A Study on the Impact of Direct Tax and Gross Capital formation on Economic Growth

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Abstract

Context: as India strives at reducing her carbon footprint through adoption of renewable energy and higher economic growth through achieving the UN's sustainable development goals (SDG), it is important to understand if economic capital formation and the switch to renewable energy sources complement or contradict the twin goals.

Aim/Objective: to examine if there is any significant relationship between tax structure, gross capital formation and economic growth of India. To ascertain the nature of relationship between the variables in the long-run or short-run.

Methodology: the study uses quantitative data, namely, Gross Domestic Product (GDP), Tax Structure (tax rate, tax collected), and Gross Capital Formation (), extracted from the websites of Income Tax India, Reserve Bank of India (RBI) and the World Bank for the period 2019-20, 2020-21, 2020-22. We used co-integration tests to identify if there is any long-run relationship between the variables. The VAR model and Granger Causality tests were performed to measure the impact and causality among the variables. All the analyses are carried out using the time series econometric procedures.

Findings: There is a significant relationship between Tax Structure and GDP. The relationship between GDP and Gross Capital Formation is not statistically significant. The relationship between capital formation and economic growth is reciprocal, indicating that stronger economic growth precedes an increase in the capital formation and vice versa. These findings are true whether gross capital formation or private fixed capital creation is used to quantify capital formation.

Keywords: *Economic Growth, Direct tax, VAR, Granger Causality*

Introduction

Due to the expansion of Indian industry into the international market, the taxation system in India is currently undergoing a revolutionary overhaul. In order to increase revenue for the government exchequer and improve the state of business generally, the Indian government is giving full attention to liberalising the taxing system while also closing loopholes to prevent intruders from evading the taxing system. As India strives at reducing her carbon footprint through adoption of renewable energy and higher economic growth through achieving the UN's sustainable development goals (SDG), it is important to understand if economic capital formation and the switch to renewable energy sources complement or contradict the twin goals.

Tax directly affects peoples' discretionary income. People begin saving money for investments if the government raises the direct tax rate. This individual's behaviour hinders the economy's ability to

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generate income. This is especially true for expensive goods. As a result, the economy produces less luxury goods, which has a negative impact on the GDP and living standards. Meanwhile, allowing appropriate deductions based on investments promotes capital formation in the economy.

In economics, public finance and fiscal policy have taken centre stage. No matter if an economy is developed, developing, or in transition, fiscal policies play a crucial role. Public fiancé has a fairly broad use. Five basic headings can be used to categorise the major components of public finance: (1) taxes; (2) public spending; (3) budget; (4) public debt; and (5) stabilisation. As a result, Musgrave codified the split of fiscal policymaking into three interdependent branches: allocation, distribution, and stabilisation (1989). India's present globalised economy is characterised by the need for fiscal measures to meet basic governmental duties. The two fundamental tools of fiscal policy are the government budget and government expenditure, both of which are dependent on the necessity of their financing. Tax receipts typically make up one of the largest portions of a country's budgetary income. Politicians, academicians, and researchers frequently debate how taxes affect a nation's ability to build its economy. Government authorities don't just use the tax system to raise money; they also use it to further goals like raising employment levels, reducing inflation through price stability, accelerating GDP growth, improving the balance of payments, promoting new industries, etc.

Literature Review

Global evidence from the link between economic growth, natural resources, energy consumption, and gross capital formation

Author: Buket Altinoz, Alper Aslan

The objective of this research is to use a Panel Vector Autoregressive (PVAR) technique to assess the impacts of natural resources, energy consumption, and gross capital accumulation on economic development over the period 1980–2018 in 124 nations grouped according to different income levels. Different results from the Panel VAR analysis were obtained for the groupings of low-, middle-, and high-income countries. While natural resources have a positive but statistically small influence on economic growth in high-income nations, urbanisation, energy consumption, and gross capital creation all do. Increases in the use of natural resources, energy consumption, and urbanisation all contribute to GDP growth in middle-income nations. GDP is positively impacted by the use of natural resources and energy, whereas capital formation has a negative effect in low-income nations.

Investigating the role of capital formation to achieve carbon neutrality in India

Author: Barnali Nag, Soumen Rej

India's ambitious objectives to reduce its carbon footprint through increasing renewable energy and higher economic growth through significant investments make up its sustainable development goals. It must be determined if the two strategies relating to capital formation and the switch to renewable energy sources in India have been complementary or have diverged. This study examines the dynamic relationship between carbon dioxide emissions, economic growth, consumption of renewable energy (RE), and gross capital formation for India from 1970 to 2018 and investigates the possibility of an Environmental Kuznets Curve (EKC).

The impact of gross capital formation on economic growth: Evidence from India

Author: Reddy, Ramaiah

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Using the Unit root test and Autoregressive Distributed Lag (ARDL) approach, the study investigates the impact of Gross Capital Formation on Real Gross Domestic Product Growth for the years 1970–1971 through 2018–19. According to the findings of the unit root test, the rate of GDP growth, general government spending, and inflation are all integrated at level I(0), whereas gross capital creation and gross domestic saving are integrated at first order I (1). The ARDL technique's findings show that Gross Capital Formation, general government spending, and inflation have all made important contributions to India's economic development. There is also proof that the contribution of gross domestic savings to economic development is negligible. India's growth rate is predicted by international rating agencies and the IMF to slow to less than 2% in 2020.

Impact of Foreign Direct Investment Gross Capital Formation and Exports on GDP of Pakistan, India, Sri Lanka, and Bangladesh

Authors: Hammad Ejaz Khan

By bringing about new government policies, technological reforms, better infrastructure, attracting foreign investment, and creating job opportunities in a region, exports, foreign direct investment, and gross capital formation have a significant impact on the development of the gross domestic product of four south Asian countries, primarily Bangladesh, Sri Lanka, Pakistan, and India. The precise link between foreign direct investment (FDI), gross capital formation (GCF), and exports (EXP), which have an effect on GDP for assessing economic growth, is found in this article. Using pooled and time-series data from 1981 to 2020, this study examines the effects of factors on the Gross Domestic Product (GDP).

Savings, Gross Capital Formation and Economic Growth

Author: Adeleke Omolade

The link between savings, gross capital creation, and economic development in the Nigerian economy between 1975 and 2008 was examined in this study. With particular emphasis on the VAR causality test, the study used co-integration and the vector error correction model (VECM) as its estimating approach. The outcome of the unit root, stationary test, revealed that saves, a proxy for gross national savings, and the gross domestic product, GDP, both serve as indicators of economic growth. GNS According to the results of the co-integration regressions, which were characterised by high R square, positive coefficients from all parameter estimates, and significant F values from all three equations, there was a long-term association between the three variables.

Aim/Objective

To examine if there is any significant relationship between tax structure, gross capital formation and economic growth of India. To ascertain the nature of relationship between the variables in the long-run or short-run.

Methodology

The study uses quantitative data, namely, Gross Domestic Product (GDP), Tax Structure (tax rate, tax collected), and Gross Capital Formation (), extracted from the websites of Income Tax India, Reserve Bank of India (RBI) and the World Bank for the period 2019-20, 2020-21, 2020-22. We used co-integration tests to identify if there is any long-run relationship between the variables. The VAR model and Granger Causality tests were performed to measure the impact and causality among the variables. All the analyses are carried out using the time series econometric procedures.

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Results and Discussions

Augmented Dickey Fuller Test

Summary and interpretation

Data is stationery in nature which is performed through Augmented Dickey Fuller test. Data is stationery as its probability is less than 0.05 that means we can reject null hypothesis which says ln_GDP is unit root. Hence, data is stationary at first difference so we can proceed for regression and VAR model.

Using Augmented Dickey Fuller Test for ln_GDP.

Ln_GDP

Null Hypothesis: LN_GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.746554	0.0132
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LN_GDP)
Method: Least Squares
Date: 10/20/22 Time: 12:44
Sample (adjusted): 2003 2019
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_GDP(-1)	-0.973035	0.259715	-3.746554	0.0019
C	0.097543	0.032682	2.984624	0.0093

R-squared	0.483412	Mean dependent var	-0.000735
Adjusted R-squared	0.448973	S.D. dependent var	0.108276
S.E. of regression	0.080375	Akaike info criterion	-2.094106
Sum squared resid	0.096901	Schwarz criterion	-1.996081
Log likelihood	19.79990	Hannan-Quinn criter.	-2.084362
F-statistic	14.03667	Durbin-Watson stat	1.862011
Prob(F-statistic)	0.001945		

OLS Regression

Summary and interpretation

Equation

LN_GDP = 0.044 + 0.558*LN_GROSS_CAPITAL_FORMATION + (-)0.008*LN_TAX

Probability of TAX and Gross capital Formation is less than 0.05 that implies both these independent variables are significant for the study. Moreover, R-square and Adjusted R-Squared value is 0.87 and 0.85

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respectively for same result. Adjusted R-Square is more acceptable than R-Square. More the value of Adjusted R-Square the more good fit the modul is. Independent variables cumulatively determines 87% of the dependent variables.

R^2 is the coefficient of determination that tells us that how much percentage variation independent variable can be explained by independent variable. Here, 87.01 % variation in GDP can be explained by Tax and Gross Capital Formation. The larger the R^2 value better the regression.

Dependent Variable: LN GDP
Method: Least Squares
Date: 10/20/22 Time: 12:48
Sample (adjusted): 2002 2019
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.044342	0.014796	2.996935	0.0090
LN GROSS CAPITAL FORMATION	0.558440	0.059618	9.366994	0.0000
LN TAX	-0.008983	0.089922	-0.099898	0.9217

R-squared	0.870180	Mean dependent var	0.097973
Adjusted R-squared	0.852870	S.D. dependent var	0.076150
S.E. of regression	0.029209	Akaike info criterion	-4.077652
Sum squared resid	0.012798	Schwarz criterion	-3.929257
Log likelihood	39.69887	Hannan-Quinn criter.	-4.057190
F-statistic	50.27218	Durbin-Watson stat	2.404259
Prob(F-statistic)	0.000000		

VAR Model

Summary and Interpretation

The vector autoregressive (VAR) model is a workhouse multivariate time series model that relates current observations of a variable with past observations of itself and past observations of other variables in the system. Star Sign (*) shows it is suggesting us to choose that number of lags, in this case its 3 lags. All the models are suggesting us to use lags as 3 only. Less than 0.05 there is no correlation. More than have autocorrelation. All the inverse roots of the characteristic AR polynomial have modulus less than one and lie inside the unit circle, the estimate VAR is stable. Now we can do Granger Causalty Test. The Granger test indicates the causal associations between the variables and shows the direction of causality based on interaction of current and past values of a pair of variables in the VAR system. LN_TAX does not effect LN_GDP because its p-value is less than 0.05. LN_GDP does not effect LN_GROSS_CAPITAL_FORMATION because its p-value is less than 0.05. It is reflected in the model that LN_GDP effects LN_TAX because its p-value is more than 0.05.

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Vector Autoregression Estimates
Date: 10/20/22 Time: 16:38
Sample (adjusted): 2004 2019
Included observations: 16 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LN GDP	LN TAX	LN GROS...
LN GDP(-1)	0.074418	-0.040002	0.262469
	(0.83080)	(0.52549)	(1.60828)
	[0.08957]	[-0.07612]	[0.16320]
LN GDP(-2)	-1.222699	-1.242872	-1.704309
	(0.88602)	(0.56042)	(1.71518)
	[-1.37999]	[-2.21777]	[-0.99366]
LN TAX(-1)	-0.395380	0.396738	-0.326795
	(0.45488)	(0.28772)	(0.88057)
	[-0.86920]	[1.37893]	[-0.37112]
LN TAX(-2)	0.434021	-0.061997	0.349551
	(0.28061)	(0.17749)	(0.54321)
	[1.54671]	[-0.34931]	[0.64349]
LN GROSS CAPITAL...	0.067790	0.375671	0.061878
	(0.47949)	(0.30328)	(0.92820)
	[0.14138]	[1.23869]	[0.06666]
LN GROSS CAPITAL...	0.721354	0.626969	1.017315
	(0.52852)	(0.33430)	(1.02313)
	[1.36485]	[1.87550]	[0.99432]
C	0.130435	0.134664	0.131217
	(0.08671)	(0.05485)	(0.16786)
	[1.50423]	[2.45530]	[0.78171]
R-squared	0.363973	0.764237	0.180242
Adj. R-squared	-0.060044	0.607061	-0.366263
Sum sq. resids	0.058789	0.023519	0.220306
S.E. equation	0.080821	0.051120	0.156456
F-statistic	0.858392	4.862310	0.329809
Log likelihood	22.14816	29.47711	11.57961
Akaike AIC	-1.893520	-2.809639	-0.572451
Schwarz SC	-1.555513	-2.471632	-0.234443
Mean dependent	0.096181	0.163553	0.094915
S.D. dependent	0.078499	0.081551	0.133852

Determinant resid covariance (dof adj.)	1.90E-08
Determinant resid covariance	3.38E-09
Log likelihood	87.93332
Akaike information criterion	-8.366665
Schwarz criterion	-7.352642
Number of coefficients	21

For all three TAX, GDP and GROSS CAPITAL FORMATION there are two lags each.

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VAR Model

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LN_GDP = C(1,1)*LN_GDP(-1) + C(1,2)*LN_GDP(-2) + C(1,3)*LN_GDP(-3) + C(1,4)*LN_GDP(-4) + C(1,5)*LN_TAX(-1) + C(1,6)*LN_TAX(-2) + C(1,7)*LN_TAX(-3) + C(1,8)*LN_TAX(-4) + C(1,9)*LN_GROSS_CAPITAL_FORMATION(-1) + C(1,10)*LN_GROSS_CAPITAL_FORMATION(-2) + C(1,11)*LN_GROSS_CAPITAL_FORMATION(-3) + C(1,12)*LN_GROSS_CAPITAL_FORMATION(-4) + C(1,13)

LN_TAX = C(2,1)*LN_GDP(-1) + C(2,2)*LN_GDP(-2) + C(2,3)*LN_GDP(-3) + C(2,4)*LN_GDP(-4) + C(2,5)*LN_TAX(-1) + C(2,6)*LN_TAX(-2) + C(2,7)*LN_TAX(-3) + C(2,8)*LN_TAX(-4) + C(2,9)*LN_GROSS_CAPITAL_FORMATION(-1) + C(2,10)*LN_GROSS_CAPITAL_FORMATION(-2) + C(2,11)*LN_GROSS_CAPITAL_FORMATION(-3) + C(2,12)*LN_GROSS_CAPITAL_FORMATION(-4) + C(2,13)

LN_GROSS_CAPITAL_FORMATION = C(3,1)*LN_GDP(-1) + C(3,2)*LN_GDP(-2) + C(3,3)*LN_GDP(-3) + C(3,4)*LN_GDP(-4) + C(3,5)*LN_TAX(-1) + C(3,6)*LN_TAX(-2) + C(3,7)*LN_TAX(-3) + C(3,8)*LN_TAX(-4) + C(3,9)*LN_GROSS_CAPITAL_FORMATION(-1) + C(3,10)*LN_GROSS_CAPITAL_FORMATION(-2) + C(3,11)*LN_GROSS_CAPITAL_FORMATION(-3) + C(3,12)*LN_GROSS_CAPITAL_FORMATION(-4) + C(3,13)

VAR Lag Order Selection Criteria
Endogenous variables: LN_GDP LN_TAX LN_GROSS_CAPITAL_FORMATION
Exogenous variables: C
Date: 10/20/22 Time: 16:49
Sample: 2001 2019
Included observations: 15

Lag	LogL	LR	FPE	AIC	SC	HQ
0	61.72404	NA*	7.99e-08	-7.829872	-7.688262	-7.831380
1	71.28784	14.02692	7.70e-08	-7.905046	-7.338606	-7.911080
2	83.66638	13.20377	5.97e-08	-8.355517	-7.364247	-8.366076
3	107.3222	15.77052	1.53e-08*	-10.30962*	-8.893520*	-10.32470*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Star sign(*) shows it is suggesting us to choose that number of lags, in this case its 3 lags.

H0: X does not Granger cause Y

H1: X Granger causes Y

RULE OF DECISION: if p.value is:

<0.05= "X" Granger causes "Y" at the 5% significance level.

>0.05= "X" does not Granger causes "Y" at the 5% significance level.

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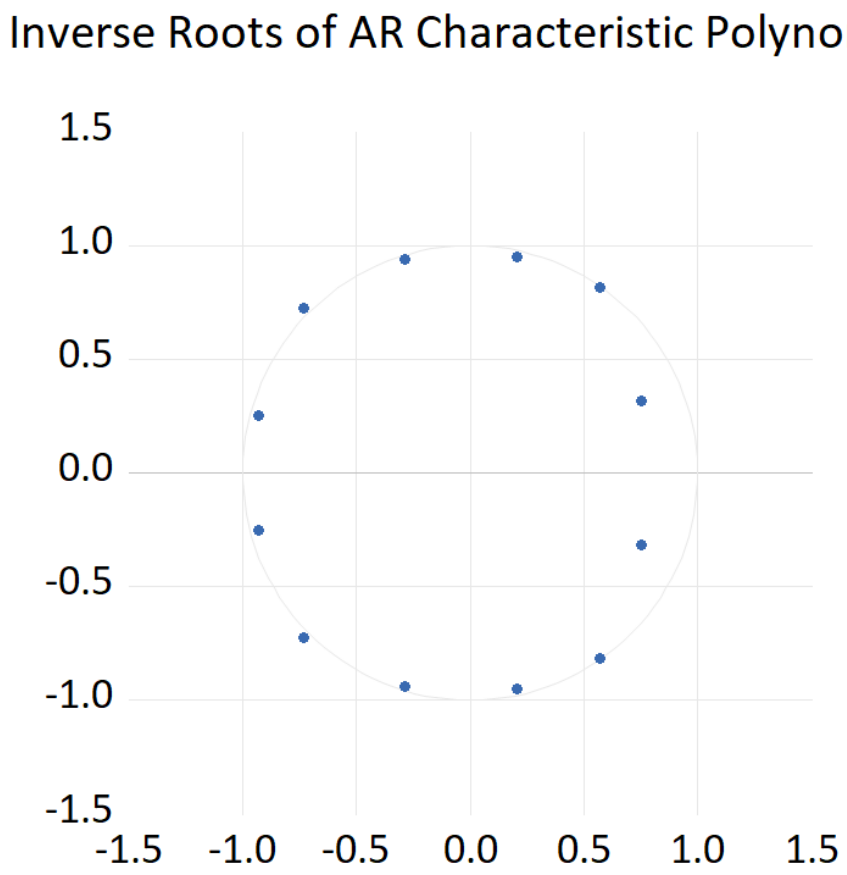

Since all the values mostly lie within the unit circle.

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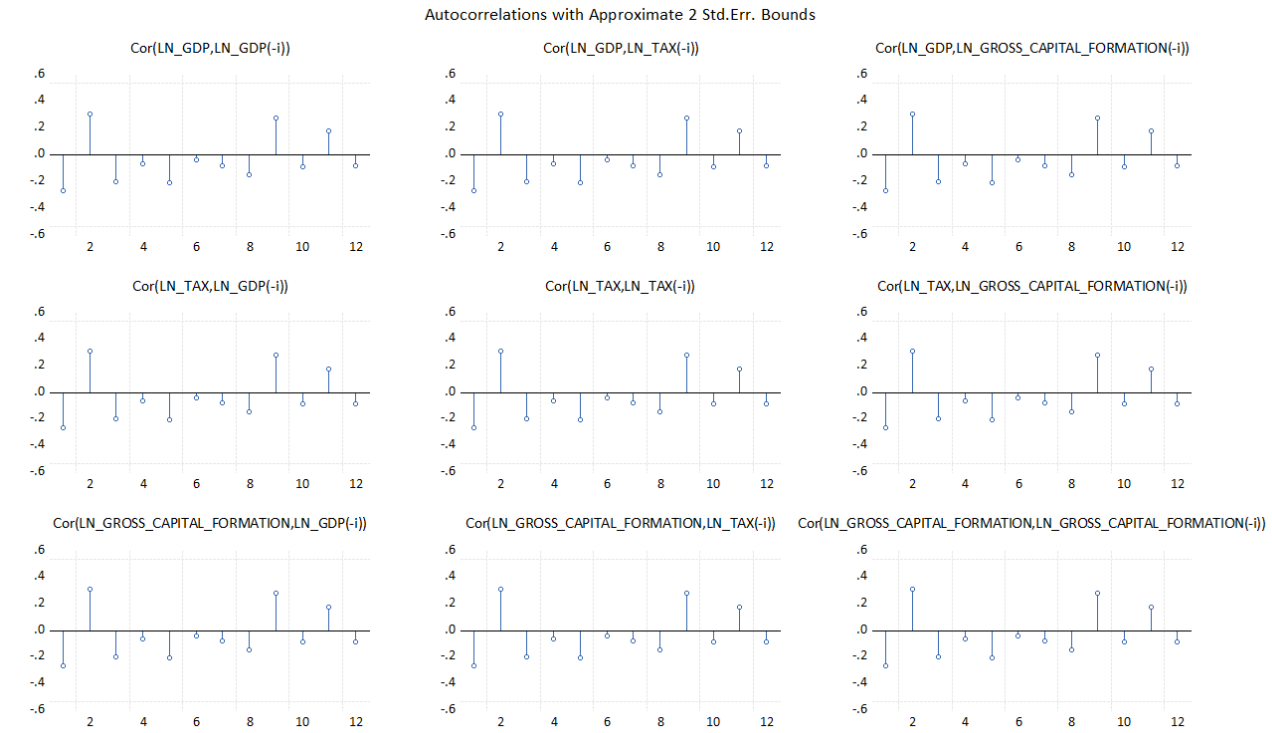

Using lag 1,3,5 is ok because there is autocorrelation as p-value is less than 0.05 but with 2 lags there is no autocorrelation because p-0value is more than 0.05.

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VAR Granger Causality/Block Exogeneity Wald Tests
Date: 10/20/22 Time: 17:06
Sample: 2001 2019
Included observations: 14

Dependent variable: LN_GDP

Excluded	Chi-sq	df	Prob.
LN_TAX	15.97435	4	0.0031
LN_GROSS_CAPITA...	12.69625	4	0.0129
All	25.65663	8	0.0012

Dependent variable: LN_TAX

Excluded	Chi-sq	df	Prob.
LN_GDP	1.440007	4	0.8372
LN_GROSS_CAPITA...	2.933722	4	0.5690
All	8.468871	8	0.3891

Dependent variable: LN_GROSS_CAPITAL_FORMATION

Excluded	Chi-sq	df	Prob.
LN_GDP	10.53042	4	0.0324
LN_TAX	11.63626	4	0.0203
All	18.95326	8	0.0151

Findings

There is a significant relationship between Tax Structure and GDP. The relationship between GDP and Gross Capital Formation is not statistically significant. The relationship between capital formation and economic growth is reciprocal, indicating that stronger economic growth precedes an increase in the capital formation and vice versa. These findings are true whether gross capital formation or private fixed capital creation is used to quantify capital formation.

Ethical/political/Societal implications of the Findings

According to existing research, the ratio of trade to GDP has risen over time, which is a clear sign of the Indian economy's increasing integration with the global economy. Additionally, a significant feature of FDI entering India is that a staggering 53% of it originates from low-tax nations, demonstrating the prevalence of aggressive tax planning, Base Erosion, and Profit Shifting (BEPS). Taxation-related concerns come into play given the growing engagement of the domestic economy with the global market. It has been noted that multinational firms frequently transfer earnings to countries with low tax rates and tax havens to lower their tax obligations. Individual citizens also evade and avoid paying taxes. Emerging discussions on how to lessen tax evasion and avoidance are crucial in such a situation. Traditional penalties are frequently used to do this, but the current study investigates the role of ethics and moral arguments in guaranteeing tax compliance and also emphasises the significance of tax literacy. It is concluded that for higher long-term advantages, moral arguments must be included in the conventional penalties system.

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Implications of the Study

Reducing marginal tax rates on wages and salaries can induce people to work more. Expanding the earned income tax credit can bring more low-skilled workers into the labor force. Tax provisions can also distort how investment capital is deployed, reducing economic output and social welfare. Tax cuts can also slow economic growth by increasing government spending, which can lead to higher deficits. The long-term effects of tax policies depend on their incentive and budgetary effects. Capital formation essentially leads to more money swirling around the economy. The accumulation of capital goods translates to investment and the production of more goods and services, which should boost the income of the population and stimulate demand.

Limitations of Study

Gross Domestic Product (GDP) is a useful indicator of a nation's economic performance. However, it has important limitations, including the exclusion of non-market transactions. It also fails to represent the degree of income inequality in society. The failure to indicate whether the nation's rate of growth is sustainable or not. Tax reform will only be attractive if it can be expected to produce offsetting gains in economic performance. The transition costs of tax reform are not considered. Tax incidence is not explicitly addressed in this work, except when it has implications for the way the tax structure affects the determinants of growth.

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