Role of monetary policy in economic growth and development: from theory to empirical evidence

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Abstract

Purpose – This article examines the effects of credit to private sector on the business and trade activities. The effectiveness of rapid expansion in public and private borrowing through state's intervention after COVID-19 pandemic has been assessed in this study.

Design/methodology/approach – The model to determine the role of credit expansion is based on four equations estimated through panel least square technique on 18 years data of 186 countries.

Findings – It is concluded that credit to private sector and external debt improve the investment in infrastructure, which is a significant determinant of gross domestic product growth. Empirical evidences corroborate that higher number of firms using banks to finance their investment and the volume of broad money determine the magnitude of credit to private sector.

Originality/value – This study explores some new evidences and aspects of the credit financing which have not been discussed in this way before.

Keywords Public private partnership, Financial inclusion, Domestic credit to private sector, Neoclassical liberalism, Ordoliberalism, Panel least square

Paper type Research paper

1. Introduction: effectiveness of monetary policy

Monetary policy is considered a part of economic planning and strategies to provide an environment for economic development and welfare of general public. A usual way to test the effectiveness of monetary policy is to test the impacts of interest rates on gross domestic product (GDP) growth, investment and inflation. The traditional Liquidity-money (LM) curve approach is also adopted to explain the implications of monetary policy.

For a desirable outcome of monetary policy, the nominal rate of GDP growth should not be less than the rate of inflation. If the effect of monetary easing on inflation is stronger than its effect on growth, it will lead to higher level of poverty. In other words, a positive real rate of growth in GDP is the indicator of an effective monetary policy. This target can be achieved if monetary expansion leads the enhancement in business activities. The volume of external trade and creation of new business entities are the indicators of enhancement in business activities, while a higher rate of GDP growth can lead to alleviation of poverty. Baily and Okun (1965) have concluded that higher economic growth in terms of GDP reduces the unemployment.

Mehar (2018a, b) has analyzed the effects of monetary policy on poverty. The accelerated growth in investment and control over inflation are the twin objectives of a monetary policy

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while growth in investment is closely related to the creation of employment opportunities. Any policy instrument which affect the inflation or unemployment will also affect the level of poverty, because magnitude of poverty is determined by the level of unemployment and inflation.

In fact, the effectiveness of monetary policy depends on the utilization of domestic credit to private sector in enhancement of economic and business activities. Mehar (2011) has identified several mechanisms that make monetary policy a regressive option to manage the economy. According to this approach, the most important regressive option is the interest rate spread. A higher rate of interest can lead to the cost push inflation if producers use the debt financing to run their production process and inventory holding. The interest on borrowing from commercial banks to manage the working capital requirements can be included in the cost of production which is a source of cost push inflation (Mehar, 2018a, b). The availability of raw material for some industries depends on crop seasons – like sugar, textile, tobacco and food. But, their sales activities are spread over the year. Such industries prefer to adopt working capital financing from banking sector. This situation can lead a higher rate of inflation if interest rate increases. The peoples in lower income groups will be the net looser, if such products are commonly used.

Monetary policy is also a key determinant of investment. The interest rate for lending from commercial banks and the easy access to credit are the components of monetary policy which determine the magnitude of investment.

The growth in credit to private sector improves the market liquidity, which plays an important role in determination of investment. Some studies have defined the market liquidity as a residual of the change in money supply after deduction of public borrowing and time deposits. This liquidity is generated through individual savings, corporate retained earnings, investable funds in financial institutions and inflow of foreign investment.

Fiscal policy is considered also an option to enhance the business activities. However, fiscal support by the government to private sector can generate fiscal deficit, which may be a cause of growing public debt. Consequently, the gilt-edged securities offered by the government to finance its fiscal deficit can divert the investable funds from private equities to government securities. An attractive interest rate on gilt-edged securities creates a selling pressure in equity market which leads to decline in the value of common stocks issued by the companies in private sector. It implies ineffectiveness of fiscal policy because of crowding out effect. Another important aspect of the excessive use of fiscal policy is the borrowing from commercial banks to finance fiscal deficit. Though, it provides an easy option to banks to lend public money to the government, which is the safest option from the bankers' point of view. Moreover, it provides handsome risk-free rate of return to the banks. Though, it reduces the banks' ability to provide credit to private sector.

The higher tax collection by the government to reduce its fiscal deficit may adversely affect the economic growth. The taxes on commodities (general sales tax, excise and import duties) are a usual way to enhance the tax collection. The higher rate of inflation is a natural outcome of such taxes. A report released by Fiscal Policy Department of IMF (Gupta, 2014) stated that some taxes levied on wealth, especially on immovable property, are also an option for economies seeking more progressive taxation. However, it has been observed that policy makers prefer to indirect taxes. It is observed that international financial institutions including International Monetary Fund (IMF) emphasize in enhancing the tax-to-GDP ratio to finance the fiscal deficit (Mehar, 2005). Surprisingly, the IMF does not pay considerable emphasize on the monetary policy in its recommended demand management measures, though its primary concern is closely related to the monetary system.

2. Theoretical background and review of literature

Before evaluation of the effects of the state's involvement in money, banking and credit policies, it seems important to review the history of theoretical development in political economy of money, banking and credit.

Keynesian's macroeconomics policies are broadly divided into three eras: (1) the era based on Keynes' ideas initiated in the 1940s; (2) the monetarist era, associated with the work of Milton Friedman, after failure of Keynesian's ideology in some cases in 1970s and (3) a combined approach of both Keynesians' and Monetarists' ideologies since late 1990s. The effectiveness and limitations of monetary and fiscal policies have been debated in economic literature. The role of monetary policy in economic growth and development has been widely discussed in economic literature. The determination of interest rate, access to credit financing, size of financial inclusion in the economy, volume of the credit to private sector, effects of monetary policy on inflation and GDP growth and effects of interest rate spread on income distribution are included in those topics which have been debated in academic literature. Some new dimensions of monetary policy have been observed during COVID-19 crisis; one of those is the expansion in soft credit policies by banking sector in different countries. One of the common measures which has been adopted by almost every country during the pandemic crisis is the softness in lending to private sector and use of public money to support the business activities.

The interaction of monetary policy, external borrowing and supply of credit to private sector in the context of COVID-19 pandemic have been examined by World Bank (2020), IMF (2020a, b), Durrani *et al.* (2020), Smith (2020), Krugman (2020), Rogoff (2020), Case and Deaton (2020), Mehar (2021) and Nemoto and Morgan (2020). Mehar (2021) has derived a mathematical model to device a criterion to assess the sustainability of external financing. Now, The Economist (2020b) and University of Cambridge (2020) have indicated the beginning of a new era after COVID-19 pandemic. It was advised (The Economist, 2020a, c) that governments should find the right path between stimulus and restraint. According to Krugman (2020), "There will be a hangover from borrowing but it should not pose any major problems." Rogoff (2020) mentioned that economic catastrophe due to COVID-19 pandemic is likely to rival or exceed that of any recession in the last 150 years. He suggested that governments should inject heavily into the economy. Shirai (2020) has described that the crisis stimulated many central banks to implement substantial monetary easing along with massive fiscal stimulus measures. The central banks in various countries urged the commercial banks to keep lending because reduction in lending will lead to bankruptcies of different businesses which will come back to hurt the banks.

Another important aspect of monetary policy is the use of financial technology for monetary transactions. Haddad and Hornuf (2019) and Foroohar (2019) have identified the limitations and adverse aspects of the uses of financial technology. The use of financial technology covers a broad area from digital currencies, mobile phone wallets, cryptoassets, online remittances, Internet banking, online brokers, robo-advisors, cryptoasset trading, mobile trading to alternative finances through crowd funding, peer-to-peer lending, online balance sheet lending and supply chain finance. According to Marlene *et al.* (2019), "fintech" is an advanced technology to improve and automate delivery and use of financial services to consumers and businesses. Gormez (2019) mentioned that electronic money is not a new concept, and technology can enhance the way of dealing, but does not change the fundamental nature. He claims that central banks that have perfectly addressed all the fundamental glitches of money and financial service provision can issue digital currencies with no reluctance. Mehar (2021) found that higher share of population receiving payments by digital modes and the use of the Internet for payments of bills or to buy something online are significant and robust determinants of trade in services. Stijn *et al.* (2018) mentioned that fintech may improve the efficiency of financial intermediation and provide a substitute

funding source for businesses and consumers. Xu and Xu (2019) have explained how the government of China has regulated peer-to-peer (P2P) lending, third-party payment and cryptoassets. Some important aspects of the relations between money, income and payment system have been analyzed by Polak (1957).

3. Policy intervention for economic growth and development

The philosophy of capitalism supports the assumption of trickle down transfer of resources from top to bottom level. This assumption has justified facilitation to private sector to ensure the continuity of business activities during COVID-19 pandemic. But, it is another reality that the pandemic has affected the different types of businesses in different ways as an increase of more than US$25bn was observed in the worth of top 100 companies (Mehar, 2021). The Financial Times (2020) has classified the pharmaceutical, cloud computing, e-commerce and gaming as winning sectors. Some analysts have expected that the greatest wealth transfer in history will take place over the next three years. Even during the Great Depression, when one-third of Americans were financially devastated, more millionaires were created at that point in time than at any other time in American history (Gunderson, 2020).

Since the financial crisis of 2008, the debate on the state's involvement in banking has become an important topic in political economy and global financial architecture. The debate has gained momentum after COVID-19 crisis when governments have intervened in the lending from commercial banks and the quantitative easing (QE) in monetary policy was adopted by majority of the central banks. To facilitate the private sector, governments have compromised on their tax revenue targets and spending on infrastructure development, while growing deficits have accelerated the rapid expansion in debt financing. The government intervention to protect the private businesses has damaged the targets of sustainable development goals (SDGs) and investment in environmental, social and governance (ESG) projects. While spending on ESG- and SDGs-related projects can play a critical role in eradication of poverty and reducing the income inequalities, the global financial crisis spurred a widespread movement to rethink excess capitalism and overemphasis on profits (Nemoto and Morgan, 2020).

The state's involvement in private businesses was always an important debate in political economy. This debate became more important after fiscal and monetary interventions by several governments in developed and developing countries to manage the effects of COVID-19. The governments all over the world have intervened in private business activities through tax exemptions, subsidies, QE in monetary policies, lowering interest rates, decline in cash reserve ratios and enhancing credit to private sector. However, some analysts think that involvement of state to support some businesses and bail out packages to some industries facilitates the transfer of wealth to some businesses (Gunderson, 2020). The involvement of government is nothing more than the creating a way for utilization of money of some peoples for the benefits or protection of other peoples. Though, utilization of this money for the protection of other peoples may be more beneficial ultimately for the depositors. The legitimacy of government's action to influence the use of depositors' money for protection and promotion of other businesses is transformed through monetary policy. What should be the criterion to determine the role of government in using the public money in commercial banks for protection and promotion of other businesses? Obviously, the intervention by monetary policy will be justified if accelerated credit to private sector promotes the creation of new business entities and trade activities.

What should be the criterion to determine the limitation of state in using the public money in commercial banks to finance the development expenditures and protect the market economy? The "Anglo-Saxon Capitalism" and "German Neoliberalism" provides different responses. The Anglo-Saxon Capitalism which is the representative of Adam Smith's

classical economics is practiced in the United Kingdom, the USA, Canada, New Zealand, Australia and Ireland, favors the low level of regulations, low taxes, provision of few essential services by public sector, strong private property rights, contract enforcement and overall ease of doing business and low barriers to free trade. In its present shape it is based on the Chicago School of Economics. The neoclassical economic liberalism in American and British economies is its one of the extreme versions. The underlying assumption of this version is that the inherent selfishness of individuals is transferred by the self-regulating market into general economic well-being. In neoclassical economic liberalism, competitive market should function as equilibrating mechanisms, which deliver both economic welfare and distributive justice. An important point of the economic liberalism is that government should regulate economic activity, but the state should not get involved as economic actor.

The "Ordoliberalism" or "German Neoliberalism" emphasizes the need for the state to ensure that the free market produces results close to its theoretical benefits. Ordoliberals suggest a strong legal system and suitable regulatory framework to ensure that market functions effectively. According to this version, unequal powers of the stakeholders can eliminate the competition in market. The cartels and monopolies can abolish the advantages of free market. So government interference is required to maintain market freedom. It implies that the freedom of markets from government intervention (laissez-faire) is different from the freedom of individuals to compete in markets (liberalism). According to Ordoliberals the main enemy of free society is monopolies instead of the state. So, they oppose creation of monopolies through protectionism, subsidies or cartels. The difference between "Neoliberalism" and "Ordoliberalism" is also described as the difference between a liberal market economy and a coordinated market economy.

Various justifications and perceptions of state intervention in the economy lead to policy differences and then these policies influence the relationship between the public and private sectors. The process and instruments of monetary and fiscal policies including tax rates, tax-to-GDP ratio, public sector development expenditures, subsidies and intervention of government in determination of interest rates, exchange rates and segmentation of the credit to private sector determine the patterns of economic growth and investment. However, a global inclination to "Neoclassical Liberalism" is reflected in the governments' policies in post-COVID-19 world. To manage the rate of interest, expansion in credit to private sector, protectionism, subsidies and participation of state in infrastructure development are the ingredients of "Neoclassical Liberalism".

Now, the global ranking of countries in their economic growth and development will be changed, depending on the growth and survival of the businesses in post-pandemic environment. The sustainability of existing businesses and the adoption of the required procedures in the new scenario require the survival and continuity of business activities which are closely related with the provision of financing to maintain liquidity and working capital requirements (Mehar, 2022). In this scenario, the involvement of state to facilitate some businesses and bail out packages to some industries may be considered a part to reshuffle the rankings of earnings and wealth. The important question is the net effect of state's involvement on various kinds of businesses and groups in the society. Some analysts consider that the involvement of government is nothing more than creating a way for utilization of money of some peoples for the benefits or protection of other peoples. The peoples' money may be in the form of taxes or their deposits in banks and nonbanks financial institutions. However, it is quite possible that utilization of this money by the government for the protection of other people may be more beneficial ultimately for the depositors and tax payers. The legitimacy of government to utilize those money and its broader consequences is the primary question in this discussion.

Based on the above-mentioned discussion, we established a hypothesis that monetary intervention affects the economic growth and development positively. In this way, we

examined the theory that growth in money supply provides an effective strategy for economic growth. The economic growth has been taken in term of GDP growth while economic development is indicated by investment in infrastructure through public-private partnership (PPP). So, this study tests the effectiveness of state's involvement in monetary, banking and credit policies for economic growth and development. The magnitudes of financial inclusions, real interest rate and credit to private sector from banks and other financial institutions have been considered as indicators of monetary policy. The role of state intervention in monetary policy will be justified if effectiveness of these policy devices is accepted. The effectiveness of these policy devices has been tested through empirical evidences in this study. The next section of this paper depicts the economic positioning and investment financing in Central Asia Regional Economic Cooperation (CAREC) and Economic Cooperation Organization (ECO) member countries. The theories regarding the justification and limitation of state's intervention in economic policies have been briefly discussed in this section. Section 5 establishes the models and methodology for empirical testing. Section 6 explains the empirical finding and statistical evidences, while conclusions and some policy implications have been described in section 7.

4. Leverage financing and monetary policy in CAREC and ECO member countries

The study focuses specially on the member countries of CAREC and ECO. Historically, these countries have experience in using state's intervention in monetary policies for economic growth and development. This study provides also a comparison of these countries with the rest of the world. Further, examining the effectiveness of monetary policy in post-Soviet regime can assess the success of classical economic tools in these countries. So, it can add some new knowledge in the existing literature of economic policies in Central Asian countries.

The patterns of economic growth, investment in infrastructure on PPP basis, external debts and monetary policy indicators have been shown in Tables 1–3. An objective of these tables is to show the trends of economic and monetary policy indicators before the COVID-19 crisis. A comparison of monetary policies and debt financing reveals the limitations of monetary and credit policies in CAREC and ECO member countries. A bird's eye view of GDP growth, investment in infrastructure on PPP basis, inflow of foreign investment, outstanding debts and monetary policy indicators shows a big variation in the monetary and credit policies in these countries.

These patterns show the diversification in monetary and credit policies among the countries in the region. Another notable point is the lower magnitude of the "credit to private sector as percentage of GDP" in these countries (except China). These countries are far behind in provision of the "domestic credit to private sector" as compared to the world's average (even far behind as compared to middle income countries). The share of short-term borrowing in total external borrowing is higher in China and Iran but other countries heavily rely on long-term debts.

Though, there is a large variation in GDP growth rates among the CAREC and ECO member countries, their rates of growth are higher than world average (except Iran and Turkey). Investment in infrastructure on PPP basis is still a weak area in CAREC member countries except China, while in Western world [including USA, Canada and European Union (EU)] it is completely a private sector activity.

A rapid growth in external debt has been shown in Table 2; it is envisaged that large part of external debts of Azerbaijan and Pakistan belong to their public sectors. The most important observation related to the monetary policy is the lower credit to private sector in CAREC member countries (except China). It is lowest in Afghanistan, Pakistan and Tajikistan. The credit to private sector as percentage of GDP in 2019 was 3.2 in Afghanistan,

Year/Country and group	GDP growth (%)		Net FDI inflows (% of GDP)		Investment in infrastructure on PPP basis** (million USD)	
	2001	2019	2001	2019	2001	2019
Afghanistan	8.8*	3.9	1.3*	0.1	0	190
Azerbaijan	9.9	2.5	14.4	3.1	230	0
China	8.3	5.9	3.5	1.3	982	25,852
Georgia	4.8	5.0	3.4	7.7	0	93
Iran	0.9	−6.8	0.3	0.6	0	0
Kazakhstan	13.5	4.5	12.7	1.8	0	554
Kyrgyz Republic	5.3	4.6	0.3	3.1	0	0
Mongolia	3.0	5.2	5.0	17.5	0	19
Pakistan	3.6	1.0	0.5	0.8	0	3,217
Tajikistan	9.6	7.4	0.9	2.6	0	0
Turkey	−5.8	0.9	1.7	1.2	1,700	1,021
Turkmenistan	4.3	6.3	4.8	4.8	0	0
Uzbekistan	4.2	5.8	0.7	4.0	0	12
Germany	1.7	1.1	2.9	1.7	0	0
United Kingdom	2.7	1.4	3.4	0.1	0	0
EU	2.2	1.8	5.0	0.8	0	0
High income	1.5	1.7	2.7	1.6	0	0
World	2.0	2.6	2.7	1.7	NA	NA

Note(s): *2003; **PPP: Public-private partnership; the abbreviations are: EU, European Union; FDI, foreign direct investment; GDP, gross domestic product; PPP, public-private partnership
Source(s): World Bank (2021)

Table 1. Growth and investment in CAREC and ECO member countries

Year/Country and group	Total external debt (billion USD)		Public sector debt (billion USD)		Short-term debt (billion USD)	
	2001	2019	2001	2019	2001	2019
Afghanistan	0.0	2.7	0.0	1.9	0.0	0.4
Azerbaijan	1.5	15.8	0.8	14.0	0.1	0.6
China	184.3	2,114.2	91.0	318.1	56.3	1,205.3
Georgia	1.9	18.8	1.3	7.0	0.1	2.3
Iran	8.3	4.9	5.3	0.4	2.7	1.6
Kazakhstan	15.3	159.0	3.5	24.7	1.3	9.0
Kyrgyz Republic	1.8	8.4	1.3	3.7	0.0	0.5
Mongolia	0.9	31.6	0.8	8.4	0.0	3.0
Pakistan	32.0	100.8	26.6	71.1	1.3	9.5
Tajikistan	1.2	6.6	0.8	2.8	0.1	1.4
Turkey	112.9	440.8	53.7	124.9	16.3	123.1
Turkmenistan	2.2	6.5	1.9	6.4	0.3	0.0
Uzbekistan	5.2	22.4	3.9	12.8	0.5	0.7

Source(s): World Bank (2021)

Table 2. External outstanding debts

11.6 in Tajikistan and 18.1 in Pakistan. It was less than 70% in other CAREC member countries, while the world average is 132%. It is an indicator of the inactiveness of banks and credit policy in these economies. The less inclusion of individuals and firms in financial system and the lower magnitude of broad money may be causes of lower magnitude of credit

Year/Country and group	Domestic credit to private sector (% of GDP)	Borrowers from commercial banks (per 1,000 adults)	Firms using banks to finance investment (% of firms)	Real interest rate (%)	Broad money (% of GDP)
Afghanistan	3.2	3.0			35.0
Azerbaijan	23.0		0.0	17.5	35.2
China	165.4	504.9		3.0	197.9
Georgia	67.7	534.6	34.5	5.3	50.0
Kazakhstan	24.3		14.0		30.7
Kyrgyz Republic	24.6	124.3	16.7	14.5	37.2
Mongolia	49.6		47.9	7.0	55.9
Pakistan	18.1	23.1		3.3	59.0
Tajikistan	11.6		8.3	19.2	28.0
Turkey	65.4	761.7	28.7		58.7
Uzbekistan	30.1	152.9	26.2	4.2	17.9
Germany	79.6				
United Kingdom	133.5				141.7
EU	85.5		16.7		
High income	147.6		36.3		123.8
World	131.7		34.1		125.6

Note(s): EU, European Union; GDP, gross domestic product

Table 3. Monetary policy indicators (2019)

to private sector. Certainly, broad money includes long-term public deposits in commercial banks which is a factor of banks' credit to private sector.

The historical role of state's intervention in monetary policy for economic growth and infrastructure development in CAREC members and some other developing countries has become more justifiable when high income countries have intervened in economic policies to mitigate the severe adverse effects of the spread of COVID-19 pandemic. The monetary and fiscal incentives to private sector and external borrowing by public sector to set off their growing fiscal deficit are those strategies which have been adopted by the governments in developed and developing countries all over the world.

In consequence of such policies, the US budget deficit has expanded to US$4 trillion due to stimulus packages. EU has announced a US$2 trillion plan to fight the impact of coronavirus over the next seven years. Almost half a million companies in Germany have sent their staff on short-term working scheme – known as "Kurzarbeit". German government has to spend more than EURO 10bn for this scheme. Due to these policies, the IMF (2020a, b, c) has predicted growth in fiscal deficit about 5% points of GDP, on average. Some countries and financial institutions have to rely on external financing; in this case the repayment of unhistorical debts will become a crucial issue. Previously, the largest, fastest and most broad-based increase in debts of developing and emerging countries was observed by Kose *et al.* (2020). After the pandemic, the debt will further increase rapidly, which can lead a financial crisis. However, Krugman (2020), Rogoff (2020) and Mehar (2021) have insisted the debt financing for economic survival. Mehar (2021) has provided a mathematical model to device a criterion to assess the sustainability of external financing.

Other than growing fiscal deficit and external borrowing, the enhancement in credit to private sector from banks and financial institution was a policy instrument which was adopted by the countries all over the world. A rapid increase in financial inclusion was observed all over the world after the pandemic crisis. The banks and financial institutions have introduced user-friendly policies for firms and individuals to use their services. The

monetary policy authorities have played a major role in introducing such soft polices. The objective of enhancing financial inclusion and lower rate of interest was the augmentation in credit to private sector. Many central banks have implemented substantial monetary easing. Consequently, growing number of central banks have faced the effective lower bound (or even zero) in their policy rates. The Bank of England, central banks in the Eurozone, Japan, USA, Australia, Canada and New Zealand are included in these banks. The central banks in Brazil, Chile, Columbia, Hungary, Indonesia, the Philippines, Poland, the Republic of Korea, Romania, South Africa and Turkey have also adopted QE (Shirai, 2020). The ease of monetary policy was adopted also by CAREC member countries. The State Bank of Pakistan has reduced the prime rate of interest by more than 5%, which was the largest decline in history of the country.

The expansion in public and private sectors borrowing may lead to a debt crisis. One of the important questions related to this debate is the impact of credit enhancement on economic and development. In the next section, we established a model to assess the impact of credit to private sector on GDP growth and investment in infrastructure. Here, it is important to mention that change and development of infrastructure will be required in the post-COVID-19 scenario. The countries and regions that can manage to change and develop their infrastructure according to the new requirements will be ranked at the higher level in global economic ranking. Despite the required change and development in infrastructure, the majority of governments in present scenario are focusing to meet their recurring expenditures to finance health facilities, subsidies to private businesses and stipends to poor families. The lack of compatible infrastructure in future can lead to further deterioration in economic growth. To attract private sector for investment in infrastructure is one of the options.

Here it is notable that the state involvement in development financing by private sector is known as "PPP". The public partnership in infrastructure development projects is required despite the private investment. The question regarding the state's involvement in PPP for investment in infrastructure will not be valid if state's participation is limited only for maintaining the law and order situation to protect the infrastructure, and providing guarantees for recovery of user charges, fees or taxes for the use of infrastructure. The government support is required for such long-term heavy investment in infrastructure-related projects.

The credit to private sector may provide financing facilities to infrastructure related projects. Though, monetary policy by the central banks plays an important role in allocation of the credit facilities to different sector and determination of the rate of interest, the banks' ability to lend is determined by other factors also. This study also identifies the determinants of the credit to private sector. It was tested that how real rate of interest and firms and individual inclusion in financial system contribute in augmentation of credit to private sector.

5. Determination of growth, investment and credit to private sector: estimation methodology

In the light of above-mentioned background, a model to determine the role of monetary policy intervention in economic growth and development has been established in this study. The monetary policy intervention in this model has been measured by the magnitude of overall domestic credit to private sector, while tax revenue to GDP ratio reflects the fiscal policy influence. It is supposed that magnitude of the credit to private sector is influenced by qualitative and quantitative measures adopted by the monetary policy authorities. To regulate an indicative (prime) interest rate, setting a mandatory reserve requirement for commercial banks, enhancing financial inclusion of firms and individuals by easing regulatory and procedural requirements and enhancing broad money through attractive

schemes by commercial banks to boost their deposits are the discretionary measures which can enhance the size of credit to private sector. It is hypothesized in this study that financial inclusion and broad money influence the size of domestic credit to private sector. We tested the role of domestic credit to private sector, tax-to-GDP ratio, investment in infrastructure on PPP basis, external outstanding debt and foreign direct investment (FDI) in determination of GDP growth. The investment in infrastructure is another indicator of economic development. The determinants of investment in infrastructure have also been explained in the model. How GDP growth and investment in infrastructure will be affected by monetary intervention, it has been tested empirically. The monetary policy intervention will be justified if intervening variables significantly affect the economic growth and development. Figure 1 explains the interaction of investment in infrastructure on PPP basis, domestic credit to private sector, external long-term debt, short-term debt, tax-to-GDP ratio, financial inclusion and FDI. The model is based on four equations, while GDP growth has been taken as targeted variable which can be written in the following linear form:

$$GROW_{it} = \beta DCPS_{it} + \gamma PPPI_{it} + \delta X_{it} + \mu_i + \tau_t + \varepsilon_{it}$$

where "$GROW_{it}$" is annual growth in "Gross Domestic Product (GDP)" for country "i" in year "t"; "$DCPS_{it}$" and "$PPPI_{it}$" are vectors of variables related to "Domestic Credit to Private Sector" from banks, nonbanking financial institutions and other sources including public-sector enterprises and "Investment in Infrastructure on Public Private Partnership" basis, respectively; "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.

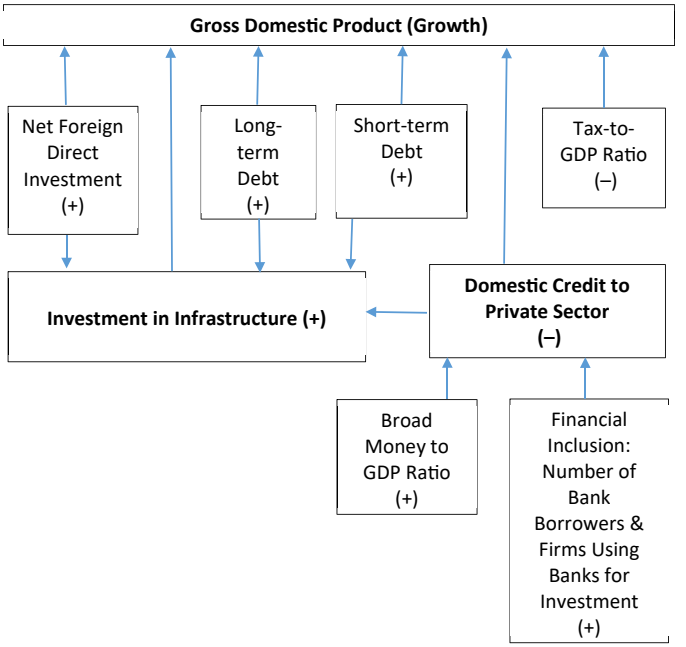

Figure 1.
Determinants of GDP growth

The theoretical framework employed constitutes the relations between the growth in GDP and the domestic credit to private sector through different channels. It can be described as follows:

$$GROW_{it} = f(DCPS_{it},\ PPPI_{it},\ FDI_{it},\ \times\ DBT_{it})$$

where "*PPPI*" is the investment in infrastructure through PPP. Relating GDP growth to the aforementioned factor, both the estimated direct and indirect effects can be expressed as follows:

$$\frac{dGROW}{dDCPS} = \frac{\partial GROW}{\partial DCPS} + \frac{\partial GROW}{\partial PPPI}.\frac{\partial TPPPI}{\partial DCPS}$$

To estimate the impacts of explanatory factors on GDP growth (GROW), investment in infrastructure on PPP basis (PPPI) and domestic credit to private sector, the following equations have been established:

$$GROW_{it} = \propto_i + \beta_1 DCPSG_{it} + \beta_2 PPPI_{it} + \beta_3 TXGDP_{it} + \beta_4 FDIGDP_{it} + \beta_5 XDBT_{it} + \beta_6 STDBT_{it} + \beta_7 HIGH_i + \beta_8 CAREC_i + \varepsilon_{it} \quad (1)$$

$$PPPI_{it} = \propto_i + \beta_1 DCPSG_{it} + \beta_2 FDINET_{it} + \beta_3 DBTPBL_{it} + \beta_4 STDBT_{it} + \beta_5 HIGH_i + \beta_6 CAREC_i + \varepsilon_{it} \quad (2)$$

$$DCPS_{it} = \propto_i + \beta_1 BMONEY_{it} + \beta_2 BNKBRWR_{it} + \beta_3 BNKFRINV_{it} + \beta_4 INTREAL_{it} + \beta_5 DSVNG_{it} + \beta_6 TRD_{it} + \beta_7 WEALTH_i + \beta_8 RECESSION_t + \varepsilon_{it} \quad (3)$$

$$BCPS_{it} = \propto_i + \beta_1 BMONEY_{it} + \beta_2 BNKBRWR_{it} + \beta_3 BNKFRINV_{it} + \beta_4 INTREAL_{it} + \beta_5 DSVNG_{it} + \beta_6 TRD_{it} + \beta_7 WEALTH_i + \beta_8 RECESSION_t + \varepsilon_{it} \quad (4)$$

In the first equation, it is hypothesized that growth in GDP (GROW) depends on the size of domestic credit to private sector as percentage of GDP (DCPS), tax-to-GDP ratio (TXGDP), inflow of FDI as percentage of GDP (FDIGDP), external debt (XDBT), short-term debt (STDBT) and investment in infrastructure projects on PPP (PPPI) basis. The tax-to-GDP ratio can affect the growth of GDP negatively. The domestic credit to private sector (DCPS) is a monetary policy indicator which reflects the availability of investable funds and liquid resources to the private sector. We have also introduced two dummy variables in these equations. The high income economies including USA, Canada, Japan, Russian Federation, China, Australia, New Zealand and countries in EU are included in the high income group (HIGH). The dummy variable for this category can capture the experiences of these economies in economic governance. A dummy variable which reflects the situation of PPP in member countries of the CAREC and ECO has also been introduced in the model (CAREC). The CAREC member countries have a historical background where private-sector participation in infrastructure projects was not common. Majority of countries in this set have been used to heavy dependency on public-sector funding to develop the physical infrastructure. The private sector investment for infrastructure development was not a popular way of financing in these countries.

The second equation in the model tests the impacts of domestic credit to private sector (DCPS), external debt to public sector (DBTPBL), net FDI (FDINET) and short-term debt (STDBT) on the investment in infrastructure on PPP (PPPI) basis. The dummy variable to capture the special economic background of CAREC member countries has also been

incorporated in this equation. The "CAREC" is a dummy variable which is equal to "1" for those 13 countries which are members of the CAREC or the ECO.

Third and fourth equations determine the causal factors of overall domestic credit to private sector (DCPS) and domestic credit to private sector by banks (BCPS) as percentage of GDP. In these two equations we tested the impacts of broad money (BMONEY) and financial inclusion on the magnitude of domestic credit to private sector (DCPS and BCPS). The financial inclusion was measured by two variables: number of banks' borrowers for per 1,000 adults in a country (BNKBRWR) and the firm getting loans from financial institutions for investment as percentage of total firms (BNKFRINV). We have also tested the impact of the real interest rate (INTREAL) and aggregate domestic savings (DSVNG) on the size of domestic credit. Besides these explanatory variables, we introduced a dummy variable to capture the impact of aggregate national wealth in a country on the domestic credit. Aggregate national wealth is the total sum of the value of a nation's assets minus its liabilities. It refers to the total value of net wealth possessed by the citizens of a nation at a set point in time, while wealth is defined as the value of financial assets plus real assets (principally housing) owned by households, minus their debts (Credit Suisse Research Institute, 2019). Seven countries (the USA, the United Kingdom, Japan, Italy, France, Germany and China) have been defined as wealthy countries. These countries cover more than 70% of global wealth in 2019. According to our selection criterion, a country is defined as wealthy country if its aggregate wealth is greater than US$10 trillion in 2019 and it is included in the list of top 15 wealthy countries for last ten years consecutively. The above-mentioned seven countries fulfill this criterion.

To test the impact of "German Neoliberalism (Ordoliberalism)" on investment in infrastructure based on PPP and GDP growth, a dummy variable (GERMANY) has been included in the model, which is equal to "1" for Germany and "0" for other countries. The other control variables are recession (RECESSION) which is equal to "1" for 2008 and 2009 and "0" otherwise. Aggregate trade as percentage of GDP (TRD) and gross domestic saving as percentage of GDP (DSVNG) are other control variables.

We have included various types of financing in these equations: external outstanding debt (XDBT), external public sector debt (DBTPBL), short-term debt (STDBT) and domestic credit to private sector (DCPS). Some specific characteristics and implications are attached with every type of loan. The short-term debt (STDBT) and domestic credit to private sector (DCPS) may be used as proxy of the availability of funds for working capital. We are interested to quantify their net effects.

We applied data of 186 countries for 18 years (from 2001 to 2018) which makes total observations of 1,674. This sample provide us an unbalanced panel data. This data allows us to apply panel least square (PLS) to estimate the parameters. Tables 4 and 5 depict the descriptive statistics and summarize the changes in the trends of these variables. To test the authenticity of the model, the relevant statistics have been shown in Tables 6–9. We applied PLS techniques to estimate the effects of explanatory variables. However, data for some countries could not be included in the model because of unavailability of data on some indicators which are included in the analysis. Data for this analysis was extracted from the World Development Indicators' Data Bank (World Bank, 2020). However, data on national wealth was extracted from Credit Suisse Research Institute (2019).

6. Results and empirical findings

The results of regression analysis have been presented in Tables 6–9. The robustness in estimated parameters have been checked by using the alternatives options, where some falsification tests have also been conducted. For this purpose some control variables have been included in the regression analysis. These results quantify the impacts of explanatory

Variable	Mean	Median	Standard deviation	Minimum	Maximum
GROW: GDP growth (%)	3.69	3.63	5.62	−62.08	123.14
DCPS: domestic credit to private sector as percentage of GDP	51.57	37.14	70.92	0.19	2,564.49
STDBT: external short-term debt in billion USD	5.15	0	46.76	0	1,239.45
XDBT: external outstanding debt in billion USD	20.72	0.44	91.09	0	1,962.3
TXGDP: tax-to-GDP ratio	17.14	16.51	7.04	0	62.86
FDIGDP: FDI to GDP ratio	10.53	3.04	70.48	−58.32	1,846.6
PPPI: PPP investment in transport, energy, ICT and water and sanitation in million USD	322.26	0	2,255.59	0	56,140.2
FDINET: net FDI inflow in billion USD	−0.56	−0.11	19.4	−336.85	177.28
DBTPBL: external debt to public sector in billion USD	8.19	0.32	25.67	0	295.04
BMONEY: broad money (% of GDP)*	57.19	46.83	43.59	2.86	396.19
BNKBRWR: borrowers from commercial banks (per 1,000 adults)*	184.57	115.76	209.4	0.02	1,165.39
BNKFRINV: firms using banks to finance investment (% of firms)*	23.92	23	14.82	0	75.8
INTREAL: real interest rate (%)*	6.25	5.47	9.39	−77.56	93.92
TRD: trade (% of GDP)*	92.11	80.78	59.64	1.3	863.2
DSVNG: gross domestic savings (% of GDP)*	22.96	21.16	17.19	−19.9	372.99
BCPS: banks' credit to private sector (% of GDP)*	46.69	35.53	40.23	0	304.58

Note(s): *data for these variables from 2005; FDI, foreign direct investment; GDP, gross domestic product; ICT, information and communications technology; PPP, public-private partnership
Source(s): Author's calculation based on World Bank data (2020)

Table 4.
Policy variables descriptive statistics (aggregate position from 2001 to 2018)

variables. The results indicate the significance of parameters and overall goodness of fit in the equations. However, some results are shocking and against the common intuitive.

It is concluded that GDP growth is significantly improved by the investment in infrastructure (PPPI), foreign direct investment (FDIGDP) and short-term debt (STDBT). However, tax-to-GDP ratio and external outstanding debt affect GDP growth negatively. The reasons are obvious; the higher tax revenues discourage the business activities while external outstanding debt emphasizes repayments of debts and interest. The interest and repayment of debts can affect the availability of funds for investment in a country. The results validate the previous findings and monetary theories in economic literature (Baily and Okun, 1965; Tobin, 1969; Glichrist and Leahy, 2002). However, the negative impact of credit to private sector on GDP growth is shocking.

Two dummy variables to represent high income countries (HIGH) and the member countries of CAREC have been included in the first equation to explain GDP growth. The regression analysis shows that growth in CAREC member countries is relatively higher than rest of the world.

The investment in infrastructure based on PPP (PPPI) is significantly improved by domestic credit to private sector (DCPS), external outstanding debt (XDBT) and external public sector debt (DBTPBL). In determination of the investment in infrastructure, it is noted that impact of short-term debt (STDBT) is positively associated with debt to public sector (DBTPBL) but it is negatively associated with outstanding external debt. The domestic credit

Variable	Mean	Median	Standard deviation	Minimum	Maximum
*For 2001–2005**					
GROW: GDP growth (%)	3.38	2.97	5.86	−9.31	63.38
DCPS: domestic credit to private sector as percentage of GDP	40.48	26.62	39.75	0.4	183.18
STDBT: external short-term debt in billion USD	1.36	0.01	5.18	0	56.3
XDBT: external outstanding debt in billion USD	9.41	0.23	30.32	0	229.96
TXGDP: tax-to-GDP ratio	16.86	15.82	7.62	1.04	48.53
FDIGDP: FDI to GDP ratio	5.8	2.35	28.4	−13.9	376.8
PPPI: PPP investment in transport, energy, ICT and water and sanitation in million USD	101.76	0	431.51	0	4,627.67
FDINET: net FDI inflow in billion USD	−0.34	−0.02	5.68	−37.36	37.23
DBTPBL: external debt to public sector in billion USD	5.62	0.2	16.22	0	96.62
BMONEY: broad money (% of GDP)*	51.49	43.57	40.41	4.53	257.69
BNKBRWR: borrowers from commercial banks (per 1,000 adults)*	127.1	56.96	176.97	0.05	891.34
BNKFRINV: firms using banks to finance investment (% of firms)*	28	29	12.03	0.4	47.3
INTREAL: real interest rate (%)*	4.96	5.42	8.42	−18.3	44.64
TRD: trade (% of GDP)*	92.4	81.47	60.35	25.64	503.21
DSVNG: gross domestic savings (% of GDP)*	22.83	21.23	12.23	−18.75	62.28
BCPS: banks' credit to private sector (% of GDP)*	41.45	27.72	39.32	0.01	239.56
For 2018					
GROW: GDP growth (%)	2.97	3.1	3.36	−19.62	8.61
DCPS: domestic credit to private sector as percentage of GDP	71.4	46.94	199.71	3.33	2,564.49
STDBT: external short-term debt in billion USD	9.83	0	83.4	0	1,218.9
XDBT: external outstanding debt in billion USD	35.66	0.62	154.65	0	1,962.3
TXGDP: tax-to-GDP ratio	16.72	17.39	6.43	0	29.55
FDIGDP: FDI to GDP ratio	3.13	2.41	6.91	−46.12	38.29
PPPI: PPP investment in transport, energy, ICT and water and sanitation in million USD	406.67	0	2,222.57	0	27,627.14
FDINET: net FDI inflow in billion USD	−1.79	−0.1	28.96	−336.85	133.22
DBTPBL: external debt to public sector in billion USD	13.4	0.41	39.33	0	295.04
BMONEY: broad money (% of GDP)*	63.82	56.29	45.6	12.31	386.14
BNKBRWR: borrowers from commercial banks (per 1,000 adults)*	228.63	184.55	209.46	0.57	1,087.73
BNKFRINV: firms using banks to finance investment (% of firms)*	19.08	10.75	15.82	7.3	51.8
INTREAL: real interest rate (%)*	5.52	5.08	8.82	−32.96	43.48
TRD: trade (% of GDP)*	93.97	84.31	57.12	1.3	376.93
DSVNG: gross domestic savings (% of GDP)*	23.12	22.2	10.84	−12.01	64.71
BCPS: banks' credit to private sector (% of GDP)*	50.36	43.91	37.74	1.52	219.93

Table 5.
Policy variables descriptive statistics (comparison over the time)

Note(s): *data for these variables for 2005; FDI, foreign direct investment; GDP, gross domestic product; ICT, information and communications technology; PPP, public-private partnership
Source(s): Author's calculation based on World Bank data (2020)

Table 6.
Dependent variable: GROW – GDP growth (%) PLS; periods included: 18; cross-sections included: 147; total observations: 1,996; sample: 2001–2018

Explanatory variable	Model: I		Model: II		Model: III		Model: IV		Model: V	
	β	T	β	T	β	T	β	T	β	T
Constant	5.694***	23.229	5.564***	22.634	5.511***	22.225	5.611***	22.738	5.565***	22.261
DCPS: domestic credit to private sector as percentage of GDP	−0.021***	−9.185	−0.022***	−10.930	−0.020***	−8.807	−0.021***	−10.698	−0.020***	−8.859
PPPI: PPP investment in transport, energy, ICT and water and sanitation in million USD	6.94E-05**	2.023	7.58E-05**	2.229	7.06E-05**	2.067	7.57E-05**	2.229	7.18E-05**	2.104
TXGDP: tax-to-GDP ratio	−0.042***	−3.081	−0.039***	−2.871	−0.038***	−2.821	−0.042***	−3.076	−0.041***	−3.003
FDIGDP: FDI to GDP ratio	0.016***	3.196	0.016***	3.276	0.015***	3.088	0.016***	3.282	0.015***	3.135
XDBT: external outstanding debt in billion USD	−0.006***	−3.216	−0.006***	−3.476	−0.006***	−3.312	−0.006***	−3.532	−0.006***	−3.395
STDBT: external short-term debt in billion USD	0.016***	5.106	0.014***	4.503	0.014***	4.485	0.014***	4.528	0.014***	4.511
Dummy: HIGH ("1" if high income country)	−0.463	−1.593			−0.461	−1.593			−0.343	−1.152
Germany ("1" for Germany, "0" otherwise)							−1.861**	−1.995	−1.597*	−1.663
Dummy: CAREC ("1" if a CAREC member country)			1.677***	4.210	1.676***	4.209	1.664***	4.180	1.665***	4.183
Adjusted R^2	0.0902		0.0971		0.0977		0.0984		0.0986	
F-statistic	29.2432		31.6326		28.017		28.2174		25.2337	
Akaike IC	5.5184		5.5108		5.5105		5.5098		5.5101	
Schwarz crit	5.5408		5.5332		5.5358		5.5350		5.5382	
H-Q crit	5.5266		5.5190		5.5198		5.5191		5.5204	
D-W statistic	1.2906		1.2999		1.3022		1.3029		1.3042	

Note(s): "β" indicates coefficient; "T" indicates t-statistics; CAREC, Central Asia Regional Economic Cooperation; FDI, foreign direct investment; GDP, gross domestic product; PLS, panel least squares; PPP, public-private partnership
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's calculations

Table 7.
Dependent variable: PPPI – PPP investment in transport, energy, ICT and water and sanitation (million USD) PLS; Periods included: 18; Cross-sections included: 186; total observations: 3,190; sample: 2001–2018

Explanatory variable	Model: I		Model: II		Model: III		Model: IV		Model: V	
	β	T	B	T	β	T	B	T	β	T
Constant	−70.774	−1.448	−66.511	−1.332	−68.342	−1.368	−75.166	−1.611	−73.161	−1.5683
DCPS: domestic credit to private sector as % of GDP	1.386**	2.456	1.372**	2.427	1.399**	2.473	1.260**	2.360	1.231**	2.307
FDINET: net FDI inflow in billion USD	−8.104***	−4.236	−8.130***	−4.247	−8.405***	−4.363	−8.130***	−4.472	−7.826***	−4.332
XDBT: external long-term debt in billion USD							24.836***	33.911	24.819***	33.886
DBTPBL: external debt to public sector in billion USD	39.965***	26.147	39.985***	26.143	40.012***	26.161				
STDBT: external short-term debt in billion USD	4.813***	5.530	4.887***	5.501	4.884***	5.499	−26.715***	−18.699	−26.692***	−18.681
Dummy: HIGH (“1” if high income country)	−345.468**	−2.509	−346.758**	−2.517	−385.026***	−2.730	−445.544***	−3.343	−403.203***	−3.097
Germany (“1” for Germany, “0” otherwise)					656.561	1.259	725.891	1.473		
Dummy: CAREC (“1” if CAREC or ECO member country)			−68.664	−0.416	−67.968	−0.412	−267.312*	−1.712	−267.956*	−1.716
Adjusted R^2	0.2743		0.2741		0.2743		0.3523		0.3520	
F-statistic	242.0946		201.7220		173.1628		248.7557		289.7467	
Akaike IC	18.1667		18.1673		18.1674		18.0537		18.0537	
Schwarz crit	18.1781		18.1806		18.1826		18.0689		18.0671	
H-Q crit	18.17089		18.1720		18.1728		18.0591		18.0585	
D-W statistic	0.8269		0.8269		0.8277		0.9321		0.9311	

Note(s): “β” indicates coefficient; “T” indicates t-statistics; AIC = Akaike information criterion, D-W = Durbin Watson; CAREC, Central Asia Regional Economic Cooperation; ECO, Economic Cooperation Organization; FDI, foreign direct investment; GDP, gross domestic product; ICT, information and communications technology; PLS, panel least squares; PPP, public-private partnership
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author’s calculations

Table 8.
Dependent variable: DCPS – domestic credit to private sector (% of GDP) PLS; periods included: 13; cross-sections included: 65; total observations: 111; sample: 2006–2018

Explanatory variable	Model: I		Model: II		Model: III		Model: IV		Model: V	
	B	*T*	*β*	*T*	*β*	*T*	*B*	*T*	*β*	*T*
Constant	−2.413	−0.668	27.087***	3.919	−1.314	−0.373	−1.430	−0.404	−7.942*	−1.771
BMONEY: broad money (% of GDP)	0.432***	10.580	−0.450**	−2.115	0.390***	9.247	0.389***	9.170	0.378***	9.000
BNKBRWR: borrowers from commercial banks (per 1,000 adults)	0.0419***	3.669	0.052***	3.016	0.040***	3.637	0.041***	3.660	0.037***	3.289
BNKFRINV: firms using banks to finance investment (% of firms)	0.396***	3.932	0.371**	2.342	0.435***	4.423	0.426***	4.245	0.460***	4.508
INTREAL: real interest rate (%)	−0.098	−0.676	−0.519**	−2.506	−0.118	−0.841	−0.123	−0.871	−0.146	−1.032
DUMMY: WEALTH ("1" if country's wealth is more than US$10 trillion)					42.771***	2.828	43.039***	2.834	47.104***	3.152
Dummy: RECESSION ("1" if 2008 or 2009)							1.810	0.511	−0.277	−0.077
TRD: Trade (% of GDP)									0.110**	2.475
DSVNG: Gross domestic savings (% of GDP)			0.145	1.389						
Adjusted R^2	0.6871		0.3831		0.7065		0.7044		0.7227	
F-statistic	61.3835		13.6713		53.9489		44.6846		40.0992	
Akaike IC	8.2171		8.9399		8.1617		8.1772		8.1401	
Schwarz crit	8.3391		9.09336		8.3081		8.3480		8.3411	
H-Q crit	8.2666		9.0020		8.2210		8.2465		8.2215	
D-W statistic	0.0254		0.0386		0.0187		0.0222		0.0250	

Note(s): "*β*" indicates Coefficient; "*T*" indicates *t*-statistics; AIC = Akaike information criterion, D-W = Durbin Watson; GDP, gross domestic product; PLS, panel least squares
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's calculations

Table 9.
Dependent variable: BCPS – banks' credit to private sector (% of GDP) PLS; periods included: 14; cross-sections included: 67; total observations: 126; sample: 2005–2018

Explanatory variable	Model: I		Model: II		Model: III		Model: IV		Model: V	
	β	T	β	T	β	T	B	T	β	T
Constant	−2.012	−0.729	−2.672	−0.905	−0.857	−0.327	−0.871	−0.330	−6.890**	−2.022
BMONEY: broad money (% of GDP)	0.410***	12.417	0.411***	12.253	0.365***	10.973	0.365***	10.897	0.356***	10.879
BNKBRWR: borrowers from commercial banks (per 1,000 adults)	0.041***	4.462	0.035***	3.675	0.039***	4.503	0.039***	4.490	0.037***	4.396
BNKFRINV: firms using banks to finance investment (% of firms)	0.341***	4.477	0.375***	4.715	0.385***	5.281	0.381***	5.132	0.396***	5.337
INTREAL: real interest rate (%)	−0.047	−0.426	−0.060	−0.529	−0.068	−0.646	−0.072	−0.679	−0.074	−0.702
DUMMY: WEALTH ("1" if country's wealth is more than US$10 trillion)					47.842***	3.916	47.952***	3.908	51.377***	4.296
Dummy: RECESSION ("1" if 2008 or 2009)							0.744	0.275	−0.670	−0.248
TRD: Trade (% of GDP)									0.092***	2.816
DSVNG: Gross domestic savings (% of GDP)			0.091	1.605						
Adjusted R^2	0.7302		0.7375		0.7588		0.7569		0.7752	
F-statistic	85.5766		66.7443		79.6373		65.8660		60.1136	
Akaike IC	7.8389		7.8554		7.7345		7.7497		7.6940	
Schwarz crit	7.9514		7.9963		7.8695		7.9073		7.8788	
H-Q crit	7.8846		7.9127		7.7894		7.8137		7.7691	
D-W statistic	0.0367		0.2013		0.0273		0.0286		0.0150	

Note(s): "β" indicates Coefficient; "T" indicates T-statistics; AIC = Akaike information criterion, D-W = Durbin Watson; GDP, gross domestic product; PLS, panel least squares
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source(s): Author's calculations

to private sector can improve the private investment in infrastructure which has been shown in the results of equation: 2 (Table 7).

"German Neoliberalism (Ordoliberalism)" has not been classified as a significant factor of investment in infrastructure based on PPP, while its impact on GDP growth is also weakly significant. Moreover, the high income countries are negatively associated with the PPP model (Table 7) which reflects the fact that infrastructure development in high income countries belong totally to private sector in those countries, where there is no need to implement a "public private partnership model".

Broad money (BMONEY), number of banks' borrowers and number of firms using banks to finance investment are the indicators of inclusion of firms and individual in financial system. Their inclusion in financial system enhances the size of domestic credit. To reduce indicative (prime) rate of interest during a recessionary period is a common practice by monetary authorities all over the world. However, this study does not confirm the significant impact of the real rate of interest (INTREAL) and recessionary period (RECESSION) on the size of credit to private sector. Similar impacts have been found by Gormez (2019) and Stijn *et al.* (2018).

It was hypothesized that financial inclusion plays an important role in determination of the size of domestic credit to private sector. The number of firms getting loans from banks and number of borrowers have been taken as indicator of financial inclusion. The significant and robust effects of these variables suggest that lending to private sector should not be concentrated; its diversification among the large number of borrowers enhances the size of credit to private sector. It confirms the findings by Gormez (2019).

The factors of credit to private sector have been tested twice: Table 8 shows the impacts of factors on credit to private sector from all sources including banks, nonbank finance companies, private lenders and public sector organizations. Table 9 shows the impacts of causal factors on credit to private sector by banks only. Both equations show the similar results though magnitudes of parameters are different.

The dummy variable to indicate the aggregate wealth status of a country (WEALTH) is equal to "1" if a country's wealth is more than US$10 trillion in 2019 and country is included in top 15 wealthy countries consecutively for the last ten years – wealth of a country is defined as a summation of the financial and physical assets owned by the peoples. Its significant positive association with the credit to private sector describes that financial and physical assets owned by the peoples of a country improve the ability to provide credit to private sector.

The more important evidence is the negative impact of the expansion in domestic credit on GDP growth. But, simultaneous inferences indicates that investment in infrastructure development is significantly supported by domestic credit and long-term external debt by public-sector enterprises. The negative impacts of the credit to private sector and external debt on GDP growth can be converted into net positive effects through positive contribution of these explanatory variables in infrastructure investment. These results are consistent with Mehar (2001).

7. Policy implications and limitations

The results of this study provide some very important and interesting policy implications. The primary objective of this research is to determine the effectiveness of growth in credit to private sector for economic development. The factors of growth in credit have also been identified. However, this study does not cover the policy shocks and short-term measures to manage the impacts of COVID-19 or other shocks.

The most important conclusion belongs to the role of domestic credit to private sector, which shows a significant negative and robust impact on GDP growth which seems

surprising. However, the role of domestic credit in determination of investment in infrastructure is significantly positive and robust in all scenarios. It reveals that domestic credit to private sector is not transformed into GDP growth instantaneously; it improves investment in infrastructure which is a positive significant and robust determinant of GDP growth. The enhancement of domestic credit to private sector may create inflation in short term which is factor of lower GDP growth (in real term). However, the positive impact of credit to private sector on investment in infrastructure ensures the growth of GDP. The policy makers should be ensured and establish a mechanism that external and domestic debts must be invested in required infrastructure and productive assets. Otherwise, it will affect the growth negatively.

The growth of economy is directly linked to the investment in infrastructure, while growth in domestic credit can play a significant role in the enhancement of investment in infrastructure. To create a fiscal space for investment by public sector in developing projects is not a recommendable policy. It will lead to higher tax collection. The crowding out effect of public expenditures for development purposes will make government interference ineffective. Such efforts increase "tax-to-GDP ratio" which negatively affects the economic growth. It has been noted in this study that higher tax-to-GDP ratio affects GDP growth negatively.

The government intervention in banking to enhance the domestic credit during the recession has not been found significant. The size of credit to private sector is not enhanced during the recessionary periods; it is shifted from one to another category of borrowers based on the prioritization set by regulatory institutions. Even the real rate of interest is not a significant determinant of domestic credit. The most important monetary policy instrument is the enhancement in the number of borrowers: firms and individuals. The number of borrowers reflects the inclusion of firms and individuals in the financial system. The credit facilities should not be concentrated. The diversification of borrowers will lead to credit enhancement. It implies that banks should not play a role in creating wealth concentration or monopolies.

FDI affect GDP growth positively but its effect on investment based on public private partnership is negative. In fact, it substitutes the domestic private investment in infrastructure, however, its positive contribution in economic growth is confirmed.

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Further reading

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