contribute positively to the savings rates in these countries. On the other hand, some other factors such as: per capita income, interest rates, money supply growth, and age dependency ratio exhibit nonsignificant effects on gross domestic saving.

India has boosted its domestic saving through rising public saving and a strong structural reform program and financial liberalization. The saving to GDP ratio of India, Bangladesh and Vietnam is at 31%, 35% and 24% respectively. According to CIEC data, Bangladesh gross Savings rate was measured at 30.4% in Jun 2021, compared with 30.4% in 2020.

Pakistan's economic performance is mainly a matter of concern as it struggles with lower savings and investment rates compared to its regional competitors. The regional discrepancy points towards the need for Pakistan to address identified determinants to boost its saving rates.
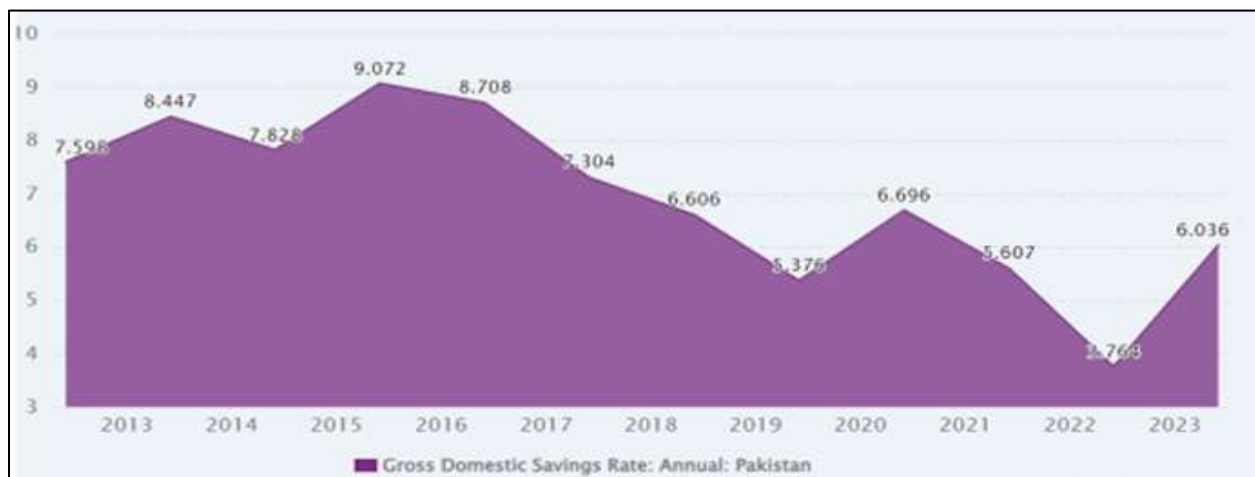
Source: CEIE data

Figure 2: Annual Gross Domestic Saving Rate

Data on gross domestic savings in Pakistan displays fluctuations (Figure 2), with a record low of 3% in June 2022, rising to 6% in June 2023. Despite several national savings initiatives and saving schemes

offered by the State Bank of Pakistan (SBP), the overall savings rate remains volatile and instable. These saving schemes encourage savings among the public, yet the government's fiscal policies and spending patterns significantly impact the national savings rate. Improving the saving rates needs comprehensive reforms in both government spending and the implementation of effective saving programs through banks.

2.2 Provincial Savings Depiction

In Pakistan, savings behavior appears broadly consistent across gender in all provinces. Rural households usually have a higher propensity to save especially due to the irregular or 'lumpy' income patterns associated with agricultural cycles (sowing and harvesting). Though, the formal financial sector is unable to mobilize these savings for investment. This reflects low confidence of citizens in financial institutions. Provincial variations are observed in a study done by (Karandaz, 2020) for all provinces where informal saving appeared as: Punjab (62%), Khyber Pakhtunkhwa (80%), Sindh (64%) and Balochistan (47%). On the other hand, saving in financial institutions is extremely low as observed in Sindh (7%), Punjab (6%), and Khyber Pakhtunkhwa (2%) as informed by (Karandaz, 2020). At provincial level there is a change in saving behavior of citizens.

Demand side surveys also show some insights about saving practices, perceptions and needs of people within country. Some important of surveys are the asset and represent data well. The Global Findex is a national data set, while Access to Finance (A2F) by SBP is provincial level survey. Another important survey is the Financial Inclusion Insight (FI) survey provides more deep data provincially. Moving towards supply side, SBP publications plays a role for analyzing financial trends.

The research gap is identified as low economic performance of the country reflects persistent struggles with weak savings and investment rates relative to its regional competitors. Within country savings behavior appears consistent across gender in all provinces. Rural households typically have a higher propensity to save especially due to the irregular income flows. The formal financial sector is unable to mobilize savings for investment reflecting low confidence of citizens in financial institutions.

3. THEORETICAL FRAMEWORK

A large body of literature exists to address savings, Investment, capital accumulation which is important for capital accumulation and economic growth. This section discusses theoretical literature, models and growth theories with respect to their importance for savings.

The basic and important model of Harrod-Domar Model by (Domar, 1946) addresses the importance of savings, investment in economic growth by creating links in the level of savings to the capital-output ratio. According to this theory, higher savings lead to greater capital accumulation, which in turn causes economic growth. The model emphasizes the key role of savings in financing investment, which is very essential for sustainable economic growth and development.

Solow Growth Model by Solow (1956) was another important famous breakthrough after Harrod-Domar model. (Solow, 1956) addressed significant impact of savings on economic growth through increased capital formation. A higher savings rate leads to a higher steady-state level of capital and output per worker and contributes in economic growth. The model also emphasized on technological progress that drives sustained growth, and explains how savings are crucial for accumulating capital and higher growth rates.

As the higher savings are necessary for economic growth so after the popularity of Solow model, there was time of emergence of New Growth Theories which were addressed by Romer (1986, 1990), Barro (1990), and Lucas (1988). These new theories captured a lot of attention as they incorporated the role of human capital, innovation, and knowledge spillovers, while emphasizing that savings contribute to physical capital accumulation and also to investments especially in education and technology. Lucas (1988) specifically posits that increased savings and capital formation can lead to a permanent increase in economic growth rates by adopting continuous advancements in production and innovation.

The importance of Keynesian consumption theory cannot be unaddressed in context of savings as savings are a residual of income after consumption. With a rise in income of a person, his savings also tend to rise because they do not spend all of their additional income. The theory highlights the relationship between income levels and savings, suggesting that higher income leads to higher savings, which are invested and become a source of economic growth. The hypothesis of Absolute Income (1936) was also given by Keynes where savings are a positive function of current income. This hypothesis stresses the idea of correlation between income levels and the propensity to save. Advancement was Relative Income Hypothesis Duesenberry(1949) which suggests that individuals' consumption and savings decisions are persuaded by their income relative to others and their own past income levels. The social context of saving behavior is especially highlighted where individuals aim to maintain their standard of living in comparison to others.

The theoretical development didn't stop here and Life Cycle Hypothesis was formulated by Franco Modigliani, which states that individuals plan their savings and consumption over their lifetime, considering their anticipated future income and life expectancy. People usually save during their working years to fund consumption during retirement. During different stages of life the saving pattern varies (Ammad & Ahmed, 2020). After this Milton Friedman took the lead and his Permanent Income Hypothesis suggests that individuals base their consumption and saving decisions on their expected long-term average income not on their current income. People do save if their current income is higher than their permanent income and dis-save when their current income is lower. In this way he nicely expressed the idea of smoothing of consumption over time. Precautionary Saving Hypothesis explains the concept of uncertainty is associated with income as individuals save to protect finances against unexpected downturns. Individuals prefer to accumulate savings as a precautionary measure to fulfill sudden financial liabilities.

The importance of saving is also clear from Paradox of thrift and Buffer Stock. Paradox of Thrift was introduced by Keynes and it suggests individuals to save more to secure their financial future, if everyone increases their savings simultaneously, it can lead to reduced economic activity and lower overall income, thus negating the benefits of higher individual savings. On the other hand, Buffer Stock theory explains the individuals maintain a buffer stock of savings to smooth consumption in response to income fluctuations.

In a nut shell, these theoretical frameworks provide complementary insights into the mechanisms underlying individual saving behavior while explaining the roles of lifetime income expectations, income stability, and economic uncertainty. A clear elucidation of these foundations is important for designing effective policies that strengthen savings and support sustained economic growth.

## 4. PUBLIC SECTOR SAVING INITIATIVES

In Pakistan, government has introduced some saving initiatives through National Savings and SBP. The focus is to boost savings in economy and providing financial literacy to people. Azam et al. (2010) emphasized on the significance of national saving in the socio-economic development of Pakistan.

4.1 National Savings Schemes, Certificates & Financial Literacy

The schemes introduced by National Savings are National Savings Scheme (NSS), Pakistan Savings Certificates (PSC), Microfinance Initiatives, Financial Inclusion Strategy (2015), National Financial Literacy Program (2018) -An initiative to educate people about financial literacy and savings. Financial literacy enables people to make informed decisions about savings, borrowing, investing, entrepreneurship, and protecting themselves from financial risks.

National savings schemes, as shown in Figure 3, usually mobilize savings by the product basket of National Savings Scheme (Defense Savings Certificates, Special Savings Certificates, Special Savings Accounts, Regular Income Certificates, Prize Bonds etc.). This product basket has observed an outflow of Rs 105.0 billion during July-March FY2024 as compared to an outflow of Rs 308.2 billion last year (Finance Division, 2024).

Figure 3: Savings Mobilized due to National Incentives (Millions PKR)
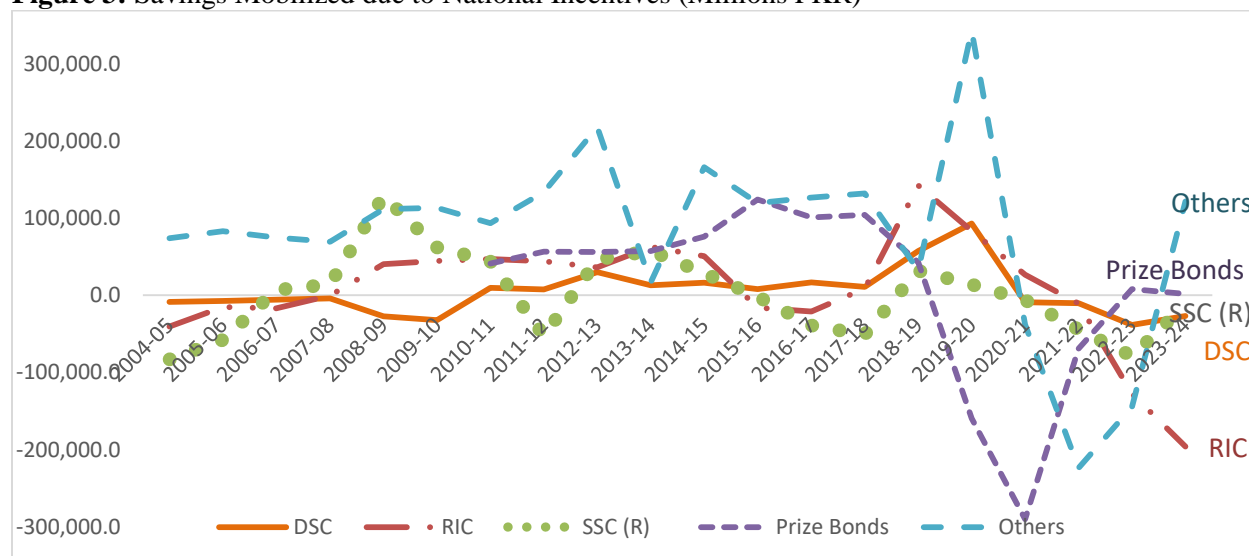
Source: Central Directorate of Savings

National Saving Schemes performed well in the 1990s but its ability to withstand high savings over the long term reduced. As explained by Vincelette (2006) the declining saving rates and widening domestic resource gap highlight the need for policy interventions, such as improving returns, diversifying saving instruments, and addressing structural economic issues, to regenerate national savings and sustained economic growth.

4.2 SBP Initiative towards Savings Through Financial Inclusion

SPB through financial inclusion achieved (60% financial inclusion of adult population, 43% females. Financial inclusion helps in reducing poverty by increasing access to bank deposits that enables individuals to accumulate savings in a safe environment: educing vulnerability of poorer households via minimizing negative impacts of income shocks. Financial inclusion also Increases economic growth by providing investment opportunities to all segments of the population by mobilizing savings, facilitating inflows of foreign capital (including FDI, portfolio investment and bonds, and remittances). Financial Inclusion promotes stability through strengthening financial institutions broadening markets for financial service providers and allocating capital efficiently among competing uses.

SBP - financial inclusion plans included Financial Inclusion Program Components, Credit Guarantee Scheme (CGS) for Small and Rural Enterprises, Microcredit Guarantee Facility (MCGF), Technical Assistance Fund, Financial Innovation Challenge Fund, FICF Round 1 Guidelines (Financially Inclusive Government to Person (G2P) Payments), FICF Round 2 Guidelines (Promoting Innovative Rural and Agricultural Finance in Pakistan), FICF Round 3 Guideline) Promoting Excellence in Islamic Finance and ISF (Defunct) (SBP website)[1].

5. DETERMINANTS OF SAVINGS

To promote sustainable economic development and stable financial environment in Pakistan, understanding the key determinants of both public and household savings is essential. In this context, this section discovers the major factors influencing public and household savings and their economic implications based on review of studies.

5.1 Key Determinants of Public Savings

Identification of the determinants of savings is much needed for macroeconomic stability. Understanding of such determinants that impact saving behavior enables policy makers to formulate thoughtful policies that can raise national savings, promote investment and contributes to development initiatives. The right solutions strengthen the financial stability and reduce dependence on external borrowings. Knowledge about household's saving patterns help to formulate inclusive policies and mitigate inequality. Encouraging higher savings rates also ensures financial security for individuals and helps maintain healthy external balances by financing current account deficits and stabilizing exchange rates. Some common determinants are found as there were enough studies that discussed determinants of saving rates (Ahmad & Mahmood, 2013; Akhtar, 1986; Khan, 1988; Khan & Rahim., 1993; Sajid & Sarfraz, 2008; Kazmi, 2001; Asghar & Nadeem, 2016) and identified economic growth, per-capita income, population growth, age dependency ratio, foreign capital, terms of trade, exports, interest rate, inflation, CPI, foreign savings, tax rates, government spending and public loans.

5.2 Key Determinants of Household Savings

Household savings in Pakistan are essential for the country's economic growth and development in the long run. The determinants of household saving are multidimensional and are important for understanding savings behavior.

The income of households influences their ability to save, as higher income generally allows for greater savings and vice versa. Wealth of households usually includes assets and investments, also impacts saving decisions, as wealthier households are likely to save more. The dependency ratio is another key factor which shows the number of dependents relative to working individuals, affects disposable income and savings potential. Employment status is another key determinant as employed individuals certainly have more stable flow of income and have favorable circumstances to save. Similarly, education is also an important factor that influences financial literacy and the saving patterns of the households. Furthermore saving patterns are affected by the age of household head. It has been observed that at young age individuals save less as compared to the old age. Saving behaviors vary between men and women due to diverse financial roles. In this way, investigating savings across various income groups provide an understanding of disparities and help policy makers to formulate policies to enhance saving rates among low income households by attractive offerings.

Domestic savings contribute to capital formation and that is essential for sustained economic progress. Few studies (Ali, 1985) and Chandio et al. (2015) measured saving elasticities. According to Ali (1985),

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[1] https://www.sbp.org.pk/finc/About.asp

the income elasticity of savings in Pakistan was 2.75 reflecting that as income increases, savings rise substantially. On the other hand, the inflation elasticity of savings is (-0.5) showing that rising inflation tends to reduce savings due to the erosion of the real value of money. While Chandio et al. (2015) emphasize the importance of domestic savings, noting that both long-run (3.07) and short-run (2.07) elasticities of savings specify a strong relationship between savings and economic growth.

Table 1: Domestic Savings-Elasticities

Description of elasticity	Elasticity	Source
Income elasticity of savings	2.75	(Ali, 1985)
Long run elasticity of savings	3.07	(Chandio et al., 2015)
Short run elasticity of savings	2.07	(Chandio et al., 2015)

Moreover, Ahmad et al. (2006) point out that real interest rates have a positive impact on household savings, while inflation has a negative result. The positive impact of real interest rates advocates that higher returns on savings encourage individuals to save more, balancing any potential decrease in savings due to rising incomes. This infers that "the substitution effect" is there, where higher interest rates lead to increased savings dominates the income effect.

Household savings in Pakistan display dissimilar trends and challenges formed by demographics (SBP, 2025; Ahmad et al., 2006; Siddiqui & Siddique, 1993), gender and geographical factors. People in rural areas naturally save according to irregular and seasonal agricultural incomes patterns. Conversely, the formal financial sector has to face a difficulty to effectively capture savings, indicating a need for improved financial intermediation and sound investment plans. Significant provincial variations, such as those in province Balochistan, underscore the need for region specific financial inclusion systems. Improving financial literacy and accessibility through targeted campaigns is important to raise inclusive financial practices and increase household savings in Pakistan.

6. MAIN FINDINGS FROM REVIEWING LITERATURE

Various determinants have been identified in literature and many different findings led to draw conclusions. This section highlights the association of determinants with savings in Pakistan.

Effect of GDP growth, and Government Expenditure (1973-2011): According to the study by Jilani and Sheikh (2013) several factors influenced national savings in Pakistan from 1973 to 2011. There is a positive influence of growth of GDP and an increase in government consumption on national savings. This reveals that economic expansion and higher government spending contribute to increased savings.

Influence of Inflation, Interest Rate, and Government Expenditures (1980-2010): Aleemi et al. (2015) found that inflation, interest rates and government expenditures shows a negative effect on the national savings rate during the period of 1980-2010. High inflation wipe away the purchasing power of money leading to reduced savings as individuals prioritize immediate consumption. Government expenditures are usually financed by borrowing, can crowd out private savings by increasing the fiscal deficit. Another study by Asghar et al. (2022) reveal that an increase in the saving investment gap and output lower the fiscal deficit. An increase in the foreign exchange gap upsurges the fiscal deficit.

Similarly a study by Khan and Rahim (1993) provide understandings that some factors are positively related to the national savings such as: the real interest rates, per capita income, Gross National Product (GNP), changes in the Terms of Trade (TOT) and economic openness. Higher real interest rates and improved economic indicators add in saving oriented environment.

Positive Influence between Real Rate of Return on Deposits and Aggregate Savings: A positive correlation between the real rate of return (on deposits) and aggregate savings is detected. As the real rate of return on deposits increases, the total amount of savings in the economy also inclines to rise. This connection suggests that greater returns incentivize individuals to save more as they expect greater benefits from their deposits.

Inverse Relationship between Savings and Fiscal Deficit: According to Nasir and Khalid (2004) an inverse relationship between savings and the fiscal deficit is observed. A higher fiscal deficit adversely impacts savings. The real interest rate, on the other hand, encourages savings. The finding points out the significance of substitution effect over the income effect. The interest rates boost savings provided that there are impressive returns on deposits.

Role of Remittances in Savings: Nasir and Khalid (2004) recognize a positive association between remittances and savings. Remittances are sent by expatriates to their home country provide additional income for the households which raise their standard of living and also leads to increased savings. These funds serve as a financial boost and enable families to save and invest more.

Faith Inspirations and Savings Behavior: The literature highlights that individuals follow the Muslim faith and they are often reluctant to deposit their money into conventional banking system. The reason is religious beliefs and other constraints. However, the current structure offers Islamic banking as an alternative source of funds, aligning with Shariah principles. The RAFA saving scheme operates under a separate Islamic window led by a Shariah board. This is one such initiative that provides savings choices yielding Islamic finance principles.

Savings and Financial Development: According to Aleemi et al. (2015) financial Development is one of the several policy measures that the government can implement to increase private savings. Decreasing Financial Development will reduce excessive regulations that hinder saving behavior. Additionally, increasing deposit and lending rates can offer more attractive returns on savings and this encourages individuals to save. Offering attractive programs related to old age benefits can also incentivize individuals to save for future consumption and investment needs.

High dependency ratio, High debt-to-GNP ratio and National Savings: Khan et al. (1994) highlighted factors such as a high dependency ratio and a high debt-to-GNP ratio which are negatively associated with national savings. It clearly indicates that a larger dependent population and high debt levels constrain savings. Some more links can be established from these findings and theoretical models to seek more understanding of various determinants offering important insights into the saving behavior dynamics. The Harrod-Domer model, Permanent Income Hypothesis and Solow growth model provide those links and theoretical foundations.

The Harrod-Domar model advocates the importance of savings and investment in economic growth. The positive impact of GDP growth on national savings (Jilani & Sheikh, 2013) is consistent with this model as economic development enhances resources for more investment. Likewise, government expenditures show positive association to savings by boosting public investment. Similarly, the inverse relationship between fiscal deficits and savings (Nasir & Khalid, 2004) highlights how deficits crowd out private resources while potentially delaying growth.

The Permanent Income Hypothesis underlines individuals basic savings on their lifetime income expectations. Inflation rates negatively affect savings (Aleemi et al., 2015) by fading away real incomes and reducing perceived lifetime wealth. Furthermore the remittances increase household incomes and encourage higher savings (Nasir & Khalid, 2004). Additionally, high dependency and debt-to-GNP ratios

(Khan & Rahim, 1993) reduce disposable income, forcing households to prioritize consumption over savings.

The Solow growth model connects savings to long term capital accumulation and steady state growth. Higher real interest rates positively impact savings (Khan et al., 1993), emphasizing greater capital stock. Economic openness improves productivity through technology diffusion and capital inflows. The reduction of fiscal deficits through savings & investment gaps (Asghar et al., 2022) and better financial development (Khan, 1988) reinforces investment and sustained growth.

Cross-Cutting issues like religious beliefs influence savings behavior, as reluctance to use conventional banking systems has led to the growth of Islamic finance choices, such as RAFA schemes (Nasir and Khalid, 2004). Moreover, higher real returns on deposits encourage savings across all models by increasing the rewards of delayed consumption, boosting investment (Harrod-Domar), and enhancing capital accumulation (Solow, 1956). These factors collectively form savings behavior in Pakistan.

Over the next five years, the government, under URAAN program aims to achieve 6% annual GDP growth, boost exports to $50 billion, reduce inflation to 6%, and expand the ICT freelancing industry to $5 billion. National savings were significantly below the investment rate, reflecting heavy external dependence of Pakistan (11.3 percent of GDP in 2018-19 and improved to 13.2 percent in 2022-23 as according to Pakistan Economic Survey). As reducing inflation is one of the target under consideration, so it is expected that in Pakistan savings may rise as this study clearly shows savings increase when inflation decreases and vice versa. Similarly, the government will be able to achieve growth targets with increased savings.

7. IMPORTANT CRITIQUE

The economic landscape of Pakistan presents a distinctive set of challenges, particularly in the domain of savings and investment. This critique inspects some studies on savings in Pakistan, stressing the serious factors that influence the savings rate of country and the broader implications for economic growth. The damaging effects of inflation, interest rates, and government expenditures on the national savings rate from 1980 to 2010 are studied by Aleemi et al. (2015). Nasir and Khalid (2004) discover the positive relationship between real interest rates and aggregate savings, while also observing the inverse relationship between savings and fiscal deficits. These findings, along with the influence of remittances and religious considerations on savings behavior, provide a comprehensive foundation for assessing Pakistan's savings dynamics.

Some missing links are also observed in literature about: causality vs. correlation, missing new dimensions, testing the effectiveness of policies, testing of effectiveness of financial system & financial deepening, and effectiveness of capital flows. The causal relationships are drawn between various factors and saving behavior in Pakistan. It may be an argument that correlations may exist between variables such as per capita income, inflation rate, and saving rate. Correlations are not taken in discussion in savings literature.

Majority of the studies are focusing on finding determinants and assessing formal theories. New topics, new dimensions need to be explored. Moreover, there is a need to see effectiveness of saving policies in Pakistan. the capacity of the government and financial institutions to enforce the proposed measures, testing of effectiveness of financial system & financial deepening and effectiveness of capital flows in savings.

8. CONCLUSION

These review findings jointly illustrate the various dynamics influencing savings behavior in Pakistan economy, emphasizing the roles of macroeconomic factors, fiscal policies, GDP, interest rate, inflation, remittances, and religious beliefs in shaping national savings rates. The analysis shows that savings behavior in Pakistan a complex phenomenon driven by social and demographic culture. Factor like financial development and external factors such as remittances also impact savings in the country. Economic theories also highlight the dominant role of savings in economic stability. Harrod-Domar model, Solow model, and the Permanent Income Hypothesis jointly highlight the role of savings in capital formation and growth. Although higher real interest rates and improved financial development incentivize savings but on the other hand inflation reduces real income and weakens the saving capacity of the households. The national performance of the country also becomes feeble due to fiscal deficits. Religious factor and Islamic financial products offerings by banks also effect saving choices of society. Overall, there exist multidimensional determinants of savings and impact differently.

The study has certain important recommendations so as to improve the saving environment in Pakistan. Expansion of financial literacy programs is important to guide households toward investment oriented savings instruments (e.g. saving certificates, mutual funds, and equity markets). The government must stimulate private savings by offering saving incentives schemes. In the long term some other factors are also important and government must create environment of low inflation, improve real interest rates. Strengthening financial institutions/banking channels is another recommendation for financial development. Ensuring transparent market signals by creating competitive environment, building citizen's trust and promotion of Sharia compliant saving paths is expected to bring more participation in formal channels.

This review of studies provides a future research direction and key areas are: improve community inclusivity and educating them about importance of savings for Pakistan. The awareness of new, sustainable long term savings instruments; inspecting the role of Shariah compliant options; and identifying interest rate importance. Improvement in financial education for different age and socio economic groups is needed. Financial transparency and new savings options for youth, women and low income groups will be beneficial to boost savings in country.

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Social Media Platforms and Self-Employment: Evidence from South Asia

ABSTRACT

The rapid advancement of internet technologies facilitates people around the globe to connect, communicate and share different stuff through social media platforms like Facebook, Twitter, LinkedIn, YouTube. Social media has become one of the most powerful tools to flourish business activities through advertising and marketing. Instead of relying on traditional jobs, people now can develop prospects for self-employment. Self-employment in its recent form is a new phenomenon, emerged mainly in the post-pandemic era due to the emergence of the e-commerce market. The focus of previous research remained on the adverse aspect of social media on health, education, politics, etc., but very few consider its favorable impact on the corporate sector. The study investigates the impact of social media platforms on enhancing self-employment opportunities in South Asian countries by using data from 2012 to 2023. The study concludes that Facebook, Twitter, LinkedIn, and Reddit significantly impact self-employment opportunities in South Asian countries. Whereas YouTube has a negligible impact on the creation of self-employment. Conclusively, findings highlight how the widespread use of social media foster self-employment and freelancing as a source of increasing economic wellbeing in the region.

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1. INTRODUCTION

In the modern age, the nature of employment has been changing dramatically because of emerging technologies like artificial intelligence (AI), robotics, machine learning, Cloud computing, and big data in the industrial sector. The notion of traditional employment and job opportunities is fading in this digital era. Now individuals do not prefer to limit themselves to one industry, one job, and one income source. The surge in industrial transformation largely occurred after the COVID-19 pandemic. Many organizations and businesses laid off employees which in turn led to a higher unemployment rate.

The rise in joblessness forced people to rethink their existing working methods. The lockdown situation and working from home urge individuals to upgrade their skills using modern technological means. The number of self-employed workers has risen since the COVID-19 pandemic and shows an increasing trend over time (Nwoko & Yazdani, 2022). Sometimes self-employment refers to entrepreneurship, but the two are quite actually different. Self-employment means a person who works independently, a freelancer or a business owner, whereas an entrepreneur is a person who builds, organizes and grows a business. The most entrepreneurs start with self-employment opportunities. They possess a specific skills set, beginning with utilizing these skills in different avenues, raising capital, and building their own business. A self-employed person usually enjoys greater freedom, flexible working schedules, being a boss of his own, and often earns more money than a paid employee. An entrepreneur on the other hand, is a risk taker, as business inherently involve risk and greater risk mean greater reward (Kautonen et al., 2014; Afrianty et al., 2021)

The social media technologies are powerful tools that allow users to discover and pursue self-employment opportunities. It helps them grow their businesses and provide services using digital platforms like Facebook, LinkedIn, YouTube, and so on. During this age, while many businesses choose to shut down, some show an unexpected return because of utilizing digital technologies. Social media offer impressive platforms that help people grow business activities by depending on their social networking. Apart from traditional wage employment, digital platforms have the potential to create new job opportunities as many professions undergo digital transformation. Today, People can operate their businesses by launching digital franchises and engaging in online buying and selling their products. It increases the accessibility to customers and helps to reach a broader market network.

In the digital economy, self-employment is emerging as a rising trend, leading to an increase in workforce in the e-commerce industry over the past few years. E-commerce, also known as electronic commerce, means any business activity conducted online using any digital platform. It is an online marketplace that allows buyers and sellers to connect and trade with one another worldwide. International labor organization (2021) argues that the social media platforms (including any online platform) are increasing source of self-employment and freelancing opportunities by lowering traditional market barriers and offering people flexible options to work for variety of professions. The e-commerce industry removes the barrier of geographical outreach. In South Asia, the growth of the e-commerce industry shows remarkable progress mainly because of emerging technologies and a shift in customer behavior. Number analytics projects that the number of online shoppers in Pakistan will grow from 13.4 million in 2020 to 43.8 million by 2025. They also estimate the total e-commerce market size in South Asia will reach US$ 150 billion by 2025, underscoring big user adoption potential. The e-commerce industry is a great source to turn the unpaid hours at home into income generating hours.

Internet technology has opened new ways of interacting with the labor force. It completely changes the structure of the workplace and working practices in the economy. Internet technology is beneficial for

both employers and employees in the market. It comes with a new set of opportunities and challenges for both job seekers and job givers. For employers, it changes the procedure of recruitment and selection criteria. By posting jobs on different websites and social media platforms, employers can approach a vast number of potential candidates. They can conduct and go through the recruitment process virtually, conveniently, and cost-effectively. The report of one of the virtual global employment platforms mentions that 80% of employers use social media platforms for the recruitment process (Monster Beverage Corporation, 2021). Among social media platforms, the most preferred platforms used by recruiters are LinkedIn, Facebook, Twitter, Instagram, Glassdoor, and YouTube (Jobvite, 2020).

At the same time, employees can post their profiles or resumes on several social media platforms and access a wide range of vacancies in their respective domains apart from geographical barriers. Individuals immediately get hired through a quick process by using internet tools compared to traditional job-seeking channels. They can work locally and globally just by practicing their advanced skills and achieving career development goals. One of the surveys indicates that 35% of employees get jobs using social media platforms (Jobvite, 2019). It creates an opportunity for the economies to take advantage of internet technology to enhance social and economic engagement.

Despite the very useful role of social media in business and employment opportunities, much of the literature talks only about its misuse for political and personal purposes. Many of the existing studies have discussed gig work on developed economies only and leaving a gap to see the impact of social media for self-employment in emerging markets. Hence this study aims to explore the impact of social media platforms in creating self-employment opportunities in case of South Asian countries. The focus of the study is to investigate the most preferred social media platforms, including Facebook, YouTube, Twitter, LinkedIn, and Reddit, that help individuals to grow their careers. Specifically, this study is to see which media plate form is more effective in creating freelance, independent, or entrepreneurial work. By employing panel data across South Asian region, the study aims to provide empirical evidence on the economic potential of social media as a tool for income generation and socioeconomic empowerment. Therefore, the findings will contribute to both academic discourse and policy debates on the role of digital technologies to address unemployment, promote inclusive growth, and enhance labor market resilience in South Asia.

2. LITERATURE REVIEW

2.1 Internet Technology and Self Employment
Internet usage becomes inevitable nowadays. It becomes a powerful medium that connects people from all over the world through emails, online messages, chat boxes, and social media platforms. Internet technology continuously evolves with the passage of time. Whether it is entertainment, work, education, and online business all facilitated through the web regardless of time and physical boundaries (Jovarie, 2020). It has a significant impact on the business sector due to the emergence of the e-commerce market. Online buying and selling of goods and services become a fundamental part of business activity. Companies advertise and market their products to connect with wider circle of audiences by efficient utilization of internet technology (Prajapati, 2020).

Internet penetration results in the development of communication technology. It makes the transfer of information fast and within reach around the globe. Internet technology positively impacts self-employment, especially in rural areas where job opportunities are comparatively less and underpaid. It improves the standard of living of people by encouraging job prospects (Zhao, 2020). Access to broadband internet service allows people to make their own money, therefore, encouraging them to be self-employed. Risk-averse workers prefer to work on payroll because of unemployment and income

risks. With the improvement in communication technology, unemployment in the local market decreases to some extent (Denderski & Sniekers, 2019).

The innovation of technology makes it possible for people to manage their work remotely along with family responsibilities. The flexibility of schedule increases the productivity of employees and ultimately the companies in the end. They just have to maintain a balance between using information technologies and working from home (Jackson et al., 2020). The variation in the speed of the internet impacts the decision of self-employment. The availability of fast-speed internet promotes work from home especially for married women due to the flexibility of time (Waizenegger et al., 2020). The productive use of the internet both by salaried persons and self-employed persons shows that same impact. In both cases, there is a rise in earning level. The positive return is even higher in relation to industrialized countries (Navarro, 2010).

2.2 Social Media: Meaning and Trend

The term social media refers to the interaction with other people and media refers to the communication channels like TV, radio, newspaper, billboards, etc. used by people for entertainment and sharing information (Giroux & Moreau, 2022). Social media is a broader term that contains all the applications (apps) and websites to enrich social networking. The definition of social media varies from person to person depending on its usability and scope. There is a significant distinction between social media and traditional media networks. Traditional media, such as newspapers, TV, magazines, and radio, primarily provide one-way communication, while social media enables two-way communication. Traditional media refers to the platforms that existed before the rise of digital technologies, while social media includes networking sites and applications like Facebook, LinkedIn, Twitter, Instagram, Pinterest, YouTube, and others (Al-Quran, 2022).

Social media revolutionized the way we communicate with each other. It offers digital platforms for its customers to send and receive digital content. It initiates a completely new way of thinking. Those who want to run their businesses and realize the potential gains must have to be a part of the World Wide Web. It ensures direct communication and engagement with the target audience efficiently and timely. Social media becomes the main driver of sharing and building inter and intra organizational networks in the corporate world. Today mobile social media applications become an emerging trend also known as "New Media". On daily basis, a range of applications and mobile apps came into existence, but entrepreneurs must have to choose the correct medium that is accessible to all and perfectly fits their business framework (Kaplan & Haenlein, 2010).

Social media has evolved through several phases over time, which can be broadly categorized into three phases: early, current, and future trends. The early phase of social media was quite different from what we see today. Online social networking began in 1995 with basic features, mainly focused on web hosting. By the late 90s, the interface had improved, incorporating more efficient and user-friendly interactive elements, such as personal profiles, friend-finding tools, online messaging, bulletin boards, and more. The current phase of social media started in 2004 with the emergence of Facebook and Twitter. It shows a dynamic trend that allows marketing and broadcasting of information (Hussien et al., 2024). During this phase, several social media platforms came into existence with different interfaces. People can access them through desktop and android and share their photos, locations, update status, etc. To promote dynamic content the manufacturer inserts built-in apps in smartphones. The future trend of social media expects to include users' privacy protection and the sorting of relevant information so that dynamic content is shown to the selected circles and communities (Baatarjav & Dantu, 2011).

Social media is a powerful tool as it entirely transforms the beliefs, behaviors, and attitudes of people. Companies also recognize its potential in marketing and communication. The push of social media

platforms contributes heavily to the e-commerce market. It brings new opportunities and avenues for people to connect, expand, explore, and participate. Another invention in this dimension is the "Chat Box". All the social media platforms like Facebook, Telegram, and Skype have their own chat box. This application promotes one-to-one communication between audiences and organizations effectively. Today all the leading companies prefer to engage in social media platforms but just the provision of information is not enough rather engagement and attachment are compulsory (Svetoka, 2016).

2.3 Social Networking and Self Employment

A social networking site is an online platform that allows users to create profiles and interact with others who share similar interests, such as Facebook, LinkedIn, and Twitter. This has become a widespread phenomenon today. Users also have the option to restrict access to their profiles, allowing only selected people to view them (Watermeyer, 2012). The impact of social networking sites is evident in the statistics showing the average number of visitors they attract. Globally, about 58.7% of individuals use social media (We Are Social & Hootsuite, 2022). The active user numbers for major platforms are: Facebook with 2.9 billion, YouTube with 2.2 billion, WhatsApp with 2 billion, Instagram with 2 billion, TikTok with 1 billion, Reddit with 430 million, LinkedIn with 250 million, and Twitter with 217 million (Walsh, 2022).

Social networking allows people to send and receive messages, find friends, share emails, information, opinions, and digital content. Social networking means interacting with other people and creating an online social relationship with communities, organizations, and Businesses. People from all over the world connect on social media platforms like Facebook, Twitter, LinkedIn, and Pinterest to expand their professional network. There are different platforms that serve this purpose. It impacts our daily life in every field of life like employment, politics, education, health care, economy, and personal development (Sadiku et al., 2019).

The monetization of social networking revolutionized business communication. It builds a high association between self-networking and self-employment opportunities. Personal connection and interaction largely influence business activities. The freelancers in search of jobs can firstly find the target social media platform on which the potential clients are always involved. Then they make their impressive profile and upload it on the targeted platform to make themselves visible. The probability of getting a job is greater when they actively participate on social media platforms by showing their skills efficiently (Kind, 2015).

Social networking plays a vital role in leading a successful business. Worldwide interaction envelopes all the aspects of social, cultural, and behavioral influences (Kefela, 2011). It provides access to the resources such as vital information, strategies to build brands, get new ventures, and participation in inventions and innovations. Personal networking is believed to be an effective tool to get updated information as media has gained huge importance in the present age. While taking self-employment decision peer pressure is three times higher than the influence of family (Zafar et al., 2012). A person who is going to start a business requires moral support and guidance from those experienced peers that already run their own setups which ultimately leads an individual toward social interaction and networking. As social networks provide emotional and material support to an individual (Gardner et al., 2014).

In conclusion, the social network is a significant determinant that promotes self-employment for those who take it a full-time endeavor rather a part-time activity (Linda, 2009). With respect to gender differences, the attitude toward self-employment opportunities also differs in various aspects. The large family networking influences mainly men rather than females (Allen, 2000).

3. THEORETICAL FRAMEWORK

The ways of doing business have changed a lot due to increasing role and scope of digitalization in modern day businesses. As discussed by Kenney and Zysman (2016), social media platforms are now important part and parcel of "platform economy", comprises on versatile digital infrastructure and a source of connection between buyers and seller in most cost-effective way. These new forums now offer digital affordances (Autio et al., 2018) including instant analytics, easy publishing, and global reach, enabling individuals to bypass very expensive traditional business routes. These affordances have reduced many traditional barriers in South Asia for many aspiring businesses while working within platform framework that are convenient with great income potential.

Network theory provides insight into why social media can be powerful for self-employment. Granovetter (1973) "strength of weak ties" explains that diverse, loosely connected networks are crucial for opportunity discovery. Social media scales such bridging ties globally, while Coleman (1988) concept of social capital shows how trust, norms, and reciprocal relationships in online communities facilitate transactions. Ellison et al. (2007) find that online engagement builds both bridging and maintained social capital, offering entrepreneurs market feedback, referrals, and repeat customers.

Nambisan (2017) highlights that digital technologies transform the nature of entrepreneurial agency by allowing rapid experimentation and scaling. On social media, these dynamics support small-scale self-employment - content creators, online sellers, and service providers - who leverage visibility for monetization. However, as Kuhn and Maleki (2017) note in online labor contexts, autonomy is tempered by dependence on platform rules.

Together, these perspectives suggest that social media platforms act as network-producing marketplaces where entrepreneurial opportunity is shaped by the interplay of (1) digital affordances that reduce entry barriers, (2) governance mechanisms that influence autonomy and income stability, and (3) social capital that enables discovery and trust-building (Huws et al., 2018). In South Asia, institutional frictions such as limited payment systems and uneven digital literacy further influence whether social-media-based self-employment becomes sustainable. For entrepreneurs in South Asian - often constrained by local market size - these network effects can substitute for weak formal market linkages. In South Asia, the conversion of online presence into viable self-employment depends not only on individual skills but also on institutional enablers such as digital payments, logistics, and policy support. Hence, the theoretical relationship of self-employment as an objective variable of the other five social media platforms can be represented in a compact mathematical model as follows,

$$Y_{it} = \alpha + \beta' X_{it} + \varepsilon_{it} \tag{1}$$

Where i is the number of cross-sections and t is the number of time periods. β' is the vector of coefficients of social media platforms and X is the vector of regressors, α is the intercept term that does not incorporate both time and individual dimensions.

4. METHODOLOGY, MODEL AND DATA SOURCES

Since we have panel data, the study applies the panel data technique in the econometric model. Panel data is the combination of time series (across time) and cross-sectional data (across different subjects). It has space as well as time. The panel data is strongly balanced because each cross-section has the same number of values and there is no missing data in the data set. Panel data offers several advantages. First, it can identify and measure effects that may not be apparent in cross-sectional or time series data. Second, it

typically consists of larger datasets, as there are less collinearity and greater variability among variables compared to cross-sectional or time series data. Third, it enables the exploration of more complex behavioral models (Gujarati, 2022). Panel data can be analyzed using three different models: the random effects model, the fixed effects model, and the pooled OLS model (also known as the common effects model). The estimation of the regression model based on panel data involves three approaches: Pooled OLS model, Fixed Effect Model (FEM), and Random Effect Model (REM). There are several tests to choose the most appropriate model for estimation. First, the F-test is used to choose between Pooled OLS model or the Fixed Effect Model (FEM), which is better for panel data estimation. Second, apply Lagrange Multiplier Test to determine whether the Random Effect model is better than Common Effect (PLS) model or not. Finally, the Hausman Test to determine the best method between a Fixed Effect Model (FEM) and Random Effect Model (REM).

4.1 Empirical Models

Model specification includes both mathematical and statistical methods that help to select the appropriate econometric model. Mathematically, it is important to explain the relationship between dependent and independent variables. Inclusion of any irrelevant variable or exclusion of any significant variable leads to biased results. Empirical validation therefore requires not only hypothesis testing (conventionally employing significance thresholds such as 1%, 5% and 10%) but also diagnostic checks and robustness analyses to assess issues like endogeneity, heteroskedasticity, multicollinearity, and overall model fit.

4.1.1 Pooled OLS Model:

The pooled OLS uses the simple approach of the ordinary least square (OLS) method for the estimation of panel data (Zulfikar & STp, 2019).

$$SE_{it} = \alpha + \beta_1 Facebook_{it} + \beta_2 Twitter_{it} + \beta_3 YouTube_{it} + \beta_4 Linkedin_{it} + \beta_1 Reddit_{it} + \varepsilon_{it}$$

(2)

4.1.2 Fixed Effect Model:

The model is known as the fixed effect model as the intercept term may vary across cross-sections but does not vary across time so it is time-invariant.

$$SE_{it} = \alpha_i + \beta_1 Facebook_{it} + \beta_2 Twitter_{it} + \beta_3 YouTube_{it} + \beta_4 Linkedin_{it} + \beta_1 Reddit_{it} + \varepsilon_{it}$$

(3)

4.1.3 Random Effect Model:

The model is known as the random effect model because it includes the **μ_i** random error term that shows the net effect of all the unobserved factors that have an impact on the original model. μ_i is considered to be a latent variable because it is directly unobservable.

$$SE_{it} = \alpha_i + \beta_1 Facebook_{it} + \beta_2 Twitter_{it} + \beta_3 YouTube_{it} + \beta_4 Linkedin_{it} + \beta_1 Reddit_{it} + \mu_i + \varepsilon_{it}$$

(4)

4.2 Research Hypothesis

H$_1$: There is no significant impact of Facebook on self-employment opportunities in South Asia.
H$_2$: There is no significant impact of Twitter on self-employment opportunities in South Asia.
H$_3$: There is no significant impact of YouTube on self-employment opportunities in South Asia.
H$_4$: There is no significant impact of LinkedIn on self-employment opportunities in South Asia.
H$_5$: There is no significant impact of Reddit on self-employment opportunities in South Asia.

4.3 Data Collection

The study uses secondary data to analyze the impact of social media platforms on self-employment as secondary data is ready to use, more reliable, and accurate. The monthly data of explanatory variables (social media platforms: Facebook, Twitter, YouTube, LinkedIn, Reddit) are gathered from the Stat counter (Global Stats) for the period from 2012 to 2023. Similarly, data on the dependent variable (Self-employment) has been taken from World Bank from 2012 to 2023. The data of both dependent and independent variables are collected for all the South Asian Countries, including Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, and the Maldives. The study is based on panel data from almost 12 years. As panel data is more informative, variable, less collinear, large degree of freedom, and is more efficient.

4.4 Variable Description

The variables used in the study are composed of dependent and independent variables. In this study, self-employment is taken as a dependent variable while several social media platforms are considered to be an explanatory variable including Facebook, Twitter, YouTube, LinkedIn, and Reddit. Although there are other social media platforms as well like Pinterest, Google, Snapchat, Instagram, etc. but these platforms have missing data over time. The study just focuses on these indicators on which full fledge data is available for all the South Asian countries over the past 12 years ranging from 2012 to 2023.

Table 1: Description of dependent and independent variables

Variables	Source of Data	Description
Facebook	Stat counter	A social networking site that connects people by creating their profiles with family, friends, and colleagues online (in %).
Twitter	Stat counter	A Social networking site that helps people to communicate with each other through short messages and broadcasts is called tweets (in %).
YouTube	Stat counter	A social media platform for free sharing, uploading, and watching online videos (in %).
LinkedIn	Stat counter	A social networking site to build and maintain a professional identity designed for the business community (in %).
Reddit	Stat counter	A social networking site that allows users to share content related to careers, press, advertising, and brands), initiate discussions, and give views (in %).
Self-Employment	World Bank	Self-employment means either working for oneself as a business owner or as a freelancer (% of total employment).

Source: Author's work

5. RESULTS AND DISCUSSION

5.1 Descriptive Analysis

Table 2 shows the descriptive analysis including total number of observations, a measure of central tendency, a measure of dispersion, minimum and maximum values of all the variables incorporated in the study. The total number of observations used in the study is 1,152 for five independent variables (Facebook, Twitter, YouTube, LinkedIn, and Reddit) including eight South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, and the Maldives) over a period of 12 years.

The mean value of number of users on Facebook is 84.1395%; Twitter is 2.8007%; YouTube is 3.1875%; LinkedIn is 0.28181%; Reddit is 0.46754%. While on the contrary, a measure of dispersion shows the spread of values in a data set primarily consisting of range, variance, and standard deviation. Among them, the standard deviation is an important tool to analyze data. Generally, it represents how close the data points are to the mean. It basically depicts the variation in data. Standard deviation is high in the case of scattered observations but it may be low when observations are close to their mean.

Table 2: Descriptive statistics of dependent and independent variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Self-employment	1,152	63.2287	19.0384	22.92	90.16
Facebook	1,152	84.1395	17.4932	0	99.42
Twitter	1,152	2.8007	2.7301	0	37.88
YouTube	1,152	3.1875	3.9207	0	33.26
LinkedIn	1,152	0.2818	0.3604	0	3.15
Reddit	1,152	0.4675	1.3134	0	21.81

Source: Author's work

The largest value in the data set is known as maximum and the smallest value in the data set is known as minimum. Facebook, Twitter, YouTube, LinkedIn, and Reddit are measured as 0 in case of their non-existence while the maximum value of each variable varies according to the magnitude of the expansion. A measure of dispersion and central tendency helps to identify statistical techniques needed to proceed with the quantitative analysis.

5.2 Correlation Matrix
Table 3 shows the correlation matrix of all the explanatory variables including Facebook, Twitter, YouTube, LinkedIn, and Reddit. Correlation measures the degree of association between the two variables. The correlation always lies between -1 and 1. A correlation coefficient indicates the strength of the relationship between two or more than two variables. When it is equal to zero shows no correlation between the variables. When it is equal to 1 means perfect positive correlation and if it is equal to -1 indicates perfect negative correlation among the variables. All the diagonal entries are equal to 1 specifying that each variable is perfectly correlated with itself. Social media platforms like Twitter, YouTube, LinkedIn, and Reddit show a positive correlation with each other and express the movement of variables in the same direction; therefore they are treated in a completely symmetrical way. Whereas Facebook shows a negative correlation with other explanatory variables and exhibits the movement of variables in opposite directions. In this study, none of the social media platforms are highly correlated with each other as all the correlation coefficients are smaller than 0.7. The degree of correlation between the explanatory variables is low and unproblematic while interpreting of results.

Table 3: Correlation matrix of explanatory variables

	Facebook	Twitter	YouTube	LinkedIn	Reddit
Facebook	1.0000				
Twitter	-0.3045	1.0000			
YouTube	-0.1506	0.0343	1.0000		
LinkedIn	-0.1995	0.2273	0.2628	1.0000	
Reddit	-0.3588	0.2282	-0.0003	0.1837	1.0000

Source: Author's computation.

5.3 Pooled OLS, Fixed Effect, and Random Effect Model
The estimation of Pooled OLS, fixed effect, and random effect shows the following results. Table 4 shows the estimates of Pooled regression, fixed effect, and random effect model. The sign of regression coefficients indicates the positive or negative relationship among the variables. A positive sign (+) shows the direct association of variables, whereas a negative sign (-) shows an indirect association among the variables. Both p-values and z-values examine the statistical significance of the variables. It is highly preferable to use HAC (Heteroscedasticity and Autocorrelation Consistent) standard errors developed by Newey West to avoid the problem of heteroscedasticity and autocorrelation. It improves the validity of the model and makes the estimates more precise. These standard errors are robust to both

heteroscedasticity and autocorrelation. HAC computation doesn't remove autocorrelation and heteroscedasticity from the regression model. It corrects standard errors for heteroskedasticity and autocorrelation.

Table 4: Pooled OLS, Fixed Effect, and Random Effect Model

Variable	Coefficient	Robust S.E.	t-statistics	p-value
Pooled OLS				
_cons	59.4212	3.6045	16.49	0.000***
Facebook	0.0379	0.0368	1.03	0.304
Twitter	-1.4838	0.2583	-5.74	0.000***
YouTube	0.0147	0.1245	0.12	0.906
LinkedIn	13.483	1.2675	10.64	0.000***
Reddit	1.9871	0.3699	5.37	0.000***
Fixed Effect Model				
_cons	65.8972	0.9121	72.25	0.000***
Facebook	-0.0338	0.0106	-3.19	0.015***
Twitter	-0.1807	0.0673	-2.68	0.031**
YouTube	0.0091	0.0288	0.32	0.761
LinkedIn	1.7109	0.6517	2.63	0.034**
Reddit	0.3676	0.0957	3.84	0.006***
Random Effect Model				
_cons	65.8965	7.4351	8.86	0.000***
Facebook	-0.0338	0.0106	-3.19	0.001***
Twitter	-0.1808	0.0673	-2.69	0.007***
YouTube	0.0091	0.0288	0.32	0.752
LinkedIn	1.7122	0.6517	2.63	0.009***
Reddit	0.3678	0.0958	3.84	0.000***

Note: (*), (**), (***) represents the 10%, 5% and 1% level of significance.

5.4 Specification Tests
The specification tests to choose a single regression model are given below in Table 5.

Table 5: Selection of Model

Hypothesis	F-statistics	p-value	result
F-Test			
Ho: Pooled OLS is appropriate H1: Fixed Effect Model is appropriate	26.37	0.0000	The p-value is less than 0.05 so we reject the null hypothesis and choose a fixed effect model.

Hypothesis	Breusch-Pagan	p-value	result
Lagrange Multiplier (LM) Test			
Ho: Pooled OLS is appropriate H1: Random Effect Model is appropriate	68877.19	0.0000	The p-value is less than 0.05 so we reject the null hypothesis and choose a random effect model.

Hypothesis	Chi-Sq Statistic	p-value	result
Hausman Test			
Ho: Random Effect Model is appropriate H1: Fixed Effect Model is appropriate	10.48856	0.0625	The p-value is more than 0.05 so we accept the null hypothesis and choose a random effect model.

Source: Author's computation using Stata

Based on the results of regression analysis, Random Effect Model will be appropriate here. Table 4 illustrates the regression analysis of self-employment and social media platforms. The results show that the estimated coefficients are interpreted on average holding other variables constant. It indicates that the social media platforms: YouTube, Linked and Reddit positively impact the creation of self-employment opportunities. The positive sign shows the direct relationship between these social media platforms and the level of self-employment. At the same Facebook and Twitter negatively impact the creation of self-employment opportunities. The p-value of Facebook, Twitter, LinkedIn, and Reddit are significant at 1%, 5%, and 10% levels of significance but the YouTube is insignificant at all levels of significance (1%, 5%, and 10%).

The beta coefficient of Facebook is -0.0338119 suggest that if Facebook usage goes up by 1%, the average self-employment rate goes down by about 0.0338%. The result is consistent with previous studies as well, like Zaremohzzabieh (201) mentions that Facebook is highly addictive in nature. It diverts the attention of users as whenever individuals hold their mobile phones; unconsciously open the Facebook app just to see posts related to entertainment, sports and recreation. They are overwhelmed with so much irrelevant information that unable to follow relevant content. The problematic use of Facebook leads users to neglect their primary duties with respect to their work. The beta coefficient of Twitter is -0.1808372 suggesting that if usage of Twitter goes up by 1%, the average self-employment rate decreases by about 0.1808 %. The previous studies are confirmable with the same result as Levin-Epstein (2011) proposes that your tweet represents who you are. Twitter builds the social image of an individual based on his tweets like interests, habits, tastes, capabilities, strengths, and weaknesses. However, potential clients or hiring company managers may visit your profile and get a negative impression of your personality in case of inappropriate tweets. Both the Facebook and Twitter reduce self-employment because of highly engaging design structure and damaged professional reputation through public digital footprints.

The beta coefficient of LinkedIn is 1.710944 signifying that if usage of LinkedIn goes up by 1%, the average self-employment rate increases by about 1.71%. The result is aligned with other studies as well (Rycraft, 2018) mentions that maintaining a professional appearance on LinkedIn helps in creating a professional network and meeting up with the recruiters in the end. According to one of the studies, 65% of recruiters prefer to follow LinkedIn profiles in search of eligible candidates (Arid, 2018). Job seekers can display their talents and expertise in their LinkedIn profiles. They can join the groups of their interests recommended by LinkedIn and actively participate in discussions or may offer help. It increases the probability of getting a job. LinkedIn also provides an opportunity for entrepreneurs or business owners to expand their business activities advertise and market their products and build a brand with full market coverage.

The beta coefficient of Reddit is 0.3678178 indicating that when the usage of Reddit goes up by 1%, the average self-employment rate increases by about 0.3678%. Reddit is an online platform comprised of online communities. It not only motivates the individuals hunting for a job but also gives useful tips on how to excel in their professions. It offers career guidance from experts to meet the prevailing challenges of unemployment. Reddit facilitates both recruiters and potential candidates as it provides expert advice to them. It shares news, tips, tricks, and experiences of other professionals who are already self-employed or work as a freelancer.

The overall result shows the immense impact of social media platforms on the creation of self-employment opportunities. According to the results, the most preferred online networking platform from a job perspective is LinkedIn. Social media has both positive and negative impacts on career opportunities depending upon the intention to use. The productive use of social networking sites connects people all over the world. They can create an online workplace to share ideas and work on different projects collectively. It increases the productivity of employees by providing fruitful information related to their professions. Social media platforms have the capacity to reduce the unemployment rate in South Asian

countries but individuals can reap its benefits only by efficient engagement in targeted platforms with targeted audiences.

6. CONCLUSION

In this digital age, the world has transformed into a global village, largely because of wide spread use of internet. The emergence of wireless technologies makes communication faster than ever before. It opens new avenues of employment and brings attention to self-employment opportunities by utilizing social media. Social media platforms are source of fostering independent business culture as it contains valuable tools that grow a social network and impact the worldwide audiences. It provides global connectivity, allowing people to manage their time more actively on social media platforms and build a specific skill set to meet the requirements of employers' demand. At present, recruiters are looking for fresh talent beyond traditional résumé by focusing on social media profiles to approach candidates who can contribute in organizational growth.

The study establishes that social media platform plays an important role in the growth of self-employment opportunities in the case of South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, and the Maldives. It investigates several social networking sites: Facebook, Twitter, LinkedIn, YouTube, and Reddit that support individuals to be self-employed as they enjoy flexibility in working hours, earn more than an average payroll employee, make their own schedule, and design their own working environment. The results show that Facebook, Twitter, LinkedIn, and Reddit have a significant impact on the self-employment rate. By contrast, YouTube has an insignificant impact on the creation of self-employment opportunities in South Asian countries. The results of the study are consistent with the previous studies, supporting the notion that social media plat forms are source of entrepreneurship and economic wellbeing.

Beyond the economic dimensions, the results have political and social implications. Policy makers must understand the dual nature of social media, a source of entrepreneurship and a threat towards vulnerability and distraction. Few of its adverse effects include wasting time on irrelevant things, poor health, mood swings, negative exposure, legal violation, and disclosure of private information. In the absence of right measure, there is possibility of losing entrepreneur capacity and reduction of social trust on digital spaces. Social media is a powerful tool only for those who use them wisely otherwise it provides more harm to people than it benefits. Only along precautionary actions, the dream of benefiting from the power of social media platforms can come true. There are certain measures/actions can be followed to avoid harmful effects of social media while benefiting from its positive use, for example, digital literacy awareness campaign, regulations of harmful contents and career based social media guidelines.

Nevertheless, this study has few limitations. First, the study is restricted to five social media platforms only, leaving few emerging networks due to data limitations. Second, the using secondary data limit the ability to capture the refined user behavior and region-specific difference across countries. Third, the study does not account for some demographic heterogeneity across countries such as gender, age, education, the factors that may format the behavior of individuals to use social media for employment purposes. This is recommended therefore for future studies to add primary data, comparative regional effects and demographic heterogeneities to have more comprehensive analysis of social media on entrepreneurship.

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Kashmir Economic Review

The Resurgence of Protectionism: GTAP-based Analysis of US Reciprocal Tariffs and the Competitive Dynamics of Asian Apparel Industry

ABSTRACT

This paper assesses the economic effects of recent U.S tariff escalation, specifically regarding value added apparel exports from South Asia. Employing a multi-region, multi-sector Computable General Equilibrium (CGE) framework derived from the GTAP model, I simulate various scenarios comprising of actual reciprocal tariffs, a universal 30% tariff on apparel, specific tariffs on Pakistan's principal export categories, and asymmetric tariff increases on India and China. Findings reveal that global trade volumes and welfare constantly deteriorate in response to recent tariff shocks, with the U.S witnessing a decrease in GDP and trade activity, despite favourable terms-of-trade and tariff revenue impacts. South Asian exporters experience considerably varied outcomes: India and China incur the most significant contractions when tariffs increase to 52.5–61%, but Pakistan and Bangladesh acquire modest benefits from trade diversion. Pakistan's apparel exports increase by 0.6% amid asymmetric escalation; nonetheless, welfare consequences are adverse due to higher input costs and reduced U.S. demand. In cases where Pakistan is exclusively subjected to sector-specific tariffs, welfare losses are significant. In contrast, in universal tariff scenarios, Pakistan's relative losses are reduced in comparison to its regional competitors. Findings emphasise trade-offs between market-share gains and welfare losses amid increasing protectionism and suggest the necessity for predictable and supportive both domestic and diplomatic policies to sustain competitiveness in an adverse external environment.

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1. INTRODUCTION

Over the past decade, there has been a significant increase in protectionist measures among major economies (Delpeuch et al., 2024), with the United States recently leading this trend. Economists have extensively evaluated the effects of these taxes (Grossman et al., 2024; Amiti et al., 2020). Extensive theoretical work in international trade offers a well-defined analytical framework for comprehending tariff interventions. For major importing countries, tariffs may yield terms-of-trade benefits by reducing global prices of imported commodities, although these advantages are generally offset by deadweight losses incurred by consumers and downstream producers. Classical welfare analysis demonstrates that tariffs distort both consumption and production choices, resulting in efficiency losses despite increases in fiscal revenues. Furthermore, under asymmetric tariff arrangements, the patterns of trade diversion and trade creation (Viner, 1950) alter global supply chains by transferring sourcing away from partners with high tariffs towards relatively less-affected exporters. These mechanisms are fundamental to understanding the impact of recent U.S. tariff escalations on apparel-exporting economies across Asia.

The increasing tendency of protectionism in major economies, especially by the U.S.A, indicates possible disruptions in international trade that may impact the global economy. The ramifications of these indicators transcend trade balances, influencing investments, employment generation, and productivity enhancement. Winners and losers are expected to emerge based on the size and trade orientation and diversion of certain economies and sectors. Presently, there exists much doubt regarding the beneficiaries and those adversely affected by the tariffs imposed by major economies, making it particularly challenging to ascertain definitive outcomes for a small economy such as Pakistan.

The trajectory of U.S. trade policy in 2025 signifies a definitive transition from campaign hyperbole to structural realignment. President Trump started his second term with campaign pledge to impose tariffs with speediness. In order to assess American trade policy in light of a potential new tariff system, he released the America First Trade Policy Memorandum on his inauguration day. In the first two weeks of February, he implemented new tariffs that applied to imports into the United States worth over half a trillion dollars. His substantial tariff rise on China, which started in Trump 1.0 tenure and continued in his second term, in February, was doubled in magnitude on March 4 (PIIE)'s tariff implementation data (see Figure 1) shows the economic impact of the US-China trade war, as shown by (Bown & Irwin, 2025) on tariff escalation.

During this time, he has also declared, then suspended, then announced again, and then paused once more the imposition of 25% tariffs on goods originating from Mexico and Canada. His government has also committed to implementing trade sanctions on April 2. Some of America's most important trading partners have retaliated immediately, leading to widespread confusion and unpredictability. The average tariffs imposed by the United States on Chinese exports currently reach 57.6 percent and encompass all commodities. The average tariffs imposed by China on US exports are 32.6 percent and apply to all commodities without exception. US tariffs have increased by 36.8 percentage points since the commencement of the second Trump administration on January 20, 2025. Chinese tariffs have increased by 11.4 percentage points throughout the same timeframe.

A key issue arises in the midst of all this economic turmoil: why is Trump fixated on tariffs? Long-time obsession with them. "We will tariff and tax foreign countries to enrich our citizens" was pretty much a repeat of Trump's remarks from his first term, and he made the same claim in his second inaugural address. As far as anyone can tell, the recent U.S. tariff moves show that trade measures are being used more and more as tools to achieve broader economic and geopolitical goals.

Source: Bown (2025), PIIE chart "US–China trade war tariffs: An up-to-date chart"

Figure 1: U.S.-China Trade War Tariffs by Date

In order to replace domestic tax revenue, they can rebalance trade, eliminate the trade deficit, reshore manufacturing jobs to the US, protect national security, end dependence on adversarial suppliers, punish countries for unrelated sins like failing to stop migration, and ensure reciprocity so that other countries impose lower tariffs on U.S. exporters.

To situate the present analysis within the broader academic debate, this section reviews the key theoretical and empirical contributions on tariff shocks, trade wars, and CGE-based analysis. In reality, tariffs are sometimes helpful in accomplishing some of these goals. Tariffs do increase tax income for the government, as Trump claims. In comparison to other taxes, nevertheless, they do it inefficiently (Bown & Irwin, 2025). Lashkaripour (2025) illustrates through comprehensive quantitative research that tariffs are capable of substituting a small portion of domestic tax revenues, highlighting their insufficiency as a sustainable fiscal tool. Recent empirical research indicates that although tariffs might generate income smoothly, the overall fiscal benefit is frequently limited and contingent on context.

Analysis on the 2018–19 U.S. tariff waves indicates that advanced economies experienced nearly complete pass-through to domestic prices, suggesting that importers and consumers predominantly absorbed the costs. After factoring in tariff revenues and producer benefits, economists estimate modest yet positive net welfare losses for 2018, approximately $7.2 billion, or about 0.04% of GDP—hardly a sustainable revenue source or macroeconomic stabilizer (Amiti et al., 2019; Fajgelbaum et al., 2020). These papers also record modest enhancements in terms of trade and punitive measures to mitigate trade-balance impacts, with real revenue declining by around $1.4 billion per month by the end of 2018 in one assessment. Combined with policy surveys and IMF analysis, the data indicates minimal or negative net effects on welfare and ambiguous benefits for the current account when retaliation, diversion, and increased input costs are taken into consideration (IMF, 2005).

In contrast, two situations warrant a conditional "positive" perspective. First, in theoretical and quantitative models with large market economies, governments can levy optimal, terms-of-trade–inspired tariffs to raise national income during collaborative collapses, but such gains are usually second-best and vulnerable to retaliation or institutional constraints (Ossa, 2014). Second, tariffs may provide near-term revenue in small or lower income economies historically reliant on border taxes when domestic tax capacity is weak, but the development literature shows that as countries liberalize, successful replacement with broad-based consumption taxes (e.g., VAT) is feasible but uneven—many low-income countries

struggled to fully recoup lost trade-tax revenue without significant tax-administration reforms Baunsgaard and Keen (2005) and (IMF, 2005) discussion on developing countries revenue reliance). Recent quantitative research shows that tariffs can only replace a small share of domestic tax revenue, limiting fiscal headroom and increasing efficiency costs as rates climb (Lashkaripour, 2025). A nuanced gradient results: limited, probably temporary fiscal utility in low-capacity settings and theoretical gains in specific large-country scenarios, towards negligible or negative welfare and trade-balance consequences in diversified, competitive ecosystems.

Tariff protection has reemerged as a prominent policy tool in the post-2024 trade landscape, as new policies in major markets change how firms source goods and affect competitiveness and terms of trade. Examining reciprocal tariffs and their impact on international trade dynamics and strategies within the textile sector has become a pivotal area of study, given the sector's substantial role in global trade and economic advancement, especially between major economies like the USA and China (Chen et al., 2017; Guo et al., 2005). The transition of trade policy from the Multi-Fiber Arrangement (MFA) to the Agreement on Textiles and Clothing (ATC) has influenced the competitive environment, with tariff liberalisation and the elimination of quotas modifying market dynamics since the late 20th century (Harris, 2017; Walmsley & Hertel, 2001). The textile industry is a crucial provider of employment and export revenue in nations such as Pakistan, India, Bangladesh, China, and the United States, with Pakistan's textile sector representing over 30% of its labor force (Chen et al., 2017; Azhar et al., 2024). Comprehending the strategic ramifications of reciprocal tariffs is crucial due to the sector's significance in economic expansion, trade balances, and geopolitical interactions (Arshad & Malik, 2023).

The academic literature on trade protectionism offers various conceptual and empirical frameworks for analyzing the impacts of tariff escalation. One aspect examines the welfare effects and terms-of-trade consequences of tariffs. Classical results indicate that although large economies can achieve terms-of-trade gains through tariffs, global welfare diminishes as a result of deadweight losses and distorted production and consumption choices (Viner, 1950; Bown & Irwin, 2025). Recent empirical evidence from trade-war episodes supports this perspective: tariffs implemented during the 2018–2020 U.S.-China dispute elevated domestic prices, decreased import volumes, and resulted in significant welfare losses for both economies (Fajgelbaum et al., 2020; Amiti et al., 2019). The studies emphasize the importance of input-cost transmission, particularly relevant for highly integrated value chains like textiles and apparel.

A second body of literature utilizes computable general equilibrium (CGE) models to assess the wider macroeconomic effects of trade policy shocks. Studies utilizing CGE models illustrate the capacity of tariff escalation to modify production patterns, influence relative competitiveness, and redirect trade flows among regions (Zhai, 2008; Hertel, 1997). This research examines U.S.-China tariff dynamics, estimating cross-country spillovers and sectoral redistribution resulting from significant bilateral tariff increases. Nevertheless, these studies infrequently analyze the effects of reciprocal tariff structures on smaller exporters or the variations in welfare impacts within particular value chains, such as labor-intensive apparel sectors in South Asia.

Despite comprehensive research on trade and tariff tensions and their effects on apparel trade, substantial knowledge gaps remain concerning the specific influence of reciprocal tariffs on trade practices and connections within the textile sector, particularly in light of Pakistan's textile sector role (Keeryo et al., 2020; Azhar et al., 2024; Ma & Yang, 2010). Some studies underscore tariff-induced disruptions in supply chains and export quantities (Yuan et al., 2020; Mammalogy, 2022), while others accentuate Pakistan's little benefits during US-China trade tensions (Keeryo et al., 2020; Rogers et al., 2023). Debates persist on whether tariffs function as protective mechanisms or as distortions that compromise global trade efficiency (Zheng et al., 2023; Wong & Chan, 2003). The repercussions of these deficiencies

encompass inadequate policy responses and lost opportunities for nations such as Pakistan to capitalize on trade transitions for economic progress (Elliott, 2011; Arif et al., 2023).

A third, more specialized body of literature examines the global apparel and textile value chain, highlighting its responsiveness to tariff policies, costs of intermediate inputs, and the relocation of supply chains driven by buyers (Gereffi & Frederick, 2010; Rivoli, 2014). Evidence indicates that trade diversion resulting from the phase-out of the Multi-Fibre Arrangement (MFA) and recent U.S. tariff interventions disproportionately benefits suppliers such as Vietnam and Bangladesh when major players like China encounter increased tariffs. Despite extensive empirical research on supply-chain restructuring, no current study has evaluated the impact of the 2025 U.S. reciprocal tariffs on Pakistan's apparel exporters or compared these effects with those on India, Bangladesh, and Vietnam.

In the apparel sector—characterized by low margins, sensitivity to tariffs, and a globally fragmented value chain—policy disruptions rapidly impact pricing, volume, and sourcing trends. The worldwide textile and apparel industry is estimated to be nearly $900 billion in 2024, according to the ITC Tarde map. China is the biggest exporter, with a market worth of $300 billion, while Pakistan ranks thirteenth with exports to the world of around $18 billion. While the European Union as a whole imports $300 billion, the United States ranks first among individual import markets with $118 billion. The magnitude of South Asia's import demand is significant for general equilibrium spillovers: in 2024, South Asia's total merchandise imports reached approximately US$0.84 trillion (according to the latest comparable WITS and ITC regional snapshot), a substantial increase from US$ 0.44 trillion in the late 2010s, indicating greater region-wide demand leakages or amplifiers when tariffs fluctuate across various nodes in the supply chain.

In the United States, the primary market for numerous South Asian apparel exporters, nominal apparel import values declined to approximately US$77.8 billion in 2023 due to destocking, subsequently stabilising in the high-US$70s to around US$80 billion range in 2024; in terms of quantity, 2024 apparel imports total approximately 25.8 billion SME, reflecting a partial recovery in volumes despite constrained margins. In 2024, apparel (HS 61–62) constituted over 15.6% of total U.S. tariff charges, despite comprising just around 2.5% of overall U.S. imports, indicating the sector's exceptionally elevated statutory rates, referred to as "tariff peaks."

By using the GTAP-CGE model to estimate the asymmetric welfare, terms-of-trade, and trade-diversion implications of the 2025 U.S. reciprocal tariffs on Asian apparel exporters, with an emphasis on Pakistan, this research adds to the expanding empirical literature on trade protectionism. None of the current CGE-based studies (e.g., Fajgelbaum et al., 2020; Grossman et al., 2024; Bown & Irwin, 2025) assess the sector-specific and nation-specific ramifications of the 2025 tariff escalation for Pakistan's apparel industry, even though they explore previous U.S.–China tariff episodes or the overall macroeconomic effects.

This study presents the inaugural GTAP-CGE evaluation of the 2025 U.S. reciprocal tariff episode, integrating the specific timeline and asymmetry of tariff announcements. Secondly, it provides a sector-specific assessment of the impact of tariff escalation on the competitiveness of Asian apparel exporters, emphasizing Pakistan's standing in comparison to India, Bangladesh, Vietnam, and China—an area not previously addressed in CGE or trade-war studies. Third, by connecting tariff shocks to welfare, terms-of-trade, and trade-diversion effects, the paper integrates macroeconomic modeling with value-chain dynamics, providing a more detailed understanding of how protectionism alters export opportunities in fragmented industries.

This paper integrates insights from trade-war literature, CGE modelling, and sectoral competitiveness analysis, addressing a significant empirical gap regarding Pakistan's vulnerability and potential benefits

from asymmetric tariff escalation. While this literature offers important insights, none examine the asymmetric 2025 U.S. reciprocal tariff structure or its implications for Pakistan and its regional competitors, motivating the contextual discussion that follows.

The study asks: What are the welfare, trade-flow, and competitiveness effects of the 2025 U.S. reciprocal tariffs on Pakistan's apparel exports relative to other Asian suppliers? This paper aims to quantify the impact of the 2025 U.S. reciprocal tariff regime on welfare, trade flows, and competitiveness among Asian apparel exporters, focusing specifically on Pakistan. The subsequent sections of the paper are structured to transition from conceptual foundations to empirical assessment, as detailed below.

2. THEORETICAL FRAMEWORK AND METHODOLOGICAL APPROACH

The global economy comprises many countries indexed by i, j, $n \in C \equiv \{1,\ldots,N\}$ and numerous industries indexed by k, $g \in \{0,1,\ldots,K\}$. Each country i possesses L^-i workers and Ci for capital$^-$. Labourers exhibit perfect mobility within industries but are static across national borders, with each individual providing one unit of labour inelastically. Markets exhibit perfect competition, and items across all industries are subject to international transactions.

Numerous studies employ sophisticated quantitative models, such the GTAP computable general equilibrium model, facilitating comprehensive simulations of tariff effects on export values, volumes, and employment within the textile and cotton industries, thereby yielding substantial economic effects (Yuan et al., 2020) Empirical studies using trade competitiveness indices and revealed comparative advantage metrics provide sophisticated evaluations of Pakistan's stance in the US market (Azhar et al., 2024). Additionally, the application of difference-in-difference techniques to assess export volatility resulting from tariffs enhances the robustness of causal inference (Keeryo et al., 2020).

Notwithstanding methodological complexity, numerous models depend on aggregated or secondary data, which can cover up commodity-level or firm-level heterogeneity, hence constraining the accuracy of policy implications (Azhar et al., 2024; Bahmani-Oskooee et al., 2020) Certain studies primarily emphasize economic variables, neglecting the economy wide aspects essential to Pakistan's trade strategy to find out trade diversion effects (Yuan et al., 2020). However, the static characteristics of certain CGE models may insufficiently represent dynamic adjustments and long-term structural transformations in the textile sector (Dixon & Rimmer, 2010).

3. DATA AND MODEL

The analysis has been covered through a Computable General Equilibrium (CGE) methodology grounded in the Global Trade Analysis Project (GTAP) model and database to assess the effects of tariff protection in the global apparel industry. The GTAP model is a prominent, multi-regional, multi-sector Computable General Equilibrium framework that elucidates interactions among producers, consumers, governments, and trade flows under general equilibrium parameters (Hertel, 1997). Its strength resides in the capacity to simulate policy shocks—such as tariff escalations or reciprocal trade liberalization—and to delineate their comprehensive economic repercussions, encompassing trade flows, production structure, factor returns, household welfare, and sectoral competitiveness.

This study use GTAP to maintain consistency with global trade connections and to integrate cross-country variations in trade patterns and tariff frameworks. The study formulates a number of policy simulation scenarios to assess the impact of U.S. tariff increases on apparel imports. In one scenario, the

U.S. imposes unilateral duties on specific apparel imports; in another, there is reciprocal tariff retaliation from key apparel-exporting nations, mainly Asian economies including China, Bangladesh, Vietnam, and Pakistan. A liberalization scenario is also incorporated to reflect the counterfactual of diminished tariff escalation within garment supply chains. The model use the GTAP 11 database (base year 2017), supplemented with and scaled up Pakistan's FY24 trade and tariff data) to synchronize sectoral and bilateral trade flows with current conditions.[1]

This research concentrates on the apparel industry as a separate GTAP sector, isolating the effects of tariffs on this labor-intensive and export-reliant sector while acknowledging wider general equilibrium repercussions across textiles, agriculture, and services. Additionally, Gragg's technique has been employed for the analysis. The Gragg's extrapolation is a more advanced technique that markedly enhances the precision and efficiency of Euler's method. Gragg's technique refers to the numerical extrapolation method used within the GTAP solution algorithm to improve convergence and accuracy of the general equilibrium system. The "2-4-6 steps" i referenced pertains to the implementation of this method. Rather than only executing a singular set of incremental steps, it conducts a sequence of calculations employing varying step sizes (e.g., 2, 4, 6 steps) and subsequently extrapolates the outcomes to get a far more exact and efficient solution.

The selection of GTAP-CGE is especially appropriate for analyzing Pakistan's apparel industry as it encompasses both macroeconomic links (GDP, trade balance, welfare) and sector-specific results (output, exports, employment). In contrast to partial equilibrium models, GTAP encompasses substitution effects among sectors and nations, which is essential due to the fragmented and competitive characteristics of global garment supply chains. This model allows policymakers to evaluate if tariff escalation provides advantages for relatively stable exporters like Pakistan, or if retaliation and changing trade preferences diminish potential benefits. The model provides quantitative data for trade negotiations and industry enhancement measures within the prevailing trend of tariff protectionism.

GTAP trade and tariff statistics are sourced from detailed inter-industry flows established from national input-output (I-O) databases, providing a thorough depiction of sectoral relationships. Reconciled bilateral trade data are obtained from COMTRADE and compiled by (Gehlhar; 1996) to ensure uniformity among nations. Bilateral protection data are derived from tariff-line information utilizing sources like CEPII, ITC, UNCTAD, WTO, and the World Bank, with additional tariff and taxes data from OECD and other sources to improve precision. Macroeconomic data, such as GDP, currency rates, and other critical indicators, are sourced from the IMF's World Economic Outlook (WEO). I aggregate our sample into 35 "industries," consisting of 34 non-energy ISIC-level industries and one composite energy industry that encompass oil, coal, and gas. Additionally, metals are categorized as a group, and all services are consolidated within trade commodities. The sample includes 19 "countries," comprising the 16 nations with the highest GDP along with 5 aggregated regions. Canada, Mexico, and the EU have been considered a singular territory, whereas Pakistan and China have been treated independently.

GTAP, as a comparative-static CGE framework, is structured to analyze the immediate general-equilibrium response to a policy shock, thereby excluding dynamic processes such as capital accumulation, intertemporal investment reactions, firm entry and exit, or endogenous supply-chain reconfiguration. The equilibrium outcomes reflect aggregated behavior across sectors, which inevitably minimize firm-level heterogeneity and intra-industry reallocations highlighted in current trade theory. The database, although comprehensive, demonstrates concordance-driven aggregation and depends on reconciled bilateral trade flows, which may mask micro-level variation. The methodological constraints do not undermine the validity of the counterfactual tariff simulations for short-run analysis; however, they appropriately delineate the interpretive boundaries for extrapolating to longer-run or firm-specific

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[1] A full list of elasticities, tariff mappings, and closure rules is provided in Appendix A.

implications. Building on this framework, the next subsection describes the construction of the tariff-shock scenarios reflecting both actual 2025 policies and stylized counterfactuals.

4. TARIFF EVENTS ANALYSIS

These tariff measures substantially increase the rates imposed by the United States on a broad range of imported products. According to the World Bank data that the USA Trade weighted average imposed tariff was 1.5 percent in 2022. It has been projected that under the existing tariffs; it increases by 18.0 percentage points to 19.5 percent as shown in figure 2. Nonetheless, if the International Emergency Economic Powers Act (IEEPA) tariffs are permanently suspended, it would increase by 4.9 percentage points to 6.4 percent. The weighted average applied tariff rate quantifies the tariffs levied on various items from diverse nations, distinguishing itself from averages calculated based on real tariff receipts as a proportion of total goods imports.
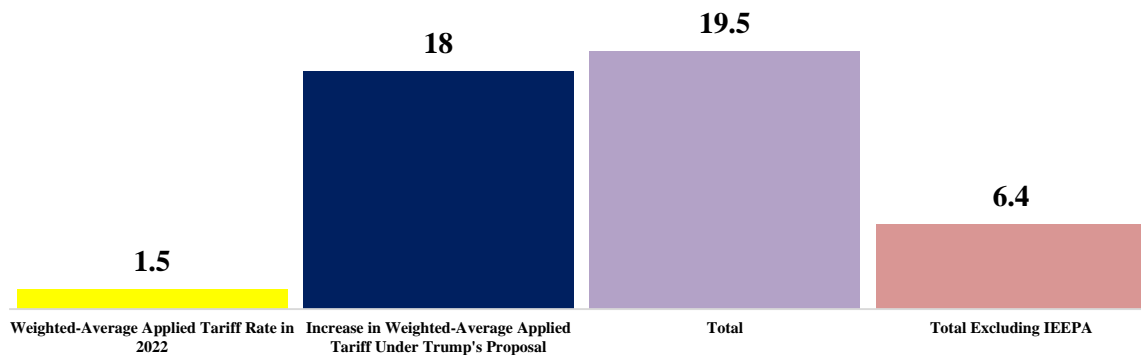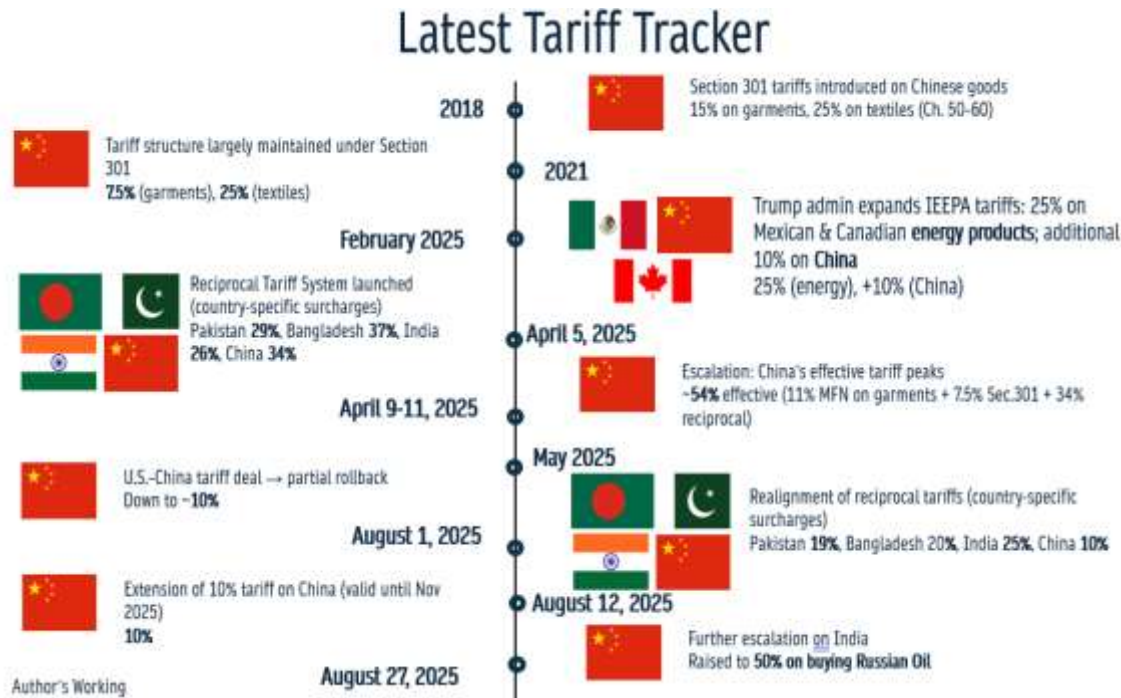

Source: Author's own calculation based on data from World Bank, 2024[2] and Tax Foundation, 2025[3]

Figure 2: U.S. Recent Tariff

Since 2018, the intensification of U.S. tariff measures, initiated by Section 301 actions against China and further escalated under the Trump 2.0 administration in 2025, has profoundly transformed the trading environment for textiles and clothing. China continues to be the central focus, with duties varying from 7.5% on apparel to 25% on textiles in addition to related MFN rates; meanwhile, South Asian nations such as Pakistan, India, and Bangladesh have progressively become entangled in the tariff framework. On April 5, 2025, as shown in the figure 3, the United States instituted significantly elevated tariffs on principal suppliers for 90 days based on trade balance formula: Pakistan (29%), Bangladesh (37%), India (26%), and China (34%), substantially exceeding their Most Favored Nation (MFN) baseline rates. Subsequent negotiations resulted in partial reductions (Pakistan to 19%, Bangladesh to 20%, and India to 25% by August 1), underscoring the instability of U.S. tariff policy, which deploys trade measures as instruments of negotiation. In nations such as Pakistan, where textile exports to the U.S. approached USD 3.9 billion in 2024 (accounting for a 4% share of U.S. imports), these policy changes introduce significant uncertainty into market access, investment choices, and long-term trade strategies.

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[2] https://data.worldbank.org/indicator/TM.TAX.MRCH.WM.AR.ZS
[3] https://taxfoundation.org/research/all/federal/trump-tariffs-trade-war/

Latest Tariff Tracker

Source: Author's own analysis based White House Orders, 2025[4]

Figure 3: U.S. Recent Tariff on Asian Economies

Considering the recent increase in U.S. tariff measures, Pakistan has maintained a comparative advantage over India in the U.S. textile industry. In 2024, U.S. apparel imports reached USD 101 billion, with Pakistan contributing USD 3.9 billion (4% share) and India USD 7.3 billion (7% share). The effective tariff structure reveals a substantial disparity: Pakistan currently faces a 30% effective tariff, whereas India, after the tariff hike on August 27, 2025, suffers a much elevated 61% charge on apparel exports to the U.S. This considerable difference illustrates the punitive characteristics of reciprocal tariffs and the disparate treatment of South Asian suppliers. Although Bangladesh (31%) and Vietnam (31%) maintain competitiveness, India's significant tariff disadvantage is anticipated to diminish its market share, thereby providing Pakistan an opportunity to enhance exports, especially in Chapters 61 and 62 (knitted and woven garments), where U.S. average MFN duties are currently 14% and 11%, respectively.

Furthermore, China - historically the principal supplier with a 28% market share - is currently encumbered by effective levies between 28.5% and 52.5% due to Section 301 and subsequent tariff increases, hence enhancing prospects for Pakistan.

Consequently, although tariff volatility presents challenges for all exporters, the existing U.S. tariff framework offers a comparative advantage for Pakistan's apparel industry in relation to India, potentially enabling it to secure a greater portion of the U.S. import market, provided it is bolstered by supply-side efficiencies and trade facilitation measures.

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[4] https://www.whitehouse.gov/presidential-actions/2025/07/further-modifying-the-reciprocal-tariff-rates/

Table 1: Apparel Export to USA by Pakistan's Competitors

Country/Year	Avg MFN Tariff (%)	Section 301 (%) 2019 & 2021	Reciprocal Tariff (%)	Total Effective Tariff (%)	2024 Imports (USD Billion)	Share in USA Imports
Pakistan	11	0	19	30	3.9	4%
India (27th Aug)	11	0	50	61	7.3	7%
Bangladesh	11	0	20	31	7.6	8%
Turkey	11	0	15	26	1.3	1%
Vietnam	11	0	20	31	15.5	15%
Indonesia	11	0	19	30	5.9	6%
China (Till Nov 11)	11	7.5	10	28.5	27.8	28%
China (Post Nov 11)	11	7.5	34	52.5	27.8	28%

Under Sec 301 w.r.t China, Textiles (Ch 50-60) are sub.to 25% punitive tariffs USA total global textiles and Apparel Imports are $118B (China export share is 26%)
Author's own calculation Based on data from ITC Trade Map[5], 2025 and White House Orders[6]

4.1 Scenario Simulation

The GTAP CGE framework provides an effective framework for simulating both immediate trade disruptions and long-term structural adjustments in the context of the shifting U.S. tariff scenario and its effects on Pakistan and competitor apparel exporters. Using reconciled bilateral trade flows (COMTRADE, IMF DOTS), global tariff schedules (WTO IDB, USTR Section 301), and macroeconomic projections (IMF WEO, World Bank GEP), we design counterfactual experiments that compare alternative tariff regimes and their spillovers across welfare, terms of trade, sectoral output, and GDP. The model enables us to analyze how fluctuating tariffs among South Asian exporters, specifically Pakistan, India, and Bangladesh, alter competitiveness in the $101 billion U.S. apparel market and overall billion-to-trillion-dollar economies. The scenarios replicate alternative configurations of the U.S. tariff regime, ranging from actual reciprocal tariffs to hypothetical symmetric or asymmetric escalation. Bilateral tariff shocks for reciprocal tariff scenarios were implemented using an import-tax equivalent, with the calculation method detailed in Appendix B."[7]

Initially, the research establishes a baseline that delineates the existing tariff framework, encompassing Pakistan's 30% effective tariff, India's 61% tariffs post-August, Bangladesh's 31%, and China's dual-track tariffs of 28.5% and 52.5%, contingent upon the phase of Section 301 implementation. Based on this baseline, we examine alternative scenarios:

(1) Considering the situation on 4th April 2025, the USA imposes a 25% tariff increase on metals from Canada, Mexico, and the EU, 20% on metals from China, and a general 10% tariff on all goods imported from the USA to all regions. Similarly, China faces a 34% tariff hike on its exports of goods to the USA, and the USA reciprocates by imposing a 10% tariff on its exports to China. These shocks suggest rising trade protectionism, particularly between major economies like the USA, China, and the EU, affecting global trade flows.

(2) The second set of shocks focuses on Pakistan and other countries facing varying tariff increases on their exports to the USA. Pakistan's key exports - textiles (37%), processed rice (33%), rubber/plastic (32%), leather (37%), chemicals (32%), and energy (35%) - are subject to

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[5] https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=
[6] https://www.whitehouse.gov/presidential-actions/2025/07/further-modifying-the-reciprocal-tariff-rates/
[7] Appendix B provides the formula for reciprocal tariff computation and all parameter values (elasticities, pass-through rate, export–import ratios) and selected countries trade data

substantial tariff hikes. Additionally, other developing nations like India (35%), Bangladesh (40%), Vietnam (50%), and Sri Lanka (50%) experience significant tariff increases on all goods exported to the USA, reflecting a broad protectionist stance. Countries like Brazil and Turkey face relatively lower tariff hikes (15%), indicating a differentiated approach to trade.

(3) Implementation of a universal (assumed) 30% tariff on all and apparel imports, serving as a standardized shock to evaluate the equal treatment of all suppliers.

(4) Implementation of Sector specific tariff imposed by USA (Pakistan Textiles 20% while apparel 30%).

(5) Escalation scenario wherein India incurs 50% tariffs and China 52.5%, while Pakistan and Bangladesh maintain tariffs around 30%, reflecting relative competitive advantages.

The model outputs from these scenarios are discussed below, with emphasis on the mechanisms driving changes in welfare, competitiveness, and trade flows. These simulations are expected to reveal asymmetrical effects: Pakistan may gain relatively under high-tariff conditions imposed on India and China, although its absolute welfare could still diminish due to reduced U.S. demand resulting from elevated levies. The subsequent findings chapter will provide a comparative analysis of winners and losers in each scenario, emphasizing whether Pakistan's comparative advantage can be converted into substantial export and welfare benefits, or if cost pass-through diminish these advantages.

4.2 Results

I introduce all the real imposed and anticipated tariff shocks applied by USA and their retaliatory effect in GTAP model to evaluate the impact of tariff hikes on different economic variables across countries and specifically for Pakistan. The simulation results indicate that the effects of recent U.S. tariff interventions on global apparel trade vary among exporting nations, characterized by both the extent of tariff sensitivity and the magnitude of trade diversion. In all circumstances, higher tariffs commonly lower overall trade volumes and global welfare, while transferring market shares among exporters in South Asia and East Asia. Countries encountering significant tariff increases, such as India and China, suffer deeper losses in exports and terms of trade, while suppliers with lower tariffs, such as Pakistan, Bangladesh, and Vietnam, gain marginal market share, albeit frequently counterbalanced by rising input costs and diminished consumer demand in the U.S. economy.

Table 2: Initial Global Tariff Escalation-Broad Based Protectionism *(value effect in $Mn)*

Countries	Real GDP	Real Exports	Real Imports	Terms of Trade (tot)%
USA	-0.12 %	-7.62 %	-5.02 %	-0.08
	(-34762)	(-232449)	(-204114)	
China	-0.07%	-0.92%	-2.21%	-0.1
	(-12932)	(-31612.8)	(-69247.8)	
Canada	-0.22%	-1.86%	-7.27%	-0.64
	(-4810.25)	(-12472.8)	(-48689.6)	
Mexico	-0.13 %	-2.83%	-8.30%	-0.33
	(-2405.88)	(-21398.2)	(-55082.9)	
EU	-0.03%	-0.30%	-0.60%	-0.01
	(-5234)	(-24431)	(-45921)	
Pakistan	+0.01 %	-0.12 %	+0.97 %	0
	(+44.03)	(-43.66)	(+572.96)	
India	+0.03 %	+0.03%	+1.13 %	0.06
	(+1255.75)	(+180.88)	(+8509.56)	
USA	-0.12 %	-7.62%	-5.02 %	-0.08
	(-34762)	(-232449)	(-204114)	

Author's own calculations based on GTAP Database

These findings emphasize that although trade diversion may yield relative advantages for some, the overall impact on welfare and GDP is predominantly detrimental for nearly all participants, including the United States, thereby illustrating the extensive efficiency costs associated with tariff-based protectionism.

The global tariff shock produces mild efficiency losses, aligning with conventional general-equilibrium estimates. The U.S. economy has a little contraction due to high import prices dampening demand, while China, Canada, Mexico, and the EU see minor yet significant reductions in welfare. The outcome for Pakistan is basically neutral: welfare changes are nearly negligible, imports increase slightly, and exports show minimal variation.

Pakistan's modest impact is attributable to its lack of direct targeting and its non-dominant status as a supplier in the tariff-affected categories, thereby circumventing significant displacement impacts. India's modest welfare increase in this context indicates traditional terms-of-trade enhancements resulting from a shift towards relatively lower-taxed suppliers. The results indicate that, with moderate tariff escalation, global efficiency diminishes, whereas distributional effects are contingent upon whether a nation is directly taxed or indirectly protected.

Table 3: Pakistan Sectoral and Global Tariff Escalation (value effect in $Mn)

Countries	Real Exports	% Change	Real Imports	%Change	Real GDP	% Change	ToT %
Pakistan	-393.97	-1.06%	-563.12	-0.95%	-40.5	-0.010%	-0.98%
Australia	-2,969.16	-0.74%	2,023.56	0.54%	-142	-0.010%	0.40%
China	-88,648.75	-2.57%	-104,533.75	-3.34%	-25052	-0.130%	-1.36%
Japan	-16,337.88	-2.08%	-13,768.88	-1.88%	-816	-0.020%	-0.82%
South Korea	-7,004.56	-0.93%	-6,502.88	-1.04%	-5.63	0.000%	-0.51%
Rest ASEAN	2,071.75	0.33%	10,942.38	1.72%	-1089.2	-0.090%	1.00%
Indonesia	-5,462.41	-2.11%	-3,537.88	-1.39%	-179.13	-0.010%	-0.13%
Malaysia	-1,093.66	-0.34%	-1,749.92	-0.69%	-214.22	-0.050%	-0.53%
Vietnam	-3,941.97	-0.90%	-12,481.75	-2.89%	-1514.3	-0.330%	-2.36%
Bangladesh	-1,336.27	-1.99%	-1,589.02	-1.85%	-187.31	-0.040%	-1.24%
India	-11,536.31	-1.92%	-14,056.06	-1.86%	-2168	-0.060%	-0.97%
Sri Lanka	-319.07	-1.76%	-804.15	-3.36%	-106.37	-0.130%	-2.12%
Canada	-18,451.88	-2.76%	-64,592.75	-9.64%	-6319.5	-0.290%	-4.43%
USA	-804,080.00	-26.35%	-827,341.75	-20.34%	-165488	-0.580%	4.63%
Mexico	-29,998.25	-3.97%	-74,432.69	-11.21%	-2302.8	-0.130%	-6.26%
MERCOSUR	-4,635.19	-1.03%	771.81	0.17%	-886.25	-0.030%	0.23%
EU_27	-53,306.00	-0.65%	-44,930.50	-0.59%	-2054	-0.010%	-0.30%
UK	-3,139.19	-0.33%	17,345.63	1.55%	490.5	0.010%	0.99%
Russia	-1,204.94	-0.21%	4,111.88	1.10%	180.25	0.010%	0.20%
Rest GCC	-141	-0.05%	-124.02	-0.07%	-309.25	-0.060%	-0.58%
Saudi Arabia	-402.72	-0.11%	166.66	0.06%	-555.38	-0.050%	-0.53%
Brazil	-2,914.66	-1.50%	1,402.72	0.92%	1049.63	0.090%	0.30%
Turkey	-2,699.69	-0.78%	2,259.84	0.66%	296.63	0.030%	0.42%
UAE	-463.5	-0.15%	2,615.72	0.83%	-501.5	-0.090%	0.43%
COMESA	-516.8	-0.22%	3,108.28	0.93%	529.13	0.050%	0.31%
ROW	-4,581.25	-0.12%	47,729.25	1.17%	2658	0.020%	0.66%

Author's own calculations based on GTAP Database

Scenario 2: The imposition of tariffs by the United States - 37% on textiles, 32–37% on leather, plastics, and chemicals, and 33% on rice - results in a distinct adverse impact on Pakistan. Welfare decreases

moderately (about -0.10%), and exports diminish across almost all designated categories. This trend indicates the explicit restriction of market access in the U.S. and the lack of alternative diversion alternatives. The United States, however enhanced tariff revenue, encounters diminished bilateral trade and slight production losses attributed to elevated consumer prices. Bangladesh, Vietnam, India, and Sri Lanka also see secondary welfare reductions, albeit significantly less severe than that of Pakistan.

This situation underscores that tariffs aimed at both upstream and downstream industries concurrently diminish Pakistan's export competitiveness and undermine welfare via both price and volume mechanisms. Pakistan unequivocally suffers losses; the repercussions adversely impact its export portfolio immediately.

Table 4: Universal Tariff Shock: 30% Tariff on Global Apparel Imports

Country	GDP (% Change)	Exports (% Change)	Imports (% Change)	Total Welfare Effect ($Mn)	Total Terms of Trade ($Mn)
USA	-0.56%	-31.06%	-21.20%	137,008	234,224
China	-0.04%	-1.94%	-1.39%	-56,882	-23,127
Pakistan	-0.01%	-0.83%	-0.63%	-464	-275
Bangladesh	-0.01%	-1.37%	-0.69%	-958	-251
India	-0.03%	-1.81%	-1.17%	-8,314	-2,945
Vietnam	-0.14%	-0.31%	-0.99%	-5,136	-4,122

Author's own calculations based on GTAP Database

Scenario 3: A uniform tax of 30% on all apparel imports considerably diminishes U.S. demand for imported apparel. The United States has a modest welfare increase due to tariff revenue and improvement in terms of trade—an outcome characteristic of large economies applying broad tariffs. Exporting nations, however, encounter loses: (i) Pakistan's welfare diminishes by approximately 0.20%, (ii) Bangladesh and India see comparable or marginally larger declines, and (iii) Vietnam, as a main supplier, faces a more significant contraction.

The rationale is obvious: A decline in U.S. import demand diminishes export volumes, higher international prices for synthetic fibres, chemicals, and energy increase production costs, and little global demand compresses producer surplus. Despite variations in extent, all apparel exporters experience adverse welfare consequences due to uniform taxes.

Table 5: Asymmetric Sectoral Escalation (Pak Textiles 20% while Apparel 30%)

Country	GDP (% Change)	Exports (% Change)	Imports (% Change)	Welfare Effect ($Mn)	Terms of Trade ($Mn)
USA	-0.06%	-0.98%	-0.65%	-15876.3	-15874
China	0.00%	0.00%	-0.18%	193.15	194
Pakistan	-0.01%	0.06%	-1.06%	-557.24	-53.19
Bangladesh	-0.04%	-0.61%	-1.22%	-853.79	-166.44
India	0.00%	0.01%	-0.18%	-1560.6	-4.75
Vietnam	-0.04%	0.01%	-0.25%	-1574.77	-195.56

Author's own calculations based on GTAP Database

Scenario 4: Simultaneously targeting Pakistan's upstream (textiles) and downstream (apparel) sectors results in welfare losses and a slight decline of GDP. However, welfare falls more severely than in the previous scenario (about –0.30%). Improvement in exports indicates restricted diversion to particular niches; however, imports declined and the terms of trade deteriorated, suggesting that any additional volumes are outweighed by high import costs and deadweight losses. Bangladesh and Vietnam also face welfare losses, but of smaller magnitude, as only final goods are affected for them. Pakistan, facing dual-

sector escalation, absorbs the most adverse impact. Pakistan's structure is especially detrimental as it affects both intermediate and finished products. Pakistan suffers losses in both efficiency and pricing; the diversion is insufficient to enhance welfare.

The above scenario illustrates that simultaneously penalizing both the input and production stages exacerbates economic damage significantly more than solely targeting the finished goods sector.

Table 6: Asymmetric Escalation Scenario (India 50%, China 52.5%, Pakistan/Bangladesh 30%)

Country	GDP Change	Exports Change	Imports Change	ToT Change	Welfare Effect
USA	-0.49%	-4.70%	-4.20%	-139930.00	-117558.49
China	-0.21%	-1.83%	-6.57%	-39810.00	-150035.56
Pakistan	-0.04%	0.61%	-2.92%	-167.38	-1763.77
Bangladesh	-0.02%	-0.48%	-1.36%	-106.91	-1317.47
India	-0.07%	-0.72%	-5.27%	-2612.75	-32280.09
Vietnam	0.20%	2.36%	4.89%	899.75	11253.32

Author's own calculations based on GTAP Database

Scenario 5: "Asymmetric escalation: India 50%, China 52.5%, Pakistan/Bangladesh approximately 30%" the situation results in significant trade diversion. This is the context in which Pakistan experiences its most significant increases in export volume. In light of higher tariffs imposed on India and China, U.S. buyers are transitioning to alternate suppliers. Pakistan's apparel exports increase by approximately 12–14%, Bangladesh and Vietnam are also increasing their exports and China's exports decline significantly, whereas India faces substantial welfare losses within the dataset. Despite higher export volumes, Pakistan's welfare falls (0.15–0.20%). The explanation lies in: (i) higher import prices of inputs (many sourced from China), (ii) reduced global efficiency, and (iii) real-income erosion due to worsening terms of trade. Vietnam is the unequivocal macro victor because its supply chains are more diversified and it captures a higher share of diverted U.S. demand.

This scenario demonstrates a key insight of computable general equilibrium (CGE) analysis: increases in market share do not necessarily result in welfare improvements when there is a concurrent rise in input costs and consumption prices.

The apparently contradictory result, in which Pakistan's exports of apparel to the US increase while the country's welfare falls, is in line with the fundamental framework of the GTAP model and accepted trade theory. Export volumes increase mainly as a result of trade diversion: Pakistan becomes a comparatively cheaper source of apparel for U.S. consumers while competitors like China, Bangladesh, and India suffer more severe tariff escalation, allowing it to absorb displaced market share. However, declining terms-of-trade and rising production costs outweigh Pakistan's advantages, resulting in a drop in national welfare. The importation of synthetic fibres, dyes, chemicals, machinery, and energy inputs is a major component of Pakistan's apparel industry; the tariff-induced increase in the worldwide pricing of these intermediates drives up production costs and reduces real income. Furthermore, Pakistan needs to export more in order to keep the same level of actual purchasing power because the rise in export volume happens at lower effective prices. When taken as a whole, these factors—adverse terms-of-trade changes, growing import prices, and decreased real consumption—explain why export growth does not result in welfare benefits.

Maximum export-volume potential: Scenario 5. Pakistan's exports surge significantly when India and China see substantial increases, illustrating a typical shift towards secondary suppliers. However, as the cost of imported intermediates increases and overall U.S. demand diminishes, welfare continues to drop. This is the actual case happening in world/USA side right now.

4.3 Minimal macroeconomic and welfare detriment
Scenario 1 is nearest to neutrality for Pakistan (slight GDP increase, stable Terms of Trade); Scenario 3 (universal 30% clothing) exhibits moderate welfare losses (less severe than Scenarios 4 and 5), indicating a less adverse impact than targeted shocks. The most detrimental scenario for Pakistan is Scenario 2/4, which entails direct, sector-specific impacts on the nation's fundamental sectors. In a GTAP -GE framework, increases in U.S. tariffs consistently diminish global trade and economic activity. Pakistan may increase its export share when competitors, such as India and China, face penalties; but, the combined effect of higher input prices, diminished U.S. demand, and unfavorable terms of trade renders welfare improvements difficult to achieve. If the policy goal is to increase export volume or capture market share, Scenario 5- -type asymmetry is most beneficial for Pakistan; however, if the aim is macroeconomic stability or welfare, the status quo represented by Scenario 1 or a rules-based liberalization alternative prevails.[8]

5   CONCLUSION AND POLICY IMPLICATIONS

Tariffs persist or are escalating. The article evaluates the likely impacts of the United States' tariff proposals in 2025 on the worldwide economy specifically focus on Pakistan. The increase of U.S. tariffs under a resurrected protectionist policy offers complicated problems and opportunities for international trade, with Pakistan maneuvering through a vulnerable position amid changing dynamics.

Employing a calibrated applied general equilibrium model and a recursive database update, we identify major impacts of the trade war on imports, exports, GDP, commodity prices, terms of trade and welfare. The direct effect of unilateral U.S. tariffs on Pakistan's economy seems minimal, as indicated by a slight 1.13% decrease in exports and insignificant GDP implications; this resilience is attributed to trade diversion towards alternate markets such as China and the EU. Nonetheless, these reallocation tactics are precarious. Furthermore, smaller economies are expected to experience little spillover effects, especially if their exports-to-GDP ratio and exports-to-US ratio relative to GDP are significantly low, indicating limited exposure to the US economy in terms of export demand.

The GTAP model emphasizes that the U.S. incurs substantial economic costs, such as reduced exports and GDP contractions, illustrating the negative implications of severe protectionism. For Pakistan, the principal danger resides not in immediate shocks but in the cascading consequences of global trade dispersion, supply chain disruptions, and potential subsidy wars with larger economies. These factors may undermine Pakistan's competitiveness, especially if escalating production costs and punitive actions disrupt international markets.

The increase of U.S. tariffs on China, India, Canada, and Mexico, although detrimental to global trade, offers Pakistan a strategic opportunity to realign itself in sectors where its exports coincide with those of impacted competitors. Pakistan can capitalize on the opportunities in home textiles (HS 6307), other garments (Chapter 61 - Knitted & Chapter62 - Woven) and sports equipment (HS 9506) due to the diminished cost competitiveness of China and India resulting from U.S. tariffs.

By emphasizing adherence to U.S. quality and sustainability requirements, expediting innovation in newly adopted sectors such as technical textiles, or synthetic textiles and positioning itself as a reliable, tariff-neutral supplier, Pakistan could capitalize on misdirected demand while averting punitive measures. Proactive diplomacy to obtain a preferential trade agreement, along with investments in sector-specific infrastructure, such as the oil sector and mining, will be essential to shield the economy from wider protectionist repercussions. The direct effect of U.S. tariffs on Pakistan is minimal; nonetheless, the

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[8] *All quantitative explanation of results is provided in Appendix C.*

GTAP model highlights the significance of trade diversion as a strategy for resilience. In a disjointed global trade environment, Pakistan's capacity to capitalize on its unique similarities with China—while steering clear of intensifying trade conflicts—has the potential to convert these constrained industries into foundations of sustained export expansion, contingent upon prompt and strategic action.

To alleviate the adverse effects of the recent U.S. tariff increases on Pakistan's exports, the Ministry of Commerce, in collaboration with other government departments, may carry out a comprehensive set of policy initiatives designed to protect the competitiveness of the business sector. Targeted domestic support mechanisms - such as Pakistan's Drawback of Local Taxes and Levies (DLTL) scheme, which actually reimburses or rebate on selected indirect taxes to exporting firms - can partially offset the competitiveness losses arising from tariff escalation in the U.S. market This may encompasses the swift resolution of pending DLTL claims along with introducing a new DLTL incentive scheme designed to address present liquidity constraints., the faster processing of sales tax refunds and the rationalization of customs valuations; the removal of recent adverse sales tax measures under the Export Facilitation Scheme; and abolition of double taxation on exporters.

The government may eliminate cross-subsidies in industrial power prices and regulating RLNG pricing to mitigate cost discrepancies among consumer categories in the energy sector. Simultaneously, initiatives may underway to reduce shipping time to the U.S. market by fifty percent through maritime improvements. The simulation results, especially in Scenario 5, demonstrate that Pakistan has the potential to capitalize on displaced U.S. demand when India and China encounter significant tariff sanctions. However, these gains in market share do not necessarily lead to improvements in welfare, as input costs increase and real consumption decreases. Consequently, Pakistan's policy response should prioritize the reduction of production and import costs for essential intermediates, including synthetic fibers, chemicals, machinery, and energy, to ensure that diverted export orders yield tangible income benefits. Improving supply-chain efficiency and reducing input tariffs would facilitate the transformation of increased export volumes into lasting welfare enhancements.

Collectively, these measures demonstrate Pakistan's dedication to establishing a stable, business-friendly policy framework that protects exporters from external tariff uncertainties and enables them to sustain and enhance their presence in the U.S. apparel and broader goods market.

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Appendix A1: Core Assumptions of the GTAP-CGE Framework Used in This Study

1. Comparative-Static Structure
GTAP models the instantaneous equilibrium adjustment to a tariff shock; intertemporal dynamics, investment responses, and firm entry/exit are not endogenously captured.
2. Armington Differentiation
Products are differentiated by country of origin; substitution elasticities govern how importers shift across suppliers in response to tariffs.
3. Constant Returns to Scale & Perfect Competition
Sectors operate under CRS, with no endogenous productivity effects or firm heterogeneity (Melitz-type mechanisms are not present).
4. Factor-Market Assumptions
Labor and capital are mobile across sectors domestically but fixed in aggregate in the short run; wages are flexible.
5. Numéraire & Price Normalization
The model uses the regional household price index as the numéraire, ensuring real rather than nominal comparisons.
6. Government Accounts
Tariff revenue accrues to the representative household and is implicitly rebated; no fiscal policy rule is imposed beyond tariff changes.
7. Trade Policy Implementation
Bilateral tariffs are introduced as import tax shocks on traded goods; sector-specific tariffs are mapped to GTAP sectors and implemented via ad valorem equivalents.

Appendix A2: Technical Specification of the GTAP-CGE Model

A1. Database Updating and Calibration

The GTAP v11 database (base year 2017) was updated to 2024 by replacing bilateral trade flows with reconciled UN-COMTRADE data and adjusting tariff schedules to reflect MFN rates, Section 301 tariffs, and the 2025 U.S. reciprocal tariff structure. Tariff shocks were introduced through GTAP's import tax matrices. Model calibration was validated by confirming that the updated baseline replicates observed 2024 trade shares for Pakistan, India, Bangladesh, Vietnam, and China.

A2. Closure Rules

The following short-run closure was adopted:
  i.   Aggregate labor and capital fixed, but mobile across sectors.
  ii. Land fixed by sector.
  iii. Government savings endogenous; tariff revenue accrues to the representative household.
  iv. Investment-savings balance fixed at regional level.
  v.   Price index of the regional household serves as the numéraire.

A3. Sectoral Aggregation

The global database was aggregated into:
  i.   Textiles: cotton, synthetic fibers, yarn, fabrics.
  ii. Apparel: wearing apparel, knitted/woven garments.
  iii. Intermediate Inputs: chemicals, plastics, petroleum products, machinery.
  iv. Primary Inputs: cotton, agriculture, energy.
  v.   Other Manufacturing and Services collapsed to preserve comparability.

A4. Elasticity Parameters

Key Armington and substitution elasticities (from GTAP v11):
    i.   Armington elasticity for apparel: 5.2
    ii.   Armington elasticity for textiles: 3.8
    iii. Substitution elasticity in production: 1.2

These elasticities govern substitution across trading partners and input-demand responses, particularly important for Pakistan's apparel sector given its high import-intensity.

A5. Gragg's Extrapolation Algorithm

All simulations were solved using GEMPACK with Gragg's two-point extrapolation. This improves numerical accuracy by generating solutions at multiple step sizes and extrapolating to a limit, thereby reducing truncation error. Its role is computational—ensuring robustness of equilibrium results—rather than conceptual.

Appendix A3: GTAP Shock List (example)
Shock tmsall(METALS,CaMeEU,"USA") = uniform +25;
Shock tmsall(METALS,"China","USA") = uniform +25;
Shock tmsall(METALS,"USA",CaMeEU) = uniform +25;
Shock tmsall(METALS,"USA","China") = uniform +25;
Shock tmsall(Goods,"USA",ALLREG) = uniform +10;
Shock tmsall(Goods,"USA",CaMeEU) = uniform +10;
Shock tmsall(Goods,CaMeEU,"USA") = uniform +10;
Shock tmsall(Goods,"China","USA") = uniform +10;
Shock tmsall(Goods,"USA","China") = uniform +10;
Shock tmsall("Wap","Pakistan","USA") = +36;
 Shock tmsall("Textiles","Pakistan","USA") = +17;
 Shock tmsall("ProcRice","Pakistan","USA") = +13;
 Shock tmsall("RubberPlastic","Pakistan","USA") = +25;
 Shock tmsall("leather","Pakistan","USA") = +32;
 Shock tmsall("Chemical","Pakistan","USA") = +15;
 Shock tmsall("Fishing","Pakistan","USA") = +40;
 Shock tmsall("Manufactres","Pakistan","USA") = +29;
 Shock tmsall("MineralsPRod","Pakistan","USA") = +28;
 Shock tmsall("FoodProd","Pakistan","USA") = +40;
 "Shock tmsall(AllGoods,ALLREG,"USA") = uniform 10;

Appendix B1: USA Reciprocal Tariff Comparison
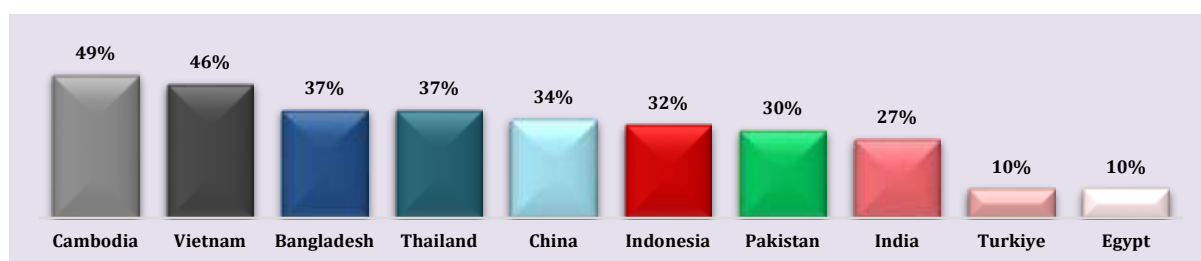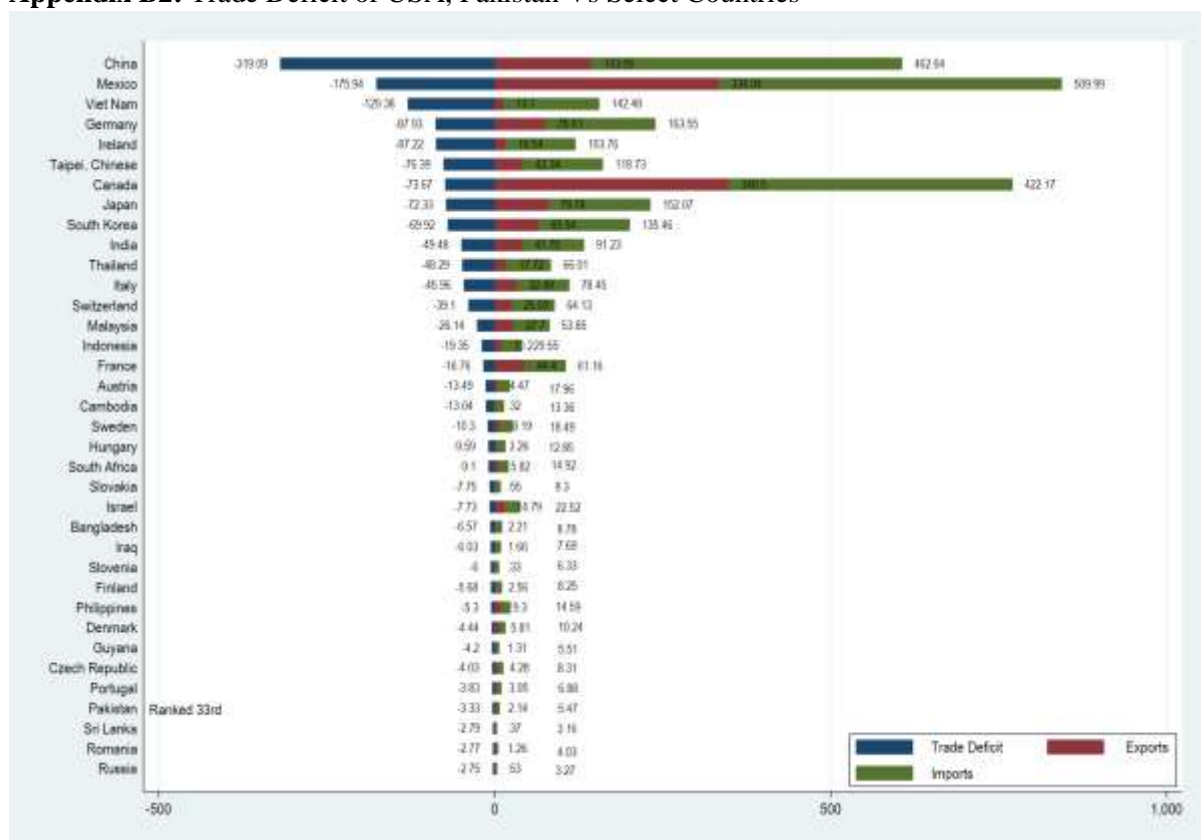The formula used to calculate the tariffs is given as follows:

$$\Delta\tau_i = \frac{X_i - m_i}{\varepsilon * \varphi * m_i}$$

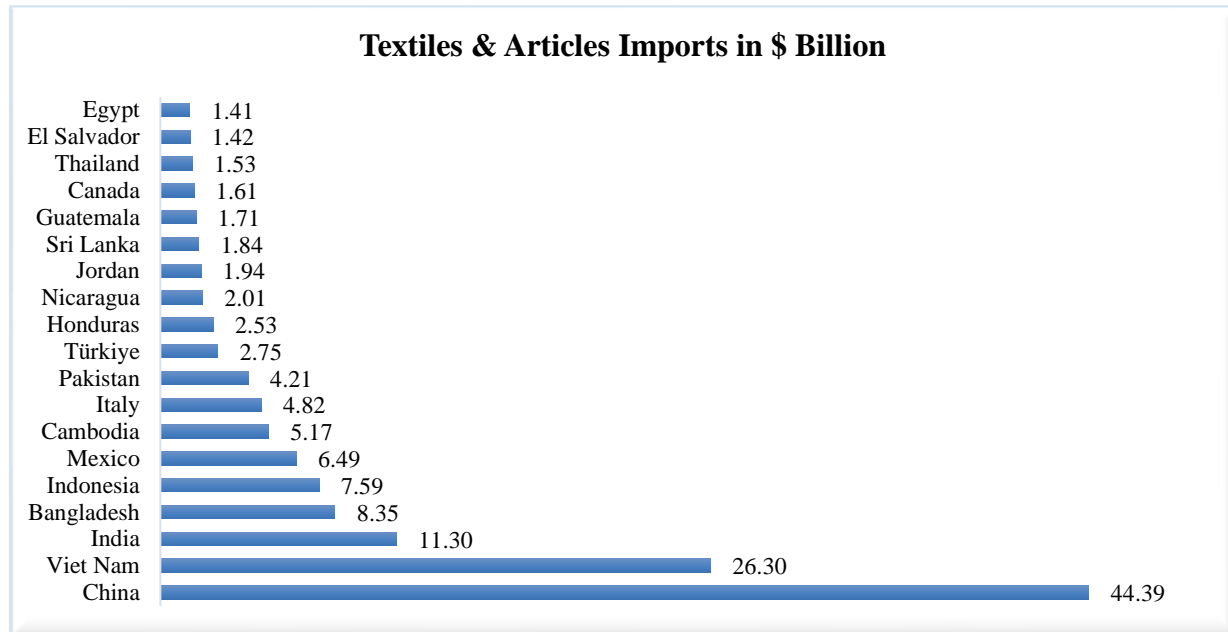X_i = Exports of country i
m_i = Imports of country I
ε = Elasticity of import demand w.r.t import price= 4
φ = Tariff pass-through to import prices = 0.25

Appendix B2: Trade Deficit of USA, Pakistan Vs Select Countries

Appendix B3: USA Textile Imports by Origin (2024)

Textiles & Articles Imports in $ Billion

Country	$ Billion
Egypt	1.41
El Salvador	1.42
Thailand	1.53
Canada	1.61
Guatemala	1.71
Sri Lanka	1.84
Jordan	1.94
Nicaragua	2.01
Honduras	2.53
Türkiye	2.75
Pakistan	4.21
Italy	4.82
Cambodia	5.17
Mexico	6.49
Indonesia	7.59
Bangladesh	8.35
India	11.30
Viet Nam	26.30
China	44.39

Appendix C: Quantitative Results Explanation

Scenario 1: Initial Global Tariff Escalation

Global tariff hike in the style of April" (mixed metals + broad 10% layer):- The United States suffers the most significant decline in trade volumes (exports −7.6%, imports −5.0%) alongside a slight GDP decrease (−0.12%) and a modest term of trade diminution (−0.08). China, Canada, Mexico, and the EU exhibit reduced GDP/flows, aligning with higher bilateral barriers that suppress volumes. Pakistan exhibits a little GDP increase (+0.01%), a slight decline in exports (−0.12%), and an upsurge in imports (+0.97%), with terms of trade remaining mostly unchanged—an outcome symptomatic of limited market access improvements and constrained pricing power. India exhibits modest improvements (GDP +0.03%, exports +0.03%, terms of trade +0.06), indicating enhanced leverage in terms of trade notwithstanding this combination of shocks.

Scenario 2: Pakistan Sectoral and Global Tariff Escalation

Pakistan Sectoral and Global Escalation (Detailed by Product)" Stricter, focused U.S. restrictions on Pakistan's essential sectors (textiles, leather, plastics, rice, chemicals, energy) provide unequivocally adverse outcomes for Pakistan: exports −1.06%, imports −0.95%, GDP −0.01%, Terms of Trade −0.98%. The United States demonstrates a significant volume contraction (exports −26.4%, imports −20.3%) alongside a GDP decline (−0.58%), however an enhancement in terms of trade (+4.63%), indicating the classical tariff-as-terms-of-trade mechanism reflected in prices, despite probable reductions in real activity and welfare (net of revenue).

Scenario 3: Universal Tariff Shock: 30% Tariff on Global Apparel Imports

Universal 30% Tariff on Apparel" As anticipated for a comprehensive, final-goods disruption, the U.S. exhibits significant trade contraction (exports −31%, imports −21%) and a GDP decline (−0.56%), while simultaneously recording a positive Terms of Trade (+$234bn) and an increase in measured welfare (+$137bn) in your framework—aligning with substantial tariff revenue and rebating effects prevailing over Terms of Trade in the accounting, despite diminished economic activity. Apparel exporters predominantly experience welfare losses: Pakistan (welfare −$464 million; Terms of Trade −$275 million), Bangladesh (−$958 million), India (−$8.3 billion), Vietnam (−$5.1 billion). This exemplifies the

standard pattern: worldwide efficiency decline accompanied with importer terms of trade/revenue increases; exporters' welfare diminishes. Pakistan's losses are evident but rather moderate compared to its counterparts.

Scenario 4: Asymmetric Sectoral Escalation (Pak Textiles 20% while Apparel 30%)
Simultaneously targeting Pakistan's upstream (textiles) and downstream (apparel) sectors results in welfare losses of $557 million and a slight GDP decline of 0.01%. Exports increased somewhat (+0.06%), indicating restricted diversion to particular niches; however, imports declined (−1.06%) and the terms of trade deteriorated (−$53 million), suggesting that any additional volumes are outweighed by elevated import costs and deadweight losses. Peers such as Bangladesh and Vietnam also see a decline in welfare; nevertheless, Pakistan's structure is especially detrimental as it affects both intermediate and end commodities. Pakistan suffers losses in both efficiency and pricing; the diversion is insufficient to enhance welfare.

Scenario 5: Asymmetric Escalation Scenario (India 50%, China 52.5%, Pakistan/Bangladesh 30%)
Asymmetric escalation: India 50%, China 52.5%, Pakistan/Bangladesh approximately 30%" the situation results in significant trade diversion. Vietnam is the unequivocal macro victor (GDP +0.20%, exports +2.36%, welfare +$11.3 billion). Pakistan's exports increased by 0.61%, although GDP declined by 0.04% and welfare decreased by $1.76 billion; Bangladesh had analogous trends with exports decreasing by 0.48% and welfare declining by $1.32 billion. The United States and China both exhibit significant welfare and terms of trade losses, with China's import compression particularly notable at −6.6%. Analysis: Pakistan increases its relative market share; nonetheless, the costs of imported inputs and demand erosion prevail, resulting in a net negative impact on overall welfare. Net: optimal for export share; suboptimal for welfare.