Global financial connectivity and ineffectiveness of sovereign debt: implications for business activities in South Asia

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Abstract

Purpose – The study examines the impacts of debt financing on infrastructure development, investment, creation of new business entities, subsidies to private sector and GDP growth.
Design/methodology/approach – The methodology is based on five simultaneous equations which have been estimated through panel least square.
Findings – The most important conclusion of this study is the significant role of sovereign bonds in determination of subsidies to private sector. The role of domestic credit is important in South Asian context because of its significant role in creation of new businesses.
Research limitations/implications – This study supports the enhancement in credit financing to private sector for creation of new business activities in the economy.
Practical implications – The improvement in liquidity position by enhancing domestic credit facilities may ensure the sustainability and continuity of business activities. Such activities may improve GDP growth in future.
Social implications – The most important aspect of the study is to identify the role of debt financing in subsidies and creation of new businesses which are important elements of social economics.
Originality/value – Usually the impacts of sovereign bonds and external debts on infrastructure development and GDP growth are examined. But, to relate these debts to creation of business entities and subsidies is a new dimension.

Keywords Covid-19, Domestic credit to private sector, Market capitalization, Non-financial assets, Sovereign bonds, Panel least square

Paper type Research paper

1. Sovereign debt and abrupt effects of Covid-19

Several monetary and fiscal measures have been adopted by the majority of countries to avoid economic disasters of Covid-19 pandemic in 2019–20. The soft lending policies for private businesses and utilization of public funds to support the private businesses were common measures. The soft lending to domestic private sector to ensure the continuity of business activities and employment of workers was one of the major decisions which has been taken by the monetary authorities in various countries. The governments have faced the unbudgeted expenditures on health services and payments of stipend to lower income households. The unusual growth in external borrowing by public sector to finance the tax exemptions and unexpected expenditures was a natural consequence of those policies. Various think tanks and policy makers have favoured the debt financing to mitigate the economic losses during the disastrous time. The use of debt financing to avoid the serious

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adverse consequences of Covid-19 was highly recommended by Sachs *et al.* (2020), (IMF, 2020a), Nemoto and Morgan (2020), Paul (2020), Rogoff (2020) and Mehar (2021). A mathematical model to assess the sustainability of external financing was created by Mehar (2021).

The broad-based, largest, and rapid increase in public and private sector debts in the past decade during the past 50 years has been noted by Kose *et al.* (2020a, b). So, repayment of unhistorical debt has become a critical issue. The further rapid increase in debt after Covid-19 pandemic added the risk of a widespread debt distress in world economy. The impacts of growing external and domestic debts on the sustainability of economic and business activities have been assessed by various think tanks and policy institutions. For instance, the International Monetary Fund (IMF, 2020a, b, c) has predicted widen in fiscal deficits by about 5 percentage points of GDP, on average. University of Cambridge (2020) has forecasted an optimistic loss of 3.3 trillion USD under a rapid recovery scenario to 82.4 trillion USD in an economic depression scenario. University of Cambridge (2020), World Bank (2020) and IMF (2020b) have assessed the impacts of leverage policies during Covid-19 crisis on economic growth and investment.

The use of public money and external borrowing for managing the working capital requirements of businesses in private sector were common strategies which have been adopted by the governments in different countries. The purpose of these strategies was to maintain working capital and liquidity in the business entities.

The growth in domestic and external debts during Covid-19 crisis has led the several questions: To assess the impacts of growing debt and soft lending policies on sustainability of business and investment is a very important question in this respect. This study is mainly concerned with this question. Another important aspect of growing debts is the repayment burden which reduces the fiscal space of governments. The curtailment in development expenditures is one of its major consequences. The curtailment of development expenditures to reduce the fiscal deficit was a common practice in developing countries even before Covid-19.

Though, it has become a common observation that governments of developing countries now rely on private sector participation and sovereign bonds to finance the development projects. In this respect, it is an interesting phenomenon from global developing history that physical infrastructures in developing countries during the bi-polar regime largely depended on aids, grants and external borrowing from industrialized countries. It is obvious that these facilitations to associated developing countries were based on political ideology and associations with the big powers. The "dependency theory" and "domino effect model" explain the technological advancement and infrastructure developmental works in developing countries in the cold war era. The "hegemonic stability theory" (Kindleberger and Charles, 1970) has explained the role of big powers in developing process of world economy. These theories describe that developing countries have been encouraged to depend on big powers for their development. The higher debt-to-GDP ratio is one of the offshoots of such mechanisms (Mehar, 2017). Drastically, this mechanism escorted over dependency on public sector fiscal resources for the development of infrastructure. To finance infrastructure development by private sector is not a common practice in these countries. Even these countries do not have large active bonds' markets.

The debt was the most popular source of financing before Covid-19. The share of debt financing for infrastructure development projects was 70% in 2017. This debt financing was further classified in international and local participants: 55% debt was financed by international investors, while 15% by local investors. Inderst (2018) has further classified this 55% international debt: Development Finance Institutions have contributed 25% debt, share of multilateral institutions was 6%, while 24% debt was generated through bilateral sources. The global patterns of infrastructure financing by private sector can be understood by these statistics. The declining share of short-term financing and higher dependency on long-term debt for infrastructure financing is a common global phenomenon.

Various choices are available to finance the development and improvement of infrastructure. The issuance of sovereign bonds is one of those options which are usually considered for long-term developmental works. The institutional lending, public–private partnership (PPP), equity participation, public funding, private sector financing, bilateral borrowing and multilateral arrangements are other available alternative sources of finance.

In cold war regime, the developmental works in middle- and low-income countries have been considered as parts of the economic packages from industrialized countries to their associated countries. However, the use of sovereign bonds becomes more important after the cold war regime because funds for development and long-term projects are no longer available from multilateral sources at concessional rates. The global recession and various economic crises in the international markets have compelled the industrialized countries to focus on their domestic economies. Lastly, the Covid-19 crisis added further problems in access to concessional financing for development from external sources.

Enhancing domestic credit to private sector (DCPS) and borrowing through sovereign bonds have generated several questions in academic and policymaking circles. One of the important questions is the effect of sovereign bonds and debt financing on GDP growth. It is usually mentioned that sovereign bonds are used to finance the infrastructure development (particularly transport infrastructure) for sustainable economic growth. However, it has been observed that fiscal resources generated by external debts and sovereign bonds may be utilized to support the private businesses. It is generally considered that external debts are utilized for improvement in business competitiveness, infrastructure development and building the institutional infrastructure, but their uses to finance fiscal deficits, managing liquidity and repayment of debts are also questionable. The creation of new business entities, investment in non-financial assets and subsidies to private sector may be affected by external debts and sovereign bonds. This study is mainly concerned with the empirical testing of the impacts of different components of external borrowing on economic growth, development and business activities. This study has examined the effects of sovereign bonds, corporate bonds, short-term external borrowing, and long-term external borrowing on infrastructure development, investment in non-financial assets, creation of new business entities, subsidies to private businesses and GDP growth.

We have considered the use of domestic credit to private sector as an important factor of growth in economic and business activities. However, it is notable that magnitude of growth in new business entities and domestic credit to private sector in South Asian economies are significantly lower than rest of the world. So, this analysis focuses on South Asian economies. The impacts of global financial connectivity have also been analyzed in this study. The global financial connectivity has been measured through inflow of foreign direct investment (FDI) and external debt through public and private sector borrowing including sovereign bonds.

Next section of this study compares the South Asian economies with the rest of the world. This section discusses also the changing in the global trends of growth in GDP, investment and private businesses. Section 3 establishes a statistical methodology for empirical testing to assess the effects of various components of debt financing on investment, infrastructure development, investment in non-financial assets, creation of new business activities, subsidies to private sector and GDP growth. Section 4 explains the discoveries and evidences based on the parameters estimated through econometric models. The limitations of the study and some policy recommendations have been mentioned in Section 5.

2. Global patterns of debt financing, economic growth and business activities

It is obvious that policy measures during Covid-19 crisis have adversely affected the fiscal deficit and leverage positions of the public and private sectors' institutions. The rapid increase in external debt was observed all over the world, however, the acceleration in

external debt is much higher in South Asian countries. Due to monetary support to the private sector after Covid-19, a big jump in the domestic credit was observed all over the world.

In analysis of the relations among GDP growth, infrastructure development and source of financing, the global statistics reveal some interesting observations. The rate of world GDP growth was 4.5% in 2007, 3.3% in 2018 and -3.3% in 2020 (Covid-19 years); it has arrived at 5.9% in 2021 (after Covid-19). However, for middle-income countries, this rate of growth was 8.9% in 2007, 4.9% in 2018 and −1.3% in 2020 (Covid-19 years). It was 7% in 2021. The share of high-income countries in global GDP was 75% in 2007, it has been dropped to 63% in 2020, while share of middle-income countries has arrived at 36% in 2020 from 24% in 2007. The changing patterns in development financing are one of the major causes among several causes behind this shift.

High-income economies including North America and Europe have advantages of their physical infrastructure, and it is a common opinion that middle- and low-income economies can use external financing and sovereign infrastructure bonds to develop their infrastructure. However, there is a negligible change in logistic performance indices from 2007 to 2018 which indicates that heavy debt financing has not impacted the infrastructure development. Higher tax-to-GDP ratio (TXTGDP), spending a high portion of public expenditures on subsidies, and lower expenses on interest payments by high-income countries as compared to middle- and low-income countries are also common phenomena which explain the variations in their growth and development.

The most interesting observation is the much higher magnitude of the domestic credit to private sector (DCPS) in high-income countries. The magnitude of domestic credit to private sector (DCPS) is much lower in middle-income countries and particularly in South Asia. The aggregate net inflow of debt through sovereign bonds in middle-income countries was 25 billion USD in 2007; it was 45 billion USD for non-guaranteed privately placed bonds. However, in 2018, the magnitude of sovereign bonds was 167 billion USD and 36 billion USD for non-guaranteed privately placed bonds. In 2020, the magnitude of sovereign bonds was 173 USD and privately placed bonds 106 USD. This shows a complete change in the composition of bond financing. A shift from corporate bonds to publicly guaranteed sovereign bonds depicts a change scenario. It raises a question about the growing dependency of governments on financing through sovereign bonds. But more important question belongs to the impact of this shift on growth and development. Another important thing is that much part of external outstanding debt (EXTDBT) of low- and middle-income countries belongs to long-term and public sector debt.

Though a shift in the net inflow of foreign direct investment (FDI) shows a change in the trend and flow of FDI to middle- and low-income countries, the value of domestic assets in terms of market capitalizations of domestic listed companies has dropped in low- and middle-income countries from 2007 to 2021. The value of these assets has grown in high-income countries from 2007 to 2021.

In considering the role of domestic credit and external debts in the determination of infrastructure development and business and economic activities, South Asian countries show an entirely different picture. First, the magnitude of domestic credit to private sector (DCPS) as percentage of GDP is much lower in South Asian countries. Second, the share of sovereign bonds in external debts is almost negligible, however, external debt-to-GDP ratio is much higher. It indicates that these countries avoid market mechanism in fundraising through external sources. For financing their infrastructure and fiscal deficit, they rely on institution loans from bilateral and multilateral sources. Third, despite higher market capitalization to GDP ratio, numbers of new business entities are lower than other countries in the world. Fourth, the government expenditures on subsidies are also lower despite high level of poverty and unemployment.

Another important aspect of South Asian region is that its economies are less mutually integrated than other regions in the world. It is considered one of the least integrated regions in economic activities. The magnitude of mutual trade among South Asian countries is less than 5% which is not comparable with other trade blocs. The volume of intra-regional trade is

50% of global trade in the case of East Asia and the Pacific. This ratio is 22% for sub-Saharan Africa. The situation is the same in the case of flows of investment among South Asian countries. Only 1% of their global FDI was invested within South Asia, while this share is 67% in Europe and 50% in East Asia.

The economic and business activities in South Asian economies in global comparison have been shown in Tables 1–3. These tables compare the trends of economic and business activities of South Asian economies with the rest of the world before and after Covid-19 crisis. It is envisaged that South Asia's share in global GDP was significantly increased during the last decade. The share of South Asia in global GDP was 2.6% in 2007 which has arrived at 4.2% in 2021.

Though there is a big variation in the economic connectivity indicators of these countries, there is no significant change in foreign direct investment (FDI) in 2021 as compared to 2007. Another notable point is that these countries are far behind in the provision of "Domestic Credit to Private Sector" as compared to the world's average (even far behind as compared to middle-income countries).

The world average of domestic credit to private sector (DCPS) as percentage of GDP is 147. It is 120 in middle-income countries. This ratio is 49 only for South Asia. The worst condition is in Pakistan and Afghanistan. This ratio is 15 in the case of Pakistan and 3 for Afghanistan. This situation reflects the role of monetary sector in the economy. It identifies that monetary sector does not play an effective role in the economies of South Asian countries. To some extent, India is relatively in a better position. The domestic credit to private sector (DCPS) as percentage of GDP is more than 50 in the case of India.

The most astonishing fact is the rapid growth in external outstanding debt (EXTDBT) which is a global phenomenon but its gravity is much higher in South Asia. The growth in the various components of external debt has been shown in Table 3.

The lower per capita income, higher GDP growth, extremely lower size of domestic credit to private sector (DCPS) as percentage of GDP, lower share of subsidies in public expenses, higher market capitalization to GDP ratio with a lower number of new business entities, and a negligible share of sovereign bonds in total external debt depict an interesting picture of South Asian economies. In this scenario, it becomes important to assess the impacts of

Region/Group	Share in global GDP	GDP per capita (current USD)	Overall logistics performance index (1 = low to 5 = high)
2007 (World GDP: 58.4 trillion USD)			
South Asia	2.6	959	2.3
Middle-income economies	23.9	2,781	2.5
World	100.0	8,743	2.7
2018 (World GDP: 86.4 trillion USD)			
South Asia	4.1	1944	2.5
Middle-income economies	35.7	5,416	2.6
World	100.0	11,366	2.9
2021 (World GDP: 96.5 trillion USD)			
South Asia	4.2	2,149	–
Middle-income economies	37.1	6,074	–
World	100.0	12,234	–

Source(s): World Bank (2022)
Author's depiction

Table 1.
Growth and development: South Asia's positioning in world economy

Country	GDP growth (%)	Tax revenue (% of GDP)	Subsidies and other transfers (% of expense)	New business registrations (per 1,000 people aged 15–64)	Net investment in non-financial assets (% of GDP)	Market capitalization of listed domestic companies (% of GDP)
2007						
Afghanistan	13.8	5.3	5.1	–	9.5	–
Bangladesh	7.1	6.9	29.3	–	1.6	11.0
Bhutan	18.4	7.7	3.3	0.03	12.0	–
India	7.7	12.1	36.9	0.08	−0.3	161.2
Nepal	3.4	9.8	–	0.47	–	–
Maldives	7.7	12.1	2.6	4.52	7.2	–
Pakistan	4.8	9.5**	3.5**	0.04	2.5	45.7
Sri Lanka	6.8	14.2	23.4	–	3.1	23.3
South Asia	7.2	11.7	26.4	0.09	0.3	138.3
Middle-Income Economies	8.9	11.8	34.2	–	–	–
World	4.5	14.8	38.2	–	1.5	113.6
2018						
Afghanistan	3.9	6.1	7.4	–	39.6	–
Bangladesh	6.0	7.7	31.5	–	1.3	12.8
Bhutan	4.8	8.6	2.9	0.05	12.5	–
India	3.1	11.0	32.3	0.09	0.6	66.0
Nepal	6.1	10.4	–	0.55	–	–
Maldives	9.5	11.6	6.4	4.56	9.8	–
Pakistan	1.7	9.8**	2.8**	0.04	2.5	13.7
Sri Lanka	6.0	13.3	22.7	0.32	2.9	10.5
South Asia	6.4	11.7	39.2	0.10	1.2	55.3
Middle-Income Economies	4.9	11.4	36.3	–	–	–
World	3.3	13.8	42.1	–	1.7	55.9
2021						
Afghanistan	−20.7			0.21*	–	–
Bangladesh	6.9	7.0	36.0	0.04*	–	24.0
Bhutan	4.1	13.0	15.9	0.09*	–	
India	8.7	12.0*	44.6*	0.15	–	97.3
Nepal	4.2	15.8	76.9	1.36	–	–
Maldives	41.7	–	–	2.78	–	–
Pakistan	6.5	8.5**	2.3**	0.15	–	10.4
Sri Lanka	3.3	7.7	34.4	0.74*	–	18.7
South Asia	8.0	11.7*	36.0	0.17	–	86.4
Middle-Income Economies	7.0	10.7*	41.7	3.36	–	–
World	5.9	13.6*	47.3	3.49	–	133.2

Note(s): *'data for 2020
**'Government of Pakistan (2022)
Source(s): World Bank (2022)
Author's depiction

Table 2.
Economic and business activities

Country	Domestic credit to private sector (% of GDP)	Net inflows of FDI (% of GDP)	Net inflows of FDI (billion USD)	Short-term debt (% of total external debt)	External debt – public sector (billion USD)	External debt – total (billion USD)	Bonds issued by private sector (billion USD)	Bonds issued by public sector (billion USD)
2007								
Afghanistan	6.8	1.9	0.2	1.1	1.9	2.0	–	–
Bangladesh	32.0	0.8	0.7	6.4	19.4	21.5	–	–
Bhutan	24.0	6.3	0.1	2.2	0.8	0.8	–	–
India	45.6	2.1	25.2	17.7	69.9	204.1	7.4	2.1
Nepal	37.3	0.1	0.0	1.5	3.5	3.6	–	–
Maldives	54.6	7.1	0.1	16.8	0.4	0.8	–	–
Pakistan	27.8	3.7	5.6	5.3	37.2	42.3	–	0.8
Sri Lanka	34.2	1.9	0.6	9.4	11.8	14.2	–	0.5
South Asia	42.5	2.2	32.5	14.3	145.0	289.3	7.4	3.3
Middle-Income Economies	60.5	3.7	520	22.4	1246.5	3085.8	44.9	25.4
World	128.1	5.3	3133.8	–	–	–	–	–
2018								
Afghanistan	9.4	0.6	0.1	16.2	1.9	2.7	–	–
Bangladesh	34.0	0.8	2.4	15.8	41.3	57.1	–	0.2
Bhutan	30.7	0.1	0.0	0.2	2.5	2.6	–	–
India	49.6	1.6	42.1	19.9	180.4	521.0	−0.3	−8.2
Nepal	51.7	0.2	0.1	4.6	5.0	5.5	–	–
Maldives	57.7	10.9	0.6	10.2	2.0	2.3	–	0.1
Pakistan	28.7	0.5	1.7	8.2	73.0	99.2	–	0.0
Sri Lanka	29.5	1.7	1.6	15.5	34.4	52.9	−0.1	1.3
South Asia	45.5	1.4	48.7	17.5	340.4	743.3	−0.4	−6.7
Middle-Income Economies	101.8	1.93	593.0	27.4	2818.1	7652.3	35.6	161.9
World	120.1	1.09	927.1	–	–	–	–	–
2021								
Afghanistan	3.1	0.1	0.0	11.9	1.9	3.5	–	–
Bangladesh	39.2	0.3	1.4	19.8	62.4	91.4	–	−0.1
Bhutan	71.4	0.1	0.0	0.1	3.0	3.1	–	–
India	54.7	1.4	44.7	18.7	205.1	612.9	3.4	3.8
Nepal	88.4	0.5	0.2	3.8	7.8	8.9	–	–
Maldives	52.9	8.2	0.4	14.3	3.1	3.8	–	0.5
Pakistan	15.0	0.6	2.1	6.9	94.7	130.4	–	3.0
Sri Lanka	–	0.7	0.6	15.2	36.5	56.6	–	−1.0
South Asia	49.5	1.2	49.5	16.7	414.5	910.6	3.4	6.3
Middle-Income Economies	120.3	2.1	737.1	25.6	3346.0	9045.7	35.4	105.3
World	147.2	2.3	2199.1	–	–	–	–	–

Source(s): World Bank (2022)
Author's depiction

Table 3.
Patterns of external debt

domestic credit and various components of external debts on economic and business activities. The study can provide a guideline to the policymakers regarding size and components of debt financing.

3. Methodology to measure the impacts of debt financing

It has been mentioned earlier that it is a common perception that sovereign bonds and external long-term debts are used for the development and improvement of logistic infrastructure, while this infrastructure is primarily required for sustainable economic growth. In this study, it is also hypothesized that sovereign bonds are used to develop and improve the logistic infrastructure. However, this study identifies that how sovereign bonds and external debts affect the overall economic growth and development. We are mainly interested to know the effectiveness and role of sovereign bonds and external debts in the determination of investment and business activities. For this purpose, we examined the effects of different components of debt financing on logistic infrastructure, investment in non-financial assets, creation of new business entities, subsidies to private sector and GDP growth. The following model has been established for this purpose. The model is based on five equations, while creation of new business entities has been taken as ultimate variable which can be written in the following linear form:

$$NBUS_{it} = \beta BONDPPG_{it} + \gamma GROW_{it} + \delta X_{it} + \mu_j + \tau_t + \epsilon_{it}$$

where "$NBUS_{it}$" is the number of new businesses per thousand people registered in a country$_i$ for year$_t$,; "$GROW_{it}$" and "$BONDPPG_{it}$" are vectors of variables related to "annual growth in GDP" and "Sovereign bonds issued by the government"; "X_{it}" is a vector of exogenous control variables; "μ_i" denotes unobserved time-invariant heterogeneity at the country level; "τ_t" is a time-fixed effect and "ε_{ijt}" is an independent disturbance term.

The relationship between target and explanatory variables constitutes the relations between the number of new businesses, investment in non-financial assets and GDP growth through different channels can be described as follows:

$$NBUS_{it} = f(GROW_{it,} DCPS_{it}, BONDPPG_{it})$$

$$NFAS_{it} = f(GROW_{it,} TXTGDP_{it}, FDI_{it})$$

where "BONDPPG" is net inflow of public debt through sovereign bonds. Relating the number of new business entities to the above-mentioned factors, the estimated effects can be expressed as follows:

$$\frac{dNBUS}{dBONDPPG} = \frac{\partial NBUS}{\partial BONDPPG} + \frac{\partial NBUS}{\partial GROW}.\frac{\partial GROW}{\partial BONDPPG} + \frac{\partial NBUS}{\partial DCPS} + \frac{\partial NBUS}{\partial GROW}.\frac{\partial GROW}{\partial DCPS}$$

$$\frac{dNFAS}{dBONDPPG} = \frac{\partial NFAS}{\partial BONDPPG} + \frac{\partial NFAS}{\partial GROW}.\frac{\partial GROW}{\partial BONDPPG}$$

$$\frac{dGROW}{dBONDPPG} = \frac{\partial GROW}{\partial BONFPPG}$$

$$\frac{dLOGIST}{dBONDPPG} = \frac{\partial LOGIST}{\partial BONFPPG}$$

$$\frac{dSUBSD}{dBONDPPG} = \frac{\partial SUBSD}{\partial BONDPPG}$$

We supposed that number of new business entities, transport logistic index, GDP growth, subsidies to private sector and investment in non-financial assets can reflect the economic development in a country. In the light of this supposition, we established the following five equations. The primary objective to establish these equations is to test the effects of external debt through institutional sources and bonds market on these variables. Several alternative options (models) have been applied to estimate these equations. Several control variables to estimate the net effect of various components of external debts have been included in the estimations. The details of those variables have been mentioned in Tables 4–8. The foreign direct investment (FDI), tax-to-GDP ratio (TXTGDP), external outstanding debt (EXTDBT) and market capitalization as percentage of GDP (MCG) are included as controlled variables.

$$GROW_{it} = \propto_i + \beta_1 DCPS_{it} + \beta_2 TXTGDP_{it} + \beta_3 FDI_{it} + \beta_4 EXDBTST_{it} + \beta_5 BONDPPG_{it} + \beta_6 COVID_t + \varepsilon_{it} \quad (1)$$

$$LOGIST_{it} = \propto_i + \beta_1 TXTGDP_{it} + \beta_2 FDI_{it} + \beta_3 EXTDBT_{it} + \beta_4 BONDPPG_{it} + \varepsilon_{it} \quad (2)$$

$$NFAS_{it} = \propto_i + \beta_1 TXTGDP_{it} + \beta_2 FDI_{it} + \beta_3 GROW_{it} + \varepsilon_{it} \quad (3)$$

$$NBUS_{it} = \propto_i + \beta_1 DCPS_{it} + \beta_2 MCG_{it} + \beta_3 BONDPPG_{it} + \beta_4 GROW_{it} + \varepsilon_{it} \quad (4)$$

$$SUBSD_{it} = \propto_i + \beta_1 DCPS_{it} + \beta_2 TXTGDP_{it} + \beta_3 BONDPPG_{it} + \beta_4 EXTDBT_{it} + \beta_5 EXDBTST_{it} + \varepsilon_{it} \quad (5)$$

The descriptions of variables have been mentioned in Tables 4–8. These estimated models are based on several theories and justifications in economic literature. Myers and Majluf (1984), Mehar (2005, 2022a, b), Frank and Goyal (2018) and Durrani *et al.* (2020) have discussed various theories and justifications to determine the above-mentioned explained variables. The logical reasoning of the determinants of explained variables has also been described in the following discussion. Mehar (2022a, b) has identified casual factors of GDP growth and investment in the context of South Asian countries. In the present study, some additional factors have been introduced.

The relations between the variables have been shown in Figures 1 and 2. These figures explain that how external debts and sovereign bonds affect GDP growth, investment in non-financial assets, creation of new business entities, subsidies to private sector and logistic infrastructure.

The above-mentioned model is based on five equations which have been estimated through Panel Least Square (PLS) estimation. In the first equation, it is hypothesized that external debt through sovereign bonds (BONDPPG), external debt in corporate bonds, domestic credit to private sector (DCPS), foreign direct investment (FDI), tax to GDP ratio (TXTGDP) and external short-term debt (DBTST) determine the GDP growth. The impacts of sovereign bonds (BONDPPG) and private sector borrowing through bonds (BONDPNG) have been tested by several alternative options by taking their lag values. The underlying assumption in taking the lag values of borrowing through bonds is that the borrowing affects GDP growth in subsequent years. Usually, the borrowing through bonds market is used for long-term financing of the infrastructure projects. So, the impact of this type of financing can be measured by their lag values.

The "Tax multiplier" concept indicates the negative effect of tax-to-GDP ratio (TXTGDP) on GDP growth (GROW). The direction of the effect has been tested in the first equation. To measure the impact of Covid-19 pandemic on GDP growth, a dummy variable equal to "1" for pandemic year (2020) and "0" otherwise has been created. This variable measures the effect of the pandemic on GDP growth.

Table 4.
Dependent variable: GDP growth in percentage (GROW) panel least square (unbalanced) periods included: 14; cross-sections included: 64; total observations: 729 sample: 2007–2020

Independent variable/Model	Coefficients (βs); Figures in parenthesis are "*t*-statistics" I	II	III	IV	V
Constant	4.891*** (11.499)	4.563*** (10.520)	4.460*** (9.703)	4.700*** (15.305)	4.447*** (9.484)
COVID: Dummy: COVID ("1" for 2020)	−7.557*** (−12.166)	−7.321*** (−12.201)	−7.314*** (−12.114)	−7.800*** (−15.474)	−7.326*** (−12.132)
DCPS: Domestic credit to private sector as percentage of GDP (DCPS)	−0.020*** (−4.296)	−0.022*** (−4.704)	−0.020*** (−4.209)	−0.023*** (−4.651)	−0.020*** (−4.160)
FDI: Net inflow of foreign direct investment (Billion USD)	0.018*** (3.260)	0.018*** (3.318)	0.020*** (3.490)	0.026*** (4.441)	0.022*** (3.771)
TXTGDP: Tax revenue (% of GDP)	−0.056* (−1.923)	−0.045 (−1.499)	−0.048 (−1.493)	−0.015 (0.2796)	−0.049 (−1.519)
DBTSTB: Short-term external debt (Billion USD)	0.002 (0.780)	0.003 (1.179)	0.002 (0.832)		
BONDPPG: Net flows of public and publicly guaranteed debt from bonds (Billion USD)	0.006 (0.155)				
BONDPNG: Net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)	0.009 (0.166)				
BONDPPG(−1): One-year lag of net flows of public and publicly guaranteed debt from bonds (Billion USD)		0.046 (1.086)			
BONDPNG(−1): One-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)		−0.039 (−0.680)			
BONDPPG(−2): Two-year lag of net flows of public and publicly guaranteed debt from bonds (Billion USD)			0.066 (1.308)	−0.014 (−0.398)	0.071 (1.311)
BONDPNG(−2): Two-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)			−0.044 (−0.762)	−0.032 (−0.743)	−0.033 (−0.567)
DBTST: Short-term debt (% of total external debt)				0.006 (0.524)	
EXTDBT: Total external debt (Billion USD)					0.001 (0.331)
Adjusted *R*-squared	0.243	0.261	0.266	0.257	0.265
F-statistic	34.384	35.228	33.523	43.414	33.408
Akaike Information Criterion	5.557	5.489	5.494	5.429	5.495
Schwarz Criterion	5.607	5.542	5.550	5.473	5.551
Hannan–Quinn Criterion	5.576	5.510	5.516	5.446	5.517

Note(s): *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's estimations

Table 5.
Dependent variable: Logistics performance index (LOGIST) panel least square (unbalanced) periods included: 5; cross-sections included: 59; total observations: 256 sample: 2010–2018

Independent variable/Model	Coefficients (βs); Figures in parenthesis are "*t*-statistics" I	II	III	IV	V
Constant	2.236*** (28.362)	2.225*** (28.127)	2.136*** (25.888)	2.229*** (28.301)	2.229*** (28.300)
FDI(−1): One-year lag of net inflow of foreign direct investment (Billion USD)			0.008*** (8.309)		
FDI(−2): Two-year lag of net inflow of foreign direct investment (Billion USD)		0.008*** (8.125)		0.008*** (8.119)	0.008*** (8.120)
FDI(−3): Three-year lag of net inflow of foreign direct investment (Billion USD)	0.008*** (8.607)				
TXTGDP(−1): One-year lag of tax revenue (% of GDP)			0.045*** (9.738)		
TXTGDP(−2): Two-year lag of tax revenue (% of GDP)		0.038*** (8.888)		0.038*** (8.862)	0.038*** (8.862)
TXTGDP(−3): Three-year lag of tax revenue (% of GDP)	0.038*** (8.824)				
DBTTOT(−1): One-year lag of total external debt (Billion USD)			−0.001** (−2.507)		
TDBTOT(−2): Two-year lag of total external debt (Billion USD)		−0.001** (−2.156)		−0.001*** (−2.976)	−0.001*** (−2.980)
DBTTOT(−3): Three-year lag of total external debt (Billion USD)	−0.001** (−2.012)				
BONDPNG(−1): One-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)			−0.003 (−0.338)		
BONDPNG(−2): Two-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)		−0.008 (−0.697)			
BONDPNG(−3): Three-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)	−0.020 (−1.556)				
BONDPPG(−1): One-year lag of net flows of public and publicly guaranteed debt from bonds (Billion USD)			0.020** (2.035)		
BONDPPG(−2): Two-year lag of net flows of public and publicly guaranteed debt from bonds (Billion USD)		0.014* (1.774)		0.015* (1.818)	0.015** (1.818)
BONDPPG(−3): Three-year lag of net flows of public and publicly guaranteed debt from bonds (Billion USD)	0.009 (0.502)				

(*continued*)

Table 5.

Independent variable/Model	Coefficients (βs); Figures in parenthesis are "*t*-statistics" I	II	III	IV	V
TRNPP(−2): Two-year lag of investment in transport with private participation (Billion USD)				0.004 (0.394)	
PPPTRN(−2): Two-year lag of public–private partnerships investment in transport (Billion USD)					0.004 (0.405)
Adjusted *R*-squared	0.419	0.397	0.418	0.396	0.396
F-statistic	37.783	35.063	38.376	34.952	34.955
Akaike Information Criterion	1.178	1.220	1.180	1.221	1.331)
Schwarz Criterion	1.261	1.302	1.262	1.303	1.412
Hannan–Quinn Criterion	1.211	1.253	1.213	1.254	1.354

Note(s): *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's estimations

Independent variable/Model	Coefficients (βs); Figures in parenthesis are "*t*-statistics"				
	I	II	III	IV	V
Constant	28.342*** (24.400)	30.156*** (18.834)	27.497*** (19.578)	−0.299 (−0.131)	8.827*** (3.658)
DCPS: Domestic credit to private sector as percentage of GDP (DCPS)	0.141*** (12.777)	0.087*** (4.017)	0.095*** (4.369)	−0.084** (−2.029)	
BONDPPG: Net flows of public and publicly guaranteed debt from bonds (Billion USD)	0.978*** (6.443)	1.087*** (7.533)	1.105*** (7.787)	0.358** (2.032)	0.333* (1.803)
TXTGDP: Tax revenue (% of GDP)	0.074 (1.297)	0.012 (0.155)	−0.039 (−0.611)	1.736*** (9.025)	1.064*** (6.678)
DBTST: Short-term debt (% of total external debt)			0.153*** (3.042)	0.606*** (8.674)	0.496*** (6.378)
STDTRS: Short-term debt (% of total reserves)		0.001 (0.241)			
DBTTOT: Total external debt (Billion USD)				0.065*** (9.700)	0.060*** (8.547)
Adjusted *R*-squared	0.123	0.081	0.108	0.476	0.338
F-statistic	72.434	19.148	27.923	70.206	54.279
Akaike Information Criterion	8.671	8.531	8.501	7.939	8.200
Schwarz Criterion	8.685	8.560	8.528	8.001	8.249
Hannan–Quinn Criterion	8.676	8.542	8.511	7.964	8.220

Note(s): *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's estimations

Table 6.
Dependent variable: Subsidies and other transfers as % of total expenditures (SUBSD) panel least square (unbalanced) periods included: 14; cross-sections included: 139; total observations: 1,531 sample: 2007–2020

Table 7.
Dependent variable: New business density – new registrations per 1,000 people aged 15–64 (NBUS) panel least square (unbalanced) periods included: 14; cross-sections included: 80; total observations: 764 sample: 2007–2020

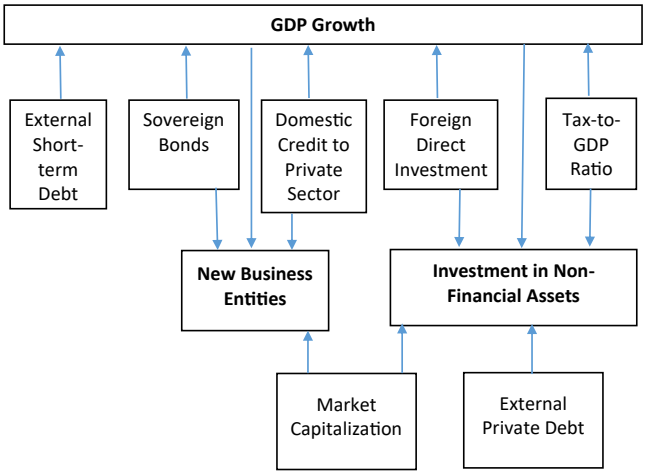
Independent variable/Model	Coefficients (βs); Figures in parenthesis are "*t*-statistics" I	II	III	IV	V
Constant	−0.549* (−1.913)	−1.043*** (−3.244)	−0.776** (−2.591)	−0.551* (−1.780)	−0.420 (−1.452)
BONDPPG: Net flows of public and publicly guaranteed debt from bonds (Billion USD)	−0.029 (−0.901)	−0.028 (−0.860)	−0.029 (−0.908)	−0.020 (−0.691)	−0.021 (−0.721)
BONDPNG: Net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)	0.012 (0.308)	0.000 (0.007)	0.003 (0.081)	0.017 (0.498)	0.018 (0.523)
DCPS: Domestic credit to private sector as percentage of GDP (DCPS)	0.048*** (14.493)	0.051*** (14.961)	0.050*** (14.763)	0.041*** (12.417)	0.040*** (12.408)
MCG: Market capitalization of listed domestic companies (% of GDP)	0.012*** (11.777)	0.012*** (11.473)	0.012*** (11.628)	0.014*** (14.765)	0.014*** (14.892)
GROW: GDP growth (annual %)		0.125*** (3.322)		0.072** (2.041)	0.067* (1.842)
PCIG: GDP per capita growth (annual %)			0.100** (2.536)		
S&P: S&P Global Equity Indices (annual % change)				−0.008* (−1.850)	−0.008* (−1.839)
Adjusted *R*-squared	0.457	0.464	0.461	0.511	0.510
F-statistic	161.366	133.007	131.303	122.478	122.214
Akaike Information Criterion	5.610	5.598	5.604	5.378	5.379
Schwarz Criterion	5.640	5.635	5.641	5.423	5.424
Hannan–Quinn Criterion	5.622	5.612	5.618	5.395	5.396

Note(s): *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's estimations

Independent variable/Model	Coefficients (βs); Figures in parenthesis are "*t*-statistics" I	II	III	IV	V
Constant	0.744** (2.063)	0.923*** (2.647)	2.300*** (9.541)	8.561*** (11.333)	9.004*** (11.812)
GROW: GDP growth (annual %)	0.148*** (3.998)	0.164*** (4.643)	0.046** (2.311)	0.119** (2.103)	0.118** (2.099)
TXTGDP: Tax revenue (% of GDP)	0.166*** (10.148)	0.151*** (9.550)	0.002 (0.211)	−0.250*** (−6.550)	−0.272*** (−7.108)
FDI(−1): One-year lag of net inflow of foreign direct investment (Billion USD)		−0.013*** (−4.089)	−0.002** (−2.115)	−0.039*** (−4.318)	−0.029*** (−3.449)
FDI(−2): Two-year lag of net inflow of foreign direct investment (Billion USD)	−0.013*** (−3.917)		−0.050*** (−2.784)		
BONDPNG(−1): One-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)		−0.068 (−1.226)		−0.027 (−0.249)	0.140 (1.360)
BONDPNG(−2): Two-year lag of net flows of non-guaranteed long-term debt from bonds that are privately placed (Billion USD)	−0.077 (−1.277)				
MCG: Market capitalization of listed domestic companies (% of GDP)			−0.008*** (−5.853)		
DBTSTB: Short-term external debt (Billion USD)				0.002 (0.480)	
DBTPVT: Private non-guaranteed external debt stocks (Billion USD)					−0.019*** (−2.971)
Adjusted *R*-squared	0.124	0.108	0.096	0.159	0.174
F-statistic	34.859	33.231	11.721	18.557	20.621
Akaike Information Criterion	5.992	5.988	3.700	6.066	6.047
Schwarz Criterion	6.017	6.011	3.750	6.119	6.101
Hannan–Quinn Criterion	6.001	5.997	3.720	6.087	6.068

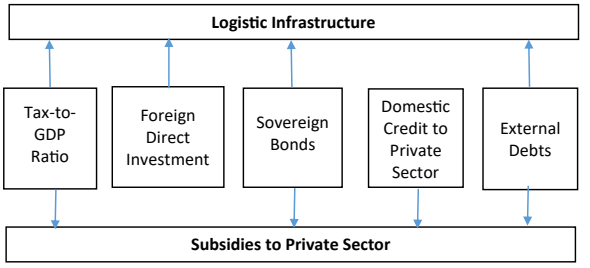
Note(s): *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's estimations

Table 8.
Dependent variable: Net investment in non-financial assets as % of GDP (NFAS) panel least square (unbalanced) periods included: 9; cross-sections included: 137; total observations: 958 sample: 2009–2017



Source(s): Author's depiction

Figure 1.
Impacts of sovereign bonds on growth and investment (simultaneity in the model)



Source(s): Author's depiction

Figure 2.
Role of sovereign bonds in logistic infrastructure and subsidies

The causal factors of development in logistic infrastructure (LOGIST) have been explained in the second equation. To measure the quality and capacity of logistic infrastructure, we applied the "Logistics performance index" constructed by World Bank (2022). This index is ranged from 1 to 5, while "1" indicates the lowest quality of logistic infrastructure in a country. Foreign Direct Investment (FDI) in billion USD, net inflow of external debt through bonds' market (BONDPPG and BONDPNG), external outstanding debt (EXTDBT) and tax-to-GDP ratio (TXTGDP) have been taken as explanatory variables in the determination of the logistic infrastructure (LOGIST) of a country. These explanatory variables indicate the availability of funds for developmental works. The impacts of these variables have been measured through their lag values in alternative options.

Third equation in the system identifies the determinants of investment in non-financial assets (NFAS). The investment in non-financial assets (INONFN) reflects the investment by public sector in infrastructure-related projects, industrialization and other physical assets which enhances the capacity of commodity-producing sectors (agriculture or industry) and can create employment opportunities. It is postulated that investment in non-financial assets is determined by the foreign direct investment (FDI), GDP growth rate (GROW), tax revenue (TXTGDP), various types of external borrowing (BONDPNG and EXTDBT) and wealth of the corporate sector in terms of the market capitalization of listed companies as percentage of GDP (MCG). These explanatory variables reflect the availability of long-term financing for investment in physical assets.

The creation of new business entities (NBUS) is explained in the fourth equation. The domestic credit to private Sector (DCPS), GDP growth (GROW) and market capitalization of listed companies (MCG) have been included as explanatory variables in this equation. The inflow of debt through sovereign bonds (BONDPPG), corporate bonds (BONDPNG) and growth in global equity index of a country (S&P) are the indicators of business opportunities in the country. They can induce the creation of new business entities. So, we have included also these variables in the determination of the creation of new business entities.

Fourth equation explained the size of subsidies to private sector (SUBSD). The inflow of private non-guaranteed debt through bonds (BONDPNG), external outstanding debt (EXTDBT), share of short-term debt in total external debt (STDTDB) and domestic credit to private sector (DCPS) as percentage of GDP are included in determinants of subsidies, while tax-to-GDP ratio (TXTGDP) has been included in this equation as a control variable.

The data of 139 countries for 15 years (from 2007 to 2021) have been used in this study. It makes total observations 1946 (unbalanced pool data). The "Panel Least Square (PLS)" technique was applied to estimate the effects of explanatory variables for these equations. Based on the nature of variables which have been included in the study, we assumed that there is no difference between intercepts of countries. It means time and countries' dimensions are not considered. So, applying a PLS on this data is the appropriate technique to estimate the effect of explanatory variables.

The data for this study has been extracted from the World Development Indicators' Data Bank (World Bank, 2022). The data for two latest years (2021 and 2022) could not be included in the model because of unavailability of data on some indicators which are included in this analysis.

4. Results and empirical findings

The estimated results have been shown in Tables 4–8. These tables depict the level of significance of the estimated parameters. The other statistical parameters including overall goodness of fit have also been presented in the above-mentioned tables. The magnitudes of the associated betas quantify the impacts of explanatory variables. Some results are surprising and against the common opinions. The adjusted R-squares and their associated F-statistics show goodness of fit. Based on adjusted R-square, it is concluded that explanatory variables in the above-mentioned equations cover the sufficient effects.

The alternative options check the robustness in estimated parameters. Some falsification tests have also been conducted by adding and subtracting some additional explanatory variables. Some control variables have also been included in the estimation of regressions.

To explain GDP growth (GROW), we included a dummy variable to represent the impact of Covid-19 pandemic in 2020 (COVID). Its significant negative impact is clear in all scenarios. The empirical evidences confirm the positive relation between foreign direct investment (FDI) and economic growth. However, the negative impact of the tax-to-GDP ratio (TXTGDP) is not clear. It is a common opinion that higher taxes on business activities cause lower growth in economy. However, the betas associated with the tax-to-GDP ratio (TXTGDP) are not robust. The expansion in domestic credit to private sector (DCPS) negatively affected the GDP growth (GROW), which is surprising. But in the other equations, it was noted that domestic credit to private sector (DCPS) positively affects the subsidies to private sector and the creation of new businesses. The significant negative impact of the domestic credit to private sector (DCPS) on GDP growth (GROW) may reflect the use of this facility in non-productive projects. Similarly, the role of sovereign bonds and net inflow of debt through private sector bonds in the determination of GDP growth are not statistically significant.

In the determination of the quality and performance of logistic infrastructure, we included foreign direct investment (FDI), tax-to-GDP ratio (TXTGDP), external outstanding debt

(EXTDBT) and inflow of debt through bonds markets (BONDPPG and BONDPPN) as explanatory variables. It has been observed that higher tax-to-GDP ratio (TXTGDP) leads to improvement in logistic infrastructure. If a government collects higher amount of taxes, more improvement in the infrastructure is likely, which is quite obvious. The positive impact of the higher tax revenue on the quality and performance of logistic infrastructure reflects the public sector investment in physical infrastructure in the presence of higher tax collection by the government. However, the external outstanding debt (EXTDBT) affects the logistic infrastructure negatively. Similarly, the role of financing through bonds market is not significant. Interestingly, it was noted that foreign direct investment (FDI) plays a significant positive role in infrastructure development. It negates the common intuitive that infrastructure development is mainly associated with the debt financing. External debts including debts from bonds market are not significant determinants of the infrastructure development. But foreign investment leads the infrastructure development. It suggests the participation of foreign equity in infrastructure financing. These results may confirm the famous "Pecking Order Theory" in finance, which states that firms prefer to finance their assets through equities. The use of debt is a preferable option for temporary financial requirements (Myers and Majluf, 1984 and Frank and Goyal, 2018). Debt financing is not transformed into physical assets. However, the empirical evidences show the negative association between foreign direct investment (FDI) and domestic investment in non-financial assets (NFAS).

All three components of external financing – debt through sovereign bonds (BONDPPG), external outstanding debt (EXTDBT) and short-term external debt (STDTDB) – affect the subsidies to private domestic sector positively. Their positive impacts are statistically significant and robust in all alternative scenarios. Similarly, domestic credit to private sector (DCPS) is positively associated with the subsidies. However, the role of tax collection (in terms of tax-to-GDP ratio (TXTGDP)) is not clear. These results clearly indicate that all the modes of debt financing are commonly used to provide subsidies to private sector.

It is surprising that the role of sovereign bonds is highly significant and robust in the determination of the subsidies to private sector, but insignificant in the determination of the creation of new business entities and the improvement in the quality of logistic infrastructure. It is against the common opinion. The empirical results indicate that sovereign bonds are not a feasible option for improvement in infrastructure. This conclusion confirms the findings by Mehar (2020).

These results provide important insights. The most important conclusion is the identification of insignificant role of the sovereign bonds in the determination of logistic infrastructure and creation of new business entities, while the role of sovereign bonds is highly significant in the determination of subsidies to private sector. The study does not favour the long-term external borrowing for the development of infrastructure. Similarly, the significant negative impact of domestic credit on GDP growth invites the rethinking of financial policies.

5. Policy implications and limitations

The role of sovereign bonds in the determination of the subsidies to private sector is the most important conclusion of this study. Though role of sovereign bonds and external debts are insignificant in the determination of the improvement in logistic infrastructure and creation of new business entities, they support the fiscal system in provision of subsidies to support and protect the domestic economy. This role becomes important in short-term crisis where protection of domestic economy requires subsidies. The policymakers should consider this role of external debt and sovereign bonds. However, dependency of infrastructure development or new business creation on debt financing is not a right option. It is envisaged by the empirical evidences that the creation of new business entities and the development of infrastructure are largely determined by the equity participation.

Similarly, this study supports the enhancement in credit financing to private sector for the creation of new business activities in the economy.

The simultaneity in the system of equations deduces the importance of FDI. The net inflow of FDI can accelerate GDP growth, while growth in GDP is a significant determinant of investment in non-financial assets and the creation of new business entities. The negative relation between GDP growth and higher magnitude of DCPS may reflect the use of domestic credit facilities to manage working capital and liquidity requirements which may not affect the GDP growth instantly. However, improvement in liquidity position by enhancing domestic credit facilities may ensure the sustainability and continuity of business activities. Such activities may improve GDP growth in future.

For South Asian economies, the growth in domestic credit is highly recommended for the creation of new business entities. The domestic credit can play an important role in the economic growth of South Asian countries. It is notable that growth in the business entities is an instrumental element of converting the employees into employers. In this way, domestic credit can facilitate financial inclusion, access and equity in the economy.

There are some limitations in interpreting the results and policy formulation based on these findings. The domestic political uncertainties and law and order situations have not been considered in this study. The recommendations are based on normal conditions. Similarly, the present global scenario because of Russia–Ukraine war and heavy fluctuations in oil prices may affect the external and domestic debt requirements. Particularly, its effects on bonds market can change the expected outcomes. These factors must be considered by policymakers in formulating a policy based on these recommendations.

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