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# Testing fiscal burden role on energy transition and economic recovery in South Asian economies

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The aim of the study is to test the role of fiscal burden on energy transition and economic recovery. The major emphasis of this study, from this viewpoint, is on the repercussions of fiscal burden on energy transition through net GDP rate in eight different nations including the south Asia region, and to unlock the opportunities for economic recovery. In order to determine whether or not there were any effects of foreign fiscal burden on energy transition through net GDP rate in the data, the World Bank collected data for the period 2000–2018. The study conducted a GMM and quantile regression analysis to see if there were any effects of foreign fiscal burden on energy transition, and how it infers economic recovery. In spite of the facts that international fiscal burden has a considerable negative influence on economic recovery and energy transition. The robustness analysis validates these results, with influencing variables accounting for 39 percent and 31 percent, respectively, with the total external fiscal burden and external fiscal burden service of the total external fiscal burden. The findings of this research will be useful to government authorities in their attempts to design more efficient and effective economic strategies in the foreseeable future. Hence, study suggested the practical implications to reduce fiscal burden and accelerate economic recovery through energy transition.

KEYWORDS

**energy transition, economic recovery, fiscal burden, quantile regression, growth rate**

## 1 Introduction

Energy transition is a matter of tremendous scientific, economic and practical relevance and relevancy. The energy transition encompasses a variety of dynamic concepts, from institutional shifts to technological advances to increased adaptability and cost savings in power use. Decisions made in this area of energy policy and transition will affect not just the energy supply in the United States, in addition to the world's energy market and its financial, political, and climatic consequences. Among the many concerns raised by the energy revolution, there are a select few that stand out as particularly pressing. A significant focus is the assessment of the ecological, biological, societal,

economic and political transition into viable systems. There, we conceptualize of energy transitions that pave the path for sustainable development and the construction of power visions as a network of avenues leading to desired social, ecological, and political outcomes. Moreover, renewable energy transition is tied to social transformation, renewable energy technologies accumulates and healthier outputs and expenditures. Decreased carbon emissions and, eventually, economies based more and more on sustainable energy are the projected results of sustainable energy changes. Other issues of fundamental relevance are the defining and monitoring of the connected issue of electricity sensitivity and resistance measures to counteract their influence to limit fuel poverty despite substantial cultural shifts.

The consequences of climate policy are receiving increasing amounts of scrutiny. More and more people are speaking up about energy, and many of those discussions centre on weather and climate concerns. The expanding activities prevalent in current history have included global marches and activity and the Mondays for Future movement firstly fomented by Greta Mueller, which have unique feature a segment of society and eventually brought the dialogue on concern for the environment of manmade nature. In specifically, these developments have shone emphasis on the relevance of climate policy and transition, which are implicated in changing climate adaption abatement and greenhouse gas emissions. A number of suggestions from civilised society are an attempt to adapt. Although there have been encouraging signs and initiatives to endorse energy transition pledges, the topic of energy transition is still not widely discussed and even less is known about in many nations. This is probably due to the fact that energy transformation involves technological and interdisciplinary understanding. Poor information and awareness, as well as strong or even erroneous preconceptions and prejudices, are persistent problems in the implementation of climate policy. Because presidential politics has a tendency to present simplistic solutions to complicated situations, this is also a common occurrence. Frequently, there is no clear cut solution to all these technological dilemmas. As a result of trying to appease the will of the people, policymakers and modellers may make poor choices, leading to the creation of energy transitions and paths that are either irrational, populism, or expensive. An efficient way and a step advance would have been the execution of activities and tactics targeted at understanding, distributing, and addressing critical problems connected to transitions and energy policy.

The energy transition has numerous avenues, difficulties, and prospects, but it is also vulnerable to a number of threats. Achieving energy security and a clean energy transition based on renewable energy sources through multiple generations requires careful consideration of concepts like sustainability, resilience, and vulnerability. However, it should be highlighted that the energy transition process would need most countries to go through phases where the existence of carbon-based energies will still dominate. This is further verified by the 2022 geopolitical and energy crises. Nevertheless, this pattern is gradually losing ground, and people are increasingly likely to favour sources that generate less pollution and have a smaller negative influence on ecosystems and the management of natural resources, social structures, and economic structures. Thus, natural resources are related to technological and economic modernization, and the efficiency of its administration is the key to speeding up structural transformation in oil-abundant economies.

Technical training and education in a wide range of subjects, from the hard to the soft sciences, are necessary for energy transition and, more generally, energy policy. Tools and expertise from the social sciences can be put to use in analysing and assessing the complicated dynamics and phenomena associated with the energy transition. Trend analysis, energy consumption forecasting, and future innovation roadmapping are all crucial. The capacity to recognise and adapt to these changes is becoming increasingly important in the job market, making it a worthwhile investment in training and a skill that can be put to use immediately. Investment in retraining and career reorientation, both of which are increasingly important in this field, is also essential.

While on the other side, external fiscal burden is a significant variable used to assess an economy's ability to finance its capital creation activities. There are a variety of problems contributing to poor internal capital development in South Asian emerging nations. Fiscal imbalances are being exacerbated by economic variables such as the servicing of foreign fiscal burden and the deepening of the current account deficit. Previous studies asserted that fiscal burden is a substantial component of the capital creation restriction experienced by emerging nations. It has the potential to produce macroeconomic stagnation while also generating low rates of profit and long-term capital accumulation in the process. Large foreign fiscal burdens have a negative impact on public expenditure, which in turn has a negative impact on the mix of public expenditure with growth and welfare impacts, ultimately leading to a decrease in public expenditure. A side effect of the fiscal adjustment is an increase in social expenditure. Insufficient space for future external financing causes many fiscal burden obligations.

The one method to recompense off these loans in time while making a profit is by forming and executing an accelerated plan for the effective use of these funds. Supply and demand are the key factors used to determine a lack of management of fiscal burdens in these countries. Within these South Asian countries, the development sector consumes all the funds covering the demand side. These countries are considered flawed because of their low per capita income and inadequate economic growth. The national saving rate is positively affected by these factors while posing a setback to the domestic savings insufficient to meet countries like Pakistan, Afghanistan, Sri Lanka and India. Furthermore, an inadequate capital earned by the commodity

exports is unable to cover the cost of the capital-intensive imports carried out by these countries giving rise to an increased need for external fiscal burden. The gaps need to be filled with increased assistance in the administrative, technical and financial sectors.

The most active tools that increase wealth, productivity, national income, and employment and minimize inflation are robust economic strategies that enable public service. However, finance growth and expansion are directly influenced by external funds' availability while making it one of the key factors responsible for the lack of economic recovery. Huge external fiscal burdens can be supported by developing countries with growing export sectors equipped with keeping a balance. The economic wellbeing of these countries can face major problems if they are unable to sustain external fiscal burden as a service in itself is an indication of a higher current deficit account in any country. After the due external fiscal burden gets out of hand, the fundamentals of any economy fail to pose a huge setback to the future of investment in that country.

Recent decades have experienced a redacting financial flow globally, increasing the importance of external fiscal burdens as a critical factor to be considered while studying development economics and has affected middle and low-income countries more than the others (Zhang et al., 2018). Many external factors are inhibiting energy transition through net GDP rate and wealth creation in these developing countries (Yoshino et al., 2020). Rising external fiscal burden creates anticipations of more distorting taxes needed to repay fiscal burden, lowering investor expectations and discouraging investment. Massive amounts of fiscal burden have been taken by the South Asian countries, both internally and externally. The extent of these fiscal burdens makes it difficult for these countries to sustain. External public fiscal burden and energy transition through net GDP rate have to go hand in hand to manage fiscal burden effectively regardless of the weak institutional and regulatory framework. Energy transition through net GDP rate is an overriding concern for most of the developing countries in the world. Improving the basic standard of living for its people is the primary concern for any country, starting with the basics, such as providing them with a robust infrastructure, resources and skills. energy transition through net GDP rate can profit the poor in two different ways–either straightforwardly, when growth favors the areas and locales where the helpless exist and the components of creation that the poor own, or by implication, through redistributive strategies that include utilizing expanded monetary assets in the development of interests in the advantages of poor people or moves and security nets for poor people (Ko, 2020).

External fiscal burden is influential in filling the problem between government spending and government revenue. It enables investment opportunities amongst beneficiary states while assisting with budget support (Sun, Schloesser and Taghizadeh-Hesary, 2020). Countries with poorly managed governments are negatively impacted by external fiscal burden, as they cannot manage the assets effectively. Foreign aid can be crucial in helping developing countries sustain their economies. The displacement effect can be controlled only by containing the growth in fiscal burden (Al-Yaeeshi et al., 2020). Additionally, it has a negative impact on the generosity of donor nations.

## 2 Literature review

This section offers an examination of the association between foreign fiscal burden and economic recovery, based on previous studies. According to a company with some room for expansion may have 'under-investment' issues as a result of fiscal burden. It is possible to limit the process of underinvestment because of agency costs between fiscal burden holders and investors. Investors are wary of putting their money into the hands of companies that are used to diluting their assets since doing so would prevent them from adding to the equity of the business, which is necessary for attracting new investments (Zhang and Li, 2018; Jiang et al., 2019).

In contrast to the preceding research, Hatefi et al. (2019) and Taghizadeh-Hesary et al. (2021) claimed that greater fiscal burden levels might result in stronger energy transition through net GDP rate I in the short term. According to the findings of this research, a one percent rise in the stock of foreign fiscal burden results in a 36 percent increase in total national production. Using the non-linear threshold model, Xing and Fuest, (2018) shown that there is an adverse association between liability and development. Specifically, it was shown by the research that it is at lower levels of fiscal burden, often between 30 and 60 percent, that the negative impacts of external fiscal burden begin to manifest themselves. It assists the nation in mitigating the negative impacts of foreign and external fiscal burden crowding out. With a rise in the ratio of foreign in fiscal burden to GDP, the danger of a current account deficit increases. Using the Solow model, which consists of a single ordinary differential equation, Tiep et al. (2021) showed that this non-linear model describes the total amount of capital stock per person. Employment compensation and property income are included in the foreign net primary income in this calculation, however taxes on goods do not include production value, as is the case in the previous equation.

Yousaf et al. (2020) proposed the "hierarchical financing theory" stating how internal funds are responsible for given that a firm with new asset. Keeping the over-in fiscal burden theory in mind, the return on investment is now lower, and it is tough to build internal capital. Saving and private investments are adversely affected by the fiscal burden, and the government has a substantial external fiscal burden on its head. All the benefits remain with the creditors in the fiscal burden return process. Governments become defensive by forming policies that can either increase domestic capital or decrease domestic

consumption leading to energy transition through net GDP rate. Winner, (2021) uses the theory of fiscal burden to elaborate on how developing countries can undergo efficiency losses due to the fast-growing unsustainability occurring due to fluctuating levels of fiscal burden.

Proposes how energy transition through net GDP rate positively influenced by the total capital formation as the economy; in this case, it is affected by skills and knowledge of the people. In any research area, human capital investment is directly related to the knowledge gained from that specific research area (Chien et al., 2021). The aim of keeping inventory is to keep track of the "work in progress" as the saying goes. In accordance with the SNA of 1993, capital creation also includes the net purchase of valued assets. Various scholars have said that the influence of financial globalisation on the inequity between the pay sections of capital and labour does not operate in a monotonous and straightforward manner over time, but rather operates *via* the use of temporary serious concerns during times of crisis. Work partially saves capital in times of crisis *via* adjustments in the allocation of compensation between work and capital, and as a result, capital is not hurt suddenly. Studies provide experimental support for this idea by demonstrating a propensity for job offers to decline sharply during a financial crisis, with recovery occurring only halfway through the following years (Wei et al., 2021).

This is the degree at which economies or governments permit commerce with other countries in both imports and exports. It is calculated as the total of commodities and services imported and exported as a proportion of (GDP) (Aslam et al., 2021). Trade is defined as the total of commodities and services exported and imported, expressed as a percentage of gross domestic product. This is the moment at which nations and economies begin the process of exchanging exports and imports. It is calculated as the total of commodities and services imported and exported as a proportion of gross domestic product (Depa et al., 2018). However, trade openness (OP) is defined as the total of exports and imports of goods and services (Peimani and Taghizadeh-Hesary, 2019).

# 3 Research methodology

## 3.1 Theoretical framework

According to the theory has an influence on the adjustment of important margins that are utilised to make choices about production and investment. The issue that has played a significant impact in this shift is the country's foreign fiscal burden. The production capacity of the borrowing nation, according to Rodriguez-Gonzalez, Rico-Martinez), may prevent the borrowing country from accumulating further fiscal burden if the present foreign fiscal burden is sufficient to restore the country's productivity levels. In his subsequent argument, Le et al. (2020) shows how external fiscal burden may have a beneficial influence on the economy of the borrowing business by ensuring that every foreign loan you incur has marginal productivity that is more than or equal to the principle and access to finance in energy sector SMEs. If the coping nation fails to return its fiscal burden, it will lose all credibility since it will cause the receiving country to lose a significant amount of foreign fiscal burden, which will have a negative impact on its economy (Malik et al., 2020). States how developing countries have to apply taxes on the private sector, although this helps them in transferring resources, the investment rate in the private sector decrease, consequently reducing investments on the whole. Cohen using the usual least square method: 1965–1973 and 1982–1987, Cohen assessed 81 developing countries with an equation based on their investment and presented that GNP growth was not affected by external fiscal burden in all of these countries. Cohen further elaborated on how the declines in investment could not be simplified if there is frequent rescheduling in the countries. Despite this, the neo-classical theory has various flaws, the most significant of which are as follows. First and foremost, the technique gives limited and insufficient information regarding energy transition through net GDP rate and development. For the second time, the neo-classicists believe that energy transition through net GDP rate is a smooth, harmonious and continuous process, and as a result, they are unable to accurately predict the possibilities for cyclical oscillations in the course of development. Finally, the assumption of full employment is unrealistic, especially in terms of capital creation; they over-emphasized the influence of the interest rate and theoretical institutional elements, which is not the case. According to the Neo-classical Assessment, if the government decides to expand its expenditure, it would drive out private investment in the nation and cause it to suffer.

## 3.2 Study data

The neo-classical school of thought believed that a government budget deficit enhances the economy's consumption level because consumers believe that the current shortages would be compensated by taxes collected from future generations. In this study, a comprehensive analysis is carried out on a dataset (WDI given by the World Bank) including data from south Asian nations between the years of 2000 and 2018.

## 3.3 Empirical design of study

CIPS unit root tests, IPS tests (Im-Pesaran-Shin tests), ADF tests (Augmented Dickey-Fuller tests), PP tests (Phillips-

Perron tests), and Hadri tests, all created by Levin, Lin, and Chu. In addition, it exhibits a wide range of short-term dynamics.

$$\gamma = \alpha + \beta 1\chi 1 + \ldots\ldots\ldots + \beta n\, xn + \varepsilon \tag{1}$$

The conceptual econometric model for the study is

$$\begin{aligned} yt = {} & \beta_0 + \beta_1 Total\ Externl\ Debt_{i,t} + \beta_2 External\ Debt\ stock_{i,t} \\ & + \beta_3 External\ Debt\ service_{i,t} \\ & + a_4 Gross\ Capital\ Formation_{i,t} \\ & + \beta_5 Economic\ Recoverys_{i,t} + \beta_6 Current\ \ Accout\ deficit_{i,t} \\ & + \beta_7 + i\sum_{i=1}^{18} Year + i + \beta_8 + j\sum_{j=1}^{8} country\ j + \beta_9 \\ & + j\sum_{j=1}^{8} Energy\ transition\ j + \varepsilon t\, a_0 \end{aligned} \tag{2}$$

The specification for each model is given below.

$$\begin{aligned} GDP_{i,t} = {} & \alpha_0 + \alpha_1 Total\ External\ Debt_{i,t} \\ & + \alpha_2 External\ \ Debt\ stock_{i,t} + \alpha_3 Capital\ formation_{i,t} \\ & + \alpha_4 Economic\ Recoverys_{i,t} + \beta_5 \\ & + j\sum_{j=1}^{8} Energy\ transition\ j + \varepsilon_{i,t} \end{aligned} \tag{3}$$

$$\begin{aligned} GDP_{i,t} = {} & a_0 + a_1 External\ Debt_{i,t} + a_2 External\ Debt\ stock_{i,t} \\ & + a_3 External\ Debt\ service_{i,t} \\ & + a_4 Capital\ \ formation_{i,t} + a_5 Trade\ openess_{i,t} \\ & + a_6 Current\ \ accout\ deficit_{i,t} + e_{i,t} \\ & min \sum_{y_i \geq x_i'\beta} .GDP\left|y_i - x_i\beta\right| + \beta_7 + j\sum_{j=1}^{8} Energy\ transition\ j \\ & + \sum_{y_i < x_i\beta} .(1-\theta) y_i - x_i'\beta \end{aligned} \tag{4}$$

Different parameters are estimated when θ is equal to different values. The AR and sargan tests indicate the validity of instruments, and no auto-correlation was found. It includes GCF, OP, ET and CAD refer to control variables, Cross and country specifications are considered. Moreover, because private investment is more productive than government expenditure, the increased production as a result of increased government spending through fiscal burden does not entirely offset the adverse effects of the crowding-out of private investment on productivity, resulting in a decrease in GDP, according to the Neo-classical school of thought.

# 4 Results and discussion

## 4.1 Empirical results

There are a variety of taxing and charging techniques that may boost tax income while also advancing sustainability requirements, which is known as EFR. Regulation and other environmental science measures may be strengthened through the use of fiscal reforms and tools that focus on environmental issues. EFR has the ability to accomplish environmental goals more quickly and cost-effectively than command-and-control (CAC) based regulatory approaches. In developing nations, environmental fiscal changes may help to poverty reduction and development objectives. Reduce contamination and protect natural resources, which helps preserve occupations and supports the very well of the poor, as well as EFR money that can be utilised for other pro-poor policies, are two possible approaches to do this. Resources-efficient and energy friendly products and services get financial assistance for energy transition from government agencies. This is used as a tool to encourage energy transition, or to enable the adoption of new legislative frameworks, or to retain ecologically sound structures and manufacturing processes. It is possible to influence energy efficiency and energy transition in a short period of time by using such incentives. It is true that they may strain public resources and disrupt regular market growth. Significant subsidies for energy and natural resources are also provided by governments to keep these essential commodities and services affordable. This leads to inefficient use of energy resources and inefficient energy transition as well as considerable budgetary constraints on the government because of under-pricing.

When it comes to foreign fiscal burden, Sri Lanka might be considered the second most vulnerable country (51.997 percent). The Maldives (MDV) is ranked third in the world, with the third largest foreign fiscal burden (51.997) and the third biggest average deficit (−12.562 percent). Nepal (NPL) has the fourth highest average level of foreign fiscal burden of any nation in the world. However, fiscal burden has significant impact on energy transition and economic recovery as reported in Table 1. More specifically, fiscal burden on South Asian economies have negative impact on energy transition specifically.

The mean and SD for all the variables are in the explanatory summary given above. If there is more data gathered around the mean, the standard deviation would be smaller. However, a more spread out data will result in more significant variability means. From Table 2 the outliers in the dataset can be analysed with the help of the given mean and median. Despite that, the mean does not show many changes in all the variables, and consequently, there are no outliers in the study, proving the analysis to be unbiased.

According to the econometric theory, the model cannot have multiple interdependent variables. Klein criterion method, step regression, and the necessary tests can be used to test the multicollinearity. The easily operated Klein criterion method dictates that if the model does not have a multicollinearity problem. Estimated multicollinearity exists between the independent variable. Regardless of an existing correlation between the independent variables, they do not show multicollinearity. The absence of multicollinearity amongst the

TABLE 1 Relationship between EXT fiscal burden and CAD.

| South Asia country | Years | EXT Fiscal burden (average) % | Energy Transition | CAD |
|---|---|---|---|---|
| AFG-Average | 2000–2018 | 15.191 | −17.725 | Yes |
| BND- Average | 2000–2018 | 22.959 | 0.451 | No |
| BNT- Average | 2000–2018 | 81.286*** | −17.537*** | Yes |
| MD- Average | 2000–2018 | 37.103 | −12.526 | Yes |
| NPL—Average | 2000–2018 | 31.354 | 1.773 | No |
| PAK- Average | 2000–2018 | 31.651 | −1.867 | Yes |
| IND- Average | 2000–2018 | 19.646 | −1.385 | Yes |
| LKA- Average | 2000–2018 | 51.997** | −3.475 | Yes |
| All countries- Average | 2000–2018 | 37.128 | −5.450 | Yes |

TABLE 2 The correlation Matrix.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| TEXTD | 1 | | | | | | | |
| EXTDSK | −0.350** | 1 | | | | | | |
| EXTDS | 0.818*** | 0.0391 | 1 | | | | | |
| GDPG | 0.0151 | 0.0833 | −0.0335 | 1 | | | | |
| GDPPC | 0.0811 | 0.138 | −0.0173 | 0.985*** | 1 | | | |
| GCF | 0.553*** | 0.153 | 0.13 | 0.193* | 0.309*** | 1 | | |
| OP | 0.383*** | −0.193* | 0.353** | 0.385*** | 0.185* | 0.0807 | 1 | |
| ET | −0.357*** | 0.159* | −0.338*** | -0.0351 | 0.0551 | −0.0083 | −0.358*** | 1 |

TABLE 3 VIF Statistics.

| Variable | VIF | 1/VIF |
|---|---|---|
| TEXTD | 5.85 | 1.37884 |
| TEXDSK | 3.93 | 1.55433 |
| GCF | 3.5 | 1.88845 |
| EXDS | 3.33 | 1.78438 |
| ET | 3.59 | 1.77453 |
| OP | 3.53 | 1.85398 |
| ER | 3.41 | 1.88430 |

TABLE 4 Panel unit root tests (IPS and CIPS).

| Variables | IPS unit root test | | CIPS unit root test | |
|---|---|---|---|---|
| | Level | First Difference | Level | First Difference |
| GDPG | −3.3318*** | −5.6156*** | −3.818*** | −5.366*** |
| GDPPC | −3.1899*** | −5.5989*** | −3.693 | −5.318*** |
| TEXTD | −1.8338 | −3.1561*** | −1.635 | −3.888* |
| EXTDSK | −1.6319 | −3.1633*** | −1.811 | −3.139** |
| EXDS | −1.9588* | −6.8366*** | −3.186 | −6.165*** |
| GCF | −1.8161 | −3.3136*** | −1.388 | −3.933 |
| OP | −3.1361* | −3.5813*** | −3.691 | −3.883*** |
| ET | −3.3583** | −6.6686*** | −3.156 | −3.831*** |
| ER | −4.5614** | −5.0771*** | −3.012 | −2.1560*** |

variables is explained by the variance inflation factor (VIF) (see Table 3), and if the VIF quotient I lower than 10, the study is free on any collinearity such as Tolerance -e (r2) " VIF = " 1/ (1-e ($r^2$).

The unit root test is used to understand the stability of the sequence in the economic variables and the variable of energy transition. Although empirical research has made use of unit root tests as a systematic method processing technique. Panel unit root tests results can be seen from Table 4.

The stationarity qualities of data are shown in Table 5. The IPS and CIPS unit root tests are used to determine the source of the unit root issue. (GDP), gross domestic product per capita (GDP), trade openness, and current account balance are all stable at the level of the economy. Additionally, all of the variables are stable at the first difference, which implies that the data is normal. Due to the fact that wide subsidies tend to help the wealthy more than the energy poor individuals, they may be deemed doubly wasteful. Decreases in government deficits and market

TABLE 5 shows the results of the pooled OLS and QR.

| | Pooled OLS | | Quantile Regression | | | |
|---|---|---|---|---|---|---|
| | Model-1 | Model–2 | Model-3 | Model-1 | Model-2 | Model-3 |
| ET | −0.0805* | −0.081* | −0.087* | −0.0524** | −0.0513** | −0.0455*** |
| | (−2.43) | (−2.35) | (−1.90) | (−5.65) | (−6.17) | (−5.41) |
| GCF | 0.0513* | 0.0534 | 0.0505* | 0.0793*** | 0.0790*** | 0.0697*** |
| | (−1.90) | (−1.90) | (−2.20) | (−3.93) | (−4.44) | (−4.18) |
| ER | 7.292* | 6.659* | 6.340* | 3.113*** | 4.398*** | 4.819*** |
| | −2.9 | −3.17 | (−2.48) | (−3.87) | (−4.39) | (−5.65) |
| EXTDSK | | −0.106* | −0.148* | | 0.266* | 0.399*** |
| | | (−0.25) | (−0.30) | | (−2.36) | (−3.38) |
| EXTDS | | | 0.143* | | | −0.126* |
| | | | −0.42 | | | (−1.19) |
| CAD | | | −0.0898 | | | (−0.0208) |
| | | | (−0.31) | | | (−1.37) |
| Constant | 3.470*** | 6.25 | 7.329 | 3.867*** | −3.097 | −6.274* |
| | (−5.99) | (−0.55) | (−0.56) | (−7.65) | (−1.03) | (−2.08) |
| Observations | 152 | 152 | 152 | 152 | 152 | 152 |

distortions may all be expected as a result of cutting or eliminating subsidies of this kind and this reduction of subisidies also have negative impact on energy transition. When subsidies are cut, targeted compensation programmes are commonly utilised to ease the burden on those who would be most badly impacted, particularly low-income families who lacks the adequate energy access.

Table 5 shows the complete specification findings when GDP growth is taken into consideration. These findings confirm the existence of a negative link between factors relating to foreign fiscal burden and economic recovery. Table 5 demonstrates, on the other hand, a negative relationship between foreign fiscal burden as a percentage of GNI and external fiscal burden service (EXDS). Increased external fiscal burden will cause the GDP to contract by 8% as a consequence of the rise in external fiscal burden. If foreign fiscal burden is reduced by 8 percent, the economy will grow at an 8 percent rate, and *vice versa* with energy transition (0.085). The quantile regression model predicts that increasing external fiscal burden (TEXTD) by 5 percent would result in a 5 percent (−0.0455) decline in GDP growth (−0.0455). Our research revealed that the current account balance has a negative association with the energy transition, which we discovered when searching for a negative link between foreign fiscal burden, economic recovery and energy transition. When the CAB is increased by one percent, it is projected that the GDP growth rate will decline by eight percent.

Table 6 illustrates the statistically significant and negative effect of foreign liability stock as a percentage of GNI and total fiscal burden servicing on GDP per capita. It simply indicates that economic recovery slows as a result of a rise in foreign fiscal burden levels. Trade openness and gross fixed capital creation, on the other hand, are positively related with both GDP growth (as measured by the GDP) and GDP per capita. Model (1) shows that GDP growth is decreased by 6 percent (−0.0612) with a 1 percent rise in foreign fiscal burden, but Model (3) shows that GDP growth is cut by 7 percent (0.0686). The other case establishes a negative connection with a value of −0.0856 (9 percent). In model (3), there is a statistically significant positive connection between FCF and GDPPC of 0.0958 (9 percent), although in the quantile regression model (3), the association seems to be 0.108 (9 percent) (11 percent). However, model (3) indicates a positive link between the two variables. A similar result was obtained in the OLS models (1) and (2), where no link could be found between the CAB and (GDPPC), however the two variables exhibited a positive relationship in the OLS model (3). After everything was said and done, a positive relationship between (GDPPC) and (CAB) was discovered in the quantile regression model (3). In contrast, no influence could be shown in either the model (1) or the model (2).

Risks to the economic program's stability from energy transition and climate change are increasingly acknowledged. From Tables 7, 8, Physical hazards, liability risks, and energy transition risks are all a part of the continuous discussions on this issue. This increases the compensation for energy transition losses or liability risk as a result of these physical harm. There is an increasing number of nations that have implemented a broad variety of new laws and regulations that either tighten their current economic requirements or place wholly new requirements on the business sector, causing a transitional

TABLE 6 Pooled OLS and QR with GDP per capita.

| | PLS | | QR | | | |
|---|---|---|---|---|---|---|
| | **Case 1** | **Case 2** | **Case 3** | **Case 1** | **Case 2** | **Case 3** |
| ET | −0.0612 | −0.0608 | −0.0686 | −0.0592*** | −0.0544*** | −0.0556*** |
| | (−2.25) | (−2.09) | (−1.72) | (−5.18) | (−5.22) | (−4.28) |
| GCF | 0.0750* | 0.0734* | 0.0958** | 0.0983*** | 0.0841*** | 0.108*** |
| | (−3.13) | (−2.92) | (−4.28) | (−3.95) | (−3.80) | (−4.28) |
| ER | 5.043 | 5.547* | 5.344 | 3.432*** | 4.628*** | 4.272** |
| | (−1.97) | (−2.74) | (−2.32) | (−3.38) | (−3.64) | (−3.27) |
| EXDSK | | 0.0843* | −0.0856* | | 0.262 | 0.222 |
| | | (−0.24) | (−0.21) | | (−1.83) | (−1.30) |
| EXDS | | | 0.0973 | | | 0.0539 |
| | | | (−0.330) | | | (−0.33) |
| AD | | | 0.0429 | | | 0.025 |
| | | | (−1.33) | | | (−1.22) |
| Constant | 1.673* | −0.537 | 3.254 | 1.943** | −4.484 | −4.051 |
| | 2.91 | (−0.06) | −0.3 | −3.15 | (−1.18) | (−0.93) |
| Observations | 152 | 152 | 152 | 152 | 152 | 152 |

TABLE 7 Empirics for QR.

| **Variables** | **OLS** | **Q10** | **Q25** | **Q50** | **Q75** | **Q90** |
|---|---|---|---|---|---|---|
| ET | -1.1875*** | -1.1355* | -1.1535* | -1.1555*** | -1.117*** | -1.137* |
| | (-5.15) | (-1.77) | (-3.57) | (-5.51) | (-8.57) | (-1.59) |
| TEXD | -1.158 | 1.119* | 1.339 | 1.399*** | -1.1797 | -1.391* |
| | (-1.53) | (-1.33) | (-1.97) | (-3.38) | (-1.58) | (-1.51) |
| EXDS | 1.153 | -1.373 | -1.1779 | -1.137 | 1.333* | 1.575* |
| | (-1.55) | (-1.88) | (-1.35) | (-1.19) | (-1.77) | (-1.77) |
| GCF | 1.1515 | 1.173* | 1.158*** | 1.1797*** | 1.1375* | -1.1537* |
| | (-1.37) | (-3.55) | (-5.71) | -5.18 | -1.53 | (-1.51) |
| ER | 7.351** | -3.118 | 1.783 | 5.819*** | 7.773*** | 13.57* |
| | (-3.13) | (-1.71) | (-1.17) | (-5.75) | (-7.18) | (-1.77) |
| CAD | -1.11898 | 1.1598 | 1.1793* | -1.1318 | -1.1953*** | -1.113* |
| | (-1.35) | -1.88 | (-3.57) | (-1.37) | (-5.73) | (-1.91) |
| Constant | 7.339 | -1.379 | -3.977 | -7.375* | 7.333 | 15.33 |
| | (-1.13) | (-1.11) | (-1.77) | (-3.18) | (-1.95) | (-1.71) |
| Observations | 153 | 153 | 153 | 153 | 153 | 153 |

risk. South Asian countries must reallocate a considerable amount of money in order to make the energy transition from unsustainable growth to eventually low-economic development, and this redistribution is likely to have a systemic influence on the stability of capital markets and socioeconomic circumstances. Leading central banks and financial regulators have launched a network for improving the energy system to exchange best practises and raise awareness about the risks and possibilities process of transition among financial institutions throughout the world

TABLE 8 Empirics for QR.

| Variables | OLS | Q10 | Q25 | Q50 | Q75 | Q90 |
|---|---|---|---|---|---|---|
| ET | -1.1686*** | -1.1319 | - | -1.1556*** | -1.1766*** | -1.1891 |
| TEXD | -1.1856* | 1.383 | 1.155 | 1.333* | 1.115 | -1.11313* |
| | (-1.33) | (-1.58) | (-1.69) | (-1.31) | (-1.66) | (-1.11) |
| EXDS | 1.1973 | -1.366* | -1.1567* | 1.1539 | 1.1375 | 1.383 |
| | (-1.391) | (-1.97) | (-1.39) | (-1.33) | (-1.16) | (-1.51) |
| GCF | 1.1958* | 1.318** | 1.199*** | 1.118*** | 1.1557* | -1.11175 |
| | (-3.53) | (-3.98) | (-6.65) | (-5.38) | (-3.33) | (-1.11) |
| ER | 5.355** | -3.315 | 1.68 | 5.373** | 8.155*** | 15.35 |
| | (-3.69) | (-1.95) | (-1.19) | (-3.37) | (-6.18) | (-1.78) |
| CAD | 1.1539 | 1.1697 | 1.165*** | 1.135 | -1.118 | -1.1553 |
| | (-1.35) | (-1.35) | (-6.81) | (-1.33) | (-1.85) | (-1.36) |
| Constant | 3.355 | -8.316 | -5.611 | -5.151 | -1.539 | 1.993 |
| | (-1.58) | (-1.67) | (-1.89) | (-1.93) | (-1.13) | (-1.18) |
| Observations | 153 | 153 | 153 | 153 | 153 | 153 |

(source: While physical hazards have been widely examined, energy transition risks are a relatively new category and remain under-explored. In light of this, this study examines the academic and practical effects on financial stability of an energy protection aimed at decarbonisation. We focused on the ways in which the shift to a reduced sector affects the balance sheet of banking sector.

The explained variables can be separated into 100 quantiles, i.e., 1%, 2%, 100%. Due to the inconsistent economic data, the exact value of each quantile cannot be specified. In order to utilize the empirical analysis, this study has used qualities 10, 25, 50, 75 and 90 as proxies. Quantile regression is an extended version of the ordinary least squares used by the classical conditional mean model. The quantile regression model has used numerous quantile functions to calculate the general model. Quantile 50, the median quantile, is equivalent to the least square regression and is used as a special case in quantile regression. The exact average of the influence caused by the explanatory variables on an explained variable cannot be found by using the quartile panel data model and is unable to find how explanatory variables will affect the explained variables considering the different quantile points.

The Quantile regression model can cover all these inadequacies. Keeping the results gathered from all three models, it is easy to say that quantile regression is instrumental in spotting the key factors that influence economic performance (Table 6). Figure 1 shows a graphical representation of the results documented for quantile regression. All the quantiles are shown in Table 6 to be validated through various tests to affect the key factors influencing economic growth. The results extracted through regression indicate much significance. This analysis of the fundamental

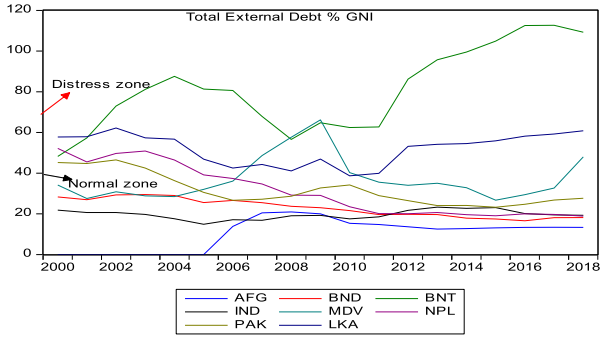


FIGURE 1
represents the total external fiscal burden % GNI.

parameters forms the foundation for policymaking on how external fiscal burden can be reduced for better economic growth.

## 4.2 Robustness analysis

The coefficient of the fiscal burden index square term is used to verify the statistical significance of the two equations in this example including energy transition and economic recovery. From Tables 9, 10, 11, If these factors are not taken into consideration in other formulae, the fiscal burden index coefficient will be negatively impacted. As a result, it is possible to establish a non-linear connection between envoirnmental stabilityand indices of fiscal burden load. When it comes to capital creation and trade openness, a

TABLE 9 Robustness analysis.

| | FGLS | | | GMM | | |
|---|---|---|---|---|---|---|
| | **Case 1** | **Case 2** | **Case 3** | **Case 1** | **Case 2** | **Case 3** |
| ET | -1.1835*** | -1.1833*** | -1.1881*** | -1.1747*** | -1.1741*** | -1.1777*** |
| | (-3.73) | (-3.74) | (-3.39) | (-4.57) | (-4.51) | (-3.77) |
| GCF | 1.1431* | 1.1454* | 1.1454 | 1.1314 | 1.1397 | 1.1358 |
| | (-1.89) | (-1.97) | (-1.85) | (-1.17) | (-1.11) | (-1.18) |
| ER | 7.818*** | 5.133 | 4.797 | 7.198*** | 7.734*** | 7.538*** |
| | (-3.38) | (-1.87) | (-1.73) | (-7.14) | (-4.58) | (-4.33) |
| EXDSK | | -1.311* | -1.371* | | 1.1731 | 1.1178 |
| | | (-1.98) | (-1.98) | | (-1.371) | (-1.17) |
| EXDS | | | 1.11 | | | 1.11 |
| | | | (-1.38) | | | (-1.37) |
| CAD | | | -1.11137 | | | 1.1111 |
| | | | (-1.11) | | | (-1.37) |
| Constant | 4.131*** | 13.37 | 13.49 | 3.513*** | 1.597 | 3.87 |
| | (-3.33) | (-1.47) | (-1.43) | (-4.87) | (-1.31) | (-1.49) |
| Observations | 153 | 153 | 153 | 153 | 153 | 153 |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Further Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Wald chi$^2$ | 33.5 | 34.17 | 34.17 | 54.37 | 54.34 | 54.44 |
| Autocorrelation | No | No | No | 1.791 | 1.778 | 1.797 |
| Sargan OIR | | | | 1.35 | 1.347 | 1.354 |

TABLE 10 Robustness check with FGLS.

| | FGLS | | | System GMM | | |
|---|---|---|---|---|---|---|
| | **Case 1** | **Case 2** | **Case 3** | **Case 1** | **Case 2** | **Case3** |
| EXD | -0.0625** | -0.0626** | -0.0695** | -0.0483*** | -0.0466*** | -0.0516** |
| | (-3.04) | (-3.08) | (-2.85) | (-3.51) | (-3.35) | (-2.93) |
| GCF | 0.0641* | 0.0654** | 0.0857 | 0.0589* | 0.0536 | 0.0824* |
| | (-1.46) | (-1.50) | (-1.72) | (-2.06) | (-1.85) | (-2.55) |
| ER | 4.812* | 4.527* | 4.214** | 4.967*** | 6.325*** | 6.365*** |
| | (-2.57) | (-1.83) | (-1.64) | (-4.28) | (-3.89) | (-3.75) |
| TEXD | | -0.0533* | -0.230* | | 0.228 | 0.0574 |
| | | (-0.19) | (-0.67) | | (-1.20) | (-0.250) |
| EXDS | | | 0.0787 | | | 0.1 |
| | | | (-0.290) | | | (-0.150) |
| ET | | | 0.0404* | | | 0.0594* |
| | | | (-0.93) | | | (-2.00) |
| Constant | 2.178** | 3.543* | 7.612* | 1.707* | -4.266 | -0.616 |
| | (-1.89) | (-0.47) | (-0.87) | (-2.43) | (-0.85) | (-0.11) |
| Observations | 152 | 152 | 152 | 152 | 152 | 152 |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Further Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Wald chi$^2$ | 15.49 | 16.02 | 16.19 | 33.15 | 34.31 | 38.35 |
| Auto correlation/ AR -2 | No | No | No | 0.709 | 0.698 | 0.755 |
| Sargan OIR | | | | 0.412 | 0.396 | 0.459 |

TABLE 11 Time lagged effects.

| | DGMM | | SGMM | |
|---|---|---|---|---|
| | Coefficient | t-statistics | Coefficient | Z-statistics |
| GDPG $_{(t-1)}$ | 1.5598*** | 14.44 | 1.5595*** | 14.44 |
| TEXD | −1.1155*** | −6.37 | −1.1719*** | −6.37 |
| EXDSK | −1.5685* | −1.77 | 1.1375 | −1.77 |
| ET | −1.1543 | −1.34 | 1.1465 | −1.34 |
| Observations | 154 | 154 | 154 | 154 |
| Year effects | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Wald chi$^2$ | – | 35.61 | – | 497.18 |
| Sargan OIR | – | 1.769 | – | 1.949 |

statistically significant positive association is shown between envoirnmental stability and both variables. In general, a negative link exists between the current account balance and energy transition. Because their export to import ratios are larger than those of the other six nations, India and Bangladesh have seen faster economic recovery than the others. As a result, these ratios have exceeded critical thresholds in all six nations, with the exception of India and Bangladesh (see table 12). Because of these conditions, it is possible that the South Asian economy may collapse, with the brunt of the strain being felt in major economies such as India, Pakistan, and Bangladesh (see chart below). Fiscal burden servicing offsets one-third of the country's budget, which accounts for 3 percent of GDP and one-quarter of total exports in 2015. The late 2000s had a low GDP growth rate of roughly 4.5 percent, which was considered poor by historical standards (Figure 2).

In the end, we found that the treatment and control groups were similar. Using this approach, we can compare default rates and loan spreads between high-polluting enterprises targeted by Clean Air Action and low-polluting firms that are less subject to regulation using the DID analysis. Financing to polluters should be treated differently than lending to other businesses if financial institutions like banks are conscious of global transformation risk.

The many relationships between fiscal burden and energy transition and economic indicators are classified according to the nation in question. According to the conclusions of this research, total foreign fiscal burden has a negative impact on GDP growth. In our novel empirical model, the statistical significance of external fiscal burden shocks persists for an extended period of time, indicating that the consequences of these shocks are felt for a long period of time. As a result, total foreign fiscal burden has an impact on GDP growth, and at the same time, GDP growth has slowed as

TABLE 12 Summary Statistics.

| Variables | Obs | Mean | SD | Mini | Max | Skew | Kurtosis |
|---|---|---|---|---|---|---|---|
| GDPG | 152 | 6.115 | 4.788 | −13.129 | 31.087 | 1.497 | 11.868 |
| GDPPC | 152 | 4.154 | 4.515 | −15.397 | 24.099 | 0.704 | 9.754 |
| TEXD | 152 | 35.418 | 23.98 | −26.393 | 112.645 | 1.025 | 4.652 |
| EXTDSK | 152 | 22.828 | 2.081 | 19.129 | 26.98 | 0.121 | 2.033 |
| EXDS | 152 | 2.376 | 1.787 | .058 | 8.549 | 1.13 | 4.247 |
| GCF | 152 | 27.432 | 12.559 | 12.154 | 68.023 | 1.488 | 4.809 |
| OP | 152 | 57.881 | 56.332 | −294.177 | 184.093 | −2.477 | 17.138 |
| ET | 152 | −7.492 | 12.051 | −72.162 | 11.427 | −2.239 | 10.155 |

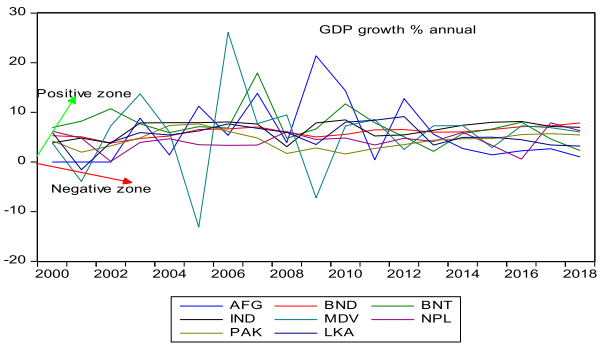


FIGURE 2
Eight South Asian countries GDP Growth rate annual % ( 2000–2018).

well. The endogenous growth model developed by Casares provides support for this data in the form of an inverted U-shaped curve demonstrating a negative link between foreign fiscal burden and GDP growth (Figure 3).

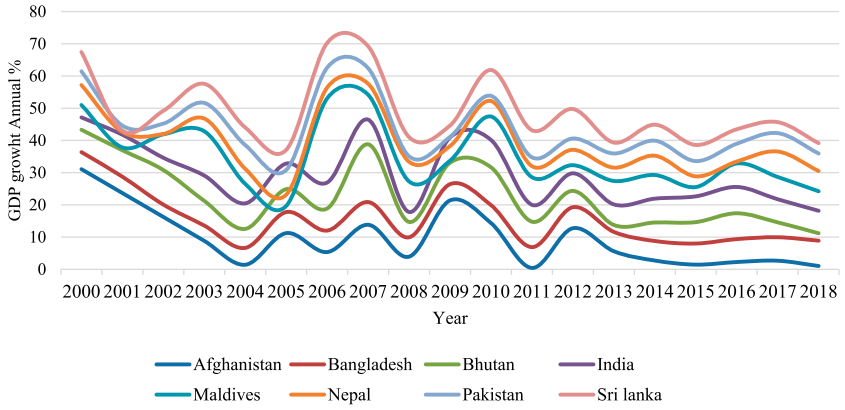


FIGURE 3
Eight South Asian countries GDP per capita % (2000−-2018).

## 4.3 Discussion

Following, governments should enhance their efforts to raise income in order to pay development expenditures rather than depending on fiscal burden as a safe choice for development. For a long time, the business community could contribute to the solution of environmental issues and the promotion of environmental sustainability. The increase in per capita income is referred to as economic recovery. This will aid in the mitigation of climate change, the conservation of ecosystems, and the improvement of water and agricultural methods in the environment. This entails environmental entrepreneurship; sustainable growth, as a result, is limited to economic recovery that is compatible with ecological sustainability. Furthermore, various studies conducted in the context of environmental modernization theory have shown that industrialisation has a favourable impact on ecological contamination. The adoption and substitution of green technologies or ecological innovation, as well as their encouragement in accordance with the progress of industrialization, may help to enhance environmental quality while reducing emissions.

External fiscal burden has a negative effect on lower (less than 30 percent) levels, but has a positive effect on the margin between 30 and 60 percent. The relationship between fiscal burden and GDP varies from nation to country. When low- and middle-income countries are taken into consideration, the effect is flipped. While the aggregate level of foreign fiscal burden creates a favourable response, the level of public fiscal burden causes no reaction. Nonetheless, this has a large marginal influence on private external fiscal burden, even within benchmarks of 0 percent and 30 percent. In addition to panel unit root tests, Pooled OLS and QR tests as well as a Robustness Check utilising System GMM and coef output regression tests, these approaches include: It is discussed in this section whether or not scientific and speculative models are static in nature, and whether or not they may be used to predict the future. An increase in SD would result in an rise in the external fiscal burden stock, which would result in a decrease in GDP of 31 percent, according to the (EXDS) regress coefficient of 0.3065 (31 percent). This indicates that an increase in standard deviation would result in an increase in the external fiscal burden stock, which would result in a decrease in GDP of 31 percent. It has been computed that an increase in Gross Domestic Product of one standard deviation would result in an increase in Gross Capital Formation (GCF) of 0.8411 (84 percent) (GDP). The output of OP generates a coefficient of 1.1463 (11 percent), which implies that if the standard deviation of OP increases, the GDP will increase by 1.1463 percent (11 percent). Last but not least, the current account balance deficit (CAD) has an output of −0.0396 and is the indicator to watch (4 percent). This suggests that a one standard deviation rise in GDP growth would result in a reduction of -0.0396 (4 percent) in the current account balance deficit (CAD).

A new study by Verner and Gyöngyösi and other academics discover the beneficial benefits of employment, money, and the balance of payments on economic growth. Model-3 specifics improve the performance of quantile regression (25 percent, 75 percent, and 90 percent) in regression. If a nation is classified as either developing or developed, the relationship between growth and fiscal burden is diametrically opposed. Furthermore, these data provide important new information that complements our previous conclusions. If a government wishes to expand its expenditure, according to neoclassical analysis, it must do so at the expense of private investment in that nation. According to this perspective, the government's

budget is insufficient since its citizens rely on future generations to pay taxes and contribute to the reduction of the deficit (Canh, 2005). (2018). The success of fiscal policy is determined by the contributions of institutions and the amount of foreign fiscal burden. Private investment outperforms government expenditure in terms of long-term productivity, according to the Neo-classical approach. As a consequence, the high rates of production that arise from government expenditure are insufficient to compensate for the setbacks produced by private investment crowding, resulting in a reduction in gross domestic product.

Myers was the first to propose the notion of fiscal burden overhang theory (1977). For the sake of identifying the variances in output growth responses to different types of external fiscal burden, our categorization analysis advises that the previously existing benchmark degrees stated in the literature be used. As a result, the baseline model is re-run to observe the influence of foreign fiscal burden on growth, with the fiscal burden benchmarks remaining at 0–30 percent, 30–60 percent, 60–90 percent, and 90 percent or more, depending on the situation. The findings have shown specific tendencies of non-linearity between growth and foreign fiscal burden in cases where there was no homogeneous evidence to support the commonly recognised benchmark level of this connection, as was the case in this study. In this case, the maintenance of foreign fiscal burden has a negative effect on GDP between 60 percent and 90 percent of the benchmark, and beyond 90 percent of the benchmark, it has a negative impact on GDP. According to the findings of this research, South Asian countries should aim to minimise their foreign fiscal burden, but they need also strengthen their investment regulations for investors and other stakeholders.

## 5 Conclusion and implications

The primary goal of this study will be to look at the effect of foreign liability and management strategies on financial development in South Asian nations, as well as the non-linear effect of liability on financial development in these countries. As a consequence of the danger of long-term extinction, concerns regarding the possibility of unpaid external service are becoming more significant. According to the findings, one important conclusion to be reached is that the ramifications of expanding the quantity of new loans should be discovered thoroughly and, if possible, put into frameworks with high profit potential in order to limit risk. In order to examine the relationship between foreign fiscal burden and economic recovery, this study employs a variety of approaches. It will provide a great opportunity for finance experts who wish to pay particular attention to the critical components of capital in order to promote economic sustainability to do so in a systematic and systematic way. Practical ramifications of this research are linked to the advantages that may be acquired by implementing a green relational environmental stability strategy in order to secure the long-term sustainability of their operations, which is particularly relevant for enterprises operating in developing economies. If we look at the theoretical implications of this research, we can see that it has made a significant contribution to the existing studies. In accordance with the findings of the study, this finding is in contradistinction to the international fiscal burden speculation as well as the belief formulated discouraging the private sector from engaging in constructive investment strategies and attempts As a result of the government's default on its fiscal burden, monies will be channelled into the Solow manufacturing sector in a number of stages, and that this has had no influence on the countries' ability to make further economic growth.

## Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

The author confirms being the sole contributor of this work and has approved it for publication

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

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