# Policy Challenges for Macroeconomic Management and Growth in Pakistan

## The Imperatives of Growth and Trade

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## Introduction

This volume emerges from the 18th Annual Conference on the Management of the Pakistan Economy, hosted by the Lahore School of Economics. Over nearly two decades, these conferences have become an important forum for rigorous, policy-oriented economic research, bringing together academics, policymakers, and practitioners to diagnose the economy's challenges and propose actionable solutions. This book is part of a longer-running series that reflects a sustained effort to develop a home-grown understanding of Pakistan's growth challenge — grounded in the country's specific institutional realities rather than generic prescriptions. Research produced within Pakistan, by those who understand the economy from the inside, is more likely to yield reforms that are both technically sound and practically implementable — and more likely to gain traction with the stakeholders who matter than prescriptions that arrive from outside.

The theme of this year's conference, *The Imperatives of Growth and Trade*, reflects a shift in focus from earlier volumes. In recent years, the priority was stabilisation — addressing a severe balance-of-payments crisis, reducing high inflation, and restoring international confidence. While that task is not complete, the most acute pressures have eased. The central argument of this volume is that Pakistan's growth challenge is no longer primarily one of macroeconomic stabilisation, but of structural transformation under balance-of-payments constraints. Sustained growth will require relaxing these constraints through export upgrading, deeper integration into global value chains, and investment in the productive and institutional capabilities that higher-value growth demands. The question, therefore, is not whether to pursue structural reform, but how to sequence and implement it given Pakistan's current constraints.

### Macroeconomic Conditions

The volume opens with an assessment of the economy's current position. The Lahore School's Modeling Lab, led by **Moazam Mahmood and Azam Chaudhry**, together with **Seemab Sajid, Amna Fatima, and Sara Qasim**, estimates GDP growth for fiscal year 2025 at 2.44 percent — a modest recovery from near-zero growth in FY2023 and 1.7 percent in FY2024. Inflation has declined from a peak of

33 percent to around 8 percent, and the economy recorded a current account surplus this fiscal year. These are welcome developments, though the vulnerabilities underlying the earlier crisis have not been fully resolved. **Kalim Hyder, Sabina Jafri, and Omar Saqib's** analysis of inflation persistence underscores that post-COVID inflationary expectations became self-reinforcing, and that anchoring them durably will remain central to maintaining price stability.

**The Growth Constraint**

Improved macroeconomic conditions have not yet translated into meaningful growth, and several contributions examine why. A consistent diagnosis across the volume is that Pakistan's growth is constrained not by policy ambition, but by the balance of payments. **Azam Chaudhry, Gul Andaman, and Aymen Junaid** estimate Pakistan's BOP-constrained growth rate at just 3.71 percent over 1996–2023, with actual growth remaining below even this ceiling. The key lever for raising it is reducing import income elasticity: liberalising imports of investment goods to stimulate capital formation, while curbing non-essential consumption imports. **Naved Hamid and Murtaza Syed** argue that maintaining a positive real interest rate remains appropriate given Pakistan's history of boom-bust cycles, and that premature monetary loosening risks reigniting external pressures before reforms take hold. **Moazam Mahmood, Shamyla Chaudry, and Muzzna Maqsood** further show that capital outflows — estimated at approximately 2.3 percent of income — reduce domestic savings available for investment, and must be incorporated into any serious accounting of the investment–saving gap. Taken together, these findings point to a coherent policy challenge: relaxing the balance-of-payments constraint requires export expansion, which in turn depends on upgrading Pakistan's position in global value chains and strengthening the domestic capabilities that support higher-value production.

**Trade: External Threats**

Trade is a central theme of this volume. Pakistan's external vulnerabilities are increasingly evident, and several papers address them directly. As the home of Pakistan's first WTO Chair, the Lahore School has developed a strong research focus in this area, and the papers by Chair **Azam Chaudhry** and co-authors reflect that commitment. **Azam Chaudhry and Gul Andaman** estimate that a 19-percent US tariff could reduce Pakistan's exports by USD 0.40 billion in 2025, with cumulative losses of USD 2.11 billion over five years, concentrated in textiles. A companion study finds that the EU's Carbon Border Adjustment

Mechanism could reduce exports to the EU by USD 308 million by 2026, rising to USD 479 million by 2036, with both agricultural and industrial sectors exposed. These findings point toward a common policy response: enhancing competitiveness, diversifying export markets, investing in cleaner production, and aligning with evolving global standards. The window for adjustment is narrow, and the cost of inaction is measurable.

**Trade: The GVC Opportunity**

Beyond these external pressures, the volume examines Pakistan's structural position in global markets. **Rabia Arif and Azam Chaudhry** show that Pakistan lags regional peers in global value chain participation, characterised by strong downstream but weak forward linkages that limit value addition. For a middle-income economy, deepening forward linkages — shifting from raw material supply toward higher-value manufacturing — offers the most effective route to improving export performance and GDP growth. The implication is that trade strategy must move beyond exchange rate management and tariffs toward actively building the productive base required for deeper GVC integration.

**Industrial Upgrading**

Building that productive base raises the question of what forms of industrial policy have worked elsewhere and what lessons Pakistan can draw from them. **Rajah Rasiah** provides a comparative analysis of Southeast Asia, showing how Singapore, Malaysia, Vietnam, and Indonesia used state-led industrial policy and foreign investment to sustain manufacturing growth and, in some cases, reach the technology frontier. A central lesson is that successful industrial upgrading requires a results-oriented state that combines incentives with accountability, embedded within a capable governance environment. For Pakistan, the question is not whether industrial policy is appropriate, but whether the institutional capacity exists to implement it effectively.

**Energy and Governance**

The volume also addresses domestic bottlenecks that continue to weigh on competitiveness, particularly in the energy sector. **Rabia Ikram, Moazam Mahmood, and Muzzna Maqsood** show that circular debt is driven less by tariff under-recovery than by fixed capacity payments embedded in power purchase agreements, which accumulate regardless of actual consumption. Reform must therefore focus on contractual structures and institutional incentives, rather than tariffs alone. **Jamshed Uppal's** cross-country analysis of independent power producers highlights governance quality — government effectiveness, rule of law, regulatory standards, and control of corruption — as the key determinant of sector performance. **Natasha Moeen, Mehreen Khan, and Theresa Chaudhry** document the air pollution burden in Punjab's transport sector and identify practical solutions, including electric vehicles, improved public transport, and better fuel standards. These constraints directly affect Pakistan's cost structure and external competitiveness, reinforcing the broader case for structural reform made throughout this volume.

**Looking Forward**

The stabilisation achieved over the past two years has created conditions that did not exist in 2023. The contributions in this volume reflect a research agenda increasingly oriented toward the structural reforms required for durable growth. They point to a consistent set of priorities: raising the BOP-constrained growth ceiling by reducing import intensity and strengthening export competitiveness; integrating more deeply into global value chains; preparing for emerging carbon and trade constraints through proactive industrial and environmental policy; and addressing the energy and governance bottlenecks that continue to limit private investment. Read alongside earlier volumes, they also reflect a cumulative, evidence-based account of why Pakistan's economy has evolved as it has — and what changes are required for it to perform differently.

Policymakers in the Ministry of Finance, the State Bank, the Ministry of Commerce, and the Planning Commission will find concrete, research-grounded guidance on the choices that matter most: where monetary policy should hold firm, which trade policy levers are most effective, what regulatory reforms can unlock the energy sector, and how the experience of successful developing economies can inform industrial upgrading. Academics and the business community will find analysis that speaks directly to the environment in which they operate. The challenge Pakistan faces is not simply to preserve macroeconomic stability, but to convert it into sustained and resilient growth — an agenda that is technically demanding and requires difficult choices and broad consensus, but one that this research suggests is both necessary and achievable.

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# 1

## State of the Pakistan Economy: Growth, Inflation, Welfare, and the Budget for the Fiscal Year 2025

**Moazam Mahmood,[1] Azam Chaudhry,[2] Seemab Sajid,[3] Amna Noor Fatima,[4] and Sara Qasim[5]**

### Abstract

*The Modeling Lab at the Lahore School of Economics estimated Pakistan's gross domestic product (GDP) growth over the fiscal year (FY) 2025 (July 2024–June 2025) to be 2.44 percent. This represents a very weak recovery from the 1.7 percent GDP growth estimated for FY 2024 and the flatlining of GDP growth (0.05 percent) for FY 2023.*

*Our estimate appears conservative compared to the World Bank's higher-end estimate of 2.7 percent, the International Monetary Fund (IMF)'s estimate of 2.6 percent, and the Asian Development Bank's estimate of 2.5 percent. The major productive sectors, manufacturing and agriculture, have weakened sectoral growth. Large-scale manufacturing contracted by 1.9 percent over the fiscal year after flatlining last year at 0.07 percent and experiencing a contraction of 2.9 percent the prior year.*

*This paper explores the structural hypothesis that Pakistan's GDP growth is constrained by external imbalances, leading to periodic crises and necessitating IMF bailouts. Inflation for FY 2025 is estimated at 8.37 percent, down from a peak of 33 percent in FY 2023, driven primarily by a stabilization of the exchange rate and a fiscal deficit of 6.0. The economy's Achilles' heel is now considered to be the current account. Observed over three cycles (FY 2013–2024), GDP growth above five percent per annum inflated the current account*

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*deficit. This behavior is not well explained by exports, but by imports, which were observed to be very elastic with respect to GDP. A policy to ride this cyclical dragon is offered by the Lahore School's Modeling Lab's trade model for Pakistan, which shows GDP growth to be constrained primarily by investment. Investment, in turn, is constrained mainly by the import of investment goods. This finding argues for a policy to liberalize the import of investment goods to raise investment and GDP growth. However, the current account must be balanced by decreasing the import of non-wage consumption goods. Finally, high inflation and low GDP growth have resulted in an increase in poverty over time, estimated as a headcount in 2024 to be 30 percent of the population. As a start, ameliorating this headcount will require about five percent of tax revenues.*

## Gross Domestic Product Growth, Inflation, and Welfare for the Fiscal Year 2025, Pending the Budget for the Fiscal Year 2026

*Gross Domestic Product Growth*

The Modeling Lab at the Lahore School of Economics estimated Pakistan's gross domestic product (GDP) growth over the fiscal year (FY) 2025 (July 2024–June 2025) to be 2.44 percent (Table 1). This represents a very weak recovery from the 1.7 percent GDP growth estimated for FY 2024 and the flatlining of GDP growth (0.05 percent) for FY 2023.

**Table 1: Estimates of annual GDP growth for FY 2025 based on Q3**

| | FY 2023 (est.) (USD billion) | FY 2024 (est.) (USD billion) | FY 2025 (est.) (USD billion) |
|---|---|---|---|
| GDP | | | 382.18 |
| Supply plus demand shock Y (S+D) | | | |
| C | | | 275.83 |
| I | | | 56.36 |
| G | | | 48.99 |
| NXn | | | 1.00 |
| **GDP growth rate** | **0.05%** | **1.68%** | **2.44%** |

Our estimate is conservative compared to those of the World Bank, International Monetary Fund (IMF), and Asian Development Bank (ADB) (Table 2).

**Table 2: Growth rate projections (FY 2025)**

| | |
|---|---|
| Lahore School Modeling Lab (est.) | 2.44% |
| Government of Pakistan (SBP/PBS) | 2.68% |
| IMF | 2.60% |
| World Bank | 2.70% |
| ADB | 2.50% |

Sources: State Bank of Pakistan (2025); Pakistan Bureau of Statistics National Accounts Committee meeting (May FY 2025); International Monetary Fund (2025); World Bank (2025); Asian Development Bank (2025).
ADB = Asian Development Bank, IMF = International Monetary Fund, PBS = Pakistan Bureau of Statistics, SBP = State Bank of Pakistan.

The Pakistan Bureau of Statistics (PBS) National Accounts Committee subsequently lowered its estimated GDP growth for Q3 from 2.7 percent to 2.4 percent. Thus, the Lahore School's Modeling Lab's estimate and the government's estimate appear to converge.

The size of Pakistan's economy is now approximated to be USD 380 billion. The largest driver of growth is consumption, accounting for 72 percent of GDP. Investment appears to be tapering off at just under 15 percent of GDP. The economy ran a USD 1 billion surplus on the current account this fiscal year.

*Sectoral Growth*

Our low estimate of GDP growth for FY 2025 is based partly on a sustained weakness in sectoral growth observed over the fiscal year. Sectoral growth in our model constitutes a supply shock. The model also incorporates demand shocks.

The major productive sectors, manufacturing and agriculture, have weakened sectoral growth. Large-scale manufacturing (LSM) contracted by 1.9 percent over the fiscal year (Table 3) after flatlining last year at 0.07 percent and experiencing a contraction of 2.9 percent the prior year.

**Table 3: Sectoral growth rates**

| | FY 2023 (%) | FY 2024 (%) | FY 2025 (%) |
|---|---|---|---|
| Agriculture | 1.55 | 1.50 | 0.60* |
| Industry | -2.90 | 0.07 | -1.90* |
| LSM | -2.90 | 0.07 | -1.90* |
| Services | 0.90 | 0.33 | 1.43** |

Sources: *State Bank of Pakistan (2025), **GOP FY 24–25 Half Yearly Report.
LSM = large-scale manufacturing.

The malaise in LSM, which should otherwise have led GDP growth, left growth reliant on agriculture, of which government policy should have been more mindful. Unfortunately, agricultural growth has also been a quarter of its trend growth, at 0.56 percent over the fiscal year (Table 3). Agricultural growth plateaued at a low 1.5 percent over the previous two years.

Services growth picked up aggregate growth in GDP over FY 2025, growing at just 1.4 percent. It was less than one percent in the prior two years.

Again, LSM's contraction over FY 2025 and its negative trajectory over the past two years put the onus of leading GDP growth on agriculture. However, agriculture, too, massively underperformed, which merits an examination and explanation.

Table 4 estimates growth in five major crops, showing that total agricultural growth was laid low at 0.5 percent over FY 2025. A 13.5 percent contraction in the quantum of production of these five major crops drove this low growth in aggregate agricultural output. In turn, this contraction was based on a contraction for each of the five crops.

**Table 4: Agriculture growth rates (FY 2025)**

| | |
|---|---|
| **Agriculture** | **0.56%** |
| **Important crops** | **-13.49%** |
| Wheat | -8.91% (production ↓, 31.81 million–28.98 million tons) |
| Maize | -15.40% (production ↓, 9.74 million–8.24 million tons) |
| Rice | -1.38% (production ↓, 9.86 million–9.72 million tons) |
| Sugarcane | -3.88% (production ↓, 87.64 million–84.24 million tons) |
| Cotton | -30.70% (production ↓, 10.22 million–7.08 million bales) |

Source: Pakistan Bureau of Statistics National Accounts Committee meeting (May FY 2025).

Wheat contracted by nine percent, based on a production drop from 32 million tons to 29 million tons. Maize contracted by 15 percent, due to a decline in output from ten million tons to eight million tons. There was a smaller contraction in rice (1.4 percent) due to a fall in production from nearly 9.9 million tons to approximately 9.7 million tons. Sugarcane contracted by four percent due to a fall in output from 88 million tons to 84 million tons. Cotton had the most significant contraction of 31 percent, dropping from ten million bales to seven million bales.

These agricultural contractions cannot be attributed to the weather, which has maintained its trend. It must, therefore, be attributed to government policy, which removed support prices for major crops like wheat and rice. Indeed, the PBS estimated the contraction in major crops in purely production terms—e.g., wheat's decline from 32 million tons to 29 million tons. However, the impact on GDP must be mediated further by the drop in wheat prices to give the total drop in the crop's output value. Wheat prices have been observed to fall, on average, by PKR 1,000 between the current and last crop. Therefore, the contraction in the value of major crops, determining the impact on GDP, was underestimated by the PBS, and was likely much higher.

It should be noted that our estimate of GDP growth uses PBS sectoral growth estimates at their reported face value (Table 4), which were approved by the National Accounts Committee. Our caveat holds that this will produce a final GDP growth estimate that will likely be an overestimate, requiring a final downward revision if sectoral growth is re-estimated in value terms.

*Inflation*

The Lahore School's Modelling Lab estimated FY 2025 inflation to be 8.37 percent (Table 5). Our estimate compares to the government's upper-range estimate of 5–7.5 percent. The IMF has a lower estimate of 5.1 percent.

**Table 5: Price model estimated for FY 2021–2025**

| Time period | Persistently large output gap (% of GDP) | Budget deficit (obs) (% of GDP) | Impact of depreciation on inflation (est) (%) | Impact of Δ commodity prices on inflation (est) (%) | Model inflation (%) | Govt. inflation (%) | IMF inflation (%) |
|---|---|---|---|---|---|---|---|
| FY 2021 | -1.80 | 5.20 | -0.78 | 9.07 | 13.49 | 8.20 | 8.90 |
| FY 2022 | 0.00 | 7.00 | 3.59 | 7.70 | 15.88 | 11.00 | 12.15 |
| FY 2023 | 0.00 | 5.00 | 26.26 | 2.04 | 33.30 | 38.00 | 29.18 |
| FY 2024 | 0.00 | 7.50 | 6.04 | 5.39 | 18.90 | 23.41 | 23.40 |
| FY 2025 | -1.60 | 6.00 | 0.00 | 3.97 | 8.37 | 5.50–7.50 | 5.10 |

Our model shows that the most significant contributor to double-digit inflation, which peaked at 38 percent two years ago, was exchange rate depreciation. Table 5 shows that the exchange rate stabilized over the current FY 2025 after substantive depreciation from FY 2022 to FY 2024. This slide was halted due to the government finally realizing the need to stop the disastrous depreciation, effectuating it through monetary policy and careful open market operations by the State Bank of Pakistan.

The impact of energy prices is another major contributor to inflation, in addition to the perennial fiscal deficit. Energy pricing, with a 0.52 percent pass-through coefficient into the general price level, contributed nearly 5.5 percent to inflation in FY 2024 (Table 5). Tables 6 and 7 show that energy prices still contributed approximately four percent to inflation in FY 2025.

The impact of energy prices on inflation in FY 2025 was due to the government's own policies. As Table 6 shows, the change in consumer price over the fiscal year comprises change in supplier prices plus change in taxation. The table estimates the weighted average of energy price changes for petrol, kerosene, high-speed diesel, electricity, coal, and natural gas. This weighted average of energy consumer price change came to 7.7 percent for FY 2025. Government taxation contributed 52 percent, while supplier price change contributed 48 percent.

**Table 6: Energy equations for FY 2025**
**(weighted percentage change in consumer price)**

| | **Δ supplier price (%)** | **Δ taxation (%)** | **Δ consumer price (%)** |
|---|---|---|---|
| Petrol | -1.05 | 0.56 | -0.49 |
| Kerosene | -0.04 | 0.00 | -0.04 |
| High-speed diesel | -1.16 | 0.50 | -0.66 |
| Electricity | 1.42 | 0.53 | 1.95 |
| Coal | 3.80 | 0.00 | 3.80 |
| Natural gas | 19.45 | 22.18 | 41.64 |
| **Weighted avg.** | **3.74** | **3.96** | **7.70** |

Source: Modeling Lab, Innovation and Technology Centre, Lahore School of Economics (May 2025).
Share of tax change in increase in total consumer prices = 51.48 percent.
Share of supplier price change in increase in total consumer prices = 48.52 percent.

**Table 7: Calculation of impact of Δ commodity prices on inflation (est) (percentage)**

| | | |
|---|---|---|
| βmp | Share of intermediate products in value added | 51.50 |
| mp* | Change in the value of commodity prices | 7.70 |
| MP | Impact of commodity prices on inflation | 3.97 |

Source: Modeling Lab, Innovation and Technology Centre, Lahore School of Economics (May 2025).

However, the macro trade-off with GDP growth has been the primary causal factor in decreasing inflation to single digits by FY 2025. Growth in the productive sectors has been low (Table 3), and manufacturing has been flatlining (FY 2024) or contracting for the previous two years (FY 2023). For FY 2025, the malaise in manufacturing growth worsened to -1.9 percent, which put the onus of growth in the productive sectors on agriculture.

Unfortunately, government policy has not raised agricultural growth but lowered it. Agricultural growth in the previous two years was below trend, approximating 1.6 percent (Table 3). For FY 2025, it fell to a third of that—0.5 percent. This decrease was based on a contraction in the growth of all major crops, which implies that government policy removed the support prices for these major crops.

Hence, inflation was brought down to single digits at the expense of growth in agriculture. A policy of sacrificing agricultural growth could be argued for if manufacturing growth had been robust. However, with manufacturing already contracting, to suppress growth in the only remaining productive sector, agriculture, was an expensive policy instrument to decrease inflation.

## The Current Account as the Economy's Achilles' Heel

The current account is a well-noted constraint on Pakistan's GDP growth. This structural hypothesis (Chaudhry, 2019; ADB, 2009; Amjad & Shahzad, 2019) posits that Pakistan's GDP growth is strongly import-constrained. Figure 1 shows that when GDP growth rises to five percent or more, it triggers large increases in current account deficits. There have been three such cycles between FY 2013 and FY 2024.

*The First Cycle of GDP Growth and the Current Account*

GDP growth was about four percent on trend during FY 2013–2015 in the first cycle. Correspondingly, the current account deficit was about USD 3 billion on trend. GDP growth rose above trend to 4.6 percent in FY 2016, raising the current account deficit to USD 5 billion. GDP growth picked up further over FY 2017 (5.2 percent) and FY 2018 (5.5 percent), which raised the current account deficit first to USD 12.3 billion (FY 2017) and then to USD 19.2 billion (FY 2018).

This substantial increase in the current account deficit was not caused by a fall in exports. Figure 1 shows that exports remained on trend in a range of USD 28 billion–34 billion between FY 2013 and FY 2018.

If not exports, the current account increase was caused by imports. Figure 1 shows that for the period FY 2013–2016, GDP growth remained below five percent, but imports ranged between USD 52 billion and USD 56 billion. GDP growth then surged above 5 percent over the next two years of the cycle to 5.2 percent (FY 2017) and 5.5 percent (FY 2018). Imports surged well above trend over these two years. They rose sharply from USD 56 billion to USD 64 billion in FY 2017 when GDP growth rose to 5.2 percent. Imports then increased further from USD 64 billion to USD 74 billion when GDP growth rose to 5.5 percent in FY 2018.

Thus, it was the USD 18 billion increase in imports when GDP growth rose above five percent that explains the substantial increase in the current account deficit to USD 12 billion (FY 2017) and USD 19 billion (FY 2018).

This first cycle from FY 2013 to FY 2018, which ended in two years of above-five-percent GDP growth, necessitated an USD 18 billion surge in imports, raising the current account deficit to USD 19 billion.

This first cycle's (ending in FY 2018) current account deficit, which was caused by surging imports, required financing in the second cycle beginning in FY 2019. Since the primary causal factor for the surge in imports was GDP growth above five percent, the financing required a plunge in GDP growth to contract imports (Figure 1).

*The Second Cycle of GDP Growth and the Current Account*

The second cycle ran from FY 2019 to FY 2022. The financing for the previous cycle's surge in GDP growth, imports, and the current account deficit began in FY 2019 with a considerable drop in GDP growth. Figure 1 shows that GDP growth fell by 3.4 percentage points from the last cycle's peak of 5.5 percent in FY 2018 to 2.1 percent in the opening year (FY 2019) of the second cycle. GDP growth fell drastically by 11 percentage points the following year, from 2.1 percent to -9.5 percent.

This drastic reduction and then contraction in GDP growth over the first two years of the second cycle (FY 2019 and FY 2020) enabled a USD 6 billion curtailing of imports from the previous cycle's high of USD 74 billion to USD 69 billion, and then again, by nearly USD 11 billion, to USD 58 billion.

In turn, this import reduction of USD 17 billion enabled a drastic USD 6 billion reduction in the current account deficit from its low of USD 19 billion in the previous cycle to USD 13 billion, and again by USD 9 billion to USD 4 billion.

This USD 17 billion import reduction in the first two years of the second cycle (FY 2019 and FY 2020), caused by the contraction in GDP growth, is virtually equal to the USD 18 billion import expansion in the previous cycle caused by the GDP growth surge above five percent. Thus, the expansion of imports in the previous cycle was paid for by their near-equivalent reduction in the first two years of the second cycle. The causality appears to be that it was GDP growth that was curtailed to enable the reduction in imports.

Led by a considerable drop and then contraction in GDP growth, the current account returned to approximate trend after two years of the second cycle (FY 2019 and FY 2020) through imports. This enabled a return to positive and significant GDP growth in the next two years of the cycle (FY 2021 and FY 2022). Figure 1 shows that in FY 2021, GDP growth vaulted from a massive contraction of -9 percent in the prior year to nearly 4 percent—an increase of 13 percentage points. It rose again, above five percent, in FY 2022.

There is now predictability in this second cycle. In its last two years (FY 2021 and FY 2022), GDP growth picked up to four percent and then rose above five percent, while the current account balance widened from nearly -USD 3 billion to -USD 17 billion.

Again, the plunge in the current account balance over the last two years of the cycle was based entirely on another massive increase in imports. Exports remained on trend in FY 2021 at USD 32 billion and even rose to USD 40 billion in FY 2022—a high for the decade. However, the surge in GDP growth was fueled by imports rising by USD 10 billion in FY 2021 from USD 58 billion to USD 68 billion. They shot up by another USD 12 billion in FY 2022, from USD 68 billion to USD 90 billion, a decade peak.

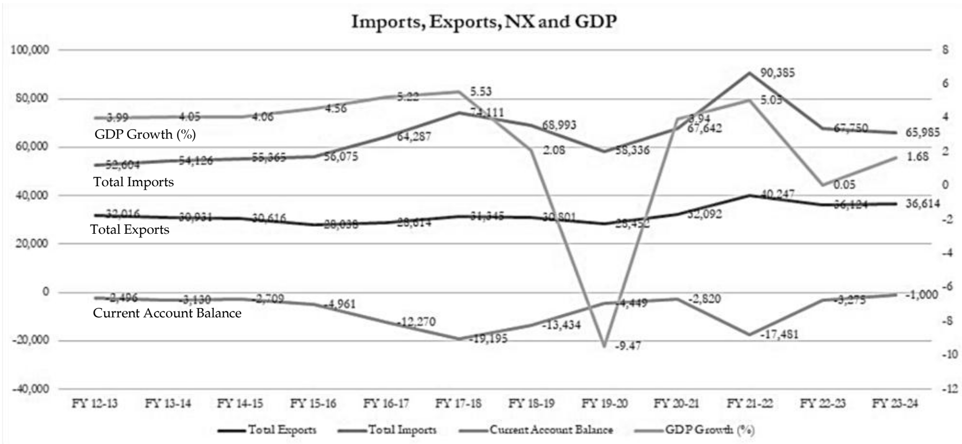
The third cycle, the first two years of which can be seen in Figure 1, encompasses FY 2023 and FY 2024 in this paper. The emergence of this cycle was inevitable, based on the first two cycles. It began with a GDP growth trough where GDP growth fell sharply from its previous 5 percent peak to 0.05 percent in FY 2023 and then experienced an anemic recovery to 1.7 percent in FY 2024. Thus, GDP growth at the beginning of the third cycle once again pays the price for the previous cycle's current account deficit of USD 17 billion (which had enabled the earlier GDP growth high of five percent).

The third cycle's fall in GDP growth rectified the current account deficit to USD 3 billion in FY 2023, and then to approximately USD 1 billion in FY 2024.

The recovery in the current account deficit is again unaided by exports, which fell toward trend at USD 36 billion over FY 2023 and FY 2024. It was imports, again, that had to be drastically curtailed. They fell by USD 22 billion in FY 2023 from the previous high of USD 90 billion to USD 68 billion, and then further by USD 2 billion in FY 2024 to USD 66 billion.

Thus, the flatlining of GDP growth in the advent of the third cycle appears to be caused by the drastic curtailing of imports, as in the previous two cycles.

**Figure 1: GDP growth, imports, exports, and current account balance**




Source: State Bank of Pakistan and Modeling Lab, Innovation and Technology Centre, Lahore School of Economics (May 2025).

Therefore, observed over these three cycles (FY 2013–2024), GDP growth above five percent per annum inflated the current account deficit, the behavior of which is not well explained by exports, but by imports, which were observed to be very elastic with respect to GDP.

Table 8 shows that remittances alone bailed out the current account. Over the ten-month period from July 2024 to April 2025, exports totaled USD 35 billion and imports totaled USD 66 billion, while remittances nearly approximated exports at USD 33 billion.

However, remittances are an exogenous variable beyond policy control, while deficits in tradables continue.

**Table 8: Current account balance (FY 2024)**

| USD million | Jul 24–25 | Aug 24–25 | Sep 24–25 | Oct 24–25 | Nov 24–25 | Dec 24–25 | Jan 24–25 | Feb 24–25 | Mar 24–25 | Apr 24–25 (P) | Jul–Apr (24–25) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Exports (goods) | 2,374 | 2,477 | 2,635 | 3,022 | 2,745 | 3,060 | 2,992 | 2,603 | 2,773 | 2,611 | 27,276 |
| Exports (services) | 633 | 617 | 662 | 688 | 666 | 792 | 692 | 713 | 726 | 716 | 6,933 |
| Primary income credit | 85 | 77 | 146 | 89 | 83 | 99 | 74 | 65 | 79 | 82 | 794 |
| Total exports | 3,092 | 3,171 | 3,443 | 3,799 | 3,494 | 3,951 | 3,758 | 3,381 | 3,578 | 3,409 | 35,003 |
| Imports (goods) | 4,819 | 4,709 | 4,696 | 4,612 | 4,100 | 4,895 | 5,443 | 5,063 | 4,943 | 5,237 | 48,619 |
| Imports (services) | 824 | 899 | 920 | 953 | 866 | 1,035 | 1,024 | 973 | 943 | 904 | 9,430 |
| Primary income debit | 849 | 636 | 799 | 992 | 924 | 835 | 825 | 636 | 736 | 685 | 7,921 |
| Total imports | 6,492 | 6,244 | 6,415 | 6,557 | 5,890 | 6,765 | 7,292 | 6,672 | 6,622 | 6,826 | 65,970 |
| Exports (imports) | -3400 | -3073 | -2972 | -2,758 | -2,396 | -2,814 | -3,534 | -3,291 | -3,044 | -3,417 | -30,967 |
| Remittances | 3,154 | 3,102 | 3,058 | 3,104 | 3,080 | 3,288 | 3,135 | 3,194 | 4,248 | 3,429 | 32,847 |
| Current account balance | -246 | 29 | 86 | 346 | 684 | 474 | -399 | -97 | 1,204 | 12 | 1,880 |
| Foreign exchange reserves | 9,102.2 | 9,436.9 | 10,701.7 | 11,156.4 | 12,037.9 | 11,710.5 | 11,418.3 | 11,249.5 | 10,676.3 | 10,214.4 | 10,214.4 |

Source: State Bank of Pakistan (May 2025).

*Policy to Ride the Cyclical Dragon*

Export-led growth has always been hailed as a solution. But now, even the prospect of this growth path is threatened by a global trade environment fractured by a tariff war. The primary question then is: what growth path does Pakistan take now, given an uncertain global trade environment, potential losses to Pakistani exports in the US market (estimated by Chaudhry to be USD 0.6 billion), some retaliatory tariffs in the European Union market, and all developing countries questing for tariff hopping? At the very least, this global uncertainty signals a greater reliance on internal growth.

One solution offered by the Lahore School's Modeling Lab's trade model for Pakistan shows GDP growth to be constrained primarily by investment. Investment, in turn, is constrained mainly by the import of investment goods. This finding argues for a policy to liberalize the import of investment goods to raise investment and GDP growth. However, the current account must be balanced by cutting the import of non-wage consumption goods.

## Welfare

Poverty is arguably the premier indicator of welfare in developing countries. The poverty headcount is estimated using the poverty line provided by the World Bank's PovCalNet. The prevalent line for extreme poverty is USD 2.15, which is based on a required dietary allowance of 2,250 calories per adult equivalent per day.

For extreme poverty in 2018, USD 2.15 (in purchasing power parity terms) translates into PKR 211, as Table 9 shows.

We take 2018 as our base year, as that is the last year the Household Income and Expenditure Survey was conducted with a sample large enough to obtain a national headcount for poverty.

Accordingly, Table 9 estimates a sample survey-based headcount for extreme poverty for 2018 using a poverty line of PKR 211. This estimate is given as 4.47 percent of the population.

We have also estimated, notionally, the transfers needed from the non-poor to the poor to eradicate this poverty of 4.47 percent of the population. To do this, Table 9 first estimates the total poverty gap, which is given by the expenditure needed by each poor person to reach the poverty line of PKR 211. This is then aggregated across all these poor persons. The daily poverty gap comes to PKR 3.3 million. This implies an annual required transfer of PKR 118 billion. As a share of prevalent tax values, this transfer comes in at two percent.

The Household Income and Expenditure Survey has not been conducted since 2018, so a sample-based estimate of current poverty for 2024 is not possible. Therefore, a current estimate of the poverty headcount would have to be based on an extrapolation.

Going from 2018 to 2024, we assume that there will be two shocks to the 2018 headcount. These shocks can be inferred to be to the poverty line of PKR 211.

The first shock will be inflation from 2018 to 2024, which will erode the purchasing power of the 2018 poverty line, raising its rupee value each year. The second shock will be the growth of income from 2018 to 2024. Income growth will increase the purchasing power of the 2018 poverty line, lowering its rupee value each year.

This gives a net shock to the 2018 poverty line, comprising inflation growth minus income growth. Accordingly, the 2018 poverty line of PKR 211 increases to PKR 215 for 2019, PKR 227 for 2020, PKR 236 for 2021, PKR 252 for 2022, PKR 311 for 2023, and finally PKR 370 for 2024.

This shocked value of the poverty line gives a headcount rising from 4.5 percent in 2018 to 4.8 percent in 2019, to 6 percent in 2020, to 7 percent in 2021, and then 10 percent in 2022. However, in the last two years, 2023 and 2024, with flatlined GDP growth and inflation peaking at 33 percent, the headcount rises to 18 percent in 2023 and then peaks at 30 percent of the population by 2024.

To eradicate a poverty headcount at 30 percent of the population, we estimate an aggregated annual poverty gap of PKR 2.1 trillion for 2024. As a share of tax values, this transfer will comprise 18 percent.

**Table 9: Poverty run, FY 2024 (extreme poverty)**

| Time period | Total shock (p° - Y°) % | Poverty line (PKR) | Poverty headcount (%) | Population-to-sample ratio | Poverty gap sample (PKR) | Poverty gap (pop.) daily transfer (PKR 000) | Annual transfer (PKR million) | Tax value (PKR billion) | % of tax value |
|---|---|---|---|---|---|---|---|---|---|
| FY 2018 | - | 211.0 | 4.47 | 1,320.2 | 246,599 | 325,568 | 118,832 | 5,200 | 2 |
| FY 2019 | -1.75 | 214.7 | 4.76 | 1,320.2 | 268,504 | 354,487 | 129,388 | 4,900 | 3 |
| FY 2020 | 5.65 | 226.8 | 5.97 | 1,320.2 | 370,605 | 489,285 | 178,589 | 6,270 | 3 |
| FY 2021 | 3.85 | 235.6 | 7.16 | 1,320.2 | 465,011 | 613,924 | 224,082 | 6,900 | 3 |
| FY 2022 | 7.15 | 252.4 | 9.49 | 1,320.2 | 689,129 | 909,809 | 332,080 | 8,000 | 5 |
| FY 2023 | 23.15 | 310.8 | 18.73 | 1,320.2 | 1,976,326 | 2,609,208 | 952,361 | 9,600 | 10 |
| FY 2024 | 18.95 | 369.7 | 30.21 | 1,320.2 | 4,263,647 | 5,629,004 | 2,054,586 | 11,240 | 18 |

Sources: PBS and Ministry of Finance (2024).

This is, of course, a considerable demand on a developing economy. However, we propose a more manageable demand as well. We have estimated that the poor spend a quarter of their caloric basket on wheat and bread. This is the first step in poverty eradication: paying 4.5 percent of revenues to provide free wheat to the means-tested poor population.

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# 2

## Revisiting Balance-of-Payments-Constrained Growth in Pakistan

**Azam Chaudhry,[1] Gul Andaman,[2] and Aymen Junaid[3]**

## Abstract

*The balance-of-payments (BOP)-constrained growth rate is the maximum gross domestic product (GDP) growth rate above which unsustainable current account deficits emerge, forcing policymakers to implement contractionary measures that ultimately reduce GDP growth. We estimate Pakistan's BOP-constrained annual growth rate to be 3.71 percent for the period 1996–2023, which is significantly lower than the estimate of 4.41 percent for the period 1980–2017. The BOP-constrained growth rate is most sensitive to changes in import income elasticity. If the import income elasticity value decreases from 1.47 to 1, the BOP-constrained growth rate increases from 3.71 percent to 5.45 percent. If remittance growth increases from 11.43 percent to 14 percent annually, the BOP-constrained growth rate increases from 3.71 percent to 4.09 percent. Similarly, if the real effective exchange rate (REER) grows at -1.5 percent annually instead of -0.83 percent, the BOP-constrained growth rate only increases to 4.02 percent. Finally, the impact of an increase in capital inflows from 13.18 percent to 15 percent annually only increases the BOP-constrained growth rate to 3.78 percent. Our analysis also reveals how Pakistan's low total factor productivity (TFP) growth has weakened export competitiveness while increasing import dependence, exacerbating these BOP constraints. A coherent and holistic strategy of structural reforms is essential to boost the BOP-constrained growth rate.*

## Introduction

Balance-of-payments (BOP)-constrained growth refers to the idea that a country cannot grow more than the rate consistent with the balance on its current account

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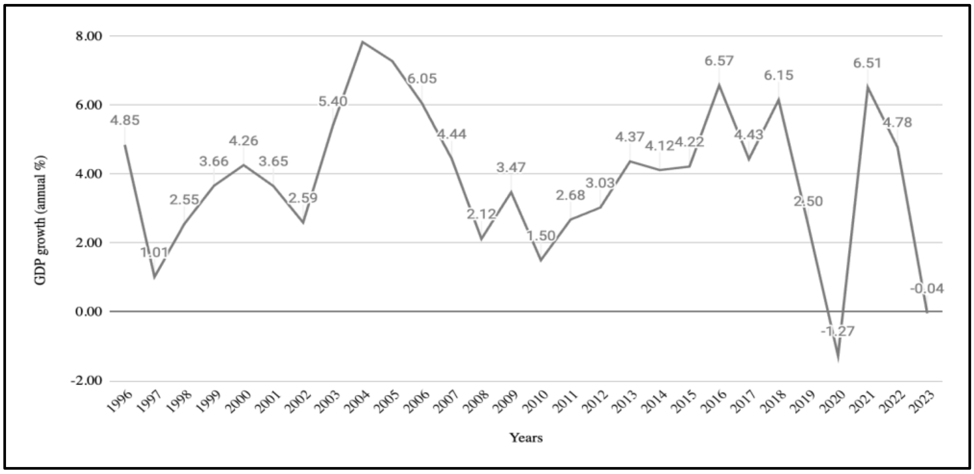
unless there are excessive and continuous external borrowings. Economic growth is limited by the country's ability to finance its current account deficits through external inflows, such as foreign exchange reserves, remittances, or foreign direct investment (FDI). In other words, an increase in the economic growth rate would lead to higher demand for imports, whereas export demand, determined by the overseas market, would remain largely unaffected. The resultant current account deficit must either be financed, which could lead to BOP difficulties, or must be quickly reduced. The former is not sustainable, so the economic growth rate must be reduced by implementing contractionary policies to do the latter.

To understand this in Pakistan's context, we must analyze its macroeconomic situation. Pakistan's gross domestic product (GDP) growth rate (Figure 1) has fluctuated considerably, averaging 3.69 percent over the 28 years from 1996 to 2023, reflecting both internal structural weaknesses and external shocks (World Bank, 2023; State Bank of Pakistan [SBP], 2023).

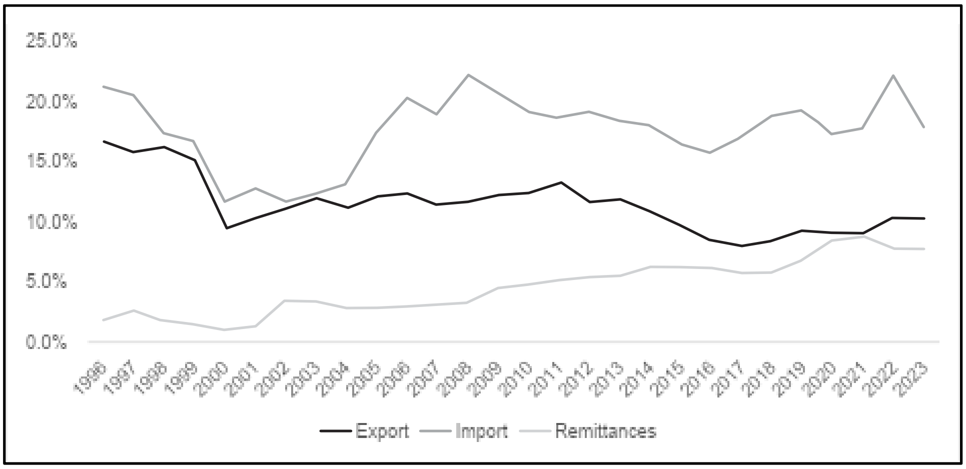
**Figure 1: Pakistan's GDP growth rate (1996–2023)**




Source: Pakistan Bureau of Statistics.

On one hand, there are deep-seated issues, including political instability, a lack of effective economic reform implementation, and low investment. In fact, the investment climate deteriorated significantly over time, with fixed capital formation declining from 22 percent of GDP in the early 2000s to 15 percent in 2023. On the other hand, Pakistan's external sector tells an equally challenging story (Figure 2). Exports fell from 16 percent of GDP in 2003 to 10 percent in 2023, reflecting the country's inability to move up the value chain in its traditional textile exports while simultaneously lacking diversification into new, high-value export sectors. Meanwhile, imports surged from 18 percent to 25 percent of GDP over the same period, driven largely by energy needs and growing consumer demand for imported goods. The resulting trade imbalance has been only partially offset by remittance inflows, which grew from 1.6 percent of GDP in 1996 to over 8 percent in 2023. This pattern of weak exports, growing import dependence, and insufficient remittances left Pakistan vulnerable to external shocks such as the COVID-19 pandemic and floods of 2022.

**Figure 2: Exports, imports, and remittances as a percentage of GDP (1996–2023)**

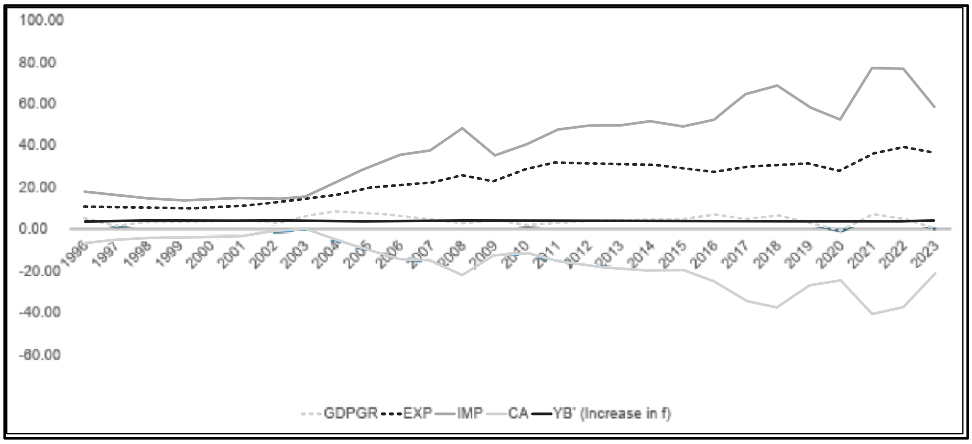



Source: Pakistan Bureau of Statistics.

Due particularly to the external sector's weakening situation, the BOP crisis recurred in Pakistan, forcing the government to enter into standby agreements with the International Monetary Fund (IMF) and seeking extended fund and credit facilities from the institution in various years. Fifteen such IMF arrangements have been made since 1988. Currently, Pakistan is once again engaged in a 37-month, USD 7 billion extended fund facility program that aims to implement structural reforms, including broadening the tax base, reducing energy subsidies, and improving governance in state-owned enterprises.

There is a tendency to blame various policymakers for this state of affairs. However, we feel doing so ignores the fact that the problem is not simply one of policymaking. Rather, the problem is a structural issue in the economy, which, if left unaddressed, will lead to a continuation of the BOP crisis cycle. There is a maximum BOP-constrained growth rate in Pakistan, given the structure of the country’s exports and imports. More specifically, Pakistan’s narrow export base (concentrated in low-value-added textiles) combined with its relatively broad import base means that as the GDP growth rate exceeds a threshold value, imports rise to unsustainable levels while exports increase only marginally. This leads to a BOP crisis, which is addressed by the usual troika of policies: devaluation, monetary contraction, and fiscal contraction (Figure 3) instead of catering to the primary issues of low export growth and heavy reliance on imports.

**Figure 3: Pakistan's macroeconomic situation (1996–2023)**




Source: The SBP's easy data portal.

Previous estimates of Pakistan’s BOP-constrained growth rate have been in the range of 4–5.5 percent (Felipe et al., 2009; Chaudhry & Andaman, 2019; Raza, 2021; Asian Development Bank, n.d.). However, we believe the BOP-constrained growth rate may have deteriorated over time because Pakistan's export growth has remained sluggish, constrained by limited diversification and low value-addition. The income elasticity of imports has remained high, as Pakistan relies heavily on imported energy, machinery, and intermediate goods. External financing options have become more restrictive due to high debt accumulation, lower FDI, and limited foreign exchange reserves. Political instability and inconsistent economic policies have further eroded investor confidence, exacerbating the constraints on growth (World Bank, 2023; IMF, 2023).

Therefore, in this paper, we reestimate Pakistan's BOP-constrained growth rate using the 28-year time frame from 1996 to 2023. We also analyze the BOP-constrained growth rate’s sensitivity to some important macroeconomic variables, highlighting those to which it responds the most. This serves a dual purpose of making a novel contribution to related economic literature and emphasizing the factors that could help increase the long-term growth rate the most.

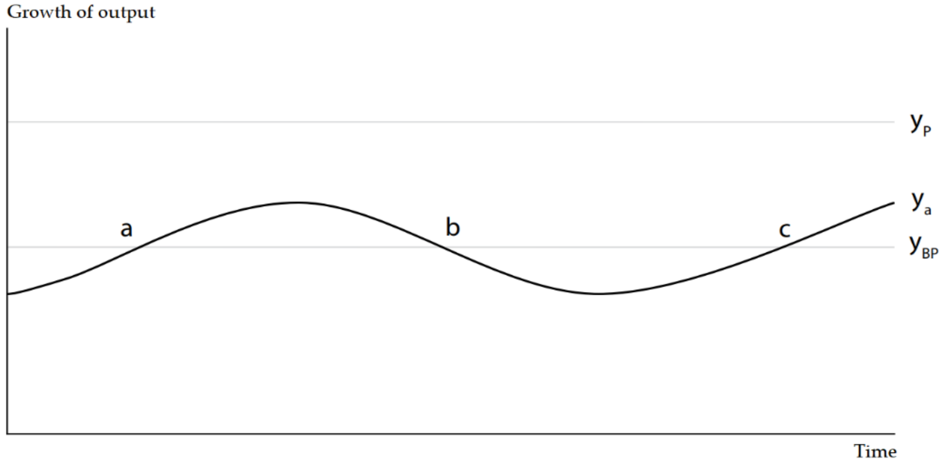
We begin with an explanation of our methodology, including export and import demand functions. This is followed by a discussion on the estimation of these functions. We then use these estimates to calculate Pakistan's BOP-constrained growth rate. The next section involves sensitivity analysis, highlighting crucial macroeconomic variables to which the growth rate responds the most. Finally, we present conclusions and policy recommendations.

## Understanding BOP-Constrained Growth

As explained above, the basic assumption behind the BOP-constrained growth model is that a country cannot grow more than the rate consistent with the balance on its current account unless there are excessive and continuous external borrowings (Thirlwall, 1979). The current account deficit must be maintained by borrowing from abroad, which is not possible indefinitely. This is because the growth of financial inflows exceeding GDP growth would lead to a high foreign debt-to-GDP ratio over time and increase the risk of private and public default. If external financing is short-term, there would be a high danger of capital flight, leading to an exchange rate collapse. In turn, this would result in capital losses in terms of foreign currency and domestic liquidity problems.

Therefore, there is an economic growth rate that countries cannot exceed for any period as it would lead to BOP problems. This is the BOP equilibrium growth rate. If an increase in the economic growth rate leads to higher imports but export demand remains stagnant, the resultant current account deficit must quickly be reduced. This leads to policies of import demand contraction, which, in turn, reduce the economic growth rate. Felipe et al. (2009) state that a country is 'BOP-constrained' if its actual growth rate (yA) is such that the current account is in balance in the long run and yA is below the growth of productive potential (yP). This is termed the BOP equilibrium growth rate (yBP) (Figure 4).

**Figure 4: BOP-constrained growth**




$Y_P$ = productive potential, $Y_a$ = actual growth rate, $Y_{BP}$ = BOP equilibrium growth rate
Source: J. Felipe, J. S. McCombie, & K. Naqvi. (2009). Is Pakistan's growth rate balance-of-payments constrained? Policies and implications for development and growth. *Oxford Development Studies*, *38*(4), 477–496.

The actual growth rate, yA, fluctuates around the BOP equilibrium growth rate, yBP. In an economic boom, when yA > yBP, there are short-term capital inflows to finance the current account deficit. Subsequently, since that is not sustainable due to exceeding debt levels, yA falls until it equals yBP. Alternatively, if yA < yBP, the country will have a current account surplus, leading to an accumulation of foreign exchange reserves almost indefinitely. This imparts a strong deflationary bias into the world economy (Felipe et al., 2009). Hence, the economic growth rate is constrained by the BOP growth rate.

The BOP-constrained growth model implies that if a country faces BOP problems, aggregate demand must be curtailed. This indicates lower employment, restricts capital accumulation, and reduces the country's export potential, further deepening the BOP crisis. However, fast export growth would lead to an appropriate amount of imports, encourage investment, and enable structural change that increases the export of high-value-added products. Hence, instead of relying on higher import growth or devaluation to increase aggregate demand and encounter a BOP crisis that eventually forces the growth rate to fall, policymakers must focus on other factors to avoid a BOP crisis and increase real economic growth sustainably. These include increasing high-value-added exports.

The theoretical model that derives the determinants of the BOP equilibrium growth rate follows Thirlwall and Hussain (1982). Equation 1 defines BOP.

$$P_d X + F = (P_f E)M \quad (1)$$

F is net capital inflows in the domestic currency, including the net change in foreign exchange reserves, $P_dX$ is exports measured in nominal domestic currency, and $(P_fE)M$ is imports in domestic currency. $P_d$ and $P_f$ are the domestic price of exports and foreign price of imports, respectively, and E is the nominal exchange rate (domestic price of foreign currency).

Export and import functions are shown in Equations 2 and 3, respectively.

$$X = AZ^{\varepsilon}\left(\frac{P_d}{P_f E}\right)^{\Psi} \quad (2)$$

$$M = BY^{\pi}\left(\frac{P_f E}{P_d}\right)^{\eta} \quad (3)$$

Z is world income (the income of major trading partners), ε is the world income elasticity of demand for the country's exports, Ψ (< 0) is the price elasticity of demand for exports, Y is domestic income, π is the domestic income elasticity of demand for imports, and η (< 0) is the price elasticity of demand for imports. A and B are constants.

The BOP equilibrium growth rate requires the growth of exports and net flows equal to that of imports. Expressing Equations 1, 2, and 3 in growth rates and substituting the export and import functions (in growth rates) into the BOP equation (also in growth rates) gives Equation 4 for output growth.

$$y = \frac{\theta_x \varepsilon z + (1 + \theta_x \Psi + \eta)(p_d - p_f - e) + \theta_F (f - p_d)}{\pi} \quad (4)$$

$\theta_X$ and $\theta_F$ are the share of exports and capital flows in total foreign earnings, respectively, or $\theta_X = (P_dX)/(P_dX + F)$ and $\theta_F = F/(P_dX + F)$, and $\theta_X + \theta_F = 1$. Lowercase letters show growth rates in the equations.

The BOP equilibrium growth rate equation depends on various assumptions. Many countries sustain current account deficits for many years because their capital inflows consist of FDI, which builds productive capacity, or they rely on foreign aid and remittances that can finance long-term deficits. If such long-term financial flows ($f_{LT}$) are included, the BOP-constrained growth equation would be as shown in Equation 5.

$$y_{BP} = \frac{\theta_x \varepsilon z + (1+\theta_x \Psi + \eta)(p_d - p_f - e) + \theta_F (f_{LT} - p_d)}{\pi} \quad (5)$$

As opposed to Equation 4, Equation 5 includes both long-term capital flows, such as FDI, and short-term speculative capital flows. It excludes volatile short-term speculative capital flows.

If all the capital flows are short-term ($f_{ST}$), then for the foreign debt-to-GDP to stabilize at any given θ acceptable to the international financial markets, $f_{ST}$ - $p_d$ must equate to y. For this case, yBP is shown in Equation 6.

$$y_{BP} = \frac{\theta_x \varepsilon z + (1+\theta_x \Psi + \eta)(p_d - p_f - e)}{\pi - \theta_F} \quad (6)$$

The third possibility is that the current account is in equilibrium and the share of capital inflows in total overseas receipts is negligible. The BOP-constrained equilibrium growth rate for this case is shown in Equation 7.

$$y_{BP} = \frac{\theta_x \varepsilon z + (1+\theta_x \Psi + \eta)(p_d - p_f - e)}{\pi} \quad (7)$$

Another possibility is that if the growth of relative prices has little systematic effect on the growth of exports and imports and there are no net capital flows, the BOP equilibrium growth rate reduces to Thirlwall's law (Thirlwall, 1979), whereby the BOP growth rate is equal to the growth of world income multiplied by the ratio of the income elasticities of demand for exports and imports. This is shown in Equation 8.

$$y_{BP} = \frac{\varepsilon z}{\pi} = \frac{x}{\pi} \quad (8)$$

Felipe et al. (2009) modify the theoretical model discussed above to the specific case of Pakistan. This paper follows their estimation of an augmented BOP-constrained equilibrium growth rate. Before that is elaborated, it is important to distinguish between a 'strong test' and 'weak test' (Thirlwall, 1979). If the country is at or close to its BOP equilibrium growth rate, yBP should be a good predictor of the actual growth rate, yA. This is the weak test and can be calculated as yBP = x/π, where x is the actual export growth rate. The BOP-constrained growth rate for the strong test is yBP = εz/π. It accounts for the estimated export growth rate based on the estimations of price and income elasticity of exports in the export demand function. This paper uses both tests to analyze whether Pakistan's growth rate is BOP-constrained or not.

The equation for the augmented BOP growth rate is given in Equation 9. It includes the share of remittances, which is an important source of capital inflows in Pakistan.

$$y_{BP} = \frac{\theta_x x+\eta(REER)+ \theta_R(r-p_x)+\theta_F(f-p_x)+ (p_x-p_m)}{\pi} \tag{9}$$

In this equation, r is the growth of remittances, REER is the growth of the real effective exchange rate, and $p_X$ and $p_M$ are the rates of change of the export and import prices, and so ($p_X - p_M$) is the rate of change in the terms of trade. The θs are the shares of exports, unrequited transfers, and capital flows (including changes in reserves), and $\theta_X + \theta_R + \theta_F = 1$. It is a weak test because it is derived using the observed growth of exports directly rather than the weighted growth of the country's trading partners. The corresponding strong test equation of yBP is shown in Equation 10.

$$y_{BP}' = \frac{\theta_x \varepsilon z+(\eta+\theta_x \Psi)(REER)+ \theta_R(r-p_x)+\theta_F(f-p_x)+ (p_x-p_m)}{\pi} \tag{10}$$

In the augmented version of yBP, the REER is taken into account instead of relative prices of import and export growth to specify the growth of imports. This does not make any significant difference if the growth of domestic prices and those of Pakistan's trading partners (weighted by the trade shares) do not differ greatly from the growth of export and import prices in Pakistan (Felipe et al., 2009).

The import demand function is shown in Equation 11.

$$lnM = \alpha_0 + \beta_1 lnGDP_t + \beta_2 lnPPP_t \tag{11}$$

GDP represents Pakistan's annual current GDP in USD billion, while PPP is the annual purchasing power parity-adjusted exchange rate in PKR/USD. M is Pakistan's aggregate imports in USD billion. Data was taken for 28 calendar years from 1996 to 2023.

The export demand function has been estimated in a similar fashion and is shown in Equation 12.

$$lnX = \alpha_0 + \beta_1 lnFGDP_t + \beta_2 ln\ PPP \tag{12}$$

X is the volume of Pakistan's exports in USD billion, FGDP is foreign GDP calculated as the current GDP value of Pakistan's major trading partners in USD billion and weighted by their trade shares, and PPP is the purchasing power parity-adjusted exchange rate in PKR/USD. Again, data for 28 calendar years from 1996 to 2023 was used. We employed the autoregressive distributed lag model for Equation 11 and vector error correction model (VECM) technique for Equation 12.

## Estimating Pakistan's Export Demand Function

As discussed earlier, the export function follows Equation 2:

$$X = AZ^{\varepsilon}(\frac{P_d}{P_f E})^{\Psi} \quad (2)$$

Z is world income (the GDP of major trading partners weighted by their trade shares), ε is world income elasticity of demand for the country's exports, Ψ (< 0) is the price elasticity of demand for exports, and A is a constant.

The export demand function was estimated using VECM specification for Equation 2 and is shown in Equation 12. The long-run cointegrating relationship is shown in Equation 13.

$$lnX = -4.96 + 1.08lnFGDP_t - 0.15ln\,PPP \quad (13)$$

Equation 13 indicates a significant positive relationship between Pakistan's exports and the GDP of its trading partners when adjusted for trade shares. Specifically, a 1-percent increase in the GDP of trading partners leads to an approximately 1.08-percent increase in Pakistan's exports. Conversely, the coefficient for the PPP-adjusted exchange rate is not statistically significant, although it has the expected sign. Also, the price elasticity of Pakistan's exports is quite inelastic, equaling only -0.15 percent. Furthermore, the VECM's error correction term, significant at 1 percent, shows a coefficient of -0.34. This indicates that about 34.3 percent of any deviation from the long-term equilibrium export level is corrected each period, underscoring a relatively rapid adjustment process (Table 1).

**Table 1: Export demand function**

| Variable | Coefficient | Standard error |
|---|---|---|
| Foreign GDP | 1.08*** | 0.128 |
| PPP | -0.15 | 0.132 |
| Constant | -4.96 | - |

PPP = purchasing power parity.
Source: Authors' calculations.

## Estimating Pakistan's Import Demand Function

The import demand function is shown in Equation 3.

$$M = BY^{\pi}(\frac{P_f E}{P_d})^{\eta} \quad (3)$$

Y is domestic income, π is the domestic income elasticity of demand for imports, η (< 0) is the price elasticity of demand for imports, and B is a constant.

The import function was estimated using the autoregressive distributed lag model on Equation 3 and is shown in Equation 11. The long-run cointegrating relationship is shown in Equation 14.

$$lnM = -1.015 + 1.475lnGDP_t - 0.587lnPPP_t \quad (14)$$

The error correction term of -0.446 is statistically significant, indicating that about 44.6 percent of any deviation from the long-run equilibrium is corrected within one period. The long-run income elasticity of Pakistan's imports is 1.47 percent, which shows that a 1-percent increase in Pakistan's GDP leads to a 1.47-percent rise in import demand. This also aligns with an import-dependent economy like Pakistan's, where higher income drives demand for foreign goods. The PPP-adjusted exchange rate coefficient shows the long-run price elasticity of Pakistan's imports. A 1-percent increase in the price of imports reduces demand by just 0.58 percent (Table 2).

**Table 2: Import demand function**

| Variable | Coefficient | Standard error |
|---|---|---|
| GDP | 1.47* | 0.36 |
| PPP | -0.59 | 0.44 |
| Constant | -1.015 | 0.29 |

Source: Authors' calculations.
GDP = gross domestic product, PPP = purchasing power parity.

## Pakistan's BOP-Constrained Growth Rate (1996–2023)

Earlier, we derived the equation for augmented BOP growth rate, which was given in Equation 9.

$$y_{BP} = \frac{\theta_x x + \eta(REER) + \theta_R(r - p_x) + \theta_F(f - p_x) + (p_x - p_m)}{\pi} \quad (9)$$

Here, r is the growth of remittances, REER is the growth of the real effective exchange rate, and $p_X$ and $p_M$ are the rates of change of the export and import prices, so $(p_X - p_M)$ is the rate of change in the terms of trade. The θs are the shares of exports, unrequited transfers, and capital flows (including changes in reserves), and $\theta_X + \theta_R + \theta_F = 1$. It is a weak test because it is derived using the observed growth of exports directly rather than the weighted growth of the country's trading partners.

The corresponding strong test equation of yBP is shown in Equation 10.

$$y_{BP}' = \frac{\theta_x \varepsilon z + (\eta + \theta_x \Psi)(REER) + \theta_R(r - p_x) + \theta_F(f - p_x) + (p_x - p_m)}{\pi} \quad (10)$$

In the augmented version of yBP, the REER is taken into account instead of relative prices of import and export growth to specify the growth of imports. This does not make any significant difference if the growth of domestic prices and those of Pakistan's trading partners (weighted by the trade shares) do not differ greatly from the growth of export and import prices in Pakistan (Felipe et al., 2009).

Table 3 shows the growth rates of the various parameters of the BOP-constrained growth rate equation, as well as the BOP-constrained growth rate for 1996–2023. The BOP equilibrium growth rate for the period is 3.71 percent, and the actual growth rate is approximately the same (3.69 percent), which suggests that Pakistan has been growing at approximately the same level as its BOP equilibrium growth rate. This outcome further substantiates our concern that Pakistan's BOP-constrained growth rate has deteriorated over time due to a complex web of challenges that have trapped the country.

Another important point to note is that the sum of the import and export price elasticities is approximately 0.74, which implies that the Marshall-Lerner conditions are not satisfied. The Marshall-Lerner conditions imply that a change in the exchange rate would have little impact on the BOP in the short run if the elasticities sum to less than one (in absolute value terms). Though there is a possibility that the import and export demand functions could suffer from issues of omitted variables and measurement errors, the estimates of these functions cast doubt on using the exchange rate as the only tool for handling Pakistan's BOP problem.

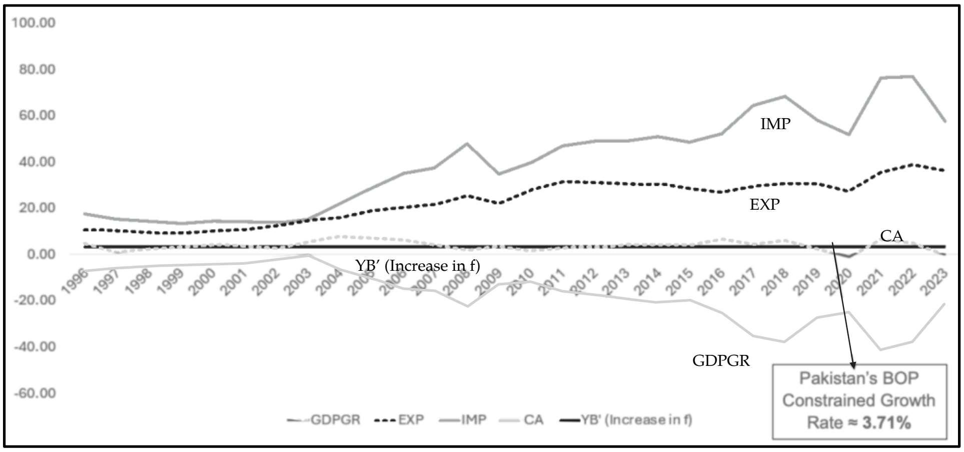
We illustrate the BOP-constrained growth rate by reproducing Figure 3 (Figure 5). Here, we see that there is a consistent tendency for imports to rise far more than exports when the GDP growth rate exceeds 3.7 percent, which, in turn, leads to a significant deterioration of the current account.

**Table 3: Pakistan's BOP-constrained growth rate (1996–2023)**

| | **Growth rates (p.a.)** |
|---|---|
| GDP growth | 3.69% |
| Weighted growth of trading partners | 4.58% |
| Growth of exports | 4.50% |
| Growth of real remittances | 11.43% |
| Growth of terms of trade | -2.34% |
| Rate of change of the REER | -0.83% |
| Capital inflow | 13.18% |
| Import income elasticity | 1.4700 |
| Import price elasticity | -0.5800 |
| Export income elasticity | 1.0800 |
| Export price elasticity | -0.1500 |
| Θx (average export share in foreign currency receipts) | 0.6763 |
| Θr (average remittance share in foreign currency receipts) | 0.2170 |
| Θf | 0.1066 |
| yBP | 3.45% |
| y'BP | 3.71% |
| π for which yA = yBP | 1.3746 |
| π for which y'A = y'BP | 1.4797 |

π = income elasticity of imports.
Source: Authors' calculations.

**Figure 5: Pakistan's BOP-constrained growth rate**

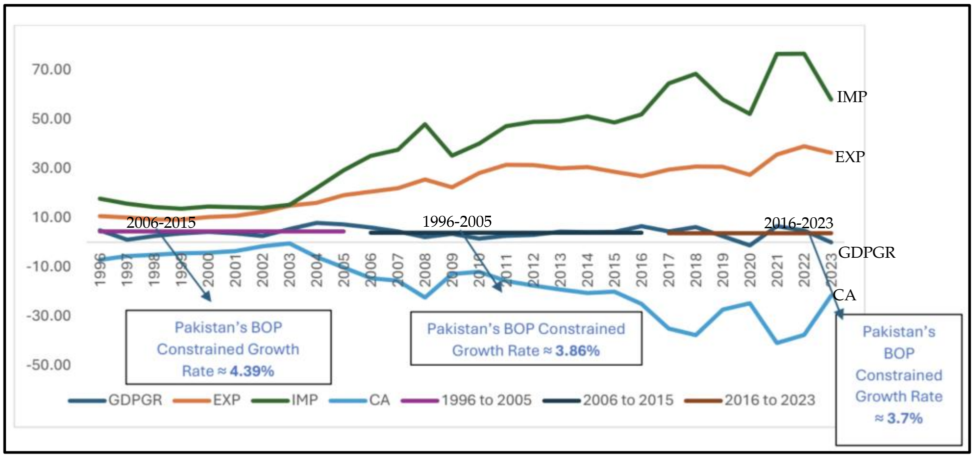



Source: Authors' calculations and the SBP's easy data portal.

## BOP-Constrained Growth Rates Over the Last Three Decades (1996–2023)

As part of our extended analysis, we also analyze and calculate Pakistan's BOP-constrained growth rate for three distinct periods within the time frame of 1996–2023. The first period is 1996–2005 (ten years), the second is 2006–2015 (ten years), and the third is 2016–2023 (eight years). In this way, we analyze the extent to which the BOP-constrained growth rate changed over time. As expected, the decade-wise analysis reveals a clear downward trend from 1996 to 2023 (Figure 6). The economy achieved its highest performance with y'BP averaging 4.39 percent during the first decade (1996–2005). This period was marked by capital inflows, investment, and a competitive exchange rate. The following decade, however, saw a pronounced slowdown in the BOP-constrained growth rate to 3.86 percent. Factors such as the 2008 global financial crisis, depreciating exchange rate, and growing import dependency gradually weakened the economy. The most recent period (2016–2023) experienced a further decline to 3.7 percent, which indicated worsening structural issues in addition to the COVID-19 pandemic and resulting trade disruptions. While external factors contributed to this progressive deterioration, domestic policy measures and structural issues played an equally critical role in shaping these patterns. It is, therefore, important to emphasize that the consistent downward movement in the BOP-constrained growth rate underscores the urgent need for policies related to higher export diversification, lower import dependency, and increasing capital inflows.

**Figure 6: BOP-constrained growth rates over the last three decades (1996–2023)**




Source: Authors' calculations and the SBP's easy data portal.

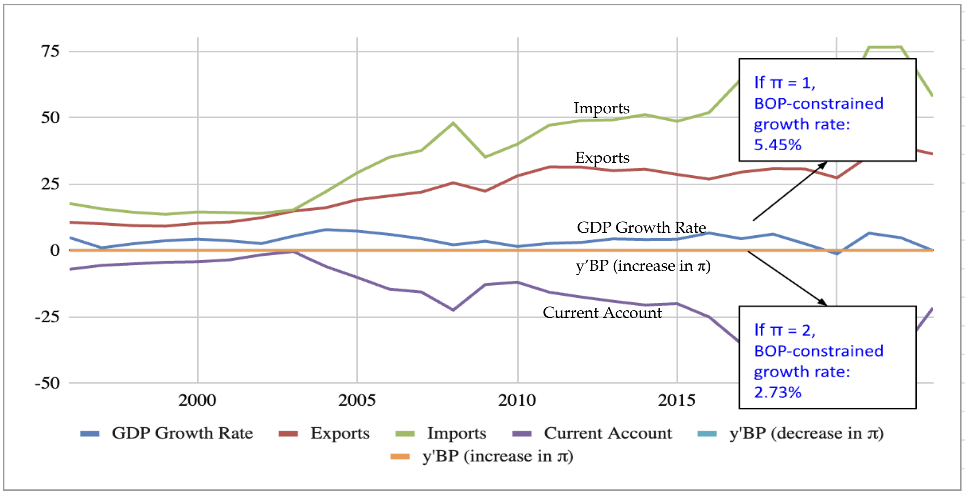
## Simulations Based on Import and Export Demand Functions

A prime objective was to estimate the elasticity of the BOP-constrained growth rate (y'BP) with respect to key macroeconomic variables to identify those to which y'BP is most responsive, so that policymakers can focus on them to help increase y'BP in the future. In particular, we examine how variations in the annual growth rates of key macroeconomic variables—remittances (r), REER, and capital inflows (f)—and changes in the value of import income elasticity (π) affect y'BP. With this sensitivity analysis, we assess the responsiveness of y'BP to changes in these variables, providing insights for policymakers on how to enhance external stability and long-term economic growth. Each macroeconomic variable is shown in a scenario below.

***Scenario 1: Changes in the Value of Import Income Elasticity (π)***

Import income elasticity (π) measures how responsive imports are to changes in domestic GDP. A lower elasticity implies that imports grow more slowly than GDP, easing external constraints. The π in the baseline scenario in Table 3 is 1.47. When it is reduced to 1, y'BP surges to 5.45 percent, indicating that reducing import dependency drastically improves the BOP-constrained growth rate. Conversely, increasing π to 2 plunges y'BP to 2.73 percent, highlighting how high import reliance severely restricts growth potential (Figure 7). This suggests that structural policies aimed at lowering import dependency, such as promoting domestic production and diversifying exports, can have a significant positive impact on BOP-constrained growth.

**Figure 7: Changes in the value of import income elasticity (π)**

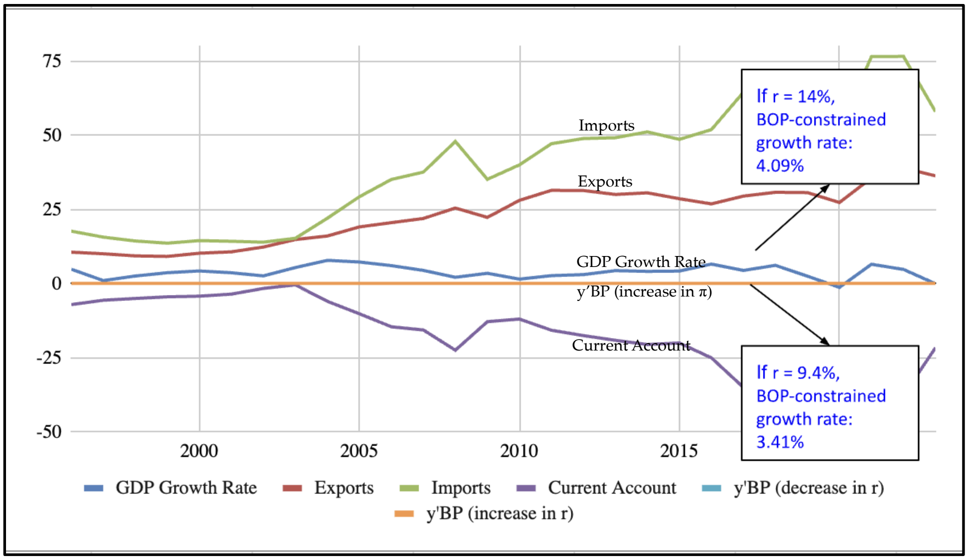



Source: Authors' calculations and the SBP's easy data portal.

### *Scenario 2: Changes in the Annual Growth Rate of Remittances (r)*

In Table 3, the annual growth rate of remittances is 11.43 percent, contributing to a baseline y'BP of 3.71 percent. When the annual growth rate of remittances is reduced to 9.4 percent, the BOP-constrained growth rate declines to 3.41 percent, reflecting a 0.3-percentage point drop. Conversely, an increase in the annual growth rate of remittances to 14 percent raises y'BP to 4.09 percent, which is an improvement of 0.38 percentage points from the baseline scenario (Figure 8). This demonstrates that higher remittance inflows enhance the BOP-constrained growth rate moderately by supplementing foreign exchange reserves and easing external financing constraints.

**Figure 8: Changes in the annual growth rate of remittances (r)**

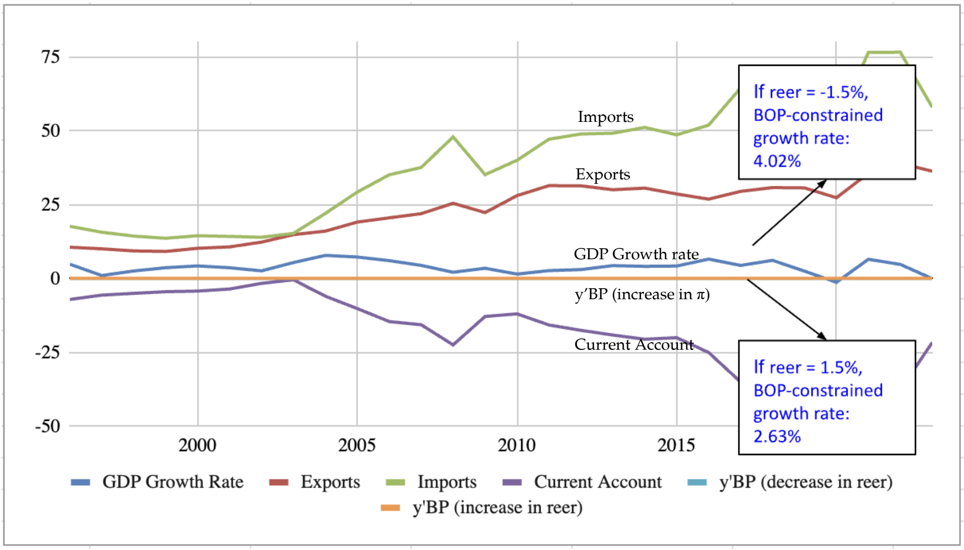



Source: Authors' calculations and the SBP's easy data portal.

### *Scenario 3: Changes in the Annual Growth Rate of REER*

The REER in the baseline scenario in Table 3 shows an annual growth rate of -0.83 percent. A higher depreciation, whereby REER increases at an annual growth rate of -1.5 percent, increases y'BP to 4.02 percent, whereas an appreciation of similar proportion, i.e., a REER annual growth rate of 1.5 percent, reduces y'BP to 2.63 percent (Figure 9). While this shows that a depreciated exchange rate boosts BOP-constrained growth, the increase is moderate and less than the ones shown in scenarios 1 and 2. Furthermore, our analysis is based on the *ceteris paribus* assumption where, in reality, depreciation may contribute to expensive imports, raising import expenditures and debt servicing costs and creating external imbalances. Therefore, exchange rate policy should not keep devaluing the currency and should instead strike a balance between enhancing export competitiveness and maintaining macroeconomic stability.

**Figure 9: Changes in the annual growth rate of the REER**

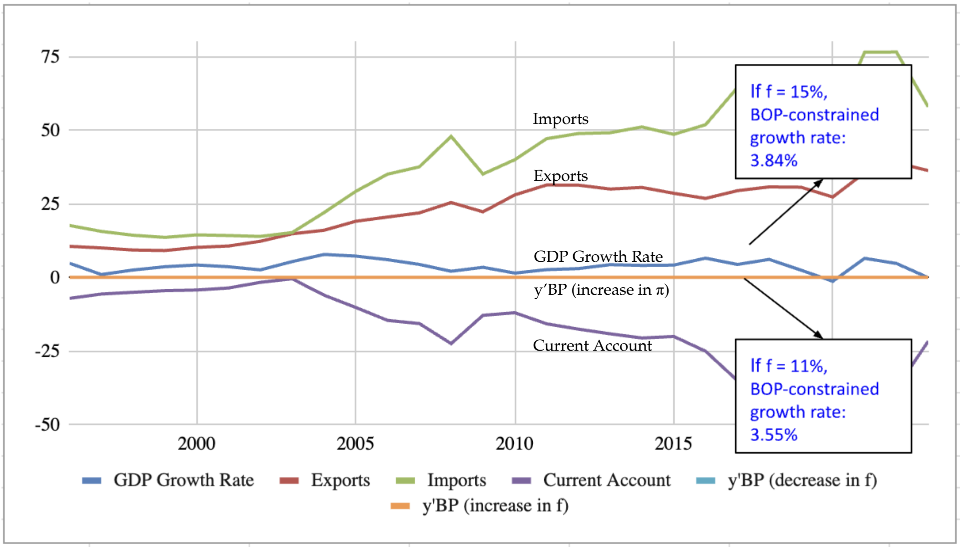



Source: Authors' calculations and the SBP's easy data portal.

***Scenario 4: Changes in the Annual Growth Rate of Capital Inflows (f)***

Capital inflows (f) supplement domestic savings and help finance investment. The annual growth rate from 1996 to 2023 is 13.18 percent, supporting a y'BP of 3.71 percent in the baseline scenario. When capital inflows' annual growth rate decreases to 11 percent, y'BP drops slightly to 3.55 percent, while an increase to 15 percent raises it to 3.84 percent (Figure 10). This indicates that higher capital inflows provide a modest boost to BOP growth, but the effect is less pronounced than all the scenarios above.

**Figure 10: Changes in the annual growth rate of capital inflows (f)**



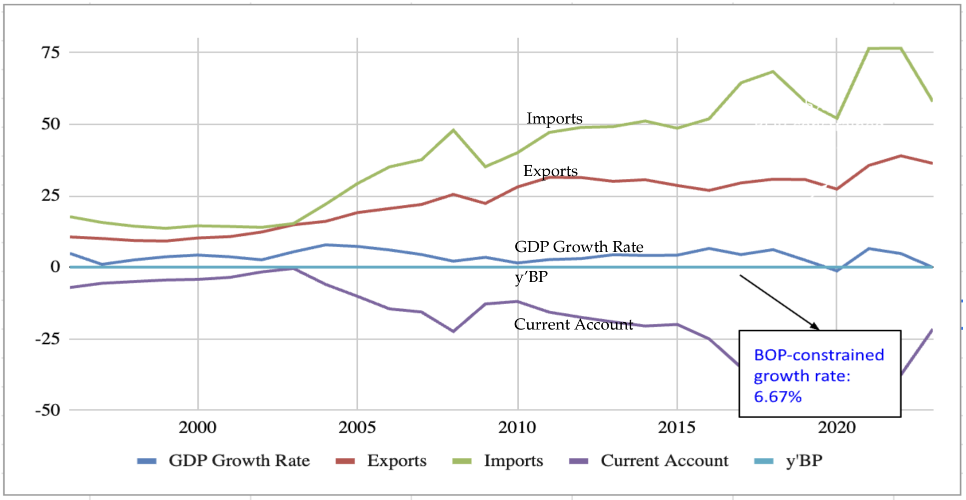

Source: Authors' calculations and the SBP's easy data portal.

### *Scenario 5: Combined Impact of Scenarios 1–4 on y'BP*

This scenario examines the impact of simultaneously implementing the most favorable changes across all key variables—remittances, REER, import income elasticity, and capital inflows—on the BOP-constrained growth rate. Building on the individual analyses, where remittances (r) grow at 14 percent per annum, the REER depreciates by 1.5 percent per annum, import elasticity (π) is reduced to 1, and capital inflows grow at 15 percent annually, the combined effect of these adjustments drives y'BP to 6.67 percent (Figure 11). This result underscores how structural reforms focusing on lowering import dependency and enhanced capital and financial inflows can work together with the policy of currency depreciation to significantly boost the BOP-constrained growth rate. The findings provide a strategic roadmap for policymakers seeking to strengthen long-term growth while maintaining macroeconomic stability.[4]

[4] Partial derivatives of variables with respect to y'BP based on Equation 10 are shown in Appendix A.

**Figure 11: Combined impact of scenarios 1–4 on y'BP**




Note: In scenario 1, the import income elasticity (π) is reduced to 1. In scenario 2, remittances (r) grow at 14 percent per annum. In scenario 3, REER depreciates by 1.5 percent per annum. In scenario 4, capital inflows (f) grow at 15 percent per annum.
Source: Authors' calculations and SBP (2025).

It is important to note that while the analysis that estimates the impact of the annual export growth rate on y'BP is missing, export growth is inherent in scenarios 1 and 3. A reduction of import dependency and depreciation of exchange rate alone, without export growth and diversification, are not meaningful or even sustainable in the long run. Felipe et al. (2009) state that focusing on export growth leads to numerous benefits. It increases the scale of production, leading to economies of scale; it leads to higher competition, which compels local producers to develop skills and innovate to gain higher market share; it enables local investors to employ the latest technologies; and it increases the growth of essential imports. An additional benefit of export growth in the BOP-constrained model is that it relaxes the BOP growth constraint. It reduces the gap between yBP and yP and allows yA to get closer to the potential growth rate (Figure 4). This is because higher export growth can employ underutilized resources in the economy, leading to a sustained increase in the investment rate, capital accumulation, and aggregate demand. Thus, export growth and diversification are crucial macroeconomic variables that can enhance the long-term BOP-constrained growth rate.

## Digging Down Into the Elasticity of Imports by Category

We observed earlier that the BOP-constrained growth rate is most sensitive to changes in import income elasticity. However, we cannot state which specific import categories or sectors contribute to higher import income elasticity in Pakistan. These sectors would require policymakers' focus to help reduce import dependency and increase the long-term growth rate. To analyze this, we consider the annual imports in Pakistan's broad economic categories (BECs) and run individual time-series regressions for each one to estimate import demand functions, category-wise import income elasticities, and import price elasticities.

The BEC classification system was developed by the United Nations to categorize traded goods by their primary end use. It groups imports and exports into broad categories like food and beverages, fuels and lubricants, transport equipment, capital goods, and intermediate goods. There are seven BECs in Rev4. Therefore, we run seven regressions to estimate elasticities, employing an import demand function similar to Equation 11. However, the dependent variable in this case is annual imports in USD in each category. The independent variables remain the same. A VECM was used to run the time-series analyses.

Of the seven BEC-based dependent variables, we found cointegration in three, indicating that there is a long-run equilibrium relationship between these import categories and macroeconomic variables (Table 4). We observe that import income elasticity for the fuels and lubricants category (BEC 3) is significant and has a high magnitude. A 1-percent increase in domestic GDP increases fuel and lubricant imports by 3.6 percent. In addition, a 1-percent increase in domestic GDP significantly increases food and beverage (BEC 1) imports by 2.65 percent. These two categories contribute the most to high import income elasticity in Pakistan, leading to external imbalances and constraining the BOP growth rate. We discuss crucial policy implications in the last section.

**Table 4: Individual import demand functions of BECs**

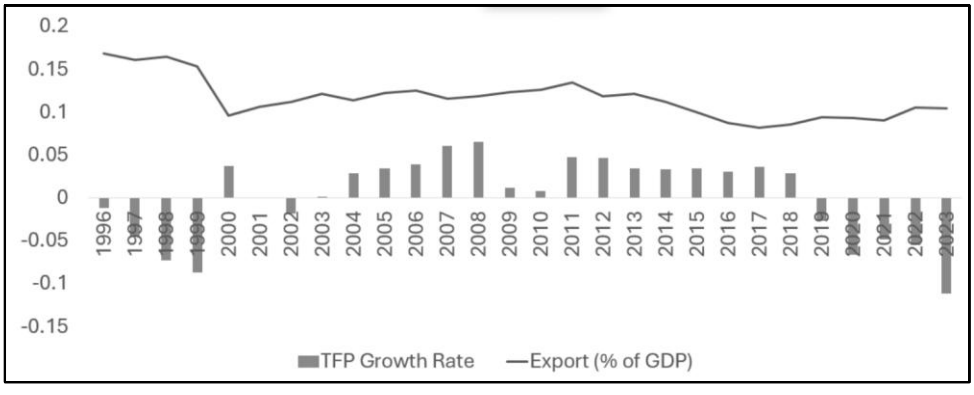
| BEC import category | Import income elasticity | Import price elasticity |
|---|---|---|
| Fuels and lubricants | 3.60*** | -2.28*** |
| Food and beverages | 2.65*** | -1.19*** |
| Transport equipment | 1.21*** | -0.235 |

Source: Authors' calculations and the United Nations Comtrade database.

## Total Factor Productivity and the BOP-Constrained Growth Rate

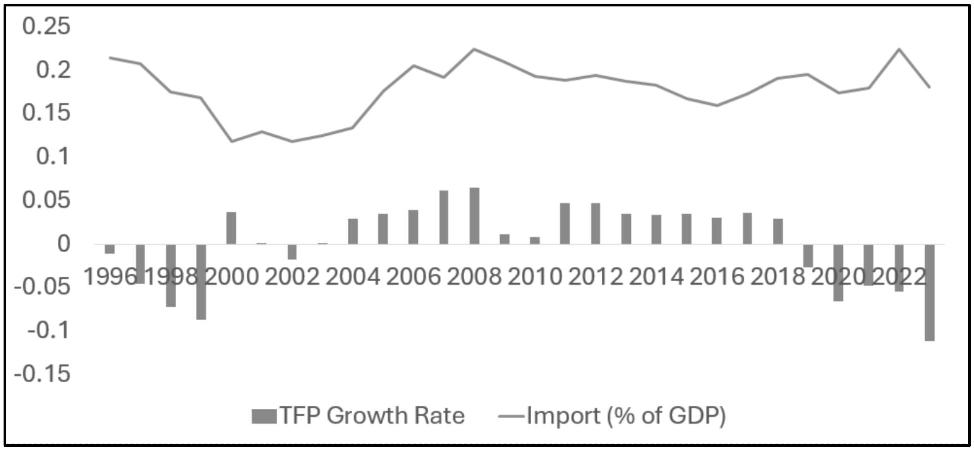
In Pakistan, the total factor productivity (TFP) growth rate, which captures the efficiency of inputs (labor and capital) in generating output, fluctuated over our 28-year time frame, due to structural inefficiencies and external shocks. The trends in Figures 12–14 show that TFP growth from 1990 to 1999 was predominantly negative, ranging from -1 percent in 1996 to -8.7 percent in 1999. This period was marked by economic instability, low investment, and weak governance, which hindered TFP growth. The period from 2000 to 2010 showed a mixed trend, with TFP growth turning positive in most years. It peaked at 6.5 percent in 2008, reflecting the benefits of economic reforms, increased remittances, and higher capital inflows during the 2000s. However, the global financial crisis of 2008–2009 led to a sharp decline in TFP growth, which dropped to 1.2 percent in 2009. From 2011 to 2018, TFP growth remained positive but relatively low, averaging around 3.5 percent. This period was characterized by moderate economic growth, but structural bottlenecks, such as energy shortages and low investments in technology, limited the gains. The years 2019 to 2023 saw a sharp decline in TFP growth, which turned negative again. The COVID-19 pandemic caused a significant drop in productivity, and TFP growth reached -6.6 percent. TFP growth erosion was further exacerbated by political instability and external debt pressures. By 2023, it had plummeted to -11.1 percent, the lowest in the dataset.

**Figure 12: TFP growth and exports as a percentage of GDP (1996–2023)**



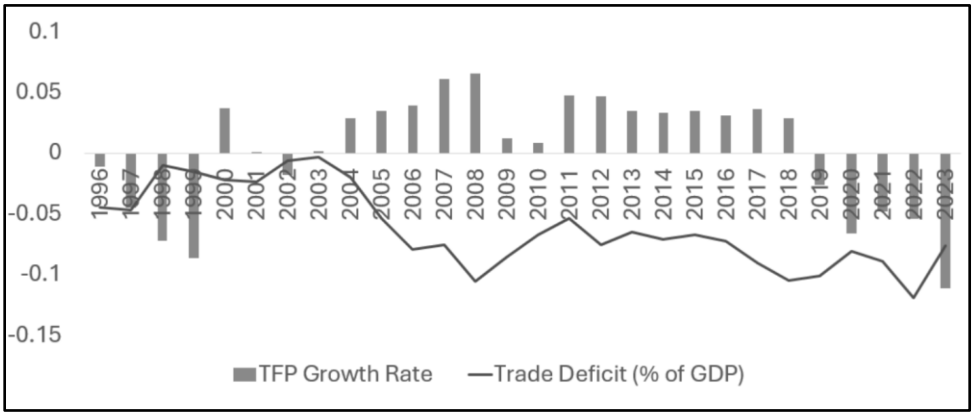

Source: Authors' calculations and the SBP's easy data portal.

**Figure 13: TFP growth and imports as a percentage of GDP (1996–2023)**




Source: Authors' calculations and the SBP's easy data portal.

**Figure 14: TFP growth and the trade deficit as a percentage of GDP (1996–2023)**




Source: Authors' calculations and the SBP's easy data portal.

The uneven TFP growth trend significantly hindered Pakistan's export competitiveness. A lack of export diversification meant that Pakistani exports remained concentrated in low-value-added sectors such as textiles. The lack of innovation and technological advancement, coupled with weak infrastructure, limited the country's ability to move up the value chain and compete with more dynamic economies in Asia, such as Bangladesh and Vietnam (World Bank, 2022).

On the other hand, due to low domestic productivity, reliance on imports for capital goods and intermediate products also increased. Pakistan has been importing a significant portion of its capital goods, energy, and raw materials, which has further widened the trade deficit and hurt BOP sustainability. Therefore, another major obstacle to sustainable economic development is Pakistan's low TFP growth over time.

## Conclusions and Policy Implications for raising the BOP-Constrained Growth Rate

This paper revisits the BOP-constrained growth rate framework to evaluate the sustainable long-term growth capacity of Pakistan's economy over the period 1996–2023. While previous estimates show that Pakistan's BOP-constrained growth rate has ranged from 4 percent to 5.5 percent, we believe the BOP-constrained growth rate may have fallen over time due to low-value-added and less sophisticated exports, high import dependency, and low productivity growth. Our analysis for 1996–2023 shows that Pakistan's estimated BOP-constrained growth rate stands at 3.71 percent, closely matching the actual average growth rate of 3.69 percent. If Pakistan's growth rate exceeds 3.71 percent, imports may rise to unsustainable levels while exports may only increase marginally, potentially leading to BOP crises. First, this finding suggests that Pakistan's economic growth has been externally constrained, confirming the central premise of the BOP-constrained growth model. Second, as we had expected, it also shows that the growth rate declined over time. In fact, our decade-wise analysis reveals a progressive deterioration in the BOP-constrained growth rate from 4.39 percent in 1996–2005 to 3.89 percent in 2006–2015 to 3.7 percent in 2016–2023.

Our analysis suggests that the decline in Pakistan's BOP-constrained growth rate is driven foremostly by high import income elasticity. Dependence on imported goods is particularly high in sectors related to fuels/lubricants and food/beverages, where the import income elasticity is estimated at 3.6 percent and 2.65 percent, respectively. This shows that imports in these sectors increase significantly as domestic GDP increases. Moreover, export diversification and value addition remain weak, with Pakistan's exports largely concentrated in low-value-added textiles, limiting the potential for dynamic export growth. Exchange rate depreciation has not proven to be helpful as depreciation without export diversification led to higher import expenditures, further widening the trade deficit. In addition, investment levels have remained low and the impact of remittances has been moderate as they have only partially eased external constraints. Pakistan's low TFP growth compounds the issue. It hampers export competitiveness and increases reliance on the import of capital and intermediate goods.

Our sensitivity analysis shows that the BOP-constrained growth rate is most responsive to changes in the value of import income elasticity, followed by changes in the annual growth rate of remittances, annual growth rate of the REER, and finally, the annual growth rate of capital inflows. When we incorporate the following favorable changes in these macroeconomic variables simultaneously and simulate the scenario, the growth ceiling increases from 3.71 percent to 6.67 percent, showcasing the potential for significantly higher sustainable growth through coordinated policy reforms.

1. Reducing import income elasticity from 1.47 to 1.
2. Increasing the annual growth rate of remittances from 11.43 percent to 14 percent annually.
3. Growing the REER at -1.5 percent annually instead of -0.83 percent.
4. Increasing the annual growth rate of capital inflows from 13.18 percent to 15 percent annually.

Based on our findings, high import income elasticity ($\pi$) emerges as the most significant factor contributing to Pakistan's low BOP-constrained growth rate. This leads to an important policy implication: policymakers should move beyond the conventional policy mix of currency depreciation and fiscal and monetary tightening to raise the BOP-constrained growth rate. We recommend a comprehensive, four-pronged strategy that prioritizes: (1) reducing import dependency to lower import income elasticity; (2) promoting sustained growth in remittances; (3) enhancing capital inflows; and (4) the implementation of prudent, calibrated currency depreciation. Achieving meaningful progress in these areas will require targeted policy reforms and the establishment of realistic, evidence-based goals. The remainder of this section provides a detailed discussion of each of these components.

As it is essential to unlock Pakistan's long-term growth potential while maintaining external sustainability, the following coordinated policy actions, based on the four-pronged policy above, are highly recommended. Policymakers should revamp trade and industrial policy to reduce import dependency, particularly in the fuels/lubricants and food/beverages sectors. First, they should promote investment in renewable energy sources (like solar energy), increase local agro-processing industries, and expand food storage infrastructures. Second, policies should focus on enhancing export generation and diversification. The promotion of high-value-added, more complex exports beyond textiles, such as IT and pharmaceuticals, is crucial for sustainable increases in economic growth. Also, the government should support firms and companies that are keen to upgrade and develop their technology and skills.

Significant investment in Pakistan is required to decrease reliance on excessive borrowing and expand the industrial base to produce higher-complexity products. Therefore, a key recommendation is encouraging FDI in export-oriented and productivity-enhancing sectors. Improving the business climate and strengthening financial supervision to ensure that inflows are channeled into productive investments should be prioritized. Furthermore, growth in remittances should be encouraged by providing overseas Pakistanis with cost-effective money transfer channels. Policymakers can also increase remittances by offering tax or other incentives for inflows that are directed toward investment in education or entrepreneurship.

It is important to realize that reliance on devaluation as a BOP correction tool could be inflationary and lead to higher debt burdens (if liabilities are dollar-denominated) and capital flight. Without coupling it with export diversification policies, depreciation will not benefit a wide range of industries/sectors—only a few commodity exporters. This is not beneficial in the long term. Exchange rate management must ensure sustainable export-led growth without causing macroeconomic disruptions. Finally, the government should prioritize investment in human capital, research and development, and digital infrastructure to improve TFP growth.

Pakistan's growth constraints are fundamentally internal structural issues. Recurrent BOP crises are symptoms of deep-seated inefficiencies in the economy's export and import structure. A coordinated approach, where policies complement each other, is required, as a single policy cannot address BOP constraints. Vietnam, for instance, combined export-oriented industrialization with careful exchange rate management, boosting manufacturing exports while maintaining external stability (World Bank, n.d.). Bangladesh leveraged remittance inflows and garment exports to strengthen its external balance (IMF, 2025). In Pakistan's case, based on our analysis, the most impactful reforms involve reducing import dependency, increasing export diversification to high-value-added sectors, enhancing remittances in a productive manner, maintaining a competitive yet stable exchange rate, prioritizing sustainable capital inflows, especially in export-oriented sectors, and increasing TFP growth.

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## Appendix A: Partial Derivatives

*Partial derivatives:*

1. With respect to ε:

$$\frac{\partial y'_{BP}}{\partial \varepsilon} = \frac{\theta_x z}{\pi}$$

2. With respect to z:

$$\frac{\partial y'_{BP}}{\partial z} = \frac{\varepsilon \theta_x}{\pi}$$

3. With respect to η:

$$\frac{\partial y'_{BP}}{\partial \eta} = \frac{reer}{\pi}$$

4. With respect to Ψ:

$$\frac{\partial y'_{BP}}{\partial \psi} = \frac{reer\theta_x}{\pi}$$

5. With respect to REER:

$$\frac{\partial y'_{BP}}{\partial reer} = \frac{\eta + \psi \theta_x}{\pi}$$

6. With respect to r:

$$\frac{\partial y'_{BP}}{\partial r} = \frac{\theta_R}{\pi}$$

7. With respect to (px−pm):

$$\frac{\partial y'_{BP}}{\partial (p_x - p_m)} = \frac{1}{\pi}$$

8. With respect to π:

$$\frac{\partial y'_{BP}}{\partial \pi} = \frac{-(\theta_x \varepsilon z + (\eta + \theta_x \psi)(reer) + \theta_R (r - p_x) + \theta_F (f - p_x) + (p_x - p_m))}{\pi^2} - \frac{y\prime bp}{\pi}$$

9. With respect to f:

$$\frac{\partial y'_{BP}}{\partial f} = \frac{\theta_F}{\pi}$$

## Appendix B: Tables for Scenarios 1–5

**Scenario 1**

| Income elasticity of demand for imports (π) | BOP-constrained growth rate |
|---|---|
| 1.47 (baseline) | 3.71% |
| 1.0 (reduced) | 5.45% |
| 2.0 (increased) | 2.73% |

**Scenario 2**

| Annual remittance growth rate | BOP-constrained growth rate |
|---|---|
| 11.43% (baseline) | 3.71% |
| 9.40% (reduced) | 3.41% |
| 14.00% (increased) | 4.07% |

**Scenario 3**

| Annual change in REER | BOP-constrained growth rate |
|---|---|
| –0.83% (baseline) | 3.71% |
| 1.50% (appreciation) | 2.63% |
| –1.50% (depreciation) | 4.02% |

**Scenario 4**

| Annual growth in capital inflows | BOP-constrained growth rate |
|---|---|
| 13.18% (baseline) | 3.71% |
| 11% (reduced) | 3.55% |
| 15% (increased) | 3.84% |

**Scenario 5**

*Baseline growth rate: 3.71 percent*

*Potential growth rate: 6.67 percent*

| Variable | Remittance growth | REER growth | Import elasticity (π) | Capital inflows growth |
|---|---|---|---|---|
| Baseline | 11.43% | -0.83% | 1.47 | 13.18% |
| Modified | 14% | -1.50% | 1 | 15% |

# 3

## Monetary Policy in a Balance-of-Payments-Constrained Economy: Fiscal Dominance, External Vulnerability, and the Case for Caution in Pakistan[1]

**Naved Hamid[2] and Murtaza Syed[3]**

### Abstract

*Following a severe macroeconomic crisis in the fiscal year 2023, Pakistan has achieved notable stabilization, with inflation falling to historic lows and external buffers rebuilding. This has intensified the debate over the State Bank of Pakistan's maintenance of a strongly positive real interest rate amidst modest economic growth. This paper argues that the current tight monetary stance is justified, given Pakistan's history of boom-bust cycles driven by fiscal dominance and a consumption-led, import-intensive growth model. Pakistan's growth is fundamentally constrained by its balance of payments, with a sustainable rate now estimated below four percent. Using recent data and historical patterns, we demonstrate that premature monetary loosening risks reigniting external pressures and exchange rate instability, thereby undermining the hard-won price stability. The primary conclusion is that monetary policy must prioritize price and financial stability over growth support until structural reforms significantly enhance productivity and export competitiveness.*

### Introduction

The Pakistani economy has undergone significant stabilization since the fiscal year (FY) 2023, one of its most challenging years, which featured negative growth

[1] The authors would like to thank our student RAs, Zahra Masood, Abeeha Fatima, and Ilham Dastagir, all from the Lahore School of Economics, for their valuable assistance with the literature review, data collection, and preparation of figures. In particular, we acknowledge their key role in conducting the empirical estimations and analyses and in preparing the drafts of the two boxes. The views expressed are the authors' own.

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[3] Head of Ecosystem, Economics Department, Asian Infrastructure Investment Bank.

and inflation exceeding 29 percent. Headline inflation had decelerated to approximately 5 percent by FY 2025, while growth recovered modestly to 2.7 percent.

This successful stabilization, while creditable, presents a new policy dilemma. Despite halving its policy rate since April 2024 to 11 percent, the State Bank of Pakistan (SBP) maintains a large positive real interest rate. This stance has drawn criticism from various quarters, which question its necessity amid low inflation and suboptimal growth.[4]

This is not the first time Pakistan has restored stability after a crisis. Similar episodes occurred in 2001–2002, 2008–2010, 2013–2014, and 2019–2020. However, a persistent pattern is the transience of these stable periods, which are frequently followed by a new crisis. The central challenge for policymakers, therefore, is twofold. First, they must ensure that the current stability is durable. Second, they must lay the groundwork for sustainable, long-term growth that generates sufficient employment for Pakistan's rapidly expanding labor force and significantly reduces poverty.

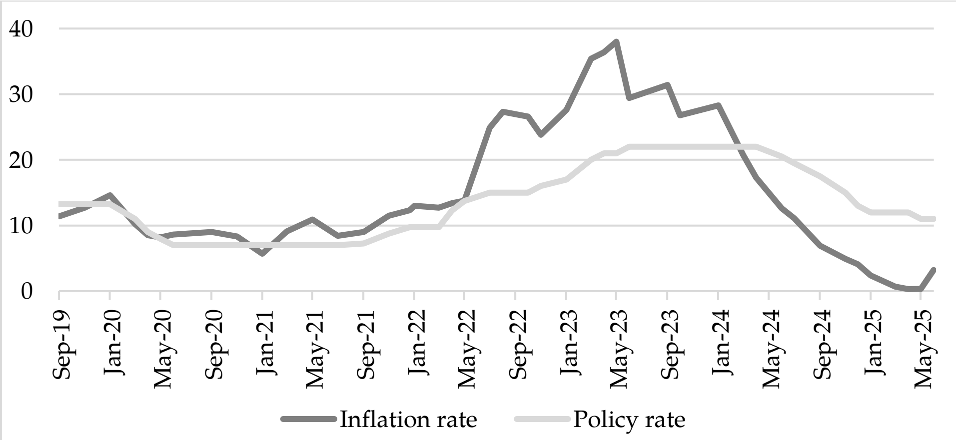
This paper contends that monetary policy's role in this context is to safeguard macroeconomic stability. The task of engineering the structural transformations necessary for sustainable growth falls to other policy domains, notably industrial, trade, and tax policy.

## The Current Conjuncture: Stabilization Amidst Persistent Vulnerabilities

The Pakistani economy exhibits a classic stabilization profile following a severe balance-of-payments (BOP) crisis. Headline inflation, which peaked at 38 percent in May 2023, had decelerated sharply to 3.2 percent by June 2025 (Figure 1). This disinflation was the direct result of a concerted macroeconomic adjustment package anchored by a tight monetary stance and fiscal consolidation under an International Monetary Fund (IMF) extended fund facility. The nominal anchor has held firm, with the exchange rate stabilizing at approximately PKR 280/USD since February 2023; a period of unprecedented stability in recent years (Figure 2).

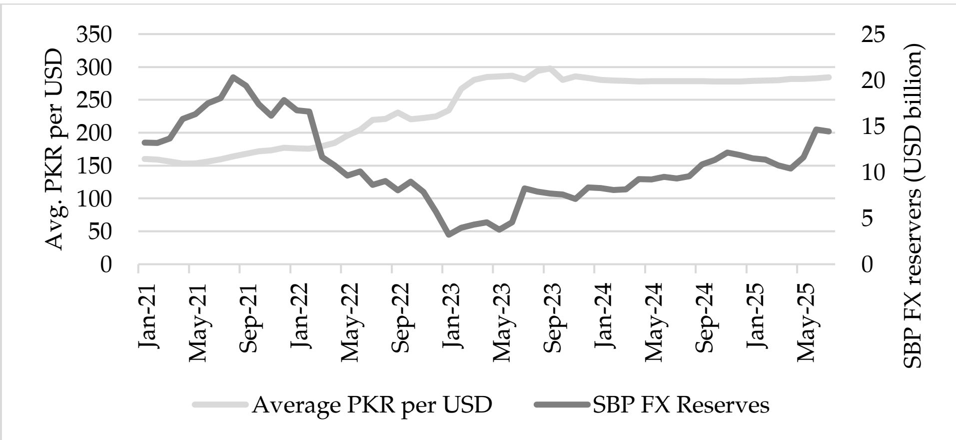
[4] See Hamid and Syed (2024) for a discussion of the relative merits of this criticism.

**Figure 1: Inflation rate and policy rate**




Source: Monetary policy report and inflation snapshot (new base: 2015–2016), SBP.

**Figure 2: Exchange rate and SBP foreign exchange (FX) reserves**

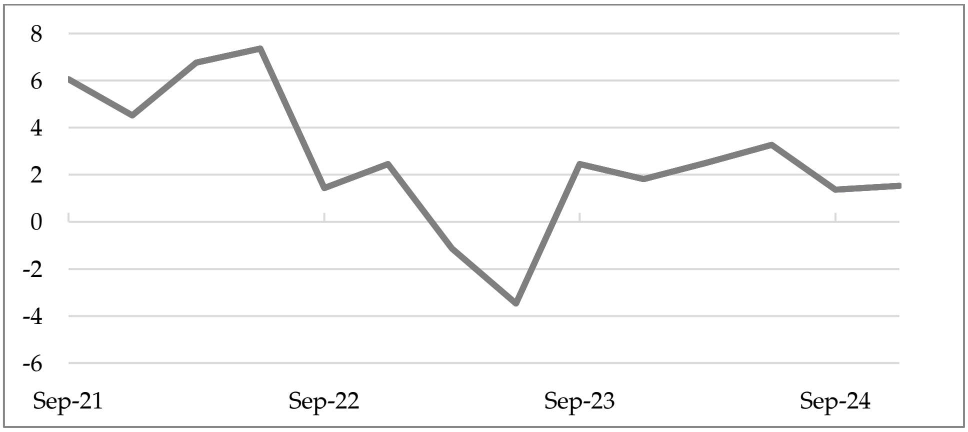



Source: Gold and FX reserves of Pakistan (SBP); International financial statistics database (IMF).
FX = foreign exchange, SBP = State Bank of Pakistan.

This stability has facilitated the rebuilding of external buffers. The SBP's FX reserves increased from a critically low USD 4.5 billion in June 2023 to USD 14.5 billion in June 2025. This accumulation was supported by the SBP's net purchases of over USD 8 billion from the interbank market between June 2024 and June 2025 (SBP, n.d.), a policy aimed explicitly at rebuilding resilience rather than resisting depreciation. The improved macroeconomic environment is also reflected in key vulnerability metrics: the ratio of total external debt and liabilities to gross domestic product (GDP) fell from 43.1 percent to 33.4 percent between June 2023 and June 2025 (SBP, 2025a), and five-year credit default swap spreads retreated to pre-crisis levels, signaling restored market confidence. The successful completion of the first review of the IMF extended fund facility in May 2025 and the negotiation of a USD 1.4 billion resilience and sustainability facility further underscore this positive reassessment by international financial institutions.

However, this hard-won stability masks persistent and deep-seated vulnerabilities. The economic recovery remains fragile and insufficiently broad-based. Quarterly GDP growth, while positive, fluctuated around a modest two-percent trend in FY 2024 and FY 2025 (Figure 3). This growth rate is only marginally higher than the population growth rate of approximately two percent, implying near-stagnant per-capita income. The social consequences are severe; Wieser and Meyer (2025) estimate that the poverty rate rose to over 25 percent in FY 2024, while the IMF (2025) reports that unemployment increased from 6.2 percent in 2022 to 8 percent in 2025. An economy growing at two to three percent cannot generate the millions of jobs required annually for its expanding labor force, let alone make meaningful progress in poverty reduction.

**Figure 3: Quarterly growth rate of GDP (percentage)**

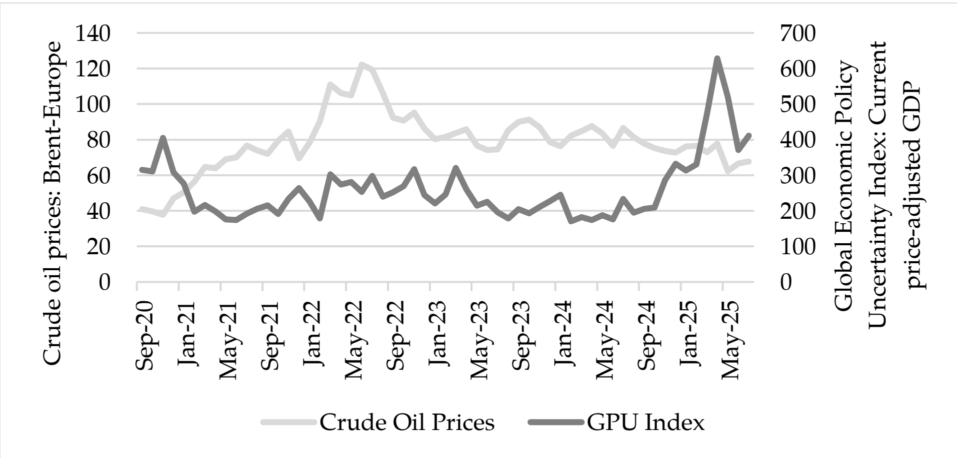



Source: Economic data: Quarterly GDP of Pakistan, SBP.

It must be emphasized that the current stabilization is also precariously dependent on a favorable, yet volatile, external environment. The decline in global energy prices provided significant relief to the import bill and current account. However, as depicted in Figure 4, this period of low prices coincides with a peak in global economic policy uncertainty, driven by a shift toward mercantilist US trade policy, the ongoing war in Ukraine, and conflict in the Middle East. This uncertainty suppresses global energy demand, creating a temporary benefit for oil-importing countries like Pakistan. A normalization of geopolitical tensions or a rebound in global growth could swiftly reverse this advantage, putting renewed pressure on the BOP. Consequently, the SBP's current monetary stance must be viewed not just through the lens of current low inflation, but as a necessary buffer against highly probable future external shocks.

Nevertheless, there is criticism from some quarters about the pace of policy rate cuts during this stabilization episode. Despite the 1,100-basis point reduction in the policy rate between May 2023 and June 2025, the even larger fall of over 3,500 basis points in the inflation rate has meant that there is a large positive gap between it and inflation. A frequently asked question is why the SBP is maintaining such a high (almost eight percent in June 2025) real interest rate as measured against current inflation. It is argued that a developing country like Pakistan cannot afford to have such a high real interest rate, particularly when inflation and growth are both relatively low. The next two sections address this point of view.

**Figure 4: Crude oil prices and the Global Economic Policy Uncertainty Index: Current price-adjusted GDP**




Source: US Energy Information Administration. (2025). *Crude oil prices: Brent - Europe (DCOILBRENTEU).* https://fred.stlouisfed.org/series/DCOILBRENTEU; Baker, S. R., Bloom, N., & Davis, S. J. (2025). *Global economic policy uncertainty index: Current price adjusted GDP (GEPUCURRENT).* https://fred.stlouisfed.org/series/GEPUCURRENT
GDP = gross domestic product.

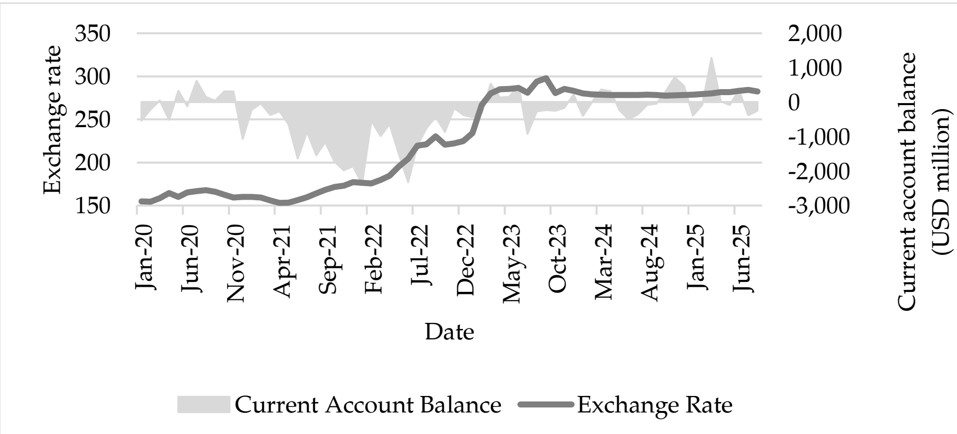
## Lessons from Recent Macroeconomic Management

The turbulent period of 2020–2023 offers three critical lessons for the formulation of monetary and exchange rate policy in an economy with Pakistan's structural characteristics.

### First, delaying necessary exchange rate adjustments through managed floating creates conditions for disorderly corrections.

The move to a market-determined exchange rate in 2019 was a step toward greater external sector flexibility. However, in practice, the SBP has maintained a tendency to 'lean against the wind,' aimed at smoothing depreciation to prevent market panic, which can prove counterproductive in the face of widening external imbalances. Figure 5 plots a three-month moving average of the current account balance against the nominal exchange rate. It reveals that as the current account deficit ballooned from November 2020, peaking in January 2022, the rupee depreciated by a mere ten percent over 14 months. This resistance contributed to immense pent-up devaluation pressure. The inevitable adjustment was consequently sharp and destabilizing, with the currency depreciating an additional 20 percent in the subsequent six months, and again, after exchange rate stability for a few months, the currency depreciated by another 20 percent between December 2022 and April 2023. This volatile, stop-go pattern of exchange rate management is more damaging than a smoother and timely adjustment, as it fuels market panic and erodes policy credibility.

**Figure 5: Current account balance and exchange rate**

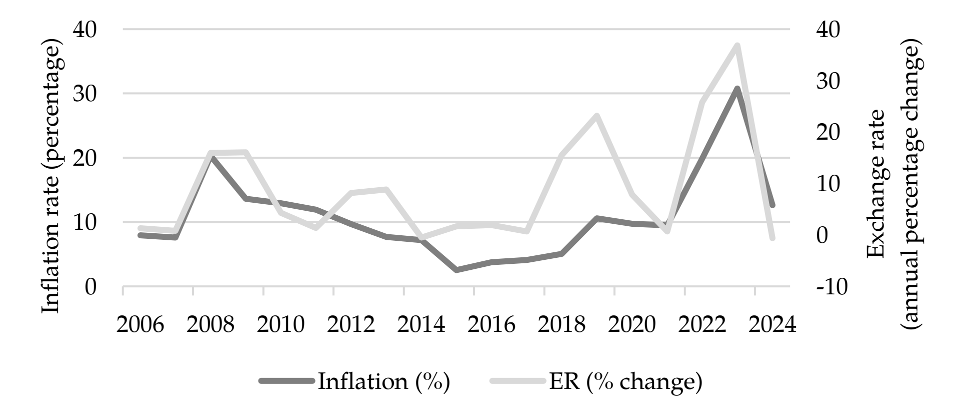



Source: Monthly summary of BOP per BPM6, SBP, and International financial statistics database, IMF.

**Second, the exchange rate is a primary determinant of inflation in a highly import-dependent economy, creating a direct channel from external stability to price stability.**

The high pass-through from depreciation to domestic prices is a well-documented phenomenon in Pakistan. Figure 6 demonstrates a strong co-movement between exchange rate changes and inflation for most of the sample period. The notable exception is the period of 2020–2021, when a tightening of macroeconomic policies and the massive negative demand shock from the subsequent COVID-19 pandemic helped suppress the inflationary impact of the preceding large depreciation.

**Figure 6: Inflation rate and exchange rate changes (2006–2025)**




Source: International financial statistics database, IMF.

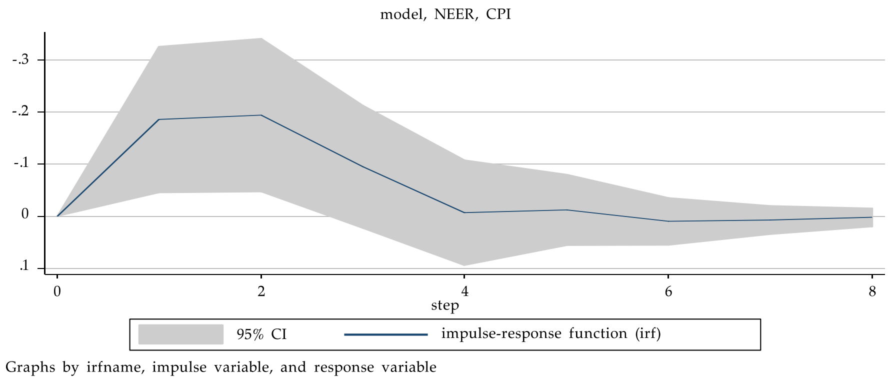
The close link between exchange rate fluctuations and inflation is also confirmed by an empirical investigation of the exchange rate pass-through in Pakistan, which shows it ranged between 50 percent and 80 percent in recent years. It also shows that the pass-through is quick, with most of the impact occurring in the first three months. Moreover, the impact is much greater when there is sustained, substantial exchange rate depreciation, such as in the periods of August 2021–August 2022 and November 2022–May 2023. In these periods, the depreciation of the rupee accounted for almost 50 percent and 80 percent of the increase in inflation, respectively (Box 1). In comparison, other variables capturing demand growth, international commodity prices, and domestic macroeconomic policies exhibit a smaller influence on inflation, with their effects stabilizing after approximately three to four months.

**Box 1: Estimating exchange rate pass-through to inflation in Pakistan**

We employ a vector autoregressive model to investigate the determinants of inflation in Pakistan in recent years, with a specific focus on exchange rate pass-through. The model is estimated using monthly data from July 2019 to April 2025, spanning the period since the move to a flexible and market-determined exchange rate regime. The dependent variable is the month-on-month percentage change in the consumer price index (CPI). The explanatory variables are also expressed as month-on-month growth rates to deal with non-stationarity. These include the nominal effective exchange rate (NEER), the large-scale manufacturing (LSM) index as a proxy for the strength of domestic economic activity, global oil prices to capture external price shocks, broad money supply (M2) to reflect domestic monetary conditions, and the primary balance as a percent of GDP to capture the stance of fiscal policy.

Our empirical results indicate that the NEER is a statistically significant determinant of inflation at the one-percent significance level. The impulse response function (IRF) shown in Exhibit A quantifies this relationship. A 1 percent depreciation in the NEER induces an immediate CPI increase of 0.2 percentage points in the first month, a further 0.2 percentage points in the second month, and another 0.1 percentage points in the third month before returning to steady state in the fourth month. The cumulative effect over this period is a 0.5 percentage point rise in inflation. The pass-through effect is temporary, dissipating over time. However, during periods of sustained exchange rate depreciation, the effect will be more persistent as it accumulates over time.

**Exhibit A. IRF: Impulse (NEER), response (CPI)**




CI = Confidence Interval, CPI = consumer price index, NEER = nominal effective exchange rate.

The forecast error variance decomposition (FEVD) in Exhibit B provides further insight into the dynamics of this transmission—shocks to the exchange rate account for none of the forecast error variance in CPI at the initial horizon. However, their explanatory power rises sharply to approximately 68 percent by the second month and then slowly dissipates over the next eight months. This pattern confirms that the exchange rate pass-through materializes with a lag of one to two months and plateaus thereafter. The FEVD analysis shows that other variables, including the LSM index, oil prices, M2, and the fiscal balance, also exhibit a lagged but smaller influence on CPI, with their effects stabilizing after approximately three to four months.

**Exhibit B: FEVD of explanatory variables**

| T (months) | NEER | LSM index | Oil prices | M2 | Primary balance |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0.681 | 0.021 | 0.014 | 0.016 | 0.028 |
| 3 | 0.123 | 0.024 | 0.013 | 0.030 | 0.030 |
| 4 | 0.135 | 0.024 | 0.013 | 0.030 | 0.030 |
| 5 | 0.135 | 0.024 | 0.017 | 0.030 | 0.030 |
| 6 | 0.135 | 0.024 | 0.017 | 0.031 | 0.030 |
| 7 | 0.136 | 0.024 | 0.017 | 0.031 | 0.030 |
| 8 | 0.136 | 0.024 | 0.017 | 0.031 | 0.030 |

LSM = large-scale manufacturing, M2 = money supply, NEER = nominal effective exchange rate.

The economic significance of this pass-through is substantial, especially during periods of sustained exchange rate depreciation. The model suggests that the depreciation of the NEER alone was responsible for around four-fifths of the surge in inflation between November 2022 and May 2023, and slightly below half of the earlier increase between August 2021 and August 2022. These results demonstrate that disorderly movements in the exchange rate have a significant bearing on inflation developments in Pakistan, such that price stability is closely intertwined with external stability during such episodes.

The pass-through coefficient is high due to the economy's reliance on imported energy, intermediate goods, and food items. This evidence underscores that, for the SBP, managing inflation is inextricably linked to avoiding extreme exchange rate depreciation. This does not mean avoiding depreciation driven by fundamentals like inflation and the trade deficit, which we noted only leads to a more disorderly correction in the future. Instead, it means allowing the exchange rate to act as a buffer as imports rise and ensuring that monetary conditions are not contributing to an overheating of the economy. A monetary policy that is too loose risks triggering external imbalances and currency depreciation, which would quickly feed through to consumer prices, undermining the central bank's primary mandate. At the same time, fiscal policy must be prudent, and domestic economic policy and political uncertainty must be kept in check to ensure that the exchange rate does not come under undue pressure and price stability is achieved.

### Third, inadequate FX reserves leave the economy acutely vulnerable to capital flight and disorderly currency depreciation, even under formal capital controls.

The exchange rate is extremely sensitive to the strength of the external position as well as macroeconomic and political uncertainty. An empirical investigation of the determinants of FX rate instability showed that the external position, proxied by FX reserves (in months of import cover) or the current account deficit, is the most important determinant, followed by the inflation differential relative to Pakistan's trading partners and economic policy uncertainty (Box 2). Therefore, maintaining external buffers and a stable domestic environment is paramount to exchange rate stability. The results suggest that the significant nominal effective depreciation of the rupee during FY 2022 can be mainly traced to the halving of FX reserves, together with the tripling of both domestic policy uncertainty and the inflation differential.

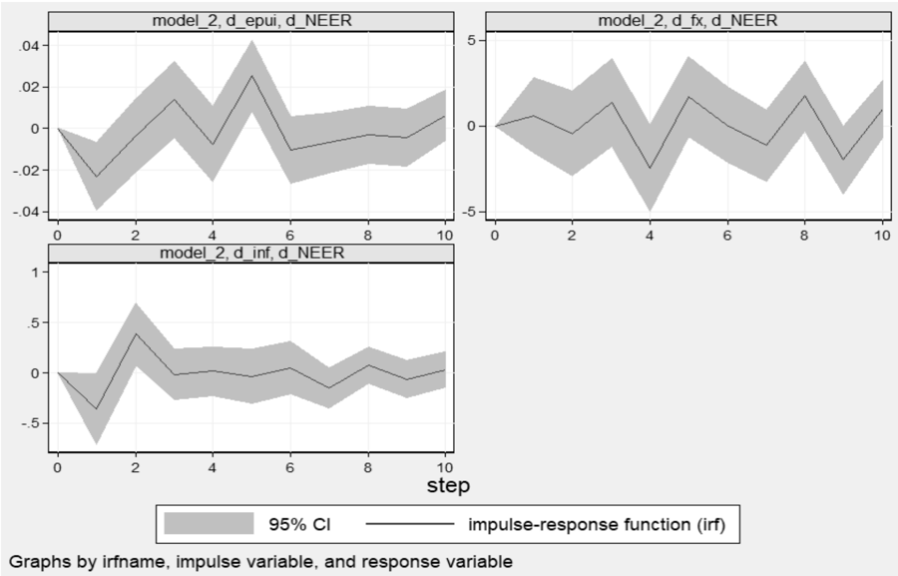
**Box 2: Investigating the determinants of the exchange rate in Pakistan**

We examine the drivers of Pakistan's exchange rate using a differenced vector autoregressive model. The model is estimated using monthly data from January 2020 to December 2024 to capture the period since the move to a flexible and market-determined exchange rate regime. The dependent variable is the NEER expressed as the first difference of month-on-month growth rates. The explanatory variables are also specified in first differenced month-on-month growth rates to address non-stationarity since a unit root was found in the growth rate data.

The explanatory variables are FX reserves measured in months of import cover (FX) as a proxy for the strength of the external position; the inflation differential between Pakistan and its trading partners (INF), capturing the fundamental effects of purchasing power parity; and the SBP's Economic Policy Uncertainty (EPU) Index as a measure of domestic uncertainty.

Granger causality tests establish that the inflation differential, FX reserves, and economic policy uncertainty are statistically significant determinants of the NEER at the five-percent level. The IRFs in Exhibit A illustrate the dynamic effects. A one-percent decline in the growth of the FX reserves position triggers an immediate 1.2 percentage point amplification in the current month's exchange rate depreciation, which moderates to 0.2–0.3 points in subsequent months before stabilizing. A similar shock to the growth in the inflation differential causes an acceleration of depreciation of approximately 0.36 percentage points in the first month, with the effect fading after the third month. Shocks to the growth in policy uncertainty (EPU) result in a comparatively smaller but persistent acceleration in depreciation of 0.01–0.02 percentage points. These findings indicate that external shocks, relative price pressures, and policy uncertainty exert a strong and persistent influence on the exchange rate.

**Exhibit A: IRFs**




CI = Confidence Interval, NEER = nominal effective exchange rate.

The FEVD in the table in Exhibit B corroborates these results over a longer horizon. After ten months, shocks to foreign reserves explain approximately ten percent of the forecast error variance in the NEER, while the inflation differential and policy uncertainty account for about seven percent and six percent, respectively.

**Exhibit B: FEVD of explanatory variables**

| t (months) | FX reserves | Inflation differential | EPU Index |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 |
| 2 | 0.030 | 0.055 | 0.028 |
| 3 | 0.029 | 0.072 | 0.027 |
| 4 | 0.030 | 0.074 | 0.027 |
| 5 | 0.075 | 0.064 | 0.027 |
| 6 | 0.078 | 0.062 | 0.054 |
| 7 | 0.080 | 0.063 | 0.060 |
| 8 | 0.080 | 0.065 | 0.060 |
| 9 | 0.090 | 0.066 | 0.059 |
| 10 | 0.100 | 0.067 | 0.061 |

EPU = Economic Policy Uncertainty (Index), FX = foreign exchange.

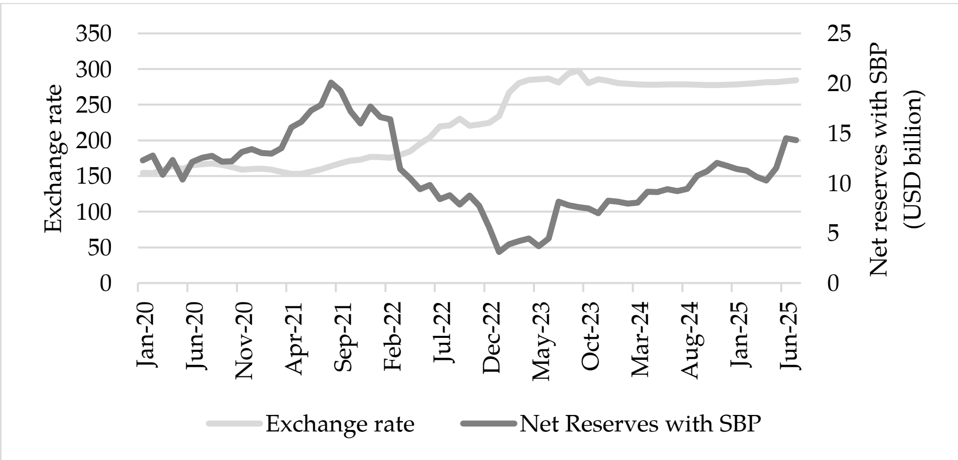
The economic relevance of these determinants is especially pronounced during periods of major instability. For instance, a 16 percent depreciation in the NEER in FY 2022 can be mainly attributed to the halving of FX reserves during this period and the more than tripling of both domestic policy uncertainty and the inflation differential relative to trading partners. These results underscore that exchange rate stability in Pakistan rests predominantly on the maintenance of strong external buffers, inflation alignment with trading partners, and the fostering of a credible policy environment. This emphasizes the critical need for sound macroeconomic management and political stability to anchor the exchange rate and prevent disorderly movements that can feed into inflation (Box 1).

The exchange rate's sensitivity to macroeconomic and political uncertainty may seem surprising since Pakistan maintains de jure capital account restrictions. However, in practice, de facto convertibility has existed in Pakistan since economic reforms by the Sharif government in 1991, which were subsequently codified in the Protection of Economic Reforms Act, 1992 (Haque, 2011). This act gave all Pakistani citizens the 'freedom to bring, hold, sell, and take out foreign currency.' They have been allowed to open foreign currency accounts in commercial banks since early 1991. In addition, residents can purchase foreign currencies from money changers and deposit them in their foreign currency accounts. In 2002, the SBP issued regulations for the establishment of exchange companies, so licensed exchange companies replaced informal money changers. This created a multi-tiered FX market in Pakistan: the official interbank market, the licensed kerb market, and an informal grey market (Khalid, 2014; Salman & Ali, 2023).

The SBP tries to ensure that the interbank market and kerb market rates are closely aligned because a large gap between the two can result in the diversion of current account flows from the interbank market, particularly remittances, to the kerb market. In normal times, the current account balance determines the rates in the interbank and kerb markets. However, during periods of stress, when FX reserves are low and economic uncertainty is high, a different dynamic emerges. Increased capital account outflows through the informal market, driven by a flight to safety, have a dominant influence on the kerb and grey market rates.

This dual dynamic is illustrated in Figure 7. The decline in the SBP's gross reserves from August 2021 onward was accompanied by a gradual depreciation. However, this depreciation process accelerated dramatically in early 2023, driven by a confluence of low reserves, a deadlock in IMF negotiations, and intense political uncertainty.[5] In this environment, the demand for safe-haven foreign assets surged. Capital flight manifested not through the official channel but through the informal economy, widening the premium in the grey market. In turn, this created a powerful incentive to divert remittances from formal banking channels to informal ones, i.e., through *hundi/hawala* networks. That the diversion of inflows from formal to informal channels can be substantial is evidenced by the USD 4 billion (over one percent of GDP) drop in official remittances in FY 2023 (Figure 8). The resulting depreciation fueled a self-reinforcing cycle: households and firms, observing the rupee's falling value, sought to dollarize their assets, further exacerbating pressure on the currency. This speculative bubble was only broken when the rupee was stabilized by an administrative crackdown on exchange companies and illegal FX operators and the imposition of informal rationing in the interbank market.[6] While helping to arrest panic and disorderly exchange rate conditions, these measures had substantial harmful side effects on the economy in terms of market distortion and the loss of investor confidence.

**Figure 7: Exchange rate and gross reserves with the SBP**

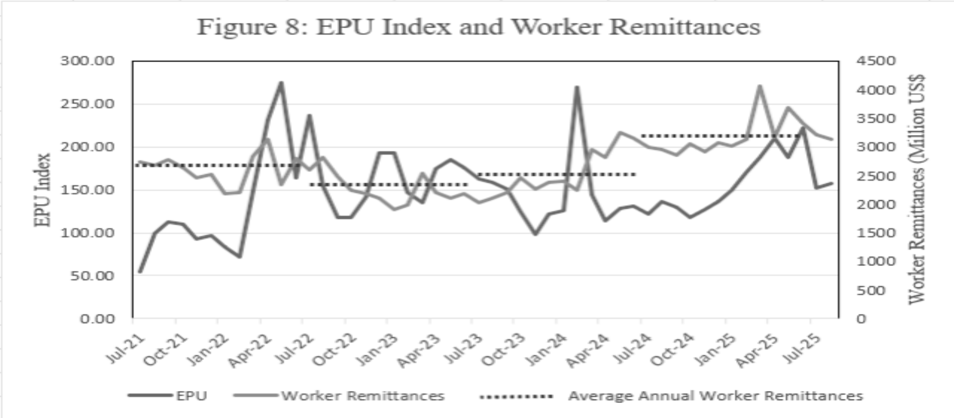



Source: Gold and FX reserves of Pakistan, SBP and International financial statistics database, IMF.

[5] See Syed and Hamid (2023) for a more detailed discussion of the 2022–2023 crisis.

[6] Tens of millions of dollars poured back into Pakistan's interbank and open markets after the military was called in and raids on black market operators took place (Shahid & Ali, 2023).

**Figure 8: EPU Index and worker remittances**




Source: Country-wise workers' remittances and EPU Index database, SBP.
EPU = Economic Policy Uncertainty (Index)

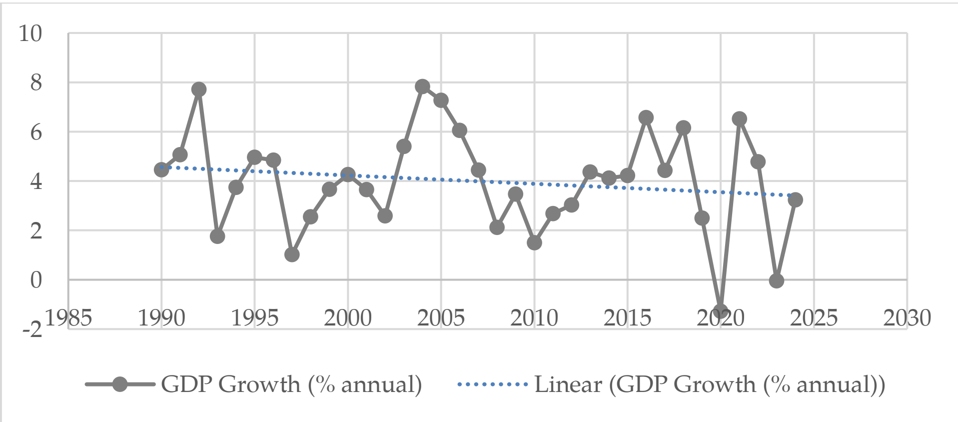
This episode delivers a clear lesson: monetary policy cannot afford to be stimulative when FX reserves are precariously low. A conservative, high real interest rate stance is essential to moderate import demand, attract portfolio flows, and, most critically, maintain confidence to prevent capital flight through informal channels. The SBP's current policy of maintaining a positive real interest rate, while criticized for its growth impact, is a rational response to the imperative of rebuilding and sustaining external stability, which is the foundation for lasting price stability.

## The Structural Context: A Balance-of-Payments-Constrained Growth Model

Pakistan's contemporary growth dilemma is not a cyclical anomaly but the culmination of a long-term structural trajectory characterized by a consumption-led, import-intensive, and externally financed growth model.

A historical perspective reveals that since the economic liberalization of the 1990s, growth has been predominantly driven by surges in government spending and private consumption rather than by productive investment or export competitiveness. This pattern has been sustained by periodic inflows of geopolitical rents, which alleviated external constraints without addressing underlying inefficiencies. During the 2000s, substantial aid and assistance flows from the US, linked to the war in Afghanistan, financed large current account deficits. In the following decade, investment from China under the China-Pakistan Economic Corridor played a similar role. This reliance on external financing has created a form of 'resource curse,' discouraging the difficult structural reforms necessary to foster a competitive, export-oriented manufacturing sector and to mobilize domestic savings. As a result, Pakistan has experienced uneven growth and a gradual decline in its average growth rate (Figure 9). This dependence on external financing has also left the economy increasingly vulnerable to shifts in global financial conditions and changing geopolitical priorities, undermining the prospects for long-term, sustainable development. The economic situation in the last few years has become even more difficult because, in addition to the drying up of access to external resources on easy terms, political developments inside the country have made it more difficult for the government to undertake much-needed structural reforms in tax, industrial, and tariff policies.

**Figure 9: GDP growth (annual percentage)**

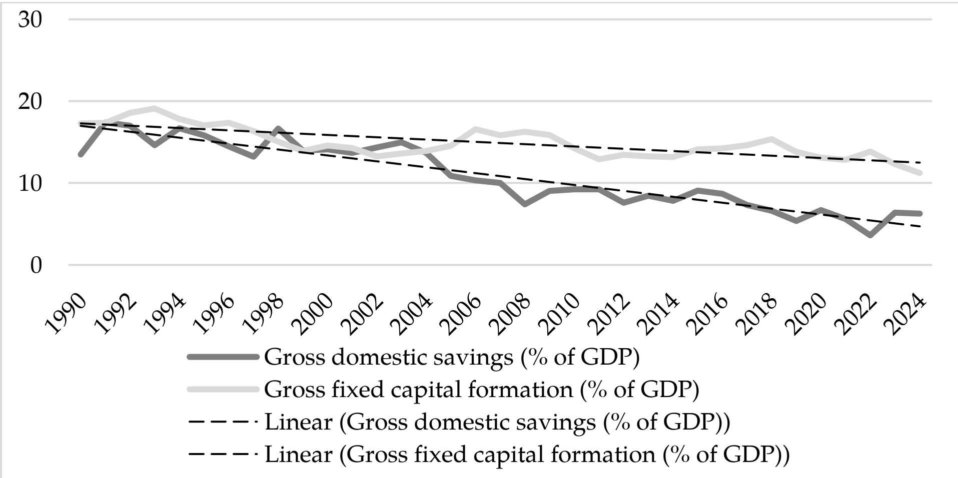



Source: World Development Indicators, World Bank.
GDP = gross domestic product.

The fundamental symptom of this malaise is a persistently low and declining investment-to-GDP ratio, which has fallen from an average of over 20 percent in the 1990s to around 15 percent in recent years (Figure 10). This decline is driven by a dual failure on both the demand and supply sides of capital formation.

On the demand side, private investment is severely discouraged by a toxic combination of recurrent macroeconomic crises and a deeply distorted investment climate. A primary source of distortion is the tax system, which places a disproportionately heavy burden on the easy-to-tax formal sectors (notably LSM) while effectively exempting large segments of the economy, such as wholesale and retail trade, real estate, and agriculture. This raises the cost of doing business in the formal industrial sector and creates a perverse incentive for capital to flow into speculative, non-tradable activities rather than productive, export-oriented industries. The pressure to meet escalating revenue targets under successive IMF programs has exacerbated this problem, further increasing the effective tax rate on the already compliant sectors.

**Figure 10: Investment and savings (percentage of GDP)**



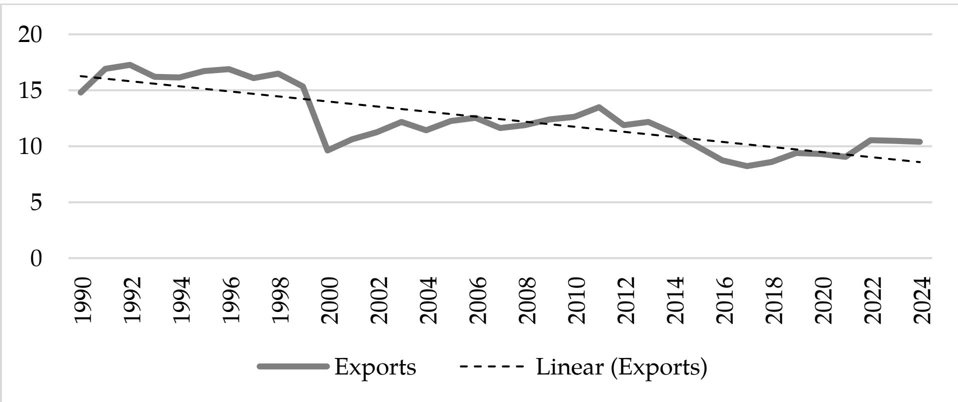

Source: World Development Indicators, World Bank.
GDP = gross domestic product.

On the supply side, rigid government spending and the chronically narrow tax base (which results in persistently low tax-to-GDP ratios) severely constrain the government's capacity for public investment in critical infrastructure, human capital, and technology. Moreover, large fiscal deficits financed by government borrowing from the financial sector crowd out lending to the private sector. At the same time, past policies designed to reduce the cost of government borrowing and please the politically important group of 'traders and retailers,' e.g., negative real interest rates and an overvalued exchange rate, stimulated import-intensive consumption and discouraged financial savings. Consequently, Pakistan's national savings rate is among the lowest of peer countries and has declined faster than the investment rate. The gap between low domestic savings and inadequate investment has been filled by external borrowing, creating a vicious cycle of debt and dependency.

A critical consequence of this growth model has been a sustained loss of international competitiveness. A substantial body of literature (Hussain, 2008; Ahmad, 2009; Hamid & Mir, 2017) documents the persistent overvaluation of Pakistan's real effective exchange rate. This overvaluation has been exacerbated by a 'Dutch disease' effect stemming from large and growing remittance inflows. A recent IMF study (Carare et al., 2025) confirms a positive correlation between remittances and overvaluation in flexible exchange rate regimes as these inflows increase domestic consumption and drive up the price of non-tradables. Coupled with low investment, this overvaluation has stifled the tradable sectors. The SBP (2025b) reports that labor productivity growth remains anemic and total factor productivity growth has been volatile and on a downward trajectory, indicating that economic activity is becoming less efficient over time.

The most telling indicator of this structural decline is the relentless fall in the share of exports in GDP, which dropped from an average of 16.5 percent in the 1990s to 11.6 percent in the 2000s, and to just 9.4 percent in the last decade (Figure 11). An economy that is failing to integrate into global markets at a comparable rate to its peers is, by definition, losing its competitive edge.

**Figure 11: Exports (percentage of GDP)**




Source: World Development Indicators, World Bank.

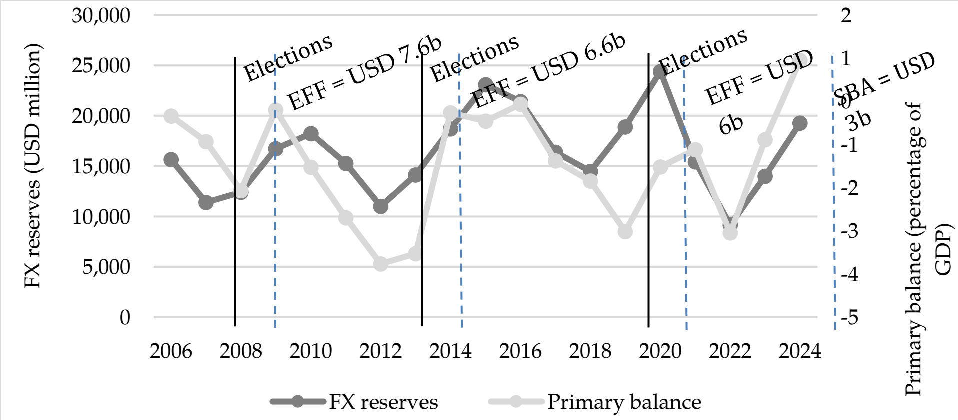
This confluence of factors (low investment, a distorted incentive structure, and declining productivity) has cemented Pakistan's status as a BOP-constrained economy (Felipe et al., 2010; Rosbach & Aleksanyan, 2019; Raza, 2021). The long-run growth rate in such an economy is determined by the growth of exports relative to the income elasticity of demand for imports. Pakistan's growth has consistently hit a 'BOP wall,' where any growth acceleration above a certain threshold rapidly inflates the import bill, leading to a deficit on the BOP. Instead of allowing the exchange rate to depreciate to act as a moderating influence on the current account deficit, international reserves are used to resist rupee adjustment until they are close to depletion. Ultimately, it becomes clear that this policy is no longer sustainable, and the country is forced to adopt contractionary policies. Crucially, this BOP-consistent growth rate itself has declined over time, from estimates of around five percent in the 2000s to less than four percent today (ibid). This decline is a direct result of the factors outlined above: falling export competitiveness (reducing export growth) and an entrenched consumption pattern (maintaining a high income elasticity of imports).

This dynamic is institutionalized in a persistent political business cycle (Figure 12). The pattern is recurrent: fiscal policy turns expansionary, stimulating consumption-led growth that exceeds the BOP-consistent rate in the run-up to general elections. This leads to overheating, a widening current account deficit, and a depletion of reserves, culminating in a crisis.

The (usually new) government is then compelled to seek an IMF-supported stabilization program, which enforces fiscal austerity and tight monetary policy, leading to a growth slowdown. Once stability is restored and the IMF program ends (usually three to four years later), the approach of the next election triggers a renewed fiscal expansion, and the cycle repeats.

The problem is that with each cycle, the underlying sustainable growth rate appears to be ratcheting downward, as structural weaknesses are left unaddressed and public debt accumulates. The historical advantages of geopolitical rents are no longer sufficient to sustain a reasonable growth rate. Without profound structural reforms to enhance competitiveness, boost domestic savings, and redirect investment into tradable sectors, Pakistan faces a future of low-quality, low-growth equilibrium, unable to generate the employment required for its burgeoning youth population.

**Figure 12: Pakistan's FX reserves, primary balance, and IMF programs**




Source: Gold and FX reserves of Pakistan, SBP and public finances in modern history database (February 2025), IMF.
EFF = extended fund facility, FX = foreign exchange, GDP = gross domestic product, SBA = stand-by arrangement.

## Conclusion

The current economic environment (low inflation and modest growth) might conventionally justify aggressive monetary easing. However, such a move would be premature and risky for Pakistan. The economy is only beginning to recover from a deep crisis. External buffers, while improving, remain vulnerable, and global uncertainty is elevated.

The SBP's primary mandate of price stability is inextricably linked to financial stability through the exchange rate channel. At the same time, Pakistan's growth is fiscally driven and BOP-constrained. Until structural reforms in taxation, industrial policy, and public administration succeed in boosting productivity, savings, and exports, the sustainable non-inflationary growth rate will remain below four percent. Monetary policy must, therefore, act as a stabilizing anchor, tightening when growth threatens to exceed this BOP-consistent rate to prevent a recurrence of exchange rate and inflation crises.

While current policymakers demonstrate an understanding of these imperatives, the critical test will come after the IMF program concludes and the country approaches the 2029 general election. The ability to resist the historical pattern of fiscal loosening will determine whether the current stabilization can be transformed into lasting prosperity.

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# 4

## The Potential Impact of US Tariff Policies on Pakistani Exports to the US

**Azam Chaudhry[1] and Gul Andaman[2]**


### Abstract

*This paper assesses the potential repercussions of US tariff policies on Pakistan's exports to the US. The imposition of a 19-percent tariff would result in an equivalent increase in costs for Pakistani exporters. Assuming this increase is passed entirely to end consumers and using long-run price elasticity estimates from Pakistan's export demand function, our analysis indicates that aggregate exports could decline by USD 0.40 billion or 7.6 percent in 2025 alone. Cumulative losses over five years could reach USD 2.11 billion. A sectoral analysis reveals that the textile and manufacturing sectors are particularly vulnerable, with textile exports potentially falling by USD 0.33 billion in 2025 and five-year cumulative losses of USD 1.74 billion. These findings underscore the need for a comprehensive mitigation strategy focused on enhancing competitiveness, diversifying exports, investing in renewable energy, and strengthening diplomatic and trade relations to cushion the economy against adverse tariff shocks.*


### Introduction

The implementation of tariffs by the US, a major economic power, can elicit adverse repercussions on the export trajectories of developing nations. They lead to elevated import prices, consequently diminishing the demand for goods originating from affected nations (Kuusi et al., 2020). This contraction in demand can trigger a decline in export volumes, which, in turn, can precipitate adverse effects on employment rates and economic growth within exporting countries. Notably, tariffs on intermediate goods can escalate exporters' production costs and

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undermine their competitive edge (Handley et al., 2020). The extent of these effects is contingent upon various factors, including the magnitude and scope of tariffs, exporting nations' reliance on the US market, and the presence of alternative export destinations (Kuusi et al., 2020).

The US has historically been a significant trading partner of Pakistan, offering economic, social, and military assistance (Asmatullah & Khalil, 2021). As one of Pakistan's largest bilateral trading partners, total two-way trade crossed USD 7 billion in 2023 and shows steady growth. Trade volumes exceeded USD 6.3 billion in the first ten months of 2024. Pakistan consistently records a trade surplus with the US, as exports far exceed imports (Federation of Pakistan Chambers of Commerce and Industry, 2024).

Textiles and apparel dominate Pakistan's exports to the US, accounting for over half of its outbound shipments. Pakistan exported goods worth approximately USD 5.3 billion to the US in FY2024, while importing about USD 1.4 billion (Zeshan et al., 2025). Other growing sectors include IT services (over USD 1 billion), pharmaceuticals, and jewelry. The US also contributes over USD 1.5 billion to Pakistan's foreign direct investment, mainly in fast-moving consumer goods, healthcare, energy, and IT (International Trade Administration, 2024).

Two points are noteworthy. First, Pakistan's exports have faced considerable challenges, with their contribution to the gross domestic product declining from 16 percent to 10 percent over the last two decades (Mustafa & Hussain, 2023). Second, Pakistan's international trade is highly concentrated, with exports depending on just a few lower value-added items (Abbas & Waheed, 2015). Therefore, and given Pakistan's trade dependence on the US, tariff increases could have significant impacts on the former's economic stability and export-led growth trajectory (Jamil et al., 2024). Thus, the imposition of a 19-percent tariff by the US on Pakistani goods presents a challenge for policymakers. It becomes imperative to conduct an analysis of the potential implications of US tariff policies on Pakistan's exports, identifying likely vulnerabilities and formulating appropriate policy responses to mitigate adverse effects.

In this paper, we investigate the likely outcomes of such tariffs on Pakistan's export performance and outline strategic policy recommendations to counteract the adverse effects. The next section highlights the Pakistan-US export profile over the last two decades. We then describe the methodology and present the results of our analysis. The next two sections list mitigation strategies to counteract the adverse impacts of tariff shocks in the short, medium, and long term and conclude the study.

## Pakistan's Export Profile to the United States (2003–2023)

Pakistani exports have long relied on textile products, which also constitute a substantial proportion of the country's overall exports to the US. Prior to the elimination of quotas under the Multifiber Arrangement, Pakistan's exports to the US focused on high value-added sectors such as clothing and interior textiles. However, these sectors' shares have decreased since then (Jamil et al., 2024), reflecting how much Pakistan's export mix has changed and how it now depends more on basic textiles. The high concentration of Pakistan's export basket in a limited range of products, particularly those with lower value-added, exacerbates its susceptibility to external economic shocks, such as tariffs.

Using data on Pakistan's exports to the US for the period 2003–2023 from the United Nations Comtrade database, we analyze and explore Pakistan-US bilateral export volumes overall and within the agricultural, manufacturing, and industrial[3] sectors. We disaggregated the data at the Harmonized System (HS) 6-digit level, aggregated it into the HS 2-digit level, and finally summed it into three broad sectors. At the HS 2-digit level, the agricultural sector contains 15 subcategories, the manufacturing sector contains 77 subcategories, and the industrial sector contains 5 subcategories (Appendix A).

Pakistan's exports to the US during 2003–2023 show a consistent upward trajectory, reaching USD 5.18 billion in 2023. However, the bulk of these exports were manufactured goods, particularly textiles and apparel. These items are highly susceptible to price changes due to their competitive and low-margin nature. Major export items include apparel and clothing accessories, worn clothing and rugs, cotton, raw hides and skins, and furniture. Given that textiles constitute a significant portion of Pakistan's exports to the US, any tariff increases on these products could substantially affect Pakistan's export revenues.

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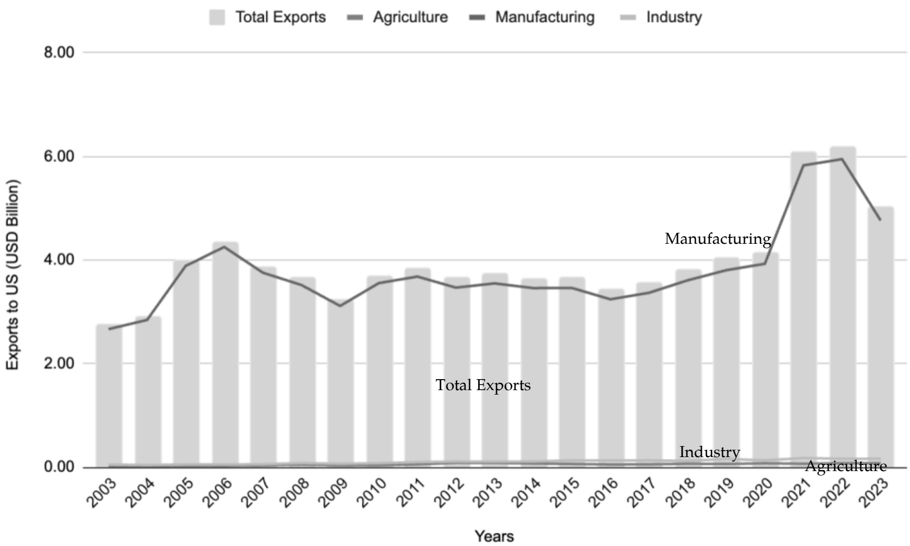
[3] The Climate Watch greenhouse gas emissions dataset, also known as the Climate Analysis Indicators Tool dataset, is accompanied by an explanatory document that defines the agricultural sector and distinguishes between subsectors within the manufacturing and industrial sectors. We explore Pakistan's exports to the US in these three broad economic sectors from 2003–2023 using these definitions. See World Resources Institute (2022).

**Figure 1: Pakistan's exports to the US**




Source: United Nations Comtrade database.

## Potential Impact of US Tariff Policies: Methodology

Our analysis shows that even a modest tariff could potentially impact Pakistan's export revenues adversely, given that the US is a significant trading partner, especially for textiles and apparel. To estimate and quantify the impact of the US tariff hike on Pakistan's exports, we adopt a structured multi-step approach that combines historical export trends with economic modeling. The first step is to establish a baseline projection of Pakistan's exports to the US in the absence of any new tariffs. This projection uses the average annual bilateral export growth rate of 2.63 percent (2003–2023) to estimate future exports from 2025 to 2028, creating a counterfactual scenario that reflects business-as-usual growth trends without policy disruption.

The second step focuses on the price elasticity of demand for Pakistan's exports to the US. Using estimates from Pakistan's long-run export demand function (Appendix B), a price elasticity (ε) of -0.4 is applied. This means that for every 1-percent increase in the price of exports, demand would decline by 0.4 percent, assuming all other factors remain constant. In this context, a 30-percent increase in export prices, reflecting the full burden of tariffs being passed on to US consumers, would be expected to reduce export revenue by approximately 12 percent.

In the third step, we estimate the potential decline in exports under the tariff scenario. The export values from the baseline scenario are adjusted downward according to the expected reduction due to the price increase. This process is carried out at both the aggregate export level and for key sectors like manufacturing and textiles, which are major contributors to Pakistan's US-bound exports.

Finally, a sensitivity analysis is conducted to capture a range of outcomes. If manufacturers absorb some of the increased price, the reduction in export revenues could be lower. Therefore, recognizing that exporters may not pass the entire cost of the tariff on to US buyers, we consider partial pass-through scenarios, leading to effective price increases of 15 percent and 10 percent. Each scenario is then used to recalculate the expected decline in exports, offering a range of possible impacts depending on how exporters and consumers share the burden of increased costs. This approach allows a nuanced understanding of how different tariff intensities and price responses affect Pakistan's trade performance.

## Potential Impact on Pakistan's Exports: Results and Projections

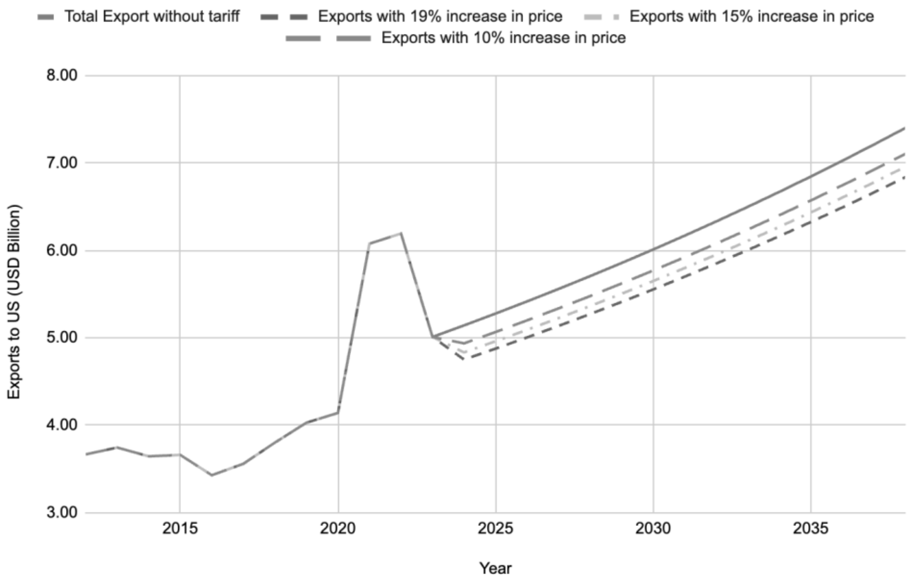
Our analysis of the impact of US tariffs on Pakistan's exports reveals a concerning outlook under the scenario of the imposed 19-percent tariff. Passing the entire burden of the tariff on to US consumers would raise the effective price of Pakistani exports substantially, leading to a significant decline in demand. With a price elasticity of export demand estimated at -0.4, a 19-percent increase in export prices would correspond to a 7.6-percent reduction in export revenue. This translates to an estimated loss of USD 0.40 billion in 2025 alone from the projected baseline level. Extending this estimate over a five-year period (2025–2029) could result in a cumulative loss of USD 2.11 billion in export revenues.

In a scenario where manufacturers partially absorb the increased price, and the effective price increase is limited to 15 percent, the reduction in export revenue would be 6 percent, which amounts to USD 0.32 billion in 2025 and a five-year aggregate loss of USD 1.67 billion. If the price increase is limited to ten percent, 2025 export revenues could potentially drop by USD 0.21 billion (four percent), while the cumulative loss over five years could decrease to USD 1.12 billion (Figure 2 and Table 1).

**Table 1: Projected changes in exports to the US under alternative tariff rates**

| Tariff rate | Export loss in 2025 | Five-year aggregate loss (2025–2029) |
|---|---|---|
| 19% | USD 0.40 billion (7.6%) | USD 2.11 billion |
| 15% | USD 0.32 billion (11.6%) | USD 1.67 billion |
| 10% | USD 0.21 billion (7.6%) | USD 1.12 billion |

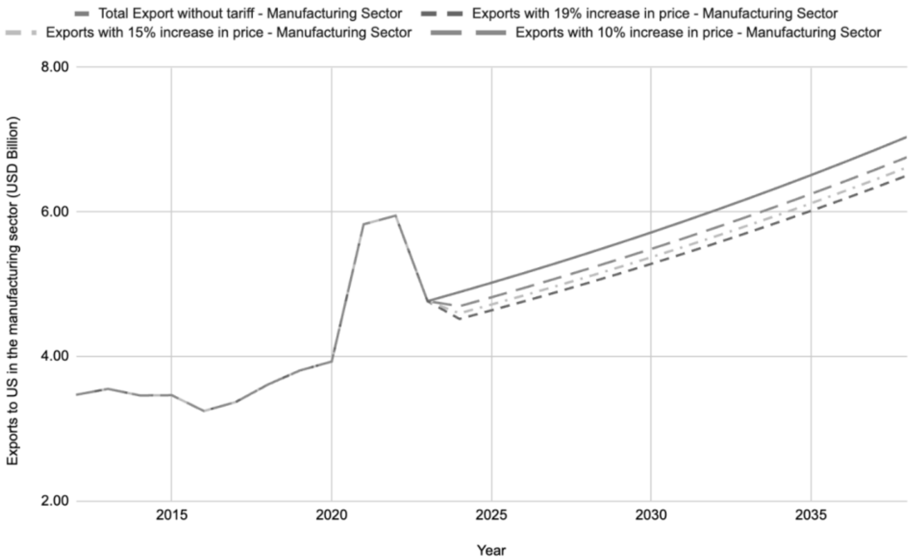
**Figure 2: Potential decrease in Pakistan's exports to the US under various tariff rates**




Source: authors' calculations.

At the sectoral level, the manufacturing and textile industries are especially vulnerable due to their dominant share in Pakistan's export profile to the US. For the manufacturing sector, a 19-percent tariff is projected to cause a USD 0.38 billion reduction in exports in 2025 and a USD 2.01 billion cumulative loss over 2025–2029 (Figure 3). Under lower effective tariff burdens of 15 percent and 10 percent, the manufacturing sector could still experience export revenue declines of USD 0.30 billion and USD 0.20 billion in 2025, respectively, translating to corresponding five-year losses of USD 1.59 billion and USD 1.06 billion.

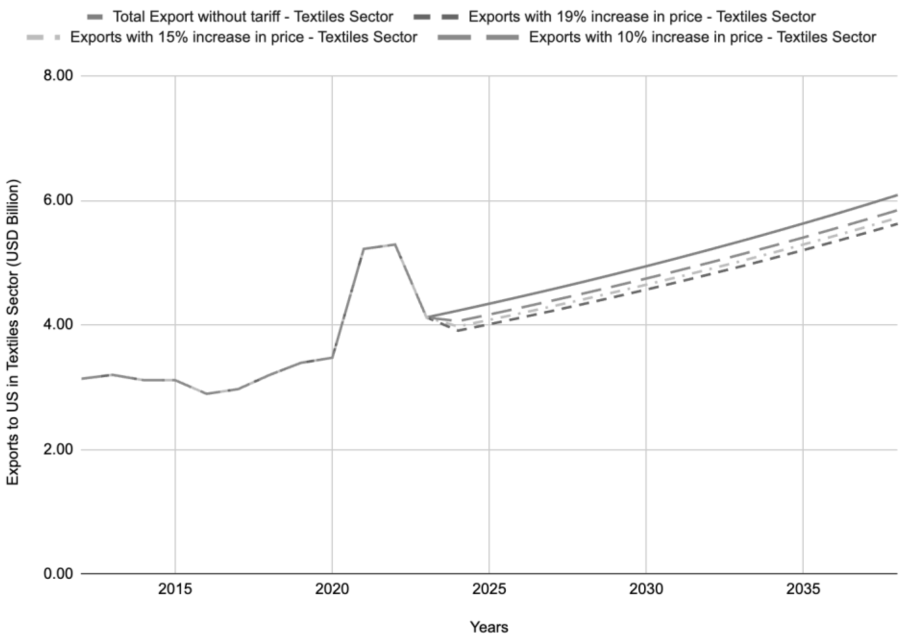
**Figure 3: Potential decrease in Pakistan's exports to the US under various tariff rates in the manufacturing sector**




Source: Authors' calculations.

The textile sector, which represents a significant portion of Pakistan's exports to the US, faces considerable losses. The full 19-percent tariff pass-through would lead to a USD 0.33 billion export reduction in 2025, with an estimated USD 1.74 billion cumulative loss over five years. For effective price increases of 15 percent and 10 percent, the one-year decline in textile exports is expected to be USD 0.26 billion and USD 0.17 billion, respectively, with corresponding five-year cumulative reductions of USD 1.37 billion and USD 0.92 billion (Figure 4).

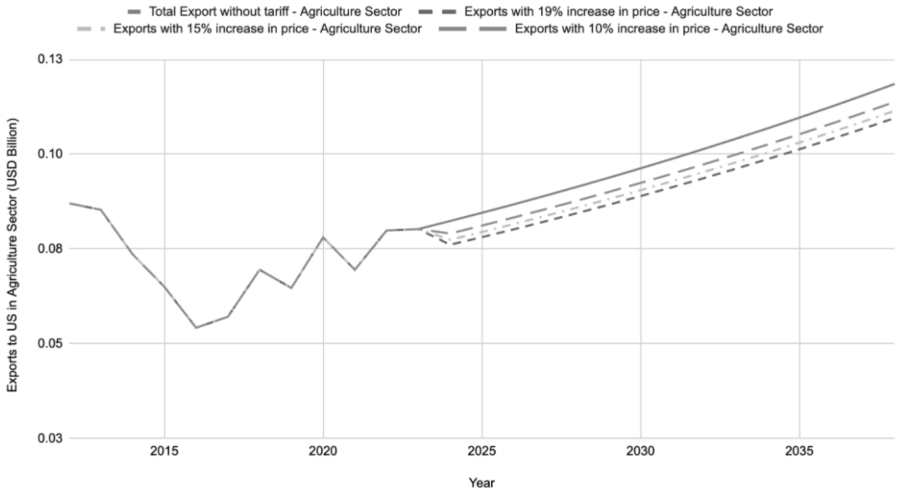
**Figure 4: Potential decrease in Pakistan's exports to the US under various tariff rates in the textile subsector**




Source: Authors' calculations.

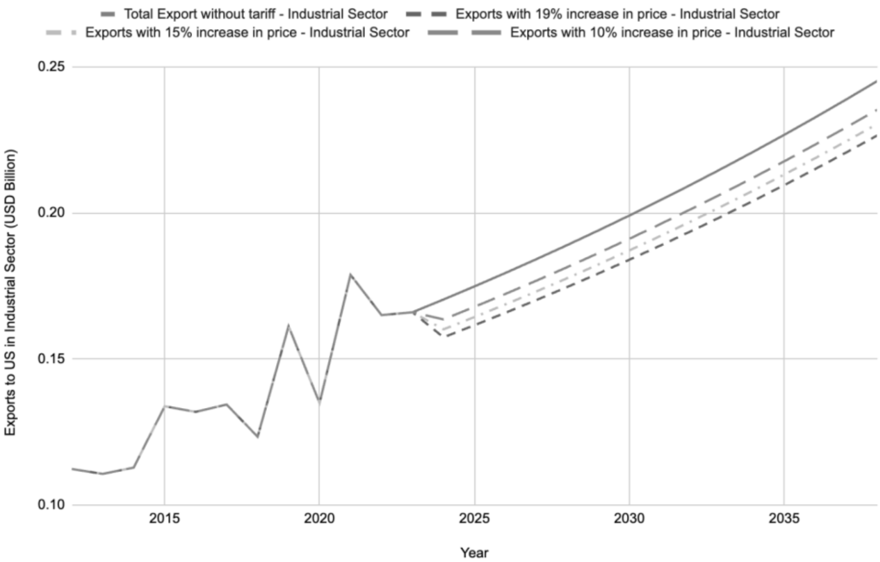
For the agricultural sector, a 19-percent tariff is projected to cause a USD 6.43 million reduction in exports in 2025, and a USD 33.87 million cumulative loss over 2025–2029 (Figure 5). The impact is cushioned under lower effective tariff burdens of 15 percent and 10 percent as the estimated loss of exports in 2025 amounts to USD 5.07 million and USD 3.38 million, respectively. This loss translates to USD 26.7 million and USD 17.82 million over five years. Likewise, for the industrial sector, a 19-percent tariff is projected to cause a USD 13.3 million reduction in exports in 2025, and a USD 70.03 million cumulative loss over 2025–2029 (Figure 6). Under lower effective tariff burdens of 15 percent and 10 percent, the estimated loss of exports in 2025 amounts to USD 10.5 million and USD 7.0 million, respectively. The corresponding figures for the cumulative five-year loss are USD 55.23 million and USD 36.86 million. These findings highlight the potential vulnerability of Pakistan's export sector to external trade policy shocks.

**Figure 5: Potential decrease in Pakistan's exports to the US under various tariff rates in the agricultural sector**




Source: Authors' calculations.

**Figure 6: Potential decrease in Pakistan's exports to the US under various tariff rates in the industrial sector**




Source: Authors' calculations.

Beyond direct price-related effects, we also consider potential macroeconomic risks, such as the onset of a global recession that may accompany escalating trade wars. Based on Pakistan's long-run estimated income elasticity of export demand (Appendix B), a one-percent decline in foreign income growth could reduce Pakistan's exports by USD 52.6 million to USD 87.8 million in 2025. If such a downturn persists, the five-year export loss attributable solely to reduced foreign income could fall to the range of USD 0.28 billion–0.46 billion.

Having stated these risks, it is important to emphasize that Bangladesh, Vietnam, and China, which are Pakistan's key competitors in apparel and textiles, face even higher tariffs. Trade diversion from these areas could shift demand toward Pakistani exporters, partially offsetting losses. Similarly, US buyers may negotiate pricing adjustments where Pakistani exporters absorb part of the tariff burden, thereby softening the impact on volumes exported. However, this would likely come at the cost of reduced margins for producers.

## Mitigation Strategies

While the short-term effects of the tariff shock may appear manageable due to relatively inelastic demand, sustained tariff pressure is projected to significantly erode Pakistan's export earnings, particularly in textiles and manufacturing. The losses could be further exacerbated by external macroeconomic shocks unless proactive and adaptive trade and industrial strategies are implemented. A successful mitigation strategy hinges on a multi-pronged approach. This would involve enhancing export competitiveness by improving productivity, diversification, and value addition; exploring alternative markets and trade agreements; and implementing policy and institutional reforms to facilitate trade.

As trade liberalization episodes may incorporate both export-enhancing and export-reducing developments (Jamil et al., 2024), the cornerstone of effective mitigation is undertaking comprehensive structural reforms such that productivity gains offset tariff disadvantages and protect the country's competitive edge in global markets (Lovo & Varela, 2022). In response to the significant risk potentially posed by the imposition of a 19-percent US tariff on Pakistani exports, particularly in the textile and manufacturing sectors, Pakistan must adopt a strategy comprising immediate and medium- and long-term interventions. These strategies could buffer the economy against immediate revenue losses, reposition key industries to regain competitiveness, and build long-term resilience through structural transformation.

In the immediate term, Pakistan's policymakers must strategize to capture more of the US market share as countries like China, Bangladesh, and Vietnam become less competitive. They can also focus on diplomatic engagement to seek tariff concessions or exemptions. Pakistan can negotiate for lower tariffs by highlighting its adherence to international standards or aligning with US trade interests. Additionally, Pakistan can look inward and work on reducing its own tariff and non-tariff barriers, particularly for US products, to create grounds for reciprocal reductions. These concessions could be instrumental in improving terms of trade and increasing Pakistani exports' competitiveness in the US market.

In the medium term, Pakistan must shift its focus toward increasing value addition and upgrading production processes in export-oriented industries. The priority should be to lower operating costs by relying on renewable energy resources more than fossil fuels. Similarly, the textile sector should transition from low value-added apparel to higher-end fashion, technical textiles, and branded goods. Establishing vertical integration, i.e., combining raw material production with finished goods manufacturing, could help reduce input costs and improve competitiveness. Moreover, Pakistan should invest in building institutional capacity to respond proactively to international trade restrictions. This could be achieved by enhancing market intelligence to anticipate trade-related challenges, improving trade defense infrastructure to counter unfair trade practices, and supporting export diversification at the policy level through targeted incentives and assistance programs. Strengthening relationships with emerging markets could reduce dependence on a few concentrated destinations like the US.

In the long term, the emphasis should be on transforming Pakistan's export base and upgrading industrial productivity. Export diversification is essential in terms of both product variety and market destinations. Pakistan must expand beyond traditional textiles and explore sectors like pharmaceuticals, IT services, light engineering, agro-processing, and electronics assembly. Diversification into non-traditional markets such as Central Asia, Sub-Saharan Africa, and Latin America will also reduce vulnerability to shocks in any one region. Such measures will make Pakistani exports more resilient to future non-tariff barriers, such as environmental regulations like the EU's Carbon Border Adjustment Mechanism.

Ultimately, the impact of US tariffs should serve as an early warning for Pakistan to reform its export sector. Rather than reacting to shocks, the country must embed resilience into its export strategy by pursuing renewable energy adoption, moving up the value chain, and diversifying into new related products.

## Conclusion

The imposition of a 19-percent tariff by the US on imports from Pakistan is an external shock with wide-ranging implications for Pakistan's export-dependent economy. Our methodology reveals that the estimated revenue losses could be as high as USD 0.40 billion in 2025 and USD 2.11 billion over the period of 2025–2029. This could be a concerning development given Pakistan's reliance on the US market, particularly textiles and manufacturing. Sector-specific estimates reveal the acute exposure of textiles to tariff shocks, and even that of smaller sectors like agriculture and industry. While the direct economic consequences are quite severe, the potential compounding effect of a global recession could deepen export contractions further. A one-year loss in export revenues could be as much as USD 87.8 million, and the five-year cumulative loss could be USD 0.46 billion.

However, our analysis also highlights potential offsets through trade diversion, as higher tariffs on competing countries like China, Bangladesh, and Vietnam may shift demand toward Pakistani goods, provided Pakistan remains cost competitive.

Mitigating the economic impact of a possible tariff barrier requires a multi-pronged approach. Pakistan must secure short-term relief through diplomacy and by taking advantage of comparatively lower tariffs. It must enhance value addition and compliance capabilities in the medium term and pursue broad-based export diversification and technological transformation in the long term. Structural reforms in energy efficiency, institutional trade support, and product sophistication are central to this vision. In essence, while US tariffs pose a serious challenge, they also present Pakistan with a critical opportunity to reconfigure its export ecosystem and strengthen long-term resilience in the face of possible future tariff or non-tariff shocks.

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## Appendix A: Subcategories Within the Agricultural, Manufacturing, and Industrial Sectors

| Agriculture | HS 2-digit codes |
|---|---|
| 01 | Animal products |
| 02 | Animal products |
| 03 | Animal products |
| 04 | Animal products |
| 05 | Animal products |
| 06 | Vegetable products |
| 07 | Vegetable products |
| 08 | Vegetable products |
| 09 | Vegetable products |
| 10 | Vegetable products |
| 11 | Vegetable products |
| 12 | Vegetable products |
| 13 | Vegetable products |
| 14 | Vegetable products |
| 15 | Animal or vegetable oils |

| Manufacturing | HS 2-digit codes |
|---|---|
| 16 | Food, beverages, and tobacco |
| 17 | Food, beverages, and tobacco |
| 18 | Food, beverages, and tobacco |
| 19 | Food, beverages, and tobacco |
| 20 | Food, beverages, and tobacco |
| 21 | Food, beverages, and tobacco |
| 22 | Food, beverages, and tobacco |
| 23 | Food, beverages, and tobacco |
| 24 | Food, beverages, and tobacco |
| 28 | Chemical products |
| 29 | Chemical products |
| 30 | Chemical products |
| 31 | Chemical products |
| 32 | Chemical products |
| 33 | Chemical products |
| 34 | Chemical products |

| Manufacturing | HS 2-digit codes |
|---|---|
| 35 | Chemical products |
| 36 | Chemical products |
| 37 | Chemical products |
| 38 | Chemical products |
| 39 | Plastics and rubber |
| 40 | Plastics and rubber |
| 41 | Raw hides and skins |
| 42 | Raw hides and skins |
| 43 | Raw hides and skins |
| 44 | Wood |
| 45 | Wood |
| 46 | Wood |
| 47 | Wood |
| 48 | Wood |
| 49 | Wood |
| 50 | Textiles |
| 51 | Textiles |
| 52 | Textiles |
| 53 | Textiles |
| 54 | Textiles |
| 55 | Textiles |
| 56 | Textiles |
| 57 | Textiles |
| 58 | Textiles |
| 59 | Textiles |
| 60 | Textiles |
| 61 | Textiles |
| 62 | Textiles |
| 63 | Textiles |
| 64 | Textiles |
| 65 | Textiles |
| 66 | Textiles |
| 67 | Textiles |
| 68 | Stones and glass |
| 69 | Stones and glass |

| Manufacturing | HS 2-digit codes |
|---|---|
| 70 | Stones and glass |
| 71 | Pearls and precious metals |
| 72 | Base metal |
| 73 | Base metal |
| 74 | Base metal |
| 75 | Base metal |
| 76 | Base metal |
| 78 | Base metal |
| 79 | Base metal |
| 80 | Base metal |
| 81 | Base metal |
| 82 | Base metal |
| 83 | Base metal |
| 84 | Nuclear |
| 86 | Transport equipment |
| 87 | Transport equipment |
| 88 | Transport equipment |
| 89 | Transport equipment |
| 91 | Clocks and musical instruments |
| 92 | Clocks and musical instruments |
| 93 | Arms |
| 94 | Misc. manufactured |
| 95 | Misc. manufactured |
| 96 | Misc. manufactured |
| 97 | Arts and antiques |
| 98 | Arts and antiques |

| Industry | HS 2-digit codes |
|---|---|
| 85 | Electrical |
| 90 | Optical |
| 25 | Minerals |
| 26 | Minerals |
| 27 | Minerals |

## Appendix B: Export demand function (1994–2020)

Johansen normalization restriction imposed:

| Beta | Coefficient | Std. error | z-stat. | P > \|z\| | 95% confidence interval |
|---|---|---|---|---|---|
| Ln-exports | 1 | | | | |
| Ln-foreign-GDP (weighted by export share) | -1.234263 | 0.1921181 | -6.42 | 0 | -1.610808, -0.8577187 |
| Ln-PPP | 0.3724517 | 0.2622682 | 1.42 | 0.156 | -0.1415844, 0.8864879 |
| Constant | 5.402005 | | | | |

GDP = gross domestic product, PPP = purchasing power parity.

# 5

# Navigating the Potential Impact of the Carbon Border Adjustment Mechanism on Pakistan's Exports: Sectoral Implications and Future Challenges

**Azam Chaudhry[1] and Gul Andaman[2]**

## Abstract

*This study assesses the potential impact of the European Union (EU)'s Carbon Border Adjustment Mechanism (CBAM) on Pakistan's exports. Starting in 2026, CBAM's definitive phase will initially target high-emission sectors, so Pakistan's exports may not be immediately affected. However, the gradual expansion of CBAM's coverage to textiles and agricultural products could significantly decrease demand for Pakistani goods as EU importers seek lower-carbon alternatives. Using historical export growth rates, this study projects Pakistan's exports to the EU from 2024 to 2036 under scenarios with and without CBAM implementation in the agricultural, manufacturing, and industrial sectors. Sectoral emission intensities are estimated using greenhouse gas emissions data from Climate Watch and data from the Asian Development Bank's input-output tables. By incorporating carbon pricing and Pakistan's long-run price elasticity of demand for exports, we estimate that CBAM implementation in 2026 could result in a decline of USD 308 million in exports, reaching USD 479 million by 2036. This corresponds to reductions of 2.26 percent in manufacturing, 10.4 percent in agriculture, and 21.1 percent in industrial exports. Additionally, Pakistan's export share to the EU, currently 29 percent, may decline by 2 percent in 2026. Our analysis suggests that the actual impact could be more severe if demand elasticity increases, carbon pricing rises, or if more countries implement similar mechanisms. To mitigate these risks, policymakers must establish a domestic carbon pricing system and transition toward environmentally sustainable production practices.*

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## Introduction

### *What is the Carbon Border Adjustment Mechanism?*

The Carbon Border Adjustment Mechanism (CBAM) is an environmental policy tool designed to impose carbon costs on imported goods equivalent to those faced by industries operating within the European Union (EU). The EU's carbon pricing mechanism, the European Union Emissions Trading System (EU ETS), is a market-based mechanism that sets a price on carbon dioxide ($CO_2$) to incentivize emission reductions in energy-intensive industries within the EU. It is the world's largest carbon trading system, influencing global climate policies (Appunn & Wettengel, 2024). There is, however, a risk of carbon leakage associated with the EU ETS, which indicates that companies within the EU may relocate production to other countries with weaker climate policies to avoid carbon costs, potentially leading to zero net emission reduction globally. CBAM's role is to address this risk by introducing a level playing field within the EU. It ensures that imported goods bear a carbon cost equivalent to that of domestically produced goods by verifying that a price has been paid for embedded carbon emissions. This helps maintain the integrity of the EU's climate goals as it creates an incentive for EU importers to purchase products from countries where carbon pricing mechanisms are in place or where the greenhouse gas (GHG) emissions per unit exported to the EU are minimized due to stringent environmental policies. Furthermore, CBAM encourages cleaner industrial production in non-EU countries as a fair carbon price is charged on emissions generated during the production of carbon-intensive goods imported into the EU (European Commission, 2025).

CBAM's transition phase began on October 1, 2023, and will last until December 31, 2025, during which it will be applied solely for data collection purposes without a financial obligation on importers (European Commission, 2024). Targeted sectors include cement, iron and steel, aluminum, fertilizer, electricity, and hydrogen, all of which are at high risk of carbon leakage. The policy's definitive phase will commence in 2026, when EU importers will be required to pay a carbon tax to the relevant authorities before importing certain products. CBAM will be phased in gradually across other sectors, allowing a careful, predictable, and proportionate transition for public authorities and EU and non-EU businesses.

***How CBAM Works***

The EU has eight-digit Combined Nomenclature (CN) product codes based on Harmonized System (HS) codes. EU importers must report embedded emissions in their imports to the relevant authorities using appropriate CN codes. This involves the following steps:

1. Based on CN codes, EU importers reaffirm that the products they are importing are covered by CBAM.

2. Importers identify all parameters and request them from exporters. These include direct GHG emissions from production in exporting countries and indirect emissions from electricity consumption per product multiplied by suitable emissions factors. Emissions factor options include the following:

    a. Default factors from the European Commission (International Energy Agency data).

    b. Other publicly available national grid factors.

    c. For self-produced electricity, emissions must be monitored at the power unit level.

    d. If electricity is sourced via a power purchase agreement, actual emission factors may be used if the supplying installation follows the same monitoring rules. Embedded emissions from precursors are included in CBAM goods data. If the precursor is produced within the same installation, embedded emissions are included. However, if the precursor is purchased externally, supplier data is requested, including installation details, direct/indirect emissions, production routes, reporting periods, and applicable carbon prices. Additional qualifying parameters need to be reported under CBAM as well, although they vary by product, e.g., clinker content is required for cement and nitrogen composition is required for fertilizer.

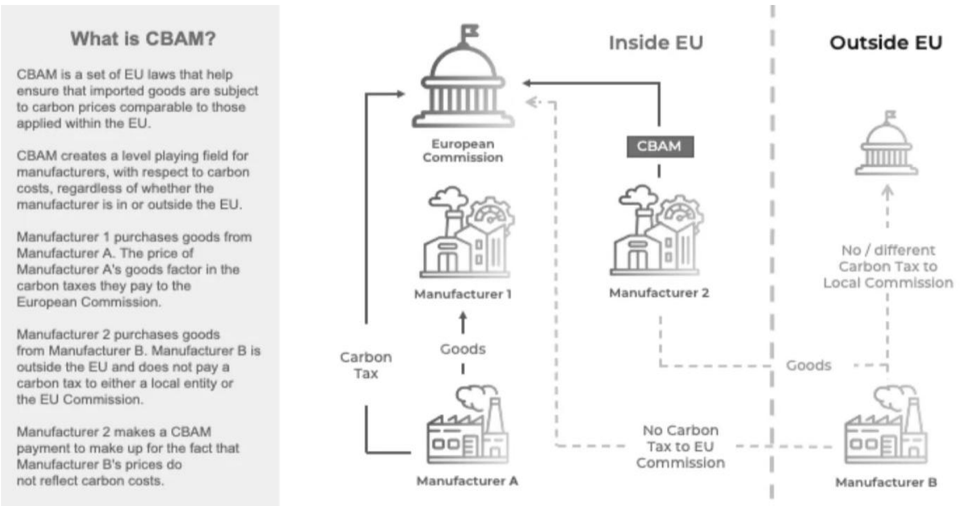
3. If a carbon price is paid in the jurisdiction where the CBAM good or precursor is produced, it reduces CBAM obligations from 2026 onwards. However, this information must still be reported during the transition period. The carbon price is assumed to be zero if no data is provided.

4. The EU importer ensures that the exporter/operator understands the reporting period, i.e., the European calendar year. Alternative periods are allowed if they cover at least three months, particularly if they align with local carbon pricing schemes, mandatory emissions monitoring schemes, and fiscal years with external audits for credibility.

5. Embedded emissions data from operators is communicated to EU importers, who then report to the relevant authorities. Operators compile monitored data for the entire reporting period, determine the attributed emissions of each production process, and divide them by the corresponding 'activity level' (total goods in a CBAM category produced during the reporting period) to obtain specific embedded emissions.[3]

Figure 1 illustrates the CBAM process. Implementation will be gradual—the proportion of embedded emissions covered will increase over time. Full coverage will not be achieved until 2034.

**Figure 1: What is CBAM?**



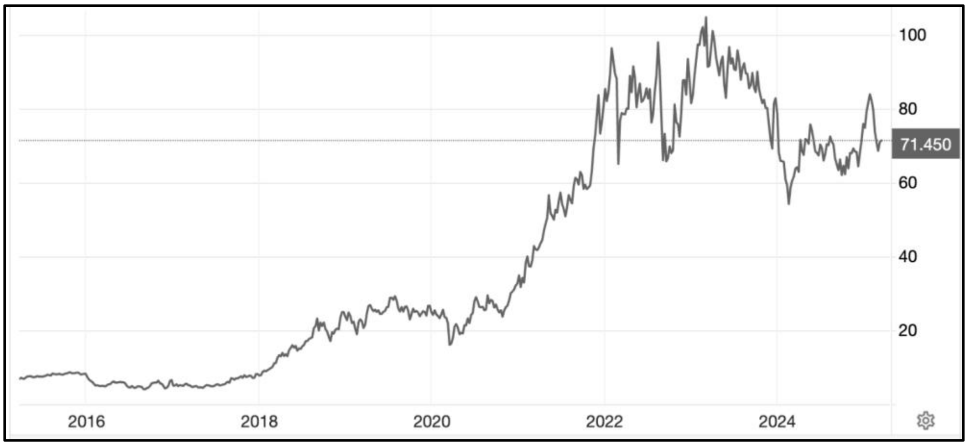

Source: Mavarick AI. (2025, December 18). *A comprehensive guide to the EU CBAM reporting.* https://mavarick.ai/blogs/eu-cbam-reporting-regulation-guide/.

As CBAM enters its definitive phase, importers will be required to fulfill a CBAM obligation by purchasing certificates for each CBAM good imported into the

[3] The European Commission is simplifying and updating CBAM packages. The latest developments are available at https://taxation-customs.ec.europa.eu/index_en.

EU, which will be expressed in EUR/tonne of carbon dioxide equivalent ($CO_2$eq) emitted. CBAM certificate prices will be based on the weekly average auction price of EU ETS allowances, expressed in EUR/tonne of $CO_2$eq emitted. The charge per tonne of GHGs emitted could vary from EUR 60 to EUR 100 (Figure 2).

**Figure 2: Historical trend of the price of EU carbon permits (EUR)**




Source: Trading Economics. (n.d.). *EU carbon permits.* https://tradingeconomics.com/commodity/carbon.

While CBAM aims to reduce carbon emissions in EU and non-EU countries alike, certain risks are associated with the policy's procedures and consequences. First, the accurate measurement and reporting of carbon emissions in imported products are challenging. Second, fairness is a key concern. International climate agreements like the Paris Agreement acknowledge that wealthy, industrialized nations bear the greatest responsibility for tackling climate change due to their historical contributions and greater financial resources. However, CBAM applies an equal burden to exporters from low-income countries and those from wealthier nations, possibly further widening the world's wealth gap (Wolfram & Krol, 2023).

***CBAM's Potential Impact on Pakistan's Export Sector***

CBAM's potential impact on various developing economies has been explored in recent literature. However, empirical studies highlighting the impact on Pakistan are missing. We fill this gap by estimating the effect of CBAM implementation on Pakistan's exports to the EU. While Pakistani exports may not be affected immediately, the gradual expansion of CBAM coverage to sectors like textiles and agricultural products in the next nine years could shift demand away from

Pakistani exports. EU importers may prefer suppliers from countries with lower carbon costs to minimize tax burden while also aligning with the EU's decarbonization goals. This could well affect Pakistan's export competitiveness. The EU is a major trading partner, so any loss in competitiveness could hinder the country's overall export growth. To address this challenge, it is essential to quantify and estimate the potential decline in Pakistan's exports to the EU resulting from CBAM so that policymakers can devise timely and appropriate mitigation strategies.

Using Pakistan's historical export growth rates (1996–2023), we project export trends from 2024 to 2036 under two scenarios: with and without CBAM. We calculate sectoral emission intensity (tonnes per dollar of production) for agriculture, manufacturing, and industry using GHG emissions data from Climate Watch and data from the Asian Development Bank (ADB)'s input-output tables. We then estimate embedded emissions in exports to the EU by multiplying emission intensity by projected bilateral export volumes.

The costs of exports rise as EU importers must purchase CBAM certificates based on carbon pricing before importing goods in the definitive phase. For example, if the carbon price is set at USD 100 per tonne in the absence of any domestic carbon tax, the cost of exports from Pakistan would rise in proportion to the emissions embedded in these exports. Applying the long-term price elasticity of demand for Pakistan's exports derived from the country's export demand function, we estimate that CBAM implementation in 2026 will lead to a decline in exports in the range of USD 308 million in 2026 to USD 479 million in 2036. This corresponds to a reduction of 2.26 percent in manufacturing exports, 10.4 percent in agricultural exports, and 21.1 percent in industrial exports. In 2023, Pakistan's export share to the EU stood at 29 percent, which could decrease by 2 percent in 2026. These estimates represent a simple baseline scenario with basic parameters. The actual impact is potentially more severe if indirect GHG emissions are incorporated in goods exported to the EU, if Pakistan's export demand elasticity increases, or if carbon pricing rises. Additionally, the adverse effects on Pakistan's exports could be exacerbated as more countries adopt similar carbon pricing policies.

***Organization of the Paper***

The next section is a review of the relevant literature. We then describe the methodology employed to estimate the potential decline in Pakistan's exports to the EU after CBAM implementation. This is followed by sections on results, limitations, and future research. The last section presents policy implications.

## Literature Review

The EU's imposition of CBAM could potentially reshape the export landscape for developing economies. It is designed to internalize the cost of carbon emissions associated with the production of imported goods, aiming to level the playing field between domestic industries subject to stringent carbon regulations and foreign producers operating in regions with more relaxed environmental standards (Chepeliev, 2021; United Nations Economic and Social Commission for Asia and the Pacific [UNESCAP], United Nations Environment Programme [UNEP], & United Nations Conference on Trade and Development [UNCTAD], 2021; Berahab, 2022).

However, CBAM implementation raises concerns about the potential impact on the overall economic development of developing nations (Brandi, 2013; Magacho et al., 2023). Empirical studies using modeling techniques to quantify CBAM impacts on developing countries' exports can provide valuable insights into potential trade diversion effects, competitiveness losses, and economic consequences (Zhu et al., 2024).

The EU CBAM could inadvertently curtail exports from the EU's trading partners (Perdana & Vielle, 2022). It could significantly impact the exports of least developed countries to the EU, especially for countries like Mozambique (aluminum) and Uzbekistan, Egypt, Ukraine, Zimbabwe, and India (various products), potentially impacting their entire economies (Brandi, 2013). Increased production costs, both domestically and in the EU, could alter export firms' competitiveness (Acar et al., 2022). Countries with a high share of CBAM-applicable exports to the EU and high carbon intensity, such as Ukraine, Iran, Bahrain, and Belarus, may be significantly affected (Overland & Sabyrbekov, 2022). Moreover, evidence suggests that the Eastern European economies, especially in the Balkans, and several African nations, such as Mozambique, Zimbabwe, and Cameroon, face disproportionate exposure (Magacho et al., 2023).

Furthermore, many developing countries may face challenges with sector-specific emissions reporting, which may position CBAM as a pathway that limits the developing world's trade options rather than acting as an incentive to decarbonize (Eicke et al., 2021). A UN report suggests that CBAM could negatively affect real gross domestic product in South and Southwest Asia (UNESCAP et al., 2021). CBAM implementation could lead to a loss of jobs and tax revenues in developing countries if the specific characteristics of the EU's trading partners are not accounted for (Magacho et al., 2023). This is further substantiated by the fact that many middle- and low-income countries, particularly in North and Sub-Saharan Africa, exhibit limited diversification in their export portfolios and rely on exports to the EU (Beaufils et al., 2023). In addition, Chu et al. (2024) highlighted the potential for certain developing countries to experience significant welfare losses due to reduced exports and competitiveness.

Despite these adverse effects, CBAM also offers potential benefits. Even though exemptions or delayed implementation for developing countries could reduce administrative effort and allow more time to adjust to lower emission standards, they may limit the impact of CBAM's climate goals (Brandi, 2013) and cause significant increases in carbon leakage. CBAM could incentivize developing countries to reduce GHG emissions and provide fair competitive conditions to local firms developing low-carbon products (Berahab, 2022). Similarly, revenue generated from CBAM could be used to support green technology transfer and investments in developing countries, decrease carbon leakage, and lower welfare costs (Perdana & Vielle, 2022).

In addition, a study employing a multi-country, multi-sector general equilibrium model finds that CBAM implementation led to a marginal increase in the EU's gross national expenditure, accompanied by a shift in trade toward cleaner domestic production (Walczak et al., 2025). Adverse CBAM impacts could be mitigated if developing countries were to receive technical assistance and technology transfers to achieve climate objectives (UNESCAP et al., 2021).

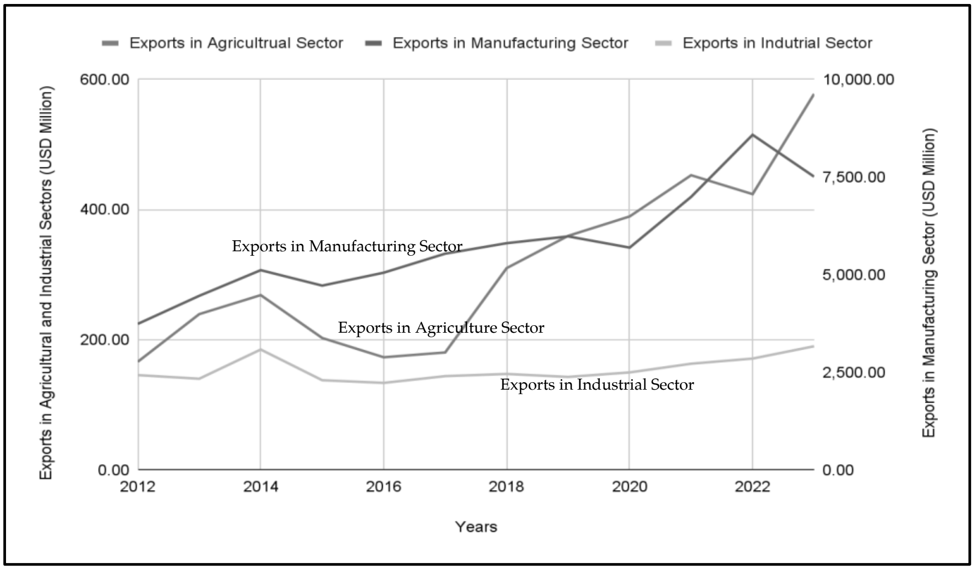
The structure of developing countries' economies, often characterized by limited diversification and heavy reliance on a few specific export commodities, exacerbates their vulnerability to the external shocks resulting from CBAM implementation. The magnitude of the impact will depend on factors like the carbon intensity of production processes in developing countries, the availability of cleaner technologies, and the capacity to adapt to new trade regulations (Magacho et al., 2023). Therefore, it is crucial to assess CBAM's potential implications on developing countries' exports by considering the carbon intensity of their industries, their economic development, and their trade relationships with developed nations that are implementing CBAM (Perdana & Vielle, 2022).

We build on the existing literature by focusing particularly on Pakistan, a country with a low share of exports to the EU but high carbon intensity (Overland & Sabyrbekov, 2022). Sectors important to Pakistan's economy, e.g., textiles and agriculture, could be affected depending on their carbon intensity and export volumes to the EU. Pakistan faces significant challenges in addressing the potential impacts of CBAM. Faruqui and Piracha (2023) express concerns about export barriers and the need for Pakistan's government and businesses to adapt to the evolving trade and environmental nexus. Pakistan was the world's seventh-largest textile exporter in 2021, with cotton-based textiles accounting for a significant portion of total exports (Jamil et al., 2024). This underscores the need to assess CBAM's potential implications for Pakistan's exports to the EU.

## Methodology

Pakistan's exports to the EU increased from USD 2.6 billion in 2003 to USD 8.28 billion in 2023 (United Nations Statistics Division, 2025). For deeper insights, we analyze and explore bilateral export volumes within the agricultural, manufacturing, and industrial sectors. The Climate Watch GHG emissions dataset, also known as the Climate Analysis Indicators Tool dataset, is accompanied by an explanatory document that defines the agricultural sector and distinguishes between subsectors within the manufacturing and industrial sectors (World Resources Institute, 2022). Using these definitions, we explore Pakistani exports to the EU in these three broad economic sectors from 2012 to 2023 (Figure 3). Manufacturing holds the most significant share of exports, within which textiles dominate—bed linens, garments, yarn, and woven fabrics. Other significant export items include rice and cereals in the agricultural sector; non-alcoholic beverages, water, ethyl alcohol, raw hides, and skins in the manufacturing sector; and optical elements and base metal items like razors, knives, and blades in the industrial sector.

**Figure 3: Pakistani exports to the EU in three broad economic sectors (2012 –2023)**




Source: United Nations Comtrade Dataset.

As explained earlier, initial CBAM coverage may not immediately affect Pakistan. Later, however, CBAM implementation will have major implications for Pakistan's export growth as its exports become more expensive for EU importers. Therefore, it is important to estimate the potential decline of Pakistani exports to the EU using the steps below.

**Step 1:** The first step is to estimate emission intensity expressed in tonnes per US dollar of production in Pakistan. In Equation 1, *e* is the emission intensity in sector *i* over time period *t*. Data on GHG emissions in various sectors is taken from the Climate Watch GHG emissions dataset (Ritchie et al., 2020). The source shows GHG emissions in tonnes of $CO_2$eq, which includes emissions from $CO_2$, methane ($CH_4$), and nitrous oxide ($N_2O$) in 11 sectors from 1990 to 2021. The ADB's input-output tables show data for Pakistan's output in USD million from 2000 to 2022.

$$e_{it} = \frac{GHG\ emissions\ (tonnes)_{it}}{Output_{it}\ (USD)} \quad (1)$$

We use Equation 1 for the same sectors (agriculture, manufacturing, and industry) shown in Figure 3. The definitions and scope of the sectors match those of the GHG emissions dataset explanatory note (methodology section). Appendix A lists the sectors in the GHG emissions dataset, the ADB's input-output tables, and the sectors considered in this analysis. Our analysis is limited to emission intensity data for the period 2012–2021. Therefore, in Equation 1, $i$ = 3 and $t$ = 10 (2012–2021).

**Step 2:** After calculating emission intensity from 2012 to 2021 for the three sectors, we gather data on the exports within each sector. Using United Nations Comtrade data on Pakistan's exports to the EU from 2012 to 2023, we disaggregate the data at the HS 6-digit level, aggregate it at the HS 2-digit level, and sum it into three broad categories aligned with the emission intensity estimates. At the HS 2-digit level, the agricultural sector contains 15 subcategories, the manufacturing sector contains 77 subcategories, and the industrial sector contains 5 subcategories (Appendix B).

**Step 3:** Here, we estimate exports to the EU in the future. CBAM implementation begins in 2026, so we estimate the projected increase in exports to the EU over the 12-year period of 2024–2036. Pakistan's long-term annual export growth rate from 1996 to 2023 was 4.5 percent. Using the same growth rate for each sector, we estimate the potential increase in exports to the EU for the calendar years 2024–2036 and label the series as export growth without CBAM implementation.

**Step 4:** We estimate GHG emissions embedded in exports to the EU from 2024 to 2036 by multiplying emission intensity by the export growth series without CBAM implementation. Since emission intensity could only be calculated until 2021, we used the 2021 values to estimate embedded emissions for subsequent years (Equations 2 and 3).

$$Embedded\ emissions_{ijt} = e_{2021i} * exports_{ijt} \tag{2}$$

$$Embedded\ emissions_{it} = \sum_{j=1}^{n}(e_{2021i} * exports_{ijt}) \tag{3}$$

Here, $i$ = sector, $t$ = 13 years (2024–2036), and $j$ = number of subcategories under the $i^{th}$ sector. We sum the embedded emissions for all subcategories in the three sectors. Therefore, n = 15 for the agricultural sector, 77 for the manufacturing sector, and 5 for the industrial sector.

**Step 5:** Next, we multiply the embedded emission values by a hypothesized carbon pricing, which provides an estimate of CBAM certificates that EU importers will have to surrender to the EU authorities before Pakistan's goods can be imported. In general, the number of certificates to be purchased depends on: (a) whether there is any carbon tax in the non-EU country; (b) the weekly average auction price of EU

ETS allowances expressed in EUR/tonne of $CO_2$eq emitted; (c) the emissions embedded in the quantity of items imported by the EU trader. Given the historical trend in Figure 2, the price of EU carbon permits could vary between USD 75 and USD 110 per tonne of GHG emissions or $CO_2$eq. The new import cost for EU importers is shown in Equation 4. The addition of the second and third terms on the right side of the equation is an estimate of CBAM certificates to be purchased.

$$M_{ijt}{}^{CBAM} = (M_{ijt}{}^{WITHOUTCBAM} + Carbon\ price * embedded\ emissions_{ijt_0} - Carbon\ price\ paid\ to\ local\ authorities_{ijt}) \tag{4}$$

$$M_{it}{}^{CBAM} = \sum_{j=1}^{n}(M_{ijt}{}^{WITHOUTCBAM} + Carbon\ price * embedded\ emissions_{ijt} - Carbon\ price\ paid\ to\ local\ authorities_{ijt}) \tag{5}$$

Here, $M_{ijt}{}^{CBAM}$ = import costs with CBAM and $M_{ijt}{}^{WITHOUTCBAM}$ = import costs without CBAM (step 3); $i$ = sector, $t$ = 13 years (2024–2036), and $j$ = number of subcategories under the $i^{th}$ sector; n = 15 for the agricultural sector, 77 for the manufacturing sector, and 5 for the industrial sector.

If we set the carbon pricing at USD 100, in the absence of a carbon pricing mechanism in Pakistan, the new import cost will be:

$$M_{it}{}^{CBAM} = \sum_{j=1}^{n}(M_{ijt}{}^{WITHOUTCBAM} + 100 * embedded\ emissions_{ijt}) \tag{6}$$

**Step 6:** Finally, we estimate a series of export growth to the EU with CBAM implementation for the same period for the three sectors to estimate the potential decline in exports if CBAM is applied in 2026 and onwards. In other words, we estimate the decline in export revenues due to higher effective prices of exports from Pakistan. For this, we employ the price elasticity of demand (ε) of Pakistan's export demand function, which considers the dataset for 1994–2020 (Appendix C). If ε = 0.3, a 1-percent increase in export price (or a 1-percent increase in import cost for the EU importer) is estimated to reduce export revenues by 0.3 percent. We calculate the percentage increase in import costs for every sector (or percentage increase in export prices in our model) from Pakistan due to CBAM implementation in 2026 and onward, and then use ε to generate the percentage decline in export revenues from those projected in step 3 for the calendar years 2026–2036.

***Sensitivity Analysis***

We used the following parameters to keep our simple baseline scenario constant over the period being considered:

a. The long-term annual growth rate of Pakistan's exports

b. Emission intensity (tonnes/US dollar of production) in 2022 and onward

c. Carbon price (US dollars/tonne of embedded emissions in imports)

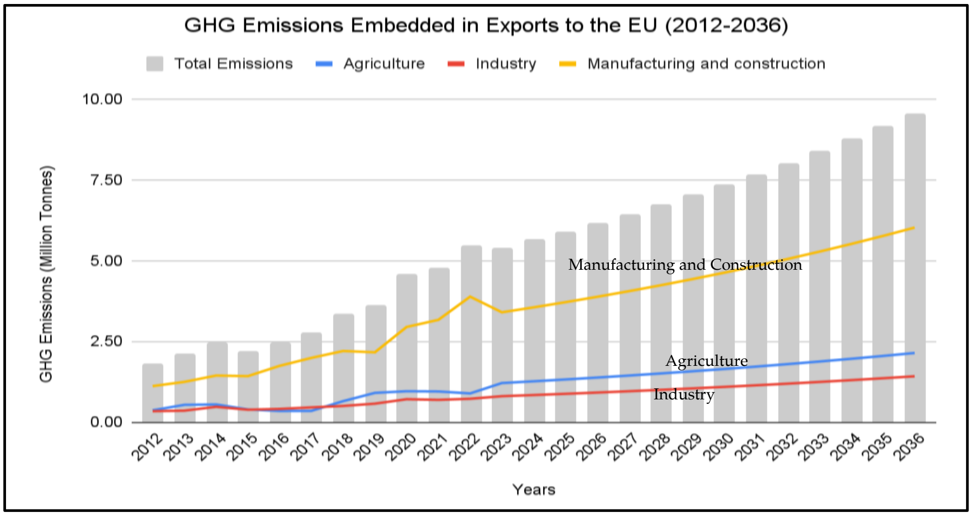
Keeping these factors constant, we vary the value of $\varepsilon$, which was originally derived from Pakistan's export demand function. This is because Pakistan's exports could become more elastic as EU importers shift demand toward low-carbon-intensive alternatives. Hence, we deviate from our baseline scenario by changing $\varepsilon$ and analyzing the outcome.

## Results

### *Emission Intensity*

Emission intensity (tonnes/US dollar of output) increased steadily during the period 2012–2021. It was calculated to be in the range of 0.002–0.004 for the agricultural and industrial sectors, and 0.0003–0.0005 for the manufacturing sector. The trends of GHG emissions embedded in the exports of the three sectors are shown in Figure 4. Emissions from 2012 to 2021 are based on actual data from the sources mentioned in the methodology section. Following 2022, we employ 2021 emission intensity values and estimate the GHG emissions embedded in exports to the EU from 2022 to 2036. The export values from 2024 to 2036 are projections based on the long-term annual growth rate of exports (1996–2023), equivalent to 4.5 percent. With the assumed parameters in the baseline scenario, the aggregate GHG emissions increase from 5.48 million tonnes in 2022 to 9.57 million tonnes in 2036. The highest value is observed in the manufacturing sector, where emissions increase from 3.88 million tonnes to 6.02 million tonnes over the same period. This is followed by the agricultural sector, where the estimated increase is from 0.88 million tonnes to 2.14 million tonnes. The corresponding increase for the industrial sector is from 0.72 million tonnes to 1.42 million tonnes.

**Figure 4: GHG emissions embedded in exports to the EU (2012–2036)**




Source: Authors' calculations.

### *CBAM's Potential Impact on Pakistan's Exports to the EU*

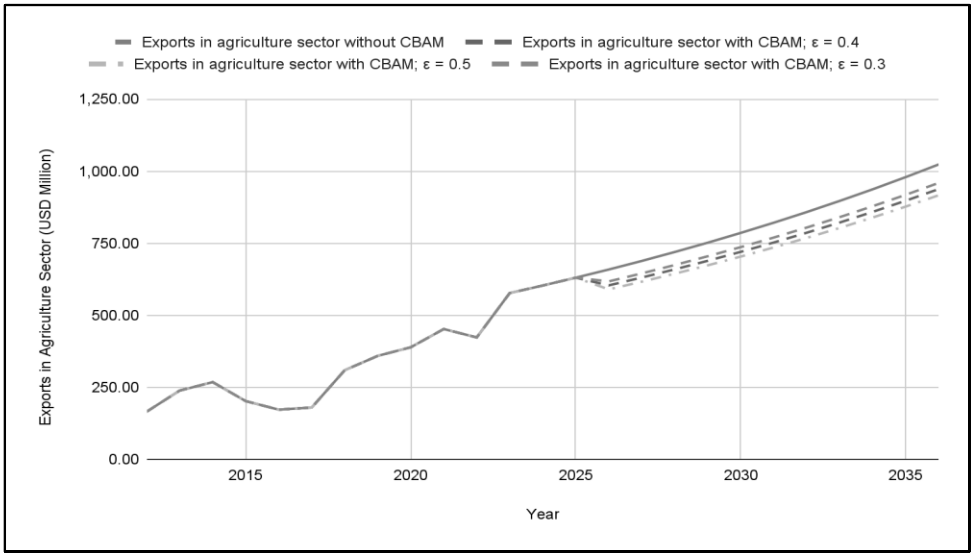
Using the annual growth rate of exports of 4.5 percent, we estimate the projected increase in exports to the EU from 2024 to 2036 in the absence of CBAM implementation. Then, as illustrated in the methodology section, we estimate the potential decline in exports using additional parameters like ε, equivalent to -0.3, and a carbon price of USD 100/tonne of GHG emissions. We apply these additional parameters from 2026, as that is when CBAM enters its definitive phase. The potential increase in the cost of Pakistan's exports to EU importers for each sector is shown in Appendix D (they also reflect the number of CBAM certificates that EU importers would have to surrender). The costs shown are added to projected exports in the non-CBAM scenario to estimate the new costs of imports for the EU. The percentage increase in import costs is calculated from the EU importer's perspective (equivalent to the percentage increase in export prices from the Pakistani exporter's perspective), and the corresponding percentage decline in export revenues (relative to the values estimated in step 3) is then generated for the three economic sectors using ε = -0.3.

Observing the aggregated values, our analysis shows that in the absence of CBAM, the projected increase in exports is from USD 9.45 billion in 2026 to USD 14.67 billion in 2036. If CBAM is applied in 2026, the estimated increase in exports could range from USD 9.14 billion in 2026 to USD 14.19 billion in 2036. This indicates that the share of exports to the EU could fall by almost two percent in 2026. Figures 5–7 show the estimated potential decrease in Pakistan's export revenues from 2026 to 2036 in each sector, incorporating the sensitivity analysis.

***CBAM's Potential Impact on Pakistan's Exports to the EU in the Agricultural Sector***

In the absence of CBAM implementation, agricultural exports are estimated to increase from USD 659.26 million in 2026 to USD 1.02 billion in 2036. If CBAM is applied in 2026, the estimated increase is from USD 617.96 million in 2026 to USD 959.67 million in 2036. This equals a decline of 6.26 percent annually. If we alter ε to -0.4 and -0.5, the fall in agricultural exports rises to 8.35 percent and 10.44 percent, respectively. The aggregate loss of exports over the ten-year period is estimated to be USD 571 million if ε = 0.3, USD 762 million if ε = 0.4, and USD 952 million if ε = 0.5 (Figure 5).

**Figure 5: Potential decline in agricultural exports to the EU**

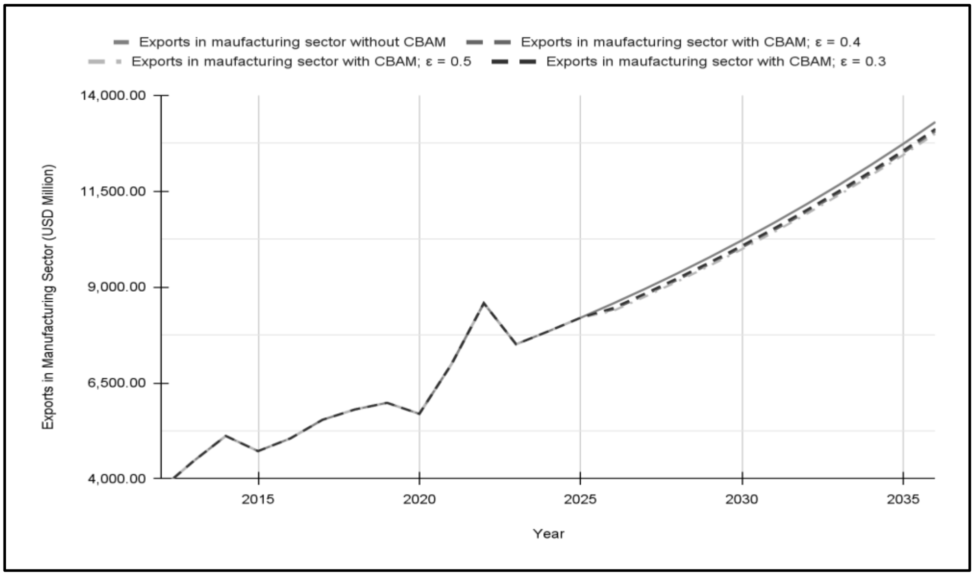



Source: Authors' calculations.

***CBAM's Potential Impact on Pakistan's Exports to the EU in the Manufacturing Sector***

In the absence of CBAM implementation, the projected increase in manufacturing exports is from USD 8.57 billion in 2026 to USD 13.31 billion in 2036. In the case of CBAM implementation in 2026, the estimated increase in exports is from USD 8.45 billion in 2026 to USD 13.13 billion in 2036. This corresponds to a decline of 1.36 percent annually, assuming ε = 0.3. The sensitivity analysis related to the value of ε shows that the decline could amount to 1.81 percent if ε = 0.4 and 2.26 percent if ε = 0.5. The aggregate decline in manufacturing sector exports to the EU over the ten-year period is estimated to be USD 1.61 billion if ε is 0.3, USD 2.14 billion if ε is 0.4, and USD 2.68 billion if ε is 0.5 (Figure 6).

**Figure 6: Potential decline in manufacturing exports to the EU**

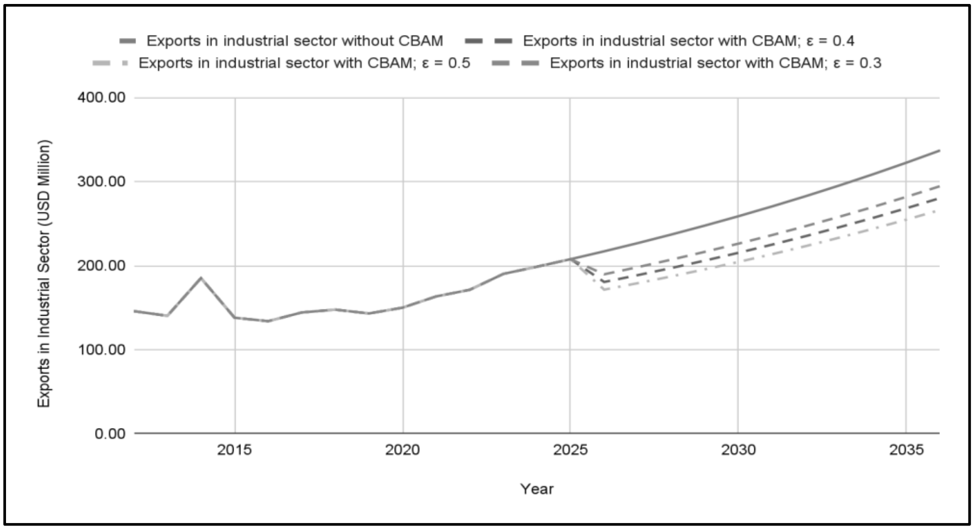



Source: Authors' calculations.

***CBAM's Potential Impact on Pakistan's Exports to the EU in the Industrial Sector***

In the absence of CBAM implementation, the projected increase in industrial exports is from USD 217 million in 2026 to USD 337 million in 2036. However, if CBAM is implemented in 2026, the estimated increase in exports is from USD 189.68 million in 2026 to USD 294.56 million in 2036. This corresponds to a fall of 12.6 percent annually, assuming ε = 0.3. If ε is increased to 0.4, the fall in exports could be as much as 16.81 percent, whereas if ε = 0.5, the value is estimated to be 21.01 percent. The aggregate fall in industrial sector exports to the EU over the ten-year period is estimated to be USD 378.61 million (ε = 0.3), USD 504.82 million (ε = 0.4), and USD 631.02 million (ε = 0.5) (Figure 7).

**Figure 7: Potential decline in industrial exports to the EU**




Source: Authors' calculations.

These estimates represent a baseline scenario with assumed parameters that may be different in reality. The numbers may not seem too drastic, but it is important to understand that the actual impact could be more severe. For instance, if Pakistan's export demand elasticity increases (which is likely in the future), if all the parameters used to calculate embedded emissions in imports are considered (they were not considered due to a lack of data), or if carbon pricing in the EU rises, the outcome could change significantly, not just undermining Pakistan's export goals but also altering trade dynamics with crucial export partners. In addition, adverse effects on Pakistan's exports could be exacerbated as more countries adopt similar carbon pricing policies. With these challenges in mind, policymakers should devise appropriate strategies to mitigate the risks posed by CBAM.

## Limitations

Our analysis provides a general direction on how Pakistan's exports to the EU are likely to be affected when CBAM enters its definitive phase and is applied to Pakistan in 2026. However, there are several limitations to consider. First, we assume a fixed carbon price per tonne of GHG emissions, which is essentially an arbitrary figure. In reality, CBAM certificate prices will be continuously updated, leading to dynamic changes in export/import patterns.

Second, in our baseline scenario, the only source of variation in GHG emissions from 2022 to 2036 is the change in exports. Our model assumes that emission intensity remains constant over this period, which is unlikely. This assumption also impacts the calculation of embedded emissions, which would differ if the values of *e* in Equation 1 varied from 2022 to 2036.

Third, due to data unavailability, our measurement of embedded emissions in estimated EU imports from Pakistan is not fully accurate as it does not account for all parameters (as explained in the literature review). If data becomes available, or if Pakistan's production practices become more or less environmentally sustainable, both emission intensity and embedded emissions will change, directly affecting export revenues over time.

Fourth, we assume the price elasticity of demand for Pakistan's exports to be -0.3, -0.4, or -0.5. Although we conduct a basic sensitivity analysis for these values, EU importers may move toward less carbon-intensive suppliers outside Pakistan for products like rice, textiles, and optical instruments. This could make demand highly elastic, possibly exceeding -0.5, which would further exacerbate the negative impact on Pakistan's exports.

Fifth, we assume a uniform export growth rate across all sectors, whereas, in reality, agricultural exports may grow at a pace different from manufacturing exports, and growth rates may vary over time.

Sixth, we have not incorporated general equilibrium models or GTAP-E, an energy-environmental version of the Global Trade Analysis Project (GTAP) model that includes emissions trading.

Given these limitations, future research could refine the model by allowing key parameters to change over time. We could also integrate other approaches to estimate CBAM's impact on exports and compare the results with our baseline scenario for deeper insights.

## Conclusions and Policy Implications

This study highlights the significant impact CBAM could have on Pakistan's exports to the EU in the manufacturing, agricultural, and industrial sectors. CBAM may not have an immediate impact on Pakistan's exports, as the current list of covered products does not include many of Pakistan's key exports to the EU. However, CBAM's scope will gradually expand over the next few years to include a wider range of imported goods. Its implementation poses substantial challenges for developing economies like Pakistan, where exporters may struggle with rising costs, trade barriers, and shifting demand patterns. Our estimate of a baseline scenario with simple parameters indicates that if CBAM is implemented in Pakistan in 2026, exports to the EU could decline by USD 308 million in 2026, reaching USD 479 million by 2036, with the manufacturing, agricultural, and industrial sectors experiencing reductions of as much as 2.26 percent, 10.4 percent, and 21.1 percent, respectively. The actual impact could be more severe if the parameters change or if more countries adopt similar mechanisms for their imports. To mitigate these potential risks, policymakers must take urgent action to align Pakistan's trade policies with global decarbonization efforts.

A crucial policy implication is that Pakistan must transition toward low-carbon production processes. Since CBAM taxes imports based on GHG emissions per unit, reducing emission intensity is essential. The government should provide incentives to firms to adopt renewable energy sources over fossil fuels and encourage resource-efficient production techniques to minimize waste and emissions. In this regard, policymakers may subsidize energy-efficient technologies in manufacturing, particularly in textile production. A sustainable textile roadmap with incentives for eco-friendly dyeing, energy-efficient machinery, and renewable power use could be developed. In the agricultural sector, policymakers could promote climate-smart farming and lower-emission fertilizers. For industrial exports, they could facilitate low-carbon industrial parks with cleaner production standards and relevant incentives.

In the long run, Pakistan's transition to low-carbon production will require significant investment. Financial resources will have to be mobilized so that appropriate funds can be established. For instance, a National Green Investment Fund to finance renewable energy projects and low-carbon manufacturing could be developed. Revenues raised from domestic carbon pricing mechanisms could be reinvested in this fund for the initiation of clean energy projects, energy efficiency improvements, and emission reduction technologies. Policymakers could also seek technical and financial support from global climate funds to help Pakistani businesses adapt to CBAM. A challenging but rewarding policy action could be setting up green certification programs for exporters to demonstrate compliance with EU sustainability standards.

Another policy suggestion is the introduction of a domestic carbon pricing system in Pakistan. If Pakistan imposed its own carbon pricing, the EU would deduct this from CBAM obligations, lowering the overall cost burden on exporters. A local carbon tax or cap-and-trade system would make Pakistani exports more competitive by signaling to the world that Pakistan is taking steps toward decarbonization. However, if a domestic emissions trading system were to be established, it would have to be phased in gradually for the ease of exporters, and emission monitoring and reporting would have to be transparent.

Pakistan must also diversify its export market to reduce reliance on the EU. Expanding trade with regions like China, the Middle East, and the Association of Southeast Asian Nations could offset potential losses from CBAM-related trade barriers. Strengthening economic ties with low-carbon trading partners where CBAM regulations do not apply could also be useful.

These policies may take time to implement, but certain short-term policy actions could be taken to mitigate the risks CBAM poses. As EU importers may shift to suppliers from other countries with lower carbon costs, reducing demand for Pakistani exports, a possible policy action could include Pakistan engaging in trade negotiations with the EU to ensure a fair transition toward carbon tax adjustment. Trade investment officers could negotiate exemptions or lower CBAM rates for Pakistani exports under existing Generalized Scheme of Preferences Plus status, or the relevant public authorities could form alliances with other developing nations to push for fairer terms at the WTO and advocate for lower compliance costs. Such proactive engagement with the EU, international trade bodies, and climate finance institutions could help reduce CBAM's impact on Pakistan's economy.

Lastly, accurate carbon emission reporting is crucial for complying with CBAM requirements. Pakistani exporters may lack standardized emission monitoring systems, which could result in higher CBAM costs due to default values being applied. Without proper verification mechanisms, exporters could struggle to prove lower emissions, making their products less attractive to EU buyers. Therefore, emission tracking must be efficient and transparent. Policymakers could support businesses, especially those exporting products to the EU, by providing relevant, timely, and appropriate technical assistance.

It is important to stress that policymakers must take early action to align Pakistan's trade policies with global decarbonization efforts. Implementing a domestic carbon pricing mechanism, investing in energy-efficient technologies, and diversifying export markets will be crucial for maintaining competitiveness. In addition, negotiating fairer trade terms with the EU and improving emission monitoring could help ease the transition for exporters. If Pakistan takes proactive steps to reduce its carbon footprint and integrates sustainable production practices, it could minimize CBAM-related trade losses while strengthening its position in an increasingly carbon-conscious global economy.

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## Appendix A: Sectors Considered

| Output sectors | Tonnes of GHG emissions |
|---|---|
| Agricultural sector | |
| Agriculture, hunting, forestry, and fishing | GHG emissions from agriculture |
| **Manufacturing sector** | |
| Mining and quarrying | GHG emissions from manufacturing and construction |
| Food, beverages, and tobacco | |
| Textiles and textile products | |
| Leather, leather products, and footwear | |
| Wood and products of wood and cork | |
| Pulp, paper, paper products, printing, and publishing | |
| Coke, refined petroleum, and nuclear fuel | |
| Chemicals and chemical products | |
| Rubber and plastics | |
| Basic metals and fabricated metal | |
| Machinery, nec | |
| Transport equipment | |
| Manufacturing, nec; recycling | |
| Construction | |
| **Industrial sector** | |
| Other nonmetallic minerals | GHG emissions from industry |
| Electrical and optical equipment | |

| Other sectors not considered | |
|---|---|
| Electricity, gas, and water supply | GHG emissions from land use change and forestry |
| Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel | GHG emissions from waste |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | GHG emissions from buildings |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | GHG emissions from transport |
| Hotels and restaurants | GHG emissions from electricity and heat |
| Inland transport | Fugitive GHG emissions from energy production |
| Water transport | GHG emissions from other fuel combustion |
| Air transport | GHG emissions from bunker fuels |
| Other supporting and auxiliary transport activities; activities of travel agencies | |
| Post and telecommunications | |
| Financial intermediation | |
| Real estate activities | |
| Renting of M&Eq and other business activities | |
| Public administration and defense; compulsory social security | |
| Education | |
| Health and social work | |
| Other community, social, and personal services | |
| Private households with employed persons | |

## Appendix B: Subcategories Within Each Sector

| Agriculture | HS 2-digit codes |
|---|---|
| 01 | Animal products |
| 02 | Animal products |
| 03 | Animal products |
| 04 | Animal products |
| 05 | Animal products |
| 06 | Vegetable products |
| 07 | Vegetable products |
| 08 | Vegetable products |
| 09 | Vegetable products |
| 10 | Vegetable products |
| 11 | Vegetable products |
| 12 | Vegetable products |
| 13 | Vegetable products |
| 14 | Vegetable products |
| 15 | Animal or vegetable oils |

| Manufacturing | HS 2-digit codes |
|---|---|
| 16 | Food, beverages, and tobacco |
| 17 | Food, beverages, and tobacco |
| 18 | Food, beverages, and tobacco |
| 19 | Food, beverages, and tobacco |
| 20 | Food, beverages, and tobacco |
| 21 | Food, beverages, and tobacco |
| 22 | Food, beverages, and tobacco |
| 23 | Food, beverages, and tobacco |
| 24 | Food, beverages, and tobacco |
| 28 | Chemical products |
| 29 | Chemical products |
| 30 | Chemical products |
| 31 | Chemical products |
| 32 | Chemical products |
| 33 | Chemical products |
| 34 | Chemical products |
| 35 | Chemical products |
| 36 | Chemical products |
| 37 | Chemical products |
| 38 | Chemical products |
| 39 | Plastics and rubber |
| 40 | Plastics and rubber |

| Manufacturing | HS 2-digit codes |
|---|---|
| 41 | Raw hides and skins |
| 42 | Raw hides and skins |
| 43 | Raw hides and skins |
| 44 | Wood |
| 45 | Wood |
| 46 | Wood |
| 47 | Wood |
| 48 | Wood |
| 49 | Wood |
| 50 | Textiles |
| 51 | Textiles |
| 52 | Textiles |
| 53 | Textiles |
| 54 | Textiles |
| 55 | Textiles |
| 56 | Textiles |
| 57 | Textiles |
| 58 | Textiles |
| 59 | Textiles |
| 60 | Textiles |
| 61 | Textiles |
| 62 | Textiles |
| 63 | Textiles |
| 64 | Textiles |
| 65 | Textiles |
| 66 | Textiles |
| 67 | Textiles |
| 68 | Stones and glass |
| 69 | Stones and glass |
| 70 | Stones and glass |
| 71 | Pearls and precious metals |
| 72 | Base metal |
| 73 | Base metal |
| 74 | Base metal |
| 75 | Base metal |
| 76 | Base metal |
| 78 | Base metal |
| 79 | Base metal |
| 80 | Base metal |
| 81 | Base metal |
| 82 | Base metal |

| Manufacturing | HS 2-digit codes |
|---|---|
| 83 | Base metal |
| 84 | Nuclear |
| 86 | Transport equipment |
| 87 | Transport equipment |
| 88 | Transport equipment |
| 89 | Transport equipment |
| 91 | Clocks/musical instruments |
| 92 | Clocks/musical instruments |
| 93 | Arms |
| 94 | Misc. manufactured |
| 95 | Misc. manufactured |
| 96 | Misc. manufactured |
| 97 | Arts and antiques |
| 98 | Arts and antiques |

| Industry | HS 2-digit codes |
|---|---|
| 85 | Electrical |
| 90 | Optical |
| 25 | Minerals |
| 26 | Minerals |
| 27 | Minerals |

## Appendix C: Export Demand Function (1994–2020)

Johansen normalization restriction imposed:

| Beta | Coefficient | Std. error | z-stat. | P > \|z\| | 95% confidence interval |
|---|---|---|---|---|---|
| Ln-exports | 1 | | | | |
| Ln-foreign-GDP (weighted by export share) | -1.234263 | 0.1921181 | -6.42 | 0 | -1.610808, -0.8577187 |
| Ln-PPP | 0.3724517 | 0.2622682 | 1.42 | 0.156 | -0.1415844, 0.8864879 |
| Constant | 5.402005 | | | | |

GDP = gross domestic product, PPP = purchasing power parity.

## Appendix D: GHG Emissions (MT)

| | Agriculture | Manufacturing | Industry | Total emissions |
|---|---|---|---|---|
| 2012 | 36.21 | 111.14 | 33.45 | 180.8 |
| 2013 | 53.15 | 124.29 | 35.15 | 212.59 |
| 2014 | 54.35 | 143.89 | 46.99 | 245.24 |
| 2015 | 39.00 | 142.05 | 38.08 | 219.13 |
| 2016 | 34.05 | 173.97 | 40.50 | 248.53 |
| 2017 | 34.39 | 198.56 | 45.20 | 278.15 |
| 2018 | 64.58 | 219.96 | 49.72 | 334.26 |
| 2019 | 90.19 | 215.94 | 56.83 | 362.95 |
| 2020 | 95.29 | 294.4 | 70.59 | 460.28 |
| 2021 | 94.55 | 316.46 | 68.65 | 479.66 |
| 2022 | 88.49 | 388.30 | 71.96 | 548.75 |
| 2023 | 120.64 | 339.83 | 79.90 | 540.37 |
| 2024 | 126.07 | 355.13 | 83.50 | 564.69 |
| 2025 | 131.74 | 371.11 | 87.25 | 590.10 |
| 2026 | 137.67 | 387.81 | 91.18 | 616.65 |
| 2027 | 143.86 | 405.26 | 95.28 | 644.40 |
| 2028 | 150.34 | 423.49 | 99.57 | 673.40 |
| 2029 | 157.10 | 442.55 | 104.05 | 703.71 |
| 2030 | 164.17 | 462.47 | 108.73 | 735.37 |
| 2031 | 171.56 | 483.28 | 113.63 | 768.46 |
| 2032 | 179.28 | 505.02 | 118.74 | 803.05 |
| 2033 | 187.35 | 527.75 | 124.08 | 839.18 |
| 2034 | 195.78 | 551.50 | 129.67 | 876.95 |
| 2035 | 204.59 | 576.32 | 135.50 | 916.41 |
| 2036 | 213.80 | 602.25 | 141.60 | 957.65 |

# 6

## Reconfiguring Growth Through Global Value Chains: Participation, Positioning, and Policy Lessons from Pakistan and Its Regional Competitors

**Rabia Arif[1] and Azam Chaudhry[2]**

### Abstract

*This paper examines how a country's integration into global value chains (GVCs) influences its economic growth. GVCs have transformed international trade by shifting the focus from final goods to fragmented production networks across countries. Using panel data from 2000 to 2022 and employing the generalized method of moments (GMM) approach, we separate traditional and GVC-led trade to evaluate their differential impacts on multiple macro indicators, including gross domestic product (GDP) per capita, total factor productivity, export intensity, and others. We distinguish between the dual dimensions of GVCs—participation and positioning, where participation constitutes forward/backward (F/B) trade ratios as critical determinants of long-term competitiveness. We find that forward linkages tend to hinder growth in low-income countries, while backward linkages enhance the export-to-GDP ratio. For middle-income nations like Pakistan, enhancing forward linkages is the most effective way to improve export performance and boost economic growth. We then assess Pakistan's position within the GVC, as reflected in measures of upstreamness and downstreamness. Our comparison of Pakistan with other countries finds that it lags behind India, Bangladesh, and China, as it is characterized by strong downstream and weak forward linkages that limit value-added exports. A sectoral comparison, particularly between India's and Bangladesh's textile industries, further contextualizes Pakistan's structural limitations. Policy strategies are proposed to deepen value addition and move Pakistan up the GVC ladder.*

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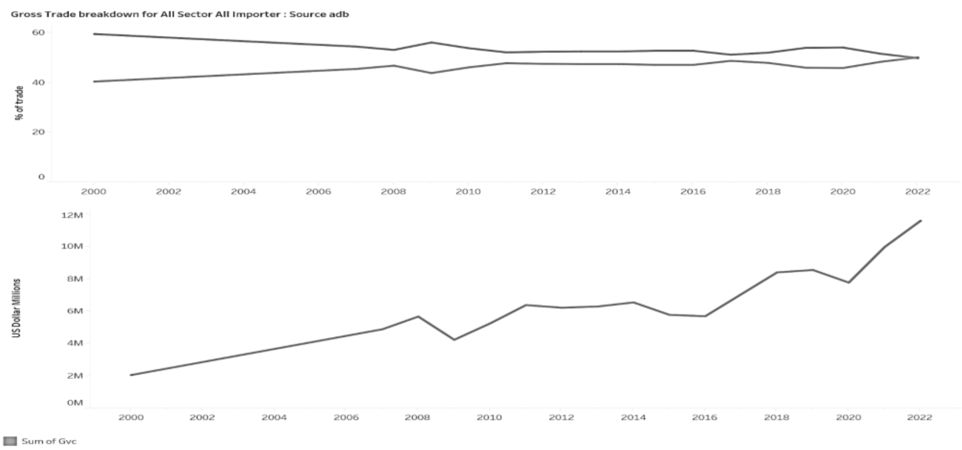
## Introduction

Global value chains (GVCs) have transformed international trade by breaking production across borders, enabling countries to specialize in specific tasks rather than producing final products—a shift from traditional comparative advantage to 'competitive advantage.' For a developing economy like Pakistan, the challenge is to participate in GVCs and secure a strategic position that enhances domestic value addition. Doing so would lead to higher gross domestic product (GDP) per capita and total factor productivity (TFP), thereby promoting export growth.

The global economy has undergone a fundamental shift over the last few decades, transitioning from traditional trade patterns to complex, interdependent chains of production, also known as GVCs.[3] Unlike traditional trade, in which final products are shipped out of countries once produced, GVCs break production into specialized tasks across multiple countries rather than producing entire products. This development, usually referred to as the 'second unbundling' of globalization, was proposed by Baldwin (2013). Japanese, Korean, and Taiwanese parts are ultimately assembled in China or Vietnam. The end product is shipped across borders multiple times through multiple stages of production, thereby creating complex webs of value addition that are not captured in traditional trade statistics.

**Figure 1: Global trade redefined: The fall of the traditional and the rise of GVCs (2000–2022)**




Source: World Integrated Trade Solutions (2024).

[3] A global value chain, therefore, refers to a production sequence for a final consumer good, with each stage adding value (e.g., production, processing, marketing, transportation, distribution) and with at least two stages taking place in different countries (Gereffi & Fernandez-Stark, 2011).

Figure 1 illustrates that globally, GVC-related trade has steadily increased in both share and value, whereas traditional trade has declined, particularly after 2020.

While the shift toward GVCs has reconfigured the factors of production, numerous factors have contributed to the increase in GVC-related trade in recent years. Notably, enhanced global communication, reduced transportation costs, and lesser asymmetry in information from modern technologies have effectively reduced the cost of geographic coordination. Meanwhile, efforts to liberalize trade and proliferate multilateral agreements have also reduced both tariff and non-tariff restrictions, thereby enhancing the significance and viability of cross-border production networks and integration (Taglioni & Winkler, 2016). These factors have also led to the rise of multinational corporations, which utilize these changes to capture comparative advantages at different stages of production through their global operations (Ye et al., 2015).

GVCs have two primary components. First, GVC participation measures the extent to which a country participates in GVCs, determined by forward and backward linkages with other countries. It is a quantitative measure that uses the volume of the product embedded in the GVC. This assesses openness, dependency on foreign inputs, and export integration. Second, GVC positioning refers to a country or firm's relative location within a GVC, based on its 'upstreamness' and 'downstreamness' scores. This component is based on the qualitative nature of information and the value-added depth of participation. GVC positioning assesses a country's technological sophistication, upgrade potential, and strategic role within a GVC.

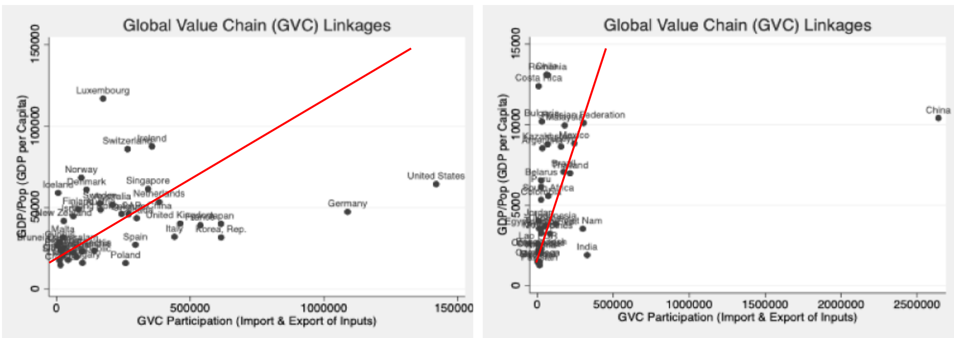
Figure 2 shows a weak but positive correlation between GVC participation and GDP per capita across countries for 2022–2023. It shows that while GVC participation is associated with economic development, the connection is complex. Countries differ significantly in the value they derive from GVCs. Advanced economies achieve high per-capita income by occupying higher-value roles in the GVC, while some developing nations, despite their heavy involvement in GVCs, remain at lower income levels.

**Figure 2: Positive correlation: GDP per capita and GVC participation**


Source: Authors' calculations.

Next, we divide overall GVC participation into leader and follower countries. Figure 3 shows that leader countries exhibit slower increases in GDP per capita than followers, reinforcing the convergence theory and suggesting that imitators can achieve faster growth through GVC participation.

**Figure 3: GDP per capita and GVC participation by leader and follower countries**




**Leader countries** **Follower countries**

Source: Authors' calculations.

A country's ability to integrate into these value chains depends on various economic and institutional factors, including comparative advantage, infrastructure quality, trade policies, and contract enforcement mechanisms, as suggested by Johnson and Noguera (2012). GVCs have also significantly altered how nations progress through various stages of economic development, as they [GVCs] provide opportunities to industrialize without creating entire supply chains locally—a phenomenon often referred to as 'industrialization through integration' (Baldwin & Lopez-Gonzalez, 2015). Developing nations can specialize in specific production phases where they possess comparative strengths (typically labor-intensive production) and enjoy global market access and opportunities for previously unavailable technology transfers. In developed economies, GVCs have facilitated high-value-added specialization in activities such as research and development, design, branding, and high-value-added services. This specialization enables developed countries to reap a competitive edge in knowledge-intensive activities and outsource low-cost production to low-cost countries.

Despite the theoretical benefits of GVC participation, empirical evidence on how it interacts with economic development remains unexplored, particularly how different forms of participation affect countries at different stages of development. This research aims to address this gap.

First, we empirically demonstrate that traditional trade has diminishing effects on growth, whereas GVC-related trade is positively associated with macroeconomic indicators.

Second, we move beyond measuring only the extent of GVC participation by analyzing how Pakistan and peer economies participate (in volumes) and are positioned (based on quality) in value chains through forward/backward (F/B) linkages and upstreamness/downstreamness.

Third, we analyze how Pakistan's sectors are positioned in the GVC.

Fourth, we present a comparative analysis of Pakistan's textile industry relative to India and Bangladesh, highlighting that Pakistan is constrained by low downstreamness and limited value addition, which hinders technological upgrading and branding potential.

Fifth, we propose a 'balanced GVC growth strategy' focused on strengthening backward linkages through industrial development. Similarly, we propose enhancing forward linkages through research and development, branding, and innovation, and shifting from downstream assembly to upstream integration within longer, high-value production chains.

The remainder of this paper is structured as follows: the next section reviews literature on GVCs and economic growth, discussing theoretical models and recent empirical evidence. This is followed by our methodology, including data sources, variables, estimation methods, and empirical results. Next, we present a comparative analysis of GVC participation and positioning in the global economy, an analysis of Pakistani sectors' positions in GVCs, and a more specific examination of Pakistan's textile sector. We conclude with policy implications and implications for achieving the maximum growth gains from GVC participation.

## Literature Review

Recent research has highlighted the importance of GVCs in enhancing productivity, facilitating technology transfers, and promoting export sophistication. However, studies also warn that simply participating, primarily through backward linkages, could reinforce dependency unless paired with upgrading strategies. Distinguishing between GVC participation (level of involvement) and positioning (place in the value chain) has become a vital analytical perspective. Our study contributes by combining macro-level generalized method of moments (GMM) estimation with sectoral and regional comparative analysis.

The theoretical foundations of GVCs can be traced to several traditions in economics, including international trade theory, industrial organization, and development economics. The early explanations of trade in intermediate goods were derived from extensions of Ricardian and Heckscher-Ohlin classical models, considering the likelihood that nations might specialize in parts rather than final products (Dixit & Grossman, 1982; Feenstra & Hanson, 1996). These theoretical contributions form the foundation of 'vertical specialization,' whereby production activities are broken into fragmented tasks spread across nations based on comparative advantage. The GVC concept later gained prominence following work by Gereffi et al. (2005), who present a governance perspective on the analysis of GVC organization and coordination. The governance perspective distinguishes between producer-driven chains (in which large producers organize networks, e.g., automobiles) and buyer-driven chains (in which brand owners and retailers lead networks without direct production, e.g., apparel).

Subsequent development added intermediate forms of governance, reflecting interdependence between lead firms and suppliers. Then Baldwin (2006) and Baldwin and Lopez-Gonzalez (2015) situated the rise of GVCs as the 'second unbundling' of globalization, where the development of information and communication technology enabled the spatial dislocation of production tasks that had previously required collocation. This highlights how declining coordination costs have reconfigured international trade from finished goods trade to task trade, thereby redrawing development opportunities and challenges. From a development economics perspective, GVCs are a possible industrialization path alongside conventional import-substituting or export-promoting approaches. Milberg and Winkler (2013) described this as 'industrialization through integration,' whereby developing countries can be integrated into the GVC without the initial need to build up complete domestic value chains. The approach enables nations to specialize in certain activities based on available capabilities while building up technology and capability for the gradual upgrading of these activities. Furthermore, Kummritz (2016) applied Trade in Value-Added database data to demonstrate that backward and forward GVC involvement are positively correlated with domestic added value in exports and GDP per capita. Likewise, the World Bank (2020) provides extensive evidence that GVC involvement is correlated with more rapid income and productivity growth than traditional trade.

The distinction between different types of GVC involvement has been emphasized in research as well. Based on firm-level data, Constantinescu et al. (2019) find that backward linkages have greater productivity implications for developing-country firms, while forward linkages are more pronounced as countries advance to higher incomes. Similarly, Taglioni and Winkler (2016) find that GVC participation effects on growth vary across countries' development levels and industrial capabilities. Javorcik (2004), who studied the channels through which GVC participation affects growth, shows evidence of foreign direct investment generating productivity spillovers to domestic upstream suppliers through backward linkages as a technology transfer mechanism. Confirming this, Halpern et al. (2015) demonstrate that intermediate goods imports enhance firm productivity through variety and quality effects, providing micro foundations for the benefits of backward GVC participation. Several studies also examine the differentiated effect of country group participation in GVCs. Kowalski et al. (2015) argue that the relationship between GVC participation and per-capita GDP growth is positive for both developed and developing economies but differs in magnitude. Initial participation through backward linkages will most likely yield high growth returns for low-income economies, while advancement toward forward linkages is crucial for the sustainable growth of middle-income economies.

In addition to the intensity of participation, researchers have turned their attention to the positioning of countries in GVCs and its effect on economic upgrading. Antràs and Chor (2013) formulated a framework for analyzing the position of industries in GVCs, separating upstream (earlier-stage) and downstream (later-stage) activities. Based on this framework, Fally (2012) and

Miller and Temurshoev (2017) built measures of 'upstreamness' and 'downstreamness' to measure industries' positions in production chains. Criscuolo and Timmis (2018) find that upstreamness is generally associated with higher productivity, particularly in industries with a high knowledge orientation. Similarly, Rungi and Del Prete (2018) demonstrated that upstream positioning is associated with the value-added shares of exports, and that nations with higher upstream positions are more likely to receive higher value. The theory of economic upgrading in GVCs, developed by Humphrey and Schmitz (2002), explains how countries move up and down over time. They developed four upgrading routes: process upgrading (improving production methods), product upgrading (producing more valuable products), functional upgrading (increasing the skill intensity of operations), and chain upgrading (transitioning to higher-value chains). Subsequent studies, e.g., by Gereffi and Lee (2012), explain how specific countries and sectors navigate these upgrading routes, viewing them as both opportunities and constraints.

Recent research has emphasized the balance between forward and backward linkages as a strategic metric for evaluating countries' development paths. Wang et al. (2017) developed improved measures of forward and backward participation that more accurately reflect countries' positions in high-order GVCs, enabling a more precise analysis of participation patterns. Drawing on this research, Pahl and Timmer (2019) examined the evolution of the forward-to-backward linkage ratio as countries develop. They find systematic patterns that align with industrial capabilities and economic structure. Several studies identify strategic shifts in this ratio that are associated with successful development. Concentrating on East Asian economies, Ignatenko et al. (2019) find that rapid industrializers South Korea and Taiwan initially engaged through deep backward linkages before increasing forward linkages and building technological capabilities in the long run. The same trends have been observed in China, which sequentially evolved from assembly (high backward linkages) to manufacturing intermediate inputs (increasing forward linkages) as local capabilities increased.

The relationship between F/B ratios and income levels is non-linear. Growth at lower income levels is generally associated with increasing backward linkages as countries become integrated into labor-intensive assembly operations. For middle-income countries, transitioning to greater forward linkage intensity is necessary to escape the 'middle-income trap' and move toward higher-value-added activities. In developed economies, maintaining strong forward linkages through innovation and technological leadership helps sustain competitive advantages amid rising labor costs.

Despite growing literature on GVCs and economic growth, several gaps remain. Most previous studies have addressed either positioning or participation intensity, but few have examined the dynamics of both components separately.

First, using the GMM framework, we estimate the impact of traditional and GVC-related trade on macroeconomic variables across a panel of 65 countries from 2000 to 2022.

Second, we provide an in-depth conceptual framework for Pakistan's participation in GVCs and its position in the GVC. We analyze how F/B linkages and upstreamness-to-downstreamness (U/D) ratios have changed in Pakistan and other relevant countries (potential competitors) to recommend policies that ensure a positive impact on macroeconomic indicators.

Third, we propose a clear transition mechanism that enables nations to gradually shift their positions in GVCs to achieve value-added growth. Next, we provide an overall sector positioning comparison for Pakistan to analyze which sector should be prioritized to move up the GVC. In addition, we discuss the specific comparative case study of Pakistan's textile sector to understand its relative position among competitors.

## Empirical Evidence for Traditional Versus GVC Trade

*Methodology*

We employ GMM estimation to address potential endogeneity using a global panel of over 65,000 observations from 2000 to 2022. The dependent variables include GDP per capita, GDP per employee, TFP, and trade ratios. Key regressors include GVC-related trade and traditional trade, as well as forward and backward linkage metrics. Income group-specific regressions allow us to explore heterogeneity in GVC effects.

Our data comes from a variety of sources. The Trade in Value-Added database, created by the Organisation for Economic Co-operation and Development, offers detailed decompositions of gross export measures into foreign and domestic value-added components. The World Development Indicators of the World Bank are our primary source for economic outcome variables, such as GDP per capita, productivity and employment indicators, and control variables like human capital, infrastructure quality, and institutions. As a complement to our analysis, the Penn World Table provides alternative productivity indicators, such as TFP and GDP values in purchasing power parity-adjusted terms. Our sample comprises 65 countries from various regions and income groups spanning over 20 years. It creates an unbalanced sample of approximately 60,000 country-year-sector observations. Since we must control for cross-sectional heterogeneity by country development levels, we categorize countries into four income groups based on the World Bank's classification: low-income, lower-middle-income, upper-middle-income, and high-income countries.

*Econometric Specification*

Our primary econometric approach employs a panel regression model to analyze the relationship between GVC participation and economic outcomes. The baseline specification is as follows:

$$Y_{it} = \alpha + \beta_1 Traditional\_Trade_{it} + \beta_2 GVC\_Output_{it} + \gamma X_{it} + \delta_i + \theta_t + \epsilon_{it}$$

$Y_{it}$ represents the economic outcome variables for country i in year *t*. We consider several key indicators to assess the economic impact of GVC engagement. TFP captures general productive efficiency, while GDP per capita is an economic development indicator. This study uses GDP per worker to measure labor productivity and the unemployment rate to represent labor-market impacts. The export-to-GDP ratio and import-to-GDP ratio are also used to determine a nation's trade orientation and degree of dependency. $X_{it}$ denotes the vector of control variables.

We control for confounding effects by including the human capital index (which captures educational attainment and quality) and infrastructure quality (which captures the state of transportation and communication networks). We also control for institutional quality using governance indicators such as regulatory effectiveness and the rule of law, as well as macroeconomic stability, measured by inflation rates and the fiscal balance. Finally, we account for financial development using indicators such as private-sector credit and capital market depth. $\delta i$ represents country fixed effects, $\vartheta t$ accounts for time fixed effects, and $\epsilon it$ is the error term.

We employed lagged dependent variables to address endogeneity concerns and GMM estimation to account for the panel data's dynamic nature.

Tables 1–3 present estimated impacts from multiple regressions of traditional trade and GVC-related trade on key macroeconomic indicators using ordinary least squares (OLS), fixed effects, and dynamic GMM.

**Table 1: Estimating the impact of traditional trade and GVC-related trade on the economy: OLS**

| Independent variables | Dependent variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TFP (1)** | **GDP per capita (2)** | **GDP per person employed (3)** | **Unemployment (4)** | **Export-to-GDP ratio (5)** | **Import-to-GDP ratio (6)** | **Agriculture, forestry, and fishing value added (7)** | **Industry (incl. construction) value added (8)** | **Services value added (9)** |
| Output related to traditional trade (crossing just one border) | 0.00155 | -0.0155*** | -0.0165*** | 0.00192 | -0.0574*** | -0.0521*** | 0.0305*** | -0.00721*** | 0.000928 |
| | (-0.000984) | (-0.00104) | (-0.00136) | (-0.00403) | (-0.00196) | (-0.00171) | (-0.00233) | (-0.00157) | (-0.000801) |
| GVC-related output (crossing more than one border) | -0.000518 | 0.0171*** | 0.0178*** | -0.0037 | 0.0637*** | 0.0528*** | -0.0257*** | 0.0117*** | -0.000463 |
| | (-0.000907) | (-0.000957) | (-0.00126) | (-0.00372) | (-0.00181) | (-0.00158) | (-0.00215) | (-0.00145) | (-0.000739) |
| Observation | 60,101 | 68,228 | 68,228 | 68,228 | 68,228 | 68,228 | 67,847 | 67,847 | 67,847 |
| $R^2$ | 0.722 | 0.998 | 0.99 | 0.859 | 0.96 | 0.963 | 0.993 | 0.997 | 0.999 |

All variables are in log form for better comparability. Controls include final consumption expenditure, gross fixed capital formation, population growth, and labor force participation rate to account for macroeconomic influences. Country income group dummies (low, lower-middle, upper-middle, high income) are included to capture structural differences using a panel dataset covering 45 sectors across 75 countries. The econometric technique used is OLS (when random effects matched OLS). Standard errors are in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

**Table 2: Estimating the impact of traditional trade and GVC-related trade on the economy: Fixed effects**

| Independent variables | Dependent variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TFP (1)** | **GDP per capita (2)** | **GDP per person employed (3)** | **Unemployment (4)** | **Export-to-GDP ratio (5)** | **Import-to-GDP ratio (6)** | **Agriculture, forestry, and fishing value added (7)** | **Industry (incl. construction) value added (8)** | **Services value added (9)** |
| Output related to traditional trade (crossing just one border) | 0.0170*** | -0.0291*** | -0.0363*** | -0.0146* | -0.105*** | -0.155*** | 0.152*** | 0.0312*** | 0.00861*** |
| | (-0.00211) | (-0.00219) | (-0.0029) | (-0.00863) | (-0.00397) | (-0.00357) | (-0.00497) | (-0.00332) | (-0.00172) |
| GVC-related output (crossing more than one border) | -0.00295* | 0.0582*** | 0.0609*** | -0.0108 | 0.216*** | 0.185*** | -0.0967*** | 0.0351*** | -0.00231 |
| | (-0.00178) | (-0.00183) | (-0.00242) | (-0.0072) | (-0.00331) | (-0.00298) | (-0.00414) | (-0.00276) | (-0.00143) |
| Observation | 60,101 | 68,228 | 68,228 | 68,228 | 68,228 | 68,228 | 67,847 | 67,847 | 67,847 |
| $R^2$ | 0.298 | 0.976 | 0.739 | 0.194 | 0.524 | 0.488 | 0.845 | 0.959 | 0.991 |

All variables are in log form for better comparability. Controls include final consumption expenditure, gross fixed capital formation, population growth, and labor force participation rate to account for macroeconomic influences. Country income group dummies (low, lower-middle, upper-middle, high income) are included to capture structural differences using a panel dataset covering 45 sectors across 75 countries. Country, sector, and year fixed effects were applied to control for unobserved heterogeneity. The econometric technique used is fixed effects for within-group variation. Standard errors are in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

**Table 3: Estimating the impact of traditional trade and GVC-related trade on the economy: GMM**

| Independent variables | Dependent variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TFP (1)** | **GDP per capita (2)** | **GDP per person employed (3)** | **Unemployment (4)** | **Export-to-GDP ratio (5)** | **Import-to-GDP ratio (6)** | **Agriculture, forestry, and fishing value added (7)** | **Industry (incl. construction) value added (8)** | **Services value added (9)** |
| Output related to traditional trade (crossing just one border) | -0.000595* | -0.00821*** | -0.000742** | -0.00313 | -0.0133*** | -0.0160*** | 0.0106*** | -0.00159 | 0.00136** |
| | (-0.000329) | (-0.000859) | (-0.000339) | (-0.00222) | (-0.00108) | (-0.00101) | (-0.00153) | (-0.00115) | (-0.000661) |
| GVC-related output (crossing more than one border) | 0.000661** | 0.00925*** | 0.000820*** | 0.00251 | 0.0151*** | 0.0160*** | -0.00935*** | 0.00369*** | -0.00116* |
| | (-0.000303) | (-0.000793) | (-0.000313) | (-0.00205) | (-0.0009) | (-0.00093) | (-0.00141) | (-0.00107) | (-0.00061) |
| Lag-1 | 0.950*** | 0.397*** | 0.944*** | 0.845*** | 0.784*** | 0.774*** | 0.700*** | 0.567*** | 0.285*** |
| | (-0.00141) | (-0.00227) | (-0.000961) | (-0.00215) | (-0.00201) | (-0.00219) | (-0.00244) | (-0.00242) | (-0.00172) |
| Observation | 57,736 | 65,645 | 65,645 | 65,645 | 65,645 | 65,645 | 65,264 | 65,264 | 65,264 |

All variables are in log form for better comparability. Controls include final consumption expenditure, gross fixed capital formation, population growth, and labor force participation rate to account for macroeconomic influences. Country income group dummies (low, lower-middle, upper-middle, high income) are included to capture structural differences using a panel dataset covering 45 sectors across 75 countries. The econometric technique used is GMM for endogeneity correction. Standard errors are in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Across all model specifications, the results consistently indicate that an increase in the volume of GVC trade (measured by output crossing multiple borders) has a significantly more positive effect on economic performance than traditional single-border trade. Under OLS and fixed effects, GVC-related output significantly increases GDP per capita, export and import ratios to GDP, and industrial value added, whereas traditional trade becomes insignificant or shows weak, inconsistent effects once country-specific effects are considered.

The GMM estimates, which address endogeneity and dynamic persistence, reinforce this conclusion: GVC-related trade has a positive and significant impact on TFP, GDP per capita, GDP per worker, and industrial value added, while also slightly reducing unemployment. The size of the GVC coefficients suggests that economies engaging in high GVC-related trade experience greater productivity (as measured by TFP, GDP per capita, export competitiveness, and industrial upgrading) than those relying solely on traditional trade in final goods.

We complemented our econometric analysis with a graphical comparison of four countries with distinct patterns of GVC participation: the US and China (higher-income countries) and India and Pakistan (lower-middle-income countries with varying levels of GVC linkages). For each case, historical trends and patterns of GVC participation, shifts in F/B linkages, and changes in upstream and downstream orientation are examined. We also examine historical trends in GVC participation, shifts in forward-backward linkage ratios, changes in upstream-downstream positioning, key policy interventions, and challenges of upgrading within GVCs. This qualitative approach contextualizes our econometric findings by highlighting differences between developed and developing economies and offering insights into practical pathways to enhance GVC-related trade and growth.

## Conceptual Framework (Participation Versus Positioning)

*GVC Participation*

GVC participation measures the level of integration through forward linkages (the export of intermediates) and backward linkages (the import of inputs).

Forward linkages refer to the exports of intermediate goods and services that are included in a country's exports. For example, the export of advanced machinery from Germany to China's manufacturing sector illustrates forward integration. Conversely, backward linkages occur when a country imports intermediate goods used in the production of exports, which account for the foreign value added in a nation's total exports. It is essential to note that GVC participation is a dynamic process, and countries may participate in it based on their initial endowment.

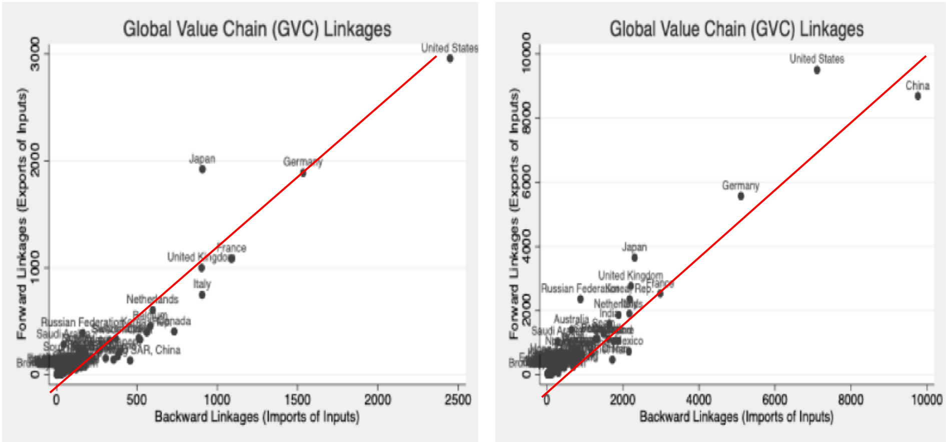
– Low-income and emerging countries → May start with high backward linkages (assembly phase)
– Advanced economies → Transition to high forward linkages (innovation and supply hubs)
– A balanced F/B ratio is key for long-term economic diversification and competitiveness

We break gross exports into components that reflect different types of trade integration to measure GVC participation. Conventional trade output reflects value added that crosses borders once and is used in the final country. GVC-related production involves multiple border crossings and value-added transactions and is further divided into pure forward linkages (domestic value added in intermediate exports used by other nations for reexport) and pure backward linkages (foreign value added in intermediate imports used to produce export goods). We scale these measures relative to GDP and derive the F/B ratio to account for differences in the economy's size.

$$F/B\ ratio = \frac{pure\ forward\ linkages}{pure\ backward\ linkages}$$

The F/B linkage ratio is an indicator used to assess balance and determine a country's position in GVCs. An F/B linkage ratio greater than 1 indicates that the country has dominant forward linkages and is therefore a major supplier of intermediate goods. In contrast, a ratio less than one suggests that the country has strong backward linkages, processes inputs from other countries, and then returns those processed inputs to those countries.

**Figure 4: GVC participation**




**2000** **2020**

Source: Author's calculations.

Figure 4 illustrates GVC participation through F/B linkages worldwide, comparing 2000 and 2020. The notable increase in both forward and backward linkages may be a crucial factor in China's economic success and its strategic integration into the global economy. A scatterplot of cross-country data on forward and backward linkages over 20 years shows that China has significantly repositioned itself within GVCs compared to other nations. We categorize countries based on their F/B ratios as follows:

**Case 1:** F/B >1, meaning that forward linkages are higher than backward linkages. This case indicates that such countries function more as suppliers (strong forward):

- The short-term impact is that exporting intermediate inputs increases net exports
- The long-term impact is boosts in value added, innovation, and resilience
- These economies export more high-value intermediate goods that other countries use in their production
- Strong domestic production capacity and a technological edge
- Higher domestic value added in exports drives continued growth

We suggest that following this trajectory for most developing countries would help them move up the value chain (e.g., from assembly to innovation). It leads to higher wages, advanced industries, and long-term economic resilience.

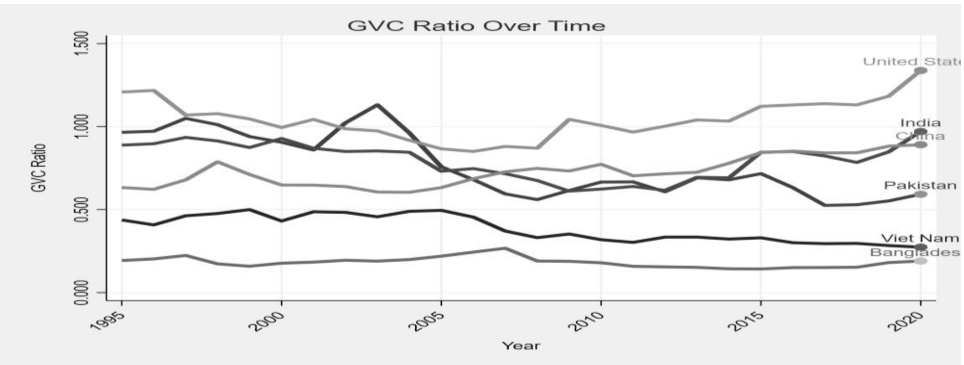
**Case 2:** F/B < 1, meaning that backward linkages are higher than forward linkages. This case indicates whether a country acts as an assembler (strong backwards).

- The short-term impact is a decline in net exports because assemblers rely on imports
- The long-term impact is more sophisticated inputs, lower domestic value added, and greater dependence on imported inputs for the country's exports
- These countries often specialize in low-cost assembly and manufacturing
- There is higher integration into global supply chains but lower domestic value added

Figure 5 shows the evolution of the F/B linkage ratio across countries from 1995 to 2020. A ratio above one indicates stronger forward linkages, meaning it is a major supplier of intermediate goods, while a ratio below one indicates greater reliance on imported inputs, reflecting backward linkages.

Pakistan's GVC ratio has remained relatively steady, consistently below one, indicating ongoing dependence on imported inputs and limited forward integration. In contrast, China and India have seen significant increases in their ratios over time, surpassing Pakistan, which suggests a shift toward more upstream, value-adding roles. Vietnam and Bangladesh consistently show low F/B ratios, indicating that their economies are assembly-based and heavily reliant on imports. The US demonstrates the highest and most consistent growth, reaffirming its role as a global input supplier with strong forward linkages.

**Figure 5: Comparison of F/B ratios across countries**

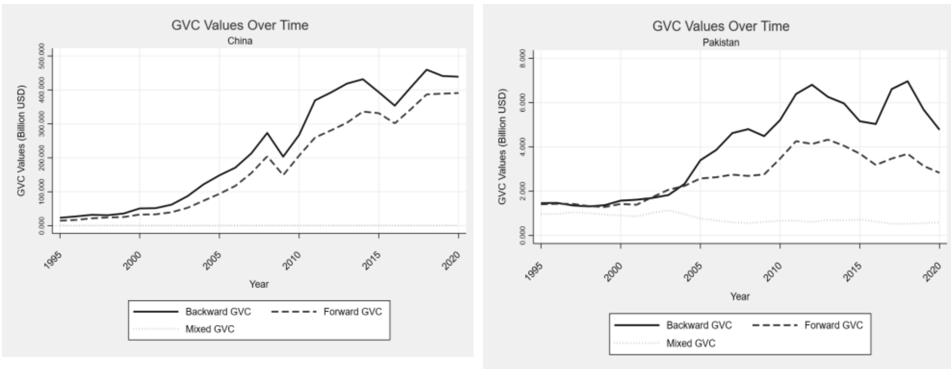



Source: Author's calculations.

*Forward/Backward Ratio Insights*

Next, we separate F/B ratios into volumes of forward and backward linkages over time from 1995 to 2020 (Figure 6). Countries with F/B ratios greater than one export intermediate goods and have higher innovation potential, while those with F/B ratios less than one are dependent assemblers. Pakistan's F/B ratio remains below one, indicating structural limitations and an overreliance on imported goods.

**Figure 6: Volumes of F/B linkages over time for China and Pakistan**




Source: Author's calculations.

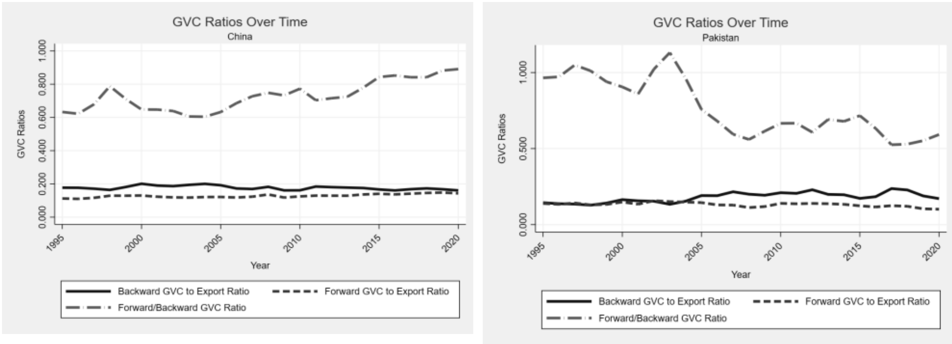
In Figure 7, we disaggregate the F/B ratios for China and Pakistan into backward and forward linkage shares of total trade to adjust for each country's size in the world market. China has successfully advanced up the value chain, with increasing forward linkages and a rising F/B ratio.

Pakistan, in contrast, continues to lag, maintaining a backward linkage-heavy profile, low forward integration, and a declining F/B ratio, reflecting limited value-added contributions to global supply chains.

Overall, Pakistan lags behind regional competitors in transitioning toward a more balanced or forward-dominant GVC role.

Moving up the value chain requires forward linkages to grow faster than backward linkages (for countries where backward linkages dominate).

**Figure 7: Disaggregating F/B ratios over time: China vs. Pakistan**




Source: Author's calculations.

*GVC Positioning*

We developed indicators for upstreamness and downstreamness to capture a nation's position in GVCs. Upstreamness focuses on the origin of inputs, capturing the distance of production from raw materials; greater values indicate later-stage production (Fally, 2012). Downstreamness focuses on where output goes; it captures the weighted-average distance of a nation-sector's output from final demand, with higher values indicating earlier-stage production (Antràs et al., 2012). We employ these indicators to calculate the U/D ratio as:

$$U/D \text{ ratio} = \frac{upward\ streamness}{downward\ streamness}$$

Higher values of this ratio indicate specialization in upstream activities, while lower values suggest concentration in downstream activities.

*Upstreamness and Downstreamness*

GVC positioning evaluates a country's position along the value chain—upstream (input supplier) versus downstream (assembler or final goods exporter). The U/D ratio offers insights into value-added potential and strategic importance. We can categorize sectors as being part of four different combinations:

- Low downstream and low upstream countries comprise sectors that produce non-tradable goods, mainly provide local services, and are part of extremely short GVCs
- Low upstream and high downstream countries include assemblers in relatively longer GVCs

– Low downstream and high upstream are characteristic of resource-based sectors (positioned very low) in relatively longer value chains
– High upstream and high downstream are part of longer value chains, maintaining strong positions. These sectors convert core intermediate inputs into high-value tradable goods, such as electrical equipment.

Empirical evidence shows that an increase in both positions (upstreamness and downstreamness) has a significant positive impact on growth indicators for middle-income countries.

Figure 8 shows a hypothetical scenario where a country moves from using less-advanced inputs to producing simpler final goods, then shifts to using more-advanced inputs to create more sophisticated final products. The process pushes the country further upstream in the value chain while keeping downstream integration low. This ultimately results in limited value added within its domestic production system because the country remains embedded in the same value chain, i.e., the end product remains the same. However, it connects to the chain at a higher level.

**Figure 8: Diagrammatic representation of a change in position within a GVC**

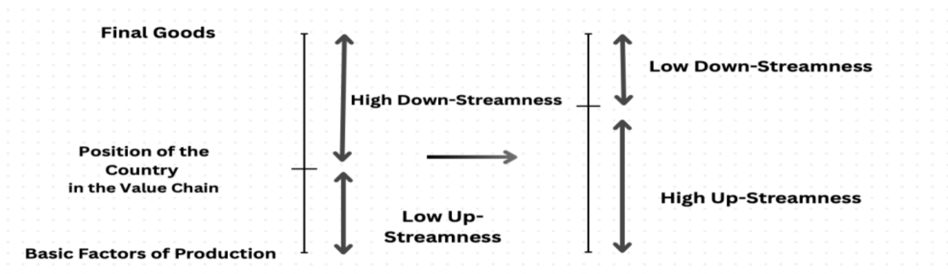



Figure 9 illustrates a hypothetical scenario where a country transitions from being part of a shorter GVC to integrating into a longer one. It moves from a more upstream to a more downstream position, progressing from producing less significant goods to higher-value-added branded products, resulting in greater value addition.

**Figure 9: A transition from shorter to longer GVCs**

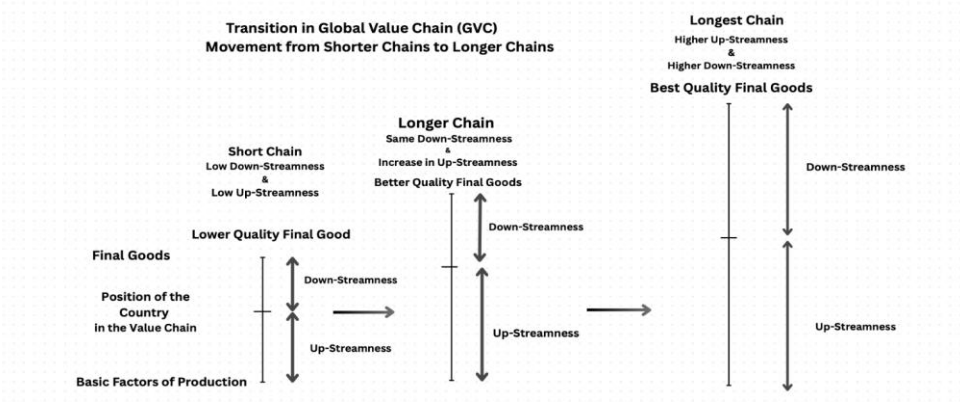
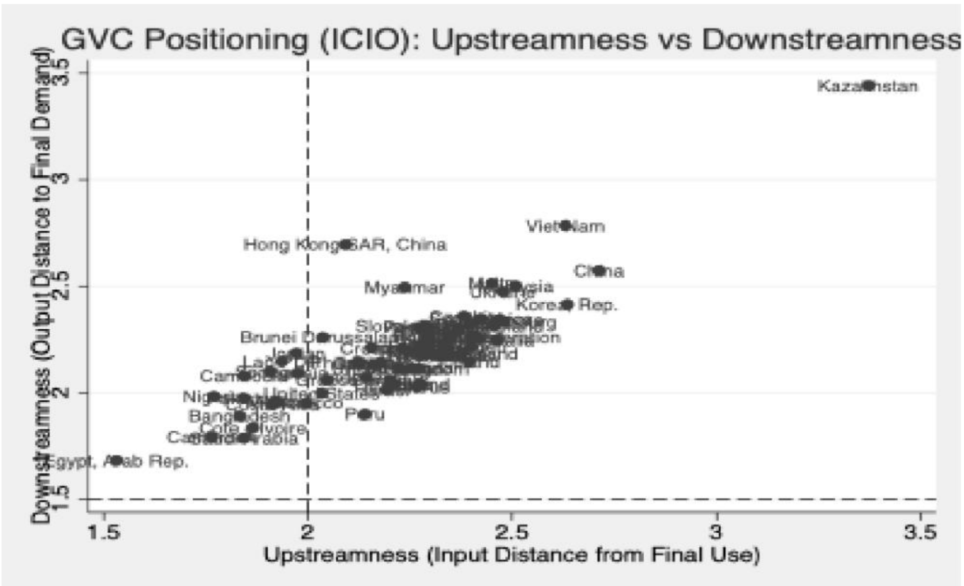



Figure 10 provides a cross-country comparison of each country's global positioning based on upstream and downstream positions within the GVC for 2022–2023.

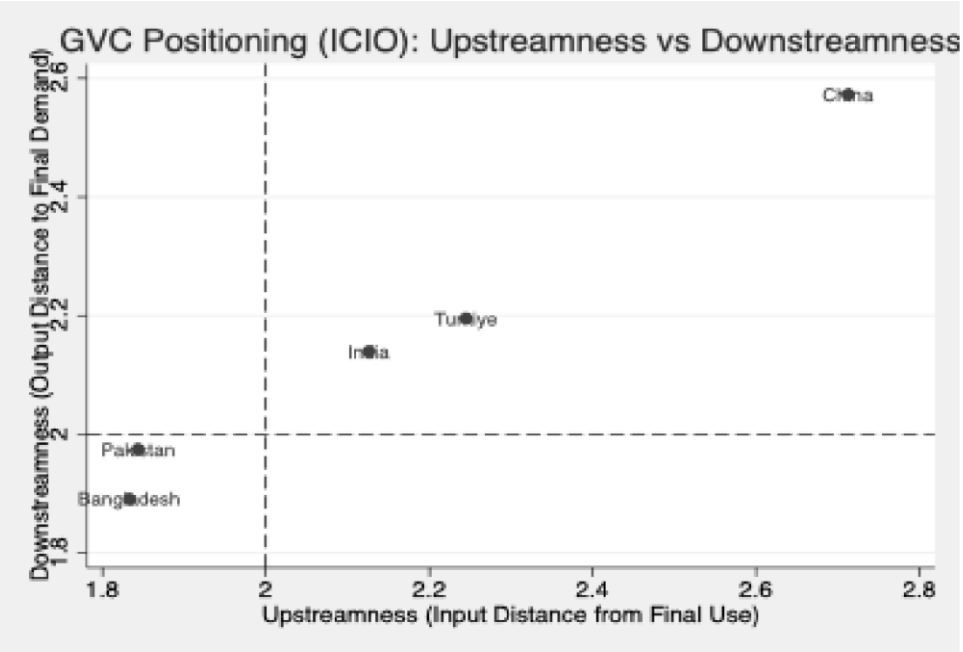
**Figure 10: Cross-country scatter plot of GVC positioning based on upstreamness and downstreamness (2022–2023)**




Source: Author's calculations.

Next, we select four countries (Bangladesh, India, Turkey, and China) to compare their relative standings with Pakistan (Figure 11).

**Figure 11: Pakistan's GVC position relative to India, Turkey, Bangladesh, and China**




Source: Author's calculations.

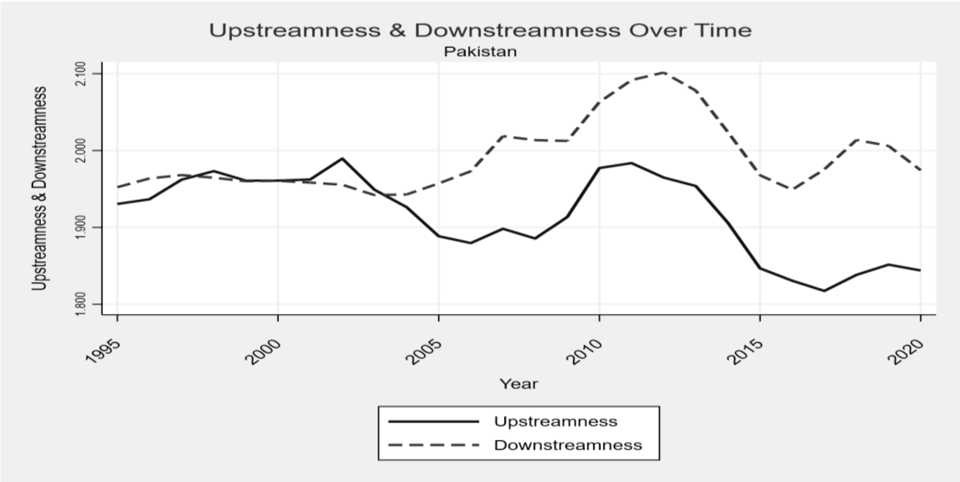
Figure 11 shows that China occupies the top-right quadrant, indicating a position that is both high upstream and high downstream. This suggests that China is deeply involved in both the early and late stages of production, providing complex inputs and participating in multi-stage production processes, thereby maintaining a strong, diversified GVC position.

Turkey and India are positioned in the upper-mid quadrant, with moderate upstream and downstream activities, ensuring a balanced GVC role as they supply inputs and export semi-final or final products.

Pakistan and Bangladesh are in the bottom-left quadrant, indicating low upstreamness and downstreamness. This means they engage mainly in simpler, lower-value-added activities closer to final use, relying on imported inputs. These inputs are used to manufacture assembly-based, labor-intensive exports with limited vertical integration.

Figure 12 shows how Pakistan's position in GVCs has changed from 1995 to 2020.

**Figure 12: Pakistan's upstreamness and downstreamness in GVCs (1995–2020)**




Source: Author's calculations.

Figure 12 highlights three key points. First, upstreamness (blue line) was relatively stable until 2010, then declined sharply, indicating a shift toward final demand and less involvement in early production stages.

Second, downstreamness (red dashed line) increased significantly after 2005, peaking around 2013, showing Pakistan's growing role as a final assembler or exporter of products directly consumed by users.

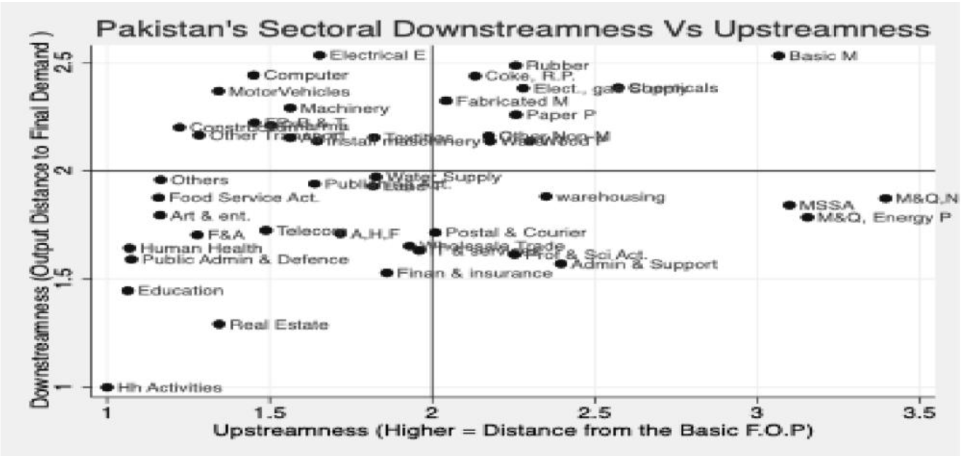
Third, the growing gap between rising downstreamness and falling upstreamness reflects a GVC structure where Pakistan is more focused on final-stage activities. These lower-value tasks may limit its ability to achieve higher margins and benefit from innovation spillovers.

Figure 12 highlights the importance of strategic upgrades in Pakistan that could move GVC participation toward higher-value roles. Progress in both areas could lead to stronger growth, particularly for middle-income countries like Pakistan, which have a weak position in downstream integration.

*Sectoral Mapping: The Case of Pakistan*

We categorize all sectors by their position in the GVC, distinguishing upstream and downstream sectors to support our argument for Pakistan. Figure 13 presents Pakistan's sectoral positioning in GVCs in 2022–2023.

**Figure 13: Pakistan's sectoral positioning in GVCs (2022–2023)**




Source: Author's calculations.

Each quadrant in Figure 13 represents different levels of upstreamness and downstreamness.

**Top-right quadrant (high upstream/high downstream):** This quadrant comprises core intermediate sectors that are deeply integrated into GVCs. Their products serve as inputs into lengthy production chains, making them strategically vital while also contributing indirectly to value creation. These sectors are part of complex, lengthy supply chains with significant potential for technological advancement. Examples include basic metals, chemicals, rubber, coke, and electrical equipment.

**Bottom-right quadrant (high upstream, low downstream):** These are typically raw material- or capital-intensive services closer to input provision but with outputs that quickly reach final demand. These sectors are resource-driven and not closely integrated downstream, resulting in fewer opportunities for multiple layers of value addition. Examples include mining and quarrying, energy production, and administration and support.

**Top-left quadrant (low upstream, high downstream):** These are downstream manufacturing sectors that often serve as assemblers, using a wide variety of imported or domestic inputs before exporting. While downstream integration can boost export growth, it may limit domestic value addition if upstream capabilities remain weak. Examples include motor vehicles, electrical equipment, machinery, and textiles.

**Bottom-left quadrant (low upstream, low downstream):** These sectors are non-traded or localized services with limited involvement in GVCs. They generate low foreign exchange but can still support domestic welfare and human capital. Examples include education, real estate, health, and public administration.

Pakistan's key industrial sectors, such as textiles, machinery, and motor vehicles, are located near the top-left, indicating a role as a final assembler that relies on imported inputs; high downstream, limited upstream.

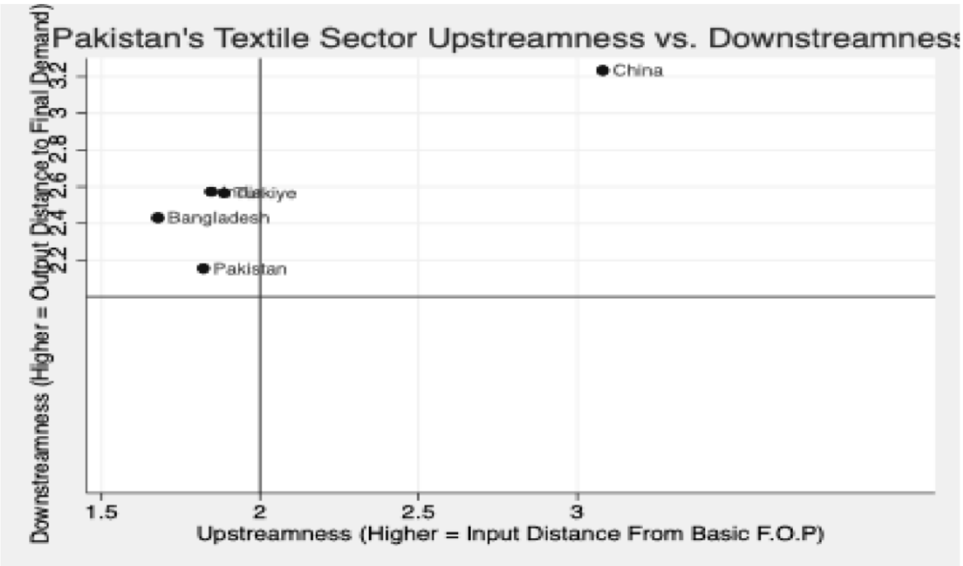
To boost domestic value addition, we recommend that Pakistan focus on further advancing along the value chain for sectors already involved in longer chains. This includes strengthening upstream industries (e.g., chemicals, metal processing), integrating them more closely downstream by building longer supply chains, and upgrading technological capacity in downstream sectors to shift them more upstream.

*A Case Study of Pakistan's Textile Sector*

This section provides a brief case study of Pakistan's textile sector in light of GVC positioning. Using a comparative analysis, we show that Pakistan's textile sector is less developed downstream and less technologically integrated than those of India and Bangladesh. It relies heavily on imported inputs and provides limited value-added.

Figure 14 shows the textile sector's relative position in 2022–2023, based on its downstream and upstream capacity in the GVC, compared to Bangladesh, Turkey, India, and China.

**Figure 14: GVC positioning of the textile sector across Pakistan and selected competitor countries**




Source: Author's calculations.

Pakistan's textile sector has a moderate upstream position and lower downstream involvement. This indicates that the sector imports a mix of domestic and foreign inputs, but its outputs are closer to final consumption (i.e., fewer intermediate processing steps remain). This reflects a narrower GVC role, common among final-stage exporters (e.g., garments), with limited integration into longer, multi-stage value chains.

Countries like India, Turkey, and Bangladesh have higher downstream positions, meaning their textile outputs undergo more transformation and use before reaching final demand. This suggests greater vertical integration and increased potential for value capture and complexity in the textile sector. Their upstreamness is comparable to, or slightly higher than, Pakistan's, indicating broader input diversity and greater involvement in intermediate stages. China stands out with significantly higher upstream and downstream activity. This shows a textile sector that produces key intermediate inputs and exports outputs used in complex, multi-country production chains. It reflects China's strategic dominance across the entire textile value chain, from inputs to advanced processing and integration.

Pakistan's textile sector exhibits the following features:

- The country assembles or finishes products using complex foreign inputs
- It adds limited intermediate value
- Pakistan's textile sector is less integrated and less value-adding in global production chains compared to its peers
- While it may be competitive in volume or labor costs, its limited upstream and downstream depth constrains opportunities for technological upgrading, branding, and innovation-led export growth

## Conclusion

GVC participation is essential, but not enough for long-term growth. Countries also need to aim for advantageous positioning. For Pakistan, the way forward involves reducing reliance, advancing up the value chain, and using both upstream and downstream integration for sustainable development. By adjusting its GVC approach, Pakistan can transform from a peripheral assembler to a key player in global production networks.

This paper examines the intricate relationships between GVC engagement and economic growth across various nation groupings and stages of development. Our results reveal several significant conclusions that support knowledge of GVC development tracks. First, GVC-linked trade has far more beneficial economic effects than traditional trade flows. Our cross-country regressions show that GVC-linked production (where products cross borders multiple times) positively affects productivity, GDP per capita, and trade performance. Traditional trade, on the other hand, is either negatively related to or unrelated to the same indicators, demonstrating the value of being part of GVCs.

Second, forward and backward linkages operate differently in promoting economic performance at varying levels of a country's development. In low-income countries, backward linkages facilitate early market access and promote export growth. In contrast, in high-income countries, forward linkages contribute to productivity growth and long-term development. Middle-income countries are particularly vulnerable to the unique challenges of transitioning from backward-driven to more balanced GVC participation patterns.

Third, the F/B linkage ratio becomes a strategic measure of countries' development paths. Economies that successfully industrialize tend to exhibit rising F/B ratios over time as they transition from assembly-focused participation to higher domestic capability building. Consistently low F/B ratios tend to indicate minimal upgrading and bottlenecks to sustainable growth.

Fourth, upstream-downstream positioning is also critical for value capture in GVCs. Upstream value activities are higher in value-added but lower in employment, whereas downstream employment-intensive activities are higher in employment but lower in value-added. Strategic repositioning toward more upstream activities, while maintaining domestic supply chain integration, will likely be needed for successful development.

Ultimately, our case studies reveal distinct patterns of GVC integration. Chinese sequential upgrading from assembly to components, US innovation-led forward integration, Indian service engagement, and Pakistani failure to upgrade under constrained conditions capture how nationally specific conditions and policy choices determine GVC outcomes. These findings support the notion that GVC engagement is not always beneficial; it has differential growth impacts that depend on the nature of integration, indigenous capacities, and accompanying policies. Policymakers' work is not merely to promote GVC engagement but to consciously determine its composition and direction to achieve maximum development benefits.

For firms with predominantly backward linkages ($F/B < 1$), strategic import facilitation is mainly required. This involves reducing tariffs and non-tariff barriers on intermediate and capital goods, creating bonded warehouses and export processing zones with streamlined customs clearance procedures, and utilizing electronic trade facilitation systems to minimize transaction costs. Domestic supplier development programs must be created to connect domestic firms with multinational firms, enabling technology transfers and knowledge spillovers. Strategic skills development is essential for aligning vocational education with GVC demand, promoting management training, and enabling targeted worker training programs. A gradual backward-to-forward transition strategy should also be pursued by identifying subsectors where domestic capabilities can be developed, phasing localization plans, and enabling applied research and development for technology adaptation.

Middle-income transition economies ($F/B \approx 1$) need to build innovation systems. Strengthened research-industry linkages, the establishment of technology centers, and investment in digital infrastructure facilitate entry into high-value activities. Strategies for upgrading, such as product development, functional upgrading, and chain upgrading, should be pursued to transition into higher value chains. High-end business services, such as design, finance, and logistics, propel GVC competitiveness. Meanwhile, regional value chain integration needs to be addressed through regional trade agreements, common standards, and enhanced infrastructure connectivity.

For high forward linkage (F/B > 1) countries, frontier innovation support plays a critical role in competitiveness sustenance. Investment in basic and applied research, better intellectual property systems, and support for the commercialization of research are critical. An advanced manufacturing retention policy must prioritize innovative specialization strategies, Industry 4.0 adoption, and high-value production technologies that integrate automation with specialized human capital. Regulatory systems for cross-border data flows and service trade agreements should enhance the development of service GVCs. Resilience improvement mechanisms, such as supply diversification, strategic inventory management, and the implementation of early warning systems, must be put in place to prevent disruptions.

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# 7

## Inflation Persistence and Expectations: Pakistan's Post-COVID-19 Inflationary Episode

**Kalim Hyder,[1] Sabina Khurram Jafri,[2] and Omar Farooq Saqib[3]**

### Abstract

*We posit that post-COVID-19 inflation persistence was at an elevated level due to high inflation expectations having morphed into a self-fulfilling prophecy amid cost shocks and policy uncertainty despite the slack in economic activity. We estimate a hybrid New Keynesian Phillips Curve for Pakistan and find a significant and positive pass-through of near-term inflation expectations on actual inflation. Specifying a threshold, the inflation expectations' explanatory power is further established as it is found to be three times greater in high-inflation periods than in low-inflation ones. Another unique result for a developing country like Pakistan is that both forward- and backward-looking expectations carry nearly equal impact in baseline estimates. Thus, our findings underscore the need for an effective anchoring of inflation expectations in Pakistan.*

### Introduction

The post-COVID-19 inflationary surge in Pakistan climbed to a multi-decade high level in FY 2023 and FY 2024 (Figures 1 and 2).[4] Initially, pent-up demand in a favorable monetary and fiscal policy environment, along with a global commodity price super cycle, pulled national consumer price index (NCPI) inflation into double digits. The fallout of the Russia-Ukraine war and supply-side disruptions from the 2022 monsoon floods in Pakistan further intensified

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[4] FY or the 'financial year' begins on 1 July and ends on 30 June the following year, e.g., FY 2023 = financial year 2022–2023.

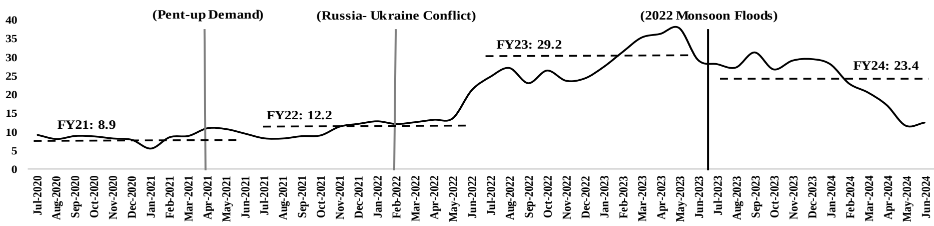
inflationary pressures. The second-round effects of higher food and energy prices and sizeable exchange rate depreciation also spilled into general prices.

The response to this inflationary surge began with the State Bank of Pakistan (SBP)'s contractionary monetary policy and macro-prudential measures in autumn 2022; fiscal policy was complemented with a wide range of tightening measures. These demand management policies arrested the pace of economic activity. The real gross domestic product (GDP) contracted by 0.21 percent in FY 2023 and grew only modestly (2.4 percent) in FY 2024, mainly due to agricultural output expansion. High-frequency domestic demand indicators remained largely compressed in both years.

However, despite this slack in overall economic activity, inflation did not plateau; instead, it remained at elevated levels in FY 2023 and FY 2024. We argue that this rigidity in inflation was due to inflation expectations, which, amid cost shocks in an environment of policy uncertainty, morphed into a self-fulfilling prophecy.

We formalize our hypothesis using a hybrid New Keynesian Phillips Curve (NKPC) in which near-term inflation expectations are established as a determinant of actual inflation in Pakistan. Estimates of the hybrid NKPC confirm that near-term inflation expectations (referred to as 'inflation expectations' going forward) have a positive and statistically significant impact on actual inflation.[5] Backward-looking expectations are also important in determining actual inflation in the estimates as they are also statistically significant.

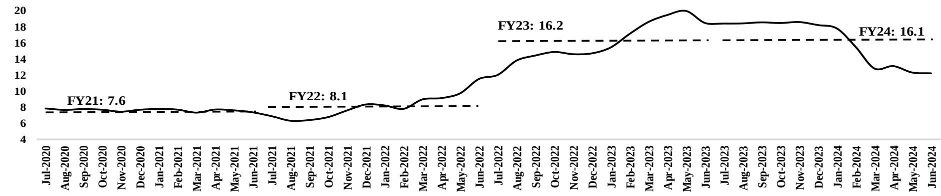
**Figure 1: NCPI inflation percentage (year-on-year), July 2020–June 2024**




Source: Pakistan Bureau of Statistics (PBS).

5 Near-term inflation expectations here are six-month-ahead inflation expectations. Refer to the Consumer Confidence Survey conducted by the Institute of Business Administration and the SBP.

**Figure 2: Non-food, non-energy (core) inflation: Urban percentage (year-on-year), July 2020–June 2024**




Source: PBS.

Our findings are further strengthened by analyzing the explanatory power of inflation expectations in a threshold regression with high- and low-inflation regimes. The pass-through estimates demonstrate that inflation expectations amplify current inflation three times as much in high-inflation regimes as in low-inflation regimes. This implies that prevailing conditions (e.g., high inflation, a matter for economic agents' expectations formation) are important drivers of inflation dynamics in Pakistan.

Another highlight of the estimation results is that both backward- and forward-looking expectations carry nearly equal impact in determining actual inflation in baseline estimates. This is a relatively unique result for a developing country like Pakistan since the share of backward-looking expectations tends to be larger than that of forward-looking ones in most developing countries.[6] Overall, our findings underscore the need for an effective anchoring of inflation expectations in Pakistan.

The study proceeds as follows. The next section is an empirical investigation that presents chronological facts about the demand- and supply-side sources of Pakistan's post-COVID-19 inflationary surge. Importantly, it establishes the theoretical link between inflation and inflation expectations, describing and justifying the conventional and subtle determinants of the formation of inflation expectations. We go on to present empirical evidence of the relationship between inflation and inflation expectations (using Pakistani data) through the estimates of a hybrid NKPC model. In doing so, we justify the adoption of a formal monetary policy regime to better anchor inflation expectations in Pakistan.

[6] Albrizio et al. (2023, p. 49). This also implies weak monetary policy.

## The Chronology of the Post-COVID-19 Inflationary Surge and the Link between Inflation and Inflation Expectations

The inflationary surge is mapped through the following shocks: pent-up demand, the Russia-Ukraine war, and the 2022 monsoon floods.

*Pent-up Demand*

The lag effect of domestic monetary and fiscal policies to counter the adverse impact of the pandemic's multiple waves was instrumental in facilitating pent-up demand after the lifting of lockdowns in late 2020. The SBP provided generous policy support, and the government rolled out sizable stimulus packages.[7] A strong inflow of worker remittances further pushed household incomes.[8] Hence, the combined effect of policy support and pent-up demand accelerated the country's GDP growth to around six percent during FY 2021 and FY 2022, driving inflationary pressures in the economy. At the same time, a rebound in global economic growth, also due to pent-up demand, widened global supply-demand imbalances, leading to a global commodity price super cycle. Concurrently, rising global trade volumes, alongside new COVID variants (Delta and Omicron) obstructed distribution networks and increased freight costs.

*The Russia-Ukraine War*

The commodity price super cycle was already a global challenge. The Russia-Ukraine war further aggravated price pressures from February 2022 onward, prompting advanced and emerging economies to tighten their monetary policies. The resultant stringency in financial conditions impeded global foreign exchange flows. At the same time, the rising US dollar and Pakistan's worsening current account deficit weakened the rupee considerably in FY 2022, especially in its fourth quarter.[9] Rupee depreciation also translated into higher domestic food and energy prices. In addition, the uptrend in inflation was further augmented by perishable

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[7] In addition to a 625-basis points reduction in the policy rate, the SBP provided a temporary economic refinance facility to aid new investments, refinance healthcare schemes, support the Rozgar scheme to prevent layoffs, finance a loan extension and restructuring package to ease borrowers' cash constraints. In the same vein, the government rolled out Ehsaas emergency cash transfers, offered a comprehensive agricultural sector package, accelerated tax refunds for export-oriented sectors, eliminated import duties on healthcare equipment, and provided utility bill relief; its stimulus amounted to PKR 1.2 trillion. The government also announced a construction package, while the SBP implemented mandatory construction financing targets for banks. Importantly, Pakistan's emergency cash intervention was ranked fourth in terms of the number of people covered, and third in terms of the share of population (source: Poverty Alleviation and Social Safety Division).

[8] Workers' remittances averaged around USD 2 billion per month during FY 2020–FY 2022.

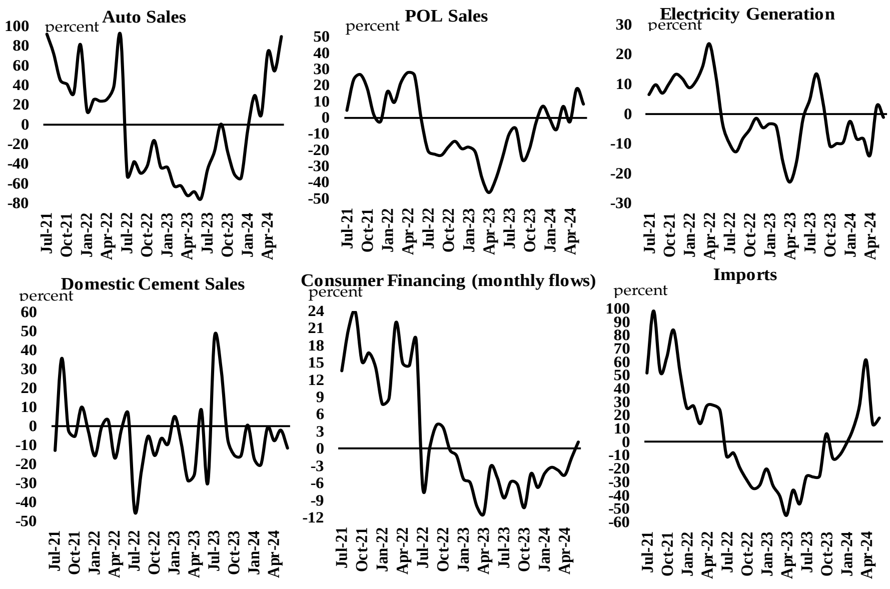
[9] The rupee depreciated by 13.2 percent during February–June FY 2022, compared to 11.2 percent during July–February FY 2022.

commodity shortages, an increase in tax rates under the Supplementary Finance Act, and an upsurge in power tariffs under the circular debt management plan.

*2022 Monsoon Floods*

Heavy rainfall and associated floods gave rise to supply shortages as food inflation rose by 37.6 percent in FY 2023 in urban areas, compared to 13.4 percent in FY 2022. Inflation in fresh milk more than doubled in both urban and rural areas and had the largest contribution to overall inflation in FY 2023.[10] The flash floods also caused significant damage to the livestock population,[11] causing upward pressure on the prices of milk, chicken, and meat. Delays in the drainage of standing water in agricultural fields cast doubts about the prospects of the timely plantation of the FY 2023 wheat crop, adding further impetus to the price uptrend. Amid flood-induced damage, perishable food items witnessed a sharp increase in inflation as well.

**Figure 3: High-frequency demand indicators: Year-on-year growth (July 2021–April 2024)**




Sources: Oil Companies Advisory Council, Pakistan Automotive Manufacturers Association, All Pakistan Cement Manufacturers Association, National Electric Power Regulatory Authority, SBP, and PBS.

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[10] The contribution of milk and wheat stood at 2.1 and 2.2 percentage points, respectively, during FY 2023 in urban CPI inflation. In rural areas, wheat and milk contributed 3 and 4.4 percentage points to inflation, respectively, in FY 2023 (source: PBS).

[11] Around one million heads of livestock perished (source: Government of Pakistan, 2022, p. 17).

*The Link Between Inflation and Inflation Expectations*

The chronology above shows that both aggregate demand and cost shocks created inflationary momentum in Pakistan's economy. To counter this, the SBP and government implemented a host of demand-compression measures starting from the autumn of 2022.[12] As a result, all major high-frequency domestic demand indicators, including the sales of automobiles, cement, and petroleum products, showed a considerable decline; imports plummeted, consumer financing shrank, and growth in electricity generation remained negative (Figure 2). Compared to nearly 6 percent growth in both FY 2021 and FY 2022, real GDP growth declined by 0.21 percent in FY 2023 and grew only moderately by 2.4 percent in FY 2024.[13] However, despite this slack in economic activity, inflation rose and persisted in both FY 2023 and FY 2024 (Figure 1); rigidity in the core component was especially noteworthy (Figure 2).

We attribute this intractable behavior of inflation to elevated, and somewhat entrenched, inflationary expectations. As the theory posits, in cases of higher future inflation expectations, both producers and consumers try to stay ahead of rising costs by setting higher prices and demanding higher wages, respectively.[14] Such behavior transforms into a self-fulfilling prophecy: expectations of higher inflation cause higher inflation. The commonly cited factor forming these expectations is economic shocks stemming from aggregate demand, commodity markets, or the foreign exchange rate, which then affect trend inflation.[15]

While the earlier rise in pent-up demand in Pakistan was a driver of inflation expectations, the role of the aforementioned supply-side developments should also be noted.

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[12] Specifically, the SBP undertook the following measures: (i) raising the policy rate by a cumulative 1,500 basis points during FY 2022 and FY 2023, (ii) tightening macro-prudential measures for auto and consumer financing in September 2021 and May 2022, (iii) increasing the cash reserve requirement for commercial banks in November 2021, (iv) imposing a 100 percent cash margin requirement on a number of import items in April 2022, and (v) issuing a prior approval list for a number of import items in December 2022. The government complemented these measures by: (i) increasing the federal excise duty on locally assembled cars, (ii) eliminating various tax exemptions under the Supplementary Finance Act in FY 2022 and FY 2023, (iii) imposing a ban on the import of non-essential items, (iv) temporarily halting fresh disbursements under the Mera Pakistan Mera Ghar and Kamyab Jawan Youth Entrepreneurship loan schemes, and (v) gradually rolling back its fiscal package.

[13] GDP growth in 2024 was mainly due to better crop production as the impact of contractionary policies continued, with large-scale manufacturing growing only marginally and overall industrial activity contracting.

[14] For inflation expectations as a central driver of inflation dynamics, see D'Acunto et al. (2023), Werning (2022), Clark and Davig (2009), Mishkin (2007), and Bernanke et al. (2001).

[15] Mishkin (2007). Some studies also account for similar determinants of inflation expectations, e.g., Moessner (2022) for the Euro area, Patra and Ray (2010) for India, Mehra and Reilly (2008) for the US, and Cerisola and Gelos (2005) for Brazil.

First, the 2022 monsoon floods dented expectations of a better wheat crop in FY 2023, apart from causing supply shortages in the food market. In addition, there was a lingering adverse impact of the Russia-Ukraine war on global commodity prices and the rupee exchange rate.

Second, the rupee continued to depreciate substantially since the second half of FY 2022 despite a sharp contraction in the current account deficit. This occurred against the backdrop of uncertainty surrounding the resumption of International Monetary Fund (IMF) program reviews and ensuing constrained foreign exchange inflows.[16] Overall, the rupee depreciated by 28.2 percent in FY 2023, compared to 9.9 percent in FY 2022.

Third, temporary import restrictions in FY 2022, including bans on certain items, raised concerns about the continued domestic supply of various commodities, which further stoked inflationary expectations.

Another subtle contributor to the formation of higher inflation expectations in FY 2022 and FY 2023 was the general uncertainty stemming from adverse political developments. In effect, political noise created policy uncertainty for the markets as it signaled the government's diminished ability to manage unfavorable shocks and its implementation of consistent or coherent policies, such as the much-delayed IMF stabilization program.[17]

## Inflation Expectations and Actual Inflation: The Evidence

We apply a hybrid NKPC model to assess whether the relationship between inflation expectations and actual inflation in Pakistan holds in the causality sense. The widely used NKPC model describes past inflation, inflation expectations, and a measure of aggregate demand as the main drivers of current inflation. Thus, in determining inflation in Pakistan, we follow Gali and Gertler (1999) and consider a hybrid NKPC model to quantify the role of inflation expectations in influencing actual inflation:

$$\pi_t = \alpha + \beta^{\mathrm{f}} * \mathrm{E_t}(\pi^e_{t+1}) + \beta^{\mathrm{b}} * \pi_{t-1} + \Theta * Gap_t + \epsilon_t \qquad (1)$$

$\pi_t, \pi_{t-1}$, and $\mathrm{E_t}(\pi^e_{t+1})$ are current inflation, lagged inflation, and inflation expectations, respectively. Inflation data (NCPI) is taken from the PBS. Inflation expectations here are six-month-ahead inflation expectations taken from the

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[16] Pakistan entered a three-year extended fund facility program with the IMF in 2019.

[17] Empirically, the nexus between political instability and inflation is well established, e.g., Aisen and Veiga (2006) and Khan and Saqib (2011).

Consumer Confidence Survey conducted by the Institute of Business Administration and the SBP. $Gap_t$ is the output gap, which is a cyclical series of the Hodrick-Prescott filter applied to the industrial production index of the large-scale manufacturing sector (from the PBS).[18] The estimation sample is two-monthly data from January 2012 to September 2023.

Using the same set-up, we further check if the pass-through of inflation expectations to actual inflation is high during high-inflation periods and low in low-inflation ones. Investigating this facilitates an understanding of the explanatory power of inflation expectations.

Therefore, with the objective of assessing the explanatory power of inflation expectations in a high-versus-low inflation environment, we specify a threshold regression as follows:

$$\pi_t = \alpha + \beta^{f^H} \times E_t(\pi^e_{t+1}) \times D^h + \beta^{f^L} \times E_t(\pi^e_{t+1}) \times (1 - D^h) + \beta^b \times \pi_{t-1} + \Theta \times Gap_t + \epsilon_t \quad (2)$$

where,

$D^h = \begin{Bmatrix} = 1 \; if \; \pi_t > \overline{\pi_t} \\ = 0 \; if \; \pi_t \leq \overline{\pi_t} \end{Bmatrix}$; where $\overline{\pi_t}$ is sample average inflation.

The estimates for Equations 1 and 2 are presented in Table 1. The coefficients have priori signs, are statistically significant, and pass all the diagnostics. The diagnostics indicate that there is no endogeneity-induced inconsistency or missing variable bias in the estimates.

The estimates in Equation 1 represent the impact of inflation expectations, our variable of prime concern, on current inflation. The results are in line with our theoretical predictions and empirical literature on NKPC. A one-percentage-point increase in inflation expectations raises current inflation by 0.14 percentage points. Thus, this establishes that inflation expectations are a determinant of actual inflation in Pakistan.

Furthermore, the significance of the coefficient of past inflation outturns (lagged NCPI) indicates that firms, when setting prices, and consumers, when

[18] Gali and Gertler (1999) emphasize the importance of using direct measures of real marginal cost, such as labor income share. However, we use the output gap (which has been widely used in NKPC literature) because of a lack of availability of such firms' marginal cost data. In another estimation of NKPC for Pakistan, Hyder and Hall (2020) use other approximations of sector-wise marginal costs. However, their approach is beyond the scope of this study.

demanding wages, take past realizations of inflation into account. In particular, a one-percentage-point increase in inflation expectations raises current inflation by 0.13 percentage points. This result adds to the findings on inflation expectations above, accentuating the persistence aspect of actual inflation.

**Table 1: Estimates of Equations 1 and 2 (January 2012–September 2023)**

| **Dependent variable** | **NCPI Equation 1** | **NCPI Equation 2** |
|---|---|---|
| Constant | 0.09 | 0.11 |
| | (0.54) | (0.62) |
| Inflation expectations | 0.14[a] | - |
| | (0.001)* | |
| Inflation expectations (high-inflation regime)[b] | - | 0.27[a] |
| | | (0.00)* |
| Inflation expectations (low-inflation regime)[b] | - | 0.01[a] |
| | | (0.001)* |
| Output gap | 0.02[c] | 0.02[c] |
| | (0.10)*** | (0.13) |
| Lagged NCPI | 0.13 | 0.12 |
| | (0.10)*** | (0.10)*** |
| Trend | 0.01 | 0.01 |
| | (0.002)* | (0.002)* |
| $R^2$ | 0.26 | 0.28 |
| F-stat | 11.86 | 10.60 |
| Durbin-Watson | 2.01 | 2.06 |
| $Q_1$ | 0.023 | 0.19 |
| | [0.88] | [0.66] |
| $Q_1^2$ | 4.80 | 3.22 |
| | [0.11] | [0.20] |
| Lagrange multiplier test (serial correlation) | 0.010 | 0.83 |
| | [0.90] | [0.44] |
| Durbin-Wu-Hausman test | | |
| Difference in J-stats (inflation expectations) | 0.03 | 0.53 |
| | [0.86] | [0.46] |
| Difference in J-stats (output gap) | 0.58 | 0.40 |
| | [0.44] | [0.52] |

Standard errors of coefficients are given in parentheses, and probabilities are given in square brackets.

[a] Short-run estimate. Long-run estimate = short-run estimate divided by one minus the lagged NCPI estimate.

[b] If $\pi_t > \overline{\pi_t}$, high-inflation regime. If $\pi_t \leq \overline{\pi_t}$, low-inflation regime. $\overline{\pi_t}$ = 10.1 percent in the January 2012–September 2023 sample.

[c] Estimated coefficients were divided by 100.

*, **, and *** indicate significance at one percent, five percent, and ten percent, respectively.

The coefficient for the measure of aggregate demand activity (output gap) is relatively smaller than the other determinants, implying its somewhat limited role in determining inflation in Pakistan. A relatively small coefficient of the output gap could also be due to the specification of the hybrid NKPC, since it is criticized for not incorporating the supply side (e.g., Batinia et al., 2005). In the same vein, Ho and McCauley (2003) suggest the significance of the exchange rate in the evolution of domestic inflation, which tends to be greater for emerging market economies than for developed economies. In addition, Sahu (2013) uses an open-economy model for India and finds that fuel inflation, the exchange rate, and foreign inflation are significant determinants of India's inflation (Hayashi et al., 2015, p. 5). Nonetheless, the lack of supply-side determinants does not undermine our estimated equations, as they pass all diagnostics.

Further analysis of the findings in Table 1 is captured in the estimates of Equation 2. In particular, we analyze whether the effect of inflation expectations on actual inflation changes with the prevailing level of inflation. The results for the interactive high- and low-inflation regimes reveal that inflation expectations have a higher and significant impact on current inflation in a high-inflation regime, while the impact is moderate in a low-inflation regime. In a high-inflation regime, if inflation expectations increase by one percentage point, inflation increases by 0.27 percentage points. In the case of a low-inflation regime, a one-percentage-point increase in inflation expectations increases inflation by 0.10 percentage points.

The results from Equation 2 underline the relevance of inflation expectations for economic agents. For example, as observed by Coibion et al. (2020), economic agents may reduce the information content of expectations when inflation is low and stable, but may become more attentive when inflation is high and volatile, thereby making expectations a major driver of actual inflation.[19] In our period of analysis, headline NCPI inflation averaged 17.4 percent during January 2020–December 2023, coinciding with the post-COVID-19 inflationary surge, as compared to only 6.3 percent during January 2012–December 2019.

These results also highlight the possibility of inflation expectations morphing into a self-fulfilling prophecy during high-inflation periods, which, in our sample, coincides with the post-COVID-19 inflationary surge. Therefore, despite a contractionary policy stance and ensuing drag in domestic demand and overall slack in economic activity, inflation's rigidity at a higher level has been due to

[19] This observation is reproduced from Albrizio et al. (2023, p. 50).

elevated and entrenched inflationary expectations, especially in the second half of FY 2023 and during the first quarter of FY 2024.

Another important interpretation of the results relates to the estimates of inflation expectations and lagged NCPI in Equation 1. We observe that the size of its estimated coefficient (0.13) is only marginally less than the estimate of inflation expectations (0.14). This implies that both forward- and backward-looking inflation expectations impact current inflation nearly equally. This finding is relatively unique because the weight of backward-looking agents is usually greater than that of forward-looking ones in a typical developing economy like Pakistan. As already noted, Albrizio et al. (2023, p. 49) observe that in most developing countries, the share of backward-looking expectations tends to be larger than that of forward-looking ones, which implies weak monetary policy since backward-looking agents tend to focus more on past outturns of inflation and less on forward-looking monetary policy actions. This is also corroborated by Dizioli and Wang (2023), who note that the inflation expectations of economic agents are based on the adaptive learning of available information, which produces inflation inertia.

Hence, this adaptive nature prolongs the time required for disinflation and increases its cost by weakening the effectiveness of monetary policy. Nonetheless, the significance of both forward-looking (especially in high-inflation periods) and backward-looking expectations highlights the need for improved and effective management of inflation expectations in Pakistan.

## Concluding Remarks

Tracking the multi-decade high post-COVID-19 inflationary surge in Pakistan, we mapped its sources to demand- and supply-side factors, namely pent-up demand, the Russia-Ukraine war, and the 2022 monsoon floods. The demand management policy response to counter the inflationary surge induced a decline in several high-frequency domestic demand indicators and a visible slack in overall economic activity in FY 2023 and FY 2024. Despite this, inflation continued to climb higher and remained at an elevated level. In other words, even invoking a recession did not help induce disinflation. We attribute inflation's relatively rigid behavior to inflation expectations. In particular, amidst several cost shocks in an environment of uncertainty, inflation expectations morphed into a self-fulfilling prophecy, due to which inflation did not plateau.

As evidence, we applied a hybrid NKPC model and formalized inflation expectations as a determinant of actual inflation in Pakistan. Inflation expectations, as gauged by the Consumer Confidence Survey, have a positive and significant pass-through on actual inflation. Furthermore, the explanatory power of inflation expectations in a threshold-augmented estimate demonstrates that the pass-through of inflation expectations on actual inflation is three times as high in high-inflation periods as in low-inflation ones. This signifies the importance of prevailing circumstances in driving inflation dynamics in Pakistan.

What policy lessons can we draw from this post-COVID-19 inflationary surge in Pakistan? Indeed, we should introduce ways and means for an improved mechanism for the management of inflation expectations. In this regard, making monetary policy more effective in anchoring inflation expectations by adopting a formal framework, such as an inflation-targeting monetary policy regime, would be optimal. Several emerging economies have successfully anchored inflation expectations by adopting such a framework. Even in the post-COVID-19 inflationary surge, some inflation-targeting economies, such as India, have fared well in anchoring inflation expectations.[20]

[20] See, for example, Kose et al. (2019) for a review of the successful implementation of inflation-targeting monetary policy regimes in Brazil, Chile, and Poland. For India, see Eichengreen and Gupta (2024).

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# 8

## Sustainable Industrial Policies and Industrial Upgrading: The Southeast Asian Experience

**Rajah Rasiah**[1]

**Abstract**

*The latecomer industrialization thesis has acted as a powerful instrument in promoting industrialization. However, there is insufficient research to explain why some economies that attempted to industrialize are facing premature deindustrialization while others have managed to not only catch up economically but also shape the technology frontier in a number of industries. This paper problematizes and assesses industrial policies and industrialization in Southeast Asia, focusing on the United Nations Sustainable Development Goals (SDGs). Geographic areas of interest include Timor-Leste; the market economies of Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, and Thailand; and the transition economies of Cambodia, the Lao People's Democratic Republic (PDR), Myanmar, and Vietnam. Driven by an agile state, Singapore managed to become a developed economy through strong industrial upgrading. By 2024, Malaysia had launched four national industrial policies, while Indonesia, the Philippines, and Thailand introduced ad hoc strategies to support industrialization. Foreign transnational corporations have played a major role in stimulating manufacturing expansion in these economies. Meanwhile, Singapore's deindustrialization has been accompanied by strong technological upgrading, while Indonesia, Malaysia, the Philippines, and Thailand have embarked on developing strategic high-technology industries, such as aerospace, to raise value added after years of premature deindustrialization. If governed effectively using a carrot-and-stick approach, it is possible for these countries to break out of the middle-income trap and reach developed status. Brunei Darussalam has shown promise in its efforts since 2018 to stimulate petroleum-related downstream processing. Vietnam has industrialized the most among the transition economies; its gross domestic product per capita has grown rapidly to join Indonesia and the Philippines in lower middle-income*

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*status. While Cambodia, Lao PDR, and Myanmar have industrialized considerably, they remain at a crossroads, with little effort to build the science, technology, and innovation infrastructure required to stimulate industrial upgrading. Timor-Leste is still pegged in primary processing activities.*

**Introduction**

Past research on industrial policy helped establish the steps latecomers took to industrialize successfully (e.g., Gerschenkron, 1952; Abramovitz, 1956; Chang, 2003; Reinert, 2007). However, the literature lacks an explanation of why several other economies that attempted to industrialize are facing premature deindustrialization. Meanwhile, growing concerns over dirty, dangerous, and demeaning industries have attracted sustainability as an unavoidable condition to industrialize. Indeed, these developments have attracted a focus on the promotion of industrialization that impacts the emergence of egalitarian economies propelled by digitalization and climate resilience. The United Nations Sustainable Development Goals (SDGs), especially SDGs 7, 8, 9, and 13, emphasize this shift.

Focusing on Southeast Asia, this paper argues for the need for sustainable industrial upgrading alongside initiatives to strengthen climate resilience. Southeast Asia is a suitable region to examine because, apart from Timor-Leste, the region's countries have launched industrial policies as a key instrument of development. Yet, only Singapore has managed to sustain rapid growth to enjoy a per-capita income (current prices) of USD 90,674 in 2024, which was 2.7 times that of Brunei Darussalam (USD 33,418), 7.6 times that of Malaysia (USD 11,867), 12.3 times that of Thailand (USD 7,345), 18.4 times that of Indonesia (USD 4,925), and 22.8 times that of the Philippines (USD 3,985). Against the transition economies and Timor-Leste, Singapore's gross domestic product (GDP) income in 2024 was 19.2 times that of Vietnam (USD 4,717), 34.5 times that of Cambodia (USD 2,628), 42.7 times that of the Lao People's Democratic Republic (PDR) (USD 2,124), 66.7 times that of Myanmar (USD 1,359), and 67.5 times that of Timor-Leste (USD 1,343) (World Bank, 2025).

Unlike the experiences of Japan, South Korea, and Taiwan, where industrialization was propelled by national firms, foreign transnational corporations (TNCs) (including joint ventures) have played a major role in stimulating manufacturing expansion in the Southeast Asian economies. Foreign firms were attracted to the export processing zones of Masan and Incheon (South Korea) and Kaohsiung (Taiwan), but both countries' dramatic expansion as exporters of manufactured goods relied on national firms. In South Korea, these included:

- LG Corporation and Samsung Electronics Co. (electronics)
- Hyundai Motor Company, Kia Corporation, and Genesis Motor (automobiles)
- POSCO Holdings, Hyundai Steel Company, Dongkuk Steel Mill Co., and Kumkang Kind Co. (steel manufacturing)
- HD Hyundai Heavy Industries Co., Samsung Heavy Industries Co., and Hanwha Ocean Co. (shipbuilding-led industrial upgrading)

In Taiwan, these included:

- Taiwan Semiconductor Manufacturing Company, MediaTek, United Microelectronics Corporation, ACES Electronics Co., and ASUSTeK Computer (electronics)
- Victor Taichung Machinery Works Co., Tongtai Machine and Tool Co. (part of TTGroup), and Goodway Machine Corp. (computer numerical control machines and machine tools)
- China Steel Corporation (steel manufacturing)
- Nan Ya Plastics Corporation, Formosa Plastics Corporation, USI Corporation, Wapo Corporation, King Yuan Fu Packaging Co., Everplast Machinery Co., and Toford Plastic Manufacturing Co. (plastic and rubber machinery manufacturing)

This paper attempts to explain the state of industrial development in Southeast Asia with a focus on stimulating upgrading to the frontier and anchoring the SDGs. Specifically, it addresses the achievement of SDGs 7, 8, 9, and 13. SDG 7 refers to the transition to affordable and clean energy; SDG 8 promotes inclusive, sustainable economic growth, full and productive employment, and decent work for all; SDG 9 calls for building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation; and SDG 13 addresses climate action.

The rest of the paper is organized as follows. The next section introduces key theoretical arguments. This is followed by a discussion on the manufacturing expansion experience of the Southeast Asian countries. The next section focuses on the evolution and implementation of digitalization and greening policies in these countries, and the last section presents conclusions.

**Theoretical Considerations**

Southeast Asia's industrialization did not follow the paths begun by latecomers such as the US, Germany, Japan, South Korea, and Taiwan. The early introduction of industrialization to the market economies of Indonesia, Malaysia, the Philippines, Singapore, and Thailand was largely an attempt to diversify exports to reduce dependence on a narrow range of commodities and to avoid the problem of the fallacy of composition (see Prebisch, 1950; Singer, 1950).

The initial focus was on the promotion of light, labor-intensive manufactured goods to generate employment through the stimulation of foreign direct investment (FDI). Indonesia, Malaysia, the Philippines, and Thailand introduced import-substitution industrialization, a strategy that failed to contribute significantly to rapid economic growth. This was because it paid insufficient attention to technological upgrading and was not accompanied by a quick switch to export orientation. In contrast, Singapore enjoyed massive growth and structural change by switching completely to export orientation in 1965 and focusing on technological upgrading since 1979.

Smith (1776) and Young (1928) argue over the differentiation and division of the labor potential of manufacturing to produce dynamic increasing returns. Industrial expansion through technological upgrading can be traced to latecomer strategies. The latecomer thesis on industrialization originally focused on broad-brush approaches that simply documented how Britain industrialized and subsequently on the catch-up experiences of the US, Germany, and other countries (Gerschenkron, 1952; Abramovitz, 1956). This thesis was later extended by Kaldor (1967), Chang (2003), and Reinert (2007).

It is pertinent to distinguish between:

- **Active industrial policy:** Industrialization strategies that are actively pursued to target industrial upgradation, often by identifying strategic industries, to spur rapid structural change
- **Passive industrial policy:** Industrialization strategies that take advantage of foreign firms' efforts to seek labor-surplus sites to relocate labor-intensive operations

Active industrial policies are those where governments promote industrialization, targeting industries, identifying strategies, and monitoring industrial performance. Japan, South Korea, and Taiwan launched active industrial policies led by national firms that eventually reached the technology frontier. Indeed, active industrial policies under the aegis of national firms drove the catching up and technological leapfrogging of manufacturing in South Korea and Taiwan. More than a focus on infrastructure, governments actively supported upgrading in South Korea and Taiwan (Amsden, 1989; Wade, 1990; Chang, 2003; Reinert, 2007). Although Ireland and Singapore adopted the export-processing zone approach, their governments intervened to ensure that incentives and grants were strictly tied to industrial upgrading through the use of leveraging strategies and an active pursuit of human capital. Brunei Darussalam's forays into manufacturing since 2018 (which drove rapid manufacturing growth) were also pivoted by leveraged interventions (see Ahmed, 2024).

The active industrial policies of Singapore, South Korea, and Taiwan sought to create desired endowments rather than leaving industrial strategies to be dictated by existing relative endowments. Neoclassical economists (e.g., Helleiner, 1973; Bhagwati & Brecher, 1980; Krueger, 1980) have argued that some government interventions are proscriptive, i.e., designed to correct past government failures and infrastructure shortcomings.

Rasiah (2025) used a stylized framework based on specialization emerging from factor endowments defined by relative prices of the neoclassical school. This shows that labor-intensive foreign firms from capital-surplus and labor-scarce developed countries relocate to labor-surplus and capital-scarce middle-income countries (MICs) and low-income countries (LICs).

MICs are expected to focus on attracting firms that require literate and trainable labor, while LICs are expected to attract the most labor-intensive firms. Through proscriptive interventions, host governments are encouraged to offer basic infrastructure, security, and simplified customs handling. Tariff exemptions and tax holidays are also recommended to lower the risk of relocating to underdeveloped sites. Once this process is set in motion, capital is expected to relocate labor-intensive operations to MICs and LICs, which is then expected to raise interest rates (r1) and lower wages (w1) at high-income country (HIC) sites, while lowering r2 and raising w2 at MIC and LIC sites. Meanwhile, with the use of flexible exchange rates, the LICs and MICs export highly labor-intensive and moderately labor-intensive goods to the HICs, while the HICs are expected to export capital- and technology-intensive goods to the MICs and LICs. The continued flows of investment from HICs to MICs and LICs (and also MICs to

LICs) are expected to result in an equalization of r and w across the countries, as would be the case with GDP per capita.

Apart from Singapore, most of the Southeast Asian economies have followed passive industrial policies by developing basic infrastructure, incentives, and security to attract foreign firms. Malaysia, the Philippines, Thailand, Indonesia, and Vietnam (MICs) have grown through the export processing route (Rasiah, 2020), while Cambodia and Lao PDR (LICs) have enjoyed similar growth experiences since the turn of the millennium (Rasiah & Yun, 2009). Myanmar and Timor-Leste, which sought to follow the same route, have achieved little manufacturing expansion since 2020 owing to political instability and poor infrastructure. In addition, Myanmar has faced economic sanctions since 2003 (Rasiah & Myint, 2013).

In this context, the World Bank (1993) glorifies the passive industrial policy approaches undertaken by Indonesia, Malaysia, the Philippines, and Thailand as having fewer policy failures and being well-positioned to follow global trade practices under the World Trade Organization. However, Rasiah (2020) argues that these countries have not yet succeeded in breaking out of the middle-income trap.

Amsden (1989, 1991) and Kim (1997) offer empirical evidence to support the latecomer catch-up thesis by focusing on the diffusion of innovation from abroad using specific host-site firms in South Korea. Following Johnson (1982) and Wade (1990), they extend developmental state arguments on how industrial policy was used successfully to stimulate economic development. In this tradition, Mazzucato (2013) frames their mission-oriented and smart intervention industrial policy arguments. Ocampo (2020), then, is able to connect policy with technological learning and upgrading through incremental innovations. Rasiah (2018) goes further by incorporating Schumpeter's (1934, 1942) concepts of incremental and radical innovations using the experience of firms in South Korea (e.g., Samsung Semiconductors) and Taiwan (e.g., Taiwan Semiconductor Manufacturing Company). Samsung took leadership of the flash memory market in 2002 (Park, 2021), overtaking firms like Texas Instruments in the integrated circuits industry. This is an example of how South Korea and Taiwan, despite contrasting industrial policies, successfully caught up with and leapfrogged over incumbents (Rasiah & Yap, 2019).

South Korea and Taiwan had also begun integrating into the world economy in the same way as the Southeast Asian economies. However, they then began to focus on the latecomer catch-up model in the early 1970s by prioritizing domestic ownership in strategic industries (Amsden, 1989; Wade, 1990). In addition, South Korea and Taiwan introduced monetary policies to ensure that volatile fluctuations in capital and trade flows did not destabilize their industrialization initiatives. Prudent monetary policies ensured that the new Taiwan dollar exchange rate against the US dollar did not fluctuate sharply. Similarly, South Korea imposed controls on foreign exchange from 1961 until the 1970s. This included controlling private entities' borrowings from abroad and maintaining state ownership of banks until the 1980s. South Korea also fixed its currency, the won, against the US dollar between 1974 and 1979 to stem the negative impact of a growing balance-of-payments problem and debt service issues when oil prices rose by four times in 1973–1975. Targeted firms, especially the *chaebols* (family-owned conglomerates), enjoyed subsidized interest rates. Simultaneously, the government imposed high arbitrage interest rate differentials between borrowing and lending to gradually reduce external debt while supporting the *chaebols* (Amsden, 1989; Chang, 1994).

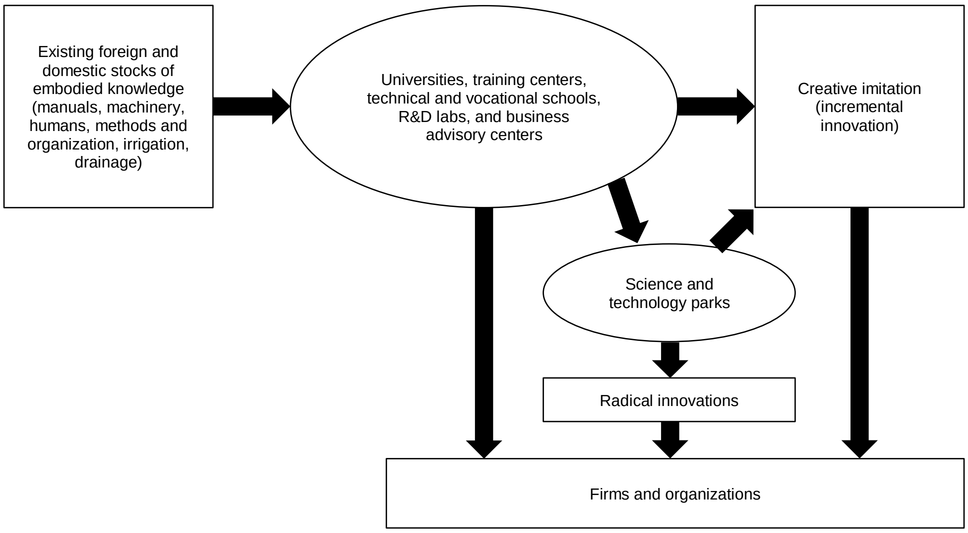
National capital dominated industrialization through massive technology flows from foreign multinationals (licensing and acquisitions played a significant role) and industrial catch-up in Japan, South Korea, and Taiwan. However, the Southeast Asian economies demonstrated the strong role of FDI. For example, Singapore's Economic Development Board (EDB) stimulated industrial upgrading to high value-added activities in both multinationals and national firms through a leveraging strategy (Rasiah, 2020b).

A stylized model of industrial policy can be developed by combining the key arguments of the manufacturing experiences of Japan, Singapore, South Korea, and Taiwan. The generation and adaptation of knowledge, incentive systems, and the appropriation of knowledge flows were critical to stimulating individuals, firms, and organizations to connect and coordinate with knowledge nodes that create synergies for technological catch-up. Given the public good characteristics of the knowledge necessary to stimulate innovation, its governance should prioritize innovation-driven technological upgrading. However, the ecosystem embedding and supporting firms and organizations must be anchored to four systemic pillars (Rasiah, 2019). The emphasis on innovation in such a network of pillars should range from incremental (minor) to radical (major) innovations, including interactive learning, to support the generation and appropriation of innovations. In such a framework, machinery and equipment (both domestic and from abroad) and embodied knowledge in humans should be continuously adapted to raise industrial productivity (Figure 1). The organizational setup can vary between countries because how initial conditions and economic structures are shaped is of considerable importance.

Institutions must be structured to pursue macroeconomic policies that provide the financial incentives and grants essential to both supporting innovative economic activity and insulating against external shocks. Institutions require strengthening to meet stringent appraisal standards to check unproductive rent-seeking. Amsden (1993) and Kim (1997) provide a lucid account of innovation appropriation and economic catch-up from foreign sources in South Korea and Taiwan. In addition, the public good characteristics of knowledge creation and appropriation (innovation) were harnessed effectively in South Korea and Taiwan. To ensure that countries achieve even regional development, effective institutional coordination between federal, provincial, and local governments becomes essential (see Rasiah & Zhang, 2015).

Critical organizations relevant to institutionalizing knowledge creation and appropriation on a national scale (universities, public labs, standards organizations, and incubators at science parks) must play an active role in stimulating incremental and radical innovations with a focus on evolving experiential and tacit knowledge (see Penrose, 1959; Polanyi, 1966; Dosi, 1995; Rasiah, 1995). Collectively, these instruments can be referred to as science, technology, and innovation (STI) infrastructure. While first movers initiate cycles of innovation, latecomers engage in incremental innovation (Schumpeter, 1942). As countries graduate from least developed to middle income, governments should ensure that gross expenditure on research and development (R&D) gradually rises. Instead of simply seeking a gradual displacement of government expenditure with business expenditure in gross domestic R&D, there should be a focus on non-business public expenditure to address STI infrastructure funding. Unfortunately, while the STI infrastructure has evolved strongly with connectivity and coordination between STI organizations, firms, and individuals since 1991, it has not done so in the remaining Southeast Asian countries.

**Figure 1: Innovation networks and knowledge synergies**




Adapted from Rasiah (2007).

Knowledge is a special public good. It is both non-excludable and non-rivalrous. Therefore, governments should support R&D as public returns exceed private returns in such circumstances. This also applies to regulatory mechanisms where technologies and their application enhance societies, digital platforms, and climate resilience (Figure 1). Climate resilience is often portrayed by economists as a negative externality that is also a global common, as its non-excludability and non-rivalrousness affect all countries (Marshall, 1890; Pigou, 1932; Samuelson, 1954; Baumol & Oates, 1988; see also Hardin, 1968). In contrast to knowledge, basic infrastructure is a public utility, as it is rivalrous.

Within public goods, resources are deployed to undertake research that generates knowledge, some of which is converted back to resources, including those with pecuniary value, with the uptake of intellectual property. A considerable part of the knowledge generated in the process seeps through and is appropriated by other economic agents to produce resources that are not appropriable by the creators of that knowledge (Rasiah, 2025). This notion of free riding (which benefits society) makes the case for governments to take charge, as public returns exceed private returns. The regulatory framework not only needs to support economic synergies but must also support social synergies, including climate resilience.

Having addressed the key structures that countries should construct and renew to stimulate innovation and economic synergies, the next section discusses Southeast Asian industrial policies in the 1990s and 2000s.

**Industrial Policy**

The Southeast Asian market and transition economies underwent industrialization without a significant focus on building climate resilience. Climate resilience and digitalization emphasis only reached these countries in the 1990s and from the turn of the millennium. Timor-Leste is still engrossed in agriculture without a clear industrial master plan (Courvisanos et al., 2025). Hence, this paper focuses on industrialization efforts in the Southeast Asian economies since 2000.

Singapore achieved high-income status with a transition to scope-based designing and small-scale, but intensive manufacturing. Indonesia, Malaysia, the Philippines, Thailand, and Vietnam, instead, focused on large-scale industrialization with a specialization in low and medium value-added industrial activities (Rasiah, 2020b). Cambodia, Lao PDR, and Myanmar are specializing in low-value industrial activities. Brunei Darussalam has mounted strategies using digitalization to complement its mining sector. Timor-Leste is still very focused on downstream processing and low-technology consumables to substitute for burgeoning imports (Rasiah & Zhang, 2015; Courvisanos et al., 2025).

*Market Economies*

Given their considerable exposure to capitalist relations, the market economies of Singapore, Indonesia, Malaysia, the Philippines, Thailand, and Brunei Darussalam are examined first, followed by the transition economies. Industrial export orientation in Southeast Asia began with Singapore. Malaysia and the Philippines followed suit. Thailand and Indonesia embarked on export-oriented industrialization (EOI) from the 1980s and 1990s, respectively. Although this paper focuses on industrialization initiatives from the late 1980s and 1990s and after 2000, Figures 2–5 present data from the 1960s (where available) because manufacturing began growing strongly in some of the countries during that period.

Singapore

Being the first mover to promote export orientation in Southeast Asia and located strategically as an entrepôt, Singapore enjoyed the room to promote industries relevant to its economic development from 1965 (Rasiah, 2020). The prime instruments used to promote exports were financial incentives and discouraging incompatible industries through the withdrawal of incentives. Strategic industries, such as shipbuilding, petrochemicals, semiconductors, and biotechnology, were offered R&D grants and facilities as they evolved strategically to support the massive trade in petroleum and the island's status as a major port (Singapore Economic Development Board, 2019; Maritime and Port Authority of Singapore, 2019; Rasiah, 2020b).

The EDB's leveraging role has often accounted for Singapore's endowments and changes in TNC strategies to sustain technological upgrading (see also Wong, 2001; Rasiah, 2016). Three clear strategies can be observed in the EDB's approach. First, Singapore took advantage of its halfway-house role in trade to develop shipbuilding and launch oil refineries that expanded into petrochemicals.

Second, Singapore's agile industrial policy allowed the EDB to replace incompatible industries with compatible ones. For example, Singapore phased out disk drive firms in 1989–1990 once it became clear the industry was labor-intensive.

Third, Singapore launched its science park to stimulate successful commercialization.

Singapore's attempt to transform the economy from low to high value-added activities by offering R&D grants and lowering corporate taxes to 17 percent attracted regional TNCs. Similarly, the government's promotion of shipbuilding and downstream petrochemical industries allowed the country to become a leader in these industries. Both offered Singapore strategic positioning as the country gradually rose to refine imported oil, create petrochemical industries, and move beyond repairing ships to building them, alongside oil rigs and platforms (Singapore Economic Development Board, 2019; Maritime and Port Authority of Singapore, 2019; Association of Singapore Marine Industries, 2018).

### Indonesia

Indonesia abandoned its import-substitution policies following an International Monetary Fund-imposed structural adjustment package after the Asian financial crisis in 1997. It focused instead on infrastructure development (Nofrian et al., 2025). The restructuring included the closure of the Timor-KIA joint venture and aircraft manufacturing (Rasiah, 2009). Although Indonesian manufacturing was not seriously affected by the 2007–2008 global financial crisis owing to its trade being decoupled from exports to the US, a combination of cumbersome administrative procedures and a lack of technological upgrading restricted the country to low and medium value-added industries (Rasiah, 2020).

In 2021, the Indonesian government announced new interventions in manufacturing to correct shortcomings associated with strengthening ecosystem instruments to support manufacturing firms (Indonesia, 2020). In addition to climate resilience and Industry 4.0 (IR 4.0) systems, the government identified strategic industries for promotion. Nofrian et al. (2025) argue that manufacturing remained important largely because of the spread of labor- and resource-intensive industries to the islands outside Java and the assembly of components and parts (including nickel processing for electric vehicles) in Java.

Malaysia

After 2000, as Malaysia turned its focus to climate resilience and digitalization, manufacturing began to contract gradually, owing to slow industrial upgrading and a lack of strong backward linkages. Hence, not only did manufacturing wages grow very little in the period 2000–2024 (Rasiah & Zhang, 2024), but workers were also often exposed to retrenchments during economic downswings.

Consequently, the government announced plans to limit financial incentives to capital- and technology-intensive TNCs while offering R&D incentives to stimulate technological upgrading. Parastatals were launched to create and strengthen the country's STI infrastructure. The Human Resource Development Council, Malaysian Industry-Government Group for High Technology, Multimedia Development Corporation, and Multimedia Super Corridor were launched in the 1990s for this purpose (Ali, 1991). The Malaysian Institute of Microelectronics Systems was corporatized, and science and technology parks were built in the western corridor to house incubators. However, the lack of stringent performance standards resulted in these meso-organizations underperforming (Rasiah, 1996).

The government changed its emphasis to focus on industrial upgrading and chip design under the New Industrial Master Plan 4. However, a lack of human capital and strong domestic linkages continued to restrict upgrading in strategic industries. Hence, manufacturing's contribution to GDP and employment fell gradually from the turn of the millennium.

While selected firms were given incentives to undertake R&D, there was little monitoring, and non-performers were not penalized. In addition, the selection process for the leadership of STI parastatals and designated technology firms excluded consideration of Malaysian professionals possessing experiential and tacit knowledge in their respective industries. The preference was for extending the legacy of creating Bumiputera (indigenous Malays) chief executive officers, an important government goal since the promulgation of Permodalan Nasional Berhad (Malaysia's largest state-owned fund management company) in 1978 and its active pursuit since 1981. The ethnic focus of industrial policy resulted in performance taking a backseat, which rendered the STI parastatals ineffective, while the firms created for support failed to compete in export markets. Perwaja, Proton, and Silterra were three examples of national firms that drained the national economy. Proton was finally taken over by China's Geely in 2017 (Zhang et al., 2018). Silterra was also sold to Chinese interests (Rasiah et al., 2024).

### The Philippines

The Foreign Investment Act of 1991 opened foreign equity ownership to 100 percent in non-export processing zone industries. Tariffs on raw materials and finished products were reduced, which helped decrease external debt (Menardo, 2004). Although largely ineffective, the generous incentives attracted FDI in electrical and electronics and automotive components and completely knocked-down parts manufacturing. However, smuggling and the lack of strong STI infrastructure and proactive promotion of technological upgrading restricted manufacturing expansion; its share in overall exports reached just 21 percent in 2011 before falling.

In 2020, the Philippine government announced its intention to correct shortcomings associated with the strengthening of ecosystem instruments to support manufacturing firms (Philippines, 2020). The government also identified strategic industries for promotion, which included aerospace, but as argued by Ofreneo (2024), the Philippines continued to lack a productively interventionist industrial policy to stimulate industrial upgrading. Most of the policy instruments implemented were designed to enable markets.

### Thailand

While manufacturing value-added expanded over the period 1988–2007, a lack of technology policies undermined the capacity of manufacturing to sustain wage increases and technological upgrading from low to high value-added activities. Minor ad hoc incentives and high-technology facilities were offered to large firms in the automobile (including an automobile university) and electronics industries (Intarakumnerd & Chaoroenporn, 2013; Intarakumnerd et al., 2015). However, the lack of STI infrastructure to support incremental and radical innovations resulted in manufacturing value-added plateauing. Its contribution to GDP has been declining since 2010.

Despite political uncertainty, the Thai government announced in 2021 that it would correct shortcomings associated with the strengthening of ecosystem instruments to support manufacturing firms (Thailand, 2021). The government also identified strategic industries for promotion, which included aerospace. Teerawat and Yot (2025) offer an incisive account of the efficacy of Thailand's industrial policies, which focus on feeble efforts to stimulate technological upgrading.

Brunei Darussalam

Much of Brunei Darussalam's economic history has been focused on petroleum drilling. Consequently, manufacturing did not emerge strongly until 2018 in petroleum-based and information technology products. Manufacturing's contribution to GDP then rose sharply through leveraging strategies to stimulate industrial upgrading (Ahmed et al., 2025).

Aggressive promotion of industrialization led to manufacturing's share in GDP rising in trend terms among the Southeast Asian free market economies. Expansion had been ongoing since import substitution industrialization (ISI) was launched in the 1950s and 1960s. However, growth was fastest during EOI due to the use of labor-intensive technologies and firms' access to larger export markets compared to small domestic markets. EOI reduced the government's burden on the foreign exchange required to promote ISI and address balance-of-payment problems. Indonesia, Malaysia, the Philippines, and Thailand's experience with ISI required them to use foreign exchange to import intermediate inputs and capital machinery, which drained their economies. In addition, a lack of competition undermined performance. Powerful liberalizing initiatives through Asia-Pacific Economic Cooperation and the World Trade Organization decreased the significance of ISI policies, particularly since the formation of the Association of Southeast Asian Nations (ASEAN) Free Trade Area in 1992. However, it was the lack of effort to pressure ISI industries to shift to EOI that caused manufacturing to stagnate.

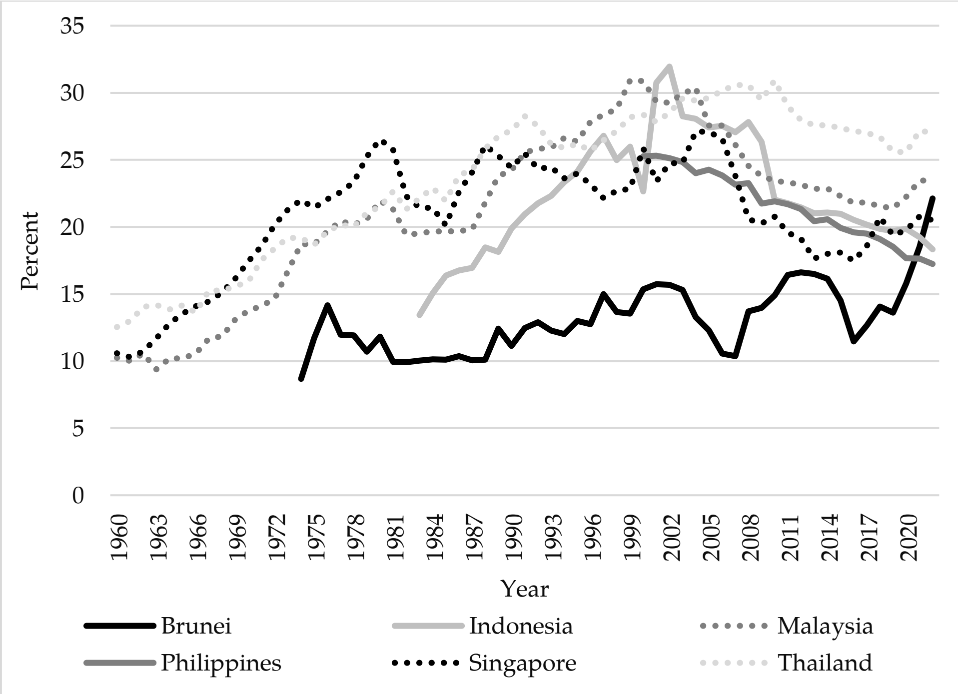
Although EOI became the dominant industrial strategy, all five Southeast Asian market economies examined in this paper have begun to deindustrialize. At its peak, manufacturing contributed over 30 percent of GDP in Indonesia, Malaysia (1999–2000), and Thailand (2008–2009). It began to slow down and contract when FDI-led light manufacturing firms could not upgrade to stay ahead of emerging low-value sites, such as China, Bangladesh, and Indochina. On the other hand, heavy industries, such as iron and steel, cement, and automobiles, have remained viable owing to preferential tariffs and incentives, and ASEAN Economic Community benefits. The primary benefit stems from a rule-of-origin condition that states that firms can enjoy liberal access to ASEAN markets if they meet a 40-percent value-added requirement.

**Manufacturing Expansion**

This section comparatively analyzes manufacturing value-added in GDP, manufactured exports in merchandise exports, and manufacturing employment as a percentage of total employment in the Southeast Asian countries.

Thailand enjoyed the highest share of manufacturing value-added in GDP in Southeast Asia in 2022 (Figure 2). Indonesia's share showed a trend rise until its peak in 2002 (32 percent) before falling sharply, while Malaysia's rose in trend terms until its peak in 2000 (30.9 percent). Singapore enjoyed its peak in 2005 (27.1 percent). Brunei Darussalam showed a sharp rise from 2016 to 2022, while the Philippines showed a trend fall from 2002. Apart from Brunei Darussalam, the remaining Southeast Asian market economies showed trend falls in the share of manufacturing in GDP. However, Malaysia, Singapore, and Thailand showed signs of reindustrialization from 2017 to 2018.

**Figure 2: Manufacturing value added as a share of GDP (market economies) (1960–2022)**

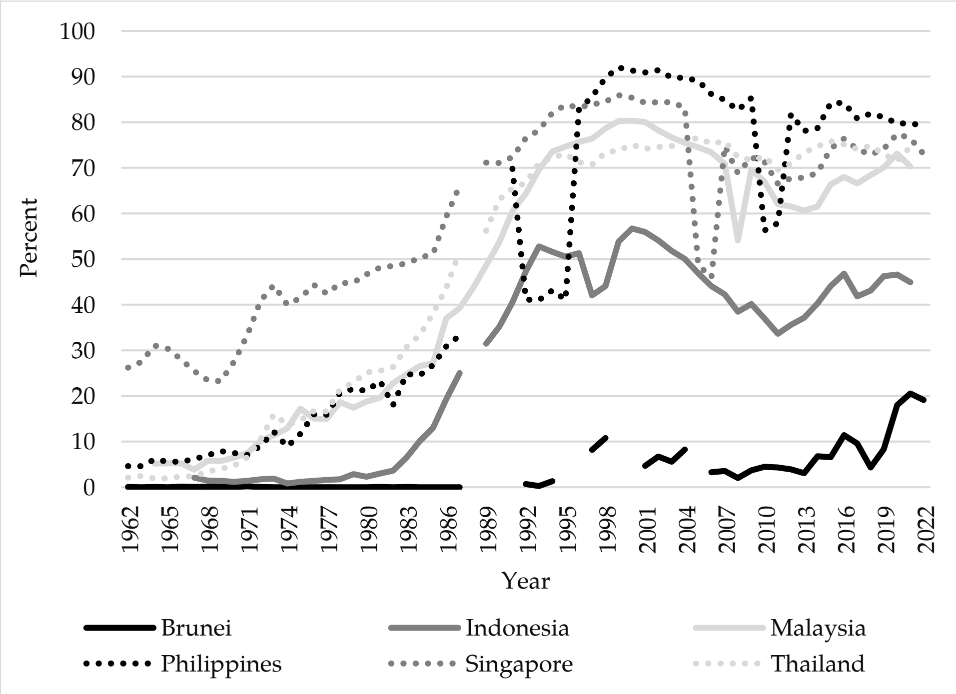



Source: Plotted using World Bank (2023) data.

*Manufactured Exports*

The trade structure of the five Southeast Asian market economies quickly shifted towards manufactured goods as liberalization and incentives propelled exports of electronics, automotive components, and textiles and garments. Apart from declines caused by external crises, manufactured export shares in the total exports of Indonesia, Malaysia, the Philippines, and Singapore peaked in 1998–2000 (Figure 3). Thailand enjoyed its highest export share in 2005. The rapid expansion of manufacturing, including diversification within sectors, helped the Southeast Asian economies avert problems caused by the fallacy of composition.

**Figure 3: Manufactured exports as a share of total merchandise exports (market economies) (1962–2022)**

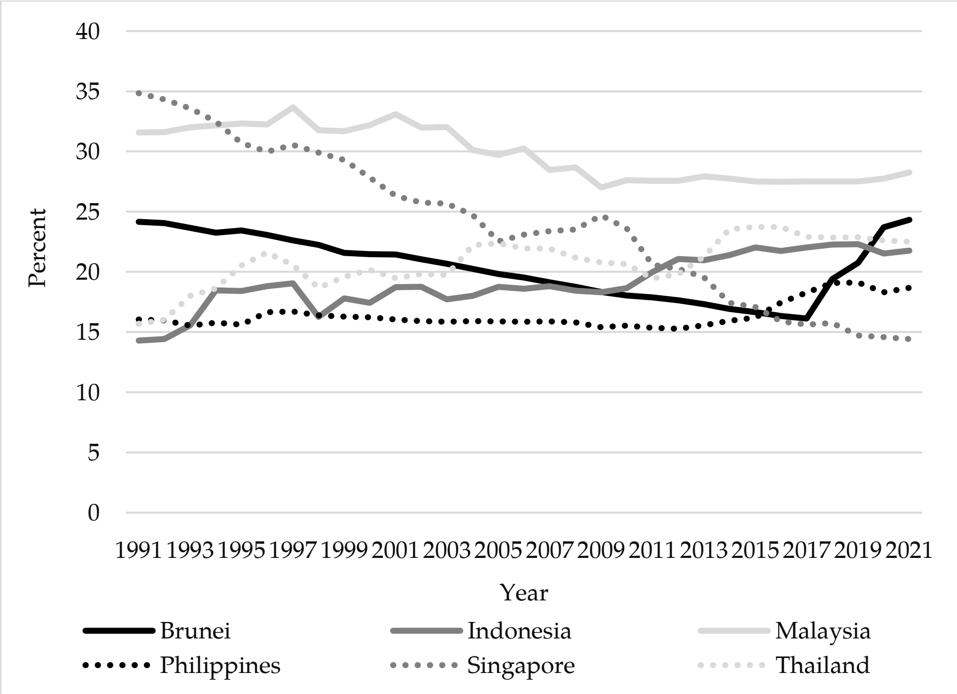



Source: Plotted using World Bank (2023) data.

*Industry Employment*

Singapore showed a trend fall in the manufacturing employment share of total employment over the period 1991–2021 (Figure 4). After a trend fall until 2009 in Malaysia and 2012 in the Philippines, the manufacturing employment share of total employment in these countries showed a trend rise until 2021. As with the rapid expansion of the manufacturing value-added share in GDP, industry employment as a share of total employment in Brunei Darussalam rose sharply during the period 2017–2021. Meanwhile, Thailand showed a fluctuating trend with a higher contribution since 2012.

**Figure 4: Industry employment as a share of total employment (market economies) (1991–2021)**




Note: Industry employment, which includes mining and construction, was used here in the absence of a sufficiently long manufacturing employment series.

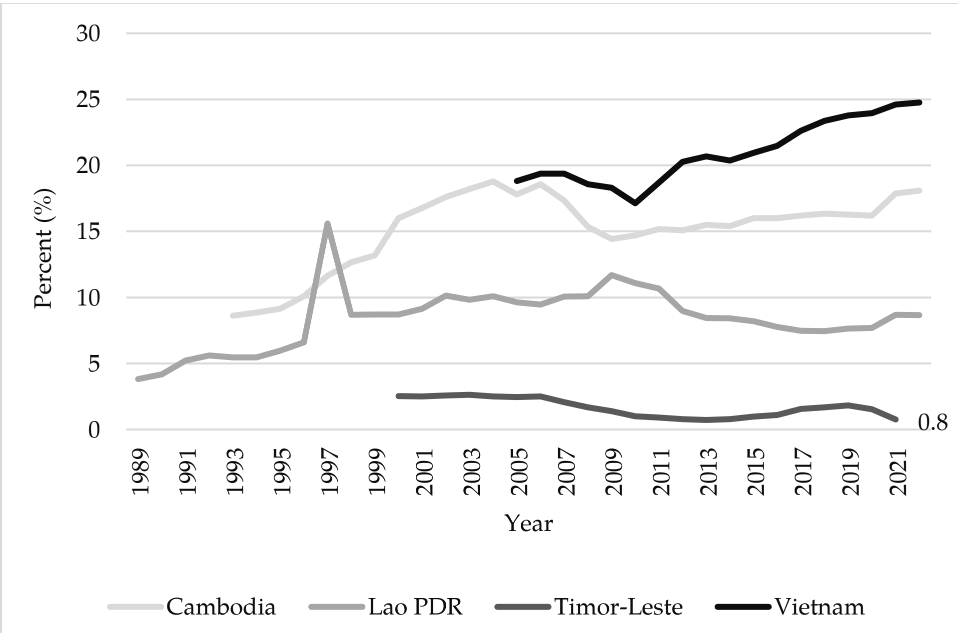
Source: Plotted from World Bank (2023) data.

*Transition Economies*

Among the transition economies, Cambodia and Lao PDR enjoyed early expansion, especially in the manufacture of clothing, as their least developed country status offered them 'everything-but-arms' access to Europe and free trade access to the US in return for observing International Labor Organization covenants. Myanmar has faced US economic sanctions since 2003, and more countries have extended sanctions since 2017. Nevertheless, in 2021, its contribution of manufacturing value added to GDP rose to the largest share among CLMV (Cambodia, Laos, Myanmar, and Vietnam) countries (24.8 percent) and Timor-Leste (Figure 5). Cambodia's share of manufacturing value added in GDP rose over the period 1993–2004 before falling in trend terms from 2005 until 2009. It rose again gradually during the period 2010–2022.

The manufacturing value-added share in GDP of Lao PDR reached a peak in 1997 owing to clothing exports manufacturing. However, it declined within a year. It remained somewhat steady during the period 1998–2022 with a focus shift to agro-processing (see Rasiah et al., 2011). The export-oriented manufacturing of Vietnam caused manufacturing's value-added contribution in GDP to rise to 24.8 percent in 2022. Timor-Leste is the least industrialized country in Southeast Asia, with its manufacturing share of GDP being just 0.8 percent in 2021.

**Figure 5: Manufacturing value added as a share of GDP (transition economies) (1989–2022)**

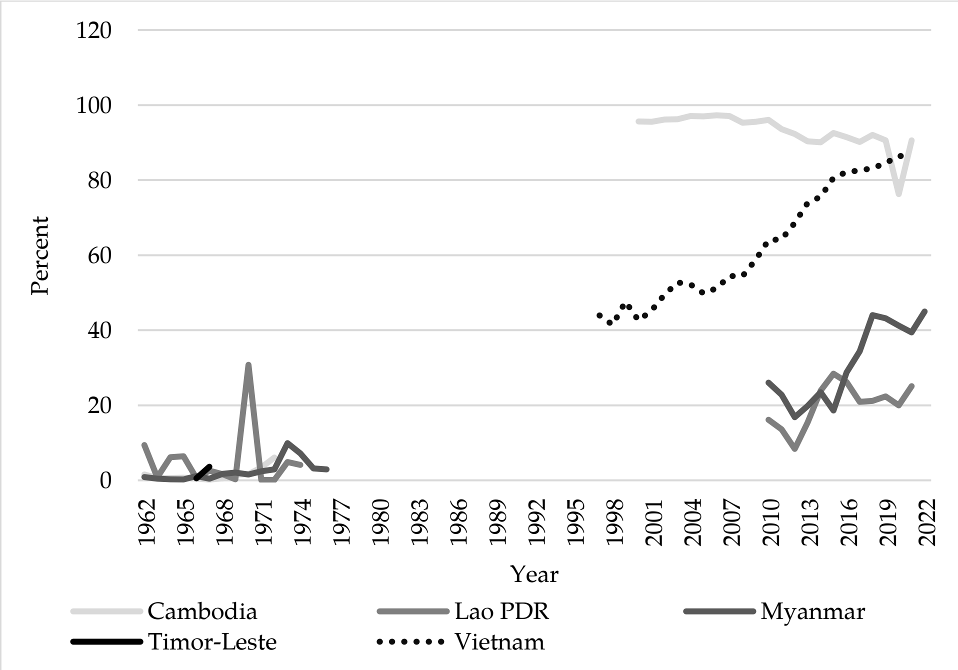



Source: Plotted using World Bank (2023) data.

*Manufactured Exports*

Led by clothing exports, Cambodia enjoyed the highest share of manufactured exports (90.6 percent) as a share of overall exports in 2021 despite gradually falling since its peak in 2006 (97.1 percent) (Figure 6). Vietnam's share rose sharply, reaching 86.4 percent in 2021. Myanmar's manufactured exports share of total exports rose in trend terms to 45 percent in 2022. While Lao PDR's manufactured exports share reached 30.8 percent in 1970, Timor-Leste recorded manufactured exports of 0.5 percent in 1966 and 3.6 percent in 1967. Manufactured exports were negligible in the rest of the years.

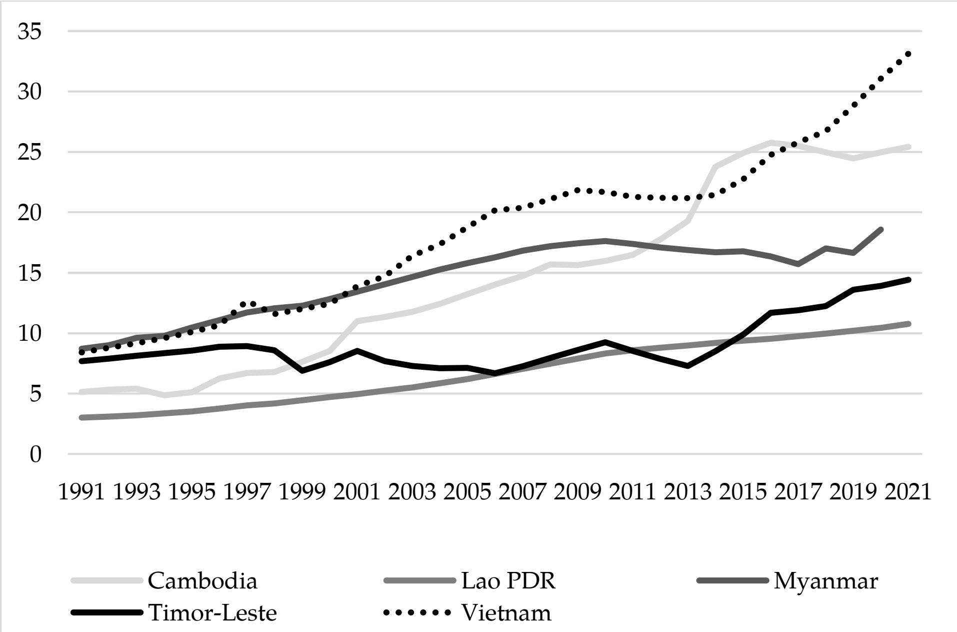
**Figure 6: Manufactured exports as a share of total merchandise exports (transition economies) (1962–2022)**




Source: Plotted using World Bank (2023) data.

Data on manufacturing employment for the transition economies and Timor-Leste was scarce, so we included mining and construction to constitute industry as a whole. All countries showed a trend rise. Vietnam enjoyed the highest industry share in overall employment with 33.1 percent in 2021, followed by Cambodia at 25.4 percent (Figure 7). The corresponding figures for Lao PDR and Timor-Leste were 10.8 percent and 14.4 percent, respectively. Myanmar's stood at 18.6 percent in 2020.

**Figure 7: Industry employment as a share of total employment (transition economies) (1991–2021)**




Source: Plotted using World Bank (2023) data.

### Pursuit of Sustainability through Digitalization and Climate Change Mitigation

Some countries had already initiated policies to promote digitalization and climate resilience, but it was not until 2015 when the United Nations launched the SDGs that the Southeast Asian countries began to take action. They established formal structures to alleviate poverty (SDG 1), expand employment and quality jobs (SDG 8), and strengthen climate resilience (SDG 13).

SDGs 7, 8, and 9 were particularly focused on (Rasiah & Vijayaraghavan, 2025; Rasiah, 2025). All sectors of the Southeast Asian economies, including manufacturing, came under scrutiny, which is why the United Nations Industrial Development Organization (2024) emphasizes SDGs 7, 8, and 9. Since the 2015 Paris Accord at the 21st Conference of Parties, national policies have increasingly been coordinated by the United Nations Convention on Climate Change (UNFCCC).

Circular economies offer the potential for environmental sustainability through the deployment of efficient tools for economic development. The linear economy model of production follows a take-make-waste approach. In contrast, the circular economy model can adopt product designs and production processes to keep materials in use for extended periods and promote the regeneration of natural systems. Key aspects of the circular economy include reducing natural resource depletion, reusing and recycling, and enhancing resource productivity. Strategies include graduating from medium- to high-value activities, using renewable energy, creating longer product lifespans, and promoting product sharing (World Bank, 2022).

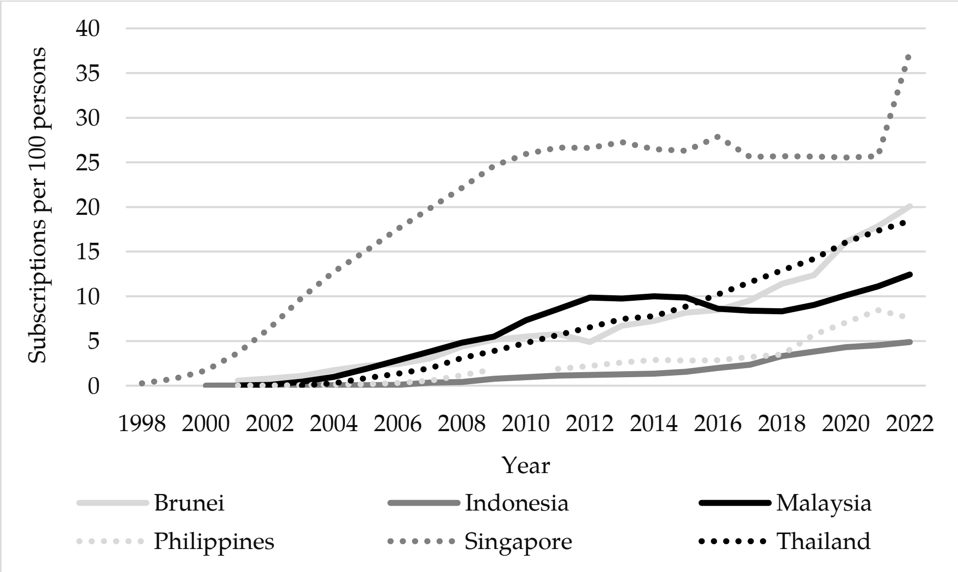
Other macro and sectoral policies that have already been implemented can diminish the feasibility and effectiveness of carbon taxes and emission trading systems. For instance, if current fuel subsidies (petrol, diesel, and cooking gas) in Malaysia remain, the impact of markets in driving the demand for renewable energy is reduced. Therefore, removing current price caps and subsidies would be part of the introduction of effective carbon pricing in the Southeast Asian countries (World Bank, 2023).

As is the case for Singapore, carbon pricing can raise revenues for the development of abatement technologies in other Southeast Asian countries. Carbon taxes can generate revenues for public budgets among all Southeast Asian countries. Emission trading systems can also generate revenues if governments auction traded allowances. The revenues from these methods can be used to fund climate policies for vulnerable households and trade-exposed industries, policies to reduce other taxes, support public expenditure, and reduce national debt levels, and policies to offset the negative impacts of carbon pricing. Therefore, the question of how the revenues are used is crucial for determining the socioeconomic impact of carbon pricing.

Figure 8 shows the proliferation of broadband subscriptions among market economies in Southeast Asia, while Figure 9 shows the transition economies and Timor-Leste.

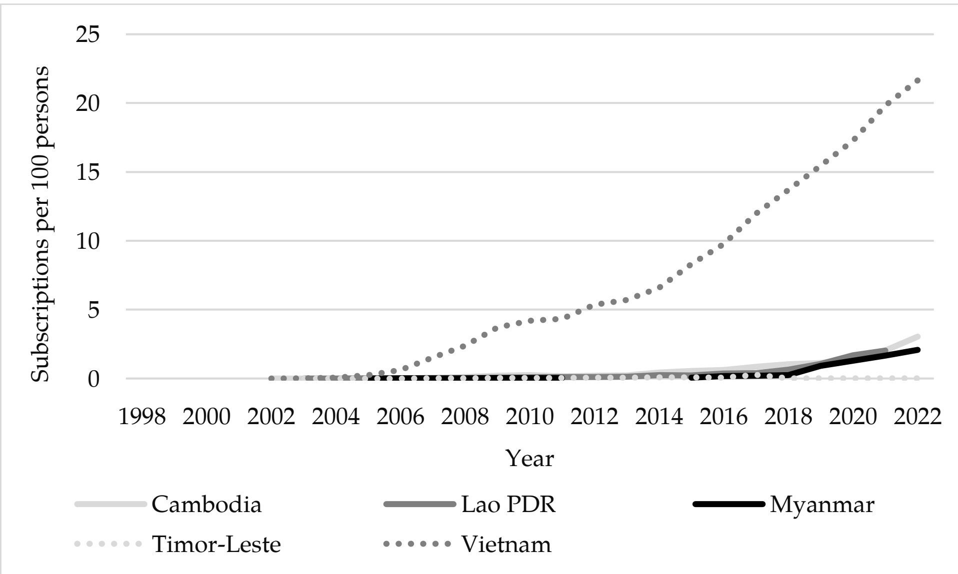
Broadband cable access by itself does not mean that economic agents (individuals and organizations) have acquired IR 4.0 instruments or are using autonomous, artificially powered vehicles to raise productivity, precision, and reach. Nevertheless, it points to the potential for the use of robots and drones powered by big data analytics, IoT, and centralized and decentralized computer control systems.

**Figure 8: Fixed broadband subscriptions per 100 persons (market economies) (1998–2022)**




Source: Plotted using World Bank (2023) data.

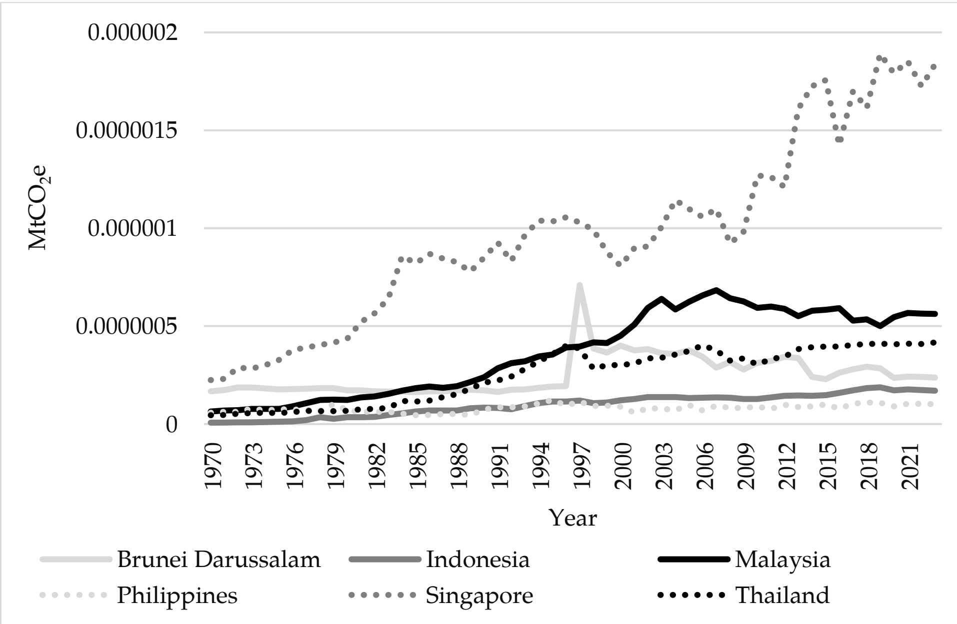
**Figure 9: Fixed broadband subscriptions per 100 persons (transition economies) (1998–2022)**




Source: Plotted using World Bank (2023) data.

Figures 10 and 11 show carbon dioxide ($CO_2$) emissions in the Southeast Asian market economies and the transition economies, respectively, which are used here to represent hazardous emissions. Singapore's per-capita $CO_2$ emissions from industrial processes are the highest in the region, with the trend still rising in the 2020s. The next highest is Malaysia, which has shown a falling trend since 2007. Thailand follows with a slightly rising trend. Brunei Darussalam comes fourth with a falling trend since 1998, followed by Indonesia. The Philippines show the lowest per-capita emissions, but the country has also faced the most drastic deindustrialization (see also Ofreneo, 2025).

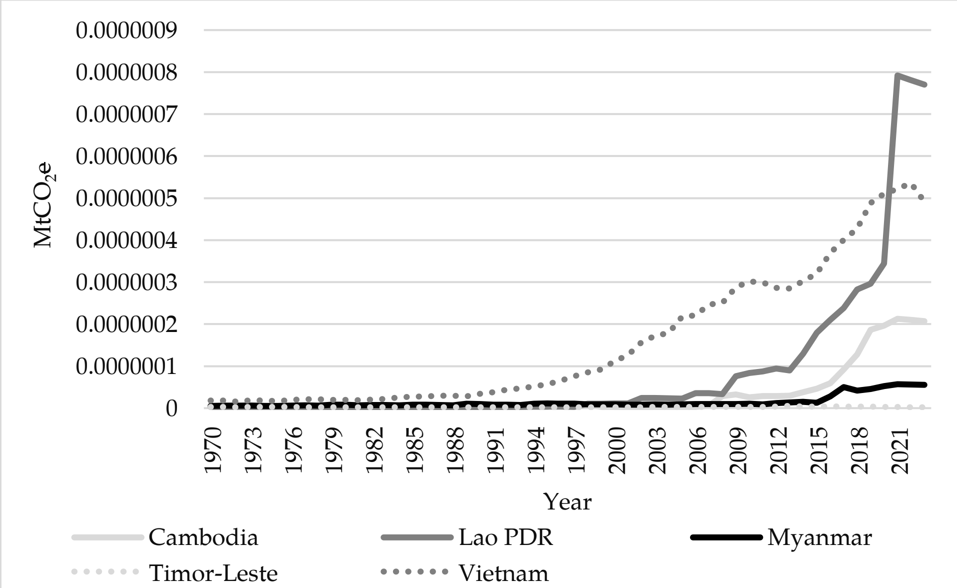
**Figure 10: Per-capita $CO_2$ emissions from industrial processes (market economies) (1970–2023)**




MtCO₂e = Million metric tons of $CO_2$ equivalent.
Source: Calculated from World Bank (2024) data.

Among transition economies, Lao PDR's per-capita industrial process $CO_2$ emissions grew rapidly from 2007, rising sharply in 2018 and overtaking Vietnam in 2021 to become the highest emitter (Figure 11). Vietnam has since ranked second, followed by Cambodia and Myanmar. Timor-Leste, which has not yet experienced modern industrialization, shows virtually no emissions.

**Figure 11: Per-capita $CO_2$ emissions from industrial processes (transition economies) (1970–2023)**




$MtCO_2e$ = Million metric tons of $CO_2$ equivalent.
Source: Calculated from World Bank (2024) data.

Table 1 shows the carbon net-zero targets of the Southeast Asian market economies and transition economies. Nationally determined contribution carbon net-zero targets are not available for the Philippines and Timor-Leste. The remaining countries demonstrate an active pursuit of achieving carbon net-zero targets.

**Table 1: South Asian nationally determined contributions (2024)**

| Country | Nationally determined contributions | Net-zero target |
|---|---|---|
| Brunei Darussalam | Reduce emissions by 20 percent by 2030 (relative to BAU levels) | 2050 |
| Cambodia | Increase mitigation ambition with an emission reduction target of 41.7 percent by 2030 (relative to BAU levels) | 2050 |
| Indonesia | Unconditionally reduce emissions by 31.9 percent by 2030 (relative to BAU levels), and conditionally by 43.2 percent with foreign aid | 2060 |
| Lao PDR | Unconditionally reduce emissions by 60 percent by 2030 (relative to the baseline scenario) | 2050 |

| Country | Nationally determined contributions | Net-zero target |
|---|---|---|
| Malaysia | Unconditionally cut carbon intensity against GDP by 45 percent by 2030 (compared to 2005 levels) | 2050 |
| Myanmar | *Aspirational conditional target:* Achieve net emission reductions of 50 percent by 2030, and net-zero emissions from the forestry and other land-use sector by 2040 | 2050 |
| Philippines | Reduce and avoid emissions by 75 percent, with 2.71 percent being unconditional (2020–2030) | NA* |
| Singapore | Reduce emissions to around 60 $MtCO_2e$ by 2030, and aim for net-zero emissions by 2050 | 2050 |
| Thailand | Unconditionally reduce emissions by 30 percent and conditionally by 40 percent by 2030 (relative to BAU levels) | 2065 |
| Timor-Leste | Refraining from setting a quantified emission reduction target | NA* |
| Vietnam | Increase unconditional contribution from 9 percent to 15.8 percent, and conditional contribution from 27 percent to 43.5 percent by 2030 | 2050 |

*The Philippines and Timor-Leste have not yet submitted plans for their nationally determined contributions to the UNFCCC. However, the general discussion internally is on meeting carbon net-zero targets by 2050.

Source: UNFCCC and countries' national policies. See Rasiah & Vijayaraghavan (2025).

BAU = business as usual, GDP = gross domestic product, $MtCO_2e$ = million metric tons of $CO_2$ equivalent.

## Conclusions

Singapore's foreign multinationals led industrialization and participated in high value-added activities through the country's successful use of leveraging strategies (Rasiah, 2020). Other Southeast Asian countries are entrenched in low and medium value-added activities, leaving them trapped as LICs and MICs. Meanwhile, Indonesia, Malaysia, the Philippines, and Thailand have begun to experience premature deindustrialization, with manufacturing value-added shares in GDP falling before sectors can shift to high value-added activities. As a share of value added in GDP, Thailand and Malaysia enjoyed the highest expansion of manufacturing among the countries examined in this paper. However, they have been unable to stimulate upgrading to high value-added activities and have not succeeded in developing national firms capable of reaching the technology frontier.

Singapore has specialized in the high value-added segments of shipbuilding and petrochemicals, where it now enjoys a relative comparative advantage. It has also attracted export-oriented manufacturing driven by TNCs by quickly shifting its industrial specialization to sustain industrial upgrading. Indonesia and the Philippines continue to specialize in low and medium value-added activities, while the transition economies have yet to demonstrate the capacity to move from low to medium value-added activities.

Though Vietnam's industrialization is nascent, it appears to be following the same pattern as Indonesia, Malaysia, and Thailand, which explains why the country has reached middle-income status. While Cambodia, Lao PDR, and Myanmar have shown considerable manufacturing expansion, they are still entrenched in low value-added activities. Timor-Leste is still engaged in sedentary activities with little growth in manufacturing.

The Southeast Asian market economies largely overcame the twin troubles of the fallacy of composition and Dutch Disease. However, the lack of effective policy coordination to avert such problems cost Indonesia, Malaysia, the Philippines, and Thailand considerable resources.

Singapore did not allow such problems to become chronic. Its sophisticated petrochemical, biotechnology, and shipbuilding industries evolved to become world leaders. The lack of scale, as well as related research in its universities, allowed Singapore to reach critical limits in electronics manufacturing. However, the remaining four market economies have populations and land space exceeding that of South Korea and Taiwan. Therefore, the contraction of the manufacturing sector since the turn of the millennium suggests that they are facing premature deindustrialization. While Singapore's textile and clothing, electrical and electronics, and vehicle manufacturing were declining, the 'mission-oriented state' (Mazzucato, 2013) removed their incentives and quickly moved them away from the country. It gradually replaced them with new compatible industries, such as biotechnology, while retaining the shipbuilding and petrochemical industries.

Indonesia, Malaysia, the Philippines, and Thailand have been unable to create an integrated STI infrastructure that can push the transformation of their manufacturing sectors toward the global technology frontier in the manner of South Korea and Taiwan. Singapore remains ahead of these countries through a sophisticated STI infrastructure and the use of a flexible strategy that has continuously renewed the industries required to support a rise in value-added production.

Cambodia, Lao PDR, Myanmar, and Timor-Leste are quite low on the industrialization ladder as their embedding ecosystems remain underdeveloped. Timor-Leste requires an industrial policy focused on rural industrialization and high value-added, scope-based activities, including coffee processing. Cambodia, Lao PDR, and Myanmar can still invest to develop their STI infrastructure. However, Timor-Leste requires external support similar to that of the Pacific Islands Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest (United Nations Industrial Development Organization, 2024). As with tuna fishing, such an agreement can be extended to fish and animal processing and animal feed processing in Timor-Leste.

Overall, industrial policy in the Southeast Asian countries (with the exception of Singapore) should focus on upgrading from low and medium value-added activities to high value-added activities. These countries should emphasize the achievement of SDG 7 (affordable and clean energy), SDG 8 (employment and decent incomes), SDG 9 (industry, infrastructure, and innovation), and SDG 13 (combating climate change).

More specifically, the emphasis on SDG 7 should be on clean renewable energy. The SDG 8 emphasis should be on employment growth and improvements in wages and working conditions, and the SDG 9 emphasis should be on industrial upgrading that strengthens infrastructure, including digital infrastructure, to raise value added in production and accelerate innovation (see also Rasiah, 2025). Emphasis on elements of environmental and social governance and the circular economy to combat climate change (SDG 13) is critical. It would ensure that the Southeast Asian countries restructure their manufacturing and fuel consumption to emphasize the circular economy while replacing fossil fuel and hazardous materials with renewable and clean energy.

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# 9

## Mitigating Air Pollution in Punjab's Transport Sector: Constraints and Opportunities

**Natasha Moeen,[1] Mehreen Khan,[2] and Theresa Thompson Chaudhry[3]**

## Abstract

*Pakistan ranks among the world's most polluted countries, with transport emissions being a major contributor to deteriorating air quality. In Punjab, rising smog poses serious environmental and public health risks, with Lahore's transport sector contributing nearly 83 percent of total emissions, followed by Multan. The government of Pakistan introduced the Clean Air Policy (2023) to tackle this, outlining cross-sectoral interventions for various stakeholders. This study explores barriers and opportunities for mitigating transport-related air pollution through 25 unstructured interviews. Findings reveal key barriers, which include weak interdepartmental coordination in phasing out old vehicles, high import and electricity tariffs that limit electric vehicle (EV) adoption, inadequate EV charging infrastructure, and poor fuel quality. Opportunities include subsidized EVs, improved public transport with feeder networks, and enhanced local capacity to provide Euro V fuel. Policymakers must understand these factors to design targeted interventions, improve air quality, and protect public health.*

## Introduction

Pakistan grapples with severe seasonal air pollution, which poses significant public health risks. With particulate matter $(PM)_{2.5}$ concentrations consistently exceeding the World Health Organization's air quality guidelines during several winter months, many Pakistani cities rank among the most polluted in the world (Table 1). Air quality was listed as 'hazardous' (the highest level) almost every day

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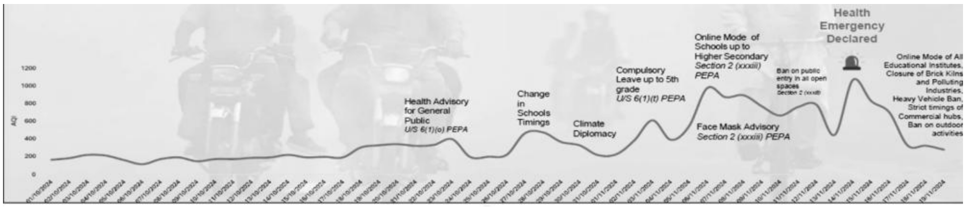
in Lahore in November–December 2024, with pollutant levels exceeding an air quality index (AQI) level of 1,000 (Khan, 2024). Lahore's air quality was the worst or second-worst in the world for several consecutive days in late 2024. As a result, the government took measures to reduce emissions through school closures and economic activity restrictions (Figure 1).

**Figure 1: AQI and government public health measures**




Source: Presentation by Samia Saleem, Punjab Green Development Program.

Punjab produces over 60 percent of Pakistan's gross domestic product (Chaudhry et al., 2024; Hasan et al., 2021). However, its transport sector is the leading contributor to its air pollution problem. The Urban Unit (Government of Punjab) reports that transport's total share of emissions is over 80 percent in Lahore. This issue is not unique to Pakistan. Overall, transportation accounts for a significant portion of international trade-related emissions, with estimates going up to 33 percent (Cristea et al., 2013). Additionally, transportation in international trade has been rising due to longer global value chains and more distant sourcing. Road freight constitutes 50 percent of trade-related emissions. As the European Union encourages its importers to reduce carbon footprints through the Carbon Border Adjustment Mechanism and corporate social sustainability policies, it will be necessary for Pakistan to 'clean up' both its trade-related production and transport sectors.

According to IQAir, two of the most polluted cities in the world in 2024 were in Punjab—Lahore and Multan (Table 1). Pakistan was the third most polluted country overall, and Lahore was the fifth most polluted city in 2024.

Globally, air pollution contributes to climate change induced by greenhouse gases (GHGs). Locally, it significantly reduces life expectancy, individual welfare, quality of life, and worker productivity. According to the World Health Organization (n.d.), air pollution in Pakistan causes approximately 22,000 premature adult deaths and is responsible for 163,432 disability-adjusted life years lost annually. Local public hospitals report an increase in admissions of both children and adults with respiratory problems, with patients complaining of throat irritation, burning eyes, and headaches (Sarfraz, 2020).

**Table 1: The world's most polluted cities**

| Rank | Location | Country |
|---|---|---|
| 1 | Byrnihat | India |
| 2 | Delhi | India |
| 3 | Karaganda | Kazakhstan |
| 4 | Mullanpur | India |
| 5 | Lahore | Pakistan |
| 6 | Faridabad | India |
| 7 | N'Djamena | Chad |
| 8 | Loni | India |
| 9 | New Delhi | India |
| 10 | Multan | Pakistan |

Source: IQAir's 2024 rankings.

According to Razzaq et al. (2024), when pollutants such as volatile organic compounds, nitrogen oxides, and carbon monoxide 'interact with sunlight, they undergo complex photochemical reactions, forming ground-level ozone and other secondary pollutants that contribute to the dense, yellowish-brown haze characteristic of smog.' Furthermore, the danger of smog, particularly the London Smog, goes beyond PM; it can even negatively impact agricultural production.

Considering the combined impact of six major air pollutants, the transport sector is the largest contributor to emissions in Punjab, Pakistan's largest province in terms of both economic size and population. In contrast, when considering only $PM_{2.5}$, the World Bank suggests that households are the largest source (Table 2). According to the Asian Transport Observatory (2024), transport sector $CO_2$ emissions accounted for 22 percent of Pakistan's total emissions in 2023, and 98 percent of transport emissions in 2022 were attributed to road transport. Furthermore, nearly 80 percent of vehicles in Punjab are motorcycles. The Food and Agriculture Organization (2020) estimates that over 40 percent of Punjab's emissions are related to transport.

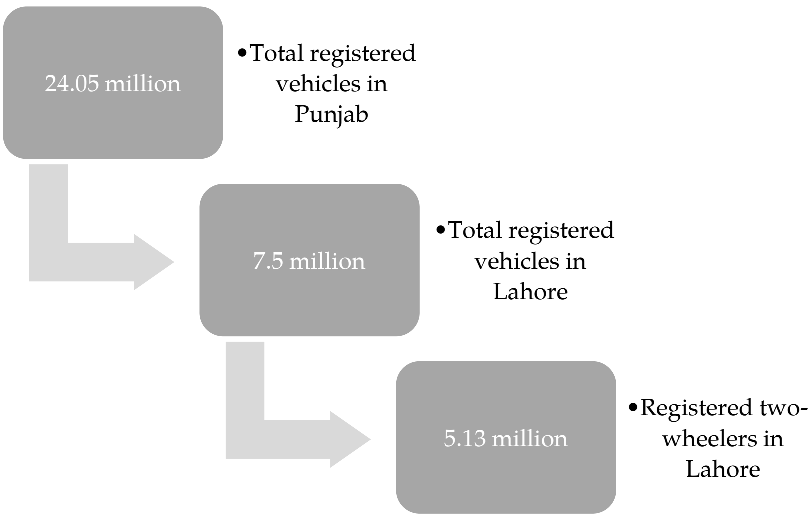
**Table 2: Sector-wise emissions**

| Sector | Emissions (%) |
|---|---|
| Transport | 83.15 |
| Industries | 9.07 |
| Agriculture (crop residue burning) | 3.90 |
| Waste burning | 3.60 |
| Domestic | 0.11 |
| Commercial | 0.14 |

Source: Urban Unit (2023).

A surge in the number of road vehicles is primarily why the transport sector has become the leading source of outdoor air pollution. The number of vehicles registered in Lahore increased by 17 million between 2012 and 2023 (Environmental Protection Agency, Punjab, 2024). According to the Excise, Taxation, and Narcotics Control (ET&NC) Department, there were more than 24 million vehicles registered in Punjab in 2024, of which 7.5 million were in Lahore. In Lahore, over five million of these vehicles are two-wheelers, mainly motorcycles (Figure 2).

**Figure 2: Vehicles in Punjab and Lahore in 2024**




Source: ET&NC Department.

Lahore's air quality data was initially sourced from non-government entities like the US consulate, the Center for Economic Research in Pakistan, and private households. However, there were concerns about the accuracy of readings, so the government of Punjab created a system to gather and share reliable daily air quality information online through its Environment Protection and Climate Change Department. These readings registered significantly lower AQI levels than those from private monitors but still showed hazardous conditions.

Recognizing the health impacts of air pollution and the urgency to address the issue, the government of Punjab developed a legal framework to decrease air pollution, called the Punjab Smog and Clean Air Policy (2023). This policy emphasizes transitioning to electric vehicles (EVs), improving public transportation, and phasing out three-wheelers and older vehicles over the next 30 years. Commercial vehicles are required to obtain a fitness certificate from the vehicle inspection and certification system (VICS) through a public-private partnership to qualify for legally mandated route permits. Additionally, road congestion should be decreased using intelligent traffic management systems, and all retail points must supply Euro V fuel.

The goal of this study is to identify the challenges stakeholders face in reducing air pollution in Punjab and explore opportunities for doing so, especially in the transport sector. To achieve this, 25 in-depth unstructured interviews were conducted across relevant provincial government departments. These consultations revealed that the transition mandated by the Clean Air Policy is, unfortunately, rife with challenges. Political and bureaucratic constraints arise from changes in government, shifts in priorities, and delays in policy approvals due to different power dynamics. Institutional obstacles, such as poor coordination among stakeholders and a lack of funding, are major barriers to obtaining vehicle emissions monitoring equipment or developing traffic management infrastructure. There are also regulatory issues, as mechanisms to remove unfit vehicles from roads or to regulate the sale of substandard fuel are entirely absent.

## Literature Review

Transport-related air pollution is a major issue in South Asia's large population centers, contributing to serious public health concerns in the region (Bandara & Thilakarathne, 2025) and specifically in Pakistan (Aziz & Bajwa, 2007; Ilyas et al., 2010; Malik et al., 2012). According to the Global Alliance on Health and Pollution (2019), nearly 125,000 excess deaths occur annually in Pakistan. This problem exists across the developing world, including low- and middle-income countries, where it leads to an estimated 6.5 million excess deaths each year. However, little progress has been achieved (Fuller et al., 2022). Economic policy uncertainty fuels pollution, but political stability can help mitigate it (Farooq et al., 2023).

The risks associated with air pollution add to the climate-related risks to which Pakistan is already vulnerable, which include floods, droughts, and high temperatures. Each of these climate risks brings its own health challenges. Floods increase the likelihood of diarrhea and gastroenteritis, skin and eye infections, respiratory illnesses, and malaria. Droughts increase the risk of malnutrition, including anemia, night blindness, and scurvy. High temperatures elevate the risk of heat stroke, cardiovascular disease, and respiratory diseases like chronic pulmonary disease and lung cancer, along with dengue and malaria infections (Khan, 2024). Alarmingly, the poorest regions, i.e., Balochistan, rural Sindh, and southern Punjab, are the most vulnerable (Malik et al., 2012). Few households have access to high-quality data on their individual exposure to pollution, and further research is needed to understand the impacts of exposure to $PM_1$ (as opposed to standard $PM_{2.5}$ measurements), in addition to the heterogeneous impacts of different pollution sources on individuals (Vilcassim & Thurston, 2023).

A significant portion of Punjab's air pollution originates from the transportation sector. This merits a shift to EVs, which presents further challenges. EV adoption depends on various interconnected factors, among these, the availability of charging stations. Barriers to adoption can be categorized as technical, policy, economic, infrastructural, and social (Adhikari et al., 2020). In Nepal, infrastructural barriers (e.g., a lack of charging stations), economic barriers (e.g., the relatively high cost of EVs), and poor government planning (e.g., building charging stations and providing fiscal incentives to subsidize EV purchases) were considered paramount (Adhikari et al., 2020).

Similar barriers are found in Pakistan and elsewhere (Qadir et al., 2024). An analysis of electronic word-of-mouth demonstrates that potential EV customers have specific concerns. These include costs, how EVs differ from standard combustion engine vehicles, the reliability of EV technology, battery safety and environmental friendliness, the availability of infrastructure and repair facilities, and the performance and image of EVs. Furthermore, the extent to which EVs reduce emissions depends on how the electricity powering them has been generated. If coal or oil needs to be burned to produce the electricity used to charge EV batteries, the carbon footprint will not be significantly reduced.

## Legal Framework

Over the past two decades, legal cases brought to court have driven policy changes and led to the creation of formal government institutions to implement those policies. The first of these was the Lahore Clean Air Commission, which was established following a 2003 court case against the government of Punjab regarding the use of four-stroke rickshaws and compressed natural gas. A decade later, legal action prompted the formation of the Climate Change Commission in 2015, followed by the Smog Commission in 2016, Punjab's first smog policy in 2017, and the Judicial Water and Environmental Commission in 2018.

The government of Punjab introduced its first smog policy in 2017, but the initial health advisory system for air pollution was not implemented until 2022. This was followed by the Clean Air Policy in 2023 and the chief minister's Smog Mitigation Plan in 2024.

The government of Punjab published comprehensive reports on the state of the environment in 2022, 2023, and 2025. Its initiatives extend beyond short-term air pollution control, also addressing water and plastics pollution. Other long-term goals include energy efficiency, green financing, and solar power, all under the Punjab Green Development Program, which the World Bank financially supports.

Among the program's achievements are the installation of 30 air quality monitoring stations and 15 water quality monitoring stations, the deployment of energy-efficient equipment and solar panels in public buildings, the initiation of emission certificates, the introduction of electric public buses, and the creation of a USD 50 million environment and climate change endowment fund. The fund will be registered as a Section 42 company and used to support research and projects aimed at reducing GHG emissions, including pilots of resource-efficient and cleaner production technologies and other demonstration activities.

The Clean Air Policy's 2030 targets are quite ambitious in some areas but could be more aggressive in others (Table 3). For example, the transport sector accounts for over 80 percent of emissions, so achieving a 25-percent GHG reduction will be difficult if only 10 percent of private vehicles have passed emissions tests and received VICS certificates. Additionally, there is no target for phasing out conventional rickshaws and motorcycles, which constitute the majority of road vehicles and often use low-quality fuel. Thus, achieving a 25–30-percent reduction in PM and major air pollutants is especially ambitious.

**Table 3: Punjab's Clean Air Policy targets**

| Target | Timeline |
|---|---|
| A 30-percent reduction in the $PM_{2.5}$ and $PM_{10}$ concentrations of 2021 (annual average) in the most polluted cities (Lahore, Faisalabad, Gujranwala, Multan) | By 2030 |
| A 25-percent reduction in the major air pollutant (NOx, SOx, ozone, CO, and $CO_2$) concentrations of 2021 (annual average) | By 2030 |
| A 25-percent reduction of provincial GHG emissions | By 2030 |
| 100 percent installation and operationalization of 30 air quality monitoring stations and dashboards | By 2024 |
| Ensuring at least 10 percent of Punjab's registered private vehicles have valid emission certificates under VICS | By 2030 |
| A 10-percent increase in urban forest cover around major polluting cities (three cities) | By 2030 |
| 100 percent conversion of conventional brick kilns to zig-zag or other suitable technology | By 2030 |
| Providing grant support to small and medium enterprises in at least five industrial sectors to pilot resource-efficient and cleaner production technologies | Continue |
| Ensuring spaces in cities/towns left for parks are developed as green areas | Continue |

Source: Presentation by Samia Saleem, Punjab Green Development Program.

Various measures can be taken in the field to improve air quality and reduce harm from high levels of air pollution. However, some can only be used temporarily, as they have their own side effects. For schools, these measures include adjusting schedules, implementing carpool systems, temporarily closing schools, and moving to online classes. Many of these actions decrease instructional time and quality, which can harm children's educational progress, as was seen during COVID-19 lockdowns. Other measures limit economic activity, such as restricting market hours, banning industrial activity and heavy vehicles, following standard operating procedures for open cooking, and prohibiting open barbecues.

Implementing the Punjab Smog and Clean Air Policy (2023) involves several government departments, given the multi-sectoral sources of the smog problem. Key parties include the following:

- Transport Department
- Environment Protection and Climate Change Department (formerly the Environment Protection Department)
- Oil and Gas Regulatory Authority (OGRA)
- Traffic Engineering and Transport Planning

- ET&NC Department
- Planning and Development Board

## Research Objectives and Methodology

We discuss some of the transport sector-related policies enacted by Punjab's Clean Air Policy, identifying stakeholder constraints.

We conducted 25 unstructured telephone interviews with relevant provincial government departments responsible for implementing the Clean Air Policy. A snowball sampling mechanism was employed after initial stakeholders were identified on LinkedIn. These interviews focused on departmental challenges and opportunities related to implementing the Clean Air Policy. They lasted up to 90 minutes, and respondents from the following departments were interviewed (in descending order of the number of interviewees):

- Environment Protection and Climate Change Department
- OGRA
- Transport Department
- Traffic Engineering and Transport Planning
- ET&NC Department
- Industries
- Planning and Development Board
- VICS
- Punjab Information Technology Board
- State Bank of Pakistan
- A handful of other energy-related departments

Before discussing specific aspects of the Clean Air Policy's transportation initiative, it should be noted that, overall, respondents emphasized the need for an integrated system to effectively reduce air pollution. Conducting thorough research and development is crucial for collecting accurate data at the government level. Providing affordable options, such as improved public transportation, is the most effective approach to addressing this issue. This strategy encourages commuters to opt for public transit when faced with congestion charges and high parking fees. Most importantly, changing travel behavior requires a deliberate, long-term, sustainable plan to lower air pollution, which can only be achieved through awareness campaigns and multiple incentives.

In this study, we consider policies that attempted to reduce road transport-fueled air pollution, focusing on three types of vehicles: commercial vehicles, private vehicles, and two- and three-wheeled vehicles. These policies include VICS, upgrading fuel quality to Euro V standards, phasing out old vehicles, transitioning to EVs, and initiatives to decrease road congestion.

### Vehicle Inspections: Attempting to Reduce Pollution from Commercial Transport

The government of Punjab established VICS to test and certify vehicles, reinspecting those failing to meet emission standards. As of 2025, there are 39 VICS centers in Punjab, of which only 3 are operational in Lahore. Public sector vehicles were the first to be inspected, but nearly a third failed emission testing (Environmental Protection Agency, Punjab, 2024).

The Clean Air Policy introduced a new system for commercial vehicle permitting, which encountered significant implementation difficulties. Prior to the new policy, commercial vehicles were required to run on approved, permitted routes from the Transport Department, which, in turn, required the payment of a token tax to the ET&NC Department.

With the new policy, commercial vehicles are required to pass emission testing and obtain VICS certificates prior to paying the token tax. Unfortunately, relatively few commercial vehicles met emission standards and went on to pay the token tax, leading to a revenue shortfall. As a result, the ET&NC Department began collecting the token tax from owners even if their commercial vehicles had not received VICS certificates.

In the end, few vehicles are being inspected, and the policy's impact on emissions is limited. Plans to test private vehicles have not yet been operationalized, and with only three VICS stations in Lahore, they remain a distant goal. Further, Qin-Qi three-wheelers cannot even be inspected as they are unregistered.

### Upgrading Fuel Quality to Euro V Standards: Reducing Private Vehicle Emissions

A government initiative aimed at reducing emissions from all vehicles, including private ones, involved raising fuel quality to Euro V standards. The government eliminated tariffs on refining machinery for the upgraded fuel standards. However, domestic refineries complain that they still face competition from imported fuel, including smuggled fuel from across the Baloch border. Currently, around 35 percent of petroleum products are refined locally. The remainder is imported.

The regulatory system for monitoring and enforcing fuel quality is weak. As the relevant regulatory organization, OGRA has limited authority to test fuel sold to consumers and no authority to enforce standards. At most, it can report low-quality fuel to the district government.

Retail points are meant to test their own fuel and report on quality to OGRA, but the moral hazard inherent in this mechanism makes it ineffective.

OGRA outsources some testing to the Hydrocarbon Development Institute of Pakistan, but it is unclear how testing sites are selected and how many are tested.

Customers can report adulterated fuel via an app called 'Reh Guzar,' although this is an ineffective mechanism as vehicle owners are unlikely to be able to identify low-quality fuel.

Given the high cost of improved fuel, many vehicles, especially motorcycles and rickshaws, use adulterated fuel. Extremely poor-quality fuel, sometimes derived from used motor oil, is sold in small informal shops commonly known as *dabba* stations. OGRA has no power to close these shops, and district governments are already stretched thin.

## E-Bike Integration and Phasing Out Old Vehicles and Three-Wheelers

The government lacks the political will to phase out the most polluting vehicles, including commercial vehicles and three-wheelers (rickshaws). Motorcycles constitute the majority of road vehicles, contributing significantly to pollution.

One issue is the lack of data on these vehicles, many of which are not registered. For example, two-wheelers are illegally converted into three-wheeled vehicles, known locally as Qing-Qis, which are often unregistered. Efforts to ban such vehicles have faced strikes and strong opposition from the Rickshaw Awami Association. Without registration, it is impossible to enforce emission standards or issue traffic fines. The owners of commercial vehicles (trucking) also hold significant political influence, making it difficult to phase them out or require emission testing. The subsidies needed to buy back vehicles, a part of the Clean Air Policy that has not yet been implemented, would be expensive and likely strain the government's administrative capacity.

E-bikes are expensive, and there are valid concerns about battery theft; the development of an anti-theft device for batteries could allay fears.

A related administrative barrier, which appears to be relatively simple to resolve, is that the ET&NC Department has not allowed the registration of electric motorcycles and conventional cycles converted to e-bikes. It has also failed to complete the digitization of existing vehicle registrations.

EV adoption will be hindered if the charging infrastructure is not developed. Furthermore, electricity tariffs keep rising as the government struggles to pay its bills to independent power producers whose plants are outdated and costly to operate.

## Initiatives to Reduce Congestion

Along with the three policies already discussed, other initiatives aim to reduce traffic by expanding public transportation and improving traffic flow. Lahore's Orange Line rapid transit train was launched in 2020. Additionally, the city introduced 27 electric buses in February 2025, another positive step. However, their high capital cost, along with expensive electricity, makes it financially challenging to expand this transition further. Moreover, travelers are generally unable to use public transport for 'last-mile connectivity' and often depend on other options like rickshaws. Better integration is needed instead of fragmented policies, including feeder buses and public parking near mass transit.

Machine learning models and specialized software can be used on emissions and traffic data, if available, to improve air quality and decrease energy consumption (Mądziel, 2023). The intelligent traffic management system is an artificial intelligence-driven tool that aims to optimize traffic flow, reduce congestion, and enhance overall road safety by adjusting signal timings based on real-time traffic conditions rather than a fixed schedule. However, its implementation faces technological and bureaucratic challenges, such as VIP protocols, which affect signal timing and cause traffic stoppages.

## Concluding Thoughts

This study identified multiple barriers to progress, including:

- Political factors—weak political will, lobbying, and shifting priorities
- Institutional challenges—poor coordination

- Administrative issues—weak digital data for phasing out old vehicles
- Regulatory gaps—the absence of EV laws, poor enforcement, and low-quality fuel
- Infrastructural constraints—limited EV charging infrastructure and road networks
- Behavioral factors—low public awareness and reluctance to adopt public transport or EVs

Subsidies can accelerate the transition from high-emission vehicles to EVs, reducing urban air pollution and GHG emissions. Enhancing public transport, particularly by developing efficient feeder networks, can make mass transit more accessible and convenient, encouraging people to shift from private vehicles to cleaner modes of transport. Additionally, strengthening local capacity to supply Euro V fuel ensures that cleaner fuels are widely available, further reducing vehicle emissions. Understanding and addressing these factors will allow for better-designed and targeted interventions that promote sustainable urban mobility.

Improving coordination between departments to effectively implement current policies is a given, but there are additional steps the government can take to enhance air quality and decrease transportation-related pollution.

First, the government should lead the development of a network of EV charging stations. Banks can be encouraged to provide loans for EV purchases, possibly with subsidized interest rates. They currently hesitate to issue such loans due to the high capital costs and longer payback periods associated with EVs.

Second, publicly supported non-government organizations like Akhuwat could offer loans for electric bike and rickshaw purchases. Lowering import tariff rates on EVs from China could also help reduce these costs.

Finally, the government should support research and development in Punjab and Sindh's auto parts manufacturing sector to begin producing EV spare parts.

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# 10

## Pricing Energy and Retiring Circular Debt

**Rabia Ikram,[1] Moazam Mahmood,[2] and Muzzna Maqsood[3]**

## Abstract

*This paper examines the structural drivers of circular debt in Pakistan's power sector, focusing on energy pricing reforms and capacity payment obligations under privatized electricity generation contracts. Although the efficiency hypothesis implies that private sector involvement enhances cost recovery and decreases fiscal burdens, Pakistan's experience indicates the existence of chronic financial imbalances. Based on data for the period of 2006–2024, this paper examines circular debt accumulation trends, electricity tariffs, and the payables composition of public and private generation entities.*

*The results indicate that, even with significant tariff rates, circular debt has been increasing. More specifically, the increasing portion of capacity purchase payments within total power purchase costs is closely linked to debt accumulation. This suggests that circular debt is not solely the result of tariff under-recovery but reflects deeper structural rigidities embedded in fixed contractual obligations and institutional inefficiencies.*

*This paper posits that to implement sustainable reform, it is necessary to address capacity payment designs, subsidy management, and pricing changes to regain financial stability and ensure competitiveness.*

## Introduction

Pakistan's economic growth has remained volatile since the early 1990s, marked by declining investment and persistent fiscal imbalances. The deceleration of

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investment growth, especially in infrastructure and energy, has limited industrial growth and long-term productivity. Gross domestic product (GDP) growth dropped, on average, by 1.84 percentage points. This decline in growth aligns with a drop in investment growth, which fell by an average of 3.11 percentage points between 1973 and 2018 (Ikram & Mahmood, 2022). Pakistan adopted structural adjustment programs under the close supervision and guidance of the World Bank and International Monetary Fund in response to fiscal stress and external imbalances. The programs were intended to tackle economic strain, narrow current account deficits, stabilize exchange rates, and manage outstanding external debt.

While these programs aimed to improve efficiency and reduce fiscal pressure, they also reduced public investment in key sectors, particularly electricity generation. This led to Pakistan entering a repeated cycle of external borrowing and adjustment.

Since the early 1990s, recurrent electricity shortages and financial stress caused by the Water and Power Development Authority, a state-owned utility, led to major reforms in Pakistan's power sector. The energy policy of 1994 allowed private sector participation in the energy sector (see Government of Pakistan, 1994), which ultimately led to the establishment of independent power producers (IPPs) (Malik, 2007). This reform was guided by the efficiency hypothesis, which argues that private ownership improves cost recovery and operational efficiency. The 1998 energy policy, introduced amid a continuing energy supply deficit, reaffirmed the confidence of private power producers, leading to an increase in the number of IPPs from 18 to around 90 by 2021 (National Electric Power Regulatory Authority [NEPRA], 2021). While privatization expanded generation capacity, it also altered the financial structure of power purchase agreements, introducing fixed capacity obligations that have had long-term fiscal consequences.

In the years that followed, growing demand and persistent supply deficits led subsequent governments to increase private participation. This increase reflects the logic of the efficiency hypothesis, which argues that private ownership tends to deliver more efficient outcomes than state-run enterprises (Megginson & Netter, 2001). However, the evidence is mixed in the case of Pakistan. IPPs helped address electricity shortages and attract foreign investment, but their entry was accompanied by tariff inefficiencies, capacity payments, and governance issues (Kessides, 2004; Malik & Qasim, 2018). In essence, IPPs *did* lead to an increase in capacity, but the target of efficiency was only partially fulfilled.

Recent evidence suggests that the shift from public to private generation has been associated with higher production costs and rising electricity tariffs (Ikram et al. 2024). These developments indicate that the financial structure of electricity generation has become increasingly costly, placing additional pressure on the power sector's payment system.

Therefore, despite increased generation capacity and recurring tariff changes, Pakistan's power sector has been experiencing chronic and growing circular debt. Instead of stabilizing the sector's financial situation, privatization and price increases have been accompanied by rising payment arrears along the electricity supply chain (Bacon, 2019; NEPRA, 2023).

This raises critical questions: if private involvement and higher electricity prices were expected to improve cost recovery and financial sustainability, why has circular debt continued to grow? Is the problem merely one of tariff under-recovery, or are there fundamental structural processes at work in the power purchase framework that accumulate debt?

This paper argues that the persistence of circular debt cannot be explained by pricing inefficiencies alone. Rather, the problem reflects the structural rigidity of contractual provisions, particularly the rising burden of capacity payment commitments under privatized generation contracts. By analyzing the composition of circular debt between 2006 and 2024, this paper demonstrates that fixed capacity payments have played a central role in debt accumulation.

To understand how privatization reshaped the power sector's financial dynamics, it is necessary to revisit the theoretical foundations of the efficiency hypothesis and assess its implications for pricing and cost recovery.

The next section explains the theoretical groundwork behind the efficiency hypothesis. This is followed by sections defining circular debt, identifying and analyzing the key financial and operational components contributing to circular debt, and an assessment of electricity tariff hikes' effectiveness in reducing circular debt. The paper goes on to examine the role of capacity payments as drivers of debt accumulation, compare Pakistan's electricity tariffs with regional and global tariffs for comparative advantage and competitiveness, and present policy recommendations.

## The Efficiency Hypothesis

The efficiency hypothesis proposes that improved efficiency in energy production and distribution can decrease unnecessary consumption, enhance productivity, and lower financial burden without requiring additional power generation capacity (Sorrell, 2015). In the context of privatization, the hypothesis argues that private ownership improves performance through stronger profit incentives, cost discipline, and reduced political interference in operational decision-making (Megginson & Netter, 2001). In contrast to state enterprises, private firms are expected to operate under strict budget constraints, align prices with underlying costs, and reduce inefficiencies arising from overstaffing, technical losses, and weak governance frameworks.

In electricity markets, this theory implies that private generation companies should improve cost recovery and financial sustainability by pricing electricity closer to its true production cost. In the long run, improved efficiency should reduce fiscal implications for the government, lower operational losses, and strengthen financial stability within the sector.

In Pakistan, however, the shift from public to private energy production has produced mixed outcomes. The growth rate of electricity generation has decelerated from eight percent to four percent after resource reallocation. In 2024, the private sector produced electricity at an average cost of PKR 30.7 per kilowatt-hour (kWh), compared to PKR 17/kWh in the public sector, representing a cost difference of approximately 75 percent (Ikram et al., 2024). This cost differential challenges the expectation that private participation decreases production costs.

Moreover, the share of capacity purchase price (CPP) has increased relative to the energy purchase price (EPP), accounting for 67 percent of the total power purchase price (PPP) in 2024. The resulting price burden has shifted to consumers, leading to higher overall tariffs and nullifying the efficiency theory (NEPRA, 2024; World Bank, 2020).

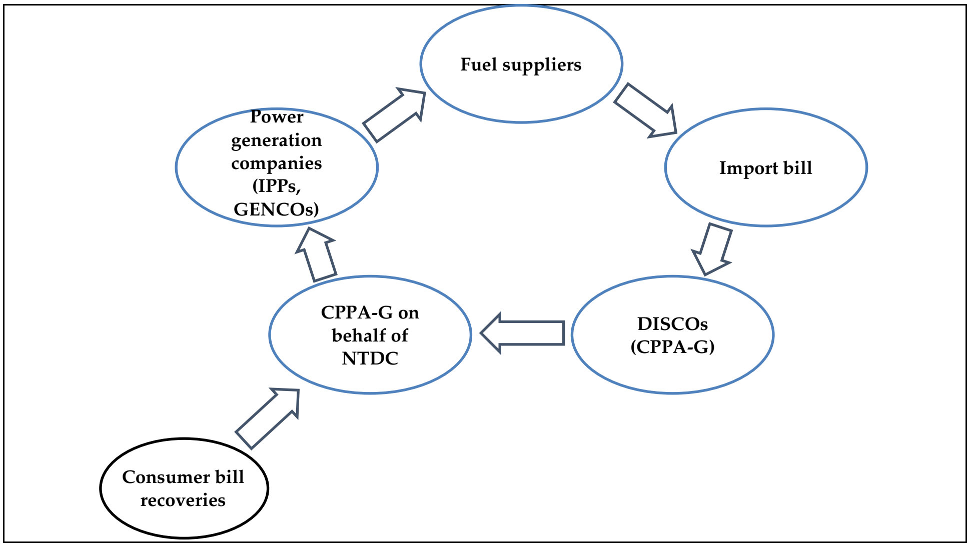
The divergence between theoretical expectations and actual outcomes suggests that financial imbalances may be embedded within the sector's cost structure. This leads to the central issue examined in the next section: the emergence of circular debt. Rather than eliminating inefficiencies, privatization may have shifted the composition of costs from variable operational losses to fixed contractual obligations, particularly capacity payments.

## What is Circular Debt?

Having examined the theoretical expectations of privatization, it is now necessary to define and contextualize the central financial problem of Pakistan's power sector: circular debt. The World Bank described circular debt as the sum of the cash gap within the Central Power Purchasing Agency-Guarantee (CPPA-G) that it cannot pay to power supply companies (Bacon, 2019). The reason for this deficit is the gap that results from the difference between the actual cost of electricity production and distribution and the revenue that distribution companies (DISCOs) collect from users.

Circular debt occurs when one entity facing cash flow problems holds back payments to suppliers and creditors (Figure 1). Thus, problems in the cash inflow of one entity cascade through other segments of the payment chain (Ali & Badar, 2010).

**Figure 1: Circular debt**



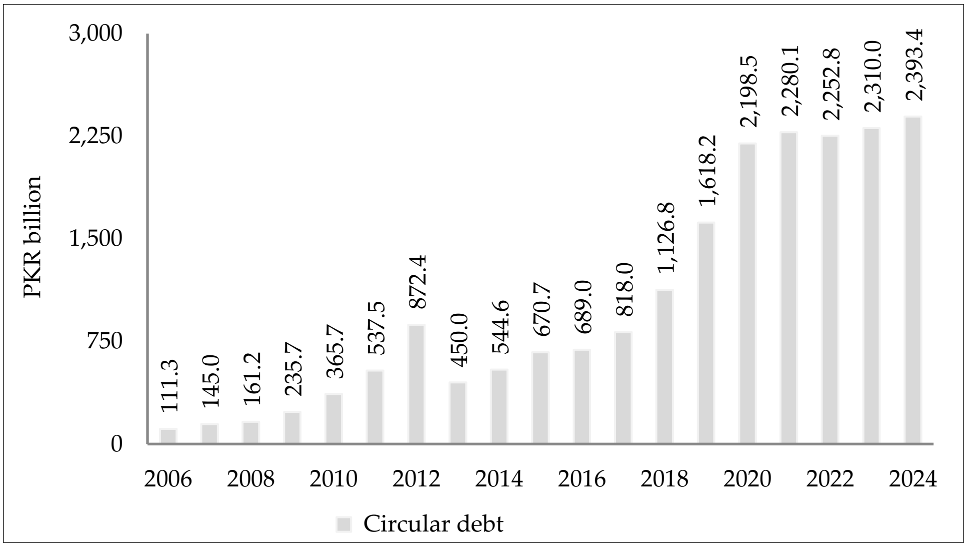

CPPA-G = Central Power Purchasing Agency-Guarantee, DISCO = distribution company, GENCO = generation company (public), IPP = independent power producer, NTDC = National Transmission and Despatch Company.

The magnitude of this issue can be observed in the historical trend of circular debt accumulation in Pakistan's power sector. Table 1 and Figure 2 illustrate the trend in circular debt accumulation from 2006 to 2024.

**Table 1: Historical trends of circular debt accumulation (2006–2024)**

| Year | Circular debt (PKR billion) |
|---|---|
| 2006 | 111 |
| 2007 | 145 |
| 2008 | 161 |
| 2009 | 236 |
| 2010 | 366 |
| 2011 | 538 |
| 2012 | 872 |
| 2013 | 450 |
| 2014 | 545 |
| 2015 | 671 |
| 2016 | 689 |
| 2017 | 818 |
| 2018 | 1,127 |
| 2019 | 1,618 |
| 2020 | 2,198 |
| 2021 | 2,280 |
| 2022 | 2,253 |
| 2023 | 2,310 |
| 2024 | 2,393 |

**Figure 2: Circular debt (2006–2024)**




Circular debt increased from PKR 111 billion in 2006 to PKR 870 billion by 2012. In 2013, the government of Pakistan injected approximately PKR 480 billion to settle outstanding liabilities, temporarily reducing the stock of circular debt to PKR 450 billion (Ministry of Finance, 2014; International Monetary Fund, 2014). However, the bailout proved to be a temporary fix, as circular debt had increased to PKR 2.4 trillion by 2024, representing 3.8 percent of GDP and 5.6 percent of total government debt. The average debt servicing surcharge paid by consumers became PKR 3.23/kWh (NEPRA, 2024; Ministry of Finance, 2025).

In Pakistan's case, this payment chain breakdown has evolved gradually due to several factors. Principally, it was due to government delays in paying producers or releasing subsidies. These delays resulted in policy implementation lags following official announcements (Bacon, 2019).

Beyond internal inefficiencies, external macroeconomic shocks also contributed to debt accumulation, particularly the sharp increase in global oil prices during 2005–2008. In 2006, Pakistan was heavily dependent on furnace oil for electricity production. To understand why fuel price volatility had such a substantial impact, it is important to examine the structure of Pakistan's energy generation mix. Table 2 shows source-wise energy generation in gigawatt hours (GWh) and demonstrates Pakistan's reliance on thermal energy generation through both public and private producers (Ikram et al., 2024).

**Table 2: Source-wise energy generation (GWh)**

| Year | Public | | | | Private | | | | | Total (public and pvt.) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hydro | Thermal | Nuclear | Total (public) | Hydro (IPPs) | Thermal | Solar | Wind | Total (pvt.) | |
| 1981–82 | 9,526 | 4,660 | 0 | 14,186 | 0 | 0 | 0 | 0 | 0 | 14,186 |
| 1982–83 | 11,366 | 4,554 | 0 | 15,920 | 0 | 0 | 0 | 0 | 0 | 15,920 |
| 1983–84 | 12,822 | 4,737 | 0 | 17,559 | 0 | 0 | 0 | 0 | 0 | 17,559 |
| 1984–85 | 12,245 | 5,907 | 0 | 18,152 | 0 | 0 | 0 | 0 | 0 | 18,152 |
| 1985–86 | 13,804 | 6,661 | 0 | 20,465 | 0 | 0 | 0 | 0 | 0 | 20,465 |
| 1986–87 | 15,251 | 7,058 | 0 | 22,309 | 0 | 0 | 0 | 0 | 0 | 22,309 |
| 1987–88 | 16,689 | 9,015 | 0 | 25,704 | 0 | 0 | 0 | 0 | 0 | 25,704 |
| 1988–89 | 16,196 | 9,555 | 0 | 25,751 | 0 | 0 | 0 | 0 | 0 | 25,751 |
| 1989–90 | 16,925 | 12,153 | 0 | 29,078 | 0 | 0 | 0 | 0 | 0 | 29,078 |
| 1990–91 | 18,298 | 13,653 | 0 | 31,951 | 0 | 0 | 0 | 0 | 0 | 31,951 |
| 1991–92 | 18,647 | 16,010 | 0 | 34,657 | 0 | 0 | 0 | 0 | 0 | 34,657 |
| 1992–93 | 21,111 | 15,157 | 0 | 36,268 | 0 | 0 | 0 | 0 | 0 | 36,268 |
| 1993–94 | 19,436 | 17,494 | 0 | 36,930 | 0 | 0 | 0 | 0 | 0 | 36,930 |
| 1994–95 | 22,858 | 17,158 | 0 | 40,016 | 0 | 0 | 0 | 0 | 0 | 40,016 |
| 1995–96 | 23,206 | 18,457 | 0 | 41,663 | 0 | 161 | 0 | 0 | 161 | 41,824 |
| 1996–97 | 20,858 | 17,068 | 0 | 37,926 | 0 | 10,740 | 0 | 0 | 10,740 | 48,666 |
| 1997–98 | 22,060 | 15,200 | 0 | 37,260 | 0 | 13,580 | 0 | 0 | 13,580 | 50,840 |
| 1998–99 | 22,448 | 13,769 | 0 | 36,217 | 0 | 15,326 | 0 | 0 | 15,326 | 51,543 |
| 1999–00 | 19,288 | 19,064 | 0 | 38,352 | 0 | 17,418 | 0 | 0 | 17,418 | 55,770 |
| 2000–01 | 17,196 | 16,798 | 1,565 | 35,559 | 63 | 22,773 | 0 | 0 | 22,836 | 58,395 |
| 2001–02 | 18,941 | 18,620 | 1,662 | 39,223 | 115 | 21,458 | 0 | 0 | 21,573 | 60,796 |
| 2002–03 | 22,253 | 19,570 | 1,386 | 43,209 | 97 | 20,658 | 0 | 0 | 20,755 | 63,964 |
| 2003–04 | 27,372 | 21,012 | 1,559 | 49,943 | 105 | 18,931 | 0 | 0 | 19,036 | 68,979 |
| 2004–05 | 25,588 | 22,181 | 2,295 | 50,064 | 83 | 23,233 | 0 | 0 | 23,316 | 73,380 |
| 2005–06 | 30,751 | 22,479 | 2,170 | 55,400 | 104 | 26,535 | 0 | 0 | 26,639 | 82,039 |
| 2006–07 | 31,846 | 21,587 | 1,944 | 55,377 | 96 | 32,163 | 0 | 0 | 32,259 | 87,636 |
| 2007–08 | 28,536 | 20,497 | 2,455 | 51,488 | 131 | 34,439 | 0 | 0 | 34,570 | 86,058 |
| 2008–09 | 27,636 | 19,568 | 1,058 | 48,262 | 547 | 35,340 | 0 | 0 | 35,887 | 84,149 |
| 2009–10 | 27,927 | 565 | 2,095 | 30,587 | 19,632 | 38,452 | 0 | 0 | 58,084 | 88,671 |
| 2010–11 | 31,685 | 305 | 2,930 | 34,920 | 13,044 | 42,342 | 0 | 0 | 55,386 | 90,306 |
| 2011–12 | 28,166 | 436 | 4,413 | 33,015 | 12,652 | 43,711 | 0 | 6 | 56,369 | 89,384 |
| 2012–13 | 29,326 | 662 | 3,668 | 33,656 | 13,838 | 40,072 | 0 | 38 | 53,948 | 87,604 |
| 2013–14 | 31,084 | 989 | 4,431 | 36,504 | 14,248 | 43,721 | 28 | 230 | 58,227 | 94,731 |
| 2014–15 | 31,525 | 1,020 | 5,033 | 37,578 | 14,223 | 44,441 | 231 | 464 | 59,359 | 96,937 |
| 2015–16 | 33,151 | 1,132 | 3,885 | 38,168 | 17,294 | 44,650 | 657 | 780 | 63,381 | 101,549 |
| 2016–17 | 31,084 | 1,016 | 5,860 | 37,960 | 19,821 | 47,316 | 664 | 1,339 | 69,140 | 107,100 |
| 2017–18 | 27,431 | 1,137 | 8,800 | 37,368 | 17,087 | 62,487 | 665 | 2,118 | 82,357 | 119,725 |

| Year | Public | | | | Private | | | | | Total (public and pvt.) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hydro | Thermal | Nuclear | Total (public) | Hydro (IPPs) | Thermal | Solar | Wind | Total (pvt.) | |
| 2018–19 | 31,146 | 1,432 | 9,038 | 41,616 | 13,590 | 62,571 | 657 | 3,166 | 79,984 | 121,600 |
| 2019–20 | 37,431 | 1,795 | 9,735 | 48,961 | 8,205 | 60,753 | 662 | 2,457 | 72,077 | 121,038 |
| 2020–21 | 37,144 | 1,922 | 10,936 | 50,002 | 7,079 | 68,896 | 727 | 2,550 | 79,252 | 129,254 |
| 2021–22 | 33,449 | 2,374 | 18,304 | 54,127 | 6,596 | 76,154 | 0 | 4,411 | 87,161 | 141,288 |

Sources: NEPRA and the National Transmission and Despatch Company.

Table 2 presents source-wise energy generation and highlights the structural shift in Pakistan's energy mix from predominantly public to private, and from hydro-based to thermal-based production. There was no private energy generation in the country before 1982. By 1997, private energy generation accounted for three-quarters of total energy generation.

This expensive generation mix and reliance on thermal power, particularly on imported furnace oil, along with the government's inability to manage price shocks, significantly increased electricity generation costs (Ali & Badar, 2010). As a result, circular debt became a major issue in Pakistan's policy discourse. While these structural and external factors explain the debt buildup, understanding circular debt requires more than defining the phenomenon; it requires identifying the components driving its growth. The following section identifies circular debt's primary financial components.

## Components of Circular Debt

To identify the primary sources of debt accumulation, it is necessary to examine the composition of circular debt and the relative contributions of its financial components. These are:

- Payables to IPPs (private)
- Payables to public generation companies (GENCOs)
- Payables to the fuel suppliers of GENCOs
- Payables to Power Holding Private Limited (PHPL)

'Payables to IPPs' refer to payments owed to private generation companies operating under power purchase agreements. These obligations arise from contractual commitments between private sector power producers and the CPPA-G.

GENCOs are state-owned electricity generation companies. 'Payables to GENCOs' represent payments owed to these companies.

'Payables to the fuel suppliers of GENCOs' refer to payments owed to public sector fuel suppliers that provide fuel and other inputs for electricity generation to GENCOs. These include Pakistan State Oil, Pakistan Petroleum Limited, and other domestic or imported fuel providers. The fuel supplied typically includes furnace oil, natural gas, or coal used in thermal power generation.

PHPL is a government entity that was established by the Ministry of Energy (Power Division) to raise and manage the capital required to settle debts owed by DISCOs to GENCOs and IPPs. This could be done through government-guaranteed loans or bonds. Hence, PHPL acts as a financial intermediary. Accordingly, payables to PHPL represent accumulated liabilities incurred to retire circular debt.

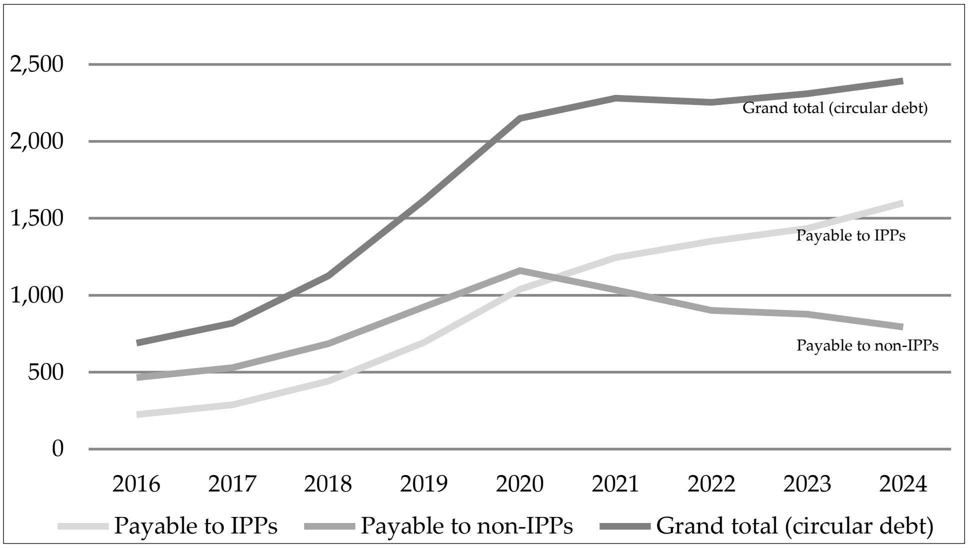
Table 3 and Figure 3 show components of circular debt in nominal values (PKR billion). Table 4 shows the percentage shares between fiscal years (FY) 2016 and 2024. The share of payables to IPPs increased from 33 percent in FY 2016 to 67 percent in FY 2024, indicating that IPPs account for the majority of circular debt. In contrast, payables to PHPL gradually declined from 53 percent in FY 2016 to 29 percent in FY 2024.

**Table 3: Components of circular debt in nominal values (PKR billion)**

| | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|
| Payables to IPPs | 224 | 288 | 441 | 694 | 1,038 | 1,245 | 1,351 | 1,434 | 1,600 |
| Payables to GENCOs | 0 | 0 | 16 | 17 | 48 | 0 | 101 | 111 | 110 |
| Payables to fuel suppliers of GENCOs | 97 | 91 | 86 | 101 | 105 | 105 | 0 | 0 | 0 |
| Payables to PHPL | 368 | 439 | 583 | 806 | 1,007 | 930 | 800 | 765 | 683 |
| Circular debt | 689 | 818 | 1,127 | 1,618 | 2,150 | 2,280 | 2,253 | 2,310 | 2,393 |

Sources: Various NEPRA state of industry reports (2002–2024); Ministry of Energy (Power Division).

**Figure 3: Components of circular debt in nominal values (PKR billion)**




Sources: Various NEPRA state of industry reports (2002–2024); Ministry of Energy (Power Division).

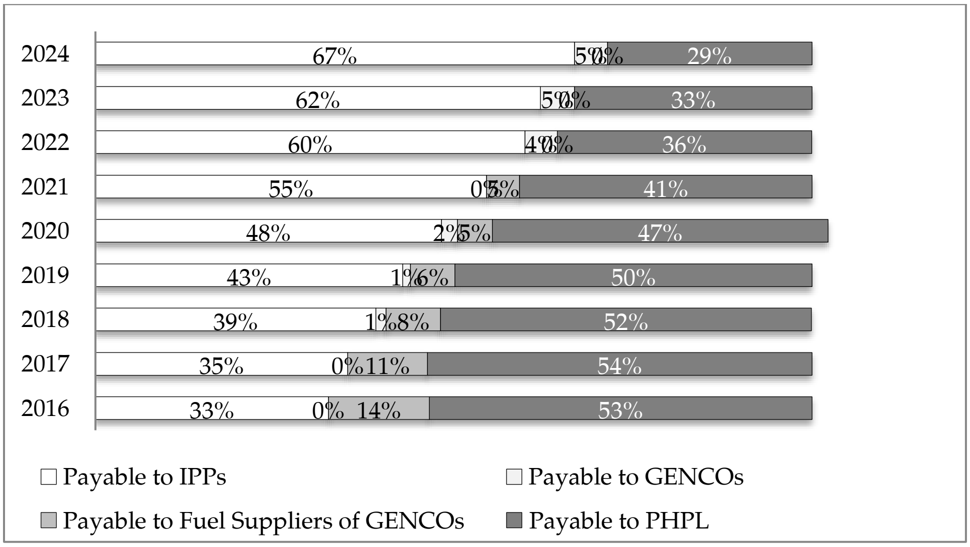
**Table 4: Circular debt for FY 2016–2024 (percentage)**

| | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|
| Payables to IPPs | 33 | 35 | 39 | 43 | 48 | 55 | 60 | 62 | 67 |
| Payables to GENCOs | 0 | 0 | 1 | 1 | 2 | 0 | 4 | 5 | 5 |
| Payables to fuel suppliers of GENCOs | 14 | 11 | 8 | 6 | 5 | 5 | 0 | 0 | 0 |
| Payables to PHPL | 53 | 54 | 52 | 50 | 47 | 41 | 36 | 33 | 29 |
| Circular debt | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Various NEPRA state of industry reports (2002–2024); Ministry of Energy (Power Division).

Figure 4 shows a shift in the composition of circular debt between 2016 and 2024. Payables to IPPs during this period increased from 33 percent to 67 percent, making them the primary contributor to circular debt. In contrast, the share of payables to PHPL declined steadily from around 53 percent in 2016 to 29 percent by 2024, indicating a reduced relative burden. Payables to the fuel suppliers of GENCOs also declined gradually, falling from 14 percent in 2016 to 0 percent by 2024, while payables to GENCOs increased from zero percent to five percent over the same period.

**Figure 4: Major contributors to circular debt**




Source: Various NEPRA state of industry reports (2002–2024); Ministry of Energy (Power Division).

Overall, the data highlights a structural shift in circular debt, with liabilities increasingly concentrated in IPP-related payments and diminishing contributions from PHPL and fuel suppliers. The rising concentration of circular debt within IPP-related payables suggests that contractual cost structures, particularly capacity payment obligations, may be central to debt persistence.

The increasing prominence of IPP-related liabilities poses an important analytical question regarding the relationship between these payables and the general accumulation of circular debt.

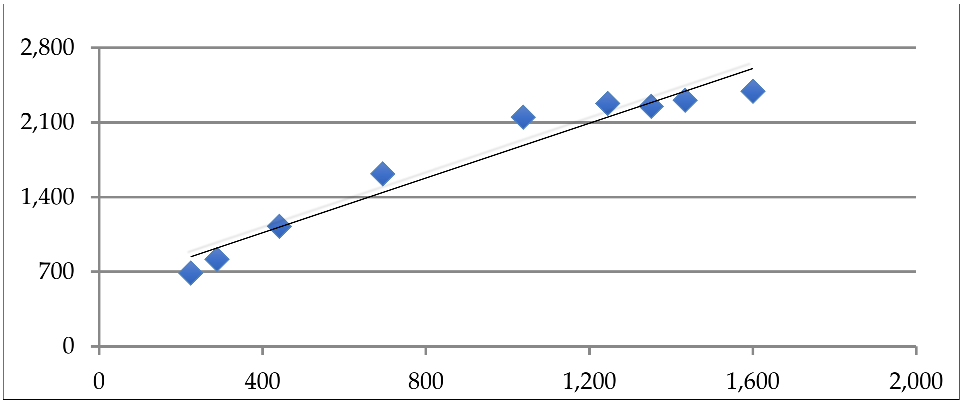
Table 5 and Figure 5 present the relationship between payables to IPPs and circular debt. The correlation coefficient of 0.97 indicates a strong positive relationship (highly significant) between IPPs' payables and total circular debt. This suggests that as circular debt in the power sector increases, the amount payable to IPPs also rises.

**Table 5: Relationship between payables to IPPs and circular debt**

| | IPP payables vs. circular debt |
|---|---|
| Correlation coefficient | 0.97*** |

Source: Authors' estimation using data from NEPRA and the Ministry of Energy (Power Division).
*** denotes significance at the one percent level.

**Figure 5: Correlation - Payables to IPPs and circular debt (PKR billion)**




The growing dominance of IPP-related liabilities raises an important question: if private generation was expected to improve efficiency, why is debt increasingly concentrated within these contractual obligations? Although the structure of circular debt demonstrates the increased role of IPP-related liabilities, another commonly cited explanation for debt accumulation is inadequate electricity pricing levels. Therefore, the following section evaluates whether electricity tariff increases have been effective in reducing circular debt.

## Have Electricity Tariff Hikes Effectively Reduced Circular Debt?

In addition to the structural factors discussed above, policymakers often attribute circular debt accumulation to inadequate electricity pricing levels. One policy response has been repeated tariff increases intended to improve cost recovery. If this approach were effective, higher prices would reduce debt accumulation. Therefore, it is necessary to examine the relationship between electricity tariffs and circular debt over time.

The theoretical efficiency argument states that an increase in energy prices should reduce circular debt by improving cost recovery. However, repeated electricity tariff hikes (a 263 percent increase since 2013) have failed to reduce circular debt, which has increased by 340 percent over the same period. Table 6 shows that from 2013 to 2024, electricity prices rose from PKR 10.9/kWh to PKR 40.2/kWh, while circular debt increased from PKR 544.6 billion to PKR 2,393 billion. Higher electricity tariffs are, therefore, associated with continued growth in circular debt. This pattern suggests that tariff adjustments alone have not addressed the underlying structural drivers of debt accumulation.

**Table 6: Electricity tariffs and circular debt (2013–2024)**

| | Price (PKR/kWh) | Circular debt (PKR billion) |
|---|---|---|
| 2013 | 10.935 | 544.6 |
| 2014 | 12.430 | 670.7 |
| 2015 | 12.655 | 689.0 |
| 2016 | 12.72 | 689.0 |
| 2017 | 12.625 | 818.0 |
| 2018 | 12.890 | 1,127.0 |
| 2019 | 14.205 | 1,618.0 |
| 2020 | 17.935 | 2,150.0 |
| 2021 | 18.975 | 2,280.0 |
| 2022 | 23.165 | 2,253.0 |
| 2023 | 33.870 | 2,310.0 |
| 2024 | 40.225 | 2,393.0 |

This reinforces the notion that price increases alone are insufficient in addressing structural imbalances within the power sector, pointing to policy ineffectiveness and deeper systemic inefficiencies within the sector.

The persistence of circular debt despite significant tariff increases suggests that the problem may lie in the structure of power purchase costs, particularly capacity payment obligations.

Table 7 and Figure 6 present the relationship between electricity prices and circular debt. The correlation coefficient of 0.74 indicates a positive relationship (highly significant) between prices and circular debt. This implies that when electricity prices in Pakistan's power sector increase, the amount of circular debt also rises.

**Table 7: Relationship between electricity prices and circular debt**

| | Prices vs. circular debt |
|---|---|
| Correlation coefficient | 0.74** |

** denotes significance at the five percent level.

**Figure 6: Correlation - Circular debt (PKR billion) and electricity prices (PKR/kWh)**

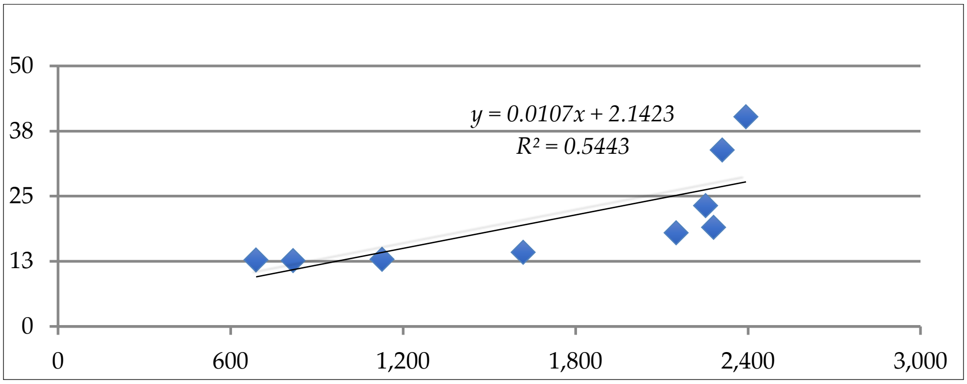
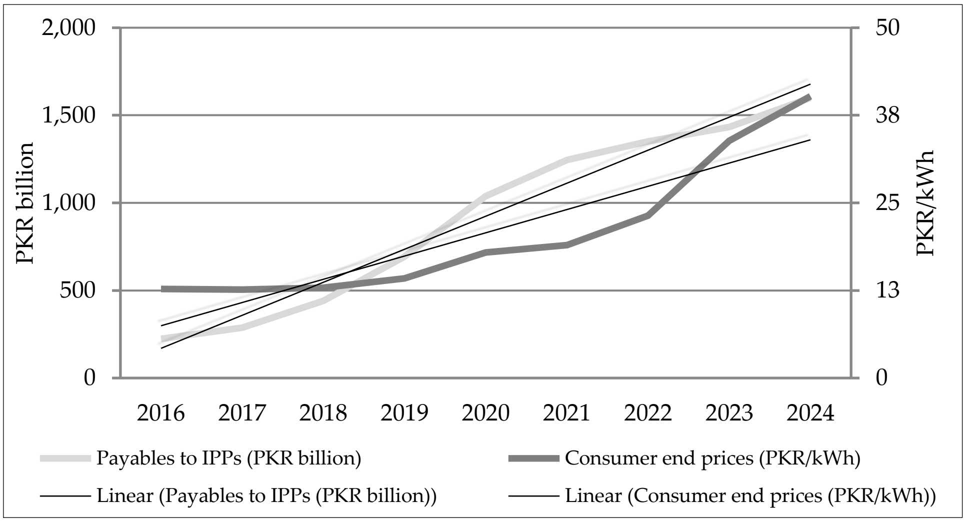



Figure 7 illustrates the relationship between payables to IPPs and electricity prices. The data shows that from 2016 to 2024, both the amounts payable to IPPs and electricity prices moved in the same direction, reflecting a positive relationship between the two variables. The fact that circular debt persists even with high tariff increases points to the possibility that the issue is not electricity pricing alone but also the structure of power purchase costs.

**Figure 7: Payables to IPPs and electricity prices (PKR billion)**




Sources: NEPRA and the Ministry of Energy (Power Division).

## Are Capacity Payments the Hidden Engine of Circular Debt?

While tariff adjustments have been widely suggested as a policy response, data on the persistence of circular debt suggests that deeper structural mechanisms may be driving debt accumulation, such as capacity payments.

Capacity payments refer to fixed contractual obligations paid to power producers regardless of whether electricity is generated (Malik, 2020; Abbas, 2023). These fixed commitments contribute significantly to the persistent growth of Pakistan's circular debt in the power sector.

Ali and Badar (2010) highlighted that consumer tariffs are often insufficient to fully cover these fixed costs, resulting in fiscal pressure on the government to cover the difference. Box 1 breaks down the components of the CPP and EPP to better explain this cost structure.

**Box 1: Components of CPP and EPP**

**The CPP comprises:**

- Project debt payments (including interest and principal)
- Return on equity over project life
- Fixed elements of operating and maintenance costs
- Plant insurance costs
- Foreign exchange risk insurance cost, which is the cost of hedging loans against foreign exchange risk

**The EPP comprises:**

- Fuel cost, which is set by the government and is higher than world oil prices by the amount of a surcharge
- Variable elements of operating and maintenance costs

**PPP = EPP + CPP**

Note: Definition from PPP forecast, CPPA-G.

Given the significance of capacity payments within the overall power purchase structure, it is important to examine how the CPP has evolved relative to circular debt over time. Table 8 shows the relationship between circular debt and the CPP from 2013 to 2024.

**Table 8: Relationship between circular debt and the CPP (2013–2024)**

| | Circular debt (PKR billion) | CPP (PKR billion) | CPP % of circular debt |
|---|---|---|---|
| 2013 | 544.6 | 185 | 34.0 |
| 2014 | 670.7 | 212 | 31.6 |
| 2015 | 689.0 | 246 | 35.7 |
| 2016 | 689 | 275 | 39.9 |
| 2017 | 818 | 358 | 43.8 |
| 2018 | 1,127 | 468 | 41.5 |
| 2019 | 1,618 | 642 | 39.7 |
| 2020 | 2,150 | 859 | 40.0 |
| 2021 | 2,280 | 796 | 34.9 |
| 2022 | 2,253 | 971 | 43.1 |
| 2023 | 2,310 | 1,321 | 57.2 |
| 2024 | 2,393 | 2,010 | 84.0 |

Sources: Authors' estimation using data from NEPRA and the Ministry of Energy (Power Division).

The CPP as a percentage of circular debt increased from 34 percent in 2013 to 84 percent in 2024, indicating a substantial rise in the share of capacity payments within total circular debt.

This finding highlights a central concern—the CPP is the main driver behind the increase in circular debt. The capacity payments charged by IPPs are fueling circular debt and are, therefore, a significant concern for the broader economy.

The PPP is the sum of the EPP and CPP. An increase in CPP directly raises the overall PPP, thereby increasing the financial burden on the system.

The main components of the CPP include debt servicing obligations (interest and principal payments), returns on equity to IPPs or state-owned companies, and fixed operating and maintenance costs. It also incorporates plant insurance and the cost of hedging foreign loans against exchange rate variations (foreign exchange risk insurance).

Containing CPP, therefore, requires reforms aimed at improving contractual efficiency and reducing structural reliance on high fixed-cost generation agreements.

In addition to capacity payment obligations, several other factors contribute to the persistence of circular debt. These include subsidies and tariff differentials. While subsidies decrease the price of electricity for some consumers, delays in government reimbursement create a funding gap, i.e., tariff differentials. As a result, power companies do not recover their full costs.

Subsequently, power sector entities experience cash flow constraints when the government delays reimbursements. In turn, these entities find it difficult to make payments to generators and fuel suppliers, ultimately triggering delays across the entire supply chain.

DISCOs fail to collect sufficient funds on the consumer end because of payment delays or poor bill recovery. Furthermore, system losses, theft, and weak administration reduce revenue collection. Together, these factors contribute to the accumulation of circular debt. While capacity obligations explain the structural buildup of debt, their consequences extend beyond fiscal imbalance. Elevated cost structures ultimately shape electricity pricing and economic competitiveness.

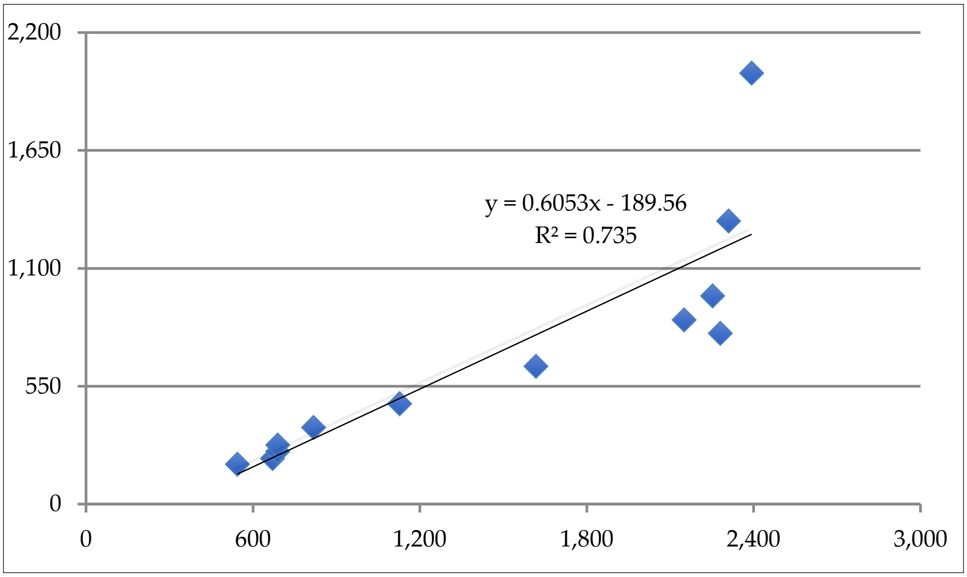
Table 9 and Figure 8 present the relationship between CPP and circular debt. The correlation coefficient of 0.86 indicates a strong positive relationship between CPP and circular debt, supporting this paper's argument that rising capacity obligations are closely linked to debt accumulation.

**Table 9: Relationship between CPP and circular debt**

| | CPP vs. circular debt |
|---|---|
| Correlation coefficient | 0.86*** |

*** denotes significance at the one percent level.

**Figure 8: Correlation - CPP (PKR billion) vs. circular debt (PKR billion)**




Sources: NEPRA and the Ministry of Energy (Power Division).

### How Does Pakistan Rank in Electricity Prices Regionally and Globally?

The cost structure of Pakistan's power sector not only contributes to circular debt but also influences the level of electricity tariffs faced by consumers and industries. Pakistan's population in 2025 is estimated at 255.22 million, making it the fifth most populous country in the world and ranking 33rd globally by area, according to worldmeters.info.

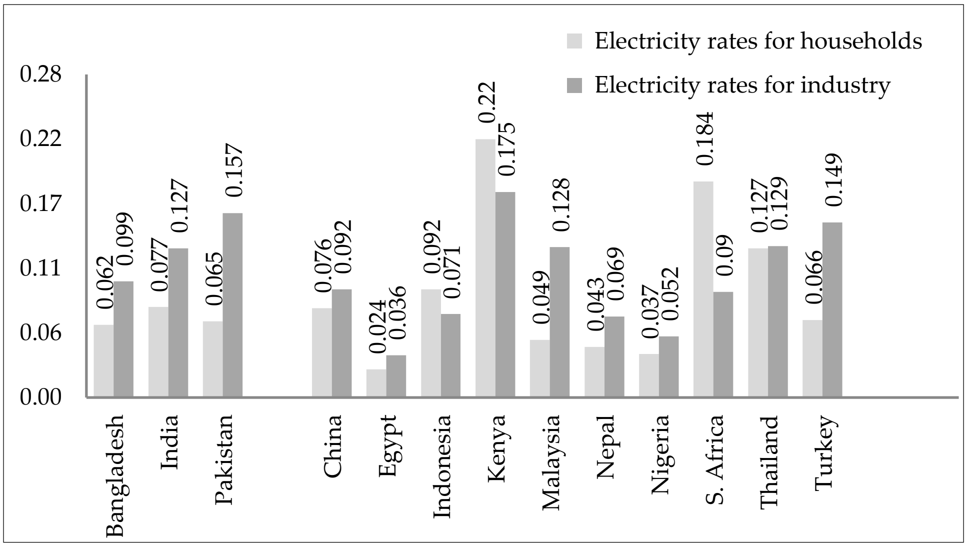
Figure 9 presents average electricity prices for households and industry in South Asia and beyond for the period of 2023–2025 (USD/kWh). Among three South Asian nations, electricity prices for households are highest in India (USD 0.077/kWh), followed by Pakistan (USD 0.065/kWh) and Bangladesh (USD 0.062/kWh).

Pakistan's average industrial electricity price is USD 0.157/kWh, the highest among the three South Asian countries considered, followed by India and Bangladesh.

Figure 9 also shows these averages for households and industry in other countries, highlighting significant variation in tariffs. The highest household rate was recorded by Kenya at USD 0.220/kWh, followed by South Africa at USD 0.184/kWh, and Thailand at USD 0.127/kWh. Egypt and Nigeria fall on the opposite side of the spectrum with the lowest rates of USD 0.024/kWh and USD 0.037/kWh, respectively.

The highest industry tariff rate was recorded by Kenya at USD 0.175/kWh, closely followed by Pakistan at USD 0.157/kWh. Industrial electricity rates are higher than household rates in most of the countries shown, which places pressure on local manufacturers and the industrial sector alike.

**Figure 9: Household and industry electricity rates (USD/kWh) - Average for 2023–2025**




Source: GlobalPetrolPrices.com.

Pakistan's electricity prices, particularly for industrial consumers, are much higher than those in neighboring countries, placing it at a competitive disadvantage in regional trade and industrial production. Higher industrial tariffs increase production costs, which are often passed on to consumers in the form of higher product prices. Higher electricity prices further add to production costs. As a result, Pakistan's manufacturing sector faces reduced competitiveness in major industrial sectors relative to regional peers (Rehman et al., 2025). Excessive price increases make it difficult for consumers to afford electricity, and elevated tariffs raise operating costs for key industries, thereby dampening economic activity (Jamil, 2012). Since electricity constitutes a major input cost for heavy industry operations, higher tariffs weaken export competitiveness in comparison to India and Vietnam in textile manufacturing. Using time-series data from 2005 to 2015, Junejo and Khoso (2018) found that Pakistan's electricity crisis significantly hampered industrial growth, reducing both industrial output growth and electricity consumption across industries.

Global electricity price benchmarks for 2022 indicate that Pakistan's residential electricity tariffs were 46.16 percent of the world average and 83.21 percent of the Asia average. In contrast, Pakistan's industrial tariffs surpassed global and regional averages, standing at 106.93 percent of the world average and 146.89 percent of the Asia average. Comparatively, India's residential tariffs were 51.28 percent of the world average and 92.45 percent of the Asia average, while its industrial tariffs were 85.99 percent and 118.12 percent, respectively. Bangladesh's industrial tariffs, at 73.20 percent of the world average and 100.55 percent of the Asia average, were comparatively lower than those of both Pakistan and India (Table 10).

**Table 10: Global and regional electricity price comparison (2022)**

| | **Residential (%)** | | **Industrial (%)** | |
|---|---|---|---|---|
| | **World avg. electricity price** | **Asia avg. electricity price** | **World avg. electricity price** | **Asia avg. electricity price** |
| Pakistan | 46.16 | 83.21 | 106.93 | 146.89 |
| India | 51.28 | 92.45 | 85.99 | 118.12 |
| Bangladesh | 45.03 | 81.17 | 73.20 | 100.55 |

Source: GlobalPetrolPrices.com.

These comparisons substantiate and reinforce the validity of this paper's theoretical framework, providing clear evidence that aligns with the predictions and assumptions outlined earlier: that Pakistan's industrial electricity costs are significantly higher in regional terms, while residential electricity prices in South Asia remain below global averages. This puts Pakistan at a competitive disadvantage and a comparative trade disadvantage.

Given these structural inefficiencies and their macroeconomic implications, comprehensive sectoral reform becomes imperative.

## Recommendations

Pakistan's power sector remains structurally constrained by persistent circular debt accumulation, accentuating the need for comprehensive reforms.

A primary reform priority is enhancing transparency in power purchase agreements. The government should mandate greater disclosure of contract terms, financial obligations, and performance metrics associated with IPPs. Improved transparency would strengthen accountability and ensure that stakeholders understand the financial commitments and operational performance of IPPs.

A second area of reform involves taking a strategic exit from costly contracts by reassessing high-cost contractual commitments. Policymakers may consider renegotiating or terminating agreements with inefficient thermal plants categorized by high capacity (e.g., above 50 percent capacity charges) and low utilization rates (below 30 percent load factor). Such measures would reduce the structural fixed cost burden.

Furthermore, Pakistan should begin shifting to cost-effective power sources by focusing on electricity from power plants that deliver higher output at lower capacity obligations. This strategy will optimize resource allocation and help reduce the overall financial strain on the energy sector.

Additionally, Pakistan should aim to improve the utilization of existing high-cost plants and prioritize purchasing electricity from plants incurring significant capacity payments to ensure that already committed funds result in tangible energy output, thus maximizing the value derived from these agreements.

The next step should be expanding renewable energy capacity to present a medium-to-long-term structural solution. Future IPP investments should increasingly shift to renewable fuel and replace retired capacity with solar or wind IPPs (no fuel cost volatility), or hydropower expansions should be carried out (base load stability) to reduce exposure to fuel price volatility and lower long-run obligations, thereby contributing to greater financial sustainability.

## Conclusion

This paper examined the structural drivers of circular debt in Pakistan's power sector, particularly the impact of electricity prices and capacity payment requirements. Although policymakers have often attributed the persistence of circular debt to inadequate electricity tariffs, this paper indicates that price changes have not been enough to eliminate them. Irrespective of the fact that tariffs have significantly increased in the last ten years, circular debt has increased substantially, indicating that deeper structural factors are at work within the power sector.

The analysis reveals that the role of capacity payments in privatized power generation contracts has emerged as a dominant component of circular debt. The proportion of CPP relative to total circular debt has increased drastically over the years, which underlines the increasing financial liabilities associated with fixed contractual obligations to IPPs. Correlation analysis further confirms the close relationship between capacity payments and circular debt accumulation, indicating that the issue may be embedded in the design of power purchase agreements and the overall costs of the electricity market.

Addressing circular debt, therefore, requires more than tariff adjustments. Sustainable reforms should aim at increasing the efficiency of power purchase agreements, reducing dependence on high fixed-cost capacity payments, and increasing financial transparency throughout the power industry. Without structural reform, Pakistan's energy system will continue to face financial instability, escalating electricity prices, and decreasing industrial competitiveness.

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# 11

## Governance Factors and the Role of Independent Power Producers in the Power Sector's Performance Outcomes: International Evidence

**Jamshed Y. Uppal**[1]

### Abstract

*Independent power producers (IPPs) are major sources of power generation around the world. Countries faced with severe energy shortages and limited public resources have turned to private investors to ameliorate the situation. However, IPPs in Pakistan have suffered from corruption allegations and doubts over contract fairness, operating performance, and their ability to decrease energy disparities. There is a need for broader reforms, especially a regulatory and governance environment that is conducive to leveraging private investment to bolster energy infrastructure. This paper's key objective is to explore the links between a country's governance and regulatory environment and the performance of IPPs in terms of access, price, quality, and technical and financial performance. The analysis is based on data from 50 countries over the period 2017–2019 and assesses six dimensions of governance. The initial results confirm the hypothesis that regulatory and governance factors significantly affect IPP performance. The results underscore the importance of improving government effectiveness, the rule of law, and regulatory quality, and controlling corruption so that IPPs can better fulfill their potential.*

### Introduction

Independent power producers (IPPs) have become a major source of power generation around the world. Countries faced with severe energy shortages and limited public resources have turned to private investors to ameliorate the situation. However, the promise of such public-private partnership (PPP) structures has not been evenly realized by different countries (Hoskote, 1995; Mayer & Trück, 2018; Tahir et al., 2024). We focus on the quality of governance across countries to understand why.

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PPPs suffer from an agency problem, i.e., the two parties, agents (IPPs) and principals (governments or public regulatory authorities), have divergent economic interests. It has long been recognized that electricity generation firms, much like public utilities, exhibit characteristics of natural monopolies and, therefore, require regulation (Sabin, 2023). While the interests of private investors could be said to be driven by profit maximization (a single-bottom line), the public sector's goals may extend beyond simply ensuring project viability and sustainability to include wider public welfare and developmental goals (a double-bottom line). The latter's goals could include universal access to electricity, eliminating power access gaps across regions and social strata, and ameliorating energy poverty and inequity. Thus, the PPP model's success relies on efficient solutions to the agency problem and, at minimum, agency costs. However, when public sector governance is weak and corrupt, monitoring and enforcing PPP contracts is difficult, and private sector players can use that to their advantage. In extreme cases, the private sector can work to the detriment of public interest through lobbying, corruption, oligopolistic practices, and 'regulatory capture,' where regulatory authorities act as cohorts rather than watchdogs.

There is also an agency problem between governments (agents) and the public (principals). At this level, autocratic or unresponsive governments exacerbate the first-level agency problem. Considering these agency issues, how IPPs participate in the power sector depends on the strength of public governance, its responsiveness to the public's demands, and on private parties' political influence.

Various authors have drawn attention to the power sector's performance-governance nexus. Vagliasindi's (2012) study on power market structures and performance speaks of the need 'to implement broader reforms, particularly introducing a sound regulatory framework [and] reducing the degree of concentration of the generation and distribution segments of the market.' Tabash et al. (2025) acknowledge that PPP investments in energy significantly reduce poverty and unemployment in the long run but suggest that improved governance and strategic public spending enhance such socioeconomic benefits. Othman and Khallaf (2023) show that the main barriers to renewable energy PPPs in Egypt are regulatory and political, while well-prepared contract documents and skilled and efficient parties are primary success factors. Kanyamyoga (2020) suggests that the quality of political, economic, and social institutions, both formal and informal, affects PPP projects' functionality and their economic outcomes.

Other scholars have also underscored the importance of conducive regulatory and governance environments in leveraging private investment to bolster energy infrastructure. They include Advanced Engineering Associates International, Inc. and Deloitte Touche Tohmatsu (2003), Akcura and Mutambatsere (2024), Hayakawa et al. (2000), Ndlovu and Telukdarie (2020), Woolf and Halpern (2001), Kashi (2015), Steelyana and Aulia (2024), Chowdhury et al. (2012), Aulia and Steelyana (2023), and Othman and Khallaf (2022).

This paper's primary objective is to explore the links between a country's governance and regulatory environment and the performance of IPPs in terms of access, price, quality, and technical and financial performance. The analysis is based on a data panel of 50 countries over the period 2017–2019 from the International Finance Corporation (2021). It is combined with the World Bank's (2025) worldwide governance indicators, which describe broad patterns in perceptions of the quality of governance across countries and over time. These indicators capture six dimensions of governance: (i) voice and accountability, (ii) political stability and the absence of violence/terrorism, (iii) government effectiveness, (iv) regulatory quality, (v) the rule of law, and (vi) control of corruption.

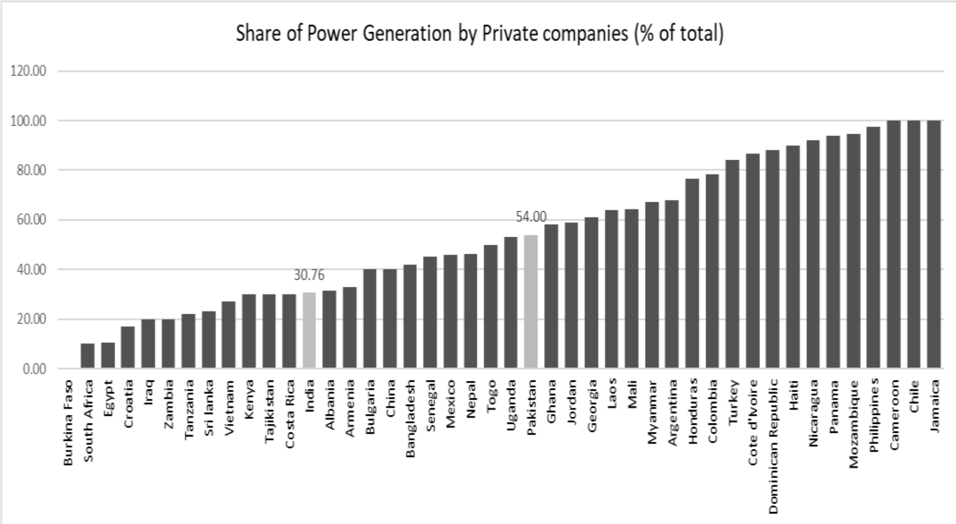
The study's results confirm the hypothesis that regulatory and governance strength positively affect IPP performance. On the other hand, a larger share of IPPs in power sectors appears to negatively impact performance outcomes. These results are useful for helping shape public policy as they underscore the role of improving government effectiveness, the rule of law, and regulatory quality, and controlling corruption in fulfilling IPPs' potential.

## IPPs: A Major Source of Power

IPPs hold a considerable share of power generation capacity around the world. Countries have sought to ameliorate energy shortages by inviting private investment in the energy sector to supplement limited public resources. As Figure 1 shows, there is a wide spread in IPPs' share of power generation across countries. It ranges from 100 percent (Cameroon, Chile, Jamaica) to 0.15 percent (Burkina Faso). In the case of Pakistan, IPPs' share is 54 percent, compared to about 31 percent in India.

The reasons for this spread include individual countries' supply-demand conditions and their orientation toward the role of the public and private sectors in their economies. The expectation of IPPs is the amelioration of energy shortages, reductions in energy poverty, increased operational efficiency, and equitable access to reliable energy.

**Figure 1: IPP share of power generation by country (percentage of total)**




## Pakistan's Experience

Pakistan was among the first countries to induct IPPs into its power sector to attract private investment and rapidly close the supply-demand gap in electric power. The Hub Power Project was a landmark project in infrastructure finance, hailed as a PPP showpiece, and considered an important precedent for the viability of private financing of energy projects in developing countries.

Pakistan's private power policy was adopted in 1994, under which 19 IPPs were launched. However, the initiative faced a setback in 1998 due to corruption allegations, leading to the renegotiation of contracts (Fraser, 2005). Since then, IPPs have come to account for over half of Pakistan's installed electricity generation capacity. However, their actual contribution varies due to power demand and other power system constraints.

IPP performance has been under critical scrutiny, both in the popular press and in professional circles, since 1994. There have been allegations of corruption and doubts over contract fairness, operational performance, and whether they increase or decrease energy access disparities (Khan, 2014; Siddiqui, 1998; Arafat et al., 2019; Ullah & Wazir, 2023).

A key criticism has been the 'take-or-pay' feature of IPP contracts, under which the government makes 'capacity payments,' minimum amounts for maintaining power generation capacity. This puts a considerable burden on the federal government, straining the budget without corresponding benefits. A second criticism is the government's commitment to supply IPPs with fuel.

Limited budget space and associated foreign exchange constraints are major factors contributing to why IPPs run below full capacity. The strategy relied heavily on imported fossil fuels like oil, coal, and liquefied natural gas due to limited domestic energy sources. This meant that the power supply was vulnerable to fluctuations in international energy prices, thereby affecting electricity costs for consumers. In response, the government has recently pursued alternative arrangements by renegotiating with some IPPs to alleviate capacity payment and circular debt concerns.

Pakistan has been characterized as having a weak governance environment; it scores toward the bottom of all governance indicators, particularly in the rule of law, government effectiveness, and regulatory quality.

Endemic corruption and weaknesses in the areas of voice and accountability create an enabling environment for elite and regulatory capture by private producers. Therefore, a case study of Pakistan's power sector lends support to our hypotheses on the linkages between IPPs' share of power generation, the quality of governance, and the power sector's performance outcome measures.

## Study Objectives

Several studies indicate that the promise of such PPP structures has not been evenly realized in various countries. The objective of this study is to investigate the role that governance factors play in enhancing or hindering the power sector's performance. Several scholars underscore the importance of institutional factors in fulfilling the PPP promise, including:

1. A sound regulatory framework
2. The degree of concentration of the generation and distribution segments of the market
3. A conducive environment for private sector investment and participation

4. A conducive regulatory and governance environment for leveraging private investment to bolster energy infrastructure

This study explores the nexus between a country's governance and regulatory environment, the share of IPPs, and the performance of its power sector in terms of the following indicators included in the International Finance Corporation's (2021) data panel of 50 countries:

1. Electricity access (percentage of population)
2. Urban-rural access gap (percentage of population)
3. System average interruption frequency index (SAIFI)
4. System average interruption duration index (SAIDI)
5. Electricity losses (percentage of output)
6. Non-technical losses (percentage of output)
7. Bill collection rate (percentage)
8. Average industrial tariff (USD/kWh)
9. Average generation cost (USD 1,000/GWh)

The governance indicators are from the World Bank (2025) and consist of the following:

1. Voice and accountability
2. Political stability and absence of violence/terrorism
3. Government effectiveness
4. Regulatory quality
5. Rule of law
6. Control of corruption

## An Exploratory Econometric Model

A multiple regression model was utilized where the nine power sector performance indicators ($P_i$, i = 1–9) (country, k = 1–50) were regressed using the following independent variables:

1. IPP share in a country's power sector ($S_k$)

2. Governance indicators ($G_{j,k}$, j = 1–6, k = 1–50), including one indicator for each regression run

3. A control variable, a country's gross domestic product (GDP) per capita ($I_k$)

Thus, the model can be expressed as follows:

$$P_{i,j,k} = \alpha_{i,j} + \beta_{i,j}S_k + \gamma_{i,j}G_{j,k} + \delta_{i,j}I_k + \varepsilon_{i,j,k}$$

This study is best regarded as exploratory since data is limited to a single timeframe. There could be a variety of omitted variables that would limit the model's applicability. Appendix 1 presents summary statistics of the variables used in the model.

## Results

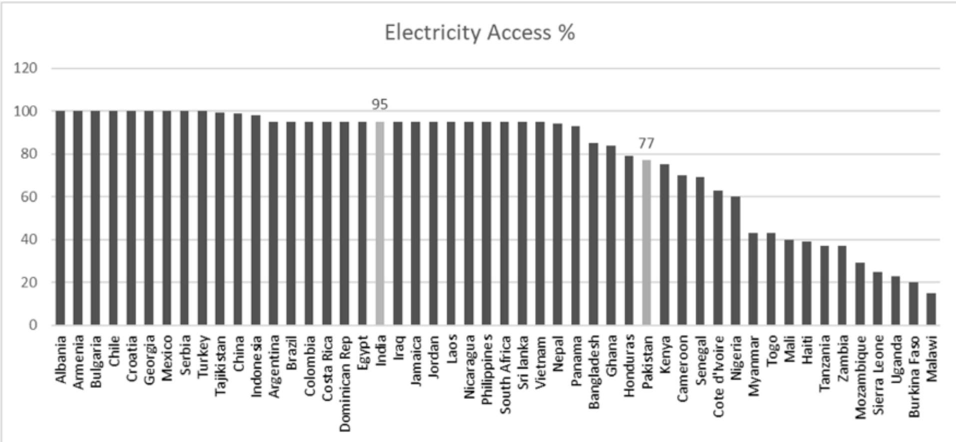
The econometric estimation was run for 54 models: one equation for each of the nine performance indicators, including one of the six governance indicators in each equation. The results are shown in Appendices 2–10. Each appendix table shows regression analysis results, including the governance indices, in six columns. The results of each performance indicator are discussed below.

### *Electricity Access*

A basic indicator of the power sector's performance is the electricity access rate, i.e., the percentage share of the population with access to electricity. Figure 2 shows that 30 of 50 countries in the sample have a 90 percent or higher electricity access rate. On the other hand, 11 countries have an electricity access rate of less than 50 percent. Pakistan and India's rates are 77 percent and 95 percent, respectively.

The results show that the share of IPPs' total power generation capacity is not statistically significantly related to the percentage access to electricity; a higher IPP share does not appear to increase electricity access. However, two of the governance indicators have positive significant coefficients. These are government effectiveness and regulatory quality, and they appear to help increase access (Appendix 2).

**Figure 2: Electricity access (percentage)**

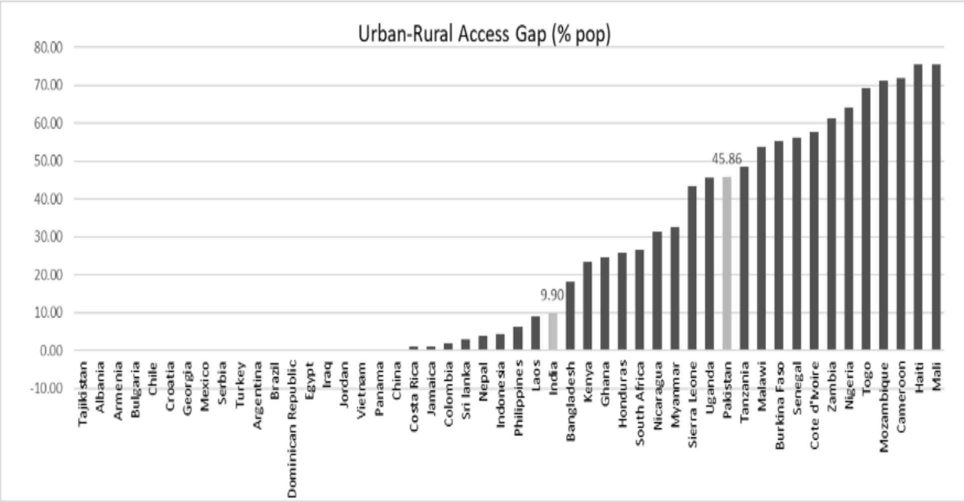



***Urban-Rural Access Gap***

The urban-rural access gap is an indicator of inclusiveness and equity in electricity access, i.e., the percentage point difference between the share of people with access to electricity in urban versus rural areas. The urban-rural access gap is five percent or less for half of the sample (25 countries). On the other hand, the gap exceeds 50 percent in 11 countries. The figures for Pakistan and India are 45.9 percent (rank 38/50) and 9.9 percent (rank 28/50), respectively (Figure 3).

The results of the regression model (Appendix 3) show that while the coefficient for the IPP share is insignificant in all six models, three governance variables are statistically significant. These are government effectiveness (p-value = 0.001), rule of law (p-value = 0.10), and regulatory quality (p-value = 0.001).

**Figure 3: Urban-rural access gap (percentage of population)**

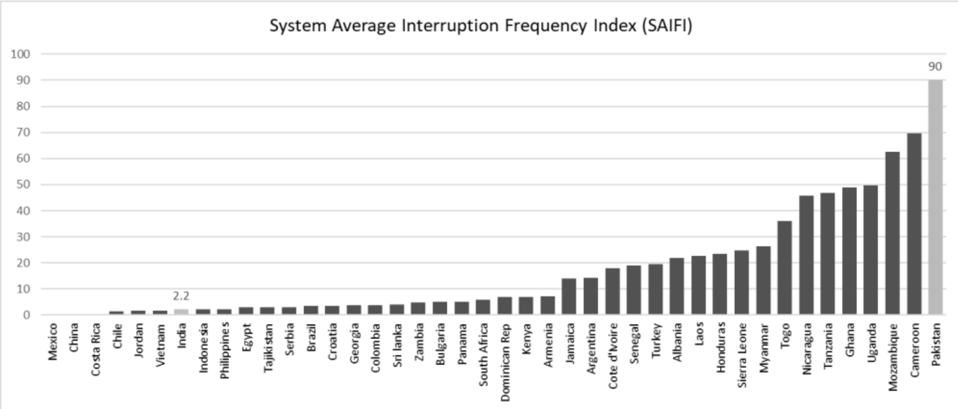



***Power Interruptions: System Average Interruption Frequency Index***

SAIFI is a key measure of operational efficiency and the quality of power supply. Pakistan stands out with the highest frequency of power interruptions (90). Eighteen countries have SAIFI values of 5 or less. India's index is 2.2 (Figure 4).

The regression results in Appendix 4 show that the IPP share is positively related to SAIFI and statistically significant. The coefficients are significant in five of the six governance models. On the other hand, the governance indicators are negatively related to the SAIFI index; the coefficients are significant for four of the six governance indicators, i.e., control of corruption, government effectiveness, rule of law, and regulatory quality.

**Figure 4: Frequency of system interruptions (SAIFI)**



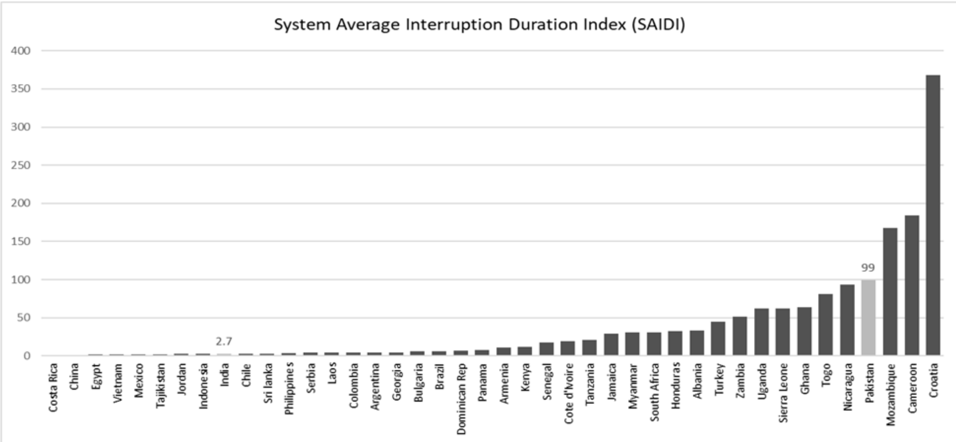

The results in Appendix 4 support our hypothesis that a larger share of IPPs is associated with a lower quality of power supply, as indicated by SAIFI, while better governance exerts pressure on IPPs and the power sector to improve delivery quality.

***Power Interruptions: System Average Interruption Duration Index***

SAIDI is another useful measure of the quality of delivered power. Once again, Pakistan's power sector stands out with an index value of 99—its rank is fourth from the worst in the sample. Figure 5 shows that 21 of 42 countries have SAIDI values of less than 10. India's value is 2.7.

The results in Appendix 5 show that neither the regression coefficients of the IPPs' share nor any of the governance indicators are statistically significant. Thus, we are unable to reject the null hypothesis of there being no relationship between IPP share or the governance indicators and the average duration of interruptions.

**Figure 5: Duration of system interruptions (SAIDI)**

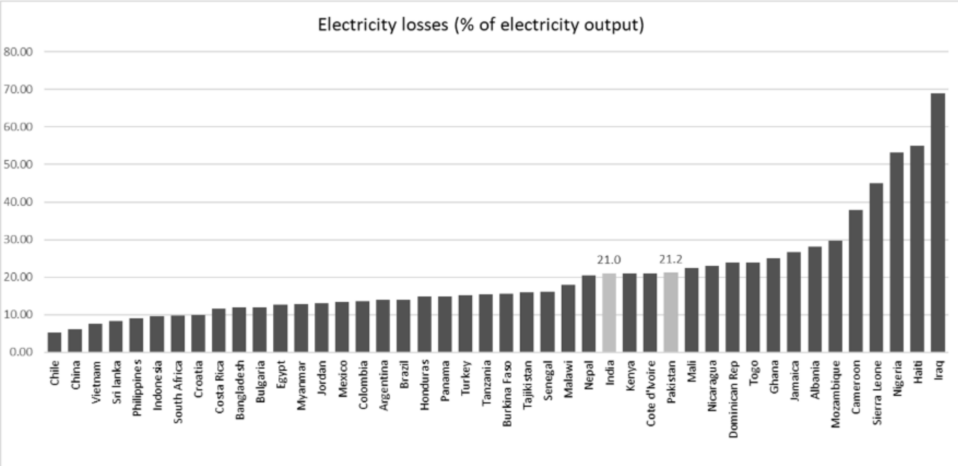



***Electricity losses***

Electricity losses (as a percentage of electricity output) are electric power transmission and distribution losses, including losses in transmission between sources of supply and points of distribution and in distribution to consumers, including pilferage. Figure 6 shows a broad spread in electricity losses across the sample, ranging from 5 percent (Chile) to 69 percent (Iraq). Pakistan (21 percent) and India (20 percent) stand close to the center of the distribution, with ranks of 31/44 and 26/44, respectively.

The question is: to what extent are electricity losses affected by the share of IPPs and the state of governance in a country? The regression results in Appendix 6 show that while the IPP share is not a statistically significant determinant of electricity losses, governance does play a role in curbing losses. Four of six governance indicators carry negative coefficients with statistical significance. These include control of corruption, government effectiveness, the rule of law, and regulatory quality, suggesting that better governance tends to ameliorate electricity losses.

**Figure 6: Electricity losses (percentage of electricity output)**



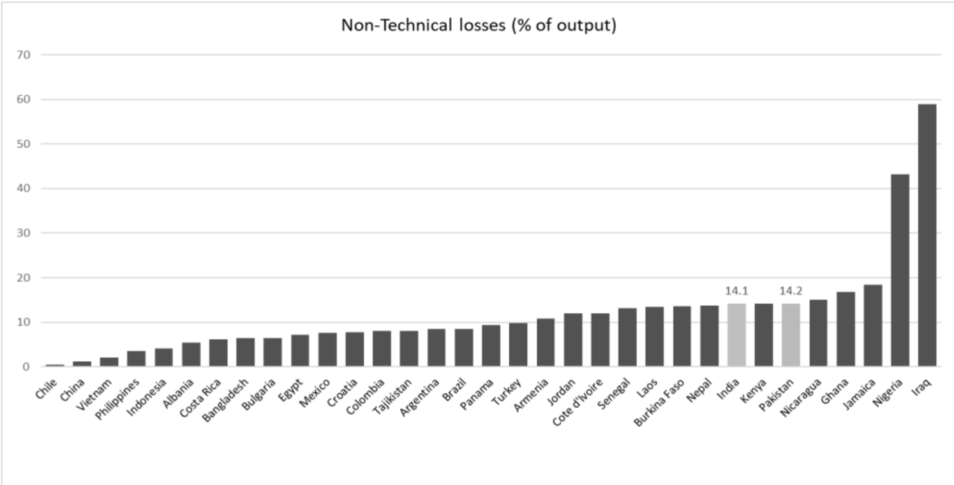

***Non-Technical Power Losses***

Non-technical losses, also known as commercial losses (as a percentage of electricity output), measure the percentage share of total electricity output lost due to factors such as theft, unmetered supplies, and conveyance errors. Apart from Iraq (59 percent) and Nigeria (43.2 percent), which are outliers in the sample, there is an even gradation of losses ranging from 0.5 percent to almost 20 percent. Pakistan and India appear towards the higher end of the loss spectrum, with values of 14.2 percent and 14.1 percent, respectively. Pakistan ranks 28/33, while India ranks 26/33 (Figure 7).

The regression output in Appendix 7 shows that none of the coefficients of IPP share are statistically significant, implying that the data does not reject the null hypothesis of there being no linkage between the share of IPPs and non-technical electricity losses. On the other hand, two of the governance indicators have significant coefficients, albeit at only the ten percent level of significance.

We note that this study does not focus on electricity losses due to energy dissipated in conductors, equipment used for transmission lines, transformers, sub-transmission lines, and distribution lines, or magnetic losses in transformers.

**Figure 7: Non-technical losses (percentage of output)**

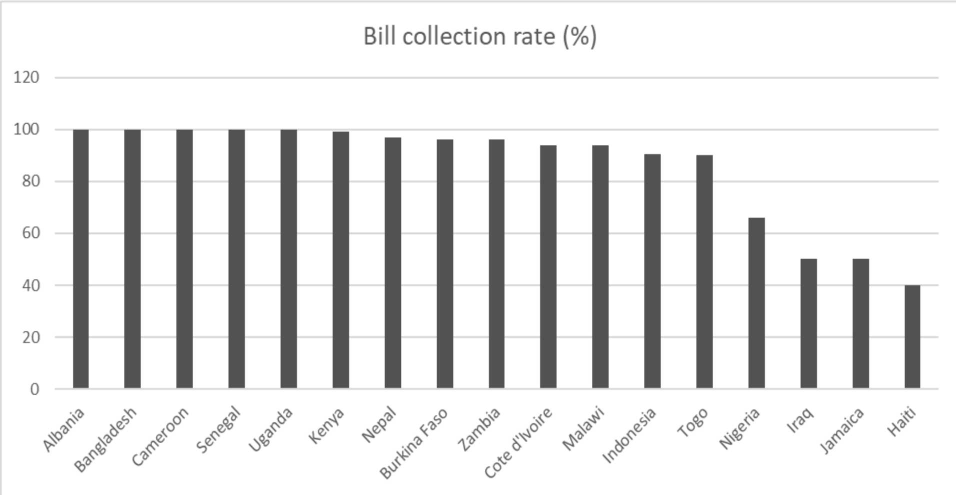



***Bill Collection Rate***

The bill collection rate is an indicator of financial resilience. It is the share of issued electricity bills that are paid (collected). Many countries face hurdles in bill collection, but most in our sample have high collection rates, although country data for this indicator was limited. As Figure 8 shows, 5 of 17 countries have collection rates of 100 percent. The next eight countries have rates above 90 percent. However, four countries have poor rates: Nigeria (66 percent), Iraq (50 percent), Jamaica (50 percent), and Haiti (40 percent).

The econometric exercise for this variable may not be as robust due to data limitations (Appendix 8). Nonetheless, the independent variable, IPP share, does not have a significant coefficient in all six models. However, two of the governance indicators, government effectiveness and regulatory quality, have statistically significant positive coefficients (p-value = 0.05). Thus, even for bill collection, governance appears to matter (with the noted reservations).

**Figure 8: Bill collection rate (percentage)**

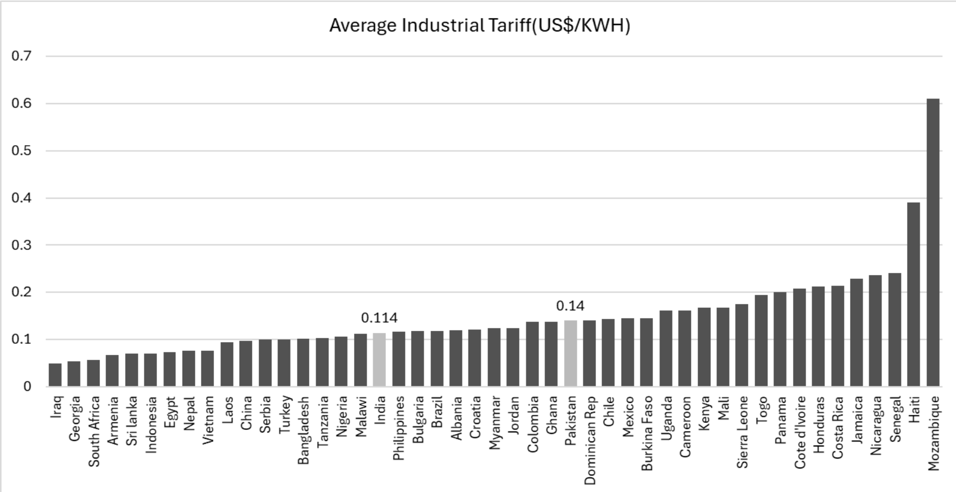



***Average Industrial Tariff***

Industrial consumer tariff (USD per kWh), or the average electricity tariff charged to industrial users, is a key indicator of power sector performance. Two countries, Haiti and Mozambique, have relatively high tariffs that stand out. The remaining countries' tariffs vary across the sample in an even fashion. Pakistan's industrial tariff average is USD 0.140 per kWh, while India's is USD 0.114 per kWh (Figure 9).

The results of the regression analysis in Appendix 9 show that IPP share is positively related to the tariff rate, as indicated by statistically significant coefficients in all six governance models. This implies that the higher the share of IPPs, the higher the tariff rate, suggesting that IPPs may be exerting some sort of market power or influence on power regulators. On the other hand, three governance variables, i.e., government effectiveness, the rule of law, and regulatory quality, have significant coefficients with negative signs. This aligns with the hypothesis that better governance leads to effective control over tariff charges to customers.

**Figure 9: Average industrial tariff (USD/kWh)**

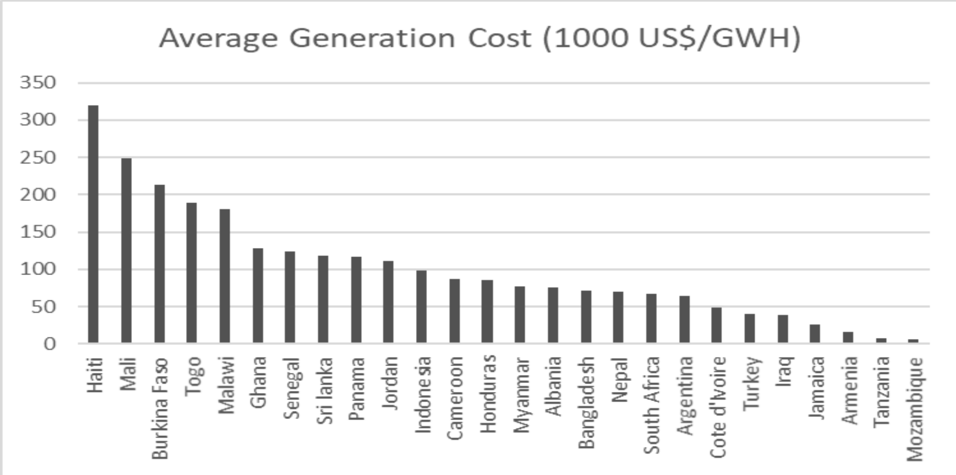



***Average Generation Cost***

Another measure of resilience is the average cost of generation (measured in thousands of US dollars per GWh of power generation). It refers to the per-unit cost of generating electricity. The cost varies between USD 6.2 and USD 320 and should be a function of the energy source mix, e.g., hydropower vs. fossil fuels (Figure 10). Nevertheless, one expected benefit of partnerships with IPPs is economic efficiency resulting in lower generation costs.

However, our regression analysis results in Appendix 10 show statistically significant negative coefficients for the IPP share in all six models. This suggests that IPP participation in the power sector may be resulting in lower generation costs, thus supporting the initial expectation from the PPP model. For governance indicators, we find that government effectiveness and regulatory quality have negative and significant coefficients (p-value = 5 percent).

**Figure 10: Average generation cost (USD 1,000/GWh)**




## Conclusion

This paper sought to examine how governance quality and the increased share of IPPs in power generation might impact power sector performance, which, in turn, was examined in terms of access, equity, technical efficiency, and cost. As a country's reliance on IPPs increases, IPP groups may acquire greater influence and economic power and be able to resist government efforts to redirect their [IPPs'] efforts toward serving the wider public interest and developmental goals. On the other hand, the PPP model was conceived with a view to bringing more private investment to the sector and greater operational efficiency through private management.

However, an agency problem is inherent in the PPP models. Private operators are likely to pursue private profits to the neglect and detriment of the wider public interest. IPPs also tend to form cartels and follow quasi-oligopolistic practices if not prevented by law. They also tend to form special interest groups and exert political pressure on governments. For these reasons, the power sectors in all countries have been heavily regulated through special bodies, e.g., utilities commissions, which work to mitigate agency conflict and ensure private producers do not ignore the development dimension of energy policy. Therefore, the key to successful outcomes from power sector PPP models is public governance—the rule of law, government effectiveness, quality of regulation, and control of corruption.

Thus, it is expected that countries with stronger governance environments will see relatively better power sector outcomes. On the other hand, greater IPP reliance is likely to be accompanied by poorer outcomes in social and developmental goals, but with better outcomes in operational areas.

The results from this cross-country study support the hypotheses that regulatory and governance factors positively impact power sector performance outcomes. Countries with stronger governance are associated with a lower frequency of system interruptions (but not duration of interruptions), greater access to electricity, smaller urban-rural gaps in power access, lower electricity losses (total and non-technical), lower tariff rates, better bill collection rates, and lower generation costs.

The main governance dimensions are control of corruption, government effectiveness, the rule of law, and regulatory quality. The indicator 'voice and accountability' appears to only affect (negatively) average generation cost and average industrial tariff. The governance indicator 'political stability' does not appear to matter for any of the performance outcomes.

On the other hand, the results indicate that a larger share of IPPs in power generation is associated with a higher frequency of system interruptions (SAIFI) and higher tariff rates but lower generation costs. A larger share of IPPs, however, does not appear to affect access to electricity, the urban-rural gap, electricity losses, or bill collection rates. This could suggest that IPP share does not help in what may be described as a government's social or developmental goals.

It is interesting to note that the IPP share in power sectors appears to lower generation costs, as is expected of private businesses. However, it seems to accompany higher tariffs. The latter could be an indication that IPPs' political influence increases as their share increases, possibly compromising public interest and leading to regulatory capture and weakening oversight.

These results are instructive for shaping public policy, as they underscore the importance of improving government effectiveness, the rule of law, and regulatory quality, and the control of corruption so that IPPs can better fulfill their potential.

The study's primary limitation is that of limited data, which raises the risk of omitted variable bias. However, it still underscores the role of governance in effectively leveraging private sector investment to further energy access and equity.

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## Appendix 1: Descriptive Statistics

| Power sector performance indicators | | Max | Min | Avg | St dev |
|---|---|---|---|---|---|
| 1 | Share of power generation by pvt. companies (percentage of total) | 100.00 | 0.15 | 53.97 | 29.03 |
| 2 | Electricity access percentage (2018) | 100.00 | 15.00 | 78.33 | 27.06 |
| 3 | Urban-rural access gap (percentage of population) | 75.48 | -0.14 | 22.38 | 26.86 |
| 4 | Average industrial tariff (USD/kWh) | 0.61 | 0.05 | 0.15 | 0.09 |
| 5 | SAIFI | 90.00 | 0.08 | 17.51 | 21.62 |
| 6 | SAIDI | 368.00 | 0.50 | 37.83 | 67.28 |
| 7 | Electricity losses (percentage of electricity output) | 69.00 | 5.20 | 20.19 | 13.44 |
| 8 | Bill collection rate (percentage) | 100.00 | 40.00 | 86.02 | 20.52 |
| 9 | Average generation cost (USD 1,000/GWh) | 320.00 | 6.20 | 101.11 | 76.21 |
| 10 | Non-technical losses (percentage of output) | 59.00 | 0.50 | 11.93 | 11.23 |
| **Governance indicators** | | **Max** | **Min** | **Avg** | **St dev** |
| 1 | Control of corruption | 81.43 | 6.19 | 35.13 | 17.27 |
| 2 | Government effectiveness | 76.67 | 0.95 | 38.85 | 19.68 |
| 3 | Political stability/absence of violence | 70.48 | 1.90 | 32.00 | 19.65 |
| 4 | Rule of law | 80.48 | 2.86 | 37.58 | 16.56 |
| 5 | Regulatory quality | 89.05 | 8.10 | 41.68 | 19.86 |
| 6 | Voice and accountability | 84.73 | 4.43 | 41.44 | 18.99 |

## Appendix 2: Electricity Access Percentage

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ind. variable | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig |
| GDP per cap | 0.003 | *** | 0.001 | | 0.004 | *** | 0.003 | *** | 0.002 | * | 0.004 | *** |
| IPP share | 0.049 | | 0.023 | | 0.048 | | 0.058 | | 0.011 | | 0.041 | |
| Governance | 0.094 | | 0.826 | *** | 0.029 | | 0.251 | | 0.517 | ** | -0.219 | |
| Constant | 57.44 | *** | 40.41 | *** | 59.37 | *** | 52.50 | *** | 47.17 | *** | 67.17 | *** |
| Adj. $R^2$ | 0.281 | | 0.456 | | 0.278 | | 0.292 | | 0.349 | | 0.296 | |
| DW stat | 2.140 | | 2.128 | | 2.112 | | 2.207 | | 2.201 | | 1.947 | |
| Akaike IC | 9.195 | | 8.916 | | 9.199 | | 9.179 | | 9.095 | | 9.175 | |
| F-stat | 7.248 | *** | 14.405 | *** | 7.174 | *** | 7.614 | *** | 9.589 | *** | 7.714 | *** |

## Appendix 3: Urban-Rural Access Gap (Percentage of Population)

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ind. variable | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig |
| GDP per cap | -0.003 | *** | -0.001 | | -0.003 | *** | -0.003 | *** | -0.002 | ** | -0.004 | *** |
| IPP share | 0.047 | | 0.077 | | 0.041 | | 0.033 | | 0.093 | | 0.057 | |
| Governance | -0.211 | | -0.867 | *** | -0.178 | | -0.436 | * | -0.583 | *** | 0.194 | |
| Constant | 43.49 | *** | 58.18 | *** | 41.91 | *** | 50.70 | *** | 52.09 | *** | 31.25 | *** |
| Adj. $R^2$ | 0.349 | | 0.535 | | 0.347 | | 0.379 | | 0.427 | | 0.349 | |
| DW stat | 1.789 | | 1.799 | | 1.793 | | 1.883 | | 1.815 | | 1.660 | |
| Akaike IC | 9.073 | | 8.737 | | 9.076 | | 9.026 | | 8.945 | | 9.074 | |
| F-stat | 9.584 | *** | 19.415 | *** | 9.517 | *** | 10.77 | *** | 12.942 | *** | 9.576 | |

## Appendix 4: SAIFI

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ind. variable** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** |
| GDP per cap | -0.002 | ** | -0.001 | | -0.002 | *** | -0.001 | * | -0.001 | | -0.002 | *** |
| IPP share | 0.194 | * | 0.195 | * | 0.191 | * | 0.177 | | 0.223 | ** | 0.199 | * |
| Governance | -0.356 | * | -0.489 | ** | -0.095 | | -0.412 | * | -0.477 | ** | -0.013 | |
| Constant | 29.50 | *** | 33.31 | *** | 21.81 | ** | 32.35 | *** | 32.73 | *** | 19.52 | ** |
| Adj. $R^2$ | 0.283 | | 0.314 | | 0.225 | | 0.284 | | 0.316 | | 0.219 | |
| DW stat | 1.622 | | 1.743 | | 1.549 | | 1.666 | | 1.628 | | 1.484 | |
| Akaike IC | 8.743 | | 8.699 | | 8.821 | | 8.742 | | 8.695 | | 8.828 | |
| F-stat | 6.393 | *** | 7.242 | *** | 4.962 | *** | 6.413 | *** | 7.327 | *** | 4.832 | *** |

## Appendix 5: SAIDI

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ind. variable** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** |
| GDP per cap | 0.002 | | 0.003 | | 0.000 | | 0.002 | | 0.004 | | 0.001 | |
| IPP share | -0.058 | | -0.057 | | -0.034 | | -0.097 | | 0.017 | | 0.048 | |
| Governance | -0.681 | | -1.078 | | 0.183 | | -0.928 | | -1.270 | | 0.167 | |
| Constant | 58.83 | * | 70.24 | ** | 33.79 | | 68.75 | * | 75.18 | ** | 43.90 | |
| Adj. $R^2$ | -0.054 | | -0.031 | | -0.076 | | 0.044 | | 0.007 | | 0.076 | |
| DW stat | 2.424 | | 2.531 | | 2.329 | | 2.429 | | 2.481 | | 2.358 | |
| Akaike IC | 11.399 | | 11.376 | | 11.419 | | 11.39 | | 11.353 | | 11.420 | |
| F-stat | 0.300 | | 0.593 | | 0.035 | | 0.421 | | 0.907 | | 0.031 | |

## Appendix 6: Electricity Losses (Percentage of Output)

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ind. variable | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig |
| GDP per cap | -0.001 | | 0.000 | | -0.001 | ** | 0.000 | | 0.000 | | -0.001 | *** |
| IPP share | 0.060 | | 0.071 | | 0.066 | | 0.051 | | 0.083 | | 0.062 | |
| Governance | -0.295 | *** | -0.355 | *** | 0.039 | | -0.307 | ** | -0.333 | *** | 0.044 | |
| Constant | 29.36 | *** | 29.40 | *** | 20.27 | *** | 30.03 | *** | 29.12 | *** | 19.81 | *** |
| Adj. R2 | 0.276 | | 0.325 | | 0.133 | | 0.256 | | 0.280 | | 0.134 | |
| DW stat | 1.856 | | 1.783 | | 2.079 | | 2.113 | | 1.917 | | 2.104 | |
| Akaike IC | 7.446 | | 7.376 | | 7.626 | | 7.473 | | 7.440 | | 7.624 | |
| F-stat | 6.325 | *** | 7.735 | *** | 3.153 | ** | 5.823 | *** | 6.447 | *** | 3.171 | ** |

## Appendix 7: Non-Technical Losses (Percentage of Output)

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ind. variable | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig | Coeff | Sig |
| GDP per cap | 0.000 | | 0.000 | | -0.001 | | 0.000 | | 0.000 | | -0.001 | ** |
| IPP share | 0.040 | | 0.051 | | 0.036 | | 0.040 | | 0.057 | | 0.032 | |
| Governance | -0.109 | | -0.195 | * | -0.041 | | -0.103 | | -0.165 | * | 0.070 | |
| Constant | 15.08 | *** | 17.49 | *** | 12.96 | *** | 15.12 | *** | 16.33 | *** | 10.13 | *** |
| Adj. R2 | 0.117 | | 0.181 | | 0.076 | | 0.096 | | 0.157 | | 0.098 | |
| DW stat | 2.218 | | 2.114 | | 2.233 | | 2.302 | | 2.194 | | 2.180 | |
| Akaike IC | 6.861 | | 6.787 | | 6.908 | | 6.885 | | 6.815 | | 6.883 | |
| F-stat | 2.372 | * | 3.277 | ** | 1.844 | | 2.103 | | 2.927 | * | 2.123 | |

## Appendix 8: Bill Collection Rate (Percentage)

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ind. variable** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** |
| GDP per cap | -0.006 | | -0.014 | ** | -0.005 | | -0.006 | | -0.013 | *** | -0.006 | |
| IPP share | 0.026 | | -0.022 | | 0.004 | | 0.013 | | 0.048 | | 0.005 | |
| Governance | 0.400 | | 0.887 | ** | 0.142 | | 0.691 | | 1.028 | ** | 0.236 | |
| Constant | 86.81 | *** | 88.28 | *** | 93.90 | *** | 76.49 | *** | 75.37 | *** | 88.95 | *** |
| Adj. $R^2$ | -0.019 | | 0.197 | | -0.108 | | 0.064 | | 0.339 | | 0.105 | |
| DW stat | 0.915 | | 1.441 | | 0.104 | | 1.121 | | 1.625 | | 0.345 | |
| Akaike IC | 8.948 | | 8.709 | | 9.032 | | 8.862 | | 8.514 | | 9.028 | |
| F-stat | 0.904 | | 2.228 | | 0.511 | | 1.344 | | 3.568 | ** | 0.526 | |

## Appendix 9: Average Industrial Tariff (USD/kWh)

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ind. variable** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** |
| GDP per cap | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| IPP share | 0.001 | * | 0.001 | ** | 0.001 | * | 0.001 | * | 0.001 | ** | 0.001 | * |
| Governance | -0.001 | | -0.002 | ** | 0.000 | | -0.002 | * | -0.002 | * | 0.001 | |
| Constant | 0.1600 | *** | 0.1800 | *** | 0.1100 | *** | 0.1900 | *** | 0.1700 | *** | 0.1000 | ** |
| Adj. $R^2$ | 0.079 | | 0.169 | | 0.036 | | 0.118 | | 0.115 | | 0.046 | |
| DW stat | 2.109 | | 2.112 | | 2.027 | | 2.363 | | 2.113 | | 2.050 | |
| Akaike IC | -1.912 | | -2.015 | | -1.866 | | 1.955 | | 1.952 | | 1.877 | |
| F-stat | 2.292 | * | 4.050 | ** | 1.554 | | 3.005 | ** | 2.945 | ** | 1.728 | |

## Appendix 10: Average Generation Cost (USD 1,000/GWh)

| Governance indicators ➔ | Control of corruption | | Gov. effectiveness | | Political stability | | Rule of law | | Regulatory quality | | Voice/ accountability | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ind. variable** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** | **Coeff** | **Sig** |
| GDP per cap | 0.000 | | 0.004 | | -0.001 | | 0.000 | | 0.003 | | -0.001 | |
| IPP share | -1.321 | ** | -1.221 | ** | -1.220 | ** | -1.263 | ** | -1.252 | ** | -1.294 | ** |
| Governance | -1.266 | | -1.876 | * | -0.247 | | -0.802 | | -1.865 | * | -0.635 | |
| Constant | 215.53 | *** | 215.92 | *** | 176.34 | *** | 196.3 | *** | 226.75 | *** | 197.24 | *** |
| Adj. $R^2$ | 0.187 | | 0.273 | | 0.138 | | 0.156 | | 0.256 | | 0.149 | |
| DW stat | 1.841 | | 1.279 | | 2.067 | | 1.904 | | 1.555 | | 1.923 | |
| Akaike IC | 11.456 | | 11.344 | | 11.514 | | 11.49 | | 11.367 | | 11.501 | |
| F-stat | 2.841 | * | 3.997 | ** | 2.283 | | 2.479 | * | 3.755 | ** | 2.406 | * |

# 12

## Saving, Investment, and Outflows in Pakistan

**Moazam Mahmood,[1] Shamyla Chaudry,[2] and Muzzna Maqsood[3]**

## Abstract

*This paper follows neoclassical theory, in which the current account (CA) reflects domestic imbalance, the difference between investment (I) and saving (S).*

*In estimating the equation for the fiscal year 2022, we obtained an investment-saving gap (I - S) of two percent of income, whereas the CA was four percent of income. Therefore, when equating (I - S) to the CA, the neoclassical theory stands in jeopardy.*

*However, we obtained a better fit when we reconsidered S by re-estimating it to account for outflows (KO). S should comprise all domestic earnings that are not consumed, while KO consists of income earned domestically that crosses borders and is transferred abroad. Therefore, KO is lost to domestic saving (Sdom) and I. Ergo, KO should be added to Sdom. We estimated KO for the fiscal year 2022 at 2.3 percent of income using the Mahmood & Chaudry (2020) equation. Therefore, our equation changed to (I - S) + KO = CA after incorporating KO to support the theory.*

*Estimating the equation gave 1.96 percent + 2.3 percent, which is approximately equal to 4 percent. This equals the CA of four percent. Therefore, we have reestablished the neoclassical investment-saving identity.*

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## Introduction to the Problem

The current account (CA) reflects the external imbalance. Neoclassical theory states that the CA is equal to the domestic imbalance, which is the difference between investment (I) and saving (S), as in Equation (1).

$$CA = I - S \quad (1)$$

Therefore, "the current account measures the component of the difference in an economy's net foreign asset position attributable to transactions in goods and services, as well as income and transfers" (Ouanes & Thakur, 1997).

We estimated this equation as percentage shares in gross national disposable income (GNDI) (Y) for the fiscal year (FY) 2022:

Where GNDI = PKR 71,487 billion

CA = PKR 3,102 billion = 4.3% of GNDI

I = PKR 10,473 billion = 14.7% of GNDI

S = PKR 9,105 billion = 12.74% of GNDI

Inserting these figures into Equation (1):

4.3% is greater than (14.7% - 12.74%)

i.e., 4.3% > 1.96%

CA equals four percent of income (GNDI) (Y), whereas we obtained an investment-saving gap (I - S) of approximately two percent of income.

Therefore, when we equated the neoclassical macro equation of CA to I - S, it did not hold. Hence, we found this neoclassical theory to be in jeopardy. The CA is well-observed and accounted for on the left side of Equation (1). However, the right side of the equation, (I - S), requires explanation. Accordingly, a conceptual framework that addresses and explains the dichotomy between S and I is required.

There is a macro framework that allows this dichotomy to exist, which is where the neoclassical equation features. This paper uses the neoclassical equation to further investigate how the difference in the gap can be explained.

The following identity represents national saving less investment in an open economy. It explains that the difference between I and domestic saving (S) is equivalent to the gap between exports (X) and imports (M), that is net exports, or the trade balance (X - M).

$$I - S = X - M \quad (2)$$

Equation (2) is derived from two basic identities of national accounts.

The first identity states that gross national disposable income (GNDI) (Y) is the sum of consumption (C), I, and (X - M).

$$Y = C + I + (X - M) \quad (2a)$$

$$S = Y - C \quad (2b)$$

Y is equal to gross national income (GNI) minus current money transfers of outward remittance (OR) plus total inward remittances (IR) to the country.

Therefore,

$$Y = GNI - OR + IR \quad (3)$$

Equation (2b) states that the income that is left after consumption is saved.

A macroeconomic framework is now employed to examine the difference between S and I. This framework states that the gap between I and domestic saving must be offset by a CA deficit. Stating Equation (1) again,

$$CA = I - S \quad (4)$$

The investment-saving gap (I - S) must be financed through borrowing from the rest of the world.

$I > S \rightarrow$ CA deficit (scenario 1)

$S > I \rightarrow$ CA surplus (scenario 2)

In scenario 2, the gap is bridged by lending money to the rest of the world, leading to a CA surplus.

In Equation (4), both CA and I are observed values, but S is an imputed value, as is the case in Pakistan. Therefore, given the ambiguity of S, we reconsider its definition, positing capital outflows (KO) as affecting S. Essentially, we posit a new definition of S that accounts for KO.

S should comprise all domestic earnings that are not consumed. KO consists of domestic income earned—it crosses the border without being consumed.

Since KO is domestic income earned that is not consumed, it should be part of domestic saving (Sdom). However, KO crosses the border and is lost to both Sdom and I.

Ergo, KO is added to Sdom in Equation (5):

$$CA = (I - S) + KO \tag{5}$$

Having estimated KO for FY 2022 to be 2.3 percent of income using Mahmood & Chaudry's (2020) methodology, we insert its value into Equation (5). Using our earlier values for CA, I, and S from Equation (1), we get:

$$4.3\% = 1.96\% + 2.3\%$$

where a sum of 1.96 percent and 2.3 percent equals 4.26 percent, which is approximately equal to the CA of 4.3 percent.

Thus, we have reinstated the neoclassical equation of Sdom from Equation (4) to Equation (5).

This paper is structured as follows:

1. We present the conceptual framework used to estimate saving in Pakistan.

2. Applying this framework to estimate a saving equation for FY 2022, we discuss the basic I - S = CA framework in percentage and nominal terms.

3. Next, we provide an estimation of KO, revisit the saving equation, examine saving as estimated by the State Bank of Pakistan (SBP), and estimate a new equation posited for a longer time series from FY 2022 to FY 2024.

## A Conceptual Framework to Estimate Saving in Pakistan

A fundamental macroeconomic accounting identity states that S is equal to I. This identity stems from the national income equaling the national product.

The Modeling Lab at the Lahore School of Economics estimated that I was 16 percent of GDP in 2022 (Mahmood et al., 2022). The Ministry of Finance (2022) estimated S to be 12 percent for the same year. This discrepancy highlights a dichotomy that requires a conceptual framework for further investigation.

Our conceptual framework is based on the relationship between S and I and consists of the following key equations:

1. Sdom comprises public saving (Spub) and private saving (Spriv):

   $$Sdom = Spub + Spriv \quad (6)$$

2. In turn, Spub is the difference between taxation (T) and government expenditure (G):

   $$Spub = T - G \quad (7)$$

3. Spriv is Y minus consumption (C):

   $$Spriv = Y - C \quad (8)$$

4. Substituting this decomposition of Sdom into Spub and Spriv from Equation (6) into Equation (4) presents an expanded form in which I minus the sum of Spub and Spriv equals the CA:

   $$CA = I - (Spub + Spriv) \quad (9)$$

5. By substituting Equations (7) and (8) into Equation (9), we obtain the following expression in which I minus the expanded terms for Spub (which is T minus G) and Spriv (which is Y minus C) equals the CA.

   $$CA = I - \{(T - G) + (Y - C)\} \quad (10)$$

Equation (10) serves as an overarching conceptual framework for estimating S available for I.

## Estimating Saving and its Components for FY 2022 in Nominal Values (PKR Billion)

Using 2022 data, we estimate our conceptual model in Table 1.

**Table 1: Estimating saving in FY 2022 (PKR billion)**

| **Spub = (T - G)**<br>**Spriv = (Y - C)**<br>**Sdom = (T - G) + (Y - C)** | |
|---|---|
| Y (GNDI) (observed) | 71,487 |
| C (observed) | 57,122 |
| T (observed) | 8,035 |
| G (observed) | 13,295 |
| I (observed) | 10,473 |
| Spub (T - G) | -5,259.9 |
| Spriv (Y - C) | 14,365 |
| Sdom {(T - G) + (Y - C)} | 9,105 |

Source: SBP.

For FY 2022, government revenue from federal and provincial tax collection (PKR 8,035 billion) less G (PKR 13,295 billion) equals Spub (PKR -5,259.9 billion).

Spriv (estimated at PKR 14,365 billion) is the difference between Y (PKR 71,487 billion) and C (PKR 57,122 billion).

This yields an Sdom value of PKR 9,105 billion as the sum of Spub (PKR -5,259.9 billion) and Spriv (PKR 14,365 billion).

## The CA = I - S Framework in Percentage vs. Nominal Values

For FY 2022, the fundamental equation of CA = I - S can be estimated using both nominal values and percentages of Y to examine whether the equation holds.

We estimate I - S, now as PKR 1,368 billion, as the difference between I (PKR 10,473 billion) and Sdom (PKR 9,105 billion).

When we equate I - S (PKR 1,368 billion) to CA (PKR 3,102 billion) in nominal values, we find that the equation CA = I - S does not hold for FY 2022, resulting in a difference of PKR - 1,734 billion.

PKR 3,102 billion > PKR -1,734 billion

Thus, there is a second gap given by I minus S minus the CA.

I - S - CA = 0

This gap should be zero, but is PKR -1,734 billion. Consequently, a higher level of Sdom is required to equate to the CA to make this I - S - CA gap zero.

Taking these nominal values as percentages of Y, we find I to be 14.7 percent, while Sdom is 12.74 percent of the income gap.

Thus, (I - S) = 1.96 percent of income, while CA, as a percentage of income, is 4.3 percent. Substituting these values into the I - S - CA equation, we find that saving must increase by approximately 2.4 percent to meet the I - S - CA gap.

We find that the neoclassical Equation (4) stands in jeopardy, as the two sides of the equation do not equate. We have attempted to address this issue by revisiting the definition of saving, which, we argue, must now include KO. This is because KO is part of national saving generated within a country but then crosses borders and is, therefore, lost to Sdom, and used instead to finance foreign investment.

## Estimation of Capital Outflows

As defined earlier, KO is part of national saving, which consists of income saved in a country but then crosses borders. A significant portion of national savings continues to be invested domestically (Feldstein & Horioka, 1980), but the remainder flows abroad as KO. This signifies that some part of Sdom crosses borders (Feldstein & Bacchetta, 1989).

The key variable to be estimated from the capital account (KA) is KO, which is theorized to include four major components (Mahmood & Chaudry, 2020) derived from the SBP accounting framework for CA and KA.

The essential argument for estimating KO, based on our earlier work, theorizes that these outflows are determined by domestic profitability relative to foreign profitability (Mahmood & Chaudry, 2020). Specifically, if domestic profitability declines relative to foreign profitability, KO is expected to increase. Conversely, if domestic profitability rises relative to foreign profitability, KO is expected to decrease.

Accordingly, the explanation of KO must begin with domestic outflows for foreign investment that are mostly derived from the KA side. In addition, the inclusion of KO from the CA side can strengthen the argument, particularly regarding the repatriation of returns from foreign-held domestic assets (Mahmood & Chaudry, 2020).

Mahmood & Chaudry (2020) identified four key components to calculate total net outflows from Pakistan, which include: direct investment abroad, portfolio investment abroad, net incurrence of assets, and net outflows of primary income from the CA (primary income balance).

Using the Mahmood & Chaudry (2020) methodology, total net outflows for 2022 are equal to USD 8,071 million/PKR 1,651 billion (at the prevalent exchange rate of PKR 204.5/USD) (Appendix 1 and 2).

## Revisiting the Saving Equation

Clearly, the neoclassical Equation (4) stands in jeopardy, as the two sides do not equate:

$$I - S \neq CA \tag{4}$$

This method is at risk, and a new conceptual framework is required.

We address this issue by reexamining the definition of saving to further improve it. Now saving must include KO because it is a part of national saving, where income minus consumption (Y - C) is saved in a country, but then crosses borders through various channels.

However, when we re-estimate saving to account for KO, we obtain a better fit.

As saving should comprise all domestic earnings not consumed, KO is saving that crosses borders. Therefore, KO should be a part of Sdom, which is lost.

Our revised equation now changes, after incorporating KO in support of the neoclassical theory, to: (I - S) plus KO is equal to the CA:

$$CA = (I - S) + KO \qquad (11)$$

Table 2 estimates this equation.

4.3% = (14.7% - 12.7%) + 2.3%

CA on the left side is 4.3 percent of income. On the right side, (I - S) is 1.96 percent of income, which, when added to KO of 2.3 percent, yields 4.26 percent.

So, the CA of 4.3 percent of income approximates the investment-saving gap plus KO of 4.26 percent.

We have reinstated the neoclassical equation of domestic saving. Consequently, KO will be added to Sdom to support our neoclassical macroeconomic theory.

**Table 2: Comparing the gap [CA - (I - S)] with KO for FY 2022 (PKR billion)**

| | |
|---|---|
| I = 10,473 | 14.7% |
| S = 9,105 | 12.74% |
| I - S | 1.9% ≈ 2% |
| CA = 3,102 | 4.3% |
| KO = 1,651.5 | 2.3% |
| CA - (I - S) = 1,734 | 2.4% |
| (I - S) + KO | 4.2% |

Source: SBP.

## Saving as Estimated by the State Bank of Pakistan

Saving is part of income that is not consumed. It is measured indirectly through national income identities by the Planning Commission, which uses information about investment estimated by the Pakistan Bureau of Statistics and the CA deficit compiled by the SBP.

Currently, the SBP uses the residual of I minus the CA to estimate S:

$$S = I - CA$$

This approach bypasses the problem this paper seeks to address. We argue that Sdom consists of both Spub and Spriv, which provides a structurally sound way of estimating S:

Sdom = Spub + Spriv

Spub is observed as the fiscal deficit, and Spriv was previously denoted as (Y - C). We propose that Spriv also includes KO.

## Estimating the I Minus S Gap With Capital Outflows for FY 2022–2024

Table 3 estimates our new equation for a small time series of FY 2022–2024. It is used to show that the old neoclassical equation equating CA to (I - S) does not work because of the large difference between them. However, the difference narrows considerably when we add KO to (I - S).

Table 3 shows that the approximation is 0.1 percent of income in 2022. The approximation is wider by 0.6 percent of income in 2023. Finally, in 2024, the approximation narrows to 0.3 percent of income.

So, the proposed definition of Spriv allows us to add KO to bridge the problem, decreasing the difference between CA and (I - S) + KO.

**Table 3: Time-series data (FY 2022–2024)**

| | 2022 | | 2023 | | 2024 | |
|---|---|---|---|---|---|---|
| Y | 71,487.0 | 100.0% | 89,558.0 | 100.0% | 112,453.0 | 100.0% |
| I | 10,473.0 | 14.7% | 11,850.0 | 13.2% | 13,931.0 | 12.4% |
| S | 9,105.1 | 12.7% | 13,169.5 | 14.7% | 15,778.1 | 14.0% |
| I - S | 1,367.9 | 1.9% | -1,319.5 | -1.5% | -1,847.1 | -1.6% |
| CA | 3,102.0 | 4.3% | 812.0 | 0.9% | 188.0 | 0.2% |
| KO | 1,651.5 | 2.3% | 1,616.7 | 1.8% | 2,439.3 | 2.2% |
| (I - S) + KO | 3,019.4 | 4.2% | 297.2 | 0.3% | 592.2 | 0.5% |

Source: SBP.

## Conclusions

This paper follows neoclassical theory in which CA is a reflection of domestic imbalance. This domestic imbalance is the difference between I and S.

When we estimate the equation for FY 2022, we obtain a value of two percent of income for (I - S), whereas CA is four percent of income. Therefore, when equating (I - S) to CA, it stands in jeopardy, which puts the neoclassical theory at risk.

However, when we reconsider S by re-estimating it to account for KO, we obtain a better fit. S should comprise all domestic earnings that are not consumed, while KO consists of income earned domestically that is not consumed and crosses borders. Therefore, KO is part of national saving, which is lost to Sdom and I. Ergo, KO should be added to Sdom.

We estimated outflows for FY 2022 at 2.3 percent of income using the Mahmood & Chaudry (2020) equation. Therefore, our equation now changes to (I - S) + KO = CA after incorporating KO to support the theory.

Estimating the equation gives us 1.9 percent + 2.3 percent, which is approximately equal to 4 percent. This equals the CA of four percent. Therefore, we have reinstated the neoclassical equation of Sdom.

Financial liberalization and interest rate fluctuations have allowed saving to move across borders in pursuit of higher returns (Artis & Bayoumi, 1990; Mahmood & Chaudry, 2020).

We have reinstated the neoclassical equation by adding KO to the existing definition of S.

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## Appendix 1

The table below estimates net outflows for FY 1990–2024 using the equation specified by Mahmood & Chaudry (2020).

**Total net outflows (USD million) (FY 1990–2024)**

| Year | Direct investment abroad (A) | Portfolio investment abroad (B) | Net acquisition of financial assets (C) | Net outflows from financial account (D) = A + B + C | Net outflows from CA (primary income) (E) | Total net outflows (D + E) |
|---|---|---|---|---|---|---|
| 1990 | 12 | 0 | -272 | -260 | 878 | 618 |
| 1991 | 7 | 0 | -448 | -441 | 941 | 500 |
| 1992 | 8 | 0 | -291 | -283 | 1,123 | 840 |
| 1993 | -4 | 0 | -702 | -706 | 1,389 | 683 |
| 1994 | -6 | 0 | -181 | -187 | 1,447 | 1,260 |
| 1995 | 3 | 0 | -140 | -137 | 1,359 | 1,222 |
| 1996 | -4 | 0 | 140 | 136 | 1,804 | 1,940 |
| 1997 | -18 | 0 | 64 | 46 | 2,203 | 2,249 |
| 1998 | 29 | 0 | -367 | -338 | 2,188 | 1,850 |
| 1999 | 44 | 0 | -34 | 10 | 1,803 | 1,813 |
| 2000 | -1 | 549 | -449 | 99 | 1,972 | 2,071 |
| 2001 | 37 | 140 | -291 | -114 | 2,203 | 2,089 |
| 2002 | 2 | 491 | 236 | 729 | 2,207 | 2,936 |
| 2003 | 27 | 0 | 434 | 461 | 2,211 | 2,672 |
| 2004 | 45 | -3 | -546 | -504 | 2,207 | 1,703 |
| 2005 | 66 | -11 | -1,235 | -1,180 | 2,386 | 1,206 |
| 2006 | 71 | -22 | -209 | -160 | 2,667 | 2,507 |

| Year | Direct investment abroad (A) | Portfolio investment abroad (B) | Net acquisition of financial assets (C) | Net outflows from financial account (D) = A + B + C | Net outflows from CA (primary income) (E) | Total net outflows (D + E) |
|---|---|---|---|---|---|---|
| 2007 | 114 | 5 | -758 | -639 | 3,582 | 2,943 |
| 2008 | 75 | 5 | 32 | 112 | 3,923 | 4,035 |
| 2009 | 25 | 1,073 | 560 | 1,658 | 4,407 | 6,065 |
| 2010 | 76 | 65 | -11 | 130 | 3,282 | 3,412 |
| 2011 | 44 | 7 | -920 | -869 | 3,017 | 2,148 |
| 2012 | 77 | 32 | -9 | 100 | 3,245 | 3,345 |
| 2013 | 198 | 99 | 314 | 611 | 3,669 | 4,280 |
| 2014 | 128 | -23 | -211 | -106 | 3,955 | 3,849 |
| 2015 | 73 | -41 | -71 | -39 | 4,599 | 4,560 |
| 2016 | 19 | 100 | 96 | 215 | 5,347 | 5,562 |
| 2017 | 86 | -1 | 1,180 | 1,265 | 5,048 | 6,313 |
| 2018 | 10 | -48 | 210 | 172 | 5,282 | 5,454 |
| 2019 | -74 | -144 | -67 | -285 | 5,610 | 5,325 |
| 2020 | -54 | -115 | -127 | -296 | 5,459 | 5,163 |
| 2021 | 171 | -12 | 1,345 | 1,504 | 4,400 | 5,904 |
| 2022 | 234 | -24 | 2,613 | 2,823 | 5,248 | 8,071 |
| 2023 | 957 | -14 | -1,029 | -86 | 5,671 | 5,585 |
| 2024 | 267 | -6 | -120 | 141 | 8,623 | 8,764 |

Source: Data from the State Bank of Pakistan. https://www.sbp.org.pk/ecodata/Balancepayment_BPM6-Arch.xls.

## Appendix 2

The table below converts the total net outflows from USD (million) to total net outflows in PKR (million).

**Total net outflows (USD million) to total net outflows (PKR million) (FY 2005–2024)**

| Year | Total net outflows (USD million) | Exchange rate (USD/PKR) | Total net outflows (PKR million) | Total net outflows (PKR billion) |
|---|---|---|---|---|
| 2005 | 1,206 | 59.67 | 71,966.60 | 71.97 |
| 2006 | 2,507 | 59.67 | 149,602.22 | 149.60 |
| 2007 | 2,943 | 60.44 | 177,869.33 | 177.87 |
| 2008 | 4,035 | 68.17 | 275,059.49 | 275.06 |
| 2009 | 6,065 | 81.26 | 492,812.18 | 492.81 |
| 2010 | 3,412 | 81.26 | 277,242.40 | 277.24 |
| 2011 | 2,148 | 85.94 | 184,601.48 | 184.60 |
| 2012 | 3,345 | 94.42 | 315,836.24 | 315.84 |
| 2013 | 4,280 | 98.91 | 423,331.80 | 423.33 |
| 2014 | 3,849 | 98.65 | 379,713.09 | 379.71 |
| 2015 | 4,560 | 101.73 | 463,870.10 | 463.87 |
| 2016 | 5,562 | 104.65 | 582,057.74 | 582.06 |
| 2017 | 6,313 | 104.79 | 661,543.69 | 661.54 |
| 2018 | 5,454 | 121.29 | 661,506.39 | 661.51 |
| 2019 | 5,325 | 162.01 | 862,712.30 | 862.71 |
| 2020 | 5,163 | 167.83 | 866,487.19 | 866.49 |
| 2021 | 5,904 | 157.32 | 928,813.15 | 928.81 |
| 2022 | 8,071 | 204.62 | 1,651,526.76 | 1,651.53 |
| 2023 | 5,585 | 286.14 | 1,598,080.17 | 1,598.08 |
| 2024 | 8,764 | 278.33 | 2,439,308.66 | 2,439.31 |

Source: Data from the State Bank of Pakistan.
https://www.sbp.org.pk/ecodata/Balancepayment_BPM6-Arch.xls.