International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

"Relationship between the economic growth of a nation and the combined expenditure of centre and state; development and non-development: India"

Anu Verma
Research Scholar
M.Phil. Jawaharlal Nehru University.

Introduction

The analysis between GDP, as proxy for economic growth of a nation, and the public sector expenditure of a nation has been done time and gain for various economies in order to understand the relationship between the two. There exist literature indicating both a positive and a negative relationship between the two. In the analysis done in the presented paper, not only a relationship between both the types of expenditure, namely development and non-development expenditure (combine for both centre and state), is done through the "Vector Auto Regressive modelling", but further "Granger Causality test" has been conducted to understand the direction of the association amongst them.

This is going to be analysed with three major research questions:

1. What is the relationship between GDP of a nation and its developmental and non-developmental expenditure?
2. What is the direction of causality between the variables?
3. What kind of relationship, short or a long term, exist among the three variables?

Literature review:

a) Balbirkaul, Sangita Mishra and Anoop K Suresh, 2003 :
This paper attempts to analyse the cyclical behavior of the social sector spending and draws special attention to the education and heath for a period of 2000-01 to 2013-14 for 17 states. It is thus a panel data study at state level and states that this pro-cyclical nature is true for education based spending. Moreover, this cyclicality has a more concentrated in bigger states and has less significance in the low income ones. The paper thus makes a claim for bettering the fiscal infrastructure during economically better periods to improvise spending on human development and thus achieve long term inclusivity and sustainability.

b) Pula and Elshani (2018)
This article extensively deals with the positive relationship between the public expenditure of an economy and its growth through the mechanism of export. It bases its model on the endogenous growth theory and Keynesian economics to analyse the impact of public expenditure, tax rate, FDI and total budget revenue in order to undertake a time series analysis for a period from 2002 to 2015. It discuses about the

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

significant impact of government spending on the nation to minimise the possibilities of market failure based on its inefficiencies and thus the negative impact it can have over the otherwise normal functioning of the economy as a whole

c) Ram, (1986)
Examining a sample of 115 countries for a period of 20 years, Ram (1986), discussed about how there exist a positive relationship between the public expenditure of government and the growth impact it had on the GDP of the nation. It was also supported by some other studies that talked about the important impact of the better public spending in encouraging investment in the economy along with building up the human capital through better educational and health based expenditure; thus improving the economic growth.

d) Maingi, 2017
This article discusses about the negative impact the public spending increase have over the growth of the economy. It deals with a basic idea of how, an increase in the spending is a common phenomenon involved in the non-productive activities of a nation and thus crowds out the private investment from the economy. Further, the growth in the public expenditure needs to be complimented by an increase in the tax and thus discouraging the local businessmen and investors sentiments. Thus, in long run, this will have an additional daunting impact on the innovation further resulting into an economic downturn.

e) Caballero and Krishnamurthy, 2004
This article bring to the forth the study proving that fiscal policy can be counter-cyclical or acyclical in the advanced economies. Further, it highlights the importance of the fact that fiscal policy should act as a stabilizing tool by increasing the state expenditure and reducing taxes during economic recession. It thus makes a claim for how the fiscal spending contracts during economic downturn and expands during boom periods and thus maintaining counteracting economics fluctuation

Methodology and data

This is a time series analysis of the combined expenditure of both centre and states, for duration of

1990 to 2020. The data has been extracted from the reports of Indian Public Finance Statistic and *State Finances: A Study of Budgets* and *Handbook of Statistics of the Indian Economy* brought out by the Reserve Bank of India. All the variables are taken at their constant prices.

Data for 2019-20 are Revised Estimates and data for 2020-21 are Budget Estimates. 1) Centre's Developmental, Non-development and Total Expenditure include gross expenditure of commercial departments and postal in respect of Central Government's Revenue Account.

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

2) States - Other Expenditure comprise discharge of internal debt, repayment of loans to the Centre (including prepayment under debt swap scheme during 2002-03 to 2004-05) and compensation and assignments to local bodies and Panchayati Raj institutions.

Both the development and the non-development expenditure of centre and state level government have been taken together in order to understand the difference of the individual impact of these variables on each other and the GDP of the nation. Further, a reverse of this relationship is also analysed in order to make a case comprehend the case for causality test.

Model specification

Vector Autoregression (VAR) is a multivariate forecasting algorithm that is used when two or more time series influence each other.

The VAR and the pairwise Granger causality as a bivariate autoregressive model looks as follow:$_{mm}$

$$X_t = \alpha_1 + \Sigma \beta_j X_{t-j} + \Sigma \lambda_j Y_{t-j} + \varepsilon_{1i} \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

J=1

j=1m m

$$Y_t = \alpha_2 + \Sigma \gamma_j X_{t-j} + \Sigma \delta_j Y_{t-j} + \varepsilon_{2i} \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

j=1 j=1

where m is the maximum number of lagged observations included in the model, the matrix β, γ, δ, and λ contains the coefficients of the model (i.e., the contributions of each lagged observation to the predicted values of Xt and Yt , α1, α2 are constants and ε1t, ε2t are residuals for each time series. Yt Granger-causes Xt if the coefficients in λj are jointly significantly different from zero. This can be tested by performing an F-test of the null hypothesis that λj = 0, given assumptions of covariance stationarity on Xt and Yt . Similarly, Xt is causing Yt if some δj is not zero in equation (2). If both of these events occur, there is a feedback relationship between Xt and Yt. **Our hypothesis** is: whether GDP granger causes development and nondevelopment expenditures as two different variables. Henceforth, model estimation is conducted to understand the impact of each variables and its respective lagged form on the various other variables undertaken for the analysis. Walds test is also considered to further understand the combined effect of these variables on each other.

Further, in the below equation, *X* and *Y* coefficients indicate dependent or independent variables, αj, βj, γj and δj indicate the parameters to be estimated, $\lambda 1$ and $\lambda 2$ indicate error

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

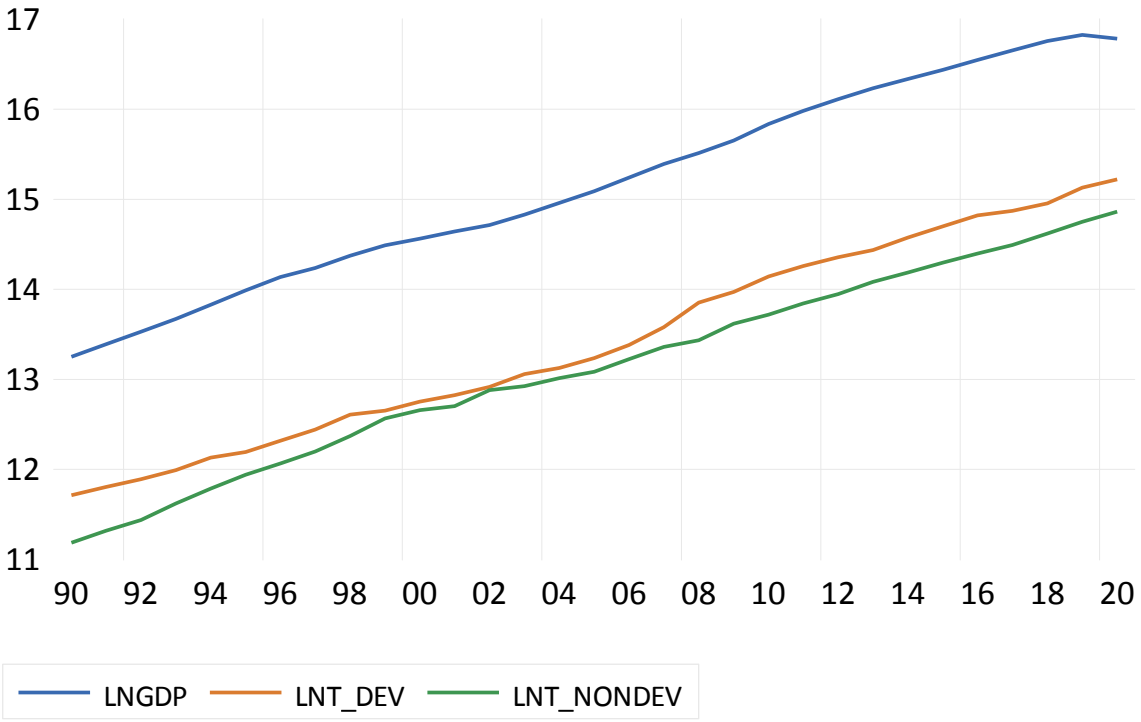
correction coefficients, *ECxt-1* and *ECyt-1* indicate lagged residuals from cointegration regression, Chen and Patel, (1998).

$$\Delta X_t = \sum_{j=1}^{m-1} \alpha_j \Delta X_{t-j} + \sum_{j=1}^{m-1} \beta_j \Delta Y_{t-j} + \lambda_1 EC_{x\,t-1} + \varepsilon_{1t}$$

$$\Delta Y_t = \sum_{j=1}^{m-1} \gamma_j \Delta X_{t-j} + \sum_{j=1}^{m-1} \delta_j \Delta Y_{t-j} + \lambda_2 EC_{y\,t-1} + \varepsilon_{2t}$$

Result

The first step of the regression involved checking for stationarity of the variables undertaken for the study through the Augmented Dickey Fuller test (ADF). It was found out the combined state and centre expenditure which are considered separately as development and non-development expenditure are integrated of order 1 I(1), however, GDP is integrated of order 2 I(2). It thus states that the VECM model cannot be conducted due to the presence of I(2) and thus no long-run relationship among the variables can be studied.



Graph 1: Showing the relation between the log of the variables. The graph indicates presence of stationarity at level. The above is further proved by the ADF test.

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

Augmented Dickey Fuller test analysis

Model-1

Null Hypothesis: D(LNGDP,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.175086	0.0324
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Model-2

Null Hypothesis: D(LNT_ DEV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.333679	0.0020
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Model-3

Null Hypothesis: D(LNT_NONDEV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.367516	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Conclusion for ADF test

Variable	t-statistic	probability
D(LnGDP,2)	-3.175086	0.0324
D(Ln_dev)	-4.333679	0.0020
D(Ln_NonDev)	-5.367515	0.0001

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

Heteroscedasticity test: A "Breusch pagan godfrey test" has been conducted to detect the presence of heroscedasticty which signifies that the model doesn't suffers from the problem.

Serial correlation: value of Durbin-Watson test has been taken care of to lie within the accepted range of 1.6 to 2.4

Vector Auto Regressive (VAR) model result

Sample (adjusted): 1992 2020
Included observations: 29 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LNGDP	LNT_DEV	LNT_NONDEV
LNGDP(-1)	1.893385	0.642301	0.151528
	(0.26597)	(0.37313)	(0.27032)
	[7.11869]	[1.72138]	[0.56054]
LNGDP(-2)	-1.051638	-0.275182	0.299352
	(0.28522)	(0.40013)	(0.28988)
	[-3.68715]	[-0.68773]	[1.03267]
LNT_DEV(-1)	-0.006706	0.986857	0.175597
	(0.14489)	(0.20327)	(0.14726)
	[-0.04628]	[4.85488]	[1.19240]
LNT_DEV(-2)	0.076177	-0.315250	-0.283134
	(0.14687)	(0.20604)	(0.14927)
	[0.51867]	[-1.53001]	[-1.89676]
LNT_NONDEV(-1)	-0.041565	0.362912	0.530748
	(0.19289)	(0.27060)	(0.19604)
	[-0.21549]	[1.34115]	[2.70734]
LNT_NONDEV(-2)	0.125821	-0.397801	0.092535
	(0.16578)	(0.23257)	(0.16849)
	[0.75896]	[-1.71044]	[0.54920]
C	0.375376	-0.709705	-0.317955
	(0.30296)	(0.42501)	(0.30791)
	[1.23905]	[-1.66984]	[-1.03263]

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

R-squared	0.999251	0.998566	0.999164
Adj. R-squared	0.999046	0.998174	0.998935
Sum sq. resids	0.022690	0.044656	0.023438
S.E. equation	0.032115	0.045053	0.032640
F-statistic	4889.246	2552.648	4379.957
Log likelihood	62.57124	52.75369	62.10085
Akaike AIC	-3.832500	-3.155427	-3.800059
Schwarz SC	-3.502463	-2.825390	-3.470022
Mean dependent	15.28871	13.53015	13.24391
S.D. dependent	1.039883	1.054465	1.000373

Determinant resid covariance (dof adj.)	1.99E-09
Determinant resid covariance	8.70E-10
Log likelihood	179.0535
Akaike information criterion	-10.90024
Schwarz criterion	-9.910133
Number of coefficients	21

Analysis through estimated equation

Model-1

Included observations: 29 after adjustments

LNGDP = C(1)*LNGDP(-1) + C(2)*LNGDP(-2) + C(3)*LNT_DEV(-1) + C(4) *LNT_DEV(-2) + C(5)*LNT_NONDEV(-1) + C(6)*LNT_NONDEV(-2) + C(7)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.893385	0.265974	7.118690	0.0000
C(2)	-1.051638	0.285217	-3.687152	0.0013
C(3)	-0.006706	0.144894	-0.046283	0.9635
C(4)	0.076177	0.146871	0.518669	0.6092
C(5)	-0.041565	0.192886	-0.215487	0.8314
C(6)	0.125821	0.165780	0.758962	0.4559
C(7)	0.375376	0.302955	1.239049	0.2284

R-squared	0.999251	M ean dependent var	15.28871
Adjusted R-squared	0.999046	S.D. dependent var	1.039883
S.E. of regression	0.032115	Akaike info criterion	-3.832500
Sum squared resid	0.022690	Schwarz criterion	-3.502463
Log likelihood	62.57124	Hannan-Quinn criter.	-3.729136
F-statistic	4889.246	Durbin-Watson stat	1.603041
Prob(F-statistic)	0.000000		

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

Estimated equation: **LNGDP = C(1)*LNGDP(-1) + C(2)*LNGDP(-2) + C(3)*LNT_DEV(-1) + C(4)*LNT_DEV(-2) + C(5)*LNT_NONDEV(-1) + C(6)*LNT_NONDEV(-2) + C(7)**

The equation states that GDP of both the previous period and the year before that has a significant impact on the current GDP; former having a higher positive effect while the latter having a lesser negative impact. Further Walds test indicates that both the lags can jointly influence itself.

Model-2

Sample (adjusted): 1992 2020

Included observations: 29 after adjustments

LNT_DEV = C(8)*LNGDP(-1) + C(9)*LNGDP(-2) + C(10)*LNT_DEV(-1) + C(11)*LNT_DEV(-2) + C(12)*LNT_NONDEV(-1) + C(13) *LNT_NONDEV(-2) + C(14)

	Coefficient	Std. Error	t-Statistic	Prob.
C(8)	0.642301	0.373133	1.721375	0.0992
C(9)	-0.275182	0.400129	-0.687733	0.4988
C(10)	0.986857	0.203271	4.854881	0.0001
C(11)	-0.315250	0.206044	-1.530012	0.1403
C(12)	0.362912	0.270599	1.341145	0.1936
C(13)	-0.397801	0.232572	-1.710441	0.1013
C(14)	-0.709705	0.425013	-1.669842	0.1091

R-squared	0.998566	M ean depende nt var	13.53015
Adjusted R-squared	0.998174	S.D. dependent var	1.054465
S.E. of regression	0.045053	Akaike info criterion	-3.155427
Sum squared resid	0.044656	Schwarz criterion	-2.825390
Log likelihood	52.75369	Hannan-Quinn criter.	-3.052064
F-statistic	2552.648	Durbin-Watson stat	1.858091
Prob(F-statistic)	0.000000		

Estimated equation: **LNT_DEV = C(8)*LNGDP(-1) + C(9)*LNGDP(-2) + C(10)*LNT_DEV(-1) + C(11)*LNT_DEV(-2) + C(12)*LNT_NONDEV(-1) + C(13)*LNT_NONDEV(-2) + C(14)**

The equation states that the previous year GDP has a significant positive impact on the total development expenditure of the nation. Further, both the aged values of development expenditure has a positive and a negative impact on the current period development expenditure respectively. Walds test also indicated that the combined impact of the dev. expenditure is also present.

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

Model-3

Sample (adjusted): 1992 2020

Included observations: 29 after adjustments

LNT_NONDEV = C(15)*LNGDP(-1) + C(16)*LNGDP(-2) + C(17)*LNT_DEV(-1) + C(18)*LNT_DEV(-2) + C(19)*LNT_NONDEV(-1) + C(20) *LNT_NONDEV(-2) + C(21)

	Coefficient	Std. Error	t-Statistic	Prob.
C(15)	0.151528	0.270323	0.560545	0.5808
C(16)	0.299352	0.289881	1.032673	0.3130
C(17)	0.175597	0.147264	1.192399	0.2458
C(18)	-0.283134	0.149272	-1.896759	0.0711
C(19)	0.530748	0.196040	2.707342	0.0129
C(20)	0.092535	0.168491	0.549198	0.5884
C(21)	-0.317955	0.307909	-1.032627	0.3130

R-squared	0.999164	Mean dependent var	13.24391
Adjusted R-squared	0.998935	S.D. dependent var	1.000373
S.E. of regression	0.032640	Akaike info criterion	-3.800059
Sum squared resid	0.023438	Schwarz criterion	-3.470022
Log likelihood	62.10085	Hannan-Quinn criter.	-3.696695
F-statistic	4379.957	Durbin-Watson stat	2.335540
Prob(F-statistic)	0.000000		

Estimated equation: **LNT_NONDEV = C(15)*LNGDP(-1) + C(16)*LNGDP(-2) + C(17)*LNT_DEV(-1) + C(18)*LNT_DEV(-2) + C(19)*LNT_NONDEV(-1) + C(20)*LNT_NONDEV(-2) + C(21)**

The estimation states that the even though individual GDP of the two lagged periods don't influence the non-development expenditure of the nation, their combined impact is there as proven by the Walds test. Furthermore, there exists a positive (negligible) impact of the 2nd lagged period development expenditure on the current development expenditure. There also exists a positive significant impact of previous year non-development expenditure on its present value. Further, the combined effect of both lagged period non-development expenditure is present as proven by the Walds test.

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

Granger-Causality test

Sample: 1990 2020
Included observations: 29

Dependent variable: LNGDP

Excluded	Chi-sq	df	Prob.
LNT_DEV	0.455446	2	0.7963
LNT_NONDEV	1.023628	2	0.5994
All	1.068971	4	0.8992

Dependent variable: LNT_D EV

Excluded	Chi-sq	df	Prob.
LNGDP	3.782736	2	0.1509
LNT_NONDEV	2.929565	2	0.2311
All	8.753488	4	0.0676

Dependent variable: LNT_N ONDEV

Excluded	Chi-sq	df	Prob.
LNGDP	5.107466	2	0.0778
LNT_DEV	3.624451	2	0.1633
All	14.42322	4	0.0061

Result: as proven by the above analysis, the combined effect of both GDP and Non Development expenditure granger causes the total development of the nation. Furthermore, the combined effect of both GDP and development expenditure also ganger causes the overall non-development expenditure of the nation

Conclusion

We can thus conclude, that there exist various inter-variable relationships amongst the GDP, total development and total non-development expenditure of the nation. However, for the period of 1990 to 2020 in the case of Indian economy, these relationships have negligible;

International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 08, August- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

either negative or positive, over each other as indicated by the low coefficient values of the VAR and the estimated coefficient analysis. Furthermore, as per the granger causality test, both development and non development doesn't expenditure doesn't granger cause the GDP of a nation. But a combined impact of either of the expenditure variable with the GDP has a causality impact on the other variable respectively.

References

Pula, L and Elshani A (2018). Role of public expenditure in economic growth: econometric analysis from Kosovo 2002-2005. Baltic Journal of Real estate Economic and Construction and Management, 6, pp-74-87.

Chen, S.-T., & Lee, C.-C. (2005). Government Size and Economic Growth in Taiwan: A Threshold Regression Approach. *Jornal of Policy Modeling, 27*(9), 1051–1066.

Kaur, Balbir and SangitaMisra (2003), 'Social sector expenditure and attainments: An Analysis of Indian states', *RBI Occasional Papers*, 24 (1 &2): 105-43.

Maingi, J. N. (2017). The Impact of Government Expenditure on Economic Growth in Kenya: 1963– 2008. *Advances in Economics and Business, 5*(12), 635–662.

Ram, R. (1986). Government Size and Economic Growth: A New Framework and Some Evidence from Cross-Section and Time-Series Data. *The American Economic Review, 76*(1), 191–203.

Caballero, Richard J. and Arvind Krishnamurthy (2004), 'Fiscal Policy and Financial Depth', *NBER Working Paper 10532*. National Bureau of Economic Research, Inc