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Determinants of Effective Tax Rate: Empirical Evidence From Selected Manufacturing Industries in Bangladesh

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ABSTRACT

Purpose : The objective of this study is to conduct an empirical investigation of financial and operational firm-specific factors that have an impact on the effective tax rate (ETR) for Bangladeshi manufacturing firms operating in a variety of industries.
Method : The study solely focused on three different production industries: Pharmaceuticals and Chemicals, Engineering, and Ceramics. At least six years' set of panel data have been collected from each industry between 2016 and 2021 in order to conduct an analysis of the panel corrected standard error model (PCSE). Thus, the PCSE model is used to conduct an analysis on a total of 265 observations derived from 44 different company listed in DSE.
Findings : Out of eight financial and operational factors, firm size and profitability has a significant positive correlation with ETR in practically every sector separately and collectively. The findings are supported by political cost theory that suggests large firms have to pay more taxes due to political attention. One exception has been found regarding Ceramics sector where firm size has insignificant negative impact on ETR. This is reinforced by the political power theory, which states that politically influential corporations are less likely to voluntarily pay taxes because of the incentives provided by the power they wield in politics. On the other hand, Interest coverage ratio, Interest to sales ratio, capital intensity, firm age leverage has also significant impact on the effective tax rate in both model ETR1 and ETR2 differently across sectors. This study also concludes that there is variation among industry to industry and little bit of year indicators.
Novelty : The study investigates the factors of manufacturing companies empirically and contributes to the variety of taxation issues among various manufacturing sectors. According to the authors' best knowledge, there has been very little research on taxes, hence this study is a completely new contribution to Bangladesh's manufacturing sector.

INTRODUCTION

Bangladesh is a rapidly developing country in South Asia and one of the emerging economies in the world currently with lots of prospects. It is operating extremely well in all regards and moving in the direction of becoming a developing country by 2026 and achieving High-Income Country (HIC) status by 2041. Being a tax-driven economy, the harsh reality is that the tax to GDP ratio of this country is one of the lowest comparing to other countries which is the major impediment in flourishing the economy. Where Taxation is referred to as one of the most important sources of government revenue for meeting public requirements, notably in the social, economic, and political spheres, the current taxation system in Bangladesh faces several challenges and concerns. These include low efficiency, inadequate revenue collection, a complex tax code, corruption, inequality, a limited tax base, and a lack of digitalization (Islam et al., 2022). As a result, the effectiveness of the tax system in Bangladesh is questionable, with many taxpayers struggling to comply with the Tax Ordinance, 1984 and the government facing challenges in collecting adequate revenue to fund development projects.

Compared to other countries, Bangladesh's corporate taxes are getting harder to deal with. Some companies try to avoid paying their proper proportion of taxes by evading taxes. Where others try to reduce their tax liability

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by tax planning or tax avoidance, violating the true intention of the tax law. Because, taxing a corporation is an important part of any effective tax system. The taxation system has a significant impact on the decisions made by businesses with regard to the mobility of capital. It has always been a strategic concern not only for the corporations but also for the policy makers. Every country has a significant link between tax revenue collections and economic development, which is primarily dependent on good tax planning, experienced and up-to-date tax administration, and proper tax collection mechanisms. Panda & Nanda (2021) showed the importance of tax performance on a number of corporate decision-making topics, including financing long-term assets, strategic mergers and acquisitions, and dividend policy structuring. Taking these troubles into account, it is important to figure out the factors that affect the corporate taxation system, which can be measured by calculating the effective tax rate of a corporation.

Several studies have determined the effect of corporate taxation by using effective tax rate (ETR) as a proxy measure of tax burden. According to Nurkholisoh & Hidayah (2019), the effective tax rate takes into account all of the taxes and other financial commitments made by a taxpayer. Effective tax rate (ETR) is a measure of how much a company has to pay taxes. It is usually calculated as the ratio of current or total income tax cost to income before financial accounting taxes are taken into account (Janssen & Buijink, 1998). International Accounting Standard (IAS) 12.86 says that when figuring out the average effective tax rate, the total tax cost, both current tax and deferred tax, should be used as the numerator, and accounting profit should be used as the denominator (Kraft, 2014).

Current tax is the amount of tax that is expected to be paid or recouped based on taxable profits or losses for a given period. On the other hand, taxation is affected by the differences between a company's financial balance sheet and its tax balance sheet, which is shown by deferred taxes (Kraft, 2014). As an economic operators ETR may be of interest to public decision-makers since it can be used as an economic policy instrument (Poli, 2019). Because taxes are the cost of a firm which induce them to reduce taxes as much as possible by techniques like tax management, tax planning etc. As a result, the drivers of ETR are essential for the firm's financial decision making.

Inferring from the existing study, it is noted that there is a dearth of research, particularly in the domain of tax, in the area of corporate taxation. To the best of authors' knowledge there is no prior study which is examined in Bangladesh regarding effective tax rate as a proxy of actual tax burden of the company. Considering all the gap this study mainly focused on the financial and operational determinants of Effective tax rate of the corporations. In this article, we have delved into financial and firm specific determinants of the effective tax rate in Bangladesh, exploring the factors that impact the tax system's ability to raise revenue and contribute to the country's development. By exploring these determinants, we aim to uncover the drivers of a more efficient and effective tax system, benefiting the country's development and reducing income inequality. The rest of the paper is organized in segments, with Section 2 providing an overview of the theoretical foundations of ETR and a critical analysis of relevant studies. Section 3 discusses methodology and econometric models. Section 4 presents data and statistics. The empirical findings are presented in the fifth part. Finally, section 6 outlines the investigation's findings and results.

Political Cost theory

Within the realm of accounting theory, one of the ideas that caused the most debate is the political cost hypothesis. A connection has been made between political cost theory and this study due to the fact that political connections have an effect on the corporation tax reforms. According to Zimmerman, (1983) there are mainly two arguments behind political cost theory. First argument is that the government tends to impose additional requirements on businesses that are larger. Second, large firms are politically more susceptible to public criticism and scrutiny, which drives them to act socially responsibly and to alter their activities and corporate conduct to what is expected of them by their social context. This makes them more accountable for their actions (Belz et al., 2019b). Hence, it can be concluded that taxation is a concern of public finance that's why determinants of effective tax rates especially firm size is supported by political cost theory.

Political Power Theory

Political power theory was introduced by Siegfried in 1972. According to this proposition large firms have greater political power than small firms, which suggests a negative size-ETR relation (Belz et al., 2019b). Besides these, previous studies by Gupta & Newberry (1997); Belz et al., (2019b) reveal that large companies have the ability to use their resources and position to negotiate their tax burden or influence legislation in their favor (for example, through lobbying operations), which results in lower effective tax rates for large companies in comparison to small companies. In accordance with the political power theory, larger corporations participate in tax planning in a more aggressive manner and use their influence to support tax laws that are in their advantage, which results in larger tax savings for the larger companies (Lazar, 2014). The political allegiance of the members has a stronger impact on the organization when viewed from the perspective of our nation.

Trade Off Theory

Tradeoff theory is one of the most popular theories about capital structure. It says that the best way to choose a capital structure is to find a good balance between the costs and benefits of the capital. This idea came about in 1970. It assumes that there is a negative relationship between debt and tax costs and a positive relationship between profits and tax costs. Taking insights from different literature Culata & Gunarsih, (2012) stated that compnies use

the debt capital in the capital structure to take the tax advantage (i,e: tax sheild for debt). According to the trade-off theory, corporations behave as if they have an optimal debt position that they strive towards. They tend to balance the tax benefits of employing debt with the agency costs and bankruptcy costs that may develop as a result of using debt in their capital structure. Firms' financing choices vary with time and space, therefore their transaction costs and speed of adjustment towards the optimal aim, as described in the trade-off theory, may also fluctuate (Ganiyu Yinusa et al., 2017). The trade-off hypothesis predicts that an inverse relationship exists between the cost and speed of changes toward the optimal debt objective. In practise, the notions of the trade-off theory are supported by prior research (Lazar, 2014; Panda & Nanda, 2021; Salaudeen & Eze, 2018).

Taxation of corporations is gaining prominence as one of the most important considerations in the decision-making process of corporations. Because day by day, compare to our country's individual tax system, taxation of corporations is getting more expensive. The company views the payment of taxes as an expense on its income statement. Hence, it affects the performance of the company. As a result, companies always try to reduce this burden by using different technique such as tax avoidance, tax planning, tax management etc. A simple understanding of the firm's nominal tax rate is insufficient to comprehend the eventual tax burden. Because of the fact that when we evaluate how corporations are taxed, nominal tax rates tell us very little about the actual amount of taxes paid by businesses (Ribeiro, 2015). In reality the tax expense of a company is computed by applying a variety of deferrals and accruals to the total amount that is obtained by multiplying the statutory tax rate by the pre-tax income of the company. This process is known as the tax provision method (Ribeiro, 2015). This happens due to the fact that the rules of accounting treatment are different from the norms of tax law. As a consequence of this discrepancy in the laws, a temporary difference is generated, and this difference is referred to as deferred tax. This temporary difference somehow connected with the possibility of managing tax or tax planning.

From this concern, several studies had been conducted on the determinants of effective tax rate (Table 1 shows summary of literature review). Thus prior studies considered effective tax rate as a proxy of tax burden and it has impact of the performance (Panda & Nanda, 2021). This study also reviewed several previous studies to understand the insight of the determinants and to find out the gap among existing literature. Because there are no fixed determinants of ETR for every sector or every country, it varies from industry to industry and country to country due to differences in tax law. According to Salaudeen and Eze, (2018) a study conducted in Nigeria during 2018 on 59 nonfinancial company listed in Nigeria stock exchange in the period of 2010 to 2014 ETR were lower compare to the statutory tax and it also varies from one sector to another. Besides this, they have found that most of the profitable firms in Nigeria face more tax burden which indicates that firm size, inventory intensity has significant positive impact on ETR whereas leverage, audit dummy is negatively associated with ETR (Effective tax rate). In consistent with this study another research was conducted on nonfinancial company listed on Bucharest Stock Exchange during 2000-2011 by using fixed effects panel data estimation model. The authors also found positive effect of profitability and inventory intensity and negative effect of leverage and capital intensity on effective tax rate (Lazar, 2014). Richardson & Lanis's (2007) study on Australia regarding corporate ETR and tax reform during 1997 to 2003 based on 92 firms found that firm characteristics, asset mix and capital structure are associated with corporate effective tax rate. More specifically, firm size, leverage, capital intensity, Inventory intensity, R&D intensity and profitability are significant determinants of ETR. Similar outcomes are found in (Di & Li, 2013; Richardson & Lanis, 2007; Gupta & Newberry, 1997).

Again a study conducted on some of the selected emerging economies during 2006 to 2015 based on 7844 companies which found that the size and quantity of inventory of a company have a positive impact on ETR, whereas other variables such as leverage, capital intensity, growth, accruals, and so on have a negative impact (Fernández-Rodríguez et al., 2021). On the other hand, Fernández-Rodríguez et al., (2019) investigated determinants of effective tax rate from different context. In this study they critically focused on the differences of tax burden from the context of ownership based on 3169 Spanish companies during 2008-2014. According to their research, non-state-owned enterprises (NSOEs) and government enterprises (SOEs) have very different tax burdens. The effective tax rates of private ownership companies are higher than those of state-owned firms. The tax burden of a privately owned business depends on its size, debt, investments in research and development, profitability, age, foreign operations, and auditing. Whereas, state-owned businesses are only affected by debt and capital intensity.

All of the research discussed above yield varied outcomes for certain ETR factors. It is evident that the factors influencing ETR varied from country to country and even sector to industry due to variances in tax law, tax holidays, decreased tax rates, and a variety of other factors. As a result, there is a significant gap in the current body of research. The study at hand has the potential to address a research gap, particularly in this subject.

Effective Tax Rate and Firm Size

The effective tax rate is determined by a number of different factors (ETR). When compared to the other indications, the size of the company is one of the most powerful indicators of ETR, which is based on research conducted in the past. A study conducted in Ethiopia concentrating on the firm size and ETR by analyzing panel data found that despite having a proportional tax rate, small businesses pay more in taxes than big businesses, while middle-sized businesses pay the least (Mascagni & Mengistu, 2019). On the other hand, according to Fernández-Rodríguez et al., (2021), there is a positive relation with firm size they argued that political cost hypothesis exists

Table 1. Summary of Literature Review

Author	Sample	Methodology	Variables	Findings
(Hazır, 2019)	All the public listed company in Turkey except bank and insurance during 2007-2016.	Panel data analysis	**Dependent variable** Effective tax rate (Cash Flow based, EBITDA based) **Independent variable** Firm size, leverage and capital intensity, Inventory intensity, Profitability.	Size: Significant (+) Leverage: Significant (-) Capital Intensity: Significant (+) Inventory Intensity: Insignificant (+) Profitability (ROA): Insignificant (-)
(Harris and Feeny, 1999)	Large firms in Australia 377 firms during 1993-1996	Panel Data analysis	**Dependent variable** Effective tax rate **Independent variable** Total profit before tax, Total revenue, Interest to sales ratio Depreciation to sales ratio, R&D expenditure and sales ratio, Subsidiary firm	R&D expenditure and sales ratio: Significant (-) Depreciation to sales ratio: Insignificant Subsidiary firm: Significant (-)
(Jaafar and Thornton, 2015)	European firms' publicly listed and private firms during 2001-2008.	Fixed effects regression Pool regression	**Dependent variable** Effective tax rate (Measured by current tax and cash flow operation) **Independent variable** Privately held firm, Tax haven, Size, Leverage, Capital Intensity, Labor Intensity, Profitability, Private Tax haven.	Tax haven: Significant (-) Size: Significant (+) Leverage: Significant (-) Capital Intensity: Significant (-) Labor Intensity: Significant (-) Profitability: Significant (+) Private Tax haven: Significant (-)
(Salaudeen and Eze, 2018)	2010-2014	Pooled ordinary least square	**Dependent variable** Effective tax rate (measured by current tax to earnings before tax and total tax including deferred tax to earnings before tax) **Independent variable** Firm Size, Leverage, Profitability, Capital Intensity, Labor intensity, inventory intensity, audit dummy	Firm Size: Significant (+) Leverage: Significant (-) Profitability (ROA): Significant (+) Capital Intensity: Significant (-) with model 2 measured by total tax expense insignificant with model 1 measured by current tax Labor intensity: Insignificant (-) Inventory intensity: Significant (+) with model 1. Audit dummy: Significant (+)/ (-)
(Adams and Balogun, 2020)	2012-2018	Pooled OLS and random effect model	**Dependent variable** corporate effective tax rates (ETR) avoidance. Measured by total tax expense (current tax + deferred tax income) to EBIT **Independent variable** Capital Intensity, Leverage, Inventory intensity, Firm Size, ROA	Firm size (FSIZE), return on assets (ROA), and inventory intensity (INVINT): Significant (+) Firm leverage (LEV) and capital intensity (CAPINT): Insignificant (-) on corporate effective tax rates (ETR)
(Panda and Nanda, 2021)	India All listed manufacturing company	Arellano–Bond dynamic panel regression	**Dependent variable** Corporate effective tax rates (ETR) **Independent variable** Asset tangibility, Debt Ratio, ROA, Growth rate, Non-Tax Shield, Interest coverage ratio, Firm Size	Firm size: Significant (+) ROA: Significant (+) Growth Rate: Significant (+) Debt Ratio: Insignificant Asset Tangibility: Significant (-) Non-Tax Shield: Significant (+) Interest coverage ratio: Insignificant Age: Significant (+)

Sources: Prepared by the authors

in emerging economies due to larger companies bearing a grater tax burden. It also supported by Ribeiro (2015), Panda & Nanda (2021), Adams & Balogun (2020), Purina (2021), Salaudeen & Eze, (2018). However Barbera et al., (2020); Richardson & Lanis, (2007); Hsieh, (2012) found significant negative relation with firm size. Some other studies found no effect of firm size on ETR (Lazar, 2014). Based on prior research, the following hypothesis has developed:

H_1:There is a relation between firm size and effective tax rate

Effective Tax Rate and Leverage

Capital structure is another firm specific determinant of ETR. A company's financing decision has impact on several aspects. Firms can choose either debt financing or equity financing or both. Determination of optimum capital structure is the major concern for the firm. If a company goes the option of equity financing, there is the possibility that it will be a less expensive solution; nevertheless, this comes with a disadvantage in that the compensation of investors, in the form of dividends, is not tax deductible. Because interest expenses may be written off against a company's tax liability, most businesses opt for debt financing rather than equity financing (Ribeiro, 2015). Most of the studies found significant negative relation of leverage with ETR but few studies found positive and insignificant result of this variable. Relevant studies that found negative relations are (Ribeiro, 2015; Stamatopoulos et al., 2019; Adams & Balogun, 2020; Lazar, 2014; Nomura, 2017). On the other hand studies like Panda & Nanda, (2021); Salaudeen & Eze, (2018) found positive association in terms of ETR measured by total tax expense. Also Kim &

Limpaphayom, (1998) found no significant correlation of leverage with ETR. Thus, analyzing all the studies the following hypothesis has been developed:

H_2:There is a relation between Leverage and effective tax rate

Effective Tax Rate and Profitability

Profitability is one of the important measurements for the business. Most of the activities of the business is conducted for this purpose only. Similarly, in case of taxation profitability can be an important determinant also. Prior studies found mixed result regarding profitability as a determinant of ETR. Some studies like (Kraft, 2014; Fernández-Rodríguez et al., 2019) found negative relation. The rationale behind this is that the more profitable firms are more involved with the tax planning or tax management. On the other hand some studies showed opposite result (Delgado et al., 2012; Lazăr & Istrate, 2018; Hsieh, 2012; Salaudeen & Eze, 2018; Panda & Nanda, 2021) etc. and some other study reveal insignificant result of profitability and ETR (Hazır, 2019). After the review of the prior studies the following hypothesis has been developed:

H_3:There is a relation between profitability and effective tax rate

Effective Tax Rate and Capital Intensity

Capital intensity is another factor of firm-specific ETR that has been studied a lot. For non-financial companies, the effect is completely obvious and demonstrates up in the form of tax benefits as a depreciation tax shield (Lazăr & Andrieș, 2022). As per the study of Panda and Nanda, (2021) conducted on India demonstrate that firms that have a lot of tangible assets can be used as collateral and can handle a lot of debt. Since, interest on debts are not taxed and leverage has a negative relationship with ETR. Some Previous research like Salaudeen and& Eze, (2018); Panda & Nanda, (2021); Lazăr & Andrieș, (2022); Lazăr & Istrate, (2018) found negative relation with capital intensity. Where some other reveals the opposite and insignificant results (Hazır, 2019); Fernández-Rodríguez et al., (2019). Hence the following proposition has developed:

H_4:There is a relation between capital intensity and effective tax rate

Effective tax rate and inventory intensity

In the same way that capital intensity can be replaced by inventory intensity, firms with a lot of inventory should have higher ETRs (Gupta & Newberry, 1997). According to Zimmerman, (1983, p. 130); Gupta & Newberry (1997) firms with more fixed assets have lower ETRs because of tax incentives, while firms with more inventory have higher ETRs. In consistent with this Richardson and Lanis, (2007); Salaudeen and Eze, (2018); Ribeiro, (2015); Delgado et al., (2012) established positive relation with inventory intensity and effective tax rate. Contrary to this findings few research established negative and insignificant association (Fernández-Rodríguez et al., 2019; Hazır, 2019). Based on the above review the following proposition has developed:

H_5:There is a relation between inventory intensity and effective tax rate

Effective Tax Rate and Interest to Sales

From the perspective of taxation interest has some tax benefits. Some company avail this opportunity to enjoy the tax incentives. Yet company has to pay minimum tax out its turnover or sales even if there are losses incurs. Hence, there is high possibility that interest to sales ratio has impact on effective tax rate. That is why interest to sales ratio is considered as one of the factors of ETR. In consistent with this proposition a study conducted in Australia found negative association with ETR (Harris & Feeny, 1999) Thus, the following proposition has established:

H_6:There is a relation between interest to sales ratio and effective tax rate

Effective Tax Rate and Interest Coverage Ratio

It is obvious that when tax rates are high, firms prefer to use more debt as interest of loan have some tax benefits. Consistent with this proposition Panda & Nanda, (2021) stated that companies are more likely to pay higher interest rates when their earnings are subject to higher tax rates, as the purpose of debt financing is to hide more earnings from higher corporation taxation at the expense of a lower Interest coverage ratio (Panda & Nanda, 2021). Previous literature regarding the use of debt by the company reveals that Companies with high tax burdens are more likely to utilize debt financing than companies with low tax burdens (Graham, 1996). Large, profitable, and liquid companies use debt economically to avail themselves of interest benefits, whereas growth organizations that generate unique products use debt cautiously in order to fuel their growth (Graham, 2000) and reduce tax. On the basis of this assumption the following hypothesis has established:

H_7:There is a relation between interest coverage ratio and effective tax rate

Table 2. Summary of Sample size

Industry Name	Number of companies (Population)	Number of companies in Sample	Sample year	Observation	Source of Data
Ceramics	5	5	2016-2021	30	Annual Report
Engineering	42	19	2016-2021	114	Annual Report
Pharmaceuticals & chemicals	32	20	2016-2021	120	Annual Report
Total	**79**	**44**	**-**	**264**	

Effective Tax Rate and Firm Age

We know, it's a basic assumption that more aged company experience more about corporate taxation as a result they are more involved with tax planning. Prior research reveals a mix association of firm age with effective tax rate. Studies like Gupta & Newberry, (1997), Richardson & Lanis, (2007), Panda & Nanda, (2021) found negative result. On the other hand, some of the industries in the study of Panda & Nanda, (2021) shows positive association of firm age. Hence, based on this analysis the following hypothesis has developed:

H_8:There is a relation between firm age and effective tax rate

RESEARCH METHODS

Three manufacturing industry (Pharmaceuticals & chemical, Engineering, and ceramics) have been selected for this study. The selected three industries are one of the top category and flourishing industries in recent periods in Bangladesh. Sample has been designed after considering the following factors: i) Firms with unavailable data or inactive firm have been excluded; ii) Companies recently listed that lack at least five years of annual reports have been excluded; iii) Particular industry that are enjoying reduced tax rate and tax holiday have been excluded; iv) Firms with negative income is considered zero percent effective tax rate because their effective tax rate is meaningless (Kim & Limpaphayom, 1998; Salaudeen & Eze, 2018; Ribeiro, 2015). Companies with several ETRs are counted as one to make the study more relevant and effective (Chiou et al., 2014; Salaudeen & Eze, 2018). This is called "two-sided censoring" method and assumed in different prior studies. v) Finally, foreign firms are excluded from the sample. On the basis of the above assumptions, secondary data were gathered from 44 different companies between the years 2016 and 2021, with a total of 264 company year observations (Table 2). To analyze the determining factors of effective tax rates, the basic basis of the econometric model uses equation 1.

$$Yit = \beta_0 + \beta X_{it} + \varepsilon_{it} \quad \text{.....1}$$

In order to accomplish the goals of this research, the panel data has been examined using panel corrected standard AR(1) model. Several earlier research, including Salaudeen & Eze (2018), Jaafar & Thornton (2015), and Lazar (2014) utilized pooled ordinary least square, fixed effects model, and generalized technique of moments. Following a review of the prior literatures, two models (Equation 2 and 3), each with some alterations, have been

Table 3. Summary Table of Variable Measurement

Acronyms	Variable Name	Measurement-(Proxy)	Reference
ETR-1	Effective Tax Rate	Current tax expense/ Profit before tax	(Gupta & Newberry, 2007); (Salaudeen & Eze, 2018);
ETR-2	Effective Tax Rate	(Current tax expense + Deferred tax expense)/ Profit before tax	(Salaudeen & Eze, 2018)
Size	Firm Size	Natural Logarithm of total asset	(Lazar, 2014); (Aksoy Hazır, 2019); (Jaafar & Thornton, 2015)
LEV	Leverage	Non-Current liabilities / Total Asset	Jaafar & Thornton, (2015); Adams & Balogun, (2020); (Lazar, 2014)
ROA	Profitability (ROA)	Operating profit/Total asset	(Lazar, 2014); Adams & Balogun, (2020); (Janssen & Buijink, 1998)
CAP_INT	Capital Intensity	Non-current Asset/ Total Asset	(Fernández-Rodríguez *et al.,* 2019)
INV_INT	Inventory Intensity	Total inventory/Total Asset	(Fernández-Rodríguez *et al.,* 2019)
INT_Sales	Interest to sales	Interest payment/Sales	(Harris & Feeny, 1999)
ICR	Interest Coverage	Operating income/Interest Expense	(Panda & Nanda, 2021);
Firm Age	Firm Age	Age of the firm starting from listed year	(Panda & Nanda, 2021)

Source: prepared by the authors

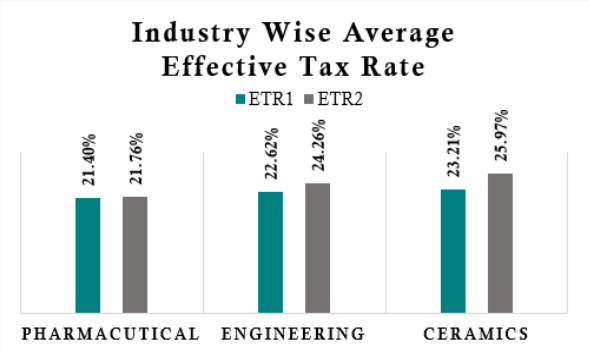

Figure 1. Industry Wise Average ETR
Source: Self constructed by authors

selected for this study in order to determine the factors that determine the effective tax rate. Table 3 shows the acronyms of the variables in this study.

$$ETR\_1_{it} = \alpha + \beta_1(LEV) + \beta_2(Size) + \beta_3(ROA) + \beta_4(CAP\_INT) + \beta_5(INV\_INT) + \beta_6(INT\_Sales) + \beta_7(Firm\ Age) + \beta_8(ICR) + Industry\ Dummy + Year\ Indicators + \varepsilon_i \quad \ldots\ldots 2$$

$$ETR\_2_{it} = \alpha + \beta_1(LEV) + \beta_2(Size) + \beta_3(ROA) + \beta_4(CAP\_INT) + \beta_5(INV\_INT) + \beta_6(INT\_Sales) + \beta_7(Firm\ Age) + \beta_8(ICR) + Industry\ Dummy + Year\ Dummy + \varepsilon_i \quad \ldots\ldots 3$$

RESULTS AND DISCUSSIONS

The effective tax rate is such a measurement technique which represent the actual tax burden of a firm after taking all the exemptions, incentives in consideration. Nearly every year, more or less, there is a change in the taxation policy in our country and as a result, change in effective tax rate. Table 4 shows of ETR information has been presented over the years.

The year wise analysis of average actual tax burden shows that Pharmaceuticals & Chemicals industry has mean ETR1 in between 19.13% to 25.36% which is almost similar in case of ETR2 mean range 19.13% to 27.13%. The analysis also shows one more observation that the highest Effective tax rate (ETR2) among all the year is 2020 that is 27.13% in case of pharmaceuticals and chemical sector. From the engineering sectors analysis, mean ETR1 ranges between 21.83% to 25.30% whereas mean ETR2 between 20.74% to 29.06%, which is little bit higher than the pharmaceuticals. It interprets the less efficiency of engineering firm in terms of tax management. Similarly in case of ceramics sector the findings also reveals a higher range of mean effective tax rate which makes it the most inefficient sector compared to the pharmaceuticals and engineering sector in taxation issues.

According to Chart 1 presentation during 2016 to 2021, the highest average effective tax rate (ETR2) is 21.76% for pharmaceuticals, 22.62% for engineering and 25.97% for ceramics sector. This is really close to being on par with the corporate tax rate that is imposed by the government. On the other hand, lowest ETR2 found in pharmaceuticals sector. Many reasons may work behind the lowest and highest ETR2, for example, profitability, financial and operational determinants or aggressive tax planning. Prior study (Salaudeen and Eze, 2018) reveals that the lower effective tax rate indicates that firms are more involved with the tax planning which means that firms are more engaged with tax incentive and utilized it properly. Higher ETR indicates lower involvement of the aggressive corporate tax planning or management. In comparison to the ceramics sector, both of these industries are better aware of their responsibilities and make effective use of the opportunities afforded to them by the law related to tax.

Table 4. Sectorwise Yearly Mean of Effective Tax Rate

Industry	Pharmaceuticals & Chemicals		Engineering		Ceramics	
Year	ETR1	ETR2	ETR1	ETR2	ETR1	ETR2
2016	19.13%	19.13%	21.40%	21.76%	18.83%	31.81%
2017	19.98%	21.98%	21.84%	24.78%	33.39%	29.32%
2018	21.09%	20.18%	21.92%	20.92%	25.09%	25.81%
2019	25.36%	24.20%	20.83%	20.74%	23.27%	27.48%
2020	22.06%	27.13%	24.41%	28.28%	11.25%	20.58%
2021	20.78%	17.96%	25.30%	29.06%	27.42%	20.82%

Source: prepared by the authors

Table 5. Descriptive Statistics

Variable	Obs.	Mean	Std.Dev.	Skewness	Kurtosis
Pharmaceuticals and chemicals industry:					
ETR1	120	0.22025	0.13842	0.750884	5.616995
ETR2	120	0.22761	0.14875	0.907643	7.324027
LEV	120	0.11469	0.12847	2.359017	11.2903
ROA	120	0.09414	0.09884	-4.68538	45.18756
INV_INT	120	0.15324	0.10379	1.078946	4.389809
NT_Sales	120	0.07563	0.18995	7.223195	59.96743
CAP_INT	120	0.51716	0.17837	-0.29482	2.275723
Firm Age	120	18.95	13.3194	0.233185	1.597186
Firm Size	120	22.1456	0.10379	0.148016	2.228205
ICR	120	10223.41	96273.57	11.93114	147.4702
Engineering industry:					
ETR1	114	0.22536	0.13806	0.659286	4.218885
ETR2	114	0.24507	0.14675	1.01281	5.726457
LEV	114	0.18309	0.24279	3.381394	18.33678
ROA	114	0.05792	0.05322	1.156396	4.385905
INV_INT	114	0.24881	0.15137	1.479114	5.00527
NT_Sales	114	0.06859	0.09221	2.30281	8.033149
CAP_INT	114	0.43796	0.43123	7.707718	74.07113
Firm Age	114	17.2895	12.4145	0.426151	1.644089
Firm Size	114	22.3156	1.57884	-0.20313	2.072097
ICR	114	6.90769	12.3886	3.595406	18.92333
Ceramics industry:					
ETR1	30	0.23209	0.19651	2.140842	9.375875
ETR2	30	0.25968	0.16147	0.420494	3.495091
LEV	30	0.06984	0.03636	0.053088	2.184296
ROA	30	0.44777	0.04368	-0.99192	6.613264
INV_INT	30	0.22941	0.12452	0.764401	2.618235
NT_Sales	30	0.06032	0.05157	0.610028	2.33614
CAP_INT	30	0.59131	0.17842	-0.09707	1.873959
Firm Age	30	20.5	9.99223	0.435348	2.041414
Firm Size	30	21.7106	1.36272	-0.83263	2.497533
ICR	30	10.1212	22.5405	3.504969	16.02301

Source: Calculated by the authors

Pharmaceuticals and Chemicals Industry

Descriptive statistics of this industry (Table 5) shows that mean value of effective tax rate (ETR1) is 22.03% when it considers only current tax. Where ETR2 measured by considering current tax and deferred tax is 22.76% which is more or less similar to the previous one. Both ETR1 and ETR2 are less than the statutory tax rate which is 25%. Lower Effective tax rate indicates the presence of corporate tax incentive which is consistent with the findings of Salaudeen & Eze, (2018). In case of explanatory variables, leverage, ROA, Inventory intensity, capital intensity, Interest to sales Firm size, Firm Age are showing reasonable level of consistency.

Engineering Industry

Summary statistics of engineering industry reveled the average effective tax rate is more or less 22%. ETR1 and ETR2 both are less deviated as their standard deviation is showing only 13% and 14% respectively. On the basis

Table 6. Pearson Correlation Matrix

Variables	ETR1	ETR2	LEV	ROA	INV_INT	INT_Sales	CAP_INT	ICR	Firm Age	Firm Size
ETR1	1									
ETR2	0.6763**	1								
LEV	-0.0398	-0.1195**	1							
ROA	0.1199**	0.1041	-0.1915**	1						
INV_INT	0.1153**	0.05	-0.0707	0.1241**	1					
INT_Sales	-0.1901**	-0.1458**	0.1944**	-0.2527**	-0.1608**	1				
CAP_INT	-0.1610**	-0.0839	0.027	-0.0806	-0.2673**	0.0197	1			
ICR	0.0023	-0.0082	-0.0515	0.1012	-0.0661	-0.0369	-0.0287	1		
Firm Age	0.1195**	0.0391	-0.0315	0.1298**	0.1827**	-0.0408	-0.0645	0.048	1	
Firm Size	0.0552	0.1165**	0.0363	-0.0092	-0.3141**	0.0374	-0.0602	0.1482**	-0.1144**	1

Source: Calculated by the authors

of sample period, explanatory variables are also found a reasonable level of consistency. It is also evident from the descriptive statistics that ETR2 is higher than ETR1 due to the inclusion of deferred tax. The findings of Table-V reveal one interesting observation is that mean profitability of engineering sector is lower than that of pharmaceuticals sector which interprets the efficiency level of pharmaceuticals in terms of profitability.

Ceramics Industry

The statistical overview of the ceramics industry is included in the Table-V which is exhibiting 23% of ETR1 mean and 25% of ETR2 mean. In comparison to the other two sectors, it has been found that the effective tax rate in the ceramics sector is significantly higher. It indicates that ceramics sector firms are less involved with tax planning activities during the sample period. This findings is supported by the previous research Salaudeen and Eze, (2018). Skewness and Kurtosis of all the variables are fairly symmetrical and to some extend they are highly skewed due to the differences in taxation issues over the years.

To comply with the assumption of linear regression analysis some validity and reliability test has been conducted in this study. The findings reveal that ETR1 and ETR2 has strong correlation because its coefficient is r = 0.6763 which lies between +0.50 to +1. The result is also consistent with the existing literature. The other variables have been shown to have a correlation that is between ± 0.30 and ± 0.49, which is considered to be moderate.

The correlation matrix (Table 6) dictates that leverage, capital intensity and interest to sales (ETR1 = (r = -0.0398; r = -0.1901; r = -0.1610)) and (ETR2 = (r = -0.1195; r = -0.1458; r = -0.0839) has a negative but weak correlation for both of the effective tax rate. On the other hand, profitability, inventory intensity, interest coverage ratio, firm age, firm size has positive association with ETR1 and ETR2 except interest coverage ratio in case of ETR2 which shows negative correlation with it.

The results of the panel data examined using panel corrected standard AR(1) model have been given in Table 7 And Table 8. Before testing the hypothesis, the whole data set has been checked by the assumption of regression analysis to make the study more reliable and valid. All the hypothesis has been tested separately for each sector.

The findings of this study evident that there is negative association between leverage and effective tax rate which is significant only in engineering sector where ETR is measured by total tax burden effect Because interest expense of leverage is tax deductible where dividend has no tax deductibility that's why companies utilize leverage to take the debt tax shield benefits. The result is supported by trade-off theory and some previous research (Ribeiro, 2015; Adams & Balogun, 2020; Lazar, 2014; Stamatopoulos et al., 2019; Nomura, 2017). Then in case of profitability, it is statistically significant with ETR1 and ETR2 in terms of all the sectors separately except in engineering. There is

Tabel 7. Regression analysis Model-1

Variable Name	Pharmaceuticals Sector		Engineering sector		Ceramics sector	
	Coefficient	P>|z|	Coefficient	P>|z|	Coefficient	P>|z|
LEV	-0.1299522	0.375	-0.0236151	0.817	0.3696785	0.663
ROA	0.1184151	0.100*	-0.1283914	0.693	1.671666	0.044**
INV_INT	0.1286499	0.304	0.1315548	0.265	-0.1493505	0.603
INT_Sales	0.0075323	0.894	-0.6076208	0.000***	0.0612573	0.953
CAP_INT	-0.140921	0.214	-0.0463097	0.016**	0.3728631	0.369
ICR	-4.74E-08	0.052**	0.0010869	0.269	0.0015166	0.26
Firm Age	-0.0005319	0.499	0.0021012	0.012***	-0.000489	0.906
Firm Size	0.013447	0.024**	0.0267446	0.015**	-0.0241257	0.56
_Constant	-0.0095098	0.95	-0.3740133	0.157	0.4596152	0.657
Rho	0.4901001		0.190932		0.0480412	
R-Squared	0.1475		0.2097		0.1477	
Wald chi2(8)	16.74		114.58		17.01	
Number of Observations	120		114		30	
Prob>chi2	0.0329**		0.000***		0.030**	
Mean Vif	1.37		1.4		2.58	

Source: Calculated by the authors

***1% significance level, ** 5% sgnificance level * 10% significance level

positive relationship between profitability and effective tax rate. It interprets that profitable firm has to pay more tax compare to smaller firm. It is also backed by trade off theory as well as some previous literature (Lazăr & Istrate, 2018; Panda & Nanda, 2021; Salaudeen & Eze, 2018). One of the astonishing facts of this findings is that inventory intensity is not significant in any of the industry. From the perspective of Bangladesh inventory intensity has less impact on the actual tax expense. Hazır (2019) and Fernández-Rodríguez et al., (2019) found similar result in their research. As per the output of the study interest to sales has significant negative association with ETR only in engineering sector separately and there is variation among the industry. It can be interpreted that high use of leverage

Table 8. Regression analysis Model-2

Variable Name	Pharmaceuticals Sector		Engineering sector		Ceramics sector	
	Coefficient	P>|z|	Coefficient	P>|z|	Coefficient	P>|z|
LEV	-0.0125675	0.939	-0.1504283	0.001***	0.8357313	0.34
ROA	0.1890144	0.048**	-0.1174471	0.677	1.933379	0.002***
INV_INT	0.1023877	0.521	0.0013064	0.989	-0.1485332	0.595
INT_Sales	-0.0155167	0.823	-0.4909888	0.002***	1.069121	0.133
CAP_INT	-0.0890962	0.426	-0.0261976	0.164	0.144217	0.596
ICR	-6.44E-08	0.053**	-0.0001255	0.918	0.0015122	0.269
Firm Age	-0.0007471	0.466	0.0016778	0.034**	-0.0013983	0.66
Firm Size	0.0163321	0.002***	0.0270126	0.072*	-0.0388749	0.282
_Constant	-0.1039432	0.376	0.3056549	0.401	0.857469	0.351
Rho	0.3325768		0.1701066		-0.1420638	
R_Square	0.0766		0.1618		0.2681	
Wald chi2(8)	17.25		105.51		20.86	
Number of Observations	120		114		30	
Prob>chi2	0.0276**		0.000***		0.0075***	
Mean Vif	1.37		1.4		2.58	

Source: Calculated by the authors

***1% significance level, ** 5% sgnificance level * 10% significance level

leads to lower amount of tax. Due to tax deductibility of interest expense interest to sales is negatively associated with the real tax burden of an entity. Harris & Feeny, (1999) also found consistent output. In case of capital intensity which has a significant negative association with effective tax rate (ETR1) measured by current tax in light of the engineering sector which is consistent with Salaudeen and Eze, (2018); Lazăr and Andrieș, (2022). It interprets that companies with large capital investments are subject to a lesser tax burden as a result of the deductibility of capital allowance, which also results in a reduction of the amount of taxable income.

In terms of interest coverage ratio both of the models used in this study show that there is a negative association between the ICR and the effective tax rate except in ceramics sector separately. The results are also backed up by (Panda & Nanda, 2021). One interesting thing about this determinant is that the interest coverage ratio in the engineering and ceramics industry has no significant relationship with ETR. It led us to think that differences between industries are caused by different tax policies and incentive schemes. Whereas firm size is statistically significant in almost every industry except the ceramics industry. This variable exhibits a positive correlation in every industry where it is found to be significant. This suggests that the actual tax burden may increase in proportion to the company's size. According to the political cost hypothesis, larger firms receive more attention than smaller ones. To conform with the governance policy, larger firms must pay regular tax and sometimes additional tax due to political pressure. The findings are also consistent with those of Ribeiro (2015), Salaudeen & Eze (2018), Panda & Nanda (2021), Purina (2021), Adams & Balogun (2015). One of the most surprising outcomes of this study's regression analysis appeared to be that, while the majority of business sectors' values of firm sizes exhibited significant associations, only the ceramics sector exhibited a nonsignificant but negative relationship with effective tax rate in both of the research models used. Furthermore, earlier research has discovered a negative connection with ETR. It is also supported by the political cost and political power hypotheses. Lastly, In the pharmaceutical and ceramics sectors, ETR was negatively correlated with business age. But the relationship is insignificant. Because experience makes the firm more aware of its surroundings as a company gets older, it plans and manages taxes more. Several past studies found a strong negative connection between the two due to everyday tax planning as one gain experience (Panda & Nanda, 2021). Surprisingly, evidence of engineering sector shows contrary effect. So, it is noticeable that variation among industry exist almost in every determinant of ETR.

Additional Analysis

The combined pooled regression and panel regression analysis for the entire sector is shown in Table 9 of regression. In case of pooled analysis almost three variables are statistically significant with ETR1 which are similar to the panel data analysis of this study. where five variables are shown to be significant in the context of ETR2 which is almost comply with the panel data analysis. Interest coverage ratio and interest to sales ratio, firm size, profitability is found to be the most significant determinants in terms of both model in this study. Again, ETR is

Table 9. Combined Data Analysis

Variables	Pooled Regression Analysis				Combined Panel Regression			
	ETR1 (Model-1)		ETR2 (Model-2)		ETR1 (Model-1)		ETR2 (Model-2)	
	Coefficient	P>|t|	Coefficient	P>|t|	Coefficient	P>|t|	Coefficient	P>|t|
LEV	0.017268	0.768	-0.0725453	0.072*	-0.0294332	0.761	-0.0889138	0.122
ROA	0.1020453	0.256	0.1692066	0.069*	0.1943303	0.008***	0.2735146	0.016**
INV_INT	0.0651316	0.325	0.0093124	0.885	0.09903	0.272	-0.0244327	0.757
INT_SALES	-0.1655872	0.000***	-0.1159089	0.002***	-0.1005747	0.095*	-0.1053193	0.059*
CAP_INT	-0.0608385	0.020**	-0.0277679	0.138	-0.0431872	0.017**	-0.031777	0.16
ICR	-5.74E-08	0.035**	-9.19E-08	0.001***	-5.50E-08	0.013***	-8.43E-08	0.10*
Firm Age	0.0010506	0.111	0.0003172	0.625	0.0011004	0.263	0.000472	0.421
FIRM SIZE	0.0085189	0.116	0.0131075	0.013***	0.0115057	0.027**	0.0121626	0.019**
_Cons	0.059047	0.646	-0.0385175	0.77	-0.0812887	0.552	-0.0674206	0.58
Number of observations	264		264		264		264	
F (17, 286)	3.09		3.28					
Prob > F	0.000***		0.000***					
R-squared	0.0907		0.0814		0.0736		0.0946	
Prob>chi					0.00***		0.00**	
Wald chi2(8)					1187.82		7417.3	
Industry dummy	Yes		Yes		Yes		Yes	
Year dummy	Yes		Yes		Yes		Yes	

*10%, **5%, ***1% significance level

found to have a positive relationship with profitability and business size in both pooled and panel regression. Here, Prob>F=0.00 and Prob>chi=0.00 indicate that the overall models are significant. This demonstrates the study's robustness. Since this study is based on data from three industries and several years, it is clear that the analysis could be affected by a cross-sectional time series factor. So, the industry dummy and the year dummy are used to find out how the industry effect and the year effect vary. The results of this study also show that there are differences from one industry to the next.

CONCLUSIONS

The primary focus of the study is on analyzing the factors that determine the effective tax rate for three well-known industries within the manufacturing sector. In order to gain a better understanding of the elements that influence the amount of taxes a firm must pay, about 304 observations have been studied here from a variety of perspectives. A number of earlier studies have been carried out on this issue, still more research is required in this area because taxation is considered more complex, and just a few studies are undertaken in Bangladesh. This research has been conducted with our country's perspective in mind. Using panel data gathered from secondary sources, this study looked at three different industries: the ceramics sector, the engineering sector, and the pharmaceutical and chemical sectors. This study not only determines the component that has a major impact on firms but also analyzes the effective tax variation among different industries. The main focus of this study is to identify the financial and operational determinants of ETR (Effective tax rate). Out of eight financial and operational determinants: firm size, profitability are the most dominant determinants which are found significant positive association with ETR almost in every sector individually and combinedly as well. From the theoretical perspective the findings are supported by political cost hypothesis which suggest that large firm has to bear more tax burden due to political attention. One exception that impact of firm size is not significant in case ceramics sector which dictates the negative impact on ETR. This is reinforced by the political power theory, which states that politically influential corporations are less likely to voluntarily pay taxes because of the incentives provided by the power they wield in politics.

The interest coverage ratio, and interest to sales ratio on the other hand, has a clear and significant negative connection with ETR. Because of the tax benefit of interest and the exemption from tax, the connection is shown to be negative. The higher the leverage, the greater the tax benefit of interest. Therefore, only the engineering industry has found that leverage to be a major determinant. Among all of them inventory intensity is the insignificant determinant in case of both model ETR1 and ETR2. After analyzing the findings of the study, it is found that this paper has some policy implications from different aspect. Most importantly, it's plausible that the firm management may find the study helpful in understanding the level of receptivity to ETR. Moreover, this paper can be used as a practical insight in the academic preference. Policymakers can think further and formulate the best policies for the greater well-being of the public and the nation also. No research is beyond limitations and scope. The analysis of this research is solely sample basis. All the data has been collected only from secondary sources. To deal with the distort outcome the study has to consider some assumption in consistent with the prior research which are mentioned in the methodology section. Due to unavailability of secondary data and inactive website of the firm, some of the companies have been eliminated from sample design. This study particularly focused on the manufacturing sector which leaves a room for other sectors also.

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