IS WAGNER'S LAW APPLICABLE FOR FAST GROWING ECONOMIES? BRICS AND MATIK COUNTRIES

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This study investigates the causality relationship between public sector spending and economic growth. Although a relationship between these two variables is traditionally accepted, the direction of this causality relationship has widely been discussed. The relationship in which the increase of public sector spending moves together with the growth is called as Wagner's Law and it is examined through developing countries' data. As being developing country group, there is a huge literature about "BRICS countries". The unique contribution of this study is that it defines a new developing country group as "MATIK countries" and it analyzes BRICS and MATIK (BM) countries together. Therefore, the validity of Wagner's Law is tested on economic growth and public spending figures of these country groups which have significant population and economic size in world economy. As a result of Granger Causality Test for the period of 1961-2013, findings are obtained as Wagner's Law is not valid for majority of BM countries, which include 10 high growing economies. This conclusion is compared with other studies, which are conducted for developing countries.

Keywords: Wagner Law, BRICS and MATIK Country, Economic Growth.

JEL Classification: F43, H11, H50.

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1. Introduction

Classical and Neo-Classical Economy are highly consistent on the subject of limiting and minimizing the public sector's activities during the growth processes. Keynes claimed that market mechanisms could not be balanced by itself, and public sector activities are necessary to remove these conditions after 1929 crisis. The share of public sector in the total economy had been increased till 1970s and growth processes had also included the public sector's activities after this hypothesis. Through 1980s this hypothesis of Keynesian economy was left so that the suggestions of neo-classical economy are started being accepted. However, the relationship between public sector activities and the economic growth has still being discussed. On the basis of the disagreements, there is the possibility that public sector's activities could have different effects depending on the development level of the countries which are examined. The second difference is public sector activities have different types. For example, public revenues are mostly depended on direct taxes in the developed countries while they are depended on indirect taxes in many of the developing countries. Different results can be reached through analysis due to these and these kinds of differences. The analyses which are based on the relationship between different public sectors activities and the growth could give different result similarly. The most commonly known relationship between the public spending which is one of the most important activities of the public sectors and the economic growth is brought forward by A. Wagner (1883) so that this is called as "Wagner's Law (Henrekson,1993).

Wagner associated this relationship to i) cultural and welfare improvement ii) administrative and preventing functions iii) spending toward to economic interruptions and firstly to natural monopolies (Bird, 1971; Tornton, 1999; Biehl, 1998). After Wagner, different many explanations are done for the increase of public spending. For example, the reason of the increase of public spending is associated with the governmental spending campaigns for low income voters and the source of the increase is seen in this point (Meltzer and Richard, 1981; Persson ve Tabellini, 1990). As a more general causalization, Masgrave (1969) commented that the increase rate of public spending would be much more than the rate of national income through the fact that education, health and public properties' rates are increased faster depending on the national income increase than shelter, food and clothing spending rates. There is a relationship between public spending and GDP increase per person in internal growth model of Barro (1990) and according to fixed contribution assumption of private sector and public services, the magnitude of public sector is effective in opposite direction on the growth rate. According to Barro (1991), public investments have positive effects on the growth rate due to raise the productivity while public spending affects the growth rate negatively.

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In the relationship between public spending and the economic growth, there are two main approaches which belong to Keynes and Wagner. The difference among Keynes and Wagner hypothesis is about causality direction (Chi-Hung and Chiehwen 2008). Keynes claimed that the increase of public spending will cause the growth while Wagner claimed that the growth will cause the increase of public spending. Both of those approaches are testes many times. Some of the studies gathered proofs about the invalidity of Wagner's Law (e.g. Ram (1986), Afxentiou and Serletis (1996); Wahab (2004)) as many studies found results about the validity of Wagner's Law. The main reason of this difference in the literature is stemmed from the fact that the perspectives and the explanatory variables were highly different in the conducted studies. Different arguments like the magnitude of the country (Alesina and Wacziarg, 1998); trade deficits (Rodrik, 1998); the differences of economic development levels (Easterly and Rebelo, 1993; Stein et al., 1999); political organization structures (Milesi Ferretti et al., 2002; Persson and Tabellini, 1999); the vulnerability level to economic uncertainties (Andres et al., 2008; Fatas and Mihov, 2001) could be effective on the results of the tests which are done for hypothesis. However in general, the relationship that Wagner claimed is more powerful in the developed countries and weaker in the developing countries (Akitoby et al., 2006).

The fact that population of the economies is constantly increasing and the increase of the welfare conditions of the individuals who are created by the economy's total growth will cause the increase of public spending by nature. The public spending which is about the welfare condition improvement will also determine the public revenues policy. Furthermore, public revenue is a function of the public spending as a budgeting principle. Moreover, an inconsistent spending policy will require increasing the tax revenues (Ram, 1987; Oxley, 1994). Therefore, this condition will create a pressure to direct and indirect tax payers and this can go further to smuggling (Barro, 1990; Roubini and Sala-i-Martin, 1995; Futagami, et al. 1993; Turnovsky, 1997). This pressure will narrow the individuals' spendable budgets and companies' profitability (Mishkin, 2011). Moreover, inflationist pressure will emerge due to the effects of taxes to manufacturing costs. In short, Wagner's Law is convenient to be discussed in all aspects of macroeconomic circle because it relates to cyclical relationship between public sector and the economic growth. I focus on the developing countries category in this study. There is a rich literature about the developing countries on the other hand due to the before mentioned reasons, different results are gathered. From this rich literature, the findings which belong to selected some studies which were conducted for selected country and country groups are provided in *Table 1*. As seen, these studies give some similar and some different results which relate to Wagner's Law.

This study is expected to make two important contributions to the literature. The first one is that this is the first study which examines BRICS economies for Wagner's Law. The second one is that Wagner's Law is tested as conducting analysis for each of two country groups by defining Mexico, Argentina, Turkey, Indonesia and Korea as "MATIK Countries" because

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there are big similarities in terms of qualitative aspects and characteristics with BRICS country group although there are quantitative differences among them. Afterwards, BRICS and MATIK countries will be shortly called as "BM".

Table 1. Selected Country and Country Groups for Wagner's Law

Author(s)	Period	Country(s)	Conclusion
Afxentiou & Serletis (1996)	1961-1991	EU	Hypothesis is valid.
Campo (1998)	1980-1990	100 World countries	Positively associated with employment expenses.
Thornton (1999)	19th cc	6 Developed European Countries	Valid with a powerful relationship.
Islam (2001)	1929-1996	USA	Valid with a powerful relationship.
Blackley (2003)	1949-1998	USA	Spending other than interest is associated with the growth.
Iyare & Lorde (2004)	1953-2000	Caribbean Countries	Hypothesis is valid.
Florio & Colautti (2005)	1870-1990	USA, U.K., France, Germany, Italy	There is a relationship in the long run.
Akitoby et al. (2006)		51 Developing Countries	It is co-integrated with 70% of the countries.
Narayan et al. (2008)	1990-2003	China States	It is valid in Western States and is partly valid in Eastern States.
Ghartey (2008)	1960-2005	Jamaica	There is a relationship in the short run.
Furuoka (2008)	1970-2005	Malaysia	It is co-integrated in the long run.
Narayan (2008)	1970-2002	The Fiji Islands	There is Granger Causality in the long run.
Rufael (2008)	1964-2004	13 African Countries	Partly double directed, partly single directed and partly no causality.
Tang (2008); Tang (2010)	1960-2006	Malaysia	It is valid after 1985.
Liu et al. (2008)	1947-2002	USA	It is valid in the multiplied spending on the other hand in the total spending Keynes in valid.
Samudram & Nair (2008)	1970-2004	Malaysia	Double directed causality for health spending; it is valid in the long run for the other spending.
Kalam & Aziz (2009)	1976-2007	Bangladesh	It is valid in both long and short run.
Dolenc (2009)	1992-2007	Slovenia	Hypothesis is valid.
Roy (2009)	1950-1998	USA	Governmental spending has negative effects on the growth.

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Author(s)	Period	Country(s)	Conclusion
Lamartina & Zaghini (2010)	1970-2006	23 OECD	There is more powerful relationship in the developing countries; It is also valid for the developed countries however the rate is lower than for the developing countries.
Montiel (2010)	1950-1999	Mexico	There is Granger causality. It is valid.
Durevall & Henrekson (2011)	1860-1970	Swedish and UK	The Law is not valid in the long run.
Zheng et al. (2010)	1952-2007	China	There is not any powerful proof.
Zaman et al. (2011)	1960-2009	Pakistan	There is no relationship between spending for agriculture and the growth in the long run.
Brückner et al. (2012)	1960-2007	43 World Country	Hypothesis is valid although the parameters are different for rich and poor countries.
Narayan et al. (2012)	1986-2009	Indian States	The Law is valid however, only capital spending supports the growth.
Magazzino (2012)	1960-2008	Italy	There is Granger causality.
Kumar et al. (2012)	1960-2007	New Zealand	Granger causality is valid for the long run.
Wu & Lin (2012)	1998-2006	China	Hypothesis is not valid.
Ijeoma et al. (2012)	1970-2010	Nigeria	Hypothesis is valid.
Gurgul et al. (2012)	2000-2008	Poland	There is causality but it is valid in the opposite direction.
Akinlo et al (2013)	1961-2009	Nigeria	It is valid as also associated with the population.
Kirchner (2013)	1901-2009	Australia	It is valid in the long run and no valid in the short run.
Bashirli & Sabiroglu (2013)	2001-2010	Oil-exporting countries	There is causality in both long and short run.
Grenade & Wright (2013)	1980-2011	Caribbean Countries	It is valid because of political effects.
Sakyi (2013)	1980-2008	West African Countries	Hypothesis is valid

Goldman Sachs has used the abbreviation of BRIC (Brazil, Russia, India, and China) for the first time to mean “rapid developing economies” in 2001 (Singh, 2013). After the regional economic cooperation organization begin to increase in last 40 years, in the final period, BRIC economies became the main topic as structuring beyond the regional samples in 2006. These economies have partially become official with the meeting that was made by foreign affairs ministers of the 4 national rapid developing economies. Brazil, Russia, India and China leaders have reached a consensus for meeting once a year in order to discuss economical and political issues. So, some kind of unity that has formed with the initials (BRIC) of these 4 countries. In 2011, when South Africa was invited to the third meeting in

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China, the group had a new addition and have been called BRICS ever since. In 2006, from the first meeting at a level of Foreign affairs ministers to the present meetings were made about foreign affairs, finance and economy, trade, agriculture, and health. The meetings have continued about science, technology, trade rivalry and national security. In 2011, in the third meeting, it reached a consensus about playing a central role for the world economy (Schmalz & Ebenau, 2012). It expanded visions that BRICS economies probably will be the biggest economies of the world in by 2030 (Khan, 2011; Yao & Liu, 2011).

Some abbreviations are generated for the rapid developing economies except BRICS. For example, the abbreviations such as Mexico, Argentina, Nigeria and Turkey (MANT); Poland, Indonesia, Korea and South Africa (PIKS); BRIC+Argentina (BRIC-A) are in question (Aggarwal, 2013; Aktan et al., 2009). I use (MATIK) abbreviation for Mexico, Argentina, Turkey, Indonesia and Korea in this study, and while I do my analysis through BRICS, I also do it for MATIK. Moreover, I include (BRICS+MATIK) into the analysis by combining these two rapidly developing country groups that generate a great majority of the world's population and economy. In addition, I include BRICS+MATIK economies into the analysis by comparing them with the world and the G-7 economies. According to January data of 2014, while world population is 7.145 billion, G-7 countries are 747.914 million; BRICS+MATIK countries population is 3.512.958 million. Proportionately, BRICS+MATIK generate 49,16% of world population, and G-7 countries generate 10,46% of world population.

Public sector is very big economical category and it is consisted of a big range from state-owned enterprises (SOE) to public revenue and spending, fiscal or monetary policy. Each of the variables in this range has different effects on the growth. Public spending is one of the most effective functions of the public sector and different effects can exist depending on the spending qualifications.

There exist empirical findings about structural and R&D based spending affects positively the growth processes while there are also some studies that depict the fact that social security spending has negative effects over the growth processes. The total population of BM countries as fast developing countries consist 49,16% of the world population and 26,46% of the world economy. BM economies which had 4,25% average growth rate (BRICS 3,7%; MATIK 4,8%) based on the period of 1962-2012 and they consist 26,46% of the world economy through 2013. The growth rate of world economies was 3,45% through the period of 1962-2012; OECD countries' average growth rate was 3,13% and G-7 countries average growth rate was 2,9 (Kargi, 2014). It is obvious that BM countries have a very big growth rate as comparing to other categories. Therefore, it is worth to examine the relationship between this big growth rate and public spending in BM economies as such a big economic category. There are many components which support BM countries this growth rate. An interesting research subject is whether public sector support and encourage this growth processes as one of those components or not.

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In short, UN country groups are fast developing economies and their growth processes should be examined through many aspects. They are also very convenient country groups to investigate the relationship between the growth and public spending which have been discussed through economy literature.

2. Data and Methodology

The growth and public spending data which belong to BM countries are obtained from UNCD and these are for the period of 1980-2012 (for Russia 1989-2013). The growth rate (g) depicts GDP increase. The variable of total public spending (s) is the rate of countries' public spending to GDP. Therefore, the direction and the degree of the relationship between public spending and the growth could be tested. Seasonal tests were not needed due to the fact that series are annual data.

The main hypothesis which is tested through the study is "there is causality from economic growth to public spending." This causality relationship could have the directions as Keynes and Wagner assumed. This study focus on the direction of the relationship between the growth and public spending, moreover the long term based relationship between the variables are tested. Accordingly, the secondary hypothesis is "economic growth and public spending is co-integrated in the long run.". Granger causality test (1969) is used for testing the first hypothesis. Dickey-Fuller (1979); Phillips-Perron (1988) and KPSS (1992) unit root tests are used to verify the condition of that series must be constant for Granger causality. (The error correction model is also applied to sustain the short term balance and to eliminate data loss which is happened because the first differences are taken in case of that the series are not constant in their level values.) Engle-Granger (1987) two phased co-integration test is applied to test the second hypothesis.

3. Empirical Analysis and Results

The results related to three different unit root tests which are done in order to test whether the series are constant or not are shown in *Table 2*. The columns in *Table 2*, which are shown as " Δ ", are the test results which are obtained when the first differences of the series are taken.

The series are not constant according to each of three tests results so that their first differences are taken to set them constant. When comparing the critic values which are shown inside of the brackets with the test statistics under the column which is depicted by " Δ " symbol in *Table 2*, they verify the series become constant as taking the first differences.

Kargi, B. (2016).*Is Wagner's law applicable for fast growing economies? BRICS and MATIK countries***Table 2. ADF, PP and KPSS Unit Root Tests (No Intercept and Trend)**

	ADF	ADF Δ	PP	PP Δ	KPSS	KPSS Δ
<i>Brazil</i>	-1.965735	-10.80296	-2.818729	-14.51167	0.444875	0.191034
	(-2.611094)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	0.426030	-8.518785	0.433711	-8.494389	0.676525	0.380891
	(-2.610192)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>Russia</i>	-2.186479	-6.709351	-2.186479	-7.228242	0.398784	0.140323
	(-2.669359)	(-2.674290)	(-2.669359)	(-2.674290)	(0.739000)	(0.739000)
	-0.342274	-5.817922	-0.248306	-7.277827	0.103066	0.500000
	(-2.664853)	(-2.674290)	(-2.664853)	(-2.669359)	(0.739000)	(0.739000)
<i>India</i>	-0.960811	-9.436515	-2.308628	-29.90033	0.835311	0.036225
	(-2.612033)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	0.952678	-6.162140	0.922685	-6.282721	0.764507	0.164603
	(-2.610192)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>China</i>	-1.623503	-8.512389	-2.676276	-9.127530	0.503965	0.275366
	(-2.612033)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	-0.296800	-2.939981	-0.292489	-8.408039	0.422569	0.095488
	(-2.610192)	(-2.617364)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>S. Africa</i>	-2.427359	-7.430080	-2.097226	-20.20259	0.390915	0.500000
	(-2.610192)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	1.958645	-5.900289	2.371291	-5.856699	0.913332	0.153946
	(-2.610192)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>Mexico</i>	-2.965035	-7.662459	-2.797686	-27.83502	0.636322	0.433913
	(-2.610192)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	0.897964	-6.332757	0.712010	-6.404030	0.708392	0.088749
	(-2.610192)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>Argentina</i>	-5.007378	-8.851651	-5.032982	-33.23015	0.100000	0.467940
	(-2.610192)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	-0.201195	-8.446579	0.325031	-8.882743	0.220561	0.180513
	(-2.610192)	(-2.611094)	(-2.910192)	(-2.611094)	(0.739000)	(0.739000)
<i>Turkey</i>	-2.332681	-8.629630	-3.805554	-25.51235	0.109445	0.084257
	(-2.611094)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	0.783708	-7.096444	0.715281	-7.117852	0.540079	0.085468
	(-2.610192)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>Indonesia</i>	-2.356792	-7.925829	-2.356792	-19.96889	0.118233	0.233555
	(2.610192)	(-2.612033)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	-0.731719	-12.28126	-0.697999	-13.12983	0.132241	0.112215
	(-2.610192)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
<i>Korea Rep.</i>	-0.682819	-6.598312	-1.652125	-22.62237	0.642071	0.175838
	(-2.614029)	(-2.614029)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)
	-0.393107	-7.014346	-0.364457	-7.032467	0.579199	0.181389
	(-2.610192)	(-2.611094)	(-2.610192)	(-2.611094)	(0.739000)	(0.739000)

Note: For each country, the values in the upper lines belong to (g) variable and italic values in the lower lines belong to (s) variable. The values inside the brackets are test critical values with 1% significance level.

The series, which became constant from the same degree, are applied to long term co-integration test for each country. The results of Engle-Granger test which is used for this are shown in Table 3. The parameters and t-statistics which belong to regression equations that are

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built among the (g) and (s) variables for each country are illustrated in the table. The error term (u) which are obtained from the regressions are applied to unit root tests (ADF and PP) again. The condition of that error terms must be constant is matched. This result is obtained when the test statistics which are obtained for error terms are compared the critical values which are shown inside the brackets.

Table 3. Engle - Granger Co-integration Test

Equation	Coefficient	t-Stat.	u → ADF	u → PP
Brazil	-0.347847	-0.755665	-10.78238 (-3.565430)	-14.23231 (-3.565430)
Russia	-0.205576	-0.349285	-6.729700 (-3.769597)	-7.508552 (-3.769597)
India	-2.487205	-2.137474	-6.307663 (-3.574446)	-21.36689 (-3.565430)
China	2.282701	1.583141	-7.761992 (-3.565430)	-8.040614 (-3.565430)
S. Africa	-1.188256	-2.568981	-7.760996 (-3.268308)	-37.72546 (-3.565430)
Mexico	-0.501953	-0.562508	-7.750828 (-3.568308)	-24.06932 (-3.565430)
Argentina	-1.163592	-2.597371	-9.743392 (-3.565430)	-18.59121 (-3.565430)
Turkey	-0.031531	-1.579511	-6.856248 (-3.565430)	-6.859222 (-3.565430)
Indonesia	0.776320	1.547725	-8.061431 (-3.568308)	-31.66495 (-3.565430)
Korea Rep.	-1.338549	-2.493665	-6.577396 (-3.574446)	-31.70071 (-3.565430)

Note: The values in brackets and under the coefficients are Standard Deviation Values. The values in brackets and under ADF, PP and KPSS test statistics are the critical values for 5% significance level.

Table 4 tests the causality relationship between (g) and (s) variables. Granger causality test results are done through 5% significance level and 2 delay. Ho hypothesis is "the variable of (s) is not Granger reason of the variable of (g)". The alternative hypothesis is as Wagner brought forward "(s) is the reason of (g)".

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Table 4. Granger Causality Test

	Hypotheses	Chi-sq	Prob.	Result
Brazil	Wagner	0.560312	0.7557	(s) is not the reason of (g).
	Keynes	1.379583	0.5017	(g) is not the reason of (s).
Russia	Wagner	4.243775	0.1198	(s) is not the reason of (g).
	Keynes	1.132042	0.5678	(g) is not the reason of (s).
India	Wagner	0.061012	0.9700	(s) is not the reason of (g).
	Keynes	2.883540	0.2365	(g) is not the reason of (s).
China	Wagner	4.421365	0.1096	(s) is not the reason of (g).
	Keynes	2.369751	0.3058	(g) is not the reason of (s).
S. Africa	Wagner	6.852868	0.0325	(s) is the reason of (g).
	Keynes	0.539072	0.7637	(g) is not the reason of (s).
Mexico	Wagner	2.489833	0.2880	(s) is not the reason of (g).
	Keynes	0.274476	0.8718	(g) is not the reason of (s).
Argentina	Wagner	1.548467	0.4611	(s) is not the reason of (g).
	Keynes	10.44791	0.0054	(g) is the reason of (s).
Turkey	Wagner	8.500288	0.0143	(s) is the reason of (g).
	Keynes	0.240998	0.8865	(g) is not the reason of (s).
Indonesia	Wagner	0.458962	0.7949	(s) is not the reason of (g).
	Keynes	2.826529	0.2433	(g) is not the reason of (s).
Korea Rep.	Wagner	1.482568	0.4765	(s) is not the reason of (g).
	Keynes	7.593163	0.0224	(g) is the reason of (s).

Note: For Wagner, H_0 : (s) is not the Granger reason of (g). H_1 : (s) is the Granger reason of (g). H_0 is declined for prob. < 0.05. H_0 is accepted when prob. > 0.05. For Keynes, H_0 : (g) is not the Granger reason of (s). H_1 : (g) is the Granger reason of (s). H_0 is declined for prob. < 0.05. H_0 is accepted when prob. > 0.05.

Whether there is causality from (g) to (s) is also tested in Table 4. The hypothesis that Keynes claimed as "(g) is the reason of (s)." is the H_1 hypothesis. Therefore tested H_0 hypothesis is "the variable of (g) is not the reason of the variable of (s)".

4. Conclusions

BM countries are growing fast. However, except China and Korea they are not the countries which can have high capital amounts. Therefore BM countries are vulnerable to external shocks. At the same time, public sector's effects over country economies are dominant. Political processes can affect the economy conjecture intensely. BM countries' growth performance and public spending are co-integrated in the long run depend on the long term

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tests that are shown in this study. Therefore, there is co-integration between (g) and (s) in the long run for all BM countries according to the results of Table 3.

However, Wagner Hypothesis is not valid for many of BM countries according to 1961-2013 data. There is causality for only South Africa, Argentina and Turkey in the long run when Table-4 is analyzed. Through these causalities, Wagner's Rule is applicable for South Africa and Turkey while Keynes's hypothesis is valid for Argentina. This result will require the examination in terms of qualitative aspects of economic growth in addition to its quantitative aspects.

As a result of this condition, it could be said that public spending is not efficient spending that support the economy. Causality between public spending and the growth is not found although economic growth is achieved through inefficient spending. On the other hand, a more widely research should be conducted about public spending types in order to determine the public spending which support economic growth in the long run.

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