

PUBLIC DEBT - MOSTLY NOT ONLY INCOME EXPENDITURE DIFFERENTIAL

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ABSTRACT

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Common perception is that when expenditure exceeds that of income, both private and public debts are resorted to. Presently, individuals can also access private loan like earlier public debt for other purposes like building house, purchasing car and other appliances in the form of higher-purchase. Development through debt can take place at both public and private level now. In terms of magnitude, public debt is of huge volume relative to private one. For generating required public debt, income expenditure difference can still be relevant for countries which cannot afford its total expenditure as well as for countries which reached a stage of development where loan is not required to meet essential expenditure but to finance excess of expenditure relative to income from time to time, sustenance of development standard achieved, research and innovation culture maintenance to reach technological heights. From this perspective, this paper makes an effort to search performance of different countries in order to provide rationale for public debt per capita at general government level in terms of difference between income per capita and expenditure per capita.

I. INTRODUCTION

There can be many justifications for a country where public debt undertaking becomes necessary. But one interpretation of public debt goes in terms of increased financial burden since it will have to be paid back by people of a country. In this respect, aggregate volume of public debt although can provide idea about total burden that will be faced by them, it cannot conceptualise how an average people will bear the load of public debt. For its measurement, public debt per capita can be relied upon. One study by *Swamy, 2015* finds from 252 countries (1980-2009) that population growth aggravates public debt problem in parliamentary democratic and coalition countries but not in federal countries probably due to absence of problems associated to large population. Numerically, it can be argued that

when per capita public debt increases over years, burden on people for repayment becomes heavier while a diminishing per capita public debt can relieve people from sufferings attached to public debt. So, for a country when public debt increases at slower rate than that of population, it implies better national progress. Author finds that out of country set in *Table I*, per capita general government public debt makes downward trend only for Denmark and Israel over the entire study period of 1999-2018. From the viewpoint of providing a nation with capacity to meet present essential expenditure, this per capita debt is expected to follow differential wedge between per capita income and per capita expenditure closely. Otherwise, wide difference in their incurred volume can arise, if a country desires to excel further in development scale for achieving next higher stage of development in near future. In that case, certainly per capita public debt will increase but people can bear upon that for achieving better standard of living likely to be realised in near future to compensate for present higher burden, which may be lower given the prevailing better performance in terms of national activity, resource position and reserve stock. *Briceño et al, 2020* while studying evolution of public debt in Euro zone for the last twenty years, advises that public debt sustainability can make economic growth sustainable and bring better standard of life in form of higher life expectancy, stable governance and institutional performance. *Tille, 2019* finds that in Swiss economy, cost of debt financing gets outweighed by higher return from utilisation of debt led wealth fund and public investment on infrastructure, education, research, energy efficiency and human capital formation suitable to digital economy. According to *Ogawa et al, 2010*, in presence of demand shortage and involuntary unemployment, public debt cannot be a burden for next generations. Similarly, *Dedák et al, 2016* did show such burden is negligible in the neoclassical growth framework and therefore, European countries should encourage public debt led fiscal expansion instead of stringent measures what were followed after 2010. While *Catrina, 2013* opined that intergenerational equity of taxation necessitates current expenditure of public debt to be covered by present taxes while capital expenditure which provides benefit in future to be realised from future generation. However, *Isomitdinov et al, 2020* estimated that public debt depends not only on country specific factors but also on global factors such as spill over effects of global financial crisis, business cycle, policy coordination to regional and international associations alongwith sudden internal and external upheavals. On the basis of data for 115 countries (1980 - 2015), they calculate that on average downward trended global factors can explain thirty per cent variation in public debt and these factors alongwith regional factors are highly correlated to GDP - debt ratio at country level. Comparatively regional factors are more important for Europe, South America and Africa while this role is played by idiosyncratic factors for Japan, USA, and non-EU countries and its importance are increasing relatively in most countries and regions. From these perspectives, this paper attempts to analyse which direction various countries of the world are following in accessing public debt in terms of per capita general government public debt, per capita gross national income and per capita gross national expenditure.

II. DETERMINANTS OF PUBLIC DEBT

When a country undertakes public debt, its rationale depends mostly upon nature of country, particularly its position in socio-economic scale, primarily determine its purpose of securing public debt. An underdeveloped country suffers from low per capita income, socio-cultural inertia of various obstructions, dampening economic activities, lack of resources and continues to operate in vicious circle of poverty and low level equilibrium trap. For such an economy, resort to public debt indicates that it wants to meet its necessary expenditure and break vicious circle of poverty and free from low level of equilibrium income trap so that it can meet its required expenditure at best. On the basis of 17 low income countries predominantly, African (1990-2003), study of *Bandiera, 2008* finds justification for public debt in high level of public expenditure spent for financing domestic and social investment to reduce poverty, meet contingent costs associated to bank failures, pension and social security schemes, inefficient revenue collection capacity and disability in fiscal policy implementation during hard times. Another study of *Swaray, 2005* undergoes panel analysis on 17 countries (1992 – 1997) with export earnings of primary commodities, mainly from the Sub-Saharan Africa and concludes that adverse terms of trade with falling trend over time and lower progress in globalisation are important determinants behind higher indebtedness of these countries.

For a developing economy, rigidity of inhibiting forces of socio-cultural factors begins to recede, pace of development starts and its sustenance requires advanced technology, modern machineries, improved human capital and sophisticated expertise. Although increase in per capita income is not enough to foster its self-growth and lack of soothing resources still persists, such countries can also strive for public debt from developed countries, national and international finance institutions to make development gear self-propelling, albeit it can contain some share of inevitable requirement for improving infrastructure meant to serve essential goods and services in an efficient way. According to *Guscina, 2008* development of domestic debt market in emerging market countries is obstructed by underdeveloped institutions, instability in macroeconomic and political structure and this makes it prone to short-term debt which in absence of legitimate long term debt share due to lack of confidence and possibility of capital flight, increase probability of debt crisis. Whereas *Bittencourt, 2015* empirical findings through dynamic panel time-series analysis (1970 – 2007) for South American countries articulate that like European countries, economic growth friendly environment is the most important factor for public and external debt ratio to improve and there is no causal relation to inflation rate, degree of inequality and constraints on the executive to usher in institutional reforms. But in respect of domestic debt, after empirical analysis on 104 developing countries (1990 – 2007), *Forslund et al, 2011* comes to conclusion that inflationary trend is the only one determinant which negatively impacted domestic debt share of countries with presence of moderate and no capital control. According to a study made by International Monetary Fund, public debt increased in

emerging countries mainly on account of higher internal debt triggered by liberal loan granting, lower inflation, exchange rate fluctuation, cost of bank restructuring, weakening primary fiscal balance, increased offbalancesheet and contingent liabilities as well as over borrowing of lower terms of trade and more corruption.

From 28 EU countries (1995 – 2017), *Filip, 2019* finds that determinants of public debt to GDP ratio are of two types, firstly, past accumulated public debt, unemployment, population size having positive influence and secondly, real GDP growth, FDI inflows, gross capital formation, trade balance, economic boom, environment conducive to local and foreign investors casting negative impact. Whereas for old EU countries, *Kudla, 2018*, on the basis of 27 EU countries (1995-2015), finds that public debt movement can be explained through changes in primary balance, interest rate growth differential and change of government assets which, in turn depend upon unemployment rate, share of social security expenditures and FDI relative to GDP. He also estimated positive impact of 2007 financial crisis on negative effect of subsidies and negative impact on significance of unemployment and social security factors.

Separately, one country specific study on Romania shows that determinants of public debt to GDP ratio are primary fiscal surplus, real interest rate, real GDP growth rate and exchange rate variation in dollar for the period of 2000-2011 and impact of real output growth rate became stronger after financial crisis (*Pirtea et al, 2013*). Another such study of *Belguith et al, 2017* on Tunisia identifies, after applying VECM (1986-2015), important determinants of public debt with positive effect are real interest rate, budget deficit and trade openness whereas inflation and investment are with negative impact. But budget deficit is found to be the most important driving force for affecting public debt in Tunisia.

Countries which reached the top of development pyramid are known as developed countries. When these countries pursue public debt mostly from international finance institutions and also national ones, these are not for meeting essential expenses but for further improvement in development, science and technology that can bring more efficiency and cost-effectiveness in human life operations, medical equipment and treatment, existing space development through beautification alongwith that for progressing outer space technology which can predict in increasing accuracy natural adversities and indirectly, these can further improve standard of living through minimising wastages and devastations for their citizens and the World as a whole, thereby making their advancement in development scale perpetual. These countries can also afford to launch altogether a new product and venture new business as well as can undertake timely steps in its commercialisation and marketisation. One study of *Sinha, Arora, and Bansal* on high income and middle income group countries finds that presently developed countries relied on public debt at their underdeveloped past due to shortfall of revenue sources to garner finance of large volume for performing government role of providing basic needs, infrastructure and social security triggered by developmental and social rationales, even though there remained consideration

for burden of interest and principal repayments. They, on the basis of panel data for the 19 developed countries (1993-2008) and 12 developing countries (1980-2008), identifies that relative expenditure on education is significant factor of public debt for high income group countries whereas for middle income group countries, relevant factors are inflation, interest and foreign direct investment (*Sinha et al, 2011*). According to *Alesina et al, 1990*, equilibrium stock of public debt is larger than that of social planner and one of the important determinants for variation in public debt over different countries and time periods is the degree of polarisation between alternating government regime. Whereas *Barro, 1979* found after empirical analysis on US economy for the period (1922-76) that otherwise downward falling debt-income ratio increased at greater rate than average during war periods of 1861-1865, 1898-99, 1917-19, 1941-45, 1952-53 and 1967-68 due to associated rise in government spending and during the Great Depression owing to rapid government expansion.

III. EMPIRICAL FINDINGS

Empirical part is based on available statistics related to General Government Debt, Population, Gross National Income, Gross Domestic Product and Gross National Expenditure from International Monetary Fund (IMF) and World Bank (WB). Although data is available for long period, continuity is observed for forty three countries during the period of 1999 – 2018 and for sixty six countries during the period of 2009 – 2018. List of these countries is given below in *Table 1* and for analysis Per Capita General Government Debt (PCGGD), Per Capita Gross National Income at Constant US\$ 2010 (PCGNI), Per Capita Gross National Expenditure at Constant US\$ 2010 (PCGNE) and DBPCGNIE as difference between PCGNI and PCGNE are taken into consideration.

Table 1

<i>1999-2018 and 2009-2018</i>		<i>Additional Twenty Three Countries for 2009-2018</i>
Australia	Kyrgyz Republic	Belarus
Austria	Latvia	Bosnia and Herzegovina
Belgium	Lithuania	Brazil
Cambodia	Luxembourg	Bulgaria
Canada	Mauritius	Congo, Dem. Rep.
Chile	Moldova	Costa Rica
China	Netherlands	Czech Republic
Colombia	Nicaragua	Egypt, Arab Rep.
Croatia	Norway	Estonia
Cyprus	Peru	Hungary
Denmark	Philippines	Kiribati

contd. table 1

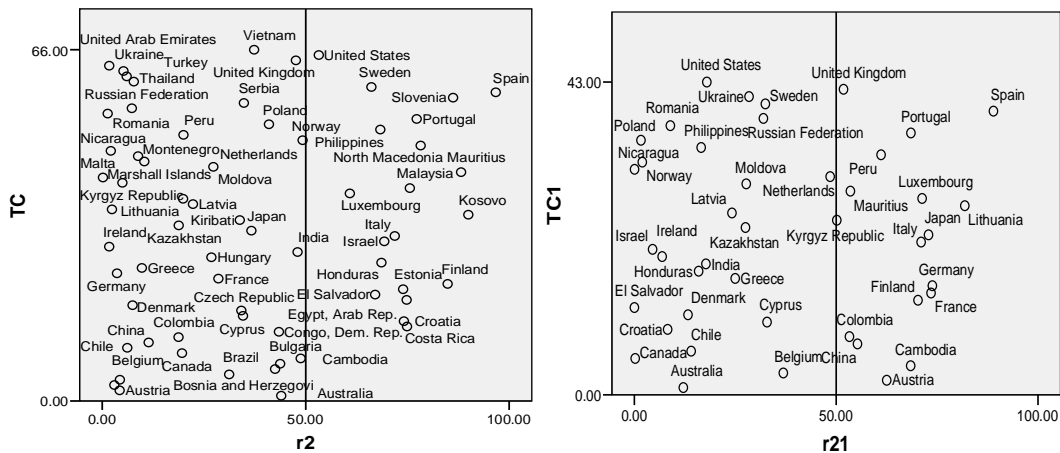
1999-2018 and 2009-2018		Additional Twenty Three Countries for 2009-2018
El Salvador	Poland	Kosovo
Finland	Portugal	Malaysia
France	Romania	Malta
Germany	Russian Federation	Marshall Islands
Greece	Spain	Montenegro
Honduras	Sweden	North Macedonia
India	Ukraine	Serbia
Ireland	United Kingdom	Slovenia
Israel	United States	Thailand
Italy		Turkey
Japan		United Arab Emirates
Kazakhstan		Vietnam

Source: WB and IMF

Countrywise correlation coefficient (CC) between PCGGD and DBPCGNIE was estimated for both shorter period of ten years (2009 – 2018) and longer period of twenty years (1999 – 2018). For short period, positive and negative CCs are shown by thirty three countries each. For longer period, result is similar as twenty one countries demonstrate positive CCs and other twenty two nations draw negative CCs. Again countries maintaining its nature of CCs in both time periods are almost same in number, sixteen (Austria, Croatia, Cyprus, Denmark, Germany, Greece, Ireland, Italy, Japan, Mauritius, Netherlands, Peru, Poland, Portugal, Russian Federation, Spain) and fifteen (Belgium, Cambodia, Chile, China, Colombia, El Salvador, Finland, France, Kazakhstan, Lithuania, Luxembourg, Philippines, Sweden, Ukraine, United Kingdom) respectively. Another feature is that six countries each (Australia, Canada, India, Israel, Norway, Romania, Honduras, Kyrgyz Republic, Latvia, Moldova, Nicaragua, United States) change its sign of CC between two period intervals. Out of additional twenty three countries (A_{23}) enlisted for shorter period, positive CCs exist for twelve countries (Kosovo, North Macedonia, Malaysia, Costa Rica, Egypt, Arab Rep., Estonia, Vietnam, Vietnam, Montenegro, Malta, Belarus, United Arab Emirates) and negative CCs prevail for eleven countries (Marshall Islands, Turkey, Thailand, Hungary, Kiribati, Czech Republic, Serbia, Brazil, Congo, Dem. Rep., Bulgaria, Slovenia).

Next square of CC (r^2) was estimated for each nation during both periods. r^2 value exceeding fifty per cent is found for twenty and seventeen countries during 2009 – 2018 and 1999 – 2018 respectively (*Figure 1*) and only six countries maintain explanation of over fifty per cent variation in PCGGD by that of DBPCGNIE in both periods. Although r^2 value less than fifty per cent is found for majority of countries, almost sixty nine per cent and sixty per cent during both short and long periods respectively, consistency can be

Figure 1



Source: WB and IMF, $r_2 - r^2$ for 2009-2018 and $r_{21} - r^2$ for 1999-2018

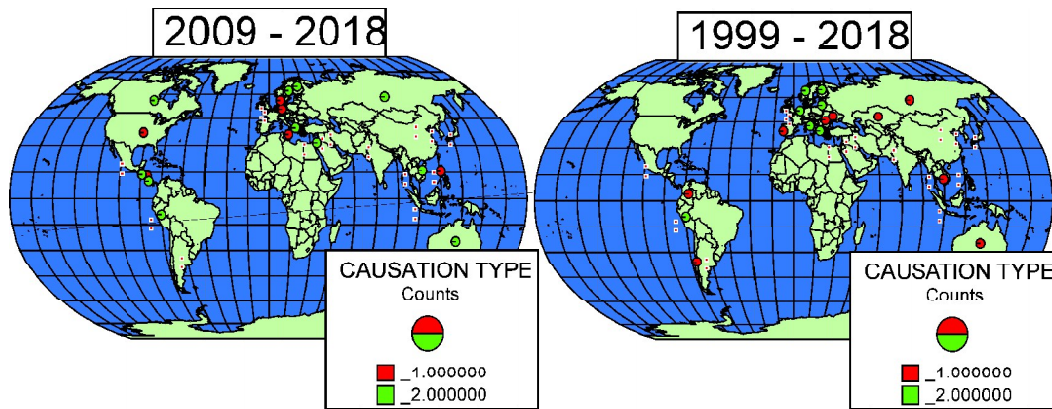
tracked only for nineteen countries. Among the A_{23} , only seven countries register $r^2 > 50\%$ and the rest sixteen countries are with $r^2 < 50\%$. Erratic inconsistency between two time intervals is found to exist for sixteen countries.

Paired samples tests were performed to search whether PCGGD and DBPCGNIE represent same values on average. For short period, such similarity exists only for four countries and one more country out of sixty six countries at ninety five (Congo, Dem. Rep., Kiribati, Marshall Islands, Moldova) and ninety nine (Kyrgyz Republic) per cent confidence interval respectively and for long period, not a single one from forty three countries estimate statistical significance of accepting null hypothesis.

Pairwise Granger Causality Tests were analysed with one period lag to view if there exists any casual relationship between PCGGD and DBPCGNIE. Estimation shows that such casual relationships exist only for twenty one countries out of sixty six countries during short time-period with six countries registering impact of DBPCGNIE on PCGGD whereas fourteen countries make opposite impact and both ways casual relationship exists only for one country (Luxembourg). Similarly for long time-period, over fifty per cent countries calculates acceptance of null hypothesis with nine countries, seven countries and two countries (Israel, Philippines) maintaining the above mentioned causal relationships respectively, making aggregate count to eighteen countries out of forty three countries (Figure II).

Based on the above analysis, it appears that there can be a relationship between PCGGD and DBPCGNIE to some extent and for ascertaining this fact, Unrestricted Cointegration Rank Test (Trace) and Unrestricted Cointegration Rank Test (Maximum Eigenvalue) were

Figure II: Nature of Causal Relationship



Source: WB and IMF, 1 – PCGGD caused by DBPCGNIE, 2 - DBPCGNIE caused by PCGGD

applied on those countries for two categories of time periods. In first time period, cointegrating relationship is found to exist for majority of countries (about sixty one per cent) while around twenty one countries did not show any such relationship and satisfaction of only one test is estimated for five countries. But for second time period, majority feature turns out to be no cointegrating association between PCGGD and DBPCGNIE for thirty four countries with existence of such relationship only for eight countries and only one country estimates satisfaction of Trace Test only. This shows irrespective of time period, cointegration property between PCGGD and DBPCGNIE is present only for seven countries and this is not likely for eleven countries. Out of A_{23} , ten countries each are in favour and against the existence of such relationship with three countries showing only half satisfaction of above tests. Such variation in pattern regarding relationship between PCGGD and DBPCGNIE for short and long period of time at disaggregate level of countries can give rise to necessity of inquiring its status at aggregate level and in order to have some idea, panel cointegration tests were performed. Surprisingly, above mentioned both the tests empirically accept existence of relationship between PCGGD and DBPCGNIE for both periods making this association time independent (*Table II*).

IV. CONCLUSION

PCGGD and differential between PCGNI and PCGNE, denoted as DBPCGNIE, are not same at all for the period of 1999-2018 and similar finding is derived for the period of 2009-2018, with only four to five countries showing no statistical difference between PCGGD and DBPCGNIE. This implies for most of the countries difference between PCGGD and DBPCGNIE is significant, meaning per capita public debt cannot be estimated by DBPCGNIE only, other factors are also there. When it is estimated to what extent variation

Table II

2009–2018		1999–2018	
Trend assumption: Linear deterministic trend			
Series: PCGGD DBPCGNIE			
Lags interval (in first differences): 1 to 1			
Unrestricted Cointegration Rank Test (Trace)			
Hypothesized	Trace	Hypothesized	Trace
No. of CE(s)	Statistic	No. of CE(s)	Statistic
None	19.88425	None	157.1826
At most 1	0.330117	At most 1	0.000865
			0.000865
			3.841466
			3.841466
			0.9774
			0.9774
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level			
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)			
Hypothesized	Max-Eigen	Hypothesized	Max-Eigen
No. of CE(s)	Statistic	No. of CE(s)	Statistic
None	19.55413	None	157.1818
At most 1	0.330117	At most 1	0.000865
			0.000865
			3.841466
			3.841466
			0.9774
			0.9774
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level			
**MacKinnon–Haug–Michelis (1999) p-values			

Source: WB and IMF

in PCGGD can be explained by that in DBPCGNIE, it is found that variation in DBPCGNIE explaining over fifty per cent variation in PCGGD, exists for twenty countries and seventeen countries during short period and long period respectively, in percentage terms this amounts to forty per cent and thirty per cent only. This implies although PCGGD and DBPCGNIE get statistical similarity for few countries during short period only, in variation explanation DBPCGNIE turns out to be important for greater number of countries. Even then, this property is not satisfied for larger share of countries. Similarly, CC analysis shows that around fifteen countries each only maintaining positive and negative correlation between PCGGD and DBPCGNIE for both periods. Lastly, Granger Causality test with one period lag estimates significant relationship only for six to nine countries. All these above analysis can cast doubt whether any relationship exists at all between PCGGD and DBPCGNIE. But disaggregate statistical results show that such cointegrating relationship prevails for over fifty per cent countries, counting almost double of counterpart during ten years of time interval even though aggregate estimation establishes this relationship time period independent.

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