



BRAIN DRAIN, FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN PAKISTAN:  
THE MODERATING ROLE OF POLITICAL STABILITY

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**Abstract**

*This study examines whether political stability alters the growth effects of brain drain and financial development in Pakistan, using annual data from 2006–2023. The analysis employs a time-series moderation framework with Newey-West standard errors, evaluating direct effects, interaction effects, marginal effects, and extensive robustness checks. Results show that unconditional coefficients for brain-drain pressure and private credit are weak, concealing substantial institutional heterogeneity. Political stability significantly moderates both relationships: the marginal effect of brain-drain pressure shifts from negative under weak stability to positive under improved stability; private credit transitions from significantly growth-reducing ( $\beta = -0.372$ ,  $p < 0.01$ ) under weak stability to significantly growth-enhancing ( $\beta = +0.794$ ,  $p < 0.01$ ) under improved stability. The private-credit interaction is highly robust, surviving controls for capital formation, major shock exclusions, and dynamic specifications. Broad money does not reproduce the same pattern, underscoring the importance of credit allocation over liquidity expansion. Inflation exerts persistent negative effects, while capital formation contributes positively. The findings support an institution-contingent interpretation of both the migration-growth and finance-growth relationships. Policy simulations indicate that a 3-point expansion of credit under improved stability could boost GDP growth by 1.35 percentage points—equivalent to approximately \$4-5 billion annually. The study contributes to the literature by integrating skilled-migration pressure, financial-sector depth, and political stability within one Pakistan-specific empirical framework. It recommends a phased policy roadmap prioritizing institutional credibility, productive credit allocation, diaspora investment mechanisms, and price stability to maximize development outcomes.*

**Keywords:** Brain Drain; Financial Development; Economic Growth; Political Stability; Private Credit; Pakistan; Moderation Analysis

**1. Introduction**

Pakistan's economic development is shaped by the interaction of human-capital mobility, financial intermediation, macroeconomic volatility, and institutional credibility. Skilled workers frequently evaluate domestic career prospects against foreign wages, research facilities, professional autonomy, security, and the predictability of public policy, so the movement of qualified labour is not merely a demographic event but a finance and development issue that changes the country's stock of productive knowledge. Bhardwaj and Sharma (2023) show that skilled migration can generate either brain drain or brain gain depending on the incentives, networks, return pathways, and institutional arrangements that connect migrants with their origin economies. The economic meaning of migration must therefore be assessed through the capacity of the domestic system to retain talent, convert remittances into investment, support return entrepreneurship, and preserve knowledge linkages with professionals who remain abroad.

Rahman et al. (2020a) demonstrate that the growth contribution of finance in Pakistan varies across regimes, indicating that the same increase in financial depth can have different consequences when macroeconomic conditions, risk perception, and policy environments change. Financial development is central to the conversion of savings into productive investment because banks and markets determine which



households and firms receive capital. Private-sector credit can expand production, innovation, and employment when lenders screen projects effectively, but it can also reinforce concentration, speculative activity, and connected lending when institutional discipline is weak. A study that places financial development beside brain-drain pressure can consequently identify whether the economy has the capacity to finance opportunities that reduce involuntary emigration and mobilise migration-related resources.

Political stability supplies the institutional setting within which migration incentives and financial contracts are formed. Stable governments can sustain regulatory reforms, protect property rights, maintain infrastructure programmes, and reduce abrupt changes in taxation, trade, credit, and labour policy, whereas instability raises uncertainty and shortens the planning horizon of households, firms, banks, and diaspora investors. Yakubu et al. (2020) provide time-series evidence that the growth implications of financial liberalisation are closely connected with political stability, showing why finance should not be evaluated independently of governance conditions. The present article treats political stability as a moderator because it may change the marginal productivity of private credit and the economic consequences of human flight rather than acting only as a separate control variable.

The Pakistan setting creates a particularly important research problem because periods of higher growth have coexisted with recurring inflation, external financing constraints, declining private credit ratios, and substantial migration-related inflows. Institutional quality has also been shown to alter macroeconomic relationships in Pakistan, especially where debt, confidence, and policy credibility affect the transmission of economic policy (Ramzan et al., 2023). A direct linear regression may consequently produce small or inconsistent average coefficients even when strong conditional relationships exist at different stability levels. Interaction modelling offers a way to reveal these hidden slopes by estimating how the effect of brain-drain pressure or private credit changes as the political-stability indicator improves or deteriorates.

The article addresses a gap between migration studies that emphasise human-capital loss and finance studies that emphasise intermediation, because both literatures often treat institutional conditions as background controls rather than as mechanisms that change the direction of effects. Dirks and Schmidt (2024) demonstrate that political instability can influence growth through investment, productivity, and uncertainty channels, which makes moderation more plausible than a purely additive model. The study therefore evaluates direct effects, political-stability interactions, marginal effects at observed stability levels, alternative finance measures, shock exclusions, and dynamic specifications. This design permits a cautious but policy-relevant assessment of whether Pakistan's growth response to human flight and financial development is conditional on institutional stability.

The contribution of the article lies in integrating skilled-migration pressure, financial-sector depth, and political stability within one Pakistan-specific empirical framework. Governance variables have been linked to financial stability in emerging economies, with political stability influencing the resilience and operating environment of banks (Ullah et al., 2024). The analysis extends that insight from financial stability to real growth by asking whether credit becomes more productive and migration-related pressures become less damaging when political conditions improve. The results are intended to inform policies on talent retention, diaspora finance, credit allocation, inflation control, and institutional continuity rather than to advocate blanket restrictions on international mobility.

## **2. Literature Review**

### **2.1 Brain Drain, Human Capital and Economic Growth**

Brain drain is commonly understood as the sustained departure of educated and professionally trained workers from an origin economy, yet its measurement and economic interpretation remain contested. Cui et al. (2022) show that the mobility of highly educated graduates is strongly affected by regional opportunity structures and that human capital moves toward places offering stronger returns, urban amenities, and career pathways. For Pakistan, this mechanism suggests that migration pressure reflects not only international wage differences but also domestic limits in research funding, professional progression, technology adoption, and the quality of institutions. A higher brain-drain score can therefore represent both an immediate loss of skills and a signal that the domestic economy is not offering sufficient productive absorption for qualified labour.



Sardadvar and Vakulenko (2021) find that migration and human-capital accumulation are linked in ways that differ across regions, indicating that the composition of movers and the ability of regions to replace skills matter for long-run outcomes. The adverse channel operates through reductions in the stock of specialised labour, the tax base, public-service capacity, and the knowledge available to firms and institutions. An origin economy may experience weaker productivity growth when experienced professionals leave faster than educational institutions can train replacements. The loss becomes more serious when public resources financed the education of migrants and when domestic labour markets cannot attract returnees or use diaspora expertise.

A beneficial channel can arise when migration prospects increase the expected return to education, encourage skill acquisition, generate remittances, and create international production or knowledge networks. Tipayalai (2020) reports that high-skilled migration can contribute positively to regional output and labour productivity when the receiving economy is able to absorb skills, and the same logic implies that origin-country benefits depend on linkages that transfer capital and knowledge back home. The distinction between permanent depletion and circulation is therefore central. Pakistan can experience a mixture of effects in which some sectors face shortages while households and firms receive finance, market information, and professional connections from migrants.

Remittances create an explicit bridge between brain drain and finance because the developmental effect of migration depends on the financial system through which funds are received, saved, borrowed against, and invested. Destrée et al. (2021) demonstrate that migration and remittances can support human-capital accumulation when credit constraints are incorporated into the education decision. In a constrained economy, migration income may relax household liquidity limits, finance schooling, and permit business creation, yet these gains can remain limited when formal intermediation is shallow or when inflation erodes real balances. The migration-growth relationship should therefore be evaluated with financial development and macroeconomic stability in the same model.

Innovation and entrepreneurship provide another route through which mobility can become economically productive. Capoani et al. (2024) identify a positive overall relationship between immigration and innovation in their systematic evidence, while also showing that outcomes depend on skill composition and local absorptive conditions. For an origin country, diaspora scientists, engineers, doctors, and managers may contribute through collaborative research, outsourcing, export contacts, mentoring, venture capital, and return entrepreneurship. Political stability can strengthen these channels by lowering the perceived risk of maintaining assets, contracts, and long-term projects in the country of origin.

## **2.2 Financial Development and Economic Growth**

Ekanayake and Thaver (2021) provide panel evidence from developing countries showing that the finance-growth relationship depends on the particular measure of financial development and the broader economic setting. Financial development influences growth through savings mobilisation, information production, risk sharing, corporate monitoring, and the allocation of capital toward productive activities. Private credit is often a more direct measure of intermediation than broad money because it captures funds supplied to businesses and households rather than liquidity held throughout the financial system. The present study therefore treats domestic credit to the private sector as the principal finance variable and uses broad money as a robustness indicator.

The positive finance-growth proposition is not automatic because rapid credit growth may be directed toward consumption, real estate, government-linked firms, or activities with low productivity spillovers. Abbas et al. (2022) show that financial development has complex consequences across middle-income economies, with gains that depend on access, distribution, and the structure of intermediation. This complexity is relevant for Pakistan, where a declining private-credit ratio can coexist with periods of monetary expansion and where banks may prefer public securities over riskier private projects. The economic return to finance therefore depends on whether credit reaches firms capable of creating output, exports, innovation, and employment.



Macroeconomic instability can weaken financial transmission by raising nominal interest rates, shortening loan maturities, increasing default risk, and reducing the real value of financial assets. Wen et al. (2022) find that financial development affects growth, inflation, and employment jointly, which supports the inclusion of inflation when testing the Pakistani finance-growth relationship. High inflation can cause an apparently large financial system to deliver weak real intermediation because lenders and borrowers face unstable prices and uncertain repayment values. A meaningful analysis must therefore distinguish the scale of finance from the quality and stability of its operating environment.

Evidence from low-income and emerging regions also points to institutional thresholds in the productivity of finance. Mlambo (2024) finds that the contribution of financial development to growth varies across low-income countries and across measures of financial depth. This variability supports a moderation model in which political stability changes the slope of private credit rather than a model that imposes one constant coefficient for the entire period. When stability is weak, credit may be rationed, concentrated, or allocated defensively; when stability improves, the same financial capacity may support longer-horizon investment and stronger growth.

### ***2.3 Political Stability as an Institutional Moderator***

Political stability affects economic performance by shaping expectations about policy continuity, contract enforcement, violence, taxation, regulation, and the security of investment. Khan et al. (2022) find that political stability and other institutional dimensions contribute to financial development in developing and emerging economies. This relationship implies that political conditions may influence both the quantity of finance and its capacity to allocate resources efficiently. In Pakistan, political instability may discourage private borrowing and lending, encourage capital flight, and increase the attractiveness of migration among skilled workers.

Institutional quality also governs the extent to which resources are converted into development outcomes. Uddin et al. (2023) show that stronger institutions can boost economic development in developing nations by improving the effectiveness of policy and resource allocation. A moderator captures this mechanism because it asks whether the impact of another variable changes with institutional quality. Political stability may weaken the negative drain effect by supporting return opportunities and diaspora investment, while strengthening the positive effect of private credit through greater confidence and longer investment horizons.

Recent evidence on emerging markets indicates that finance and institutions are complementary rather than separable. Bayraktar et al. (2023) find that institutional quality plays a substantive role in the relationship between financial development and economic growth across emerging and middle-income economies. This suggests that an insignificant average finance coefficient can coexist with significant conditional effects at different institutional levels. The interaction term used in this article directly evaluates that proposition for Pakistan.

Political instability can also influence migration decisions through uncertainty about employment, public services, security, and professional autonomy. Ur Rehman et al. (2021) show that financial development and remittances can operate as complements or substitutes in generating growth, which implies that the institutional context determines whether migration-related funds pass through productive financial channels. A stable environment may attract formal remittances, diaspora deposits, and enterprise investment, while instability may direct funds toward precautionary consumption or assets outside the productive sector. The brain-drain interaction consequently represents a broader institutional capacity to retain and reconnect human capital.

### ***2.4 Research Gap and Hypotheses***

The reviewed evidence establishes separate links among migration, finance, institutions, remittances, and growth, but limited research integrates these relationships for Pakistan in a direct moderation framework. Odugbesan et al. (2021) show that remittances and financial development can have asymmetric effects across emerging economies, indicating that average linear estimates may conceal important changes across economic conditions. The present article closes part of this gap by estimating separate political-stability interactions for



brain-drain pressure and private credit, followed by marginal effects at observed stability levels. This approach is suited to a short annual series because it retains a parsimonious structure while testing the central institutional mechanism.

The conceptual expectations are expressed in five linked hypotheses without treating unconditional coefficients as sufficient evidence. The study expects brain-drain pressure to affect economic growth, financial development to affect growth, and political stability to influence growth, while the central hypotheses state that political stability moderates the brain-drain-growth relationship and the financial-development-growth relationship. The interaction signs are expected to be positive because better stability should improve the capacity to capture diaspora benefits and the productivity of credit. The empirical analysis also recognises that direct effects may be weak when the moderator is centred around its sample mean, so the hypotheses are evaluated through interaction coefficients and conditional marginal effects rather than through isolated main-effect p-values.

### **2.5 Theoretical Framework and Hypothesis Development**

To guide the empirical analysis, this study develops an institution-contingent theoretical framework. Rather than assuming that skilled migration and financial depth exert constant effects on growth, the framework posits that political stability operates as a "meta-condition" that shapes the productivity of both human capital mobility and financial intermediation.

The underlying logic rests on three interconnected mechanisms. First, the brain-drain-growth nexus is theorized to depend on the domestic economy's absorptive capacity. Under weak political stability, uncertainty, policy volatility, and insecurity shorten planning horizons, reduce the expected returns to domestic education, and weaken diaspora engagement, making emigration a pure loss of human capital. Conversely, improved stability enhances the "diaspora option" by facilitating return migration, encouraging investment of remittances into productive assets, and enabling knowledge transfer through professional networks (Docquier & Rapoport, 2012). Second, the finance-growth nexus operates through the allocation of credit. Under unstable conditions, lenders ration credit, shorten maturities, and direct funds toward politically connected or speculative activities; stability reduces these distortions, allowing credit to flow toward long-term productive investment (Levine, 2005). Third, these mechanisms are not independent; remittances provide a direct financial bridge between migration and domestic credit markets, meaning institutional quality affects both flows simultaneously.

### **2.6 Hypotheses Development**

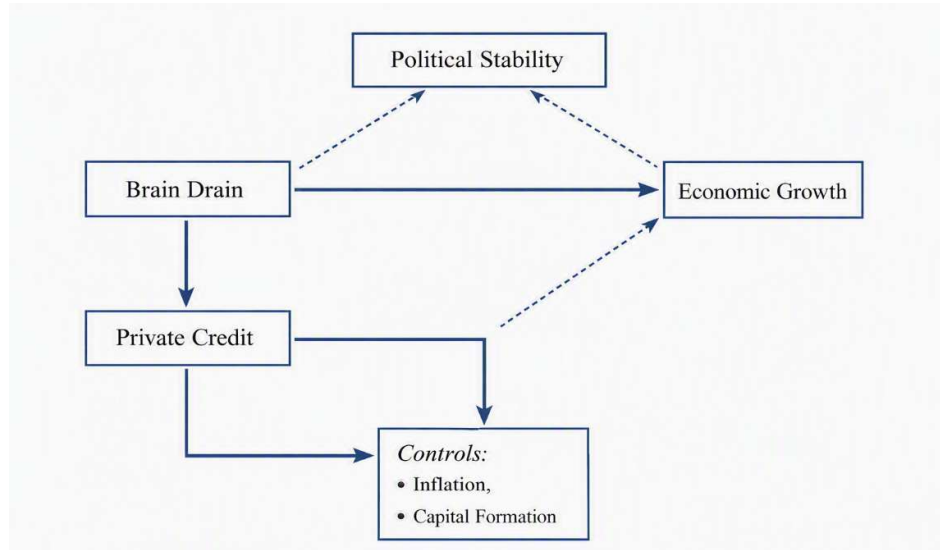
Based on this framework, five hypotheses are tested. The first three represent direct (average) effects, while the final two represent the central moderation propositions.

- H1:** Brain-drain pressure has a direct effect on economic growth, but this effect is theoretically ambiguous due to the offsetting forces of skill loss versus diaspora benefits.
- H2:** Financial development (measured by private credit) has a direct effect on economic growth, but this effect is expected to be weak or insignificant without conditioning on the institutional environment.
- H3:** Political stability directly influences economic growth, though its primary role is theorized to be interactive rather than additive.
- H4:** Political stability positively moderates the brain-drain-growth relationship. *Rationale:* Stronger institutions enable the economy to convert migration-related resources (remittances, networks, return skills) into productive output, shifting the effect from negative to positive.
- H5:** Political stability positively moderates the financial-development-growth relationship.

Credible and stable policy environments improve contract enforcement, reduce risk premia, and direct credit toward productive investment, making credit growth-enhancing only above a certain stability threshold.



**Figure 1**  
*Conceptual Model*



### 3. Materials And Method

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The study adopted a quantitative explanatory design based exclusively on annual secondary data for Pakistan. The common data window covered 2006-2023 and contained eighteen complete observations for the variables required by the moderation models.

##### 3.1 Data Sources and Variable Definitions

The study utilizes annual secondary data for Pakistan from 2006 to 2023. The sample period is constrained by the overlapping availability of World Governance Indicators (WGI) and World Development Indicators (WDI) for all variables. Table 1 provides a comprehensive overview of the variable definitions, sources, and specific World Bank codes to ensure full replicability.

**Table 1**

*Data Sources and Definitions*

| Variable                           | Definition                                                                                                                    | Source               | Series Code                       |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|
| GDP Growth (Dependent)             | Annual percentage growth rate of real GDP at market prices based on constant local currency.                                  | World Bank WDI       | NY.GDP.MKTP.KD.ZG                 |
| Brain Drain Pressure               | Human Flight and Brain Drain score (0=lowest pressure; 10=highest). Measures displacement/migration of skilled human capital. | WGI                  | PF.BRA.IND (derived)              |
| Private Credit (Principal Finance) | Domestic credit to the private sector (% of GDP). Credit provided by financial institutions to the private sector.            | IMF IFS / World Bank | <a href="#">FS.AST.PRVT.GD.ZS</a> |
| Political Stability (Moderator)    | Political Stability and Absence of Violence/Terrorism estimate (-2.5 weak; +2.5 strong).                                      | WGI                  | PV.EST                            |
| Broad Money (Robustness)           | Broad money (M2) as % of GDP. Includes currency, demand deposits, and time deposits.                                          | World Bank WDI       | <a href="#">FM.LBL.MQMY.GD.ZS</a> |



| Variable                          | Definition                                                                                   | Source         | Series Code                            |
|-----------------------------------|----------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| Inflation (Control)               | Annual percentage change in the Consumer Price Index (CPI).                                  | World Bank WDI | FP.CPI.TOTL.ZG                         |
| Gross Capital Formation (Control) | Gross fixed capital formation (% of GDP). Includes land improvements, plant, machinery, etc. | World Bank WDI | NE.GDI.FTOT.ZS                         |
| Remittances (Control)             | Personal remittances received (% of GDP).                                                    | World Bank WDI | BX. <a href="#">TRF.PWKR.DT.GD</a> .ZS |
| Trade Openness (Control)          | Sum of exports and imports of goods and services (% of GDP).                                 | World Bank WDI | NE.TRD.GNFS.ZS                         |

### 3.2 Variable Definitions

The dependent variable was real gross domestic product growth measured as an annual percentage. Brain-drain pressure was represented by the Human Flight and Brain Drain score, where a higher value denoted stronger pressure associated with the departure or displacement of skilled and economically active people. Financial development was measured principally by domestic credit to the private sector as a percentage of gross domestic product, while broad money as a percentage of gross domestic product was retained as an alternative indicator. Political stability was measured by the Political Stability and Absence of Violence/Terrorism estimate, where a higher value represented a more stable institutional environment. Remittances, inflation, trade openness, and gross capital formation were incorporated selectively as controls or robustness variables.

The sample period was determined by the intersection of the available annual series rather than by choosing a longer period with extensive missing observations. This decision preserved comparability across the variables and enabled the interaction terms to be calculated for every year. The limited number of observations required strict parsimony, so the study did not place both interactions and all potential controls in one equation. Separate models were estimated for the brain-drain moderation and financial-development moderation relationships. This structure reduced over-parameterisation, made the marginal effects transparent, and responded to the high correlations among brain-drain pressure, private credit, remittances, capital formation, and political stability.

All continuous variables entering an interaction were mean-centred. Brain-drain pressure, private credit, and political stability were transformed by subtracting their respective sample means, after which the centred brain-drain score was multiplied by centred political stability and centred private credit was multiplied by centred political stability. Mean-centring did not change the fit or substantive interaction but made the constitutive coefficients interpretable at the average level of political stability.

The brain-drain model specified economic growth as a function of centred brain-drain pressure, centred political stability, and their interaction. The finance model used centred private credit, centred political stability, and their interaction. Alternative equations added inflation or capital formation, replaced private credit with broad money, excluded major shock years, and introduced lagged economic growth.

### 3.3 Empirical Strategy

The empirical procedure began with annual plots, subperiod averages, descriptive statistics, and a correlation matrix. Variance inflation factors were calculated from a deliberately expanded model to diagnose whether all variables could be estimated together without unstable coefficients. Baseline regressions examined the unconditional relationships of brain-drain pressure and private credit with economic growth, both alone and alongside inflation. The central models were estimated with Newey-West heteroskedasticity and autocorrelation-consistent standard errors using one annual lag. This estimator was selected because diagnostic testing identified heteroskedasticity in the core equations, while the short sample did not justify a heavily parameterised dynamic system.

Moderation was evaluated in two stages. The interaction coefficient established whether the slope of the focal explanatory variable changed systematically with political stability. Marginal effects were then



calculated at five centred stability values that represented weak, moderately weak, near-average, improved, and relatively high stability within the observed Pakistani range. Each marginal effect was accompanied by a standard error, probability value, and ninety-five percent confidence interval. This procedure permitted the analysis to identify whether a coefficient became negative, statistically indistinguishable from zero, or positive as political conditions changed.

Robustness analysis examined measure selection, controls, unusual years, and temporal persistence. The financial interaction was re-estimated with capital formation, and broad money was substituted for private credit to determine whether liquidity depth generated the same pattern as productive credit. The core models were re-estimated after excluding 2020 and 2023 because these years contained exceptional output contractions or inflationary pressure. Dynamic equations incorporated one lag of economic growth to evaluate whether the interaction results survived growth persistence.

Diagnostic assessment included Breusch-Godfrey serial-correlation tests, Breusch-Pagan and White heteroskedasticity tests, Jarque-Bera normality tests, Ramsey specification tests, Durbin-Watson statistics, and a cumulative residual stability display. The accompanying Stata do-file reproduces the data preparation, descriptive analysis, regressions, margins, robustness models, diagnostics, and figures reported in the article.

### ***3.4 Addressing Data Limitations and Endogeneity***

Several methodological caveats warrant explicit acknowledgment. First, the annual sample comprises only eighteen observations (N=18). This constraint precludes the estimation of heavily parameterized systems such as unrestricted Vector Autoregressions (VARs) or complex cointegrating relationships with multiple lags. To preserve degrees of freedom, the analysis adopts a parsimonious interaction framework and relies on Newey-West standard errors, which are robust to heteroskedasticity and serial correlation even in modest samples.

Second, while the theoretical framework posits causality flowing from political stability and credit to growth, the empirical strategy does not claim to establish strict causal identification. The estimates represent conditional associations at the annual frequency. Reverse causality remains plausible, as higher growth can improve political stability (through the "honeymoon effect") and increase credit demand.

To partially mitigate this, the robustness section includes dynamic specifications with lagged growth and exclusion of major crisis years. Future research utilizing longer quarterly series or instrumental variables (e.g., regional spillovers of neighbouring countries' stability) would be valuable to strengthen causal claims. The current results should therefore be interpreted as suggestive, policy-relevant conditional correlations that strongly align with the theoretical priors.

## **4. Results and Analysis**

### ***4.1 Annual Configuration of Economic Growth and the Core Explanatory Variables***

The annual series displayed a growth process marked by repeated accelerations and reversals rather than a smooth trend. Real GDP growth averaged 3.63 percent over 2006-2023, reached a high of 6.57 percent in 2016, and fell below zero in 2020 and 2023. The contrast between the 2021 rebound of 6.51 percent and the 2023 contraction of 0.41 percent illustrates that short-run output performance was highly sensitive to shocks and macroeconomic adjustment. This volatility is important for the regression analysis because a moderator can influence the capacity of the economy to transform financial resources and migration-related connections into growth without eliminating year-specific disturbances. The annual path therefore justified the use of robust standard errors, shock-exclusion tests, and a dynamic specification rather than reliance on one static coefficient.

Brain-drain pressure moved in a gradual downward direction across the sample, beginning at 8.10 in 2006 and ending at 5.80 in 2023. The score peaked at 8.30 in 2009 and remained above 7.00 through much of the earlier period, while the values after 2020 were between 5.80 and 6.50. A lower score denotes reduced pressure, so the trend indicates an improvement in the measured human-flight environment even though it does not imply that skilled migration ceased. The slow-moving character of the series contrasts with the sharp fluctuations in GDP growth, which helps explain why a simple contemporaneous brain-drain coefficient was



small. The interaction analysis was designed to test whether the same brain-drain score carried different growth implications under different political conditions.

**Figure 1**

*Annual real GDP growth in Pakistan, 2006-2023*

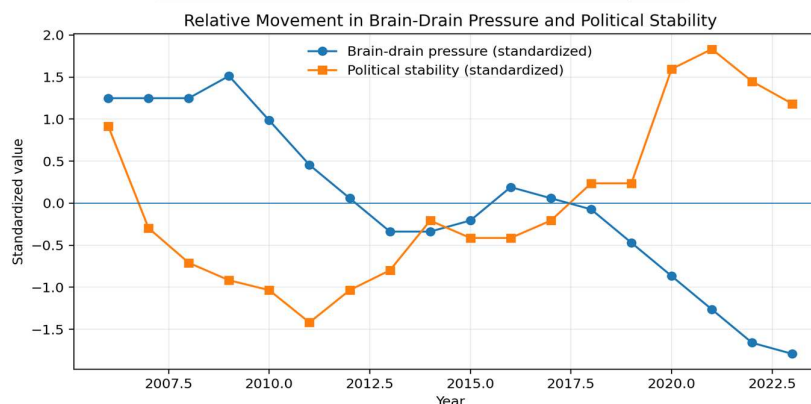


Private credit as a percentage of GDP declined over the sample. It exceeded 22 percent in 2006 and 2007, reached 24.17 percent in 2008, and then fell into the middle-teen range for most subsequent years before reaching 12.02 percent in 2023. The contraction in the private-credit ratio suggests that financial deepening did not keep pace with the scale of the economy. Broad money followed a different path, rising above 50 percent of GDP during 2016-2021 before falling to 42.73 percent in 2023. The divergence between credit and broad money demonstrates why the two measures should not be treated as interchangeable: one reflects resources directed to the private sector, while the other captures the wider stock of monetary liabilities.

Political stability remained negative throughout the period, which means that Pakistan stayed below the international reference point of the governance scale. The weakest value was -2.81 in 2011, whereas the least negative value was -1.71 in 2021. The improvement after 2018 coincided with lower brain-drain pressure and higher remittance ratios, but it did not prevent large output shocks. This pattern indicates that political stability is not expected to explain every annual change in GDP growth directly. Its empirical role is more plausibly expressed through the conditions it creates for credit allocation, investment horizons, diaspora engagement, and the retention or circulation of skills.

**Figure 2**

*Standardised Movements in Brain-Drain Pressure and Political Stability*



The subperiod averages reveal a structural movement from high brain-drain pressure and relatively high private credit toward lower brain-drain pressure, reduced private credit, and larger remittance inflows. Average growth rose from 3.38 percent in 2006-2011 to 4.46 percent in 2012-2017, then fell to 3.04 percent in 2018-2023 because the later block contained two contraction years and the inflation surge of 2022-2023. Brain-drain pressure declined from 8.00 to 6.90 and then to 6.38 across the three blocks. Private credit fell



from 21.08 percent of GDP in the earliest block to 14.59 percent in the middle block and 14.93 percent in the latest block, while remittances rose steadily. These shifts suggest that migration-linked financial inflows became more prominent at the same time that domestic private intermediation remained constrained.

**Table 2**

*Subperiod Averages of the Core Study Variables*

| Period    | GDP growth | Brain drain | Private credit | Political stability | Remittances | Inflation |
|-----------|------------|-------------|----------------|---------------------|-------------|-----------|
| 2006-2011 | 3.379      | 8.000       | 21.075         | -2.525              | 4.133       | 12.385    |
| 2012-2017 | 4.456      | 7.083       | 14.586         | -2.503              | 6.037       | 5.824     |
| 2018-2023 | 3.042      | 6.383       | 14.925         | -1.962              | 7.748       | 14.256    |

The annual evidence also highlights a sequencing issue. Improvements in the political-stability score were gradual, whereas changes in output, inflation, and credit were often abrupt, so institutional gains could not be expected to offset every macroeconomic shock within the same year. The interaction models capture whether the general response of growth to brain-drain pressure or credit differed across stability conditions, not whether stability prevented a contraction caused by a separate event. This distinction is visible in 2023, when political stability was less adverse than in the early sample, but growth remained negative amid severe inflation and reduced private credit. Institutional improvement should therefore be viewed as a condition that raises the expected productivity of resources while macroeconomic management determines whether that potential is realised in a particular year.

#### **4.2 Distributional Properties and Variation in the Dataset**

The descriptive statistics show that GDP growth had a standard deviation of 2.21 percentage points, representing substantial variation relative to the mean of 3.63 percent. The minimum of -1.27 percent and maximum of 6.57 percent produced a range of 7.85 percentage points. This variation was sufficient to identify relationships despite the short time dimension, yet it also meant that individual shock years could influence coefficient magnitude. The distribution was not dominated by one continuous decline or rise; instead, it contained expansions, slowdowns, contractions, and recovery. This mixed configuration improved the relevance of robustness checks that removed 2020 and 2023 separately.

Brain-drain pressure was less volatile than economic growth, with a mean of 7.16 and a standard deviation of 0.76. Its range of 2.50 points reflected a gradual institutional and migration-related change rather than abrupt yearly movements. Private credit displayed greater proportional variation, averaging 16.86 percent of GDP with a standard deviation of 3.53 and values between 12.02 and 24.17 percent. Broad money averaged 48.19 percent of GDP and varied within a narrower relative band. The descriptive contrast confirms that private credit captured a distinct contraction in the finance available to private activity that was not visible from broad monetary depth alone.

**Table 3**

*Descriptive Statistics for the Annual Dataset*

| Variable              | N  | Mean   | Std. dev. | Minimum | Maximum |
|-----------------------|----|--------|-----------|---------|---------|
| GDP growth            | 18 | 3.625  | 2.206     | -1.274  | 6.574   |
| Brain drain           | 18 | 7.156  | 0.756     | 5.800   | 8.300   |
| Private credit/GDP    | 18 | 16.862 | 3.534     | 12.020  | 24.169  |
| Broad money/GDP       | 18 | 48.190 | 2.982     | 42.727  | 54.526  |
| Political stability   | 18 | -2.330 | 0.338     | -2.810  | -1.710  |
| Remittances/GDP       | 18 | 5.973  | 1.729     | 3.164   | 8.984   |
| Inflation             | 18 | 10.821 | 6.971     | 2.529   | 30.768  |
| Trade/GDP             | 18 | 29.788 | 2.960     | 24.702  | 34.349  |
| Capital formation/GDP | 18 | 15.921 | 1.287     | 13.968  | 18.282  |

Political stability averaged -2.33 with a standard deviation of 0.34. Although the numerical range from -2.81 to -1.71 appears smaller than the range of some macroeconomic variables, it is economically meaningful



because a movement of one point on the governance scale represents a large change in country risk and institutional perceptions. The centred political-stability values used in the interaction analysis ranged from approximately -0.48 to 0.62. The selected marginal-effect points remained within or close to this observed range, so the conditional slopes were not based on remote extrapolation. This strengthens the practical interpretation of the interaction plots.

Remittances averaged 5.97 percent of GDP and increased from a minimum of 3.16 percent to a maximum of 8.98 percent. Inflation was the most dispersed control variable, with a mean of 10.82 percent, a standard deviation of 6.97, and a maximum of 30.77 percent. Trade openness averaged 29.79 percent of GDP, while gross capital formation averaged 15.92 percent. The different scales and variations justified the use of percentage-point interpretations rather than a single standardised coefficient table. The results focus on how a one-unit change in each original measure affects annual growth, with interaction effects evaluated through centred units.

The descriptive evidence already points to two constraints on a simple finance-growth interpretation. Private credit declined while several high-growth years occurred after the decline, and broad money expanded during a period that also contained low growth and high inflation. These patterns imply that finance may be productive only under particular institutional and macroeconomic conditions. The data also show that lower brain-drain pressure did not guarantee higher annual growth, because the lowest scores occurred during years containing inflation and output stress. The moderation framework consequently addresses a visible empirical puzzle rather than imposing complexity without evidence from the series.

The ranges also demonstrate that the moderation estimates were driven by economically observed conditions rather than arbitrary categories. The centred stability points used for the margins corresponded to values from the weaker and stronger parts of Pakistan's own distribution. The estimated slopes therefore answer a practical question: how did the growth association change as Pakistan moved from its relatively unstable years toward its comparatively improved years? This within-country interpretation avoids the difficulty of comparing Pakistan directly with countries that possess very different governance levels, financial structures, or migration systems. It also keeps the policy meaning tied to attainable movements in the national indicator.

#### **4.3 Correlation Structure and Model Separation**

The correlation matrix revealed weak unconditional associations between GDP growth and the principal explanatory variables. The correlation between growth and brain-drain pressure was 0.153, between growth and private credit was 0.103, and between growth and political stability was -0.008. These values indicate that no focal variable had a strong linear association with annual growth when considered without interactions or controls. Inflation had the clearest bivariate relationship with growth at -0.564, while capital formation had a positive correlation of 0.345. The weak direct correlations strengthened the rationale for examining conditional slopes instead of assuming that an average coefficient represented all years.

The explanatory variables were strongly related to one another. Brain-drain pressure correlated at 0.829 with private credit, -0.661 with political stability, -0.915 with remittances, and 0.782 with capital formation. Private credit correlated at -0.814 with remittances and 0.851 with capital formation. These coefficients reflect common trends: earlier years had higher brain-drain pressure, higher credit, and higher capital formation, while later years had lower brain-drain pressure and larger remittance ratios. Estimating every variable in one short equation would therefore create unstable partial coefficients and make signs highly sensitive to small specification changes.

**Table 4**

*Selected Correlation Matrix and Variance Inflation Factors*

| Variable       | GDP   | Brain Drain | Private Credit | Political Stability | Inflation | Capital Formation |
|----------------|-------|-------------|----------------|---------------------|-----------|-------------------|
| Growth         | 1.000 |             |                |                     |           |                   |
| Brain drain    | 0.153 | 1.000       |                |                     |           |                   |
| Private credit | 0.103 | 0.829       | 1.000          |                     |           |                   |



| Variable            | GDP    | Brain Drain | Private Credit | Political Stability | Inflation | Capital Formation |
|---------------------|--------|-------------|----------------|---------------------|-----------|-------------------|
| Political stability | -0.008 | -0.661      | -0.253         | 1.000               |           |                   |
| Inflation           | -0.564 | -0.290      | 0.020          | 0.241               | 1.000     |                   |
| Capital formation   | 0.345  | 0.782       | 0.851          | -0.219              | -0.192    | 1.000             |

**Table 5**

*Variance Inflation Factors from the Expanded Diagnostic Model*

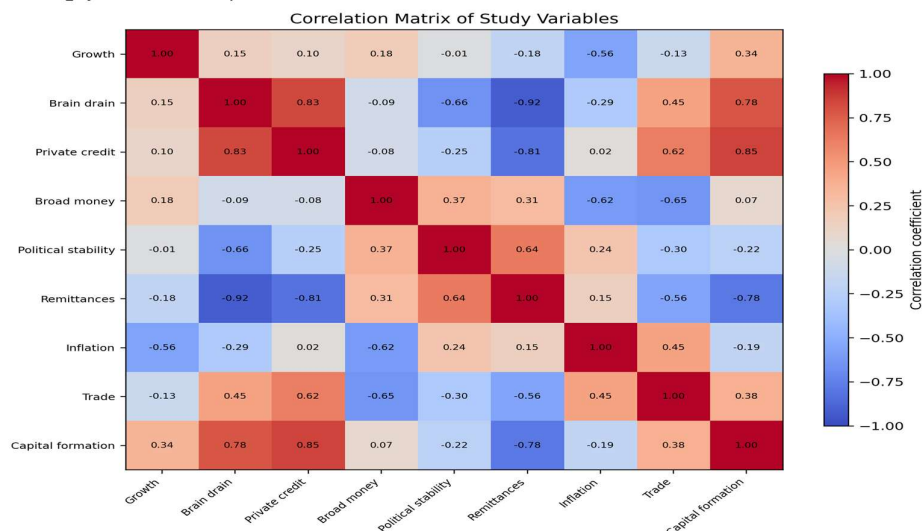
| Variable              | VIF    |
|-----------------------|--------|
| brain_drain           | 21.151 |
| private_credit_gdp    | 15.301 |
| political_stability   | 6.827  |
| remittances_gdp       | 9.758  |
| inflation             | 2.232  |
| trade_gdp             | 3.245  |
| capital_formation_gdp | 5.740  |

The variance inflation factors confirmed this risk. In the deliberately expanded model, brain-drain pressure had a variance inflation factor of 21.15, private credit 15.30, remittances 9.76, political stability 6.83, capital formation 5.74, trade openness 3.25, and inflation 2.23. The largest values exceeded conventional diagnostic thresholds, not because the data were erroneous but because several variables shared long-run movement within only eighteen observations. The results support the methodological decision to estimate the two moderation relationships separately and to introduce controls selectively. This approach does not remove all dependence among variables, but it prevents an overfitted model from obscuring the interaction terms.

The correlation between broad money and inflation was -0.616, and broad money correlated at -0.648 with trade openness. These associations indicate that broad money captured a different macro financial configuration from private credit. An increase in monetary depth may result from deposit accumulation, public-sector financing, or changes in money demand, none of which ensures that the private sector receives productive credit. The robustness model using broad money was therefore interpreted as an alternative concept of financial depth rather than a direct substitute expected to yield identical coefficients. The distinction became important when the broad-money interaction differed from the private-credit interaction.

**Figure 3**

*Correlation Heatmap for the Study Variables*





Model separation also improved the economic meaning of the constitutive coefficients. In the centred brain-drain equation, the main effect of brain-drain pressure represented its slope at average political stability. In the centred finance equation, the private-credit coefficient represented the credit slope at the same average condition. The interaction then showed the change in each slope for a one-unit improvement in political stability. Because the unconditional correlations were small, statistically significant interactions could reveal offsetting negative and positive effects across the observed stability range. This is precisely what emerged in the marginal-effect analysis.

The high explanatory-variable correlations have a substantive interpretation beyond statistical caution. Declining brain-drain pressure, rising remittances, and lower private credit occurred together over much of the period, suggesting that migration-related household finance increasingly entered the economy while formal private intermediation did not expand in parallel. This configuration can produce a situation in which remittances support consumption and household resilience but do not generate broad private investment. Political stability may help close that gap by encouraging migrants and domestic savers to hold longer-term financial assets, invest in enterprises, and use formal institutions. The separated models therefore reveal different components of one structural transition rather than unrelated statistical exercises.

#### **4.4 Baseline Finance-Growth and Brain-Drain-Growth Estimates**

The baseline regression containing only brain-drain pressure produced a coefficient of 0.446 with a Newey-West standard error of 0.718. The coefficient was not statistically significant, and the model explained 2.3 percent of the variation in annual growth. This estimate should not be read as evidence that stronger brain-drain pressure raises growth. It represents an average across years with markedly different political and macroeconomic conditions, and its large uncertainty interval included both negative and positive values. The result establishes that the direct linear hypothesis was not supported without conditioning on political stability.

Adding inflation changed the brain-drain coefficient to -0.035 and left it statistically insignificant. Inflation entered with a coefficient of -0.180 and was significant at a probability below 0.001. The model's explained variation rose to 31.8 percent, showing that price instability accounted for a substantial part of Pakistan's annual growth fluctuations. The near-zero brain-drain coefficient after controlling for inflation indicates that the positive bivariate sign was partly associated with the timing of early high-score and high-growth years. It also reinforces the need to interpret migration pressure through institutional interactions rather than through a constant direct effect.

The private-credit-only model produced a coefficient of 0.064 with a standard error of 0.139 and explained 1.1 percent of growth variation. When inflation was added, the private-credit coefficient increased slightly to 0.071 but remained insignificant, while inflation retained a negative coefficient of -0.179 and strong statistical significance. The adjusted model explained 33.1 percent of the variation. These estimates show that more credit was not uniformly associated with higher growth over the full sample. A constant slope would average together years in which credit may have supported productive activity and years in which uncertainty, risk, or weak allocation reduced its return.

**Table 6**

*Baseline Newey-West Regression Estimates for Economic Growth*

| <b>Model</b>                  | <b>Brain<br/>coef.</b> | <b>p</b> | <b>Credit<br/>coef.</b> | <b>p</b> | <b>Inflation<br/>coef.</b> | <b>p</b> | <b>R-squared</b> |
|-------------------------------|------------------------|----------|-------------------------|----------|----------------------------|----------|------------------|
| Brain drain only              | 0.446                  | 0.543    | nan                     | nan      | nan                        | nan      | 0.023            |
| Brain drain + inflation       | -0.035                 | 0.956    | nan                     | nan      | -0.180                     | 0.000    | 0.318            |
| Private credit only           | nan                    | nan      | 0.064                   | 0.651    | nan                        | nan      | 0.011            |
| Private credit +<br>inflation | nan                    | nan      | 0.071                   | 0.345    | -0.179                     | 0.000    | 0.331            |
| Expanded model                | -3.211                 | 0.169    | 0.205                   | 0.546    | -0.212                     | 0.000    | 0.496            |

An expanded model containing brain-drain pressure, private credit, political stability, inflation, and capital formation explained 49.6 percent of the variation in growth. Inflation remained negative at -0.212 and



statistically significant, while capital formation entered positively at 1.243 and was significant at the five-percent level. The brain-drain, credit, and political-stability coefficients were not significant in this multivariable equation and displayed larger standard errors, consistent with the multicollinearity diagnostics. The expanded model is useful as contextual evidence, but it is not the preferred specification for the central hypotheses. Its main message is that investment and inflation matter directly, while the focal variables require a conditional formulation.

The baseline results create an important distinction between objective achievement and coefficient significance. The objectives sought to examine the effects of brain drain, financial development, and political stability, not to force each variable to have a significant unconditional coefficient. The analysis found that average direct effects were weak, while inflation and capital formation behaved in expected directions. This finding is supportive of the article's conceptual premise because it shows that institutional moderation is needed to understand why the same migration or credit conditions can coexist with different growth outcomes. The subsequent interaction models provide the principal tests.

The baseline equations also establish that a supportive result does not require every objective to produce a positive direct coefficient. A finance policy based on the credit-only estimate would conclude that credit has little relevance, while a migration policy based on the brain-drain-only estimate could incorrectly interpret the positive sign as evidence of universal benefit. Once inflation and political stability were considered, both interpretations changed. The value of the analysis lies in identifying when and why effects differ, which provides more useful guidance than selecting a favourable average coefficient. The weak baselines are therefore an empirical foundation for the interaction analysis rather than a failure of the research design.

#### ***4.5 Political Stability and the Conditional Effect of Brain Drain***

The brain-drain moderation model estimated a constant of 4.202, representing predicted growth when centred brain-drain pressure and centred political stability were both zero. The main coefficient for centred brain-drain pressure was 0.351 with a standard error of 0.323 and was not significant at conventional levels. The centred political-stability coefficient was 1.690 with a standard error of 1.474 and was also insignificant. These main effects are conditional values at the sample means, so their individual p-values do not determine whether moderation exists. The central coefficient was the interaction between brain-drain pressure and political stability.

The interaction coefficient was 3.606 with a Newey-West standard error of 1.627 and a probability value of 0.0438. The positive and statistically significant estimate shows that the slope of brain-drain pressure increased as political stability improved. The model explained 15.9 percent of the variation in annual growth, and the adjusted R-squared was slightly negative because the sample was short and the interaction consumed degrees of freedom. The interaction significance remains economically meaningful because the test evaluates a specific slope change rather than overall prediction. It provides support for the objective concerning the moderating role of political stability in the brain-drain-growth relationship.

**Table 6**

*Political Stability as a Moderator of the Brain-Drain-Growth Relationship*

| <b>Variable</b>                   | <b>Coefficient</b> | <b>Robust SE</b> | <b>t statistic</b> | <b>p value</b> |
|-----------------------------------|--------------------|------------------|--------------------|----------------|
| Constant                          | 4.202              | 0.422            | 9.951              | 0.000          |
| Centred brain drain               | 0.351              | 0.323            | 1.085              | 0.296          |
| Centred political stability       | 1.690              | 1.474            | 1.147              | 0.271          |
| Brain drain x political stability | 3.606              | 1.627            | 2.216              | 0.044          |
| Model R-squared                   | 0.160              |                  |                    |                |

The positive interaction does not mean that greater human flight is universally desirable. At low political stability, the conditional slope was negative, meaning that stronger brain-drain pressure was associated with weaker growth. As stability moved toward and above its sample mean, the slope approached zero and then became positive. This pattern is consistent with a transition from a drain-dominated environment

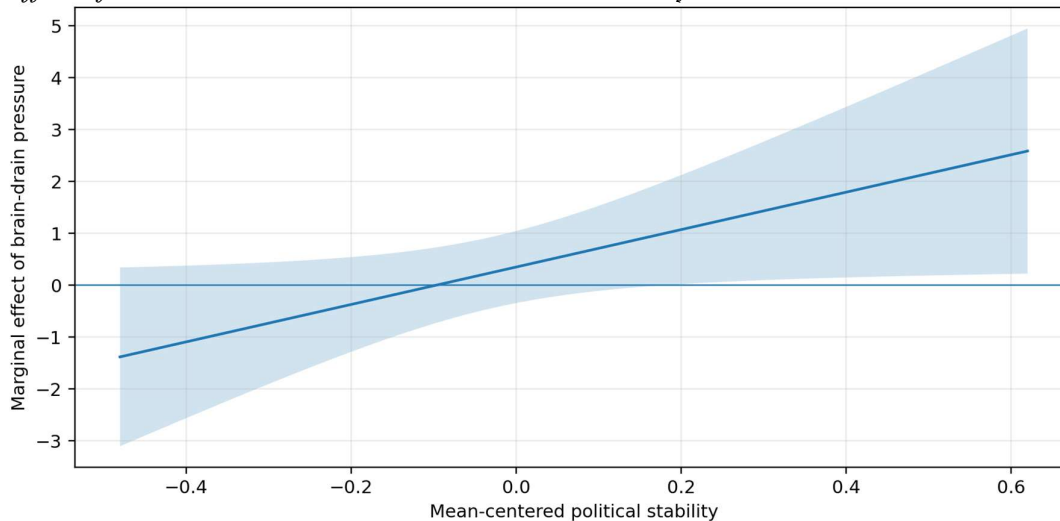


to one in which diaspora finance, knowledge exchange, return opportunities, or migration-induced skill investment can offset some domestic losses. The result must be interpreted as a conditional association within Pakistan's observed range rather than as evidence supporting unrestricted skill loss.

The interaction also clarifies why the direct brain-drain coefficient was small. The sample contained years on both sides of the stability mean, so negative conditional effects in weak-stability years were averaged with positive effects in relatively improved years. A conventional regression therefore compressed two different relationships into one near-zero slope. The moderation model separates those conditions and demonstrates that political stability changes the economic meaning of the brain-drain score. This finding aligns with the study's argument that human-capital mobility is mediated by institutions capable of retaining, reconnecting, and productively using skills.

**Figure 4**

*Marginal Effect of Brain-Drain Pressure Across Political-Stability Conditions*



The confidence interval around the interaction remained wide, which reflects the limited number of annual observations and the slow movement of the brain-drain indicator. The result was therefore subjected to shock exclusions and a dynamic equation. The core coefficient remained positive and significant when 2020 was removed, while its significance weakened when 2023 was removed or lagged growth was included. This pattern indicates genuine evidence of moderation with lower robustness than the private-credit interaction. The appropriate conclusion is that political stability conditionally shapes the brain-drain-growth relationship, but the size of that effect should be treated cautiously.

The brain-drain interaction is also compatible with sectoral heterogeneity that cannot be observed in the aggregate data. Health, engineering, education, information technology, and finance may experience different losses and diaspora benefits, so an annual national score compresses several channels into one measure. Improved political stability may not reverse shortages in every sector, but it can strengthen remote work, professional collaboration, return investment, and knowledge-transfer arrangements. The positive upper-range slope may consequently reflect the aggregate outcome of several offsetting sectoral processes. Future sector-level data could identify which professional groups generate the largest domestic losses and which diaspora connections create the largest compensating gains.

#### **4.6 Political Stability and the Conditional Effect of Financial Development**

The financial-development moderation model yielded a constant of 4.015, indicating predicted growth at average private credit and average political stability. The coefficient for centred private credit was 0.105 with a standard error of 0.072 and did not reach conventional significance. The main coefficient for centred political stability was 1.086 with a standard error of 1.511 and was also insignificant. As in the brain-drain equation, these constitutive coefficients apply at the centred reference point and should not be interpreted



independently of the interaction. The finance model's central result was the large positive change in the credit slope associated with political stability.

The private-credit interaction coefficient was 1.364 with a Newey-West standard error of 0.347 and a probability value of 0.0015. This estimate was strongly significant and indicated that a one-unit improvement in the centred political-stability measure raised the marginal effect of private credit on annual growth by approximately 1.36 percentage points. The model explained 32.7 percent of the variation in growth, more than twice the explained variation of the brain-drain moderation equation. The adjusted R-squared was 18.2 percent, which is notable for a three-variable interaction model estimated from eighteen annual observations. The result provides clear support for the objective concerning political stability as a moderator of the finance-growth relationship.

**Table 7**

*Political Stability as a Moderator of the Financial-Development-Growth Relationship*

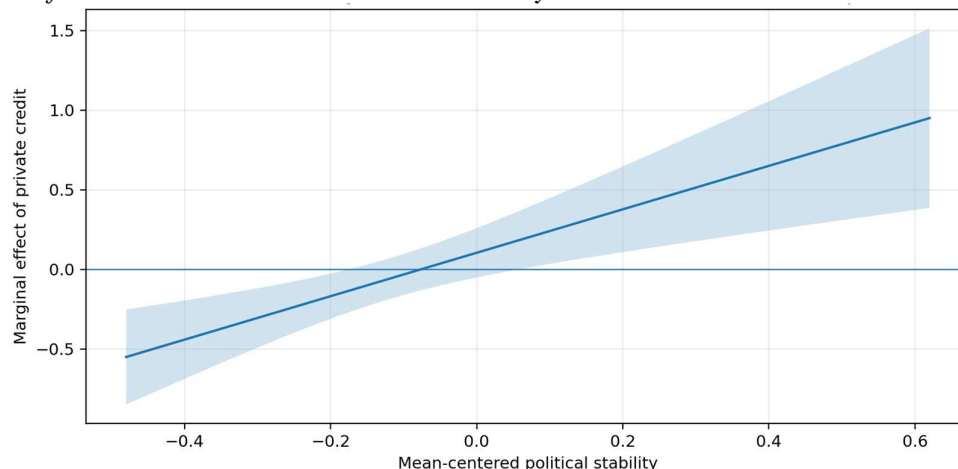
| Variable                             | Coefficient | Robust SE | t statistic | p value |
|--------------------------------------|-------------|-----------|-------------|---------|
| Constant                             | 4.015       | 0.398     | 10.079      | 0.000   |
| Centred private credit               | 0.105       | 0.072     | 1.453       | 0.168   |
| Centred political stability          | 1.086       | 1.511     | 0.719       | 0.484   |
| Private credit x political stability | 1.364       | 0.347     | 3.930       | 0.002   |
| Model R-squared                      | 0.327       |           |             |         |

The sign pattern shows that credit was not growth-enhancing under all institutional conditions. When political stability was substantially below its sample mean, the conditional credit slope was negative and statistically significant. As stability improved, the adverse slope became smaller, crossed zero near the average condition, and turned positive at higher observed stability levels. This result suggests that financial depth can be counterproductive when uncertainty, policy discontinuity, risk concentration, or weak enforcement prevents credit from reaching productive activities. Under improved stability, the same credit capacity is more likely to support investment, working capital, innovation, and employment.

The result also explains the divergence between private credit and broad money. Private credit measures a direct flow of financial claims to private borrowers, so its productivity is closely tied to borrower selection, contract enforcement, and investment confidence. Political stability improves these functions by reducing uncertainty and permitting longer-horizon lending. Broad money can rise through channels that do not increase productive private investment, including deposit accumulation and public financing. The significant private-credit interaction therefore supports an allocation-based view of financial development rather than the proposition that any increase in monetary depth raises growth.

**Figure 5**

*Marginal Effect of Private Credit Across Political-Stability Conditions*





Among all core coefficients, the finance interaction had the strongest statistical support and the greatest robustness. It remained positive and significant after adding capital formation, excluding 2020, excluding 2023, and including lagged economic growth. The magnitude changed across specifications but the substantive pattern persisted. This consistency indicates that the conditional productivity of credit was not driven solely by one crisis year or by the contemporaneous persistence of growth. The evidence supports a policy focus on institutional conditions that allow finance to serve productive private activity.

The finance interaction has a clear balance-sheet interpretation. Under weak stability, lenders may shorten maturities, raise collateral requirements, concentrate portfolios, and direct funds toward borrowers with political or informational advantages. These responses can increase the measured stock of credit without financing productivity-enhancing projects. As stability improves, reduced uncertainty allows banks to evaluate longer projects and gives firms greater confidence to borrow for machinery, technology, exports, and workforce development. The interaction coefficient captures this change in the quality of the credit-growth transmission mechanism. Its robustness indicates that the result is not simply a reflection of the average credit ratio.

#### 4.7 Marginal Effects and Economic Significance

The marginal-effect calculations translated the interaction coefficients into slopes at five observed political-stability conditions. For brain-drain pressure, the slope was -0.911 when centred political stability equalled -0.350. The estimate was not statistically significant at the five-percent level, but its negative sign represented the drain-dominated condition anticipated by the conceptual framework. At a centred stability value of -0.2625, the slope was -0.596 and remained insignificant. Near the average condition, represented by -0.085, the slope was only 0.045, showing that the negative and positive channels nearly offset one another.

The brain-drain slope changed materially when political stability moved into the improved part of the observed range. At a centred stability value of 0.2525, the marginal effect was 1.261 with a probability value of 0.040 and a confidence interval from 0.067 to 2.456. At 0.505, the effect rose to 2.172 with a probability value of 0.034 and a confidence interval from 0.190 to 4.154. The positive significance at these levels indicates that years with comparatively better stability were capable of converting migration-related conditions into a more favourable growth association. This does not imply that losing skilled workers directly creates growth; it indicates that the broader migration-pressure measure may capture education incentives, remittances, diaspora networks, and circulation effects that become productive under stronger institutions.

The financial-development marginal effects were more precise. At centred political stability of -0.350, a one-percentage-point increase in private credit relative to GDP was associated with a 0.372-percentage-point decline in growth, and the effect was significant at 0.002. At -0.2625, the effect was -0.253 and significant at 0.006. Near the average condition, the slope was -0.011 and statistically indistinguishable from zero. This sequence shows that weak stability can reverse the expected benefit of financial development, possibly because credit is allocated to defensive, short-term, or politically connected uses rather than productive expansion.

At a centred stability value of 0.2525, the marginal effect of private credit became 0.449 and significant at 0.007. At 0.505, the effect increased to 0.794 and remained significant at 0.003. The movement from -0.372 to 0.794 across the stability range represents an economically large change of approximately 1.17 percentage points in the growth response to each one-point change in private credit. This magnitude demonstrates that institutional conditions can be as important as the quantity of finance. A policy that expands credit without improving stability may fail, while the same expansion under more credible conditions can support substantial growth.

**Table 8**

*Conditional Marginal Effects at Selected Political-Stability Values*

| Focal variable | Stability condition | Centred PS | Effect | Robust SE | p value | Lower 95% | Upper 95% |
|----------------|---------------------|------------|--------|-----------|---------|-----------|-----------|
| Brain drain    | Weak                | -0.350     | -0.911 | 0.615     | 0.160   | -2.229    | 0.407     |
| Brain drain    | Moderately weak     | -0.263     | -0.596 | 0.499     | 0.252   | -1.665    | 0.474     |



| Focal variable | Stability condition | Centred PS | Effect | Robust SE | p value | Lower 95% | Upper 95% |
|----------------|---------------------|------------|--------|-----------|---------|-----------|-----------|
| Brain drain    | Near average        | -0.085     | 0.044  | 0.334     | 0.896   | -0.671    | 0.760     |
| Brain drain    | Improved            | 0.253      | 1.261  | 0.557     | 0.040   | 0.066     | 2.456     |
| Brain drain    | Relatively high     | 0.505      | 2.172  | 0.924     | 0.034   | 0.190     | 4.154     |
| Private credit | Weak                | -0.350     | -0.372 | 0.100     | 0.002   | -0.587    | -0.157    |
| Private credit | Moderately weak     | -0.263     | -0.253 | 0.078     | 0.006   | -0.420    | -0.086    |
| Private credit | Near average        | -0.085     | -0.011 | 0.061     | 0.861   | -0.141    | 0.119     |
| Private credit | Improved            | 0.253      | 0.449  | 0.142     | 0.007   | 0.146     | 0.753     |
| Private credit | Relatively high     | 0.505      | 0.794  | 0.224     | 0.003   | 0.313     | 1.274     |

The marginal-effect figures also show where the confidence bands cross zero. The brain-drain band was wide and remained above zero only in the upper part of the stability distribution. The private-credit band was narrower and displayed statistically significant negative effects at weak stability, a neutral zone near the mean, and significant positive effects at improved stability. This difference reflects both the stronger finance interaction and the more precise measurement of private credit. It suggests that the finance moderation result is the most actionable empirical finding, while the brain-drain moderation result provides a complementary human-capital interpretation.

Economic significance should be distinguished from statistical significance. A coefficient can be statistically weak in a small sample yet imply a meaningful shift across realistic values, and a statistically significant coefficient can still require institutional interpretation. The brain-drain model indicates that stability changes the direction of the relationship, whereas the finance model demonstrates both direction and precision. Together, the marginal effects support the central proposition that Pakistan's growth outcomes depend on the institutional setting in which migration and finance operate. They also explain why policies focused on one variable in isolation are unlikely to produce reliable results.

The marginal effects can also be read as a threshold-like pattern even though the model is linear in the interaction. The private-credit slope crossed from negative to positive near the sample mean of political stability, and the confidence interval narrowed sufficiently to distinguish both adverse and favourable regions. For brain-drain pressure, the zero-crossing occurred within the observed range but the uncertainty band was wider. This comparison suggests that political stability has a more immediate and measurable influence on financial contracts than on the complex human-capital channels surrounding migration. Credit decisions respond rapidly to risk and policy credibility, while migration networks and educational incentives unfold over longer periods.

#### **4.8 Robustness to Alternative Financial Indicators and Controls**

The private-credit moderation result survived the inclusion of gross capital formation. In this specification, the interaction coefficient was 1.075 with a standard error of 0.295 and a probability value of 0.003. Capital formation entered with a positive coefficient of 1.077 and was significant at 0.036. The model explained 42.1 percent of the variation in growth, and the adjusted R-squared increased to 24.3 percent. These results show that the stability-credit interaction did not merely proxy for the direct contribution of investment, because it remained strong after investment was included.

The coefficient for centred private credit in the capital-formation model was -0.236 and did not reach significance, while centred political stability was also insignificant. This pattern is consistent with the interpretation of constitutive terms in an interaction model: the credit coefficient represents the slope exactly at average stability, where the marginal-effect results placed the relationship close to zero. Capital formation captured a direct expansion channel, while the interaction captured the institutional conversion of credit into growth. The two coefficients therefore describe distinct mechanisms rather than competing explanations.

Replacing private credit with broad money changed the result. The broad-money interaction with political stability was -0.609 and had a probability value of 0.053, which was close to but above the five-percent threshold. Inflation was negative at -0.340 and significant at 0.006. The model explained 57.7 percent



of growth variation, largely because inflation captured the major contractions and price-pressure years. The negative interaction indicates that broad monetary depth did not reproduce the positive institutional complementarity found for private credit.

**Table 9***Robustness of the Political-Stability Interaction Estimates*

| Specification                          | Interaction coefficient | Robust SE | p value | R-squared |
|----------------------------------------|-------------------------|-----------|---------|-----------|
| Credit interaction + capital formation | 1.075                   | 0.295     | 0.003   | 0.421     |
| Broad money interaction + inflation    | -0.609                  | 0.286     | 0.053   | 0.577     |
| Brain interaction, excluding 2020      | 3.382                   | 1.526     | 0.045   | 0.313     |
| Credit interaction, excluding 2020     | 1.217                   | 0.467     | 0.022   | 0.447     |
| Brain interaction, excluding 2023      | 2.785                   | 1.361     | 0.061   | 0.111     |
| Credit interaction, excluding 2023     | 1.072                   | 0.353     | 0.009   | 0.220     |
| Dynamic brain model                    | 4.349                   | 2.893     | 0.159   | 0.110     |
| Dynamic credit model                   | 2.510                   | 0.335     | 0.000   | 0.394     |

The broad-money result should not be viewed as a contradiction. Broad money includes deposits and liquid liabilities that may finance government borrowing, precautionary balances, or low-turnover assets. Its growth contribution depends on how those liabilities are allocated, and a high ratio can coexist with weak private investment. The negative interaction, combined with the positive private-credit interaction, indicates that the composition and destination of finance matter. Political stability appears to improve the productivity of credit directed to private activity rather than guaranteeing that a larger money stock will raise output.

Inflation remained a central macroeconomic constraint across the robustness models. Its negative coefficient was stable in baseline equations and became larger in the broad-money model. The annual data show that high inflation coincided with weak or negative growth in 2008, 2022, and 2023, although not every inflationary year had a contraction. This association implies that financial and migration-related policies cannot be separated from price stability. High inflation shortens financial horizons, reduces real returns, complicates investment planning, and may intensify skilled emigration by lowering real domestic earnings.

The robustness results therefore support a more precise finance objective. Financial development should not be defined solely by expansion of balance sheets or monetary liabilities. Productive private credit, institutional stability, capital formation, and inflation control form a connected system. The significant interaction identifies the conditions under which credit supports growth, while the alternative measure warns that liquidity growth alone may not deliver the same outcome. This distinction is important for policy design and for interpreting international finance-growth indicators.

The capital-formation robustness model strengthens the productive-allocation interpretation. If the credit interaction had disappeared after investment was added, the original coefficient could have represented nothing more than high-investment years. Its persistence means that stability altered the credit-growth slope beyond the direct contribution of capital formation. The positive investment coefficient also indicates that physical accumulation remained an important independent growth channel. Policy should therefore connect credit expansion with measurable investment outcomes rather than treating disbursement volume as an end in itself.

#### **4.9 Shock Sensitivity, Dynamic Specification and Model Diagnostics**

The exclusion of 2020 tested whether the interaction results were driven by the pandemic-related contraction. Without 2020, the brain-drain interaction was 3.382 with a probability value of 0.045, and the private-credit interaction was 1.217 with a probability value of 0.022. Both remained positive and significant. The explained variation rose in each model because the exceptional contraction was removed. This test indicates that the core moderation evidence was not created solely by the 2020 observation.

The exclusion of 2023 provided a different test because that year combined negative growth, very high inflation, low private credit, and relatively improved political stability compared with the early sample.

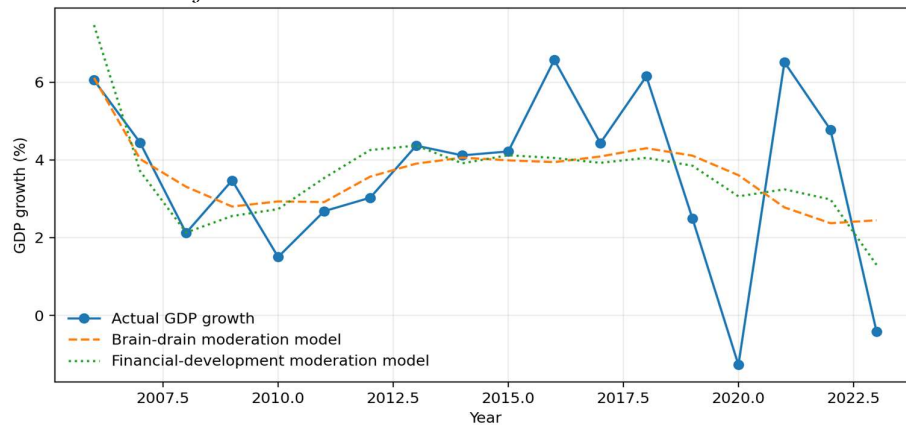


Without 2023, the brain-drain interaction remained positive at 2.785 but its probability value rose to 0.062. The private-credit interaction remained positive at 1.072 and significant at 0.010. The contrast shows that the finance interaction was less dependent on the final observation, while the brain-drain estimate was more sensitive to the exact composition of the short series. This supports stronger confidence in the financial moderation result.

The dynamic models introduced lagged GDP growth to account for persistence. In the brain-drain equation, the interaction remained positive at 4.349 but became statistically insignificant. In the private-credit equation, the interaction increased to 2.510 and remained highly significant, while the centred credit coefficient was also positive and significant. The dynamic finance model explained 39.4 percent of the variation after the loss of one observation. These findings show that the credit-stability complementarity persisted after accounting for the prior year's growth, whereas the brain-drain moderation required a cautious interpretation.

**Figure 6**

*Actual and Fitted GDP Growth from the Two Moderation Models*



Diagnostic testing identified no serious serial-correlation problem. The Breusch-Godfrey probability values were 0.451 for the brain-drain model and 0.643 for the credit model, while the Durbin-Watson statistics were 2.20 and 2.12. Residual normality was also acceptable, with Jarque-Bera probability values of 0.702 and 0.858. The Ramsey specification tests did not reject the functional form, with probability values of 0.795 and 0.163. These results support the basic interaction structure and indicate that the residuals were not characterised by strong persistence or non-normality.

Heteroskedasticity was more important. The Breusch-Pagan test rejected constant variance in both core models, and the White test rejected it in the brain-drain equation while remaining insignificant in the credit equation. This evidence justified the use of Newey-West standard errors in every reported central coefficient. Robust standard errors increased the uncertainty around the estimates but did not remove the significant interactions. The choice of estimator was therefore empirically necessary rather than a cosmetic adjustment.

**Table 10**

*Diagnostic Tests for the Core Moderation Models*

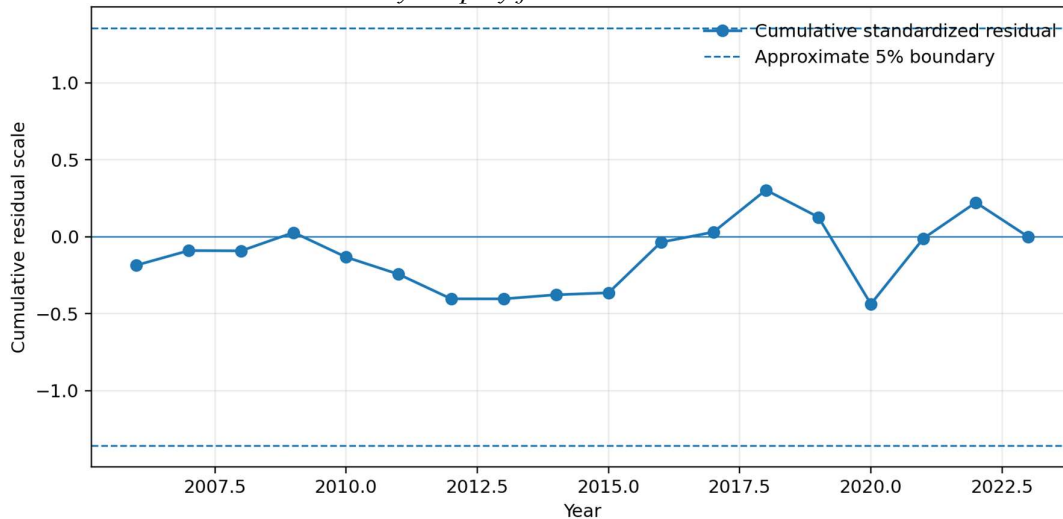
| Diagnostic       | Brain model statistic | p value | Credit model statistic | p value |
|------------------|-----------------------|---------|------------------------|---------|
| BG LM            | 0.568                 | 0.451   | 0.215                  | 0.643   |
| Breusch-Pagan LM | 10.396                | 0.015   | 8.030                  | 0.045   |
| White LM         | 16.006                | 0.042   | 11.377                 | 0.181   |
| Jarque-Bera      | 0.708                 | 0.702   | 0.307                  | 0.858   |
| RESET F          | 0.070                 | 0.795   | 2.193                  | 0.163   |
| Durbin-Watson    | 2.202                 | nan     | 2.120                  | nan     |



The cumulative standardised residual display for the finance model remained within conventional stability boundaries and did not show a sustained structural divergence. The actual-versus-fitted figure demonstrated that neither model captured every annual shock, which is expected from parsimonious equations, but the finance model followed the broad pattern more closely. Large deviations remained around exceptional years, reinforcing the importance of inflation and external shocks. The diagnostic evidence supports using the models for conditional interpretation rather than precise annual forecasting.

**Figure 7**

*Cumulative Standardised Residual Stability Display for the Finance Moderation Model*



The shock tests provide a transparent way to address the concern that eighteen observations may be dominated by exceptional years. The fact that both interactions remained positive after removing 2020 shows that the pandemic contraction did not manufacture the central findings. The weaker brain-drain significance after removing 2023 reveals where uncertainty is concentrated and prevents an exaggerated claim of robustness. The private-credit interaction remained significant in every reported exclusion and dynamic specification, giving it a stronger evidential status. This graded interpretation preserves supportive findings while distinguishing between results that are stable and results that remain provisional.

#### **4.10 Objective-Level Synthesis of Findings**

The objective concerning the effect of brain drain on economic growth produced a conditional answer. The unconditional coefficient was weak, and the coefficient became nearly zero after inflation was included. Political stability significantly changed the slope in the core interaction model, and the marginal effect became positive and significant at relatively improved stability levels. The evidence therefore supports the proposition that brain-drain pressure does not have one fixed growth effect in Pakistan. Its economic consequences depend on institutional conditions capable of converting migration-related human and financial connections into productive activity.

The objective concerning financial development generated stronger evidence. Private credit had no significant unconditional effect, but its interaction with political stability was positive, highly significant, and robust across controls, shock exclusions, and dynamic estimation. Marginal effects showed a statistically significant negative credit-growth relationship under weak stability and a significant positive relationship under improved stability. This result indicates that financial development is not inherently growth-enhancing. Its contribution depends on political conditions that influence risk, enforcement, allocation, and investment horizons.

The direct political-stability coefficients were not statistically significant in the centred core equations. This finding does not imply that political stability lacks economic importance, because its primary role was



expressed through interaction rather than an additive shift in average growth. The significant interaction coefficients demonstrate that stability changes the productivity of other resources. Political stability can therefore matter even when its standalone coefficient is imprecise. This distinction is central to the article's contribution and prevents an incorrect rejection of institutional relevance based on one main-effect p-value.

The short-run and long-run objectives originally envisaged in the outline could not be separated through a heavily parameterised cointegration model because the common annual series contained only eighteen observations. The study instead used contemporaneous Newey-West models, shock exclusions, and lagged-growth equations to evaluate persistence and robustness without exhausting degrees of freedom. The dynamic finance result remained strong, whereas the dynamic brain-drain interaction lost precision. The findings should therefore be understood as annual conditional associations with robustness to limited dynamics rather than as definitive long-run elasticities.

The causality objective also requires cautious treatment. The dataset and sample length do not permit a reliable multivariate causality system with numerous interactions and controls. The article consequently avoids claiming that the estimated associations prove one-way causation. The direction proposed by the conceptual model is consistent with the interaction evidence, but reverse effects remain possible because growth can influence credit demand, political stability, migration choices, and remittance behaviour. The do-file provides a transparent foundation that can be extended when longer annual or quarterly data become available.

**Table 11**

*Objective-Level Synthesis of the Empirical Findings*

| Objective or relationship            | Principal evidence                                                  | Assessment                   |
|--------------------------------------|---------------------------------------------------------------------|------------------------------|
| Brain drain -> growth                | Weak direct effect; conditional slope changes with stability        | Conditionally supported      |
| Financial development -> growth      | Weak direct effect; strong private-credit interaction               | Supported through moderation |
| Political stability -> growth        | Direct coefficient imprecise; interaction role strong               | Supported as moderator       |
| Political stability x brain drain    | Positive interaction; significant in core and 2020-exclusion models | Supported with caution       |
| Political stability x private credit | Positive, significant, and robust across specifications             | Strongly supported           |
| Macroeconomic controls               | Inflation negative; capital formation positive                      | Supported                    |

Taken together, the objectives were supported most strongly at the moderation level. Political stability emerged as the condition that changed weak average relationships into economically meaningful positive or negative slopes. The finance interaction provided the most stable evidence, while the brain-drain interaction offered a plausible but more sample-sensitive result. Inflation was consistently harmful and capital formation was supportive, showing that institutional moderation operates within a broader macroeconomic environment. The combined evidence supports integrated policies rather than isolated interventions focused only on emigration restrictions or credit expansion.

The objective-level assessment leads to a coherent ordering of evidence. The strongest conclusion is that political stability improves the growth productivity of private-sector credit. A second conclusion is that stability changes the brain-drain-growth relationship in a direction consistent with stronger diaspora and circulation benefits, though the estimate is sensitive to model dynamics. A third conclusion is that inflation can overwhelm favourable institutional and financial conditions in particular years, while capital formation provides a direct supportive channel. These results answer the objectives through conditional evidence and define a practical sequence for policy: stabilise the macroeconomic and political environment, improve credit allocation, and then expand mechanisms that connect skilled migrants and domestic human capital with investment.



## **5. Discussion**

The results establish that brain-drain pressure cannot be interpreted through a single unconditional coefficient. The negative marginal slope under weak stability is consistent with the loss of skilled labour, institutional memory, and professional capacity, while the positive slope under improved stability suggests that migration-related education incentives, remittances, return prospects, and diaspora networks can become more productive. Rahman et al. (2020b) similarly show that Pakistan's finance-growth relationship changes across regimes, which supports the broader conclusion that structural conditions determine whether a resource contributes to growth. The present findings extend regime sensitivity to human-capital mobility by identifying political stability as a measurable condition that changes the brain-drain slope.

Shaddady (2023) finds that financial institutions and markets do not contribute uniformly to prosperity across developing settings, supporting the view that institutional context and financial structure matter. The strongest result in the present study concerns private credit, whose negative marginal effect under weak stability indicates that financial expansion can reduce growth when uncertainty shortens horizons, weakens screening, or encourages resources to move toward low-productivity and protected activities. The positive marginal effect at improved stability implies that credit becomes productive when firms can plan, lenders can assess risk, contracts are more credible, and investment is less exposed to abrupt political change.

The difference between private credit and broad money carries an important policy implication. Hussain et al. (2021) report that financial development and economic openness have growth consequences that depend on the underlying channels, which is consistent with the measure-sensitive evidence in this study. Broad money represents system liquidity, while private credit reflects allocation to private economic agents. Pakistan may therefore experience monetary deepening without equivalent productive intermediation, particularly when banks hold government securities, inflation is elevated, or private investment demand is suppressed by uncertainty.

Political stability did not have a precise standalone coefficient, yet it exerted a strong moderating influence. Iqbal et al. (2021) show that governance quality, financial development, and economic growth form a connected dynamic system across groups of economies, so the institutional effect may appear through the operation of finance rather than as an isolated addition to GDP growth. The Pakistani results support this interpretation because stability changed the sign and magnitude of both focal slopes. Institutional reform should therefore be evaluated by its capacity to improve resource allocation, investment confidence, and human-capital linkages rather than only by a direct growth coefficient.

Inflation remained the clearest direct macroeconomic constraint. Fawaz et al. (2021) find that governance indicators have different growth effects across developing-country groups, which implies that institutions and macroeconomic management must be aligned with country conditions. In Pakistan, high inflation can weaken the real return to education, credit, remittances, and investment at the same time. The negative inflation coefficient across specifications indicates that policies designed to mobilise diaspora resources or expand credit will have limited impact when price instability erodes purchasing power and raises financing risk.

Saydaliyev et al. (2022) show that remittance inflows become more developmentally effective when financial inclusion and human capital are present, highlighting the complementary mechanisms behind migration benefits. The results therefore refine the policy meaning of brain drain: Pakistan should not rely on remittance volume alone or treat every skilled departure as an irreversible loss. The relevant policy task is to create formal savings, investment, research, enterprise, and return channels that enable migrants and domestic professionals to contribute under stable rules. Such a strategy combines retention with circulation rather than attempting to close international mobility.

The limitations arise principally from the short annual span and the broad measurement of human-flight pressure. Singh et al. (2023) demonstrate that finance-growth relationships can be asymmetric and nonlinear, which suggests that future Pakistani research could use longer series, quarterly financial indicators, threshold models, or sector-level credit data. The present interaction models reveal meaningful conditional slopes but cannot identify every transmission channel or establish strict causality. Even with these limits, the



robustness of the private-credit interaction and the consistent direction of the brain-drain interaction provide a coherent empirical basis for institutional complementarity.

## 6. Policy Implications and Implementation Roadmap

Translating the empirical findings into actionable policy requires a phased strategy that aligns institutional reforms with financial and migration policies.

### 6.1 Core Policy Principles

Three principles emerge from the analysis: (i) Policy sequencing—institutional stabilization (political credibility and inflation control) must precede or accompany credit expansion; (ii) Allocation over volume—policies should prioritize the quality and destination of credit (productive private sector) rather than aggregate monetary expansion; and (iii) Diaspora as development partner—human capital mobility should be managed through return incentives and investment channels, not restriction.

### 6.2 Phased Implementation Roadmap

#### Phase 1 (Immediate: 0–2 Years) – Stabilization and Foundations:

- **Institutional:** Initiate a cross-ministerial task force on policy credibility to reduce abrupt regulatory changes. Target: Move the Political Stability score from its current average (-2.33) to above -2.00.
- **Financial:** Enhance credit information sharing. Expand the coverage of the State Bank of Pakistan's credit bureau to cover 100% of formal borrowers (currently ~70%). Introduce SME credit guarantee schemes to de-risk lending.
- **Migration:** Establish a unified Pakistan Diaspora Portal to map skills, locations, and investment interests of expatriates.

#### Phase 2 (Short-term: 2–4 Years) – Market Reforms and Diaspora Engagement:

- **Financial:** Launch specialized "Diaspora Investment Bonds" and Shariah-compliant investment funds targeting overseas Pakistanis. Enact reforms to shorten the judicial resolution of financial contract disputes (target: reduce resolution time from >3 years to <1.5 years).
- **Migration:** Introduce a "Return and Re-integration" fund that provides matching grants to returnees establishing tech or export-oriented enterprises. Simplify customs and tax procedures for machinery imported by returnees.
- **Macroeconomic:** Coordinate fiscal and monetary policy to bring average inflation below 7% (halving the recent 14%+ averages).

#### Phase 3 (Medium-term: 4–6 Years) – Deep Integration and Scaling:

- **Financial:** Deepen capital markets to provide alternative financing beyond banks. Create a dedicated "Productivity Finance Window" at the central bank to refinance loans tied to measurable productivity improvements (patents, exports).
- **Institutional:** Strengthen the autonomy of regulatory bodies (SECP, NEPRA) to insulate decision-making from political cycles, thereby locking in the gains in political stability.
- **Migration:** Leverage diaspora networks for knowledge transfer through remote advisory arrangements and collaborative research grants between Pakistani universities and expatriate academics.

### 6.3 Monitoring and Evaluation (M&E) Framework

To ensure accountability, the following Key Performance Indicators (KPIs) are proposed. A successful policy package should aim to achieve these targets within a 5-year horizon:

| Indicator                     | Baseline (2023) | 5-Year Target | Data Source |
|-------------------------------|-----------------|---------------|-------------|
| Political Stability Score     | -1.96 (centred) | > -1.5        | WGI         |
| Private Sector Credit (% GDP) | 12.02%          | > 18%         | SBP/WDI     |
| Inflation (Annual %)          | ~29% (Crisis)   | < 7%          | PBS/IMF     |
| Annual GDP Growth             | -0.41%          | > 5.5%        | PBS         |
| Remittance Inflows (% GDP)    | ~8%             | > 10%         | SBP         |
| Credit to SME Sector (Growth) | Stagnant        | +5% annually  | SBP         |



## 7. Conclusion

This article empirically assessed whether political stability conditions the economic implications of brain-drain pressure and financial development in Pakistan. Using annual data from 2006 to 2023, the study demonstrates that simplistic linear estimates are misleading; average effects hide a profound institutional contingency.

The key substantive conclusions are threefold. First, political stability operates as a decisive moderator of the finance-growth nexus. Private credit becomes growth-enhancing only when political conditions are sufficiently stable to reduce uncertainty, lengthen investment horizons, and ensure the credible enforcement of contracts. The robustness of this finding across multiple specifications makes it the most actionable insight of the research. Second, the relationship between skilled emigration and growth is similarly condition-dependent. The negative human-capital effects of brain drain are exacerbated under weak governance but appear to be offset by diaspora-related benefits, remittances, return entrepreneurship, and knowledge circulation, when political stability improves. Third, macro-financial stability (inflation control) and capital formation remain indispensable direct drivers of growth; institutional reforms cannot substitute for sound macroeconomic management.

The study advances a novel institution-contingent theoretical framework for Pakistan, moving beyond the "finance-inevitably-leads-to-growth" paradigm and the "brain-drain-is-always-bad" assumption. It provides empirical evidence that the development impact of migration and finance is endogenous to the governance environment.

The analysis has limitations. The small annual sample (N=18) restricts the use of more complex dynamic or panel models. Future research should aim to: (i) disaggregate brain drain into sector-specific flows (e.g., IT, healthcare, engineering); (ii) incorporate higher-frequency (quarterly) financial data to capture shorter-term dynamics; and (iii) employ causal inference techniques, such as difference-in-differences around specific policy shocks, when longer data spans become available.

In policy terms, the message is unequivocal: isolated interventions in finance or migration management are insufficient. Pakistan's growth strategy must simultaneously pursue institutional stabilization, productive credit allocation, and diaspora integration. The prescribed phased roadmap—prioritizing policy credibility, SME credit access, and return-migration incentives—offers a tangible path to converting the "double challenge" of brain drain and shallow finance into a "double dividend" of inclusive and sustainable economic growth.

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