ASSOCIATION BETWEEN GOVERNMENT EXPENDITURE AND ECONOMIC GROWTH: METATREND ANALYSIS BASED ON TEXT MINING

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Abstract

The research study gives a bird's eye-view of the extant research related to the association between the two macroeconomic variables of Government expenditure and economic growth for the period 2000-2019. A compendium of abstracts from 105 refereed journal manuscripts from databases such as Taylor and Francis, Elsevier, ABDC ranking, Springer, Wiley and Sage were used as the dataset. The journals considered were primarily Scopus indexed journals. For analytical purposes, the study uses text mining techniques. The contribution of this study lies in the longitudinal text analysis of abstracts of research publications and availability of a micro perspective of the related taxonomy especially keeping in mind changing macroeconomic situations ie the global financial crisis etc. Analytical tools include Word cloud visualization, Topic Modeling and frequency trend of the topic over time. The outcome of the study provides a direction in theoretical and empirical research to economists and researchers. It gives a direction to policymakers with regards to the applicability of the association between these two macroeconomic variables and is an enabler for effective economic policy making and ensuring that quality of Government expenditure improves with respect to the growth objective and vice versa. It can help policymakers in designing growth oriented fiscal policy decisions and in setting government expenditure priorities especially during times of global financial crisis and Covid19.

Keywords: Government Expenditure, Economic Growth, Text mining, Review of literature, Word cloud, Topic Modeling, Research trend

Introduction

Over the past decade substantial amount of research has been conducted on the relationship between Government expenditure and economic growth and their association has been a matter of discussion and analysis. The analysis outcome of the relationship between these two macroeconomic variables is an enabler for effective economic policy making and ensuring that quality of Government expenditure improves with respect to the growth objective and vice versa. It can help policymakers in designing growth oriented fiscal policy decisions and in setting government expenditure priorities. The results of such an analysis is indicative to policy makers to take economic decisions during different periods of economic growth and provide economic and fiscal stimulus accordingly.

For the purpose of conceptual development, the proposed manuscript begins with a theoretical review of concepts and theories. During 1945-1965, developed countries were of the view that greater government spending was one of the ways to achieve economic and social goals. However, in the 80s they questioned the validity and applicability of this philosophy keeping in mind the inefficiencies that government expenditure was riddled with and the downside of tax financing. In case of developing economies requisite boost to economic growth is an outcome of policy measures of increasing government intervention and spending by the State.

There have been key theories or laws defining the association between the two variables. Adolph Wagner in 1883

identified an association between the two variables and stated that the role of the government and in turn size of the government increases due to a rise in economic growth of the country. Wagner's law also known as the law of increasing state spending states that public expenditure rises as income growth expands. This is due to the increased demand for regulatory and protective functions which are imperative to help sustain the increasing economic wealth of people. Also, as countries become more developed demand for education and healthcare services rises in conjunction with increased economic growth. Thus in case of Wagner's Law the causality direction is from economic growth to government expenditure. It states that increased national income / economic growth leads to augmented Government expenditure $G_t=f(Y_t)$ (Gandhi, 1971), (Ansari, 1993), (Medhi, 2014), (Hussin & Selamah, 2010), (Ono, 2014), (Hansul, 2015), (Chang, 2002), (Islam, 2001), (Khan, 1990), (Nomura, 1995), (Yuk, 2005), (Narayan, Prasad, & Singh, 2008), (Manyeki & Kotosz, 2017), (Kempe, 2014), (Sharma & Singh , 2019), (Kaur & Afifa, 2017), (Mehta, 2017). Subsequently, different researches espoused different versions of Wagner's law ie (Musgrave, 1969) , (Mann, 1980), (Peacock & Wiseman, 1961), (Pryor, 1969) and (Gupta, 1967) and (Goffman, 1968).

Wagner's law of public expenditure which emphasizes on economic growth as a fundamental factor of public sector growth was examined by Kolluri, Panik & Wahab (2000) for G7 industrialized countries (1960-1993). It was seen that both in the short run and long run, growth in national income has an influence on government expenditure. Study by Kofi & Grace (2015) employed the Vector Autoregressive method and Granger Causality test and concluded that causality exists from GDP growth to government expenditure growth (Wagner's law) and policies must focus on enabling the environment for sustained growth against increasing of Government expenditure.

The contradicting view is the Keynesian theory which was developed during the Great Depression of 1930s and states that economic growth is an outcome of augmented government spending. Government expenditure is treated as an independent exogenous variable and economic growth is the endogenous macroeconomic parameter. It advocates increased levels of Government expenditure and lower taxes to stimulate the economy. The theory talks in terms of generation of social and economic infrastructure thereby stimulating investment leading to economic growth (Keynesian theory) $Y_t=f(G_t)$. Keynesian economists justify government intervention through public policies with an objective of achieving higher economic growth (Ghani, Habibullah, Azall & Azman-Saini, 2005; Ram, 1986; Singh & Sahni, 1984; Bataineh, 2012; Ahmad & Loganthan, 2015; Lin, 1994; Ebaidalla, 2013; Loizides & Vavmvoukas, 2005). With reference to the Keynesian theory, it was stated by Ram (1986) that a larger government size would result in slower economic growth due to inefficiencies and excess burden which can have a negative influence on output and production. It was stated by Barro (1990) that initially with an increase in productive Government expenditure it has a positive influence on economic growth, however the positive impact subsequently peaks resulting in excessive intervention by the Government in economic life negatively impacting growth levels. This could be due to the fact that government interventions are many a times inefficient and thus reduce the overall productivity of the economic system resulting in suboptimal economic decisions.

As per Le & Suruga (2005) public capital expenditure plays an important positive role in promoting economic growth while public non capital expenditure has an inverse relationship with the economic growth variable. Role of government in influencing economic growth was studied by Cooray (2009). He looked at the size and the quality dimensions of government expenditure and concluded that both the size and quality of the government play an integral part in influencing economic growth. He stated

that spending on enriched governance was an important objective for the countries that were examined.

These two macroeconomic variables and their association have been extensively researched by many an economists (Ansari, 1993; Liu,Hsu &Younis, 2008; Al-Faris, 2002; Kolluri & Wahab, 2007; Srinivasan, 2013; Gangal & Gupta, 2013; Yay & Tastan, 2009; Abu-Eideh, 2015; Wu,Tang & Lin, 2010; Chandran, Rao & Anawar, 2011; Gebreegziabher, 2018; Okere, Uzowuru & Amakao, 2019; Joshua, 2019; Parui, 2010). A bidirectional causality between the two macroeconomic variables was found by Gurdal, Aydin & Inal (2021) in case of the G7 countries ie. Canada, France, Germany, Italy, Japan, UK, and the USA. The relationship between government spending and economic growth in the ECOWAS Union countries was studied by Olaoye, Orisadare & Okorie (2020). A trivariate causality testing for the two macroeconomic variables was conducted by Olaoye & Afolabi (2021).

In their study, Lahirushan & Gunasekara (2015) studied the influence of government expenditure on growth rates of the economy and vice versa for Asian countries. The findings suggest a positive influence and a long run association between government spending and growth rates of the economy with a bidirectional causality between the two macroeconomic variables, thereby validating both Wagner's law and Keynesian theory for Asian countries.

In his research Landau (1985) investigated if countries with lower economic growth had higher amounts of government expenditure? His investigation of 96 developing countries found that large government spending depressed the growth of per capita income levels. Vice versa, Rubinson (1997) found that a bigger government size ie share of government revenue in GNP, encourages economic growth with special reference to the poorer developing countries. In his research Ram (1986) on researching 115 developed and developing countries for the time period 1960-1980 found that influence of government size on economic growth in majority of the cases is positive with the association being stronger in case of the lower income nations. Simultaneous equation model testing by Grossman (1998) identified a weak positive effect between government spending and economic growth.

In their research (IMF, 1989) attempts to assess the relevance of the growth model and understand government expenditure's part in the growth of developing countries. Total government spending was segmented into: capital, current, total nondefence, total noninterest and total nondefence noninterest expenditure. Capital expenditure showed a statistically significant positive association with real growth rates. They also investigated an experimental modeling of economic growth based on growth in physical capital, human capital, technical change and change in efficiency of resources. In their research Blejer & Khan (194) talked about public investment such as development of infrastructure and other types of government capital expenditure which complements private investment and thus, propels economic growth. The research by IMF also refers to government expenditure leading to increased human capital formation and undertaking activities such as health and education which enhance labor productivity. With improvement of capacity utilization of existing government infrastructure especially in developing countries it can have a positive influence on growth without unduly increasing developmental government expenditure. Government capital expenditure for social purposes ie infrastructure etc and education were seen to be positively associated with economic growth.

The effectiveness of government expenditure on economic growth was studied by Amusa & Oyinlola (2019). The research findings concluded that while recurrent expenditure contributes to economic growth there should be more focus on productive development

expenditure to enhance short term and long term growth prospects of the country. Research by Scott-Joseph & Turner (2019) concluded that fiscal expenditure positively and negatively contributed to economic growth in agriculture, manufacturing and mining sectors. Effect of government investment expenditure on economic growth was studied by Mazorodze (2018) and a unidirectional causal relationship between the two macroeconomic variables was established. In their study, Chu, Holscher & McCarthy (2020) state that productive forms of expenditure are associated with higher levels of growth both in high income and low to middle income economies.

Based on Barro's theory, China's stage of economic development and keeping in view that it is largely influenced by government policies as it is a socialist state, (Lee, Won, & Jei, 2019) studied the association between economic growth and government expenditure. Kolluri & Wahab (2007) in their study have attempted to differentiate between periods of strong and weak economic growth and estimate the association between the two macroeconomic variables. Results showed that maximum government expenditure has happened in times of economic slowdown and there is weak evidence for increased government expenditure in times of rapid economic growth. Influence of changes in the composition of government expenditure leading to higher growth rates in the economy was studied by Devrajan, Swaroop & Zou (1996). Interestingly, results found that when productive expenditure is used in excess it can become unproductive. In their research Loizides & Vamvoukas (2005) conducted a trivariate analysis between government expenditure, economic growth and inflation and unemployment. They ascertained that in case of Greece, UK and Ireland, government size granger causes economic growth in all countries in the short run and in the long run it is applicable for Ireland and UK; economic growth Granger causes government size in case of Greece.

For a set of 182 countries, granger causality was tested between government expenditure and economic growth for the time period 1950-2004 by Wu, Tang & Lin (2010). The results confirmed presence of bi-directional causality between government spending and growth rate of an economy with the exception of low income countries in whose case inefficient government machinery and inferior institutions played a role. Analysis for the short run and long run period between government expenditure and potential output in EU countries was studied by Arpaia & Turrini (2008). They found that for EU 15 countries for 1970-2003, there is a long term elasticity which in the long run decreased considerably and is higher than one in catching up countries, in fast ageing countries and in low debt countries.

In a study of Pakistan, Attari & Javed (2013) disaggregated government expenditure into government current expenditure and government development expenditure. They employed econometrics tools such as Augmented Dickey Fuller (ADF) unit root test, ARDL, Johansen cointegration and Granger-causality test to investigate the relationship. In his study Odhiambo (2015) studied government expenditure and economic growth for South Africa. Data analysed for 30 developing countries by Bose, Haque & Osborn (2007) based on disaggregated government spending found that government capital expenditure in GDP is positively and significantly correlated with economic growth. In a study conducted by Suanin (2015) for Thailand, the researcher found that stated budgetary expenditure stimulates economic growth in the long run while extra budgetary spending and quasi fiscal spending by the Government can propel economic growth in the short run.

The association between government spending and economic growth for the period 1995-2015 for European Union was investigated by Dudzeviciute, Simelyte & Liucvaitiene (2018). The results showed that eight EU countries have a significant association between these two variables. For countries with a uni-directional

causality from government expenditure to economic growth, the Government can employ expenditure to fuel economic growth. Research done by Oladele, Mah & Mongale (2017) states that there is a significant and positive association between the two variables in the long run in South Africa and thus increased spending should be directed towards sectors such as infrastructural development and industrial development with a perspective of accelerating economic growth.

The effects of accelerating and decelerating economic growth on growth in government expenditure through a vector error correction model for OECD countries was studied by Wahab (2004). As per Mallick, Das & Pradhan (2016) the association between Government expenditure and economic growth was studied for 14 Asian countries. The study found a positive and statistical significant impact between the two variables for these countries. It indicated a uni-directional causality from economic growth to spending on education both for the long run and short run.

Study done by Dash & Sharma (2008) for India (1950-2007) found that influence of government expenditure on economic growth is positive for the short run and long run. The researchers employed econometric tools such as ADF, Engle Granger Causality test and Vector Error Correction model. On studying the existence of Wagner's law for India, Ravi (2017) found that Peacock-Wiseman version and Gupta version of Wagner's law is applicable in India. Using cross section data for 29 Indian states, Bansal & Shradha (2012) found that Wagner's law is not applicable for India and public spending is growing at a lower rate than growth of the economy. Study by Verma & Arora (2010) examined the validity of Wagner's law for 1950-51 to 2007-08. They found that even though two structural breaks of liberalization were considered Wagner's law is still reinforced for India. In relation to India, Tamang (2011) states that on analyzing the behavior of the macroeconomic variables of Government expenditure and economic growth for 1980-2008 for India it was seen that there exists a long run relationship between education expenditure and economic growth. However, spending on physical capital per labour has a larger positive impact on economic growth relative to spending on education. Zhang & Zou (2001) found that for India, increases in government spending on development projects, non-development projects and social and community services can promote regional growth thus, leading to development of the nation.

From the above review of existing literature on the association between Government expenditure and economic growth / GDP it can be seen that extensive in-depth analysis has been conducted for the same. However, it has also been increasingly felt, that with changing macroeconomic situations across the world especially keeping in mind the effect of the global financial crisis and the black swan event of the coronavirus ie Covid 19 adversely impacting economic health of countries a more in-depth analysis is required with the applicability of the association of these two key macroeconomic variables. The major interest areas for researchers with reference to these two macroeconomic variables in the recent decades especially with reference to the dynamic macroeconomic scenario needs to be analysed and studied. Has the research focus changed, evolved or have new areas been identified in relation to these two variables. What are the observed trends in recent researches and publications?

The current research aims to delve into assimilating available bibliometric information and subsequently statistically analyzing the same with the objective of: 1) identifying the trend of research related to the association between the two macroeconomic variables of Government expenditure and economic growth based on extant literature from 2001-19; 2) identification of the taxonomy related to the research conducted for these two variables, 3) the research inclination for the relationship between these two macroeconomic variables in recent times keeping in mind the global financial crisis

of 2008; is the association between these two variables still of interest to economists, policymakers and Government officials.

The contribution of this study lies in the longitudinal text analysis of research publications and availability of a micro perspective of the related taxonomy. It gives a bird's eye-view of the extant research and classifies the same into categories in which research related to the association between these two macroeconomic variables of Government expenditure and economic growth has been conducted. The contribution of the study lies in use of text mining techniques to analyze compendium of abstracts of reputed publications related to the topic of study and provide a direction in theoretical and empirical research to economists, researchers and policymakers. It gives a direction to policymakers with regards to the applicability of the association between these two macroeconomic variables thus helping in making of policy decisions especially during times of global financial crisis and Covid19.

Data and Methodology

Text mining refers to extraction of high quality information from a large quantity of unstructured data using computational tools and techniques. It is also known as Knowledge Discovery from the text and is supported by machine analysis of text. Knowledge Discovery in Databases (KDD) is the process of finding knowledge in data and has been defined as "the non-trivial process of identifying valid, novel, potentially useful and ultimately understandable patterns in data" by Fayyad, Piatetsky-Shapiro & Smyth (1996). Text mining as a data analytical tool has gained acceptance amongst researchers as it assists in extraction of knowledge from a large pool of unstructured textual data. Machine learning and natural language processing has made possible mining of data to find patterns in the data text. Knowledge Discovery in text or text mining has a multidimensional approach which constitutes activities from data collection to knowledge interpretation. The process of text mining primarily involves five steps: 1) Data collection from unstructured dataset 2) Data cleaning and preprocessing 3) Data transformation 4) Data Mining ie classification, clustering of data etc 5) Data Interpretation and knowledge discovery. The present study follows the KKD process of text mining for the meta trend analysis of textual data ie the compendium of abstracts of reputed publications related to the association between Government expenditure and economic growth.

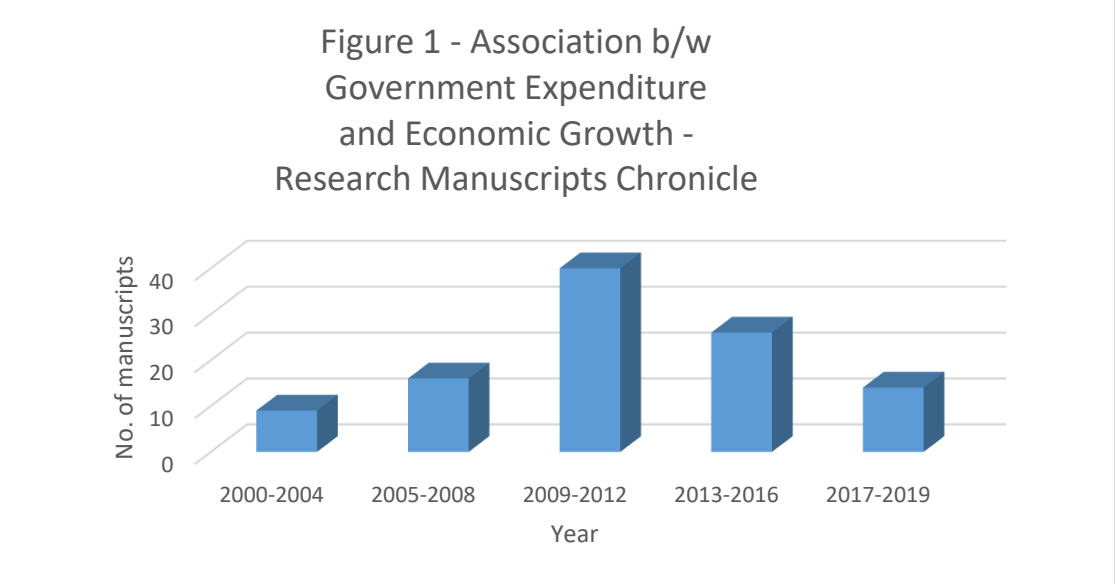
Data Collection

To analyze the extant research undertaken for the association between the two macroeconomic variables of Government Expenditure and Economic Growth a compendium of abstracts from 105 refereed journal manuscripts from databases such as Taylor and Francis, Elsevier, ABDC ranking, Springer, Wiley and Sage were used as the dataset. The journals considered were primarily Scopus indexed journals. The search was limited to retrieving of research manuscripts post 2000-01 ie for the period 2000-19. The focus was to collect abstracts from high quality research journals. Abstracts of manuscripts were used for the purpose of text mining as they provide the essence of the research and help lessen the data noise in the investigation.

Figure 1 portrays the research conducted over the years on the relationship between the two macroeconomic variables of Government Expenditure and Economic Growth since 2000-01 – 2018-19. It is interesting to note that considering extensive research and deliberation has already happened in this field of research since 1880s with the advent of Wagner's Law and subsequent Keynesian Hypothesis, this is still a topic of keen interest for economists and researchers. From the figure, it can also be seen that highest number of research manuscripts found were for the time period 2009-2012 followed by 2012-2016. Keeping the Global Financial crisis of 2008 in mind, it is important to understand that the crisis had negatively impacted economic growth of countries

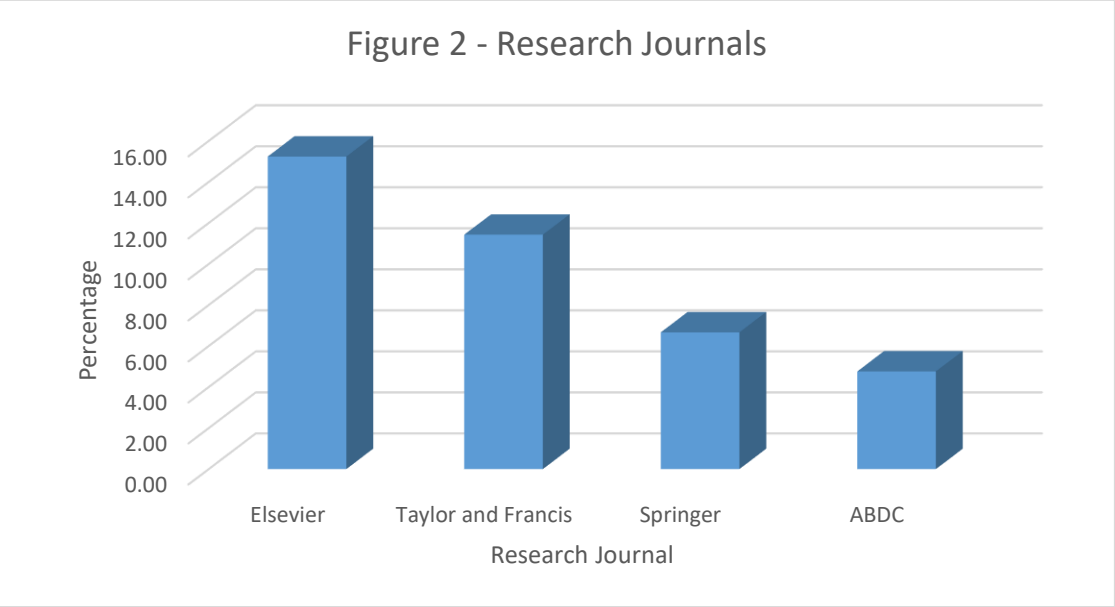
across the world. Government bodies and policy makers were designing and providing stimulus packages be it monetary or fiscal policy incentives to help stimulate the economy. Thus, these two macroeconomic variables and their association had once again become a focal point and a topic of research for economists and researchers. It was important for policymakers to gauge the impact of the stimulus being provided by Governments on the economic growth of the country and if yes, was the causality uni-directional or bi-directional.

Figure 1



In Figure 2, a list of the top journals which have published research manuscripts for the period under study with reference to these two macroeconomic variables has been provided. Under Elsevier journals research manuscripts in Journal of Policy Modeling, European Economic Review, The Quarterly Review of Economics and Finance, International Review of Law and Economics, Journal of Public Economics, Journal of Economics and Business have published manuscripts analyzing these two macroeconomic variables, Taylor and Francis Journals such as Applied Economics, Applied Economic Letters, Journal of Development Studies, Global Economy Journal; Springer Journals such as Comparative Economic Studies, Atlantic Economic Journal, Central European Journal of Operations Research, Empirical Economics, Frontiers of Economics in China and ABDC journal such as Macroeconomics Dynamics, Eurasian Journal of Business and Economics were some of the journals in which the manuscripts were published. These are all top ranking and highly reputed journals in the field of Economics.

Figure 2



Data Cleaning and Preprocessing

Text mining is a process of deriving patterns and trends from unstructured text, and helps gain an overview of the dataset and investigate the dynamics of the study Ramage, Rosen, Chuang, Manning & Farland (2009). Since it deals with unstructured data, it is imperative that the dataset be cleaned for data noisiness. For the same, the R-Programming (R) and statistical software was used to execute the data cleaning work. In the statistical package R, data cleaning is achieved through the library package 'tm'. The first step entailed importing the texts ie 105 abstracts into the R computing environment into a Corpus, enabling readLines so that the package is able to read the text and thereafter tidy the text. The tidying of the text involves certain steps such as: 1) transforming the entire text into lower case as the 'tm' package reads the same word as two different words in case one is in lowercase and the second starts with an uppercase. 2) The second step entailed removing words such as 'stopwords' used commonly in the English language and 'myStopwords' such as "say","one","way","use" etc. 3) Next all punctuations ie (',;,;,")were removed from the Corpus 4) this was followed by 'removeNumbers'command as the study did not need the function of numbers to be read from the dataset, since the purpose was to derive the main "Words" being frequently used by researchers 5) in the last step all 'whitespaces' were removed from the Corpus document through the requisite command in the R package. After removing of all such noise and cleaning of the data, the pre-processing of the Corpus was completed and the same was ready for transforming of the pre-processed text into a structured format for actual computation.

Data Transformation

On obtaining the cleaned structured 'Corpus' the same was transformed next into a 'TermDocumentMatrix', a mathematical matrix that describes the frequency of terms that occur in a collection of documents. The rows tallied to documents in the structured text while columns corresponded to the terms. The objective of the TermDocumentMatrix was to characterize the topic of a document by the frequency of semantically significant terms.

Results and Discussion

Data Mining

The transformed matrix was subsequently used for analysis of data. Data Analysis was done based on two models; the first being

Wordcloud and second being Topic Modeling. "Word cloud" or tag clouds are visual or graphical representations of word frequency and provides greater visibility to those words which are more frequently used in the text. The larger and bolder the word that appears in the graphical representation signifies that the more common was the word in the document. Word cloud has been defined as "the visual representation of words for a certain written content structured as per its frequency" (Jayashanlar & Sridaran, 2016). As per Sinclair & Cardew-Hall (2008) word cloud is a preliminary stage for an in-depth analysis of certain text material. Thus, the next step post Word cloud visualization was to do an in-depth analysis of the compendium of abstracts based on Topic Modeling.

Rapid advancement in machine learning and natural language processing has led to the development of a probabilistic framework text mining approach called Topic Modeling. Topic Modeling is the attempt to find similar topics across various documents and trying to group different words together, such that each topic consists of words with a similar thought process or meaning. Topic modeling can be viewed as a dimension reduction approach and is used for its rich interpretative quality as well. The dataset is analysed into a few topics. Topic modeling uses the primary technique of Latent Dirichlet Allocation (LDA) and is akin to discrete PCA ie Principal Component and Factor Analysis. The visualisation helps us understand the topics that are extracted from the abstracts. The topics may contain words from several topics in different proportions ie in a two topic document it can be interpreted that "Document 1 is 90% topic A and 10% topic B, while Document 2 is 30% topic A and 70% topic B". It is a statistical model for discovery of unstructured topics across collection of documents or abstracts in the concerned study.

Several in-depth studies have been conducted based on Topic Modeling (Hall, Jurafsky & Manning, 2008; Paul & Girju, 2009; Cui, Liang, Li & Guan 2015). Thus, based on Topic Modeling, tentative topics were identified by unsupervised machine learning through Latent Dirichlet Allocation (LDA). Subsequently, the identified topics were deliberated upon by two domain experts from the field to interpret the data. The two experts labelled these topics and identified the theme to which the topic belonged.

Data Interpretation and Knowledge Discovery

Figure 3 gives the visualisation outcome of the Word cloud. A word cloud is one of the methods of visualising the most frequent terms in an unstructured text. From the word cloud it can be seen that some of the most frequently used words are 'Government', 'growth', 'expenditure', 'Wagner's', 'Keynesian', 'granger', 'causality', 'countries', 'GDP', 'hypothesis', 'empirical', 'economic', 'cointegration', 'education', 'development', 'investment', 'health', 'economy', 'capital', 'income', 'longrun', 'shortrun', 'defense,' 'policy' etc. Thus the word cloud helps us gain an understanding of the frequently used terms in the compendium of abstracts related to Government expenditure and Economic growth.

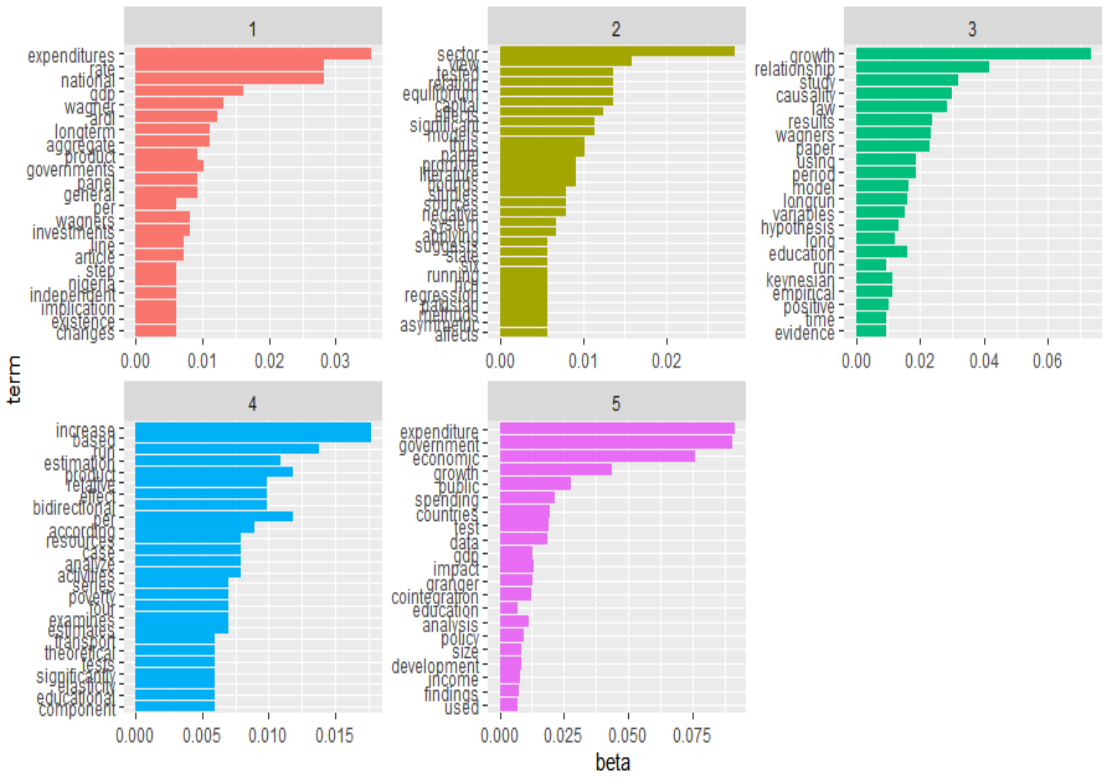
Figure 3 – Word cloud

Topic Modeling

Topic modelling based on LDA is a statistical method of discovering topics in an unstructured text. This is based on the assumption that documents are represented as a random amalgamation over underlying topics in which each topic is characterized by a distribution of words. Topic modeling used LDA as a probabilistic model to explore hidden topics in documents and makes it easy to analyze a large set of data. It is a powerful exploratory tool when used

Figure 4 – Topic Modeling

on a large collection of abstracts and will help in assimilating primary topics under which extant research has been undertaken for the investigating the relationship between Government expenditure and economic growth. Figure 4 shows the outcome of Topic Modeling that was conducted for the dataset. The same was interpreted with the help of two domain experts. The analysis showed that there were primarily five topics derived from the dataset.



Topic 1 refers to Wagner's Law and talks in terms of relationship between Government expenditure and GDP. It also refers to the Autoregressive Distributed Lag Model (ARDL) of analysing the data. This topic additionally talks about investment expenditure on the part of the Government. Of the dataset, 41 research manuscripts have discussed the same. Thus Topic 1 can be labelled as the "Wagner's law".

Topic 2 refers to the implication of Government capital expenditure and refers to regression analysis undertaken for quantitative analysis. 14 research manuscripts have discussed the effect of Government capital expenditure. Topic 2 can be labelled as the role played by Government capital expenditure wherein researchers have explored the "Importance of capital expenditure" as a constituent of Government expenditure and its impact and influence on economic growth.

Topic 3 refers to the Keynesian theory and the relationship between government expenditure and growth. It talks of an empirical analysis and causality of the relationship between the two macroeconomic variables in the longrun. 28 research manuscripts have researched on the same. Topic 3 can be labelled as the "Keynesian theory".

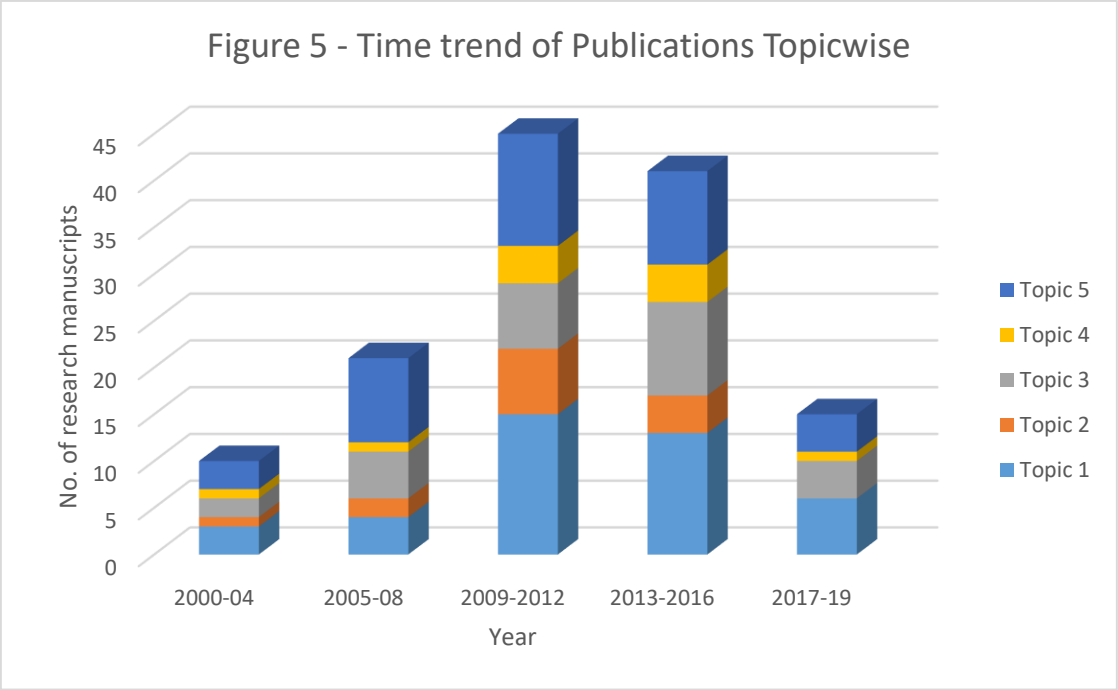
Topic 4 talks in terms of impact of education, transport in the short run and long run along with a bidirectional causality of the relationship. Topic 4 refers to the fact that researchers have explored if there exists a "bi-directional causality or un-directional causality" between these two macroeconomic variables ie both increase in Government expenditure can provide a stimulus to the economy and vice versa ie increased economic growth leads to a rise in Government expenditure. 11 research manuscripts have delved into this topic.

Topic 5 refers to impact of development expenditure on growth and analysis of the same across countries. It talks of the Granger causality and Cointegration test between the variables of Government expenditure and growth. This topic primarily refers to an in-depth study of relationship between "Government Development expenditure ie influence of increased spending by Government on education, health sectors etc on economic growth". Interestingly 38 research

manuscripts have investigated and analysed into the same.

Figure 5 plots the time trend of publications Topicwise. It is important to notice that as stated earlier research into the association between Government expenditure and Economic Growth has increased post the Global financial crisis of 2008. From a policy makers perspective and from the viewpoint of researchers and economists it was important to understand if the impetus / fiscal and monetary stimuli was having the required impact on economic growth and vice versa. Interestingly, another outcome seen is that the number of research manuscripts investigating into Topic 5 ie "Government Development expenditure ie influence of increased spending by Government on education, health sectors etc on economic growth" is the highest across the five topics. Thus, economists are going a step ahead and trying to gauge if Government expenditure and Economic Growth has an association, what kind of Government expenditure is able to fuel economic growth and vice versa. Is it recurrent expenditure ie current expenditure or Development expenditure ie education, health sectors etc. This will provide a direction to policy makers and Government in decision making while exploring the feasibility of a stimulus package in terms of declining economic growth.

Figure 5



Conclusion

Findings of the current study will provide a direction in theoretical and empirical research to economists, researchers and policymakers engaged in the field of understanding the impact and influence of Government expenditure and economic growth and vice versa. The contribution of this study lies in the longitudinal text analysis of abstracts of research publications and availability of a micro perspective of the related taxonomy. The study has also identified the topics of research that have been investigated into and studied by researchers from 2000-2019 related to the two macroeconomic variables. Interestingly, it was also seen that research into the association between Government expenditure and Economic Growth has increased post the Global financial crisis of 2008. Additionally, economists and researchers are attempting to go a step

ahead and estimate if Government expenditure and Economic Growth has an association, what kind of Government expenditure is able to fuel economic growth and vice versa. Is it Government current expenditure or Government capital expenditure. This will provide a direction to policy makers and Government officials and aid them in the process of decision making.

Text mining as an exploratory tool is a fast emerging method for researchers to obtain a summary report and the same can be used by economists and researchers to obtain an overview of the research conducted in a particular area. This method importantly is a blend of inputs received from machine learning and human interpretation of the same. It allows qualified input by domain experts for Topic Modeling and thus gives a qualified direction to the research. Text mining as a technique helps in discovery of research trend and patterns.

Practical Implications

Keeping in mind that extensive research has already been conducted with regards to the Wagner's Law and Keynesian hypothesis it is interesting to note that even in recent years the association between the two variables of government expenditure and economic growth has been of keen interest to researchers and analysts. Rather, during and post the Global Financial Crisis ie between 2009-12 and 2013-16 maximum research in this topic has been conducted. Topic modeling showed that primary topics researched on were the Wagner's Law, Keynesian hypothesis, implication of Government capital expenditure and its impact and influence on economic growth, impact of development expenditure on growth and analysis of the same across countries and influence of increased spending by Government on education, health sectors etc on economic growth. Interestingly, another outcome seen is that the number of research manuscripts investigating into Topic 5 ie "Government Development expenditure ie influence of increased spending by Government on education, health sectors etc on economic growth" is the highest across the five topics. Thus, economists are going a step ahead and trying to gauge if Government expenditure and Economic Growth has an association, what kind of Government expenditure is able to fuel economic growth and vice versa. Is it recurrent expenditure ie current expenditure or Development expenditure ie education, health sectors etc. The identified topics can give a direction to policymakers especially in times of a black swan event such as Covid19 adversely impacting not only the health of people but also the economic health of nations. With Governments and regulatory authorities coming up with conventional and unconventional stimulus measures, the identified topics in the research manuscript can give a direction to policymakers. Government capital expenditure ie development expenditure on infrastructure, education and health can have long term positive impacts on economic growth and stimulus measures can be accordingly designed.

Limitations

One of the limitation of the current study is that only abstracts have been taken to control for noise thus certain important areas such as research methodology and research tools might have been left out. The analysis results do give a direction in terms of application of ARDL model and Granger causality test, however, based on inputs from the domain experts, Vector Autoregressive method and Vector Error Correction model of analysis has also been applied to research in this area.

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