Assessing the impact of indirect taxation on poverty and inequality: A pseudo-panel and cross-country analysis

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Project Title: Sensitising and promoting direct taxation to boost revenue and tackle inequality in Bangladesh

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Abstract

This paper investigates the impact of indirect taxes on poverty, income inequality, and economic growth in Bangladesh and globally. The escalating Gini coefficient in Bangladesh highlights the urgency of addressing income inequality. The study constructs a pseudo-panel using Bangladesh's four rounds of household income and expenditure survey and cross-country panel data from the World Bank's World Development Indicators for estimating the panel fixed effect regressions. Regression results reveal that a one per cent increase in the indirect tax burden corresponds to a notable 0.92 per cent rise in poverty. Cross-country patterns show higher poverty rates and increased inequality in nations heavily dependent on indirect taxation. Additionally, findings also suggest that for a given level of total tax revenue, a larger share of indirect taxation in total tax revenue could negatively affect the economic growth of a country. The paper advocates a nuanced reassessment of Bangladesh's tax structure, proposing a shift towards direct taxation. The research underscores the need for a balanced tax approach to alleviate poverty, reduce inequality, and foster sustainable growth.

Keywords: Indirect tax, direct tax, Tax structure, Poverty, Inequality, Economic growth.

JEL codes: D63, H20, H2, I30, I32

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I. Introduction

The recent trajectory of inequality in Bangladesh, as highlighted by the escalating Gini coefficient – from 0.448 in 2010 to 0.499 in 2022 – underscores a pressing socio-economic concern. In the face of this widening income gap, the role of progressive taxation becomes pivotal not only for addressing inequality but also for bolstering government revenue. Progressive taxation fosters a fair society while facilitating the financial resources necessary for public goods, services, and social protection programmes. However, in Bangladesh, a critical challenge emerges as nearly two-thirds of the revenues are derived from indirect sources, a fiscal strategy that can disproportionately impact lower-income households.

This paper investigates the effects of indirect taxes on poverty within the context of Bangladesh and on poverty, inequality, and economic growth across countries by employing a comprehensive approach that combines pseudo-panel analysis using four rounds of Bangladesh's Household Income and Expenditure Survey (HIES) data and cross-country panel data from the World Bank Development Indicators (WDI). Our primary focus is on investigating the ramifications of indirect taxation, particularly in the form of value-added tax (VAT), on poverty incidence and income inequality.

The findings from pseudo-panel fixed effect regression estimation reveal that a one per cent increase in the indirect tax burden corresponds to a notable 0.92 per cent rise in the poverty level. This underscores the detrimental consequences of an overreliance on indirect taxation tools for revenue collection, particularly in the context of Bangladesh. The adverse impact of higher indirect taxation on poverty is further substantiated by our cross-country panel regressions, unravelling a global pattern where countries with greater dependence on indirect taxation exhibit higher poverty rates and increased inequality.

Our results shed light on the urgency of reevaluating the current taxation framework in Bangladesh. The emphasis on indirect taxes, while contributing significantly to government revenue, appears to be exacerbating rather than mitigating poverty incidence. This calls for a nuanced reassessment of the tax structure, with a particular focus on rebalancing the scales through a more equitable distribution of the tax burden.

This paper contributes to the literature on the structure of taxation and its impact on two important macroeconomic objectives; lowering income inequality and poverty, and ensuring economic growth. To the best of our knowledge, this study is the first one in the literature that uses micro-level household data and a panel regression model to investigate the effect of indirect taxation on poverty incidence. By doing so, we contribute to the ongoing discourse on effective policy interventions that can foster a more inclusive and equitable society, transcending borders and providing valuable insights for global economic governance.

Additionally, this study contributes to the existing literature by connecting micro-data within-country evidence from Bangladesh to the cross-country findings of the adverse impact of indirect taxation on poverty and inequality. Furthermore, the paper provides evidence that the use of direct taxation for government revenue while holding the level of indirect taxation the same can

serve dual purposes: (1) accelerating economic growth, and (2) reducing income inequality and poverty incidence in a country.

The rest of the paper is organised as follows: Section 2 provides an overview of the current state of direct taxation and inequality in Bangladesh. Section 3 discusses relevant literature on taxation and income inequality, economic growth, and poverty, along with the dynamics of the tax structure worldwide. Methodology and data description are provided in Section 4. Section 5 elaborates on the findings of the paper. Policy recommendations are given in Section 6. Finally, Section 7 concludes the paper.

## II. The state of direct tax and inequality in Bangladesh

The direct tax, which is imposed on the incomes and profits of individuals and businesses, contributed to less than one-third of the total tax revenue over the last two decades in Bangladesh. The National Board of Revenue (NBR), working as the main tax-collecting institution in Bangladesh, has increased the volume of tax revenue considerably (illustrated in Figure 2.1) over the years. Notably, the direct tax reached a record high of Tk. 1.167 trillion in the fiscal year 2022-23 (Figure 2.2), indicating an improvement from a modest collection of roughly Tk. 40 billion since 2001-02. However, the overall tax structure exhibits an unduly heavy reliance on indirect taxation for revenue generation, which accounted for more than two-thirds of the revenue generation throughout the period.

Figure 2.1: NBR tax revenue
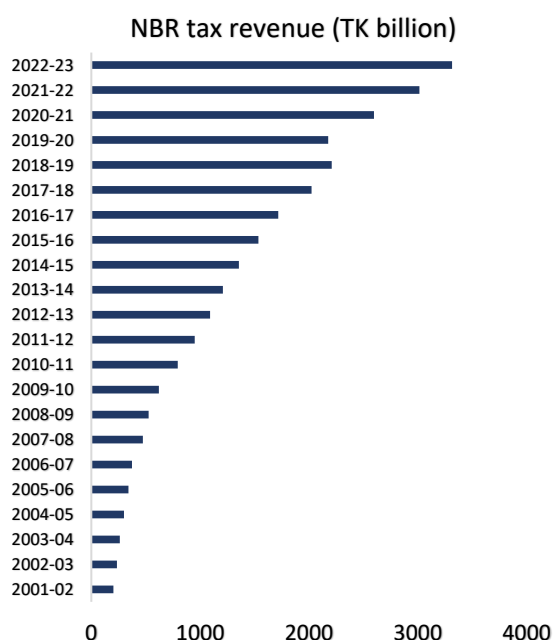
NBR tax revenue (TK billion)

Figure 2.2: Direct tax comprises around one-third of total tax revenue

Composition of direct and indirect tax revenue

Source: Ministry of Finance and National Board of Revenue (NBR), Bangladesh.
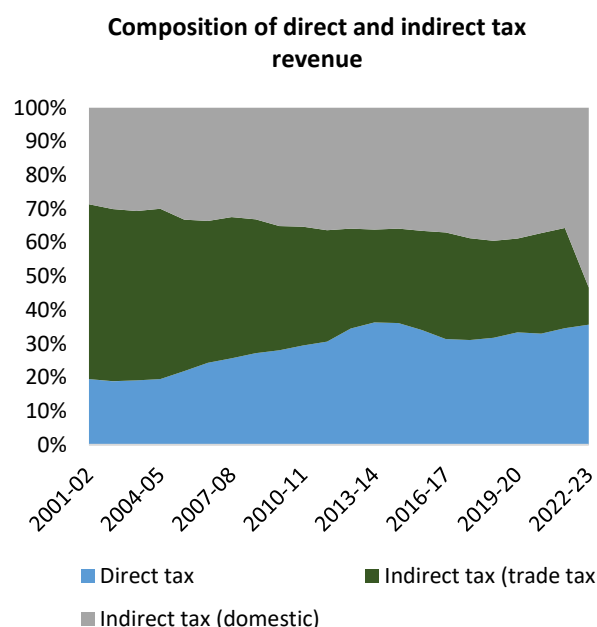
Source: Authors' presentation using data from the Ministry of Finance and National Board of Revenue (NBR), Bangladesh.

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The direct tax to Gross Domestic Product (GDP) ratio continues to remain consistently low in Bangladesh. The ratio receded to 2.3 per cent in 2019-2020, reflecting the COVID-19 Pandemic shock. Subsequently, it improved slightly reaching a peak of 2.6 per cent in 2022-23 (Figure 2.3), however, it has remained relatively stagnant over the subsequent period with no marked improvements.

Figure 2.3: Direct tax in Bangladesh (% share of GDP)

Direct tax in Bangladesh (as a per cent of GDP)

Year	Direct tax (% of GDP)
2015-16	2.5%
2016-17	2.3%
2017-18	2.4%
2018-19	2.4%
2019-20	2.3%
2020-21	2.4%
2021-22	2.6%
2022-23	2.6%
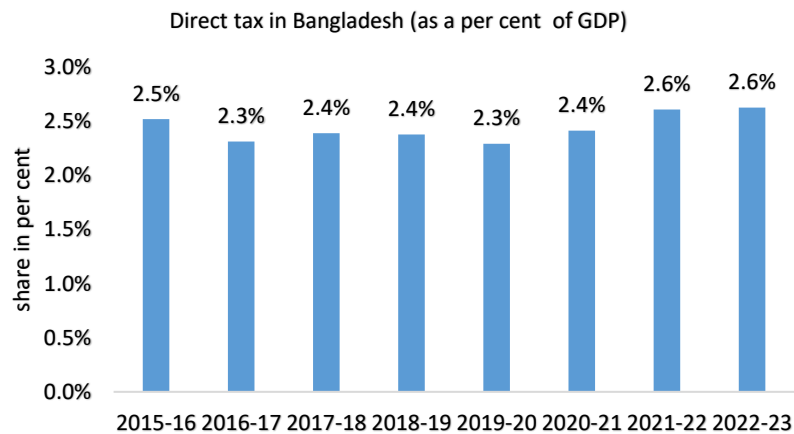
Source: Author's estimate based on NBR and BBS data.

Figure 2.4: The direct tax to GDP ratio is one of the lowest in Bangladesh[2]
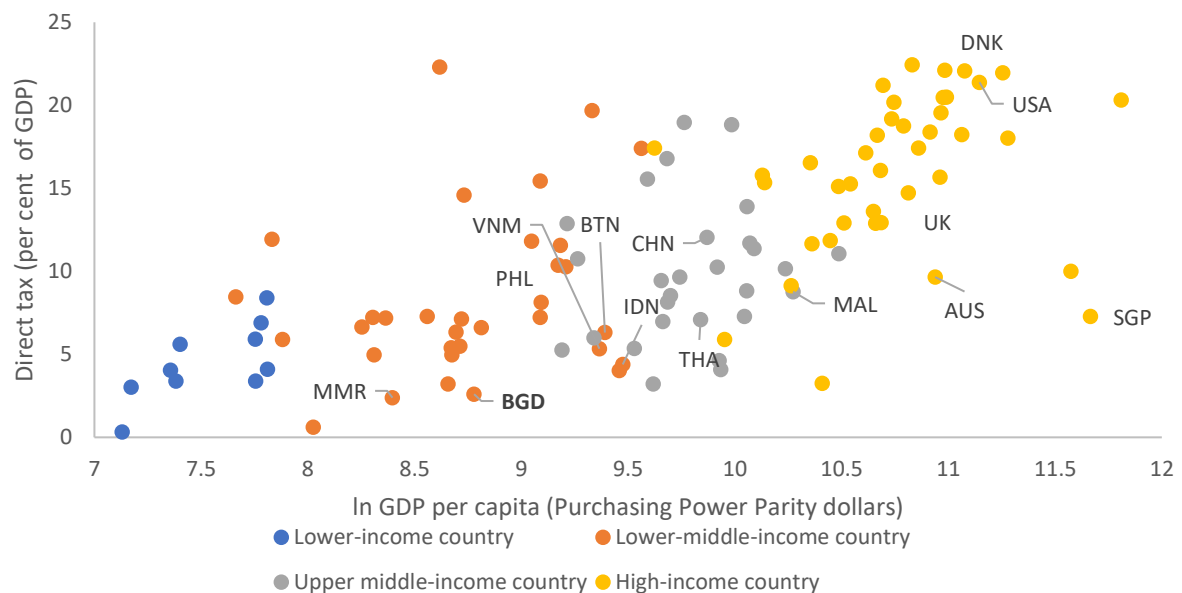
Source: Authors' presentation using data from the Government Revenue Dataset (GRD), UNU-WIDER and the World Development Indicators (WDI), World Bank

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[2] Note: Countries are indicated as AUS – Australia, BGD – Bangladesh, BTN – Bhutan, CHN – China, DNK – Denmark, IDN – Indonesia, MAL – Malaysia, PHL – the Philippines, SGP – Singapore, THA – Thailand, UK – the United Kingdom, USA – the United States of America, VNM – Vietnam.

The tax-to-GDP ratio in Bangladesh is one of the lowest compared to the lower-middle-income (Figure .4). Existing literature highlights a strong correlation between higher GDP per capita and higher tax-to-GDP ratio, a trend predominantly noticed in higher-income countries. This offers Bangladesh great potential to undertake extensive taxation reforms and diversify its fiscal revenue bases, thereby increasing its fiscal robustness and economic stability. Furthermore, it is observed that the direct tax to GDP ratio tends to increase as countries move up from lower to higher income levels, as per the progressive taxation system.

In Bangladesh, the tax revenue structure is characterized by heavy reliance on indirect taxes which account for the majority of the total tax revenue (Figure 2.5). In contrast, the direct tax's contribution is barely half of that of the indirect tax revenue. Over the years, there have been limited improvements in increasing direct tax contribution, as it increased from 1.1 per cent of GDP in 1993 to 2.88 per cent of GDP in 2021. The stagnant trend is indicative of the persistent regressive nature of the tax structure in Bangladesh which perpetuates inequality within the economy.

Figure 2.5: Annual Distribution of Tax Revenue in Bangladesh
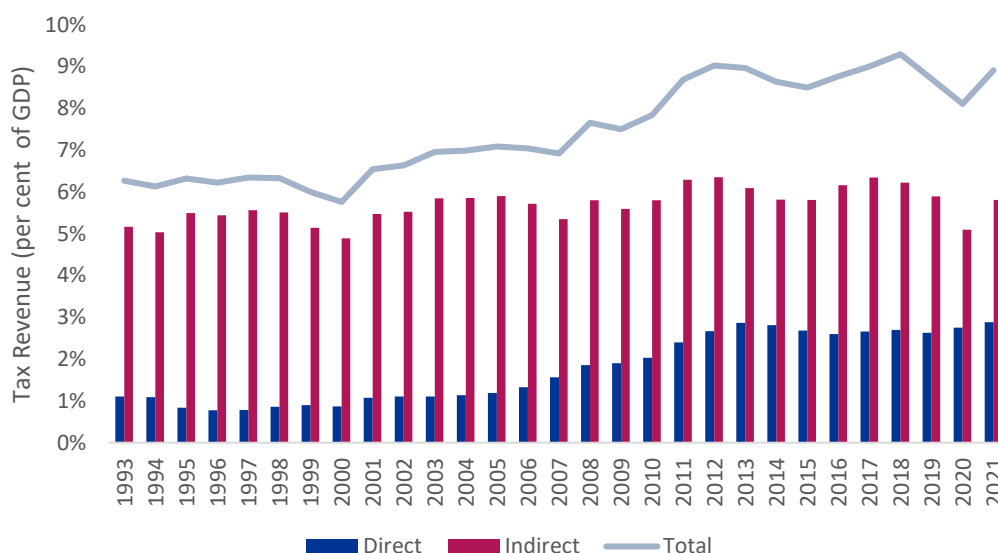
Source: Authors' analysis using the UNU WIDER dataset

Maintaining a minimal tax burden is considered instrumental for economic growth as it induces private sector growth. However, aggravating inequality is the trade-off that has emerged from such a policy approach in Bangladesh, which is evidenced by the data from the Household Income and Expenditure Surveys (HIES). The report revealed that the income shares of the richest 5 per cent of the population have increased from approximately 17 per cent in the 1990s to over 30 per cent in 2022 (Figure 2.6). In contrast, the income share of the poorest 5 per cent declined from an already minimal 1.03 per cent of total income to a further low 0.37 per cent of total income in 2022, albeit there has been a moderate recovery since 2016 in terms of slightly narrowing the gap. Overall, the general pattern of the growing disparity in income distribution emphasises the urgent necessity to tackle the pronounced income gap in Bangladesh.

Figure 2.6: Income shares held by the poorest and richest five per cent of households

Source: Authors' presentation from the Household Income and Expenditure Surveys conducted by the Bangladesh Bureau of Statistics (BBS).

According to the data from the World Inequality Database, only one per cent of Bangladesh's population controlled 16.2 per cent of the entire country's income in 2022. This highlights a striking concentration of wealth in the hands of a few and a high economic disparity. The Income Gini index, calculated using household income, demonstrated a notable increase from 0.39 in the early 1990s to 0.49 in 2022 (Figure 2.7). This sharp upward trend, similar in urban and rural regions, indicates that the gap between the rich and the poor has widened over time. Meanwhile, the Consumption Gini index, calculated using consumption expenditures, exhibited a relatively modest rise in inequality. Notably, the ratio has observed a decrement over the last two decades in Urban areas. The variance between income and consumption inequality reveals distinct spending patterns between the two socio-income groups, whereby, proportionately greater expenditure on consumption is made by lower-income groups relative to higher-income groups. This underscores the necessity for targeted economic policies to tackle escalating inequality.

Figure 2.7: Gini index in the past few decades showed an increasing trend
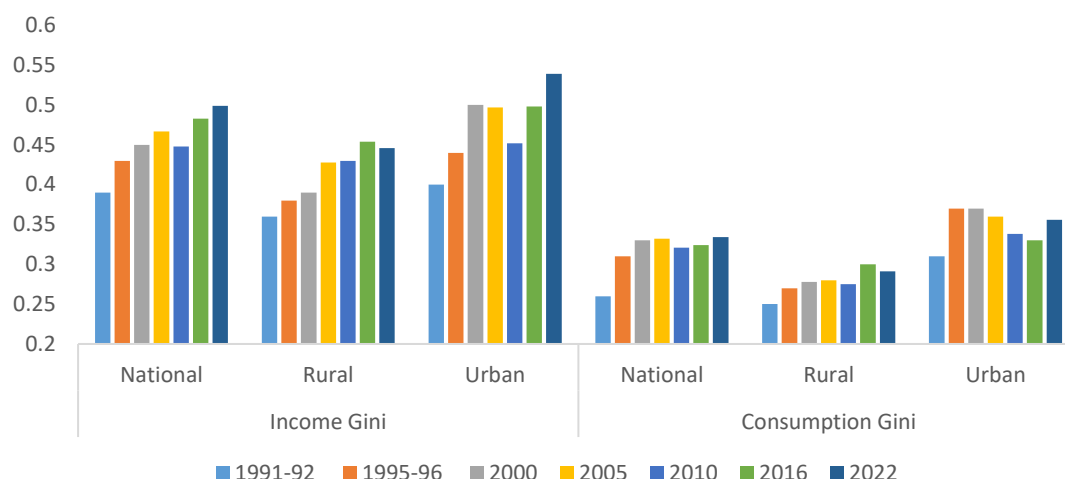
Source: Author's analysis using the Household Income and Expenditure Surveys

The Palma Ratio, a measure of income inequality, compares the income of the top 10 per cent with the income of the bottom 40 per cent, where higher values indicate higher levels of inequality. The Palma Ratio for Bangladesh has shown a consistent upward trend throughout the past two decades, reaching a historic peak at 3.18 in 2022 compared to 1.68 in 1992 (Figure 2.8). This observed trend implies the expansion of the economic divide and a marked wealth concentration in the hands of a few, while the broader economic base faces diminishing financial prospects for upward mobility.

Figure 2.8: Palma Ratio for Bangladesh
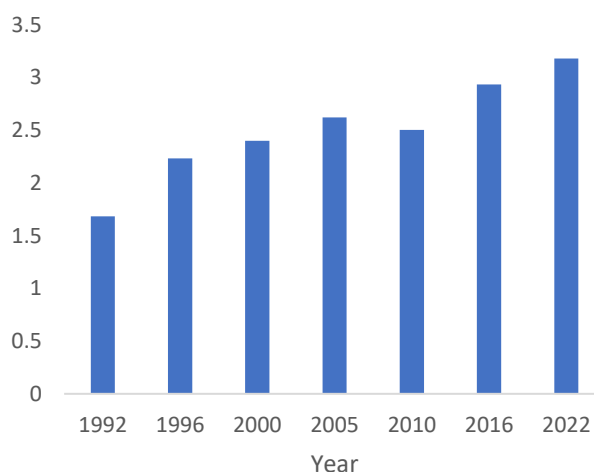
Source: Authors' analysis using HIES, various years, BBS

III.   Related literature

The impact of indirect taxation on poverty, inequality, and economic growth has been the subject of extensive research, with scholars employing various methodologies and focusing on diverse geographical contexts. The thematic analysis of these studies reveals nuanced and sometimes contrasting findings, providing a comprehensive understanding of the multifaceted relationship between indirect taxes and key economic indicators. This study contributes to the literature by

providing evidence of higher poverty because of a greater reliance on indirect taxes in Bangladesh using household-level microdata. In addition, it shows that the dependency on indirect taxation for government revenue leads to higher poverty and inequality but lower economic growth. A brief discussion of studies on these issues is provided in this section.

Effects of taxation on poverty and inequality

A comprehensive investigation regarding the effect of fiscal policy on the redistribution of income and poverty in South Africa was carried out by Maboshe and Woolard (2018). The findings of the paper indicate that direct taxes as well as cash transfers are progressive in general and can play a pivotal role when it comes to the reduction of inequality as well as poverty. The burden of indirect taxation falls predominantly on the consumers. Low-income earners spend larger portions of their entire earnings on consumption, therefore they pay a greater portion of their income in indirect taxes compared to their wealthier counterparts. This disproportionate burden on lower-income earners aggravates disparity in income distribution, limiting their capability to invest in accumulating physical capital or enhancing human capital.

In contrast, a direct tax is levied on entities based on their ability to pay, higher income earners bear more burden compared to low-income earners. Therefore, it has positive income redistribution effects, helping in combating inequality and fostering sustainable economic growth. This strong relationship between indirect taxation and income inequality is confirmed by the empirical findings of Prasad (2008) and Barnard (2010). Woo et Al. (2021) found that a 0.4-0.9 per cent increase in inequality is associated with a 1 percentage point increase in indirect taxes as a percentage of GDP. Similarly, Anyaduba and Otulugbu's (2019) investigation in Nigeria found varied effects of specific taxes on income inequality, with Company Income Tax having a negative impact and Customs and Excise Duties having a positive effect.

Khan et al. (2021) analysed the impacts of different types of taxation on income inequality in Pakistan, a country where the present tax structure has been predominantly regressive. Their major findings suggest that direct tax, progressive and equitable in nature, diminishes income inequality as higher levels of income are taxed at higher rates, while low-income levels are taxed at lower rates. On the other hand, indirect taxes, regressive in nature, accentuate income inequality as people of all income groups pay the same rate, meaning, take up a greater portion of the earnings of low-income earners compared to the high-income earners. They also highlighted the significant efficacy of increased government spending on development projects to lessen the widening income disparity. However, they also argue that a high budget deficit may further induce inequality if public debt is settled through indirect taxes. Therefore, it is imperative to keep public debt in check alongside increased expenditures on development projects.

Lustig et al. (2014) focused on analyzing the incidence of taxation on different income groups in six different Latin American countries. According to their study, direct taxes and cash transfers were linked to poverty alleviation and diminished income inequality in Argentina, Brazil, and Uruguay. On the other hand, the redistributive impacts of the mentioned fiscal measures were less pronounced in Mexico, Bolivia, and Peru due to the low GDP share of direct taxes. Notably, the effects of cash transfers were found to be progressive in all 5 countries, however, Bolivia was the only exception due to an ineffective targeting of the poor. Subsequently, they found that the

regressive effects of indirect taxation almost entirely wiped out the poverty-diminishing effects of cash transfers in two countries, namely Bolivia and Brazil. Moreover, the study discovered that the positive redistributive impacts of in-kind transfers are more impactful than cash transfers in all six countries. As established by previous literature, they also emphasised the significance of fiscal intervention in tackling poverty and inequality. However, the analysis excluded factors like behavioural, lifecycle, or general equilibrium effects.

However, some studies find that indirect taxation could reduce income inequality, especially in developed countries. Ciminelli et al. (2019) investigated the effects of fiscal consolidations on inequality across 16 OECD countries, highlighting that tax-based consolidations, including indirect taxes like VAT, reduce both market and disposable income inequality. The study emphasises a trade-off between equity and efficiency, with certain indirect taxes, particularly VAT, showing a relatively large effect in reducing income inequality without significant contractionary effects on economic activity. In contrast, Pugachev (2023) focused on Russia and found that indirect taxation, specifically VAT, did not substantially influence income inequality. The study suggested that factors beyond VAT, such as the progressive scale for personal income tax, played a more significant role in observed decreases in inequality.

Alavuotunki, Haapanen, and Pirttilä (2019) explored the introduction of value-added tax (VAT) in various countries, concluding that, on average, VAT adoption did not necessarily result in higher income inequality. However, they highlighted the complexity of the impact across different measurement methods and income levels, noting an increase in inequality when using disposable income as a basis. Similarly, Mahler and Jesuit's (2018) study on developed countries revealed a positive correlation between the share of indirect taxes in GDP, including VAT, and the effectiveness of pre-government inequality reduction. The research underscores the intricate dynamics influencing the feasibility of sustaining a high indirect tax burden for financing social transfers.

Yaru and Adisa-Ohiaka's (2022) study across Sub-Saharan African countries revealed nuanced relationships between indirect taxes and poverty. While the impact of domestic goods and services taxes and customs and import duties on poverty was negative, it was not statistically significant, except in one model. Government expenditure on education and real GDP per capita had negative and significant impacts on poverty, suggesting potential avenues for poverty alleviation. Choga and Giwa's (2023) study in seven African countries found a positive and significant relationship between property tax and income redistribution in the long run. This underscores the potential role of specific taxes in shaping long-term income distribution outcomes. Analogously, Maskaeva, Mmasa, and Msafiri (2021) analysed the impacts of indirect tax benefits on income distribution and poverty in Tanzania, emphasising the positive impact of specific reforms on income distribution and poverty reduction.

Thilanka and Ranjith's (2021) analysis in Sri Lanka highlighted the negative impact of direct taxes and the positive impact of indirect taxes and tax non-compliance on income inequality, emphasising the need for a nuanced understanding of tax structures. Deyshappriya's (2018) study in Sri Lanka revealed that VAT increased the probability of extreme poverty, poverty, and vulnerability, emphasising the need for policymakers to consider the redistributive impact of VAT, particularly on vulnerable populations. Oueslati et al.'s (2017) cross-country analysis across OECD

countries highlighted the nuanced relationship between taxes on energy products and income inequality, emphasising the role of revenue recycling mechanisms in mitigating the negative impact of energy taxes.

Impact of taxation on economic growth

Several studies explore the impact of various types of taxation on economic growth. Egbuhuzor and Tomquin (2021) investigated the effect of indirect taxes on economic growth in Nigeria, finding a negative and insignificant effect of value-added tax on GDP and a positive and significant effect on the human development index. Similarly, Stoilova and Patonov (2013) explored the impact of taxation on economic growth in the European Union, highlighting the importance of considering various components of tax revenue, including indirect taxes, in understanding their influence on GDP growth.

Jalata's (2014) study in Ethiopia found a positive impact of VAT on GDP growth, emphasising VAT's substantial contribution to the economy. However, concerns were raised about regressive patterns resembling sales tax, indicating the need for further examination of its distributional effects. Maina's (2017) analysis of consumption taxes in Kenya revealed their regressive nature, positively correlated with GDP per capita. Akhor's (2016) study in Nigeria revealed a significant negative impact of VAT on the Real Gross Domestic Product (RGDP). Elshani and Pula's (2023) exploration of the effects of different tax types on economic growth in Eurozone countries highlighted the varying impacts of personal income tax, social security contributions, property tax, value-added tax, and corporate income tax. The study underscored the significance of considering the diverse components of tax structures in shaping economic growth trajectories. Hassan, Oueslati, and Rousselière's (2020) investigation into the impact of energy-based taxes on economic growth emphasised the short-term negative effect of energy taxes, dependent significantly on the economy's reliance on polluting energy sources.

Grdinić, Drezgić, and Blažić's (2017) exploration of tax structures in Central and Eastern European (CEE) countries revealed significant differences in the effects of tax structure on economic growth between developed and emerging economies. Ahmad, Sial, and Ahmad's (2018) empirical analysis of the relationship between indirect taxes and economic growth in Pakistan highlighted the need for a comprehensive understanding of their consequences on economic growth.

IV. Data and estimation frameworks

This study examines the impact of the indirect tax burden on the levels of poverty among households in Bangladesh. We have employed data from the Household Income and Expenditure Survey (HIES) for the years 2000, 2005, 2010, and 2016. The initial phase of data processing involved addressing missing values and eliminating duplicate entries. For the calculation of Value Added Tax (VAT), we identified eligible products based on the VAT documents provided by Bangladesh Customs. Subsequently, we calculated the aggregate yearly VAT payments for each household, as well as their annual income. The indirect tax burden was defined as the annual percentage share of income paid as VAT by each household. Additionally, relevant control variables were extracted from the survey.

To construct the poverty variable, we initially computed the income percentile for each household, followed by generating a dummy variable based on the household's corresponding poverty level. Household income was categorised into 100th percentile groups for each corresponding HIES dataset. The average of all variables was then calculated based on the 100th percentile of income, household gender, and urban-rural status for each dataset. Moreover, a Pseudo panel was constructed by appending the four processed datasets for a comprehensive analysis.

In the context of cross-country analysis, this study employs the Gini Index and Poverty Headcount Ratio at the national poverty line as dependent variables, focusing on measuring inequality. Additionally, data on per capita GDP, the total share of indirect taxes, GDP growth, and tax revenue as a percentage of GDP were retrieved. All data for the cross-country analysis were sourced from the World Development Indicators. This holistic approach enables us to assess the impact of indirect taxation on poverty and inequality at both the household and national levels.

To assess the effects of the household's indirect tax burden on poverty levels, we use the following panel data model:

$$\text{Poverty}_{it} = \alpha + \beta_1(\text{IDB})_{it} + \beta_2 \log(\text{IC})_{it} + \beta_3(\text{EDU})_{it} + \beta_4(\text{SSNP})_{it} + \beta_5(\text{HHZ})_{it} + \beta_6(\text{ADR})_{it} + \vartheta_{it} + \epsilon_{it}$$
(1)

In this context, Poverty refers to the poverty rate within the i th percentile group at time t. IDB denotes the household's annual burden of indirect taxes. IC and EDU denote the income and education levels of the household, respectively. The term (HHZ) represents the household size. SSNP serves as a dummy variable indicating whether the household is a recipient of social safety net benefits. ADR corresponds to the age dependency ratio, and ϑ represents the fixed effect for the unit, capturing unobserved individual-specific characteristics that remain constant over time.

In the context of cross-country analysis, we applied the panel data model to examine the impact of indirect tax share. This section of the study delves into the repercussions of indirect tax share on multilevel inequality indices, as well as its impact on a country's economic growth.

$$\text{Gini Index}_{it} = \alpha + \beta_1(\text{TIDBS})_{it} + \beta_2 \log(\text{GDPC})_{it} + \beta_3(\text{TRS})_{it} + \vartheta_{it} + \epsilon_{it} \quad (2)$$
$$\text{PHR}_{it} = \alpha + \beta_1(\text{TIDBS})_{it} + \beta_2 \log(\text{GDPC})_{it} + \beta_3(\text{TRS})_{it} + \vartheta_{it} + \epsilon_{it} \quad (3)$$
$$\text{ECG}_{it} = \alpha + \beta_1(\text{TIDBS})_{it} + \beta_2 \log(\text{GDPC})_{it} + \beta_3(\text{TRS})_{it} + \vartheta_{it} + \epsilon_{it} \quad (4)$$

In this study, the Gini Index is utilised to denote the Gini coefficient for country i at time t, serving as a measure of income inequality. The Poverty Head Count Ratio (PHR) represents the proportion of the total population living in poverty at the national level poverty line. Economic Growth (ECG) is indicated by the GDP growth rate, reflecting the rate of economic expansion.

The variables TIDBS and GDPC are employed to represent the share of total indirect tax burden and per capita GDP, respectively. These variables provide insights into the tax structure and income level of a country. TRS is used to denote the share of total tax revenue, offering a measure of the government's fiscal capacity. The parameter ϑ is incorporated as a time-fixed effect for the unit, capturing unobserved individual-specific characteristics that vary over time. This allows for the control of potential confounding factors that are not directly measured in the study, thereby enhancing the robustness of our findings.

In our study, we employ both pseudo and cross-country panel analysis, utilising fixed effects and random effects models. This approach allows us to cover a comprehensive range of analytical perspectives. Additionally, to account for potential within-cluster correlation and heteroscedasticity, we implement VCE-robust standard error adjustment, as outlined by Wooldridge(2012). This method ensures that our analysis is robust to potential deviations in the data structure, thereby enhancing the reliability of our findings.

V.   Findings

Table 5.1 presents a comprehensive overview of the temporal evolution of poverty within Bangladesh. The data illustrates a notable advancement in poverty alleviation efforts, with an average reduction rate of 51 per cent observed over the span of a decade. However, an analysis of the coefficient of variation across different years unveils an underlying issue of income inequality, indicating a skewed distribution of wealth within the population. This disparity is further underscored by the findings depicted in (Figure 5.1), which highlight a significant increase in the indirect tax burden borne by individuals belonging to the lower poverty line. The data reveals a concerning trend wherein the proportion of this tax burden relative to income has escalated by 2 to 7 per cent among the households in the lower poverty bracket. In essence, while Bangladesh has made substantial strides in reducing poverty over the past decade, the imposition of indirect taxes disproportionately affects the most economically vulnerable segments of society, exacerbating income inequality.

Table 5.1: Summary statistics of poverty

	Mean	SD	CV	Min	Max
2000	49.61	50.06	1.009	0	100
2005	40	49.05	1.226	0	100
2010	30.92	46.28	1.496	0	100
2016	24	42.76	1.782	0	100
N	1586				

Note: The CV (coefficient of variation) is derived by dividing the Standard Deviation (SD) by the Mean.

Figure 5.1: VAT burden share based on the poverty line.
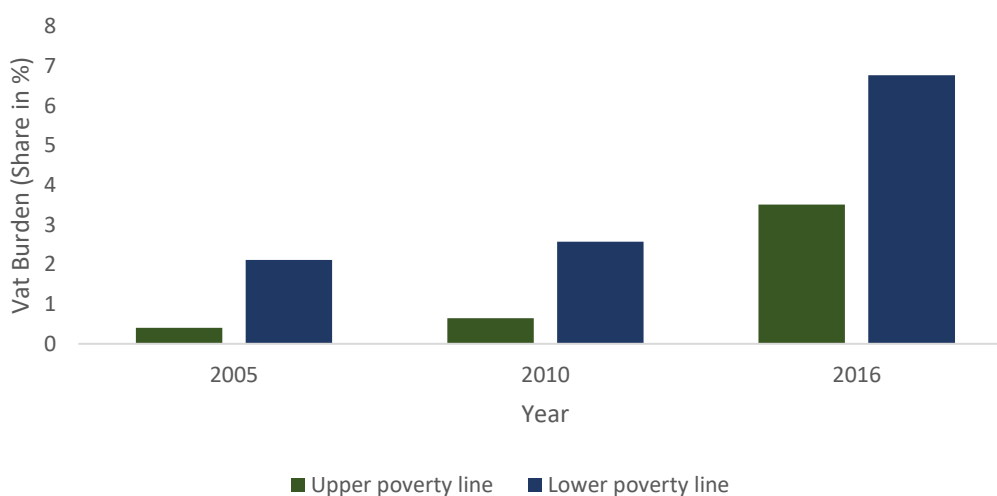
Source: Authors' analysis using the Household Income and Expenditure Surveys

To highlight the uneven impact of indirect taxation on the poorest segments of society, we have quantified the cumulative Value-Added Tax (VAT) payment as a fraction of the annual income of households (Figure 5.2). The weight of indirect taxation is inordinately high for households in the lower income deciles. This leads to households with lower income disbursing a larger share of their annual income as indirect tax, thereby increasing the income inequality in Bangladesh. The data suggests that the poorest decile households bear the majority share of the VAT, and this burden has been on an upward trend over the years.

Figure 5.2: Indirect Tax burden based on income percentile
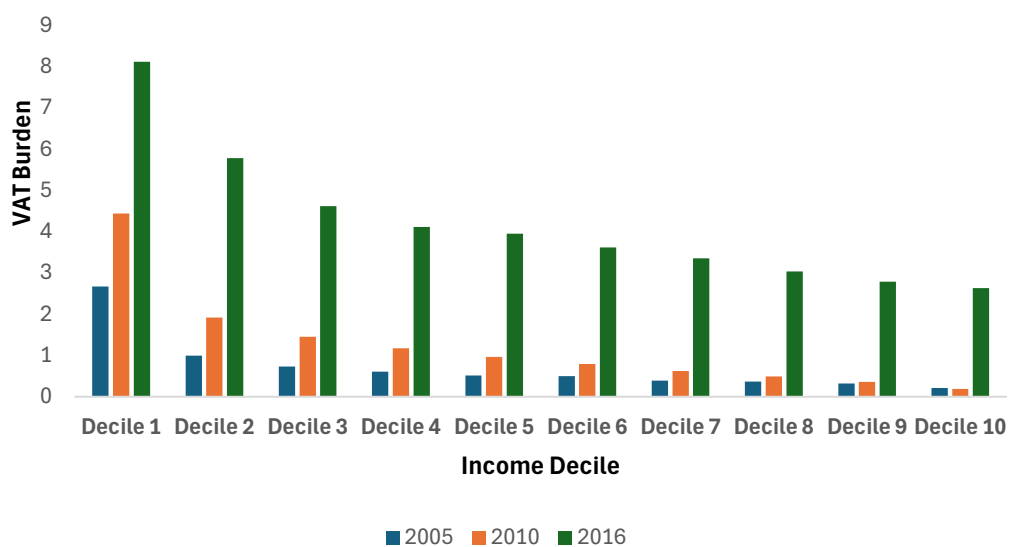
Source: Authors' analysis using the Household Income and Expenditure Surveys

Figure 5.3: Average VAT burden and poverty levels across districts in Bangladesh.
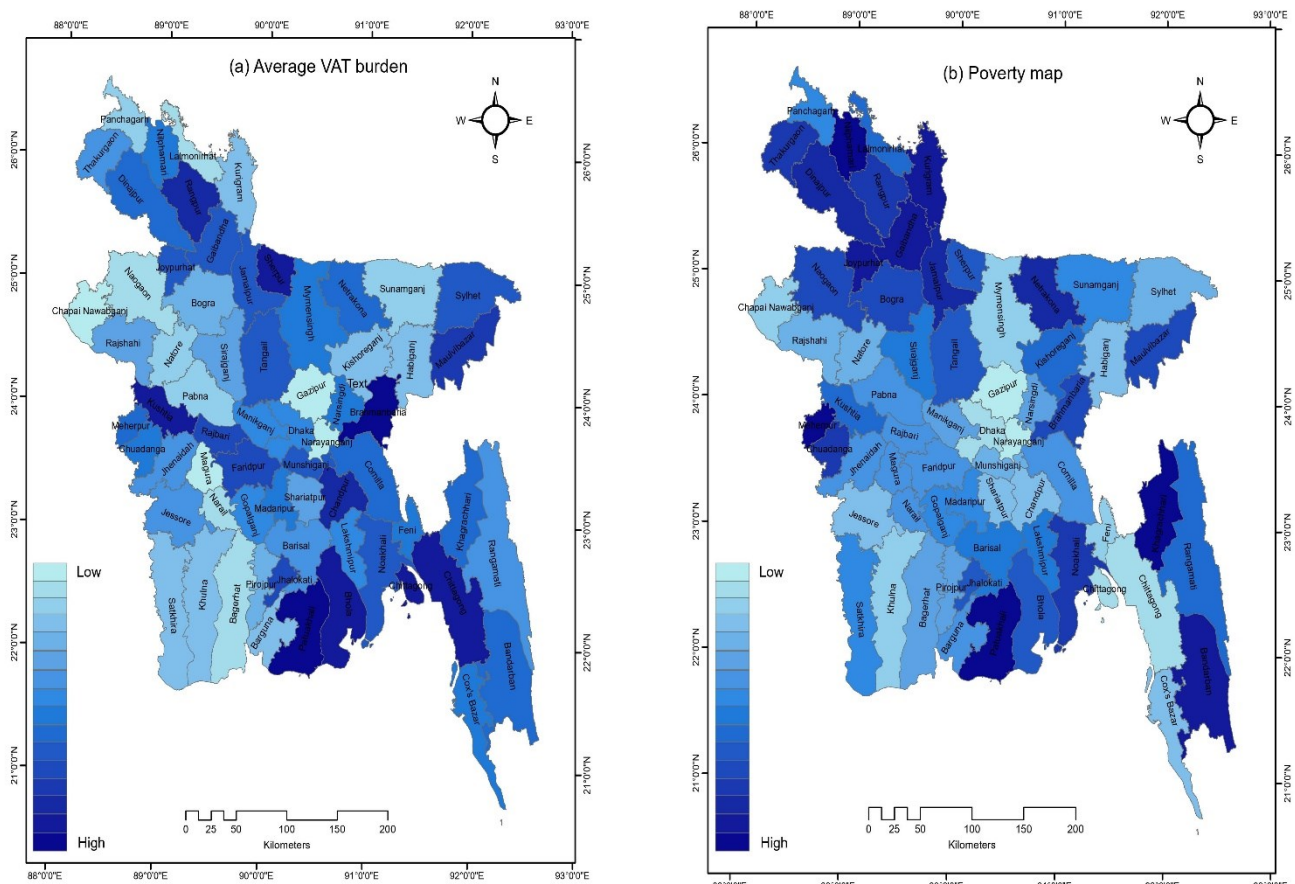
Source: Authors' analysis using the Household Income and Expenditure Surveys

The visual representation depicted in (Figure 5.5) conducts a comparative examination of the average Value Added Tax (VAT) burden and poverty levels across various districts in Bangladesh. The map on the left (a) utilises a colour gradient to categorize the districts according to their average VAT burden, with lighter hues denoting lower burdens and darker hues indicating higher burdens. A significant observation is the prevalence of a higher VAT burden in some districts in contrast to peripheral ones. The second map, right (b) shows poverty levels using a darker hue for higher poverty rates.

Comparing both maps, we notice an interesting connection: certain areas with higher value-added tax (VAT) burdens tend to have higher poverty rates, while areas with lower VAT burdens tend to have lower poverty rates. For instance, districts near the capital, such as Gazipur, Narayanganj, and Munshiganj, contribute less to the total VAT burden. However, less developed districts such as Patuakhali, and Rangpur are burdened with a disproportionately high amount of VAT. With the progressive goal of the VAT system, which includes exemptions and reduced rates for necessities, this observation is rather startling. The data's depiction of the ground reality points to a different story. There are several possible explanations for the increased VAT burden in certain districts, such as the presence of certain industries, consumption patterns, and lower income levels. Moreover, these districts also typically show greater rates of poverty.

Table 5.2: Higher indirect tax burden and its association with national poverty level increase.

	(1)	(2)	(3)	(4)	(5)
Indirect Tax Burden	0.524**	0.0356	1.318***	0.0515	0.426**
	(2.15)	(0.15)	(5.25)	(0.21)	(2.09)
Log(Income)				-25.93***	-8.439***
				(-14.16)	(-3.35)
Education				-1.615***	-0.258
				(-4.47)	(-0.46)
SSNP (1=Received SSNP, 0=otherwise)				0.0431 (0.81)	-0.0559 (-0.44)
Household Size				-2.625**	-2.150
				(-2.17)	(-1.53)
Dependency Ratio				0.140***	0.0187
				(4.52)	(0.61)
Constant	34.70***	36.06***	46.25***	330.4***	152.1***
	(17.07)	(42.61)	(35.15)	(21.25)	(5.98)
Group fixed effect	No	Yes	Yes	No	Yes
Time fixed effect	No	No	Yes	No	Yes
Observations	1580	1580	1580	1080	1080

Note: The dependent variable is the poverty rate.
*t* statistics in parentheses
$^{*}\ p < .1,\ ^{**}\ p < .05,\ ^{***}\ p < .01$

Table (5.2) presents the outcomes of the fixed effect regression analysis conducted on pseudo-panel data, derived from the most recent four rounds of Household Income and Expenditure Surveys. The analysis unveils a distinct pattern, highlighting a statistically significant positive correlation between the indirect tax burden and poverty levels. More specifically, after controlling for various household characteristics and group and time-fixed effects, a one per cent escalation in the indirect tax burden is associated with a 0.42 per cent increase in poverty levels (Column 5). This observation amplifies the potential regressive impact of indirect taxation on income distribution, thereby intensifying the existing poverty conditions. It is imperative to investigate the complex dynamics driving this relationship and to design policy measures that can effectively counteract the detrimental effects of indirect taxation on poverty.

In conjunction with the examination of the indirect tax burden, our study also explores a range of other variables. A significant finding emerges – a one per cent rise in income is associated with a substantial 8.4 per cent decrease in poverty. These findings highlight the crucial role of income growth in the broader objective of poverty reduction. Notably, the results show a negative relationship between poverty and education, indicating the critical role that education plays in lowering poverty. This research supports the notion that ending the cycle of poverty requires education.

Our pseudo-panel analysis has revealed the role of the indirect tax system in exacerbating inequality in Bangladesh. To corroborate the robustness of our findings, we have conducted a cross-country analysis. This ensures that our results are not only consistent within the context of Bangladesh but also maintain their relevance when juxtaposed with other countries. As illustrated in (Figure 5.4), it is evident that indirect tax contributes to the rise of inequality on a global scale. This figure also delineates the position of Bangladesh in this context. For instance, despite having a comparable per capita GDP to its neighbouring country, the share of the indirect tax burden in Bangladesh is significantly higher. Table 5.3 displays the results of a cross-country panel data fixed-effect regression model, with each column corresponding to a different specification for the Gini Index (a measure of inequality) as the dependent variable. The explanatory variables include the share of indirect tax in total tax revenue, the logarithm of per capita GDP, and tax revenue as a percentage of GDP.

Figure 5.4: Cross-country analysis between Indirect tax share and Per Capita GDP[3]
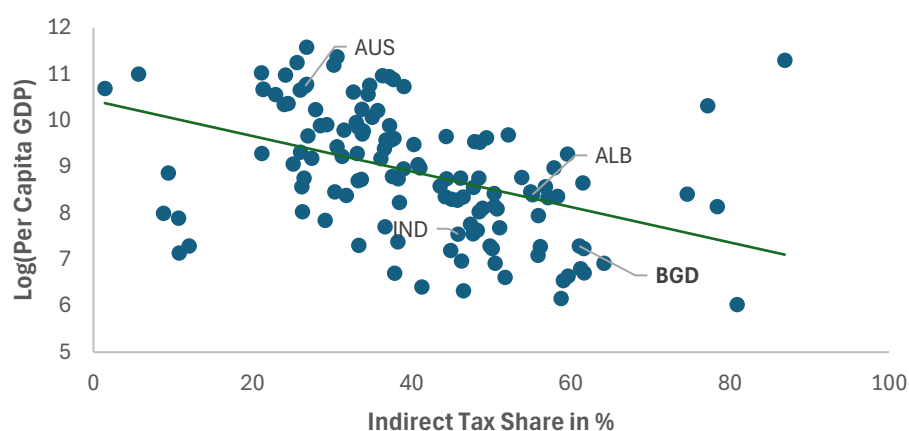
Source: Author's analysis using the data from WDI

Column 4 in Table 5.3 presents the results of the panel fixed effect regression analysis where country- and time-fixed effects are controlled for. A coefficient of 0.961, accompanied by a t-statistic of 3.02, signifies a robust and statistically significant positive correlation between the proportion of indirect tax in total tax revenue and the Gini Index. This suggests that an escalation in the indirect tax burden corresponds to an increase in income inequality. In parallel, there exists a significant negative correlation between the logarithm of per capita GDP and the Gini Index, implying a higher per capita GDP is associated with a reduction in income inequality. Regarding the total tax revenue as a percentage of GDP, a coefficient of -0.092 with a t-statistic of -2.00 indicates a statistically significant negative correlation between tax revenue and the Gini Index. This suggests that a higher ratio of tax revenue to GDP is associated with a decrease in income inequality.

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[3] Note: Countries are indicated as AUS = Australia, ALB = Albania, BGD = Bangladesh, IND = India

Table 5.3: A higher indirect tax share is associated with greater income inequality globally.

	(1)	(2)	(3)	(4)
Indirect Tax Share	0.101***	0.102***	0.0961***	0.0961***
	(7.66)	(7.51)	(7.39)	(3.02)
Log(Per Capita GDP)	-1.475***	-1.467***	-3.239***	-3.239**
	(-5.32)	(-4.57)	(-5.87)	(-2.16)
Tax revenue (% of GDP)	-0.0735***	-0.0724***	-0.0921***	-0.0921**
	(-3.00)	(-2.86)	(-3.77)	(-2.00)
Constant	48.24***	47.63***	58.12***	58.12***
	(18.03)	(15.03)	(11.44)	(4.49)
Country Fixed Effects	No	Yes	Yes	Yes
Time Fixed Effect	No	No	Yes	Yes
Observations	1455	1455	1455	1455

Note: The dependent variable is the Gini coefficient.
t statistics in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

In Table 5.4, where the dependent variable is the headcount poverty ratio, the results reveal a significant positive correlation between the proportion of the indirect tax and the headcount ratio of poverty. This implies that an escalation in the indirect tax burden corresponds to an increase in the incidence of poverty. The results also demonstrate a robust negative correlation between per capita GDP and the Head Count Ratio, suggesting that a higher per capita GDP is associated with a lower incidence of poverty. Lastly, a significant negative correlation is observed between tax revenue as a percentage of GDP and the Head Count Ratio, indicating that a higher ratio of tax revenue to GDP is associated with lower poverty rates.

Table 5.4: A higher indirect tax share leads to higher poverty rates across countries.

	(1)	(2)	(3)	(4)
Indirect Tax Share	0.107***	0.0989***	0.0832**	0.0832
	(2.86)	(2.72)	(2.31)	(1.13)
Log(PerCapita GDP)	-12.60***	-21.75***	-23.14***	-23.14***
	(-17.37)	(-22.46)	(-16.44)	(-5.94)
Tax revenue (% of GDP)	-0.0839*	-0.162***	-0.180***	-0.180**
	(-1.83)	(-3.73)	(-4.15)	(-2.31)
Constant	130.9***	219.6***	239.9***	239.9***
	(18.65)	(23.17)	(18.58)	(6.68)
Group fixed effect	No	Yes	Yes	Yes
Time fixed effect	No	No	Yes	Yes
Observations	802	802	802	802

Note: The dependent variable is the poverty headcount ratio.
t statistics in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

Does the type of taxation have any impact on the economic growth of a country? Table 5.5 presents the results answering this question. The main finding in Table 5.5 is the significant positive association between GDP growth and total tax revenue as a percentage of GDP, while there is a negative relationship between GDP growth and the share of indirect tax in total tax revenue, although it is not statistically significant at conventional levels. This suggests a potential but weak association between higher indirect tax shares and slower GDP growth. Thus, overreliance on indirect taxation for revenue generation could also potentially undermine economic growth.

GDP per capita has a negative and significant impact on GDP growth and this is intuitive as countries with higher per capita GDP generally have lower GDP growth rates, whereas developing countries with relatively lower per capita GDP achieve a higher rate of GDP growth. In order to observe the true impacts, we have purposefully left the crisis out of our analytical model.[4] This methodological choice enables us to concentrate on normal operational settings, guaranteeing that the exceptional circumstances that usually typify a crisis period do not distort or skew our findings.

The results indicate that the share of indirect tax in total tax revenue has a consistent positive association with income inequality (Gini Index) and poverty (Headcount Ratio). Higher per capita GDP is consistently associated with lower income inequality and a lower incidence of poverty. The relationship between tax revenue as a percentage of GDP and GDP growth is nuanced. While higher tax revenue relative to GDP is associated with lower income inequality and poverty, it is also positively linked to GDP growth.

Table 5.5: A higher indirect tax share could lower the economic growth of a country.

	(1)	(2)	(3)	(4)
Indirect Tax Share	0.0117	-0.0222	-0.0185	-0.0185
	(1.15)	(-1.10)	(-0.92)	(-0.58)
Log(Per Capita GDP)	-0.764***	-8.249***	-9.323***	-9.323***
	(-5.98)	(-8.47)	(-7.12)	(-2.87)
Tax revenue (% of GDP)	-0.0148	0.0690**	0.0747**	0.0747
	(-0.74)	(2.07)	(2.23)	(1.33)
Constant	9.881***	76.08***	85.62***	85.62***
	(7.68)	(8.81)	(7.46)	(3.04)
Group Fixed Effects	No	Yes	Yes	Yes
Time Fixed Effect	No	No	Yes	Yes
Observations	1270	1270	1270	1270

Note: The dependent variable is the GDP growth rate.
t statistics in parentheses
$^{*} p < .1,$ $^{**} p < .05,$ $^{***} p < .01$

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[4] The estimation does not include the financial crisis of 2008–2009 or the COVID-19 shock that began in 2019.

The findings suggest that policies focusing on reducing the reliance on indirect taxes and promoting higher per capita GDP can contribute to mitigating income inequality and poverty on a cross-country level. Additionally, the positive association between tax revenue and GDP growth highlights the complex interplay between fiscal policies and economic development.

In essence, our cross-country analysis broadens the scope of our research, unveiling intricate connections between indirect taxation, economic indicators, and inequality dynamics. The robust positive impact of the indirect tax burden on multidimensional inequality indices accentuates the need for nuanced policy considerations. Simultaneously, the role of total tax revenue as a mitigating force highlights the potential of a comprehensive tax strategy in fostering economic equality in a country.

VI.   Discussion and Policy Suggestions

The pseudo-panel data analysis, conducted using nationally representative household data, clearly shows that indirect taxes exacerbate poverty in Bangladesh. Furthermore, the findings from the cross-country panel regression indicate that indirect tax is associated with increased poverty and inequality, as well as reduced GDP growth in different nations. Keeping the level of indirect taxation constant, an increase in overall tax revenue leads to a faster rate of GDP growth. Therefore, based on our study, it can be deduced that increasing tax revenue while keeping indirect taxation at the same level or reducing reliance on indirect taxation can assist in achieving two goals simultaneously. Firstly, it will contribute to the reduction of poverty and inequality inside a nation. Secondly, it can facilitate the attainment of higher rates of income growth for a country.

Currently, the tax system in the country is highly regressive, as indicated by the National Board of Revenue (NBR) report, with indirect taxes accounting for 66 per cent of the total tax revenue received in 2023. This article argues for the implementation of direct taxation as a vital tool in tackling the growing disparity in income. It also emphasizes the importance of direct taxation in strengthening Bangladesh's efforts to generate money. Recognizing the NBR's recent objective to increase the percentage of direct tax in the overall tax income from 35 per cent to a challenging 70 per cent, it is crucial to acknowledge that attaining this goal will necessitate a steady and planned method. Achieving this objective is not an immediate result, but rather a sustained effort over a prolonged period. Therefore, it is necessary to establish a set of systematic policy measures to aid the achievement of this goal.

The challenging objective of augmenting direct taxation cannot be promptly achieved and requires a significant amount of time. Attaining this objective is dependent on executing clearly stated policy measures within specified periods. An all-encompassing plan that includes strategies for the short, medium, and long term is crucial to properly manage the process. Hence, it is crucial to establish a set of progressive policy measures that are essential for achieving this goal. For instance, a particular objective could be to raise the share of direct tax by 5 percentage points throughout the 8th Five-Year Plan duration (2024-25). Drawing inspiration from Tanzania's approach (Maskaeva, Mmasa, & Msafiri, 2021), Bangladesh can undertake a phased tax reform

initiative spanning 10-15 years. The early phases would give priority to broadening the tax base and modernizing tax administration, while the following stages would concentrate on addressing corruption and reorganising exceptions as well as incentives through systematic evaluations.

Additionally, tax exemptions in Bangladesh are random and not based on any evaluation, and are often influenced by the elite stakeholders to favour a certain group of people. Tax incentives and special provisions lower revenue collection by letting many people legally avoid paying taxes. Studies show that the revenue-GDP ratio would be 2 percentage points more without exemptions (Razzaque et al., 2023). The government should do a cost-benefit analysis to see the effect of all the tax incentives. Based on the analysis, the common tax exemptions should be removed or adjusted. This can be supported by reducing tax rates. Tax exemptions may not be needed for foreign investment if the corporate tax rate is adjusted.

To enhance the effectiveness of tax exemptions, it is proposed to restructure the existing framework by prioritising exemptions for activities that directly contribute to job creation. This involves a comprehensive review and reduction of current exemptions, with a focus on redirecting fiscal incentives toward sectors and individuals engaged in employment-generating endeavours. The policy suggests introducing targeted exemptions for businesses, startups, and individuals involved in labour-intensive operations, fostering economic growth and mitigating unemployment, and hence lowering poverty and inequality. Clear and transparent eligibility criteria should be established, and periodic evaluations should be ensured to align exemptions with evolving economic priorities. For instance, SMEs account for approximately 25 per cent of Bangladesh's GDP (Hossin et al., 2023). By providing tax incentives to these entities, the government could stimulate further growth and job creation. This will work as a domino effect in terms of boosting revenue in the country.

In 2019-20, the COVID-19 pandemic led to a reduction of the top base personal income tax rate from 30 per cent to 25 per cent(NBR, 2020). However, the economy has recovered from the pandemic-related economic crises, and the top-income tax rate does not impact the low- and middle-income groups. Therefore, the government should consider restoring the top personal income tax rate to 30 per cent. Based on HIES 2016 data, this can increase the revenue collection from personal income tax by about 0.5 per cent of GDP (Razzaque et al., 2023). Along with raising the top income tax rate, the government should also revise the minimum tax threshold. The current tax-free limit is Tk. 3,50,000(NBR, 2023). This should be increased due to the high inflation and rising cost of living.

A critical challenge in raising direct tax revenue in Bangladesh is a general tendency of not reporting income accurately and not paying the fair share of their income in tax. Out of the total Tax Identification Number (TIN) holders registered, more than two-thirds do not pay taxes (NBR, 2024). A policy needs to be adopted to encourage these TIN holders to file tax returns and pay the right amount of tax. For corporate income tax, 2.73 lakh traders have registered with the Registrar of Joint Stock Companies and Firms (RJSCF). But only 11 per cent (about 30,000) of them paid corporate taxes in 2021-22 (Razzaque et al., 2023). Many registered traders, like personal

income taxpayers, are not in the corporate tax net. All registered businesses and TIN holders should submit the tax return, no matter how much income they have.

Currently, there is no way to find out and inform the taxpayers (individuals and businesses) who do not file the return. The registered taxpayers, both individuals and businesses, should get notifications from an automated system, with less human involvement. The automated system can also send regular reminders for return filing. The businesses registered with the Registrar of Joint Stock Companies and Firms (RJSCF), who do not pay corporate taxes, are easier to track. They should be monitored frequently and should be included in the tax net. A high fine or penalty for tax evasion or avoidance will help increase the tax base and tax net at the same time.

A potential way to enhance the share of direct tax in total tax revenue could be a wealth tax. However, Bangladesh lacks a legal basis for such a tax. The current wealth surcharge imposed by the government has many drawbacks. It is paid by a small number of people and yields very little revenue. The surcharge is based on the deed value of the asset but applied to the total tax liability (NBR, 2024). Moreover, many assets are inherited, and their deed values are much lower than the market values. Hence, the government should urgently conduct a thorough study to explore the feasible alternatives of wealth tax for Bangladesh. One option could be to apply a wealth surcharge on the market value of the asset, although it is hard to ascertain the true value of the asset. Nevertheless, the government has recently declared its intention to reform the land/asset registration system according to the market price. It is currently developing a policy and guideline to establish the actual market price of assets. This could be used to impose a wealth surcharge on assets.

VII.   Conclusion

This study investigates the intricate dynamics of indirect taxes and their impact on poverty in Bangladesh and on poverty, income inequality, and economic growth across countries. Our findings, drawn from both pseudo-panel data analysis and cross-country panel regressions, underscore the detrimental consequences of high indirect taxation. A one per cent increase in the indirect tax burden correlates with a substantial rise in poverty levels. Moreover, the global pattern reveals that countries heavily dependent on indirect taxation exhibit higher poverty rates and increased inequality.

The paper advocates for a nuanced reassessment of the tax structure in Bangladesh, emphasising a more equitable distribution of the tax burden. The regressive nature of the current tax system, with indirect taxes comprising 66 per cent of total revenue, necessitates a shift towards direct taxation. Our policy suggestions highlight the importance of a gradual and strategic approach. These include restructuring the tax framework, prioritising exemptions for activities that contribute to job creation, revising tax thresholds, and implementing measures to curb tax evasion.

The analysis also advocates for a re-evaluation of random and unexamined tax exemptions, proposing a comprehensive review to ensure fiscal incentives align with employment-generating endeavours. This includes targeted exemptions for businesses, startups, and individuals engaged in labour-intensive operations, promoting economic growth and reducing poverty and inequality.

Considering the impact of the COVID-19 pandemic, the paper recommends restoring the top personal income tax rate to 30 per cent to enhance revenue collection. Additionally, addressing the general tendency of underreporting income is crucial. The paper suggests implementing automated systems to notify and remind taxpayers, with penalties for evasion, fostering tax compliance. In addition, to enhance the share of direct tax in total revenue, a wealth tax is proposed, acknowledging the current lack of a legal basis. The study encourages a thorough exploration of alternatives, including a wealth surcharge based on market values.

In essence, our research contributes valuable insights for effective policy interventions, advocating for a holistic and strategic approach to taxation in Bangladesh. Achieving a balance between direct and indirect taxes emerges as a key strategy to alleviate poverty, reduce inequality, and foster sustainable economic growth in the country.

VIII.   References

Ahmad, S., Sial, H. M., & Ahmad, N. (2018). Indirect taxes and economic growth: An empirical analysis of Pakistan. Pakistan Journal of Applied Economics, 28(1), 65-81.

Akhor, S. O., & Ekundayo, O. U. (2016). The impact of indirect tax revenue on economic growth: The Nigeria experience. Igbinedion University Journal of Accounting, 2(08), 62-87.

Alavuotunki, K., Haapanen, M., & Pirttilä, J. (2019). The Effects of the Value-Added Tax on Revenue and Inequality. The Journal of Development Studies, 55(10), 2148-2166.

Anyaduba, J. O., & Otulugbu, P. O. (2019). Taxation and income inequality in Nigeria. Accounting and Finance Research, 8(3), 118-135.

Choga, I., & Giwa, F. (2023). The Effect of Property Tax on Income Redistribution in Selected African Countries. Sustainability, 15(7), 5891.

Ciminelli, G., Ernst, E., Merola, R., & Giuliodori, M. (2019). The composition effects of tax-based consolidation on income inequality. European Journal of Political Economy, 57, 107-124.

Deyshappriya, N. P. R. (2018). Impact of Value Added Tax on Poverty in Sri Lanka. Journal of Management and Tourism Research, 2(1), 12–21.

Egbuhuzor, C. A., & Tomquin, A. I. (2021). Effect of indirect taxes on economic growth in Nigeria. Journal of Accounting and Financial Management, 7(1), 1-10.

Elshani, A., & Pula, L. (2023). IMPACT OF TAXES ON ECONOMIC GROWTH: AN EMPIRICAL STUDY IN THE EUROZONE. Economic Studies, 32(2).

Grdinić, M., Drezgić, S., & Blažić, H. (2017). An Empirical Analysis of the Relationship between Tax Structures and Economic Growth in CEE Countries 1. Ekonomicky Casopis, 65(5), 426.

Hassan, M., Oueslati, W., & Rousselière, D. (2020). Exploring the link between energy based taxes and economic growth. Environmental Economics and Policy Studies, 22, 67-87.

Hossin, M. M., Azam, M. S., & Hossain, M. S. (2023). Defining SMEs in Bangladesh's Economy: Their Present Status and Contribution.

Jalata, D. M. (2014). The role of value added tax on economic growth of Ethiopia. Science, Technology and Arts Research Journal, 3(1), 156-161.

Khan, S., & Padda, I. (2021). The Impact of Fiscal Policy on Income Inequality: A Case Study of Pakistan. THE LAHORE JOURNAL OF ECONOMICS. https://doi.org/10.35536/lje.2021.v26.i1.a3.

Lustig, N., Pessino, C., & Scott, J. (2014). The Impact of Taxes and Social Spending on Inequality and Poverty in Argentina, Bolivia, Brazil, Mexico, Peru, and Uruguay: Introduction to the Special Issue. Public Finance Review, 42, 287 - 303. https://doi.org/10.1177/1091142113506931.

Maboshe, M., & Woolard, I. (2018). Revisiting the impact of direct taxes and transfers on poverty and inequality in South Africa. WIDER Working Paper. https://doi.org/10.35188/UNU-WIDER/2018/521-3.

Maina, A. W. (2017). The effect of consumption taxes on poverty and income inequality in Kenya. International Journal of Accounting and Taxation, 5(2), 56-82.

Mahler, V. A., & Jesuit, D. K. (2018). Indirect taxes and government inequality reduction: A cross-national analysis of the developed world. Journal of Income Distribution, 26(2), 1-26.

Maskaeva, A., Bochkaeva, Z., Mmasa, J., & Msafiri, M. (2022). The impact of indirect tax on income distribution and poverty in Tanzania. Annals of Public and Cooperative Economics, 93(1), 103-128.

Oueslati, W., Zipperer, V., Rousselière, D., & Dimitropoulos, A. (2017). Energy taxes, reforms and income inequality: An empirical cross-country analysis. International Economics, 150, 80-95.

Prasad, N. (2008). "Policies For Redistribution: The Use Of Taxes And Social Transfers", International Institute for Labour Studies, Discussion Paper. No:194.

Pugachev, A. A. (2023). The Impact of Indirect Taxation on Inequality in Russia. Journal of Tax Reform, 9(1), 19-33.

Razzaque, M. A., Rahman, J., Rabi, R. I., Islam, D., & Eusuf, A. (2023). Using direct taxation to boost revenue and tackle inequality: A political economy analysis.

Stoilova, D., & Patonov, N. (2013). An empirical evidence for the impact of taxation on economy growth in the European Union. Tourism & Management Studies, 1031-1039.

Thilanka, H. R. A. C., & Ranjith, J. G. S. (2021). The Effect of Tax Composition on Income Inequality: Sri Lankan Experience. Economic Research, 8, 2.

Wooldridge, Jeffrey M., 1960-. (2012). Introductory econometrics : a modern approach. Mason, Ohio :South-Western Cengage Learning,

Yaru, M. A., & Adisa-Ohiaka, U. (2022). Indirect Taxation and Poverty in Sub-Saharan Africa: An Empirical Evidence from Panel Data Analysis. African Journal of Economic Review, 10(5), 26-43.