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Taxation and Entrepreneurship: Panel Data Evidence from SAARC Countries

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Entrepreneurship plays a vital role in the economy; there is no well-established evidence on how taxes affect start-up activity in SAARC countries. We examine the effects of the personal income tax rate on self-employment using the annual time series data from the SAARC countries for the period 2015 to 2019. According to the differenced-GMM model developed by Arellano and Bond [1], the personal income tax rate has a statistically significant and negative impact on self-employment rate. The result shows that a one percentage point increase in the personal income tax rate is associated with a 0.03 percentage point decrease in the self-employment rate, while other variables being constant. The results confirm that the negative incentive effect dominates the causation between personal tax rate and self-employment for this panel. This suggests that in SAARC countries, there is still a negative correlation between personal income tax rates and entrepreneurship. According to the Robustness tests, an increase in the personal income tax rate discourages entrepreneurship as measured by the number of new limited liability companies and business density rate, two alternative measures of entrepreneurship. An important implication of our result is that a reduction in personal income tax rate encourages self- employment. Our findings are significant in designing the tax policy in SAARC countries. Removing tax barriers for entrepreneurs would boost the dynamic of SAARC countries while also making the tax structure more neutral, efficient, and simple for all taxpayers.

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1. INTRODUCTION

1.1 General Background

Entrepreneurs who aim to benefit from seizing business opportunities form new businesses, which is a key driver of economic growth. This process has been documented since it was originally discovered by Schumpeter [2] and formalized by Aghion and Howitt [3]. "Entrepreneurship is a phenomenon related to "Entrepreneurial human action in pursuit of the formation of value, through the creation or enhancement of economic activity, by recognizing and exploiting new products, processes, or markets" [4]. In a growing economy, entrepreneurship is a critical source of innovation, employment, and growth.

Small business owners are often criticized for creating a disproportionate number of jobs in the economy. Small enterprises, according to some, drive economic growth through innovation, which manifests itself in new goods, technology, and organizational structures. As a result of these inventions, positive externalities or spillover benefits occur to others in the economy at no additional cost, resulting in economic growth. Furthermore, it is suggested that the presence of these externalities, along with institutional limits on risk trading, leads to a market that does not produce the optimal level of entrepreneurial activity.

The rate of self-employment is influenced by a number of factors, including the tax system. Entrepreneurial activity is influenced by tax policy in a variety of ways. For starters, small business income is taxed differently than wage income from paid employment. Profits are taxed under the corporate income tax system if the company is incorporated. Profits from an unincorporated business are frequently (but not always) taxed as individual income under the personal income tax system. As a result, tax policy has an impact on not just whether or not to start a new business, but also on how the new company should be structured and how profitable it can be.

"The impact of taxes on employment is unclear in theory. On one hand, taxes may reduce self-employment by lowering the expected return from risky business ventures and the additional costs involved with being self-employed. High taxes, on the other hand, may encourage self-employment by making it more appealing to evade taxation through underreporting and reclassifying income. High taxes may stimulate tax-driven employment because it is easier to do so. Furthermore, high taxes may encourage risk-taking if loss-offsetting is allowed, in which case the government shares the risk with the entrepreneur" [5]. Because the effect is theoretically unclear, empirical evidence is required to evaluate the impact of income taxation on self-employment.

In both developed and developing countries, encouraging entrepreneurship and small company activity has become a priority. According to a research conducted by the International Labor Organization's (ILO) [6], over seven out of ten workers globally are self-employed or work for small firms. In South Asia, self-employment and micro-enterprises account for more than 80% of employment [7]. In the Republic of Korea, more than three times as many entrepreneurs seek higher income or independence as those who are motivated by necessity. In India, on the other hand, few people are motivated to enhance their lives by pursuing entrepreneurial chances; instead, they frequently start firms because they have no other employment options. In much of East and South Asia, innovation is less prevalent and occurs less frequently. In India, a moderate total (early-stage) entrepreneurial activity (TEA) rate combined with a 47 percent level of innovation shows a measurable overall benefit. In order to start a firm, entrepreneurs rely heavily on family members, in some East and South Asian economies. In India, though, just about a quarter of entrepreneurs rely on family [8]. According to the ILO [9], economic and social development plans should prioritize assisting small economic units. It emphasizes the necessity of providing an enabling environment for such firms, including ensuring that they have effective representation and that social dialogue models work for them as well.

1.2 Self Employment in SAARC Countries 2015-2019

Multiple concerns relating to self-employment are increasingly receiving significant consideration

among South Asian Association for Regional Cooperation(SAARC) policymakers due to their demonstrated multidimensional impact to a country's socio-economic situation. The businesses are simple to start, require less capital, create more jobs, and produce goods that meet local needs while also contributing to export earnings. Only five out of ten people are employed on a wage or salary around the world, although wage employment is increasing.

South Asia has the highest share of self-employment in total employment (67%) in 2019, followed by Sub-Saharan Africa (50%) and the Middle East and North Africa (44%). The self-employed had the largest employment share of all the size classes investigated in each of these regions. In the Middle East and North Africa, the self-employed and micro-enterprises account for about 70% of employment, while in South Asia and Sub-Saharan Africa, they account for more than 80%. (See Fig.1). Specially, Self Help Groups (SHGs) in industrial, consumer, and artisan products, as well as Farmer Producer Organizations (FPOs) in the agro and allied sectors, are emerging as viable business models in South Asia [10].

Female employment trends in South Asia reveal that women are progressively being left out of the labor market in the region. The low female labor force participation rate and the ongoing gender gap in female and male employment rates are proof of this. The employment quality for women in the labor market is extremely poor. A large percentage of women in the workforce engage in part-time or self-employed jobs that are naturally informal (See Fig. 2).

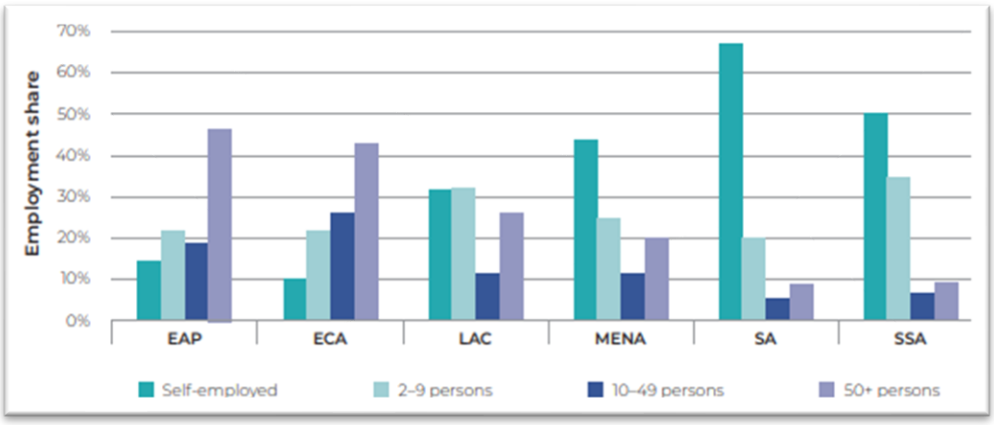

Fig. 1. Employment share of the self-employed and different firm size classes by region
Source: ILO [11]

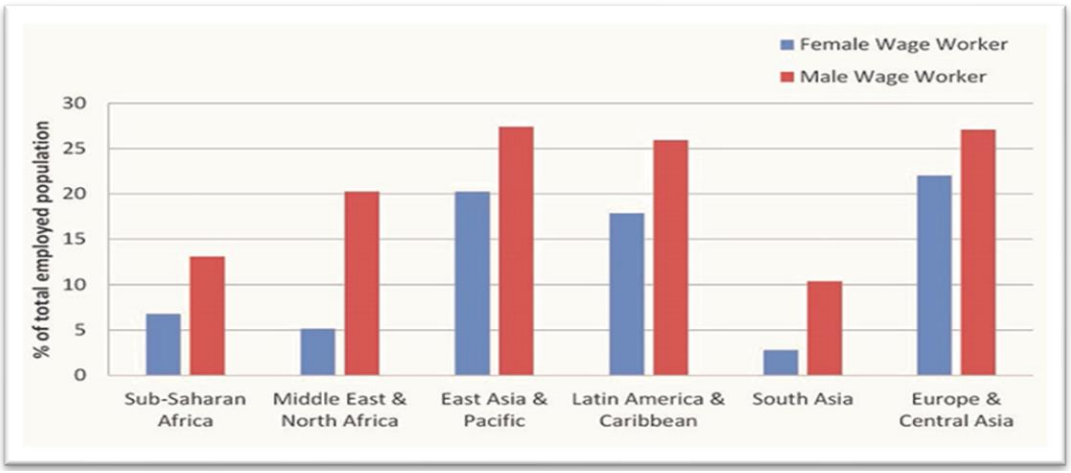

Fig. 2. Wage Workers, by Sex (2019) in Different Regions
Source: ILO [11]

By 2025, over 30 urbanized South Asian economic hotspots would account for over 80% of wage employment opportunities. The shrinking primary sector, as well as the resulting rural employment and entrepreneurial structure, would be unable to stop this economic movement [12]. Because, these industries face numerous issues during their start-up and expansion phases, such as taxation and regulation.

The relationship between self-employment and the tax system has been studied in a number of studies. However, most of the research has only looked at countries like the United States, the European Union, and the Organization for Economic Cooperation and Development (OECD). In South Asian countries, so far, no research has been done to examine the association between these two variables. It is necessary to ascertain the influence of taxation on entrepreneurship in SAARC countries from the perspective of emerging economies. Entrepreneurship is a key driver of economic growth since it generates new employment and products. Taxes have different consequences on self-employment at the same time, as the relationship between taxation and self-employment is unclear in theory.

To shed more light on this critical issue, this research examines the impact of personal income tax rates on entrepreneurship using data from SAARC nations from 2015 to 2019, which is the main contribution of this study. It employs a differenced-GMM model to capture the impact of taxation on entrepreneurship. The empirical research controls for a variety of variables that are widely regarded as major predictors of entrepreneurship, in addition to the income tax rate.

The remainder of the paper unfolds in the following way: Section II narrates the theoretical and empirical evidence on taxation and entrepreneurship, which will be followed by the methodology and the result interpretation in Section III. Finally, Section IV summarizes the conclusion and important policy recommendations.

1.3 Theoretical Frameworks

Several models explore the relationship between taxation and self-employment; see, for example, Blau and Boal [13]; Gentry and Hubbard [14]; Cullen and Gordon [15]. The tax system can influence the rate of self-employment in different ways. Theoretical literature focuses on three channels: (1) an incentive effect, which influences the supply and effort of self-employed people in the economy; (2) an evasion effect, which influences people's willingness to become self-employed to reduce their tax burden; and (3) an insurance effect, which influences the number of risk people are willing to take and thus influences the likelihood of becoming self-employed.

The after-tax return on self-employment is reduced by a self-employment tax. This makes being self-employed less profitable, and it may also make expanding a business more expensive if retained earnings are utilized. The incentive to become self-employed is decreased by a lower after-tax return or higher expansion expenditures. As a result, a higher tax rate can have a significant impact on self-employment as a type of income shifting in the economy.

The tax may have a negative incentive effect, reducing self-employment in the long run. Self-employment usually entails more risk and requires more effort than salaried work. As a result, it seems likely that the self-employed modify their behaviors more than employees in reaction to a tax adjustment, making self-employment appear more desirable when taxes are low.

Entrepreneurs are not always risk-takers, therefore a reduction in risk for a given predicted return is frequently desired. Particularly if they can keep the gains while having someone else endure the losses, the entrepreneurial move should be more desirable. When it is easier to (illegally) evade or (legally) avoid taxes as a self-employed person than as a normal employee, an evasion effect occurs. It may be easy to underreport income by omitting to record cash sales or to overstate costs by registering personal spending as business expenses; another option is to often use informal agreements that are difficult to verify or show to the tax authorities. As a result, increased taxes may encourage people to go into business for themselves to take advantage of these opportunities.

The last effect, the insurance effect, is a variation of Domar and Musgrave's [16] theory that "taxation (with complete loss offset) might act as a type of insurance, hence encouraging risk-taking in the economy. When applied to self-employment, which is often regarded as a risky

activity, a higher tax rate on the net return combined with a full loss offset would minimize the after-tax variance of the outcome of business activity and hence the risk associated with it. As a result, if loss offsets are allowed, a higher tax not only reduces the expected after-tax return but also compresses the distribution of after-tax returns. If people thinking about starting their own business are afraid of taking risks, this risk reduction could help to boost self-employment in the economy".

In conclusion, theoretical justifications exist for both a negative association due to incentive effects and a positive one due to avoidance and insurance effects. Because the theoretical models produce unclear results, determining which effects will dominate and whether the relationship between taxes and self-employment is positive or negative is ultimately an empirical question.

1.4 Empirical Survey

Many scholars have used data on self-employment and tax levels at the individual country level using time series analysis, such as ordinary least squares (OLS). Given that, Blau and Boal [17] provides "an analysis of the causes of non-agricultural labour force self-employment in the United States ceased its decreasing trend and has been increasing ever since. A general equilibrium model of self-employment and wage employment is examined, and predictions resulting from the model are tested using aggregate US time series data. According to the empirical analysis, changes in technology, industrial structure, tax rates, and social security retirement benefits all contributed to the reversal of the previous decreasing trend, which had continued for over a century".

The effect of entrepreneurs' personal income tax circumstances on the growth rates of businesses is investigated by Carroll et al. [18]. They found that individual income taxes have a statistically and significantly considerable impact on business growth rates. The impact of federal income, payroll, capital gains, corporate income, and estate taxes on self-employment rates in the US is examined by [19]. Most of these taxes have a significant impact but minor impact on self-employment activity, according to their regression analyses. A battery of cointegration and causality tests back up the basic conclusion that taxes can have a major impact on entrepreneurship, but they are unlikely to be effective tools for creating meaningful changes in entrepreneurial activity. Further, using data from Sweden, Hansson [20] investigates the relationship between income taxes and the decision to become self-employed. The changing tax rate structure, combined with the fact that small business entrepreneurs in Sweden do not receive any additional tax benefits compared to those who work as employees, provides a compelling context in which to investigate the impact of the tax rate structure on individuals' decisions to become self-employed. This study further reveals that both average and marginal taxes have a negative impact on the decision to become self-employed. Stenkula [21] used Swedish data for the whole postwar period to examine the impact of tax policy on the rate of self-employment. Payroll taxes appear to have had a slight negative impact on the unincorporated rate of self-employment. In the Netherlands, the response of self-employment income and the choice of self-employment over wage employment to tax changes is studied by Bosch and Boer [22] They take advantage of multiple tax reforms between 1999 and 2012 that affected self-employment and wage income in different ways. They discovered that self-employed people respond to tax incentives far more strongly than wage earners and that they did so more in response to the large tax reform in 2001 than the two smaller reforms in 2005 and 2007.

Some studies examine whether changes in tax rates or tax paid to affect an individual's decision to become self-employed using data from multiple countries, usually in panels. Bruce [23] examines whether differences in income and payroll taxes affect self-employed workers' decisions to continue operating or close their doors and take wage and salary positions using panel data on self-employed people. Using data from the panel study of income dynamics, the researchers take advantage of statutory differences in the tax treatment of wage and self-employment income. It is discovered that higher relative marginal tax rates on self-employment income do not necessarily enhance the chance of exit when the endogeneity of individual-level tax rates is taken into consideration. Rin and Giacomo [24] investigate the impact of tax policy on the formation of new businesses. They put together a new country-level panel database including data on entry for 17 European countries from 1997 to 2004. They discovered that corporate income taxes have a large negative impact on entry rates. The effect is concave, implying that tax cuts only affect entry rates

below a given tax threshold. They also discovered that in nations with greater institutional infrastructure, lowering corporate tax rates is more effective. Further, using data from the Global Entrepreneurship Monitor (GEM) from 2000 to 2009, Baliamoune-Lutz [25] examines how taxes and tax progressivity affect two types of entrepreneurship: established business ownership and nascent entrepreneurship in a large group of OECD countries. Higher tax progressivity appears to have a negative impact on nascent businesses, but no effect on established business ownership, according to empirical findings from the Arellano-Bond GMM estimation. Changes in marginal and average tax rates did not affect either type of entrepreneurship, according to the findings.

The impact of taxes on small business activities is investigated by Bruce and Deskins [26]. The analysis of a 50-state panel of tax policy data from 1989 to 2002 finds that state tax policies do not appear to have a quantitatively significant impact on entrepreneurial activity and state tax portfolio composition is not found to be a major factor of state entrepreneurship. Ferede (2013) investigates the implications of personal income tax progressivity on self-employment, in the sense of a growing marginal income tax rate [27]. According to empirical estimations based on Canadian provincial data from 1979 to 2006, there is a negative relationship between income tax progressivity and self-employment. This indicates that the negative impact of income tax on entrepreneurial risk-taking surpasses the potential for self-employment tax avoidance. Bacher and Brulhart (2013) investigate the effects of changes in the average tax burden, the tax schedule's progressivity, and the tax code's complexity on entrepreneurial activity, as measured by company birth counts using data on sub-federal jurisdictions in Switzerland [28]. They discovered that high average taxes and intricate tax rules lower firm birth rates, but tax progressivity increases firm births in general. The latter finding indicates the presence of a risk-averse entrepreneur's insurance impact from progressive corporate income taxes. Implied elasticities about the quantity and complexity of corporate taxes, on the other hand, are an order of magnitude higher than elasticities with respect to tax schedule progressivity.

Lutz and Garello (2014) analyze the effects of taxation and tax progressivity on entrepreneurship in a large set of European countries using macro-level panel data [29]. They investigate whether tax increases discourage entrepreneurial activity, with an emphasis on new self-employment, as well as the impact of tax progressivity on entrepreneurship, with a focus on new self-employment once again. They discovered that tax progressivity has a significant detrimental impact on nascent entrepreneurship at higher-than-average income levels. Braunerhjelm and Eklund [30] discovered that the administrative burden imposed by the tax system on businesses greatly reduces the establishment of new businesses. They cover 118 countries over six years. They discovered that the administrative cost of taxes had a negative impact on market entry. Although Bruce et al. [31] concentrated on self-employment rates, they also consider more policy-relevant intense margin metrics derived from non-farm proprietors' income and employment data. They look at a larger set of state data from 1978 to 2009. They conclude that major state tax policies have no statistically meaningful impact on entrepreneurship. The study by Borchers and Deskins (2015) on the association between small business activity and state tax policy in the United States has mostly concentrated on a few small company indicators [32]. This study uses a longitudinal dataset for the United States to evaluate the impact of state tax policy on small companies using broader measures of small company activity. They also calculate the link between state tax policies and large-scale company activity. The findings show that state tax policy has a major impact on the small business firm, establishment, payroll, and job development, but there is little evidence that it has a significant impact on large business growth. The influence of the institutional environment on company birth and mortality rates in U. S. border countries is investigated by Crum and Gohmann [33]. They use a set of custom tabulations for this investigation provided by the US Census Bureau. State taxation levels and minimum wages exhibited no significant association with firm birth rates in a sample of eastern US state border counties, but there was a negative relationship between state union densities and firm birth rates.

The effects of taxes on startup activity were identified by Curtis and Decker [34]. They evaluate the effect of state corporate, personal, and sales tax rates on new business activity and test for cross-border spillovers in response to these policies using newly developed county-level data on startups. They discovered that corporate tax rates have a negative and

disproportionate impact on new business employment. They also discovered that there was less proof of a link between personal and sales taxes and entrepreneurial outcomes. Braunerhjelm et al. (2021) investigated how taxes and the tax administrative burden affect entrepreneurs in OECD nations at various stages of the entrepreneurial life cycle [35]. The data suggest that the impact of the tax administrative burden varies from extremely negative to insignificant across the entrepreneurial life cycle. In the early phases of entrepreneurship, the most pronounced negative impacts arise. Using data from Canadian provinces from 1984 to 2015, Ferede (2021) uses the dynamic panel estimate method to study the effects of the top personal income tax rate on entrepreneurship as proxied by the employer business entrance rate [36]. The findings reveal that the highest marginal tax rate has a negative and statistically significant influence on entrepreneurship in both the short and long run.

Based on the above literature review, it can be concluded that many previous studies proved that taxation has a negative relationship with entrepreneurship, with respect to different regions or countries around the world. Yet, the empirical evidence with respect to the South Asian region is surprisingly difficult to find. As one of the promising economic hubs in the world, the major determinants of entrepreneurial activities in this region are yet to be uncovered. Therefore, this research attempts to fill that existing vacuum in the empirical literature.

2. METHODOLOGY

The empirical analysis uses annual aggregate panel data for the SAARC countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, over the period 2015- 2019. The study period is limited by the number of the cross-section that should be greater than the time period of the data in the Generalized method of moment (GMM) method. The differenced-GMM method, Pooled Ordinary Least Square (POLS) and fixed effect (FE) methods are used in the present analysis.

2.1 Model Specification

The following equation (1) serves as the basic specification for the empirical analysis:

$$LSEMP_{it} = \beta_0 + \beta_1 LSEMP_{it-1} + \beta_2 LPIT_{it} + \alpha' X_{it} + \mu_i + \theta_t + U_{it} \quad (1)$$

Where $LSEMP_{it}$ is an entrepreneurship indicator for country *i* in year *t*. $LPIT_{it}$ is for personal income tax rate, X stands for a vector of other important control variables, and U_{it} stands for the error term. β_0, β_1, β_2 and α's are the coefficients to be estimated. The time-invariant unobserved country-specific fixed effects and year effects are denoted by the letters *i* and *t*, respectively. All the variables are transformed into the natural logarithm.

The ratio of total self-employment to total employment (LSEMP) is used to measure entrepreneurship, the dependent variable in the above model. Self-employed workers are those workers who work on their own account or with one or a few partners or in a cooperative entity. Previous empirical studies such as Folster [37]; Ferede [38] also use a similar measure of entrepreneurship. Accordingly, the number of new limited liability companies (LNLL) and business density rate (LBDR) are employed as the alternative measures of entrepreneurship as a part of the sensitivity analysis of this research. To account for possible persistence in entrepreneurship, the above specification specifically includes the lagged value of the dependent variable as an explanatory variable.

The income tax rate (LPIT) is the major variable of interest in this study since it is the focus of the investigation into the influence of income tax on entrepreneurship. Because of the progressive nature of the individual income tax system, different income tax rates apply to different income tax brackets. We used the personal income tax rate as the main independent variable. Due to the dynamic nature of the main specification, $\beta_2$depicts the short-term effects of changes in the personal income tax rate on entrepreneurship. In addition to the personal income tax rate, the empirical model accounts for a number of variables that are meant to have an impact on entrepreneurship. Similar control variables were identified by previous empirical studies as relevant determinants of entrepreneurship. In particular, as control variables in the analysis, the study contains measures of the level of human capital (school enrolments at the secondary level) (LSSE), GDP per capita (LGDPPC) and startup cost (LSC). These control variables are denoted as X in equation (1). The data were extracted from the World Development Indicator of the World Bank database. A higher level of human capital could generate a positive impact on the increasing number of entrepreneurs in a country, thus a

positive relationship between LSSE and LSEMP could be expected. However, the counterargument is if the secondary education system lacks relevant professional or technical knowledge, then the above positive relationship between LSSE and LSEMP would be challenged. Next, higher GDP per capita level, associated with faster economic growth may create positive expectations about future economic conditions which could boost investors' confidence, thus increasing the number of new business entities. Therefore, the causal nexus between GDP per capita and self-employment ratio should be positive. Finally, startup costs might affect entrepreneurship in two ways. On one hand, the lower the startup cost, the higher the number of entrepreneurs, thus a negative relationship could be expected. The main reason is the lower startup cost level would welcome more and more entrepreneurs to start new business ventures. On the other hand, higher startup costs attract quality entrepreneurs into the economy, so a positive association could also be expected.

See Table A1 of Appendix 1 for a detailed description and sources of these variables.

2.2 Estimation

As the traditional approaches, we used Pooled OLS method and the Fixed-Effect method to investigate the impact of taxation on entrepreneurship. Since the specification is a dynamic panel, estimating equations by POLS and FE method will result in a biased estimate of coefficient estimates. Nickell (1979) illustrates that in a dynamic panel model context, such an approach will result in biased and inconsistent coefficient estimates since the lagged dependent variable is associated with the error term [39]. According to Anderson and Hsiao [40], the dynamic panel data model presented in equation (1) can be transformed by first differencing as given below in equation (2):

$$\Delta LSEMP_{it} = \beta_0 + \beta_1 \Delta LSEMP_{it-1} + \beta_2 \Delta LPIT_{it} + \beta' \Delta X_{it} + \mu_i + \theta_t + \Delta U_{it} \quad (2)$$

According to Anderson and Hsiao [40], the problem can be solved by employing the instrumental variable estimation method to estimate equation (2) using two period lagged values of the level or differenced lagged dependent variable as an instrument. Later investigations, however, reveal that, in addition to removing the countries' fixed effects and significant information with them, this strategy produces inefficient coefficient estimations. Arellano and Bond [41] provide an alternate approach for estimating the dynamic panel data model that is more efficient than Anderson and Hsiao's instrumental variable method (1981). Their method is known as the differenced-GMM method in the literature. The dynamic panel model can be estimated using this method by first differencing (equation (2)) with valid instruments in the set of first differenced equations being the level values of the dependent variable lagged two periods or more. The model's other exogenous explanatory variables can act as their own instruments. To assess the validity of the various instruments in the differenced GMM model, we can apply the Sargan test for over-identification restrictions. As a result, differenced-GMM is used to conduct the main empirical analysis.

3. RESULTS AND DISCUSSION

3.1 Descriptive Analysis

It's important to get an understanding of our dataset before moving to econometric analysis. We use raw data for summary statistics. The results are presented in Table 1.

The average values of each of the variables are represented by the mean values in row (2). In row (3), the median values indicate the middle value for each variable, while the maximum and minimum values represent the greatest and the lowest figures for each variable. In row (6), the standard deviation represents the deviation from the sample mean for each variable. SEMP, PIT, and SSE exhibit normal distributions based on the skewness value- because the skewness values of these variables are close to 0. These variables also have a kurtosis value of less than 3, indicating that they are platykurtic. These series have lower values than the sample mean, according to the platykurtic. The right tails of the other variables are long, indicating that these series are positively skewed and leptokurtic. Because the kurtosis values are more than 3, these are peaked distributions. Jarque-Bera test statistics measure the difference between the skewness and kurtosis of the series with those from the normal distribution. The null hypothesis for the Jarque-Bera test is that the distribution is normal. Therefore, the probability values of SEMP, PIT, and SSE are 0.0858, 0.2592, and 0.5572, respectively, which are above the significance value of 0.05. So, with respect to

SEMP, PIT, and SSE, we cannot reject the null hypothesis. Thus, we can conclude that SEMP, PIT, and SSE are normally distributed. On the other hand, we reject the null hypothesis of the normal distribution for all other variables, as the probability values are highly significant. So, the distributions of SUC, GDPPC, BDR and NLL are not normal. These results are close to the results of kurtosis and skewness values of these seven variables.

3.2 The Dynamic Panel Estimates

Table 2 reports the empirical results obtained using the different estimation methods. First, we perform pooled OLS panel data estimations and report the results in column (1) of Table 2. The results suggest that the lag value of the self-employment rate has a significant and positive impact on the current year's self-employment rate in the short run, while other variables are constant. A percentage change in one period lag value of the self-employment rate is associated with a 0.964% increase current year's self-employment rate in the short run, at the 1% significance level. However personal income tax has no significant impact on self-employment based on the POLS regression results. These calculations, however, do not account for the possibility of endogeneity in tax rates, GDP per capita, secondary school enrollment, and the cost of starting a firm. Jarque-Bera test also implies that the normality assumption is violated in POLS regression. Because the probability value of the Jarque-Bera test is lower than the 5% significance level. Thus, we reject the null hypothesis, which states that error is normally distributed. Further, based on the Breusch-Pagan test results, the cross-section is significant at a 5% significance level and the time effect is not significant. So, we can conclude that there is only a one-way cross-section effect in POLS and no panel effect.

The results in column (2) show the results of the Fixed-Effect (FE) model. Accordingly, the estimated FE model reveals that there is no significant impact of the explanatory variables on self-employment. Although the fixed effect estimation results are presented for comparison, it is well known that in the presence of a lagged dependent variable in the model, these estimates are biased and incorrect. Thus, as discussed previously, it is important to address this empirical issue with the help of appropriate estimation methods. In column (3), the differenced-GMM is employed. The personal income tax rate has a statistically significant and negative effect on the self-employment rate, according to the differenced-GMM model [See column (3) of Table 2]. More specifically, the result shows that a one percentage point increase in the personal income tax rate is associated with a 0.03 percentage point decrease in the self-employment rate, while other variables being constant. The above results confirm that the negative incentive effect dominates the causation between personal tax rate and self-employment for this panel. As we discussed earlier, higher tax rates lead to lower after-tax returns. Lower after-tax returns may discourage prospective entrepreneurs to undertake risky business ventures. As a result, there is still a negative association between personal income tax rate and entrepreneurship in SAARC countries.

The coefficients of the one-period lag value of self-employment and startup cost are positive and statistically significant, at the one percent significance level, as shown in column (3). The results indicate that a one percentage point increase in the one-period lag value of self-employment rate and startup cost are associated with an increase in the self-employment rate by about 0.973 and 0.001 percentage points in the short run, respectively. The lagged dependent variable has a statistically significant, positive, and high coefficient, indicating that entrepreneurship is persistent and that past levels of entrepreneurship have a considerable impact on current levels of entrepreneurship.

We argue that startup costs are linked to innovative entrepreneurship in various ways. On one hand, startup costs, such as notary fees or registration fees, are one-time expenses that raise the entry barriers to entrepreneurship. Low entrepreneurship rates are frequently correlated with high startup expenses. High startup cost, on the other hand, may have an impact not only on the number of entrepreneurs but also on the quality and type of entrepreneurship. Significant startup costs may, in fact, lead to a favorable selection of those who are highly motivated and predict high earnings from entrepreneurship. Low startup rules, according to Branstetter et al. [42]; Rostam-Afschar [43], attract low-quality entrepreneurs with low expected returns. We propose that innovative entrepreneurs who expect large profits (Schumpeter [44]), are readier to pay high startup costs than other entrepreneurs. Furthermore, they are frequently in a good position to seek outside finance Desai et al. [45]. Next, secondary school enrollment has a significant and negative impact on the self-

employment rate. If secondary school enrollment increased by 1 percent self-employment rate decreased by 0.146 percent in the short run, while other variables were constant. The ILO has issued recommendations for developing economies to embrace more technical education that can enhance self-employment rather than putting more emphasis on formal primary, secondary, and tertiary education systems, citing the unique challenge of securing relevant employment placement; Krueger and Lindahl [46]. In SAARC countries, the lack of technical knowledge in secondary education would cause a negative influence on self-employment.

The estimated regression passes all the specification tests, indicating that the coefficients are consistently estimated and that the differenced-GMM is appropriate for the empirical model. It is proved by the fact that column (3) passes all the diagnostic statistical tests. At the conventional 5% level of significance, the Sargan test statistics for the null hypothesis of valid instruments cannot be rejected, implying that the instruments used in the regression are valid. Jarque-Bera test also implies that the normality assumption is satisfied in differenced-GMM regression. Because the probability value of the Jarque-Bera test is higher than the 5% significance level. So, we accept the null hypothesis, which states that error is normally distributed. Overall, the results of the post-estimation tests confirm that this model is correctly specified.

Direct comparison with earlier empirical studies is often challenging due to the differences in specification and variations in the entrepreneurship and income tax rate indicators used. The only studies that use dynamic panel specification are Folster [47] for Sweden and Bruce et al. [48] for US states. Self-employment is used as a measure of entrepreneurship in both studies. Folster's results for Sweden imply that an increase in the income tax rate is associated with a decrease in the self-employment rate, which is very similar to the findings of this research.

In the following part, the results of this study are exposed to additional robustness testing. More particular, the paper's preferred outcome is tested for robustness using a variety of different entrepreneurial indicators. The self-employment rate has been used as a measure of entrepreneurship in the empirical investigation so far. However, as previously stated, there is no general agreement in the literature on how to measure entrepreneurship. While self-employment rates represent the total self-employment as a share of total employment, it is well known that some businesses exist for a variety of reasons. As a result, an alternative measure of entrepreneurship was used to test the validity of the core result of this paper in such settings. The robustness assessments for the major empirical result stated in column (3) of table 2 are presented in Table 3.

Table 1. Summary Statistics for key variables (2015- 2019)

	SEMP	PIT	SSE	SUC	GDPPC	BDR	NLL
Mean	62.04200	33.87302	70.19575	13.95250	2896.208	0.729951	20877.64
Median	66.73000	27.11610	73.08374	11.30000	1715.343	0.135449	7606.000
Maximum	84.21000	56.37555	100.3352	82.30000	10561.61	3.478295	128565.0
Minimum	23.05000	16.43906	39.60365	3.500000	485.6684	0.041286	44.00000
Std. Dev	19.33935	14.05510	17.41866	13.32247	2832.715	1.087181	35631.64
Skewness	-0.818103	0.370565	-0.263213	3.487052	1.718367	1.738613	2.103678
Kurtosis	2.481674	1.493966	2.225398	18.41145	4.779745	4.556446	5.874865
Jarque-Bera	4.909718	2.700021	1.169511	476.9180	24.96438	21.77044	38.95004
Probability	0.085875	0.259238	0.557242	0.000000	0.000004	0.000019	0.000000
Sum	2481.680	779.0795	2246.264	558.1000	115848.3	26.27823	751595.0
Sum Sq. Dev	14586.41	4346.011	9405.702	6922.040	3.13E+08	26.27823	4.44E+10
Observations	40	23	32	40	40	36	36

SEMP= The ratio of total self-employment to total employment; PIT= Private Income Tax rate; SSE= school enrolments at the secondary level; SUC= Start-up Cost; GDPPC= Gross Domestic Product per capita; BDR = Business Density Rate; NLL = The number of new limited liabilities companies

Table 2. Effects of Taxation on Self-employment rate (2015-2019): Dynamic panel estimates

Variable	Pooled OLS (1)		Fixed Effect (2)	Differenced-GMM (3)
Self-employment (-1)	0.964084***		0.030218	0.973461***
	(0.0000)		(0.8787)	(0.0032)
Private income tax	0.016292		-0.030721	-0.030588***
	(0.4984)		(0.4403)	(0.0035)
Secondary school enrollment	0.045190		-0.055862	-0.146572***
	(0.4493)		(0.5922)	(0.0006)
Startup cost	-0.010400		-0.006188	0.001100***
	(0.1741)		(0.3405)	(0.0080)
GDP per capita	-0.031309		-0.067484	0.000740
	(0.3122)		(0.1533)	(0.9364)
R- squared	0.998852		0.999857	-
J-Statistics(probability)	-		-	0.0915
Normality (Jarque- Bera test)- Prob	0.001316		0.695687	0.932305
Breusch-Pagan	Cross-section	Time	-	-
	4.202724**	0.702674		
	(0.0404)	(0.4019)		

*Note: P-Value is given in parenthesis. ***, ** indicates that variables are statistically significant at 1% and 5% levels, respectively*

Table 3. Robustness checks

Alternative measures of entrepreneurship		
	LNLL (1)	**BDR (2)**
Private income tax	-4.594755**	-0.491258**
	(0.0180)	(0.0000)

*Note: P-Value is given in parenthesis. ** indicates that variables are statistically significant at 5% level*

LNLL and BDR are defined as the number of new limited liabilities companies and business density rate, respectively. The coefficient of the personal income tax rate is negative and statistically significant at the 5% significance level, indicating that there is a negative relationship between the income tax rate and these new measures of entrepreneurship, according to the results of columns (1) and (2) in Table 3. The results suggest that an increase in the personal income tax rate discourages entrepreneurship as measured by the number of new limited liabilities companies and business density rate. These results are in line with the estimates of Table 2. However, the numerical magnitude of the effects is greater than the influence on the self-employment rate of the preferred result in Table 2. In conclusion, the empirical analysis of this study reveals that a personal income tax has a negative impact on entrepreneurship in the short run in SAARC countries. This result is confirmed by the additional sensitivity tests as well.

4. CONCLUSION

The impact of taxes on entrepreneurial activity has recently received a lot of attention. Income tax progressivity has two opposing consequences on self-employment in theory. Increases in income tax progressivity lower successful entrepreneurs' returns. Self-employment is discouraged as a result. On the other hand, the return from tax evasion and avoidance will be higher as tax progressivity rises. This in turn encourages self-employment. As a result, the net impact of tax progressivity on self-employment is unclear. The study's purpose was to see how personal income tax rates affected entrepreneurship. Using the GMM technique developed by Arellano and Bond [49], the study used annual time series data for SAARC countries from 2015 to 2019 to empirically analyze the dynamic link between two variables: personal income tax and entrepreneurship. For better interpretation, the model included secondary school enrolments,

startup costs, and GDP per capita as explanatory variables. Other complementary self-employment variables, such as the number of new limited liability companies and the business density rate, were also tested. The Sargan test was used to assess for over-identification issue.

The results for pooled OLS panel data estimations reveal that personal income tax has no significant impact on self-employment. These calculations, however, do not account for the possibility of endogeneity in tax rates, GDP per capita, secondary school enrollment, and the cost of starting a firm. There is only a one-way cross-section effect in POLS and no panel effect. So, we performed Fixed Effect model. The estimated FE model reveals that there is no significant impact of the explanatory variables on self-employment. Although the fixed effect estimation results are presented for comparison, it is well known that in the presence of a lagged dependent variable in the model, these estimates are biased and incorrect. The personal income tax rate has a statistically significant and negative effect on the self-employment rate, according to the differenced-GMM model. More specifically, the result shows that a one percentage point increase in the personal income tax rate is associated with a 0.03 percentage point decrease in the self-employment rate, while other variables being constant. The results confirm that the negative incentive effect dominates the causation between personal tax rate and self-employment for this panel. As a result, there is still a negative association between personal income tax rate and entrepreneurship in SAARC countries. The one-period lag value of self-employment and startup cost has positive and statistically significant impact on self-employment. Secondary school enrollment has a significant and negative impact on the self-employment rate.

Our results can be compared with Folster's results for Sweden [50], implies that an increase in the income tax rate is associated with a decrease in the self-employment rate, which is quite similar to the findings of this study. There is no general agreement in the literature on how to measure entrepreneurship. While self-employment rates represent the total self-employment as a share of total employment, it is well known that some businesses exist for a variety of reasons. As a result, an alternative measure of entrepreneurship was utilized to check the validity of the paper's main finding in such circumstances. There is a negative relationship between the income tax rate and these new measures of entrepreneurship. The results suggest that an increase in the personal income tax rate discourages entrepreneurship as measured by the number of new limited liabilities companies and business density rate [51].

Our findings suggest that there is a negative relationship between personal income tax and self-employment. However, conventional tax policy assessments miss the negative systemic consequences of complicated tax codes, and that reducing the complexity of the tax code will result in higher rates of market entrance for new enterprises. Our findings are significant in the design of state tax policy because they show that changes in tax policy are unlikely to have the effects on small business activity that policymakers expect. Rather than targeting tax advantages for small businesses, governments should focus on classic tax changes such as lower tax rates, broader tax bases, and simpler tax systems, which will create a more neutral and productive tax environment for small businesses, large firms, and individuals alike. Entrepreneurs would not establish businesses, invest, or take risks because of the tax system. In a competitive market, both startups and incumbents should compete, allowing market forces to determine the most efficient allocation of resources in the economy. For all in the economy, including entrepreneurs, a more neutral tax policy would improve incentives to work, save, and invest. Removing tax barriers for entrepreneurs would boost the dynamic of SAARC countries while also making the tax structure more neutral, efficient, and simple for all taxpayers. Low progressivity or even a flat tax could be part of such a strategy, but it's also critical to decrease the overall fiscal burden and start-up expenses.

We couldn't employ the System GMM because the study didn't include enough lag instrumental variables. As a result, future research should concentrate on emerging economies. This will assist in the analysis of the relationship between personal income tax and entrepreneurship using System GMM. On the same topic, additional work has to be done at the national and sub-national levels to examine the effects of tax systems more thoroughly. In addition, additional research is needed to determine the effects of taxation on the longevity or survival of self-employed businesses. To this point, the majority of the research has concentrated on the relationship between taxation and the entry into self-employment. Finally, much of the previous

research has concentrated on the link between personal income taxes and entrepreneurship. The effects of other taxation systems, such as consumption taxation, on self-employment and noncompliance are poorly understood. While the general subject of optimal tax systems has received a lot of attention in the public economics literature, there is still a lot of uncertainty about the relative impacts of various tax alternatives on self-employment and compliance. A greater knowledge of this topic will aid policymakers in making educated tax policy decisions and ensuring that the desired consequences are achieved.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX 1

Table A1. Definition of variables and data sources

Variable	Description	Source
Self employment rate (SEMP)	Self-employed workers are those workers who, working on their own account or with one or a few partners or in cooperative, hold the type of jobs defined as a "self-employment jobs."	World Development Indicator of the World Bank data base
Private income tax (PIT)	Taxes on income, profits, and capital gains are levied on the actual or presumptive net income of individuals, on the profits of corporations and enterprises, and on capital	World Development Indicator of the World Bank data base
Secondary school enrollment (SSE)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.	World Development Indicator of the World Bank data base
Startup cost (SUC)	Cost to register a business is normalized by presenting it as a percentage of gross national income (GNI) per capita.	World Development Indicator of the World Bank data base
GDP per capita (GDPPC)	GDP per capita is gross domestic product divided by midyear population.	World Development Indicator of the World Bank data base
Number of new limited liability corporations (NLL)	New businesses registered are the number of new limited liability corporations (or its equivalent) registered in the calendar year.	World Development Indicator of the World Bank data base
Business density rate (BDR)	The number of new registrations per 1,000 people ages 15-64.	World Development Indicator of the World Bank data base

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