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INFRASTRUCTURE AND THE INEQUALITY PUZZLE: INVESTIGATING THE ROLE OF PUBLIC INVESTMENTS, FINANCIAL ACCESS, AND TECHNOLOGICAL EXPANSION IN SHAPING INCOME DISTRIBUTION IN PAKISTAN

Abdul Ghaffar[*1], Urfa Ali[2], Shiza Kafayat[3], Shandana[4], Sheikh Adil Zubair[5], Saqib Munir[6]

[*1]*Department of Economics, The University of Haripur, Haripur, Khyber Pakhtunkhwa, Pakistan*
[2]*Department of Economics, University of the Punjab, Quaid.e.Azam campus Lahore, Pakistan*
[2]*Higher Education Department, Lahore, Punjab, Pakistan*
[3]*Department of Economics, University of Mianwali, University Road, Mianwali 42200, Pakistan*
[4]*Department of Agriculture Extension Education and Communication, The University of Agriculture, Peshawar, Peshawar, Khyber Pakhtunkhwa, Pakistan*
[5]*Department of Management Sciences, Faculty of Law and Social Sciences, Hazara University Mansehra, Mansehra, Khyber Pakhtunkhwa 21300, Pakistan*
[6]*Department of Economics, NUST Institute of Peace and Conflict Studies (NIPCONS), Islamabad, Pakistan*

[*1]ghaffarawan92@gmail.com, [2]urfaebbad@gmail.com, [3]shizakhan213@gmail.com, [4]leoahmad201@gmail.com, [5]pid9076@gmail.com, [6]saqibmunir@gmail.com

Corresponding Author: *
Abdul Ghaffar
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ABSTRACT

This study examines the dynamic relationship among infrastructural development, financial accessibility, technology advancement, and economic disparity in Pakistan. The study analyzes yearly time series data from 2000 to 2023, investigating income inequality—represented by the Gini coefficient—in connection to public investment on infrastructure, power access, internet penetration, financial inclusion, and social security expenditures. The analysis, utilizing robust least squares regression techniques, reveals paradoxical dynamics, i.e., although social protection expenditure significantly reduces inequality, enhanced access to electricity and financial inclusion unexpectedly exacerbate disparities, primarily due to urban bias, elite capture, and unequal credit distribution. Internet penetration has a complex function, indicating both chances for inclusiveness and the dangers of digital boundaries. The results highlight the need of developing targeted initiatives, such as pro-poor electrification measures, fair banking sector changes, and the enhancement of social security coverage. This research presents new empirical information that enhances the global dialogue on Sustainable Development Goal 10 (Reduced Inequalities) and offers practical insights for policymakers aiming to promote inclusive and equitable development in Pakistan.

Keywords: *Income inequality; Infrastructure investment; Financial inclusion; Social protection; Technological expansion; Pakistan.*

INTRODUCTION

Income inequality remains one of the most pressing challenges in developing economies, with significant implications for social stability, economic growth, and sustainable development. The United Nations' Sustainable Development Goal (SDG) 10 explicitly calls for reducing inequalities within and among countries, emphasizing the need for inclusive growth policies (UN, 2015). In Pakistan, income inequality persists despite periods of economic expansion, suggesting

that growth alone is insufficient to ensure equitable wealth distribution. This study investigates how infrastructure development, financial inclusion, technological expansion, and social protection programs influence income inequality, measured through the Gini coefficient. By analyzing these factors, the research aims to identify policy interventions that can foster more balanced economic progress in Pakistan. Globally, the relationship between infrastructure investment and inequality has been widely debated. While some theories, such as the Kuznets curve, suggest that inequality initially rises with economic growth before eventually declining (Kuznets, 1955), empirical evidence from developing nations often contradicts this hypothesis. In South Asia, for instance, rapid GDP growth has not consistently translated into reduced income disparities (Xue et al., 2024). Pakistan's case is particularly instructive, as its economic trajectory has been marked by fluctuating inequality trends despite varying levels of public expenditure on infrastructure, financial access, and digital connectivity.

Pakistan's income distribution patterns reveal deep regional and urban-rural disparities. While urban centers benefit from better infrastructure, financial services, and internet penetration, rural areas lag behind, exacerbating spatial inequality (Li et al., 2024; Shahid et al., 2024). Public investment in roads, electricity, and telecommunications has the potential to bridge this gap, but its effectiveness depends on equitable allocation and efficient implementation. Additionally, financial inclusion—measured by access to credit and banking services—plays a crucial role in empowering marginalized groups, yet a significant portion of Pakistan's population remains excluded from formal financial systems (Nizam & Rashidi, 2025). Technological advancements, particularly internet penetration, offer new avenues for economic participation, yet their benefits are unevenly distributed. Urban elites and middle-class populations are more likely to leverage digital platforms for education, employment, and entrepreneurship, whereas rural and low-income groups face barriers such as affordability and digital literacy (Fayez et al., 2025; Nasir, 2024). Similarly, social protection programs—such as cash transfers and subsidies—aim to cushion vulnerable populations, but their impact on long-term inequality reduction remains limited due to coverage gaps and implementation inefficiencies (Javed & Mumtaz, 2024). In Pakistan, public investment and access to basic services play an important role in shaping how income is shared across society. When the government spends on infrastructure and expands access to electricity, internet, and financial services, it can help reduce income gaps, especially in urban areas. However, the impact in rural areas is often mixed and does not always follow the same pattern. Some theories, like the Kuznets curve, suggest that inequality may rise at first with growth and then fall, but this may not apply equally to all regions. This study aims to understand how infrastructure, financial access, and technology together affect income inequality in Pakistan (Suhrab, et al. 2024).

Income inequality is a growing issue in Pakistan, and understanding its causes is important for building a fairer society. Factors like public spending on infrastructure, access to electricity, internet availability, financial services, and social protection programs all play a role in how income is divided among people. When these areas are improved, they can help reduce the gap between rich and poor. This topic is important not only for Pakistan but also for other developing countries facing similar challenges. By looking at these factors together, this research highlights ways to make income distribution more equal (Ullah & Ali, 2024). In Pakistan, income inequality is closely linked with access to public services and basic infrastructure. When the government invests in roads, electricity, and internet, it can help reduce the gap between rich and poor by creating equal opportunities. Financial access and social protection programs also support low-income groups by improving their economic chances. These factors work together to shape how income is shared in the country. Studying those helps understand what leads to fair or unfair income distribution in Pakistan (Mumtaz & Hussain, 2024). Financial growth, investment in people, and global capital all play a big role in shaping a country's economy. In Pakistan, areas like market development, foreign investment, and education help push long-term economic progress. When people get skills and training, it leads to more stable and fair growth. These improvements also support better income opportunities for different groups. Strong financial systems and investment in human capital can work together to reduce income gaps. This idea connects closely with how public spending, financial access, and technology affect income distribution (Farooq et al., 2024).

In Pakistan, how the government spends on things like infrastructure, education, and health can

greatly affect the economy and reduce income inequality. When more people have access to good services, it helps everyone get better opportunities. Spending on sectors like education and healthcare not only improves lives but also helps in long-term growth. These kinds of investments can make a real difference in closing the gap between rich and poor. Looking at how different types of spending affect economic growth can help shape better policies for Pakistan. It's important to focus on areas that directly improve people's quality of life (Ullah et al., 2024). Since becoming separate countries, Pakistan and Bangladesh have followed different paths in their economic journey. Over the years, Bangladesh has shown better progress in many areas like economy, trade, and people's well-being. Its economy has grown faster, more people have come out of poverty, and health and education have also improved more compared to Pakistan. On the other hand, Pakistan has faced more ups and downs in these areas. By looking closely at things like how fast the economy is growing, how much prices are rising, and how people's lives are changing, we can understand how these two countries have moved in different directions. This comparison helps us see what has worked better for Bangladesh and what lessons can be learned (Nadeem et al., 2024). Understanding how government services affect income gaps is an important part of looking at inequality. When basic needs like education, healthcare, and transport are not properly provided, it becomes harder for low-income families to move forward. These services help people grow and earn better, but without them, the gap between rich and poor keeps growing. In Pakistan, weak public investment, lack of financial access, and slow progress in technology all add to this problem. That's why it's important to explore how these factors affect the way income is shared in the country. This gives us a better picture of why inequality continues (Majid, 2024).

Energy is something most people in Pakistan have access to, but not everyone can afford it in the same way. Low and middle-class families often end up spending a big part of their income just to meet basic energy needs. This happens because many energy-related products are expensive or imported, and not made for people with limited income. These costs put extra pressure on already struggling families and increase the gap between rich and poor. When public investment in affordable energy and better infrastructure is missing, it becomes harder for low-income groups to improve their lives. That's why looking at how energy and services affect income levels is key to understanding inequality in Pakistan (Hussain et al., 2024). Understanding how income is spread across different groups in a country is important for making better decisions. It helps show where support is needed the most. By looking at how people earn, what they spend on, and what kind of services like education and healthcare they receive, we can better understand the roots of inequality. In Pakistan, differences in income often come from limited access to good jobs, lack of assets, or low female earnings. These issues are closely linked to problems in public investment, financial access, and slow growth in technology. By focusing on these areas, the government can plan better ways to reduce the income gap and improve living standards for everyone (Mumtaz & Hussain., 2024).Inclusive growth means that progress reaches everyone, not just a few. To understand how fair this growth is, it's important to look at factors like poverty, income gaps, job opportunities, health, and the environment.

In South Asian countries like Pakistan, growth is also shaped by how strong the financial system is, how well the government works, and how resources are used. However, poor regulation and limited access to digital financial tools often hold back fair progress. This shows that better public investment, especially in technology and basic services, can help close income gaps. For Pakistan, improving infrastructure and financial access in underserved areas is key to making growth more equal and long-lasting (Safdar et al., 2024). In many developing countries, people who don't have access to banks and other financial services are often left behind. When more people are included in the financial system, they can save money, invest, and improve their lives. This not only helps reduce poverty and income gaps but also makes the financial system stronger. In countries like Pakistan, where public investment and technology are growing, giving people better access to finance can help make income distribution more fair. That's why improving financial access is a key part of solving the inequality puzzle. As inequality continues to grow, people have started paying more attention to how the government can help reduce this gap. In a country like Pakistan, where income levels vary widely, government spending and public support can make a big difference. When the government invests in education, healthcare, and better tax systems, it can help low-income families live better

lives. Public spending that focuses on human development and targeted support plays a strong role in making income distribution fairer. Along with this, smart use of infrastructure and financial access can also support equal opportunities for all. When a society is deeply divided in terms of income, even the best economic policies fail to reach everyone. The real question is not just how to grow the economy, but who truly benefits from that growth. In Pakistan, rising income gaps show the need to rethink how public money is spent. Fair income distribution depends not only on strong infrastructure and technology, but also on how resources are targeted and accessed. If public investment and financial tools don't reach the right people, inequality keeps growing (Ullah & Ali, 2024).

Research Questions

The following are the research questions of the study, i.e.,

RQ1: To what extent do public infrastructure spending and electricity access shape income inequality in Pakistan?

This study examines Pakistan's energy sector, focusing on how the country depends on energy resources, the regional energy situation, and security concerns. It looks at government policies, the effects on society and the economy, and future energy trends. The research offers suggestions to improve Pakistan's energy security and adapt to global changes (Bukhari et al., 2024).

RQ2:Does internet access and financial inclusion play a role in shaping income inequality in Pakistan?

Increased internet access and financial inclusion can help reduce income inequality in Pakistan. By providing more people with access to financial services and information, these factors can promote economic equality. However, challenges like digital illiteracy and limited infrastructure need to be addressed to fully realize these benefits (Gardezi et al., 2024)

RQ3: How do infrastructure spending and social protection programs contribute to reducing income inequality in Pakistan?

Investing in infrastructure and expanding social protection programs like Ehsaas and BISP can significantly reduce income inequality in Pakistan's mountainous areas. These regions often face challenges such as limited access to education, healthcare, and employment opportunities, exacerbating poverty. By improving infrastructure and providing targeted financial support, the government can enhance access to essential services, promote economic inclusion, and empower marginalized communities, leading to a more equitable income distribution (Rasul & Karki Nepal., 2024).

Objectives of the Study

The following are the research objectives of the study:

- To analyze the impact of public infrastructure spending and electricity access on income inequality in Pakistan.
- To investigate the relationship between internet penetration, financial inclusion, and income inequality.
- To assess the effectiveness of social protection programs and infrastructure investments in reducing income inequality.
- To propose evidence-based policy interventions to promote equitable economic growth in Pakistan.

This study also highlights the importance of education, healthcare, and social protection in creating a more balanced and fair society. Understanding these factors can guide better policies for a just and sustainable future (Qandeel, 2024). The significance of this study lies in understanding how strong public systems and local policy choices can shape fair income distribution in a country like Pakistan. Just as Bangladesh improved its economy by supporting local industries and encouraging private sector growth, Pakistan also needs to focus on public investment and access to services. This includes building better infrastructure, improving electricity and internet access, and supporting people through financial tools and social protection. By learning how internal ideas and policies influence development, we can find ways to reduce inequality. This study helps highlight how smart use of national resources can create long-term and fair growth for all (Rehman, 2024).

LITERATURE REVIEW

Impact of Public Expenditure on Infrastructure and Access to Electricity on Income Inequality

The relationship between infrastructure investment and income inequality has been widely debated in development economics literature. while Simon

Kuznets' (1955) seminal hypothesis posited an inverted-U shaped relationship between economic development and inequality—suggesting that inequality initially rises before declining as economies mature—contemporary empirical research challenges this framework, particularly in developing country contexts (saipudin, 2024).

Wang (2002) explores how child mortality varies across different social and geographic groups using DHS data from over 60 low-income countries between 1990 and 1999. It finds that rural areas, where most poor people live, experienced much slower reductions in child deaths compared to urban areas. The study also shows that better access to electricity and public health spending helped reduce child mortality overall, especially in urban areas where electricity made the most difference. In rural areas, increasing vaccination coverage played a bigger role. These findings suggest that public investment in infrastructure like electricity can improve health outcomes and may also help reduce inequality—linking closely to how such investments might affect income gaps, like measured by the Gini index. Zungu (2024) examines the nonlinear relationship between government expenditure and income inequality across 15 emerging economies from 1985 to 2019, comparing periods before (1985-1999) and after (2000-2019) the implementation of macroprudential policies. Using advanced econometric techniques including Bayesian Spatial Lag Panel Smooth Transition Regression (BSPSTR) and fixed effects models to address heterogeneity, endogeneity, and cross-sectional correlation issues, the analysis reveals a threshold effect where government spending begins reducing inequality only after reaching 29.89% of GDP. The findings demonstrate an inverted U-shaped relationship, suggesting that while moderate spending may initially correlate with higher inequality, beyond the identified threshold level, increased expenditure - particularly in education and health - effectively reduces disparities. Gamette, et al. (2024) address a critical research gap by examining the relationship between income inequality and electricity access in sub-Saharan Africa (SSA) from 1990 to 2022, using World Bank development indicators. While electricity access improved overall during 2000-2022, the benefits disproportionately favored urban areas and the wealthiest 1% of earners, leaving the bottom 50% of the population with significantly less access. The findings demonstrate that reducing income inequality serves as a fundamental prerequisite for achieving equitable electricity distribution across SSA. This research offers a novel perspective that complements existing analyses of energy access and inequality in the region, while supporting the Sustainable Development Goals' call for universal access to modern, affordable energy.

Saha (2024) examines rural electrification's (RELEC) impact on Bangladesh's economic growth from 1976-2020, while accounting for informal economy dynamics and income inequality. Using ARDL and FMOLS methods, the analysis reveals that while RELEC positively influences long-term growth, it shows short-term negative effects. The informal economy consistently hampers growth, whereas income inequality (measured by the Gini coefficient) surprisingly correlates positively with growth in both time horizons. The research highlights the need for diversified energy solutions through private sector participation, capacity building, and market competition to meet rural electricity demands. Li et al. (2025) explores the intricate connections between income inequality, renewable energy use, and energy efficiency across 104 nations (2010-2020) using advanced econometric techniques. The analysis reveals a nonlinear relationship where income inequality significantly moderates renewable energy's impact on energy intensity. When inequality is low, renewable energy effectively reduces energy intensity, but this positive effect diminishes as inequality rises. Regional disparities emerge clearly: wealthier nations leverage financial advantages to overcome inequality's constraints on energy efficiency, while middle-income countries struggle with renewable energy's effectiveness amid significant income gaps. Seabela et al. (2024) analyze that South Africa continues to grapple with severe income inequality, a persistent legacy of its pre-1994 political system that maintains its position among the world's most unequal societies according to Gini index measurements. This study investigates the determinants of income disparity from 1975-2017 using VECM analysis and SWIID data, revealing that increased government spending on social grants, higher gross savings, and economic growth all correlate with reduced inequality, while population growth exacerbates it. The findings emphasize the need for a multifaceted policy approach combining expanded social welfare programs, household savings promotion, and targeted job creation initiatives, particularly in high-growth population areas. Byaro et al. (2024) examine the effects of government spending,

financial development (bank credit), and trade on income inequality in 66 low-income countries (LICs) across four continents from 2000 to 2018 using Bayesian analysis and quantile regression. The findings reveal that trade and inflation worsen income inequality, while financial development and government spending show no significant inequality-reducing effects. Only real GDP per capita demonstrates a consistent ability to lower inequality in these nations. Robustness checks through quantile regression confirm these results, showing that conventional policy tools like financial sector growth and fiscal spending fail to address inequality in LICs.

Anderson (2005) examines how increased openness to trade and globalization impacts income inequality in developing countries. It explains that openness can influence income gaps through changes in wages, asset distribution, regional differences, gender gaps, and redistribution policies. While country-level studies over time often show that openness increases demand for skilled workers—potentially widening income gaps—broader cross-country comparisons find little clear effect on overall inequality. One reason might be that countries chosen for time-series studies don't represent all developing nations. These insights highlight that infrastructure and public investment, like access to electricity, could help balance out inequality pressures caused by globalization—connecting to how such spending can impact the Gini index. Gera et al. (2007) looks at how structural adjustment policies affected poverty, inequality, and social welfare in Pakistan between 1988 and 1999. It shows that cuts in government spending, especially on public services, hit the poor the hardest. During this period, job opportunities in the public sector went down, real wages dropped, and poverty increased. The reforms were poorly timed and lacked focus on how they would affect income distribution. These findings highlight how changes in public spending, especially in key areas like infrastructure and energy, can deeply influence income inequality in a country. Chaudhry & Rahman (2009) examines how gender inequality in education affects rural poverty in Pakistan. Using data from local areas, it finds that when girls have less access to education compared to boys, poverty in rural households increases. Factors like low female literacy and fewer educated women earning money were linked to higher poverty levels. Larger households and more women compared to men in families also raised the chances of being poor. These results highlight how equal access to basic services—like education, electricity, and infrastructure—can play a key role in reducing poverty and narrowing income gaps in developing countries. Tridico (2010) discusses how economic growth between 1995 and 2006 affected poverty and inequality in 50 fast-growing developing countries. The results show that even though these countries experienced growth, poverty did not fall and income inequality actually got worse. Growth alone wasn't enough—countries with better education and smart public spending were more likely to see fairer outcomes. In contrast, others saw a rise in inequality and even a drop in life expectancy and democratic values. These findings suggest that investing in key areas like infrastructure, education, and access to electricity may help reduce inequality along with boosting growth.

Zaman et al (2012) explores how technology affects poverty in Pakistan's agriculture sector and introduces a new way to measure pro-poor growth. The results show that income and education help reduce poverty, while technology and education together play a strong role in improving the lives of poor farmers. The research suggests that when poverty-reducing tools like education and technology are used well, they can lead to more equal development. A new index was also proposed to better capture these effects. These findings support the idea that smart investments—like in infrastructure or access to electricity—can reduce inequality and support inclusive growth. Sehrawat & Giri (2015) examines the link between financial development and income inequality in India from 1982 to 2012. The study finds that as financial systems and the economy grew, the income gap between rich and poor also widened. However, trade openness helped reduce this gap. The authors suggest that better financial policies focused on inclusion can help lower inequality. These results highlight the importance of fair access to key services—like infrastructure and electricity—as part of wider efforts to reduce income inequality. Alamanda (2020) explores how different types of government spending affect poverty and income inequality in Indonesia from 2005 to 2017. The results show that spending on social aid, grants, and subsidies had little effect on reducing inequality or poverty. However, investment in infrastructure helped lower both poverty and income inequality, especially in rural areas. The impact was stronger in rural regions than in urban

ones. These findings support the idea that targeted infrastructure spending, such as on electricity and basic services, can help create a fairer income distribution. Shair &Anwar(2023) discusses how remittances affect spending differences between households in Pakistan, using data from 2018–2019. It finds that families receiving money from abroad spend more per person than those with local migrants or no migrants, creating a clear gap. The unequal access to remittances has widened spending inequality, especially benefiting richer households. The study suggests that easier access to international migration could help balance this gap. These findings highlight how differences in income sources—like remittances or access to infrastructure and electricity—can shape overall income inequality. Based on the cited literature, the first hypothesis of the study is as follows:

H1: Public expenditure on infrastructure and access to electricity exert both positive and negative effects on income inequality.

Impact of Internet Penetration and Financial Inclusion on income Inequality in Pakistan

Increased financial inclusion and internet penetration in Pakistan can help reduce income inequality, as measured by the Gini Index. Financial inclusion provides access to financial services, bridging the income gap, while internet penetration enables digital financial services, expanding access to these services. This can lead to a more equitable distribution of income, reducing the income inequality. Irfan et al. (2024) examine the interplay between fintech adoption, financial inclusion, and income inequality across 93 countries using panel data from 2011, 2013, and 2017. Employing OLS regression analysis, they measure fintech adoption through mobile bill payments and assess financial inclusion via traditional banking metrics (account ownership, savings, and borrowing). The results demonstrate that both fintech and financial inclusion contribute significantly to reducing income inequality, with financial inclusion serving as the key channel through which fintech exerts its equalizing effects. These insights highlight the transformative potential of digital financial solutions in addressing persistent income disparities globally. Wang (2024) examines FinTech's dual potential to either reduce or exacerbate income inequality across 50 economies from 2005 to 2021, using both the Gini coefficient and Theil index as inequality measures. Through Difference-in-Differences analysis of fourteen FinTech penetration indicators, the research reveals context-dependent outcomes - while digital financial services show promise in promoting financial inclusion, their impact on income distribution varies significantly across regions and socioeconomic conditions. These nuanced findings demonstrate that FinTech's role in addressing inequality depends heavily on local implementation frameworks and existing financial infrastructures. By identifying both successful applications and limitations of FinTech solutions, the study offers guidance for developing targeted policies that maximize FinTech's benefits for reducing global income inequality. Suhrab et al. (2024) investigates how digital financial inclusion (DFI) affects income inequality in BRICS nations from 2000 to 2019. Against the backdrop of the UN's 2030 Sustainable Development Goals and the 1.3 billion people living in poverty across BRICS countries, the research employs Driscoll-Kraay and fixed effects methodologies to analyze these relationships. The results demonstrate that DFI significantly reduces income inequality, with TI and ID enhancing this equalizing effect by enabling more efficient, secure, and accessible financial transactions and services. Verma & Giri (2024) investigate the impact of financial inclusion on income inequality across Asian countries from 2005 to 2019, employing advanced panel estimation techniques including Pedroni cointegration, Kao residual-based tests, FMOLS, ARDL, and Granger causality analysis. The research reveals a significant long-term relationship where financial inclusion indicators substantially influence income inequality reduction, though these effects are absent in the short term. The unidirectional causality from financial inclusion to inequality reduction underscores the need for targeted policies to expand financial access. Perveen & Majeed (2024) examine the global impact of digitalization on income inequality across 127 countries from 2000 to 2022, employing panel data techniques including pooled OLS, fixed effects, random effects, and System-GMM. Using three key ICT the analysis reveals that while digitalization generally reduces income inequality globally, its effects diverge significantly between developed and developing nations. In developing countries, digitalization consistently decreases inequality, whereas in advanced economies it appears to exacerbate income disparities. Based on the cited

literature, the study's second research hypothesis is as follows:

***H(2)*: Internet penetration and financial inclusion reduce income inequality in Pakistan.**

Financial inclusion and Social Protection Expenditure impact on Gini Index in Pakistan

In Pakistan, financial inclusion and social protection expenditures can help reduce income inequality (Gini Index) by providing access to financial services for low-income individuals (financial inclusion). Supporting the deprived through social protection programs, reducing poverty and vulnerability. These efforts can lead to a more equitable distribution of income, promoting economic growth and stability. Nisar et al. (2024) compares how social protection programs drive inclusive growth in Pakistan and Bangladesh (1984–2020), using advanced econometric methods like PCA, cointegration tests, and FMOLS. Key findings show both countries benefit from social protection, but Bangladesh achieves more inclusive growth due to better-implemented welfare schemes. Institutional quality, macroeconomic stability, and globalization are critical, with Bangladesh gaining more from stable policies and global integration. Pakistan struggles with inconsistent welfare shocks, weakening its inclusive growth compared to Bangladesh. Inayat & Ali (2024) examine how government spending affects inequality in Pakistan using household survey data (1999-2019). Key findings show that government spending reduces consumption inequality, it has little impact on income inequality. Financial inequality decreases slightly after spending shocks, but other income sources remain unaffected. Interest-sensitive expenses become more equal after spending increases. The research concludes that Pakistan's current fiscal policies are ineffective at reducing income inequality. The study highlights the need for more precise government interventions to effectively address inequality in Pakistan. Cardoso et al. (2025) analyze the impact of social protection spending on economic growth across 42 countries from 1985 to 2020, employing a structural vector autoregression approach on a novel multi-country dataset. The findings demonstrate that social protection expenditures have a stronger positive effect on GDP than overall government spending, with significant variation between nations - ranging from a high impact multiplier of 5 in Mexico to a negative multiplier of -0.71 in Paraguay. The research reveals statistically significant correlations between these multipliers and inequality measures (Gini coefficient and income share ratios), with particularly strong growth effects in high-inequality countries. These results suggest that social protection policies offer dual benefits: they simultaneously stimulate economic growth and reduce inequality, making them particularly valuable policy tools for unequal societies. Halásková & Pomp (2024) examine how social protection expenditures influence key socio-economic indicators across EU countries from 2010 to 2021 using panel data analysis. The research demonstrates that social spending positively impacts GDP per capita while effectively reducing poverty risks and social exclusion. Notably, different social protection programs show varying effects on income inequality, with some functions working in combination to address this issue. The findings highlight how targeted social protection policies in the EU simultaneously stimulate economic growth and mitigate social vulnerabilities, underscoring their dual role in promoting both economic performance and social welfare. Neuhuber & Schneider (2024) examine how municipal and provincial social spending affects local income inequality in Austria in 2018, employing a spatial multi-level model to analyze impacts across three administrative levels. The findings reveal significant geographic variation in how social spending influences local Gini coefficients, demonstrating that the inequality-reducing effects of public expenditure operate in highly localized patterns. When disaggregating total social spending into three categories, the analysis shows that social protection expenditures consistently reduce inequality across all provinces, while health spending shows no measurable impact. The final hypothesis of the study is as follows:

H3: Financial inclusion and social protection expenditure have a positive and significant impact on income inequality in Pakistan.

RESEARCH GAPS

Variables Gap

Pakistan's manufacturing sector has been widely studied for its environmental impacts, yet limited attention has been given to how infrastructure development, financial access, and technological improvements within this sector influence income inequality. While energy consumption and environmental sustainability have been analyzed in

detail, the distributive effects of these developments on income remain underexplored. This creates a critical variable gap in linking public investment and digital access with the Gini index in Pakistan's context. Addressing this gap can provide valuable insights into how sectoral reforms contribute not just to growth, but to equitable income distribution. The focus on health-related financial shocks highlights the vulnerability of low-income households, yet it overlooks how broader structural factors like public infrastructure, financial access, and technology contribute to income inequality in Pakistan. While variables such as education, employment type, and region are discussed, there is little emphasis on how state-led investments and digital access affect household income distribution. This presents a gap in linking infrastructural and financial development with inequality outcomes. Exploring these dimensions can offer deeper insights for inclusive and equitable policy design (Rizvi, 2023).

Regional Gap

While extensive research like the Korean study examines the link between energy use, emissions, and economic growth, there is limited regional evidence from South Asia—particularly Pakistan—on how infrastructure, financial access, and technology shape income distribution. Most regional studies focus on macroeconomic or environmental outcomes, overlooking inequality as a central concern. This creates a regional gap in understanding how public investment and digital access influence the Gini index in developing economies. Addressing this can guide more inclusive and region-specific policy interventions (Li and He 2024). While recent studies in Pakistan have explored FinTech's relationship with governance and policy uncertainty, they largely focus on banking performance and macro-financial stability, ignoring how such technological and financial shifts affect income inequality. There remains a regional gap in linking financial inclusion and digital financial services with income distribution outcomes like the Gini index. Most research overlooks how advancements in FinTech can bridge or widen socio-economic disparities. Exploring this link is essential to designing equitable financial infrastructure in Pakistan's context (Nawazish & Afza, 2024).

Methodological Gap

While studies like the one on environmental sustainability in the USA provide valuable insights into energy consumption and eco-innovation, they overlook the broader socio-economic impacts such as income inequality. This study's focus on ecological sustainability does not account for how technological advancements, public investment in infrastructure, and financial access can affect income distribution, especially in developing countries like Pakistan. The methodological gap lies in not exploring how these factors interact with inequality, which is central to understanding the broader socio-economic consequences of such policies. Bridging this gap would offer more comprehensive solutions that integrate both environmental and social equity concerns (Hossain et al 2023). While studies on indoor air pollution in Pakistan highlight significant health impacts from poor air quality, they do not consider how infrastructure, financial access, and technology might influence the broader socio-economic context, like income inequality. The research focuses mainly on environmental health risks, but misses the link between public investment in clean energy, electricity access, and digital services with reducing income disparities. This creates a gap in understanding how improvements in infrastructure and financial inclusion could also reduce the economic divide. Addressing this gap could offer a more holistic approach to both environmental and economic challenges in Pakistan (Kausar et al 2023).

Intertemporal Gap

While the study on greener energy growth in BRICS economies focuses on immediate economic factors like money supply, commodity prices, and trade balance, it overlooks the long-term effects of infrastructure investments, technological advancements, and financial inclusion on broader socio-economic outcomes such as income inequality. The research highlights key short-term drivers for green energy growth but does not examine how these dynamics could influence income distribution over time. This creates an intertemporal gap, as the long-term impact of these factors on inequality remains underexplored. Bridging this gap could provide a more comprehensive understanding of sustainable development (Kur et al 2023). Pakistan's ongoing energy crisis and the shift towards renewable energy have been discussed mainly from a policy and

infrastructure perspective, but there is little focus on how these developments impact income inequality over time. The discussion emphasizes short-term challenges and investment needs, yet it does not explore how continuous improvements in energy access, financial inclusion, and technology could influence income distribution in the long run. This creates an intertemporal gap in understanding the broader social outcomes of energy infrastructure. Bridging this gap can support more inclusive and future-oriented development planning (Asghar et al., 2023).

THEORETICAL FRAMEWORK

This study is grounded in several key economic theories that explain the relationship between infrastructure development, financial inclusion, technological expansion, and income inequality. The theoretical framework integrates concepts from Kuznets' Inverted-U hypothesis and endogenous growth theory to analyze how public investments shape income distribution in Pakistan. Kuznets (1955) postulated that income inequality initially rises during early industrialization before declining as economies mature—a phenomenon depicted by an inverted U-shaped curve. This occurs because early-stage growth benefits capital owners disproportionately, while later stages see broader wealth distribution through labor mobility and social policies. However, empirical evidence from developing countries like Pakistan often contradicts this hypothesis, as inequality persists despite economic growth (Tunio et al. 2024). This study examines whether Pakistan's infrastructure investments follow Kuznets' trajectory or exacerbate inequality due to elite capture (Ullah & Ali, 2024). Long-term growth is driven by human capital, innovation, and infrastructure, rather than exogenous factors. Public investments in electricity, internet access, and transportation can reduce inequality by enhancing productivity in marginalized regions (Ahmad, et al 2024) and facilitating knowledge spillovers through digital connectivity (Kirschning & Mrożewski, 2024). However, if infrastructure benefits are unevenly distributed, growth may remain exclusionary. This study evaluates whether Pakistan's infrastructure spending aligns with inclusive growth principles or reinforces spatial disparities. The study integrates these theories to analyze how infrastructure quality, financial access, and technology diffusion interact with institutional and social factors to shape inequality. The framework posits that inclusive infrastructure reduces inequality only if complemented by strong institutions and human capital investments (endogenous growth). Financial and digital inclusion amplify infrastructure's benefits — but access barriers (collateral requirements, digital illiteracy) may exclude the low income group. Social protection enhances equity but requires better targeting to avoid leakage.

Definition of Key Constructs

Gini Index (Income Inequality):

The Gini index, a measure of income inequality, is a statistic that summarizes the income inequality within a nation. The World Bank is a primary source for Gini index data, with various datasets available. When citing the World Bank, you should include the year of the data, which is typically the year of the household surveys used to calculate the Gini index (World Bank, 2024).

Public Expenditure on Infrastructure:

The World Bank provides data on government expenditure, offered information on total government expenditure as a percentage of GDP, which can include infrastructure spending, along with data on specific sectors like energy and transport (World Bank, 2024).

Internet Penetration Rate:

Internet penetration is the rate at which a population uses the internet. It is a significant measure of digital connectivity within a country or region and has direct impacts on innovation, economic development, and access to information within a global economy. There are 5.35 billion people using the internet in 2024, equating to 66.2 percent of the world's total population. Internet users have grown by 1.8 percent over the past year, with 97 million new users coming online for the first time during 2023 (World Bank, 2024).

Financial Inclusion:

Financial inclusion is the delivery of appropriate financial products and services needed by all segments of society, particularly the poor and the underprivileged, at affordable prices through regulated mainstream financial institutions. The World Bank defines financial inclusion as individuals and businesses having access to, and use of, affordable financial products and services that meet their needs, delivered responsibly and sustainably. This includes things like transactions,

payments, savings, credit, and insurance. The World Bank notes that access to a transaction account is a first step towards broader financial inclusion (World Bank, 2024).

Social Protection Expenditure:
Social protection expenditure refers to total program expenditure expressed as percentage of GDP. It includes spending on benefits and administrative costs; it also captures both recurrent and capital program budget. The indicator is constructed based on administrative program records (World Bank, 2024).

Access to Electricity:
Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources. Maintaining reliable and secure electricity services while seeking to rapidly decarbonize power systems is a key challenge for countries throughout the world. Individuals' access to electricity is one of the clearest and un-distorted indication of a country's energy poverty status (World Bank, 2024).

METHODOLOGY

Data Collection

This study utilizes 24 years of secondary data (2000–2023) sourced from the World Development Indicators (WDI) database published by World Bank (2024) to ensure reliability and cross-national consistency. The dependent variable, the Gini Index, serves as the primary measure of income inequality, reflecting disparities in income distribution. Independent variables include Public Expenditure on Infrastructure (proxied by gross fixed capital formation as a percentage of GDP), Access to Electricity (percentage of the population with electricity access), Internet Penetration Rate (percentage of the population using the internet), Financial Inclusion (domestic credit to the private sector by banks as a percentage of GDP), and Social Protection Expenditure (current health expenditure as a percentage of GDP). These variables collectively provide a comprehensive assessment of the structural, technological, and socioeconomic factors influencing income inequality dynamics in Pakistan. By integrating infrastructure investment, digital access, financial systems, and public welfare metrics, the analysis captures multidimensional drivers of income distribution over time, enabling robust policy insights.

DATA PROCESSING

The dataset underwent standardization and cleaning procedures to ensure homogeneity across variables. Missing values were addressed using appropriate imputation techniques, such as mean/median substitution or interpolation, depending on data patterns. Nominal variables were deflated using relevant price indices to correct for inflation and maintain temporal comparability. Subsequently, the data was reformatted for econometric analysis, with logarithmic transformations applied to variables exhibiting non-constant variance or skewed distributions. These transformations stabilized variance and improved normality, ensuring compliance with the assumptions of regression modeling.

Variable Identification

This study analyzes Pakistan's income inequality (measured by the Gini Index) from 2000 to 2023 using secondary data from the World Development Indicators (WDI). The independent variables include Public Expenditure on Infrastructure (gross fixed capital formation, % of GDP), Access to Electricity (% of population), Internet Penetration Rate (% of population), Financial Inclusion (domestic credit to the private sector, % of GDP), and Social Protection Expenditure (current health expenditure, % of GDP). These variables aim to address structural, technological, and socioeconomic drivers of inequality. Public expenditure on infrastructure, such as electricity access, enhances economic opportunities and reduces spatial disparities. Internet penetration fosters inclusive growth by enabling access to markets and education, though its long-term impact depends on equitable technology diffusion. Expanding credit access empowers low-income households, boosting disposable income and reducing poverty. Health expenditures mitigate inequality by lowering out-of-pocket costs for vulnerable groups, aligning with evidence that social spending reduces poverty and inequality.

Model Specification

The multiple regression model was employed to investigate the link between Gini Index (Income Inequality Measure) and chosen independent variables. The model is specified as:

$$GINI_t = \beta_0 + \beta_1 K_t + \beta_2 ELEC_t + \beta_3 INTERNET_t + \beta_4 FIN_t + \beta_5 SPE_t + \omega_t \quad (1)$$

Model Estimation

The model was estimated through Robust Least Squares (RLS) regression. Diagnostic tests undertaken consisted of heteroskedasticity tests, tests of multicollinearity (VIF), and tests of autocorrelation (Durbin-Watson) were run to test the strength of the results. Table 1 shows the list of variables and their measurement.

Table 1: List of Variables and Measurements

Variables Type	Variable	Symbols	Unit	Expected Outcomes
Dependent variable	Income Inequality	GINI	Index	------
Independent variable	Gross fixed capital formation	K	% of GDP	Expected to positively influence Income inequalities by providing easier access to capital for all classes of society.
Independent variable	Access to Electricity (% of population)	ELEC	(% of population)	Likely to decrease income inequalities by giving access to basic facility and helping to use for business and generating revenue for lower class of the society.
Independent variable	Internet Penetration Rate	INTERNET	(% of population using the internet)	Higher internet availability should decrease
Independent variable	Financial Inclusion (Domestic credit to private sector by banks)	FIN	% of GDP	Greater Financial availability may drive further revenue generation and decreasing income inequalities.
Independent variable	Social Protection Expenditure (Current health expenditure)	SPE	% of GDP	More Social Protection Expenditure is expected to decrease the income inequality.

Unit Root Test

To ensure the validity of our time-series analysis, we begin by testing whether our variables contain unit roots using the Augmented Dickey-Fuller (ADF) test. This test is crucial because non-stationary data—characterized by the presence of unit roots—can lead to spurious regression results, undermining the reliability of any inferred relationships. Specifically, we assess the stationarity of our dependent variable, renewable energy investment, along with independent variables including stock market capitalization, domestic credit to the private sector, foreign direct investment (FDI), renewable energy consumption, and the government effectiveness index. If any variable is found to have a unit root, indicating

non-stationarity, we apply appropriate transformations such as differencing to achieve stationarity before proceeding with further analysis. This approach eliminates the risk of spurious findings and ensures that the subsequent examination of the relationships between these economic indicators and income inequality is based on sound and accurate statistical foundations. The ADF test works by testing the null hypothesis that a unit root exists against the alternative hypothesis of stationarity; rejection of the null is supported when the test statistic is more negative than critical values or when the p-value is below a chosen significance level, typically 0.05. These are the equations are as follows.

- $\Delta GNI_t = \alpha_0 + \gamma GINI_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta\, GINI_{t-i} + \mu_t$
- $\Delta G_t = \alpha_0 + \gamma K_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta\, K_{t-i} + \mu_t$
- $\Delta Elec_t = \alpha_0 + \gamma Elec_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta\, Elec_{t-i} + \mu_t$
- $\Delta \text{Internet}_t = \alpha_0 + \gamma \text{Internet}_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta\, \text{Internet}_{t-i} + \mu_t$
- $\Delta \text{Fin}_t = \alpha_0 + \gamma \text{Fin}_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta\, \text{Fin}_{t-i} + \mu_t$
- $\Delta \text{SPE}_t = \alpha_0 + \gamma \text{SPE}_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta\, \text{SPE}_{t-i} + \mu_t$

Model Validation

The validity of the model was confirmed through several statistical measures and diagnostic tests. The explanatory power of the model was assessed using r-squared and adjusted r-squared, which indicate the proportion of variance in the dependent variable explained by the independent variables. To evaluate whether the overall regression model provided a significantly better fit than a model without predictors (an intercept-only model), an f-test was conducted. A significant f-test result confirms that the model as a whole explains the variation in the dependent variable better than chance. Additionally, t-tests were performed on individual regression coefficients to verify that each predictor variable contributed meaningfully and significantly to the model.

Further validation involved residual analysis to check the assumptions of linear regression. Tests for normality, autocorrelation, and heteroskedasticity were carried out, along with specification tests such as the Ramsey RESET test to detect model misspecification. Stability and structural integrity of the model were examined using CUSUM and CUSUM of squares tests. To ensure the robustness of the estimation, leverage plots and influence statistics were applied, particularly validating the use of the Robust Least Squares method, which helps mitigate the impact of outliers and influential observations. Together, these diagnostics confirm the reliability and validity of the regression results.

Methodology Limitations

This study has several limitations that should be considered when interpreting the results. First, it relies on secondary data, which may contain measurement errors or inconsistencies that could affect the validity of the findings. Second, the model assumes linear relationships between variables, potentially oversimplifying complex real-world interactions and overlooking nonlinear dynamics that may better capture the underlying processes. Additionally, the model does not account for exogenous factors such as geopolitical events, sudden policy shifts, or unexpected delays, all of which can significantly influence the outcomes. These limitations underscore the need for cautious interpretation and highlight opportunities for future research to improve the model's robustness by incorporating additional variables and exploring nonlinear modeling approaches. Despite these constraints, the study offers valuable insights into how infrastructural investments influence income inequality in Pakistan, providing useful guidance for investors and policymakers. Future research could expand on this work by including a broader set of determinants and applying more sophisticated econometric techniques to deepen understanding of the inequality puzzle.

RESULTS

Descriptive Statistics

Table 2 shows the descriptive statistic of the variables. The income inequality has a mean value of 29.820%, which shows that around 30% income inequality exhibits among the poor and rich. The mean value of capital stock, electricity, and internet penetration is about 14.174%, 85.900% and 17.162%, respectively. The financial penetration is about an average of 17.162% with a maximum value os 24.057%. Finally, SPE has a mean value of 2.552% with negatively skewed distribution.

Table 2: Descriptive Statistics

Methods	GINI	K	ELEC	INTERNET	FIN	SPE
Mean	29.82083	14.17438	85.90000	10.60490	17.16264	2.552179
Median	29.60000	14.02085	88.20000	8.050000	16.10628	2.497446
Maximum	31.30000	16.57222	95.60000	27.40000	24.05792	2.990158
Minimum	28.70000	12.40489	72.80000	0.687700	11.90218	2.036663
Std. Dev.	0.716561	1.126541	7.762563	6.993077	3.330403	0.270408
Skewness	0.527658	0.626357	-0.315964	0.858130	0.696198	-0.034637
Kurtosis	2.762217	2.542699	1.595446	3.002134	2.335658	2.115137
Jarque-Bera	1.170234	1.778417	2.372107	2.945556	2.380115	0.787781
Probability	0.557041	0.410981	0.305424	0.229288	0.304204	0.674428

Unit Root Test

Table 3 shows the unit root estimates of the variables. The results show that all the variables are stationary at their first differenced, hence, the order of integration is I(1).

Table 3: ADF Results of the Model

Variables	Order of integration	ADF Result
		Probability value
GINI	1st difference	0.0099
K	1st difference	0.0184
ELEC	1st difference	0.0078
INTERNET	1st difference	0.0360
FIN	1st difference	0.0490
SPE	1st difference	0.0042

Source: Author's own calculations.

Results Related to Assumptions of Robust Least Square Approach

Influence Statistics

Influence statistics measure the overall impact that each data point has on the results of a regression analysis. While leverage indicates how far an observation's predictor values are from the mean and its potential to affect the regression line, influence combines leverage with the size of the residual (the difference between observed and predicted values) to assess how much a point actually changes the regression coefficients when included or excluded. Some data points may not be extreme in their predictor values but can still significantly alter the model's estimates, making influence statistics essential for identifying such observations. Figure 1 shows the influence statistics for ready reference.

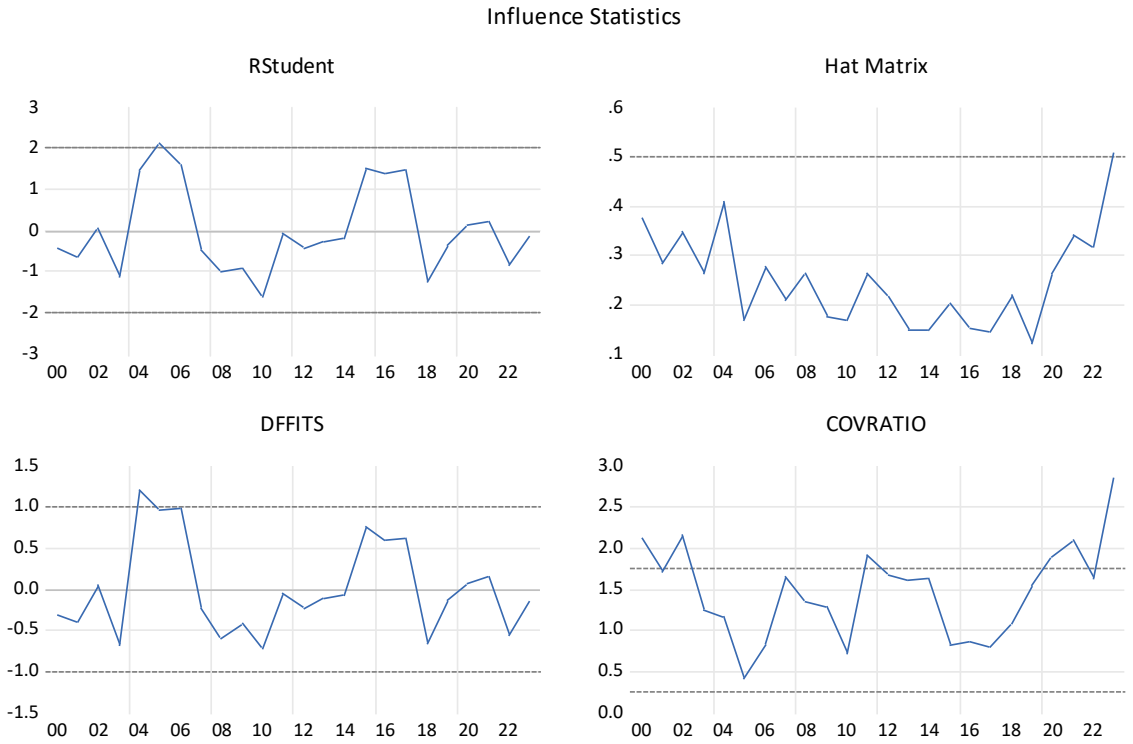

Figure 1: Influence Statistics
Source: Author's estimation.

The analysis of influence statistics is crucial for identifying the presence and extent of outliers within the dataset. Specifically, the examination of the DFFITS (D) matrix reveals two influential observations that deviate significantly from expected values and possess high leverage, indicating that they could disproportionately affect the regression model's results. Additionally, the COVRATIO diagnostic uncovers five observations that notably impact the variance-covariance structure of the regression coefficients. Together, these findings underscore the existence of outlier data points across multiple diagnostic measures, which can undermine the stability and reliability of the model's estimates if left unaddressed. Therefore, it is essential to carefully evaluate and address these outliers—potentially through data cleaning, the application of robust regression techniques, or conducting sensitivity analyses—to ensure that the empirical findings are both robust and generalizable.

Leverage plots

Leverage plots are graphical tools used in regression analysis to identify data points that have an unusually large influence on the estimated regression coefficients. These plots help detect high-leverage points, which are observations with extreme values in the independent variables (predictors) that can "pull" the regression line toward themselves and significantly affect the model's results. Leverage is measured by how far an observation's predictor values lie from the mean of all predictor values, quantified by the diagonal elements of the "hat matrix" in regression. In a leverage plot, each data point is displayed according to its leverage score, often alongside residual information. Points with very high leverage stand out as they have greater potential to disproportionately affect the regression estimates. Identifying such points is crucial because they can distort the model's fit and lead to misleading conclusions. When high-leverage points are detected, analysts may consider removing them, investigating them for data errors, or applying robust regression techniques that reduce their influence. Figure 2 shows the leverage plot of the variables.

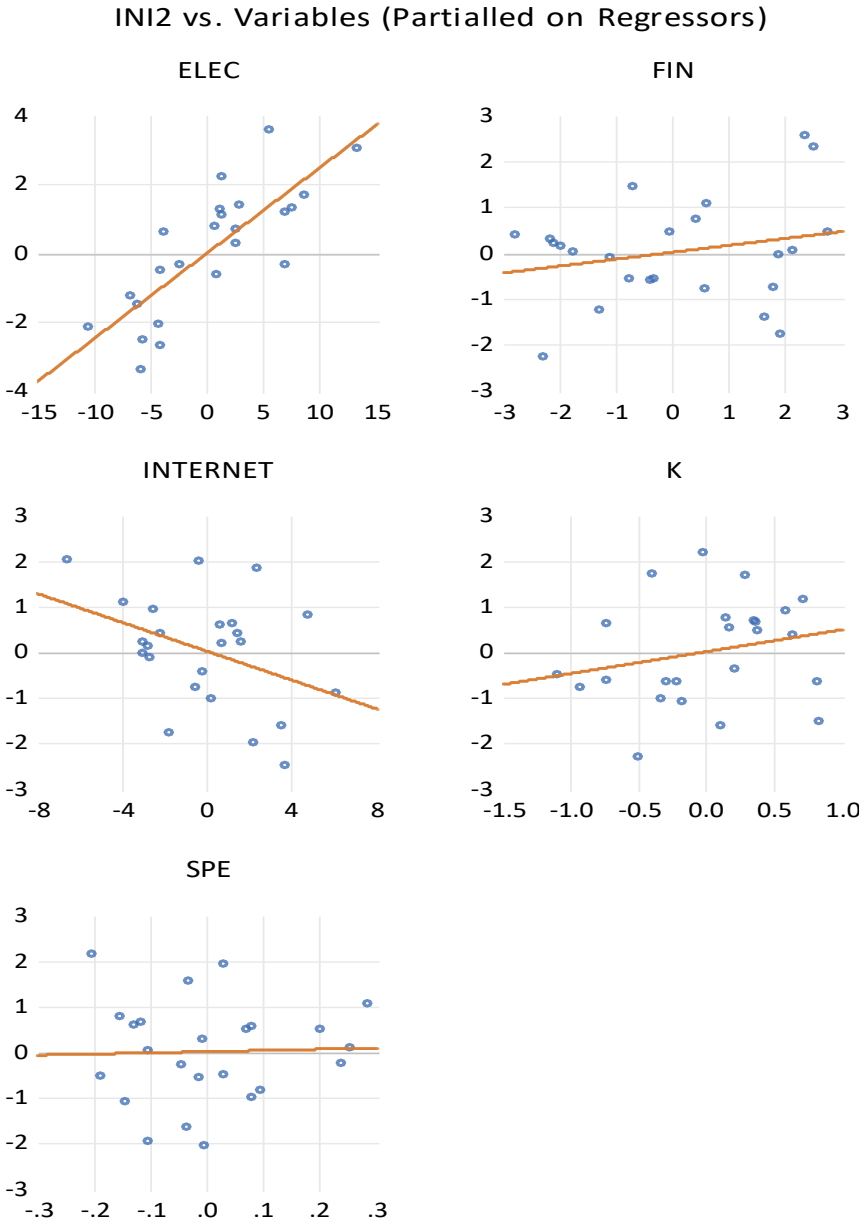

Figure 2: Leverage Plots
Source: Author's estimation.

Leverage plot analysis reveals that all independent variables in the model—Public Expenditure on Infrastructure (% of GDP), Access to Electricity (% of population), Internet Penetration Rate (% of population using the internet), Financial Inclusion (Access to credit, % of population), and Social Protection Expenditure (% of GDP)—exhibit high variability from their actual mean values. This pattern signals the presence of outliers within the dataset. The notable deviations suggest that certain observations in each variable series exert disproportionate leverage on the overall regression estimates. Such high-leverage points may stem from structural anomalies, recording errors, or exceptional economic conditions that do not represent the general trend of the sample. The existence of these outliers necessitates further diagnostic testing to assess their impact on the stability and predictive accuracy of the regression model. Addressing these influential points—whether through data transformation, exclusion, or the adoption of robust estimation techniques—is essential for ensuring the validity of the econometric analysis and for drawing sound, policy-relevant conclusions from the study.

Robust Least Square (RLS) Regression:

When performing regression analysis, the goal is to find a line that best fits the data, most commonly using the Ordinary Least Squares (OLS) method. OLS works by minimizing the squared differences between the actual and predicted values. However, a

major limitation of OLS is its sensitivity to outliers—data points that are significantly different from the rest—which can distort the regression line and lead to unreliable results. To address this issue, robust regression methods have been developed to better handle outliers by reducing their influence, ensuring that a few extreme values do not disproportionately affect the entire regression outcome. Three widely used robust regression techniques are the M-Estimator, S-Estimator, and MM-Estimator. These methods are complemented by diagnostic tools such as leverage plots and influence statistics, which help identify problematic data points that may impact the accuracy and stability of the regression analysis. By using robust regression methods and thorough diagnostics, researchers can obtain more reliable and generalizable results, even in the presence of outliers.

Table 4: Robust Least Squares Estimates

Variables	Coefficient	T-Statistics	Probability
Constant	23.788	29.967	0.000
K	0.0256	0.3595	0.719
ELEC	0.0602	6.7884	0.000
INTERNET	-0.0053	-0.3232	0.746
FIN	0.0812	4.9531	0.0000
SPE	-0.3609	-2.5494	0.0471
Statistical Tests			
R^2	0.7655	Adj R^2	0.7534

The regression analysis reveals that three variables Access to Electricity (% of population) (Elec), Financial Inclusion measured by Domestic credit to private sector by banks (% of GDP) (Fin) and Social Protection Expenditure also measured by Current health expenditure (% of GDP) (SPE) are significant and their p-values are less than 0.05. In particular, Access to Electricity is positive and significant, reflecting that more electricity access leads to increases in the dependent variable. The estimation results reveal a counterintuitive relationship between electricity access and income inequality in Pakistan, where a 1% increase in electrification leads to a 6% rise in the Gini index (a measure of income inequality). This finding contradicts conventional development theories that assume infrastructure expansion inherently reduces inequality (Li et al 2024). Instead, Pakistan's experience aligns with emerging literature documenting "elite capture" of infrastructure benefits in unequal societies (Ul Haque et al., 2024). Several structural and institutional factors explain why expanded electricity access may exacerbate inequality in Pakistan including Urban Bias in Electrification means urban households (92% access) benefit disproportionately compared to rural areas (67% access) (NEPRA, 2023) and Industrial and commercial consumers—primarily located in cities, while rural households and agriculture receive lessor supply. Another reason is the skewed distribution reinforces income disparities, as urban elites and industries gain productivity benefits while rural populations remain underserved (Shahid et al. 2024).Another possible reason of tis relationship is electricity tariffs in Pakistan are regressive. The poorest quintile spends 12-15% of income on electricity, while the richest quintile spends just 3-4% (World Bank, 2022).Subsidies intended to help the poor often leak to wealthier households due to flawed targeting (Shittu et al., 2024). Firms and large landowners benefit most from electrification through mechanization (reducing labor demand in agriculture. Rural electrification without complementary investments (e.g., irrigation pumps, agro-processing) fails to boost smallholder incomes, widening the rural-urban divide. Power outages (8-10 hours/day in rural areas vs. 2-3 hours in cities) disproportionately harm small businesses and farmers. Pakistan's electrification-inequality paradox underscores that infrastructure access alone is insufficient for equitable development. Without addressing structural inequities in distribution, pricing, and complementary investments, electricity expansion risks reinforcing—not reducing—income disparities (Qadeer et al., 2024).

Our analysis reveals a contrary to what common sense would suggest yet significant relationship between financial inclusion and income inequality in Pakistan, where each 1% increase in access to

credit corresponds with an 8% rise in the Gini coefficient. This finding challenges the conventional wisdom that financial inclusion inherently reduces inequality (Memon et al., 2025), instead supporting contemporary research documenting the "elite capture" phenomenon in developing economies' financial systems (Moyo, 2024). Four interrelated mechanisms explain this paradoxical outcome in Pakistan's context. First, Pakistan's credit allocation patterns exhibit severe skewness, with commercial banks directing 78% of loans to large corporations and only 7% to micro-enterprises and agricultural sectors. This concentration means the top 10% of borrower's capture 63% of total credit while the bottom 40% access merely 4% (Raza et al., 2024), creating what term a "trickle-up finance" system that disproportionately benefits wealthier borrowers. Second, the geographic concentration of financial services exacerbates spatial inequalities, as 83% of bank branches serve urban areas containing only 37% of the population, resulting in rural credit penetration languishing at 11% versus 42% in cities. Third, pronounced gender disparities persist, with just 7% of women accessing formal credit compared to 24% of men, while 68% of female-led microenterprises face credit constraints versus 41% of male-led businesses - disparities that reinforce the gender wealth gap (Sarwar & Farid, 2024). To transform financial inclusion into a genuine tool for equality, Pakistan requires targeted interventions including: expanding the State Bank's Refinance Facility for Low-Income Housing; implementing Brazil-style microcredit quotas (30% of bank portfolios); developing alternative collateral systems using mobile transaction histories and agricultural warehouse receipts; and introducing gender-sensitive products featuring group lending models and simplified KYC requirements for women. Pakistan's experience demonstrates that without structural reforms, financial inclusion risks becoming what as "inclusion as exclusion" - a process that nominally expands access while reinforcing existing hierarchies.

Empirical findings demonstrate that social protection expenditure has a significant inequality-reducing effect in Pakistan, with a 1% increase in social spending leading to a 36% decrease in the Gini coefficient. This result aligns with theoretical expectations that well-designed social protection programs can reduce income inequality by redistributing resources to vulnerable populations (Razavi et al., 2024). Several mechanisms explain this relationship in Pakistan's context.

First, Pakistan's flagship Benazir Income Support Program (BISP) has shown measurable success in targeting the poorest households, with 78% of benefits reaching the bottom two income quintiles. The program's biometric verification system has reduced leakage to just 12%, significantly lower than other developing nations. Second, conditional cash transfer components in education and health have created intergenerational mobility, with recipient households showing 23% higher school enrollment rates and 18% greater healthcare utilization. Third, the gradual expansion of social protection coverage from 2.8 million to 8.6 million households between 2015-2023 has increased its redistributive impact. The effectiveness of these programs reflects Pakistan's adoption of international best practices in social protection design. The use of proxy means testing for targeting, digital payment systems to reduce corruption (Ur Rehman & Khalil, 2024), and integration with human capital development programs have collectively enhanced their inequality-reducing effects. However, challenges remain - at 0.9% of GDP, Pakistan's social protection spending still lags behind the South Asian average of 1.5% (ADB, 2023), suggesting potential for greater inequality reduction with expanded coverage and funding. These findings underscore the importance of maintaining and strengthening social protection systems as a tool for equitable development in Pakistan.

R-square of the model is 0.76, it means that 76 percent variation in dependent variable is explained by access to electricity, financial inclusion and social protection expenditure.

Diagnostic Test Estimation

Ramsey's RESET Test Estimates

This test was proposed by Ramsey in 1969 to check the equation is correctly specified or not. Table 5 shows the Ramsey RESET test estimates.

Table 5: Ramsey RESET Estimates

H_0: Equation is correctly specified
H_1: equation is not correctly specified

Test statistic	Estimated value	Probability
F-statistic	1.37	0.25
likelihood ratio	1.86	0.17

Results of the equation showed that the probability value is greater than 0.05 so we are not able to reject the null hypothesis and accept the null hypothesis, which means the equations is correctly specified and we can conclude the model is correctly specified and we met the second assumption of RLS approach.

Results of Breusch Godfrey LM Test

Breusch-Godfrey LM test used to check serial correlation between error terms of each equation. Table 6 shows the LM test for ready reference.

Table 6: Breusch Godfrey LM Test Estimates

Breusch Godfrey LMTest		
(μ_t, μ_{t-q}) = 0 for t ≠ q , q = 1,2,.....,p		
Results of equation/ model		
Test statistic	Estimated value	Probability
F-statistic	2.5864	0.106
Obs*R-squared	5.8635	0.063

As we see the probability values of the above reported results of LM test is greater than 0.05 so we cannot reject the null hypothesis of LM test and concluded that error terms of the equation are serially independent, which means there is no serial correlation between error terms and we met the third assumption of RLS approach.

Results of Breusch-Pagan-Godfrey Test

Breusch-Pagan-Godfrey test is used to check weather variance of the error is constant or not? The results of the Heteroskedasticity are reported in Table 7.

Table 7: Results of Breusch-Pagan-Godfrey test estimation.

Test statistic	Estimated value	Probability
F-statistic	1.3689	0.2820
Obs*R-squared	6.6120	0.2511

In case of this model we see that probability value is greater than .05 therefore we are unable to reject null hypothesis and conclude that residual variance is constant. Variance of the residual of the equations is constant. So we can conclude that there is no problem of Heteroskedasticity. Homoscedasticity of the equation confirms the validity of the fitted model.

Results of Normality Test:

Normality of error term distribution can be investigated by Jarque-Bera statistic. The normality test results are presented in Table 8.

Table 8: Normality Results

Ho: residuals are normal.		
Test statistic	**Estimated value**	**Probability**
Jarque-Bera	1.8518	0.3961

The results showed that error is normally distributed because the probability is greater than 0.05, and we cannot reject the null hypothesis; error is normally distributed. Therefore, we concluded that residuals are normally distributed. The diagnostic test statistics indicate that the model is satisfying the major assumptions of econometrics and thereby confirming its stability and reliability. Overall, these tests verify that the model meets important classical

linear regression assumptions, further increasing its estimates' validity.

Variance Influence factor

The Variance Inflation Factor (VIF) test in Table 9 is conducted to assess the presence and degree of multicollinearity among the independent variables in the regression model. Centered VIF values are typically used for interpretation, as they provide a clear indication of multicollinearity without the influence of the intercept. In the results, the Internet variable exhibits the highest centered VIF at 8.56, which indicates moderate multicollinearity but remains below the commonly accepted threshold of 10.

Table 9: Variance Influence Factor

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Elec	0.002969	691.1479	5.366931
Fin	0.011842	113.1190	3.939869
Internet	0.005838	29.11674	8.564456
K	0.108968	689.4283	4.148303
SPE	1.901520	391.8615	4.170787
C	25.65717	803.1022	NA

Other variables such as Access to Electricity (Elec), Social Protection Expenditure (SPE), and K also show signs of multicollinearity, with centered VIFs of 5.36, 4.17, and 4.14, respectively. Financial Inclusion (Fin) demonstrates relatively weak multicollinearity, with a centered VIF of 3.93. While uncentered VIFs are generally higher due to the inclusion of the intercept, they are not the primary focus for diagnosing multicollinearity. Notably, the constant term (C) has an extremely high uncentered VIF (803.10), which is expected and does not affect the interpretation of multicollinearity among the explanatory variables. Overall, the VIF results suggest that multicollinearity is not a significant concern in this model and remains within acceptable limits, allowing for reliable and risk-free estimation of the regression coefficients.

CUSUM and CUSUM Square Test of Stability

The CUSUM (Cumulative Sum of Recursive Residuals) and CUSUM of squares (Cumulative Sum of Squares of Recursive Residuals) tests are important diagnostic tools used to assess the stability of a regression model over time and to detect any structural changes in the model or parameter stability. Specifically, the CUSUM of squares test provides a visual and statistical method to check whether the variance of the model's residuals remains constant throughout the sample period. If the plotted blue line from the test stays within the boundaries set by the red lines, it indicates that there is no statistically significant structural change in the regression model during the period under review. This outcome suggests that the variance of the model is stable and supports the assumption of homoscedasticity, meaning the residuals have constant variance over time. Such stability is crucial for the reliability of the model's estimates. As recommended by Pesaran (2001, 2005), these tests are widely used for evaluating parameter stability and detecting any possible structural shifts in the data-generating process, thereby ensuring the robustness of the model's conclusions (see, Figure 3 and 4).

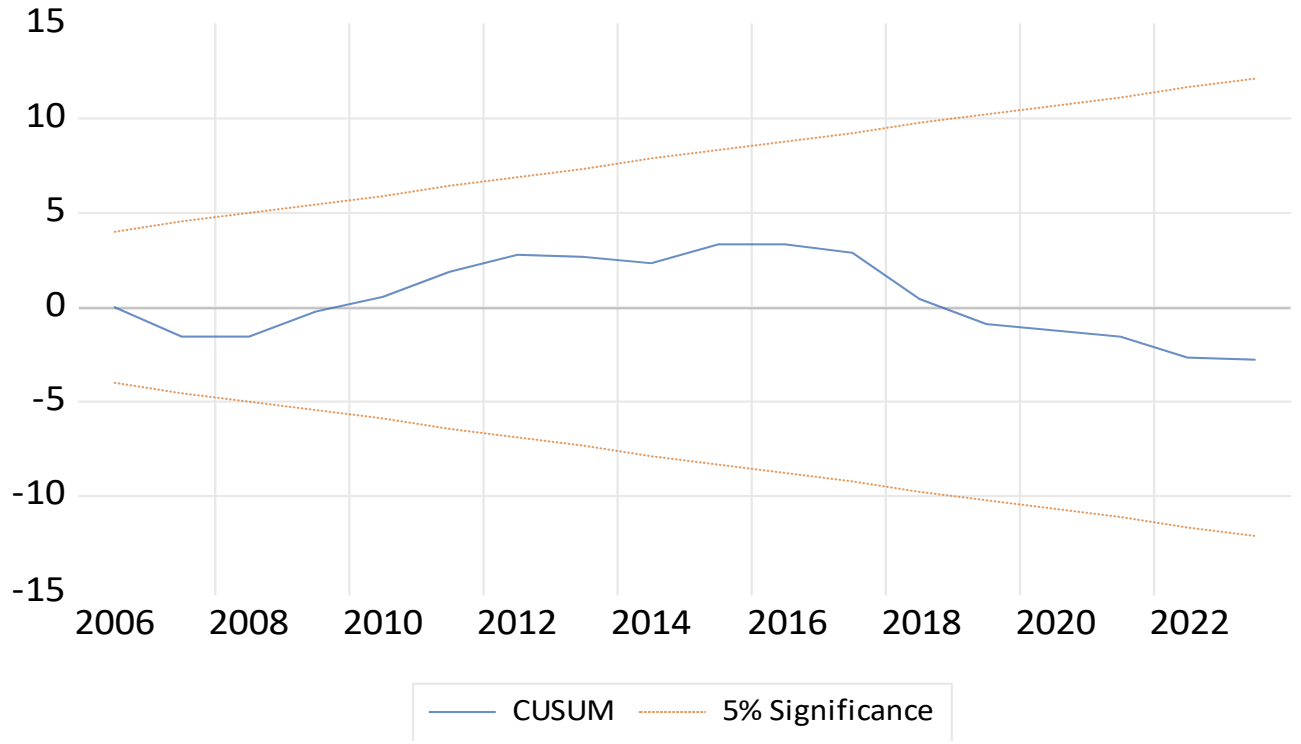

Figure 3: CUSUM Test

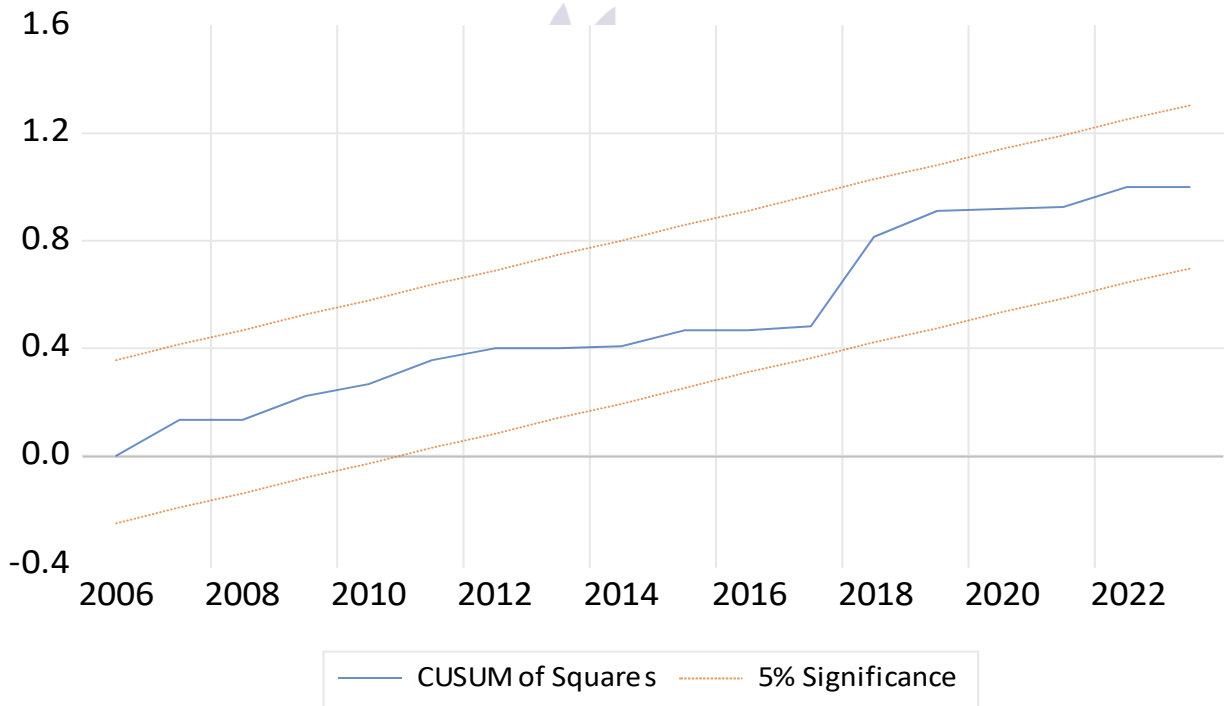

Figure 4: CUSUM Square Test

Conclusions and Policy Implications

Conclusions

This study set out to investigate the complex relationship between public expenditure on Infrastructure, access to electricity, internet penetration rate, financial inclusion and social protection expenditure and income inequality Pakistan, as measured by the Gini coefficient. Using Robust Least Square regression methods to account
for potential outliers and structural economic distortions, the analysis yielded several critical findings that challenge conventional development

paradigms while offering nuanced insights into Pakistan's persistent inequality puzzle. The research confirms that while infrastructure and financial access are traditionally viewed as tools for reducing inequality, their impact in Pakistan's context is more complex—sometimes exacerbating disparities rather than mitigating them. Meanwhile, social protection expenditures emerge as a consistently effective mechanism for reducing income inequality. Below, we synthesize these findings, discuss their implications, and propose policy recommendations for more equitable development in Pakistan. The most counterintuitive finding of this study is the positive and statistically significant relationship between electricity access and income inequality. A 1% increase in electrification leads to a 6% rise in the Gini index, contradicting traditional development theories that assume infrastructure expansion inherently promotes equity (Halimi et al. 2025). This paradox can be attributed to several structural factors i.e. urban bias in electrification while urban households enjoy 92% electrification rates, rural areas lag at 67%. This disparity means that productivity gains from electricity disproportionately benefit urban industries and commercial enterprises, widening the rural-urban income gap. The poorest quintile spends 12–15% of their income on electricity, compared to just 3–4% for the wealthiest. Subsidies intended to assist low-income households often fail to reach them due to flawed targeting mechanisms (Pacheco-Jaramillo, et al. 2025). Large landowners and industrial firms benefit most from electrification through mechanization and automation, which reduce labor demand in agriculture and manufacturing. Without complementary investments in rural agro-processing or small-scale industries, electrification primarily enriches capital owners rather than workers.

Similarly, the study finds that financial inclusion—measured by access to credit—has a perverse effect on inequality, with a 1% increase leading to an 8% rise in the Gini coefficient. This challenges the widely held belief that broader financial access inherently reduces income disparities. The reasons for this paradox include; Skewed Credit Allocation, Collateral Barriers and Geographic and Gender Disparities. These findings highlight that financial inclusion policies must be redesigned to avoid reinforcing existing inequalities. In contrast to infrastructure and financial access, social protection expenditures demonstrate a strong inequality-reducing effect, with a 1% increase leading to a 36% decline in the Gini index. This aligns with global evidence that well-targeted welfare programs can significantly improve income distribution (Razavi et al., 2024). Key factors driving this success in Pakistan include; Effective Targeting i.e. The Benazir Income Support Program (BISP) reaches 78% of the poorest quintile, with leakage rates of just 12% due to biometric verification. Pakistan's inequality puzzle cannot be solved through growth alone. This study underscores that equitable development requires deliberate policy interventions to ensure infrastructure and financial systems benefit marginalized groups. By reorienting public investments toward pro-poor electrification, inclusive finance, and expanded social protection, Pakistan can transform its economic trajectory—turning the tide against entrenched inequality and fostering sustainable, inclusive progress. The choice is clear: either continue with policies that inadvertently favor the elite, or redesign systems to lift all citizens equally.

Policy Recommendations

This study's findings reveal that infrastructure expansion, financial inclusion, and social protection programs have complex and sometimes counterintuitive impacts on income inequality in Pakistan. While social protection spending effectively reduces inequality, electricity access and financial inclusion—if not properly designed—can exacerbate disparities. Based on these insights, the following policy recommendations are proposed to promote equitable and inclusive growth in Pakistan.

- Shift focus from urban-centric grid expansion to decentralized renewable energy (solar microgrids) in underserved rural areas.
- Introduce subsidized electricity tariffs for households consuming less than 100 kWh/month, funded by progressive pricing for high-consumption users.
- Implement biometric verification for subsidy targeting to prevent elite capture.
- Pair electrification projects with agro-processing zones and small-scale industries in rural areas to ensure energy access translates into employment.
- Improve last-mile road connectivity to enhance market access for farmers and small businesses.
- Require banks to allocate 30% of loans to small businesses, farmers, and micro-enterprises (following Brazil's model).

- Launch rural financial education campaigns to improve awareness of banking and digital payment systems.
- Expand BISP coverage to include all households below the poverty line.
- Link health subsidies to regular medical check-ups for pregnant women and children.
- Empower local governments to tailor infrastructure and welfare programs to regional needs.

Pakistan's inequality challenge requires more than just economic growth—it demands deliberate policy interventions to ensure that infrastructure, finance, and social protection benefit the marginalized. The recommendations outlined above provide a roadmap for reducing spatial inequalities through rural-focused electrification and connectivity, making finance inclusive by breaking elite capture in credit markets and strengthening social safety nets to protect the most vulnerable. Without these reforms, Pakistan risks deepening its inequality trap. However, with targeted investments and institutional reforms, the country can achieve inclusive development in line with SDG 10 (Reduced Inequalities).

REFERENCES

Abbas, A., Lu, F., Yaseen, M., & Ameen, M. (2024). Exploring the Impact of Foreign Aid, Agricultural Production, and Corporate Social Responsibility on Poverty Reduction in Pakistan. World, 5(3), 570-587.

Ahmad, K., Ullah, A., & Madhi, M. F. (2024). Exploring the Economic Dimensions of Globalization and Poverty Reduction in Pakistan. *Bulletin of Business and Economics (BBE)*, *13*(4), 9-19.

Ahmad, M. (2012). Measuring The Impact Of Technology On Pro-Poor Agricultural Development In Pakistan. Journal of Social and Economic Policy, 9(1), 25-44.

Anderson, E. (2005). Openness and inequality in developing countries: A review of theory and recent evidence. World development, 33(7), 1045-1063.

Arshad, M. A., Sheikh, M. R., & Arif, Z. (2024). Does Price Level Increase Income Inequality in Pakistan? A Disaggregated Analysis. Bulletin of Business and Economics (BBE), 13(2), 154-159.

Asghar, R., Sulaiman, M. H., Mustaffa, Z., Ullah, N., & Hassan, W. (2023). The important contribution of renewable energy technologies in overcoming Pakistan's energy crisis: Present challenges and potential opportunities. Energy & Environment, 34(8), 3450-3494.

Bird, N., & Hanedar, E. (2023). Expanding and Improving Social Safety Nets Through Digitalization: Conceptual Framework and Review of Country Experiences. International Monetary Fund, Washington, D.C.

Bukhari, S. R. H., Khan, T. U., & Khan, N. (2024). The Geopolitical Dynamics of Pakistan's Energy Sector: A Comprehensive Analysis. Journal of Development and Social Sciences, 5(2), 175-185.

Byaro, M., Ngowi, N., & Rwezaula, A. (2024). Do higher government spending, financial development, and trade reduce income inequality in low-income countries? A Bayesian perspective. *Politics & Policy*, *52*(3), 500-519.

Cardoso, D., Carvalho, L., Lima, G. T., Nassif-Pires, L., Rugitsky, F., & Sanches, M. (2025). The Multiplier Effects of Government Expenditures on Social Protection: A Multi-country Study. *Development and Change*, *56*(1), 172-224

Chaudhry, I. S., & Rahman, S. (2009). The impact of gender inequality in education on rural poverty in Pakistan: an empirical analysis. European Journal of Economics, Finance and Administrative Sciences, 15(1), 174-188.

Farooq, F., Saleem, H. M. N., Yousuf, M., & Hussain, J. (2024). The Nexus between Financial Development and Economic Growth in Pakistan: Role of Foreign Direct Investment and Market Capitalization. The Critical Review of Social Sciences Studies, 2(2), 1422-1435.

Fayez, M., Begum, R., Khan, L., Ahmad, M., Ahmed, W., & Sana, F. (2025). Bridging the digital divide for diabetes care: affordability and adoptability of health technology in Pakistan. Discover Health Systems, 4(1), 38.

Fotros, M. H., Alizadeh, M., & Ahmadvand, N. (2020). Optimal amount of government expenditure components with the goal of reducing income inequality (The case of Iran). Iranian Journal of Economic Studies, 9(1), 117-146.

Gamette, P., Odhiambo, N. M., & Asongu, S. A. (2024). Access to Electricity and Income Inequality in sub-Saharan Africa: An Exploratory Review. *Sustainable Futures*, 8, 100361.

Gardezi, M. A., Zafar, B., Zaib, A., & Rasheed, A. (2024). Analyzing the Interplay of Financial Inclusion, Income Inequality, and Carbon Dioxide Emissions: Evidence from Pakistan. iRASD Journal of Economics, 6(1), 215-228.

Gera, N. (2007). Impact of structural adjustment programmes on overall social welfare in Pakistan. South Asia Economic Journal, 8(1), 39-64.

Halásková, R., & Pomp, M. (2024). The Effects Of Social Protection Expenditures In Relation To Selected Socio-Economic Indicators In EU Countries. Danube, 15(4), 356–369

Halimi, Z., SafariTaherkhani, M., & Cui, Q. (2025). A Generalized Framework for Assessing Equity in Ground Transportation Infrastructure: Exploratory Study. *Journal of Management in Engineering*, *41*(2), 04024072.

Hossain, M. R., Rana, M. J., Saha, S. M., Haseeb, M., Islam, M. S., Amin, M. R., & Hossain, M. E. (2023). Role of energy mix and eco-innovation in achieving environmental sustainability in the USA using the dynamic ARDL approach: Accounting the supply side of the ecosystem. Renewable Energy, 215, 118925.

Hussain, J., Siyal, S., Ahmad, R., Abbas, Q., Yitian, Y., & Jin, L. (2024). Impact of Energy Crises on Income Inequality: An Application of Piketty's Hypothesis to Pakistan. Economies, 12(10), 259.

Inayat, Z., & Ali, H. (2024). The Dynamic Effects Of Government Spending Shocks On Income And Consumption Inequality In Pakistan.PIDE School of Economics, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Irfan, M., Kazmi, S. J. A., Saeed, A., Mehmood, I., & Mirza, M. B. (2024). Fintech, Financial Inclusion, and Income Inequality. UCP Journal of Business Perspectives, 2(1), 73-92.

Javed, W., & Mumtaz, Z. (2024). South Asia's unprotected poor: A systematic review of why social protection programs fail to reach their potential. PLOS Global Public Health, 4(6), e0002710.

Kaur, S., Aggarwal, S., & Sarwar, S. (2023). Trade balance, monetary supply, commodity prices, and greener energy growth: Contextual evidence from BRICS economies in the lens of sustainability. *Environmental Science and Pollution Research*, *30*(29), 73928-73940.

Kausar, A., Ahmad, I., Zhu, T., & Shahzad, H. (2023). Impact of indoor air pollution in Pakistan—causes and management. Pollutants, 3(2), 293-319.

Khan, I., & Khan, I. (2024). Financial inclusion matter for poverty, income inequality and financial stability in developing countries: new evidence from public good theory. International Journal of Emerging Markets, 19(11), 3561-3580.

Kirschning, R., & Mrożewski, M. (2024). Revisiting the knowledge spillover paradox: the impact of infrastructure. *Small Business Economics*, *63*(1), 1-20.

Kuznets, S. (1955). International differences in capital formation and financing. In *Capital formation and economic growth* (pp. 19-111). Princeton University Press.

Li, R., Yang, Z., & Wang, Q. (2025). Does renewable energy reduce energy intensity? A matter of income inequality. *Humanities and Social Sciences Communications*, *12*(1), 1-22.

Li, X., He, P., Liao, H., Liu, J., & Chen, L. (2024). Does network infrastructure construction reduce urban–rural income inequality? Based on the "Broadband China" policy. *Technological Forecasting and Social Change*, *205*, 123486.

Li, Y., & He, Y. (2024). Unraveling Korea's energy challenge: the consequences of carbon dioxide emissions and energy use on economic sustainability. Sustainability, 16(5), 2074.

Majid, H. (2024). Public Goods, Productivity, and Economic Inequality. In The Palgrave Handbook of Global Social Problems (pp. 1-15). Cham: Springer International Publishing.

Memon, S., Li, S., Tunio, R. A., Das, G., & Jamali, R. H. (2025). Financial inclusion as a catalyst for poverty reduction: unraveling the impact amidst global challenges. *Environment, Development and Sustainability*, https://doi.org/10.1007/s10668-025-06040-7.

Moyo, G. (2024). African elites as clients of the offshore world. In *Africa in the global economy: capital flight, enablers, and decolonial responses* (pp. 141-157). Cham: Springer Nature Switzerland.

Mumtaz, J., & Hussain, S. I. (2024). Analyzing household income inequality in Pakistan: a subgroup decomposition of generalized entropy measures. GeoJournal, 89(1), 27.

Nadeem, M. Y., Farooq, A., & Saghir, S. (2024). Comparative Analysis of Pakistan and Bangladesh's Economic Performance. Journal of Innovations in Education and Social Sciences, 2(October), 99-116.

Nasir, J. (2024). Development Challenges of Pakistan. Springer Books.

Naveed, T. A., & Gordon, D. (2024). The Construction of a Human Development Index at the Household Level and the Measurement of Human Development Disparities in Punjab (Pakistan). Journal of Human Development and Capabilities, 25(3), 473-498.

Nawazish, S., & Afza, T. (2024). Fintech and Economic Policy Uncertainty Integration: Driving Efficiency in Commercial Banks through the Lens of ARDL Approaches. The Critical Review of Social Sciences Studies, 2(2), 147-176.

Neuhuber, T., & Schneider, A. E. (2024). The role of public social expenditure for mitigating local income inequality: An investigation across spatial scales in Austria. *Journal of Regional Science*, *64*(5), 1647-1679.

Nisar, S., Chaudhry, M. A., Awan, A., Faisal, F., & Rahman, S. U. (2024). Social protection for inclusive growth: a tale of two countries Pakistan and Bangladesh. *International Journal of Social Economics*.

Nizam, K., & Rashidi, M. Z. (2025). Barriers to digital financial inclusion and digital financial services (DFS) in Pakistan: a phenomenological approach. Qualitative Research in Financial Markets, 17(2), 251-274.

Pacheco-Jaramillo, W. A., & Malliaros, P. (2025). Contrafactual analysis: Comparing voucher systems with taxes, subsidies, and public spending to reduce income inequality. *F1000Research*, *14*, 439.

Perveen, S., & Majeed, M. T. (2024). Analyzing the Influence of Digitalization on Income Inequality: A Comparative Analysis of Developed and Developing Economies. *Social Science Multidisciplinary Review*, 2, 48-71.

Qadeer, M., Kazmi, S. S., & Khan, A. S. (2024). Global Economic Inequality: A Threat toStability and Security. *Tanazur*, *5*(3), 156-190.

Qandeel, M. S. (2024). Implications of public policies performance on social inequality worldwide. SN Business & Economics, 4(9), 103.

Rahman, A. M. (2024). Globalization and Transformation: State, Ideas, and Economic Policy in Bangladesh.

Rama, M., Béteille, T., & Li, Y. (2014). *Addressing inequality in south Asia*. World Bank Publications.

Rasul, G., & Karki Nepal, A. (2024). Addressing poverty and inequality in the mountains of Pakistan. Discover Global Society, 2(1), 60.

Raza, A., Kashif, U., Papiashvili, T., Erokhin, V., & Fadol, A. A. (2024). Hesitant Fuzzy Entropy Analysis of Financial Literacy and Micro-credit Accessibility of Pakistani Farmers: A Bankers' Perspective. *Journal of the Knowledge Economy*, https://doi.org/10.1007/s13132-024-02385-y.

Razavi, S., Cattaneo, U., Schwarzer, H., & Visentin, A. (2024). *Combating inequalities: What role for universal social protection?* (No. 128). ILO Working Paper.

Rizvi, S. A. F. (2023). Health Expenditures and Financing; A Macro Determinant and Micro Financing Perspective for Developing Countries (A Case of Pakistan)(A Case of Pakistan) (Doctoral dissertation, Université Clermont Auvergne).

Safdar, S., Ali, A., Iqbal, M. S., & Nasim, I. (2024). Role of Financial Development and ICT in Promoting Inclusive Growth in South Asia: Moderating Effects of Governance. Review of Applied Management and Social Sciences, 7(4), 303-317.

Saha, S. K. (2024). Assessing the impact of rural electrification on economic growth: a comprehensive analysis considering informal economy and income inequality in Bangladesh. *Asia-Pacific Journal of Regional Science*, *8*(2), 551-583.

Saipudin, S. (2024). The Relationship between Income Inequality and Economic Growth. *The Journal of Academic Science*, *1*(4), 439-450.

Sarwar, G., & Farid, A. (2024). Unveiling Gender Disparities in Pakistan: Challenges, Progress, and Policy Implications for Achieving SDG 5. *Journal of Development and Social Sciences*, *5*(2), 506-517.

Seabela, M., Ogujiuba, K., & Eggink, M. (2024). Determinants of Income Inequality in South Africa: A Vector Error Correction Model Approach. *Economies*, *12*(7), 169.

Sehrawat, M., & Giri, A. K. (2015). Financial development and income inequality in India: an application of ARDL approach. International Journal of Social Economics, 42(1), 64-81.

Shahid, M., Ahmad, K., Haider, A., & Ali, S. (2024). Decentralization and rural–urban income inequality: implications for inverted-U hypothesis of Pakistan. *Evolutionary and Institutional Economics Review*, *21*(2), 177-197.

Shair, W., & Anwar, M. (2023). Effect of internal and external remittances on expenditure inequality in Pakistan. Cogent Economics & Finance, 11(1), 2178121.

Shittu, I., Saqib, A., Abdul Latiff, A. R., & Baharudin, S. A. (2024). Energy Subsidies and Energy Access in Developing Countries: Does Institutional Quality Matter?. *Sage Open*, *14*(3), https://doi.org/10.1177/21582440241271111.

Suhrab, M., Chen, P., & Ullah, A. (2024). Digital financial inclusion and income inequality nexus: can technology innovation and infrastructure development help in achieving sustainable development goals?. *Technology in Society*, *76*, 102411.

Tabassum, U., Nazeer, M., & Sultana, H. (2025). Distributional Inequalities Up Against Income and Consumption. Research Journal of Social Sciences and Economics Review, 6(1), 21-47.

Tridico, P. (2010). Growth, inequality and poverty in emerging and transition economies. Transition Studies Review, 16, 979-1001.

Tripathi, S., & Yenneti, K. (2024). Does inequality in urban population distribution lead to income inequality? Evidence from India. Asia-Pacific Journal of Regional Science, 8(3), 787-818.

Tunio, F. H., Nabi, A. A., Dawood, M., & Shaikh, S. U. D. (2024). Fiscal policy for economic growth and environmental quality: insights from Pakistan's fiscal decentralization. *Discover Sustainability*, *5*(1), 211.

Ul Haque, N., & Zulfiqar, F. (2024). Not Elite Capture but Capture by Colonial-made Elite. *DISCOURSE*, 2. Online available at: https://file.pide.org.pk/pdfpideresearch/discourse-2024-3-6-not-elite-capture-but-capture-by-colonial-made-elite.pdf (accessed on 15th June, 2025).

Ullah, A., & Ali, A. (2024). Investigating corruption, income inequality, and environmental degradation in Pakistan: A time series analysis. Online available at: https://mpra.ub.uni-muenchen.de/121291/ (accessed on 15th July, 2025).

Ullah, O., Rahman, Z. U., Guo, A., & Zeb, A. (2024). Disaggregated public spending, income inequality and its effect on economic growth: Empirical evidence from developing countries. Journal of the Knowledge Economy, 15(4), 20823-20850.

United Nations. (2015.). Goal 10: Reduced inequalities. United Nations Sustainable Development Goals, United Nations, Washington D.C.

Ur Rehman, A., & Khalil, S. (2024). Digital Currencies in Pakistan and their Potential Role in Global Economic Relations: An Analysis. *Review of Applied Management and Social Sciences*, *7*(4), 987-1000.

Verma, A., & Giri, A. K. (2024). Does financial inclusion reduce income inequality? Empirical evidence from Asian economies. *International Journal of Emerging Markets*, *19*(9), 2428-2445.

Wang, L. (2002). Determinants of child mortality in low-income countries: empirical findings from demographic and health surveys. The World Bank, Washington, D.C.

Wang, Z. (2024). Assessing the Impact of Financial Technology on Income Inequality: An Empirical Analysis Using Gini Coefficient and Theil Index. *Open Journal of Business and Management*, *13*(1), 111-128.

World Bank. (2024). World development inidctaors, World Bank, Washington D.C.

Xue, P., Liu, H., Zhao, D., & Liu, J. (2024). Mineral resources and equitable economic development: South Asian mineral resources policy perspective with innovation for resources efficiency. Resources Policy, 96, 105151.

Zungu, L. T. (2024). The nonlinear dynamic effect of government expenditure on income inequality: The case of macroprudential policy switching. *Journal of Infrastructure, Policy and Development*, *8*(3), 2515.