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WAGNER'S LAW VS KEYNES' HYPOTHESIS: EMPIRICAL EVIDENCE FROM JAVA AND SUMATRA, INDONESIA

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Abstract

The purpose of this study is to examine the impact of real GRDP on government expenditure, or vice versa, and to see whether Wagner's law or Keynes' hypothesis applies in existing and newly-split districts/cities in Java and Sumatra, Indonesia. The population is the control variable of this study. The analytical method used is panel data regression. The results show that Wagner's law and Keynes' hypothesis apply both in new districts/cities and in existing districts/cities. In existing districts/cities, the population has a significant positive impact on the real GRDP and government expenditure. However, in new districts/cities, the population has a significant positive impact only on the real GRDP. The implication is that the governments are supposed to allocate their expenditure better so that the economy develops better. The economy must be supported and maintained with appropriate regulations so that the business climate continues to be conducive. A synergy between the government and the business world is needed to support each other.

Keywords: Wagner's law, Keynes' hypothesis, government expenditure, gross regional domestic product, population

1. Introduction

Wagner's Law, also known as the "Law of increasing state activity", hypothesized that as the economy develops from year to year, government activities and functions also develop. Economic development has increased in per capita income. When per capita income increases, national government expenditure also increases (Arestis et al., 2021). Empirical studies show that Wagner's Law applies in various countries, such as in Spain (Jaén-garcía, 2011), Greece (Antonis et al., 2013), Turkey (Bayrakdar et al., 2015), Romania (Wang et al., 2016), Nigeria (Nwude & Boloupremo, 2018), Pakistan (Munir & Ali, 2019), and Egypt (Eldemerdash & Ahmed, 2019).

In contrast to Wagner, Keynes argued that aggregate demand holds the positive impact of autonomous government expenditure on economic growth (Arestis et al., 2021). From the Keynesian point of view, government expenditure can form macroeconomic policy instruments to increase national income through a multiplier effect on aggregate demand and subsequently the level of output. Government expenditure is seen as the engine that drives economic growth. According to Keynesians, government expenditure is an exogenous variable that affects GDP growth (Govindaraju et al., 2011). Empirical studies reveal that Keynes' Hypothesis also occurs in several countries such as Nigeria (Babatunde, 2018), Turkey (Karahan & Colak, 2019), Armenia, and Spain (Sedrakyan & Varela-Candamio, 2019).

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As such, it is important to find out which hypothesis applies in a country. By knowing which variables are exogenous, whether income affects government expenditure (Wagner's law), or government expenditure affects income (Keynes' hypothesis), or whether one influences the other - the government can take appropriate policies so that the economy can develop well. This is vital for Indonesia's economic development.

As an effort to increase economic development, Indonesia has implemented a regional splitting policy since 2004. Regional splitting provides an opportunity for regions to become new autonomous regions in the form of provinces, districts, and cities. The purpose of this study is to increase the capacity of the new autonomous region in providing public services so that the welfare of the people in the region increases. Since the enactment of the law, the number of districts and cities in Indonesia has grown rapidly.

Sumatra is a large island in Indonesia that experienced the most splitting, with the addition of the most districts and cities (19 districts and cities). On the other hand, Java experienced the least splitting, only creating 3 new districts. After more than 15 years since the law was enacted, it is apparent that there is a difference in real GRDP and government expenditure between those that are split and those that are not. Figures 1 and 2 present information on the real GRDP and average government expenditure between existing and newly-split districts/cities in Java and Sumatra in 2010-2019.

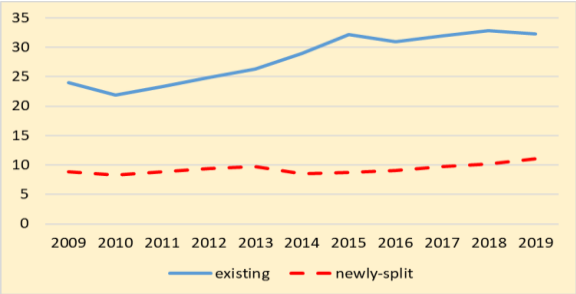

Figure 1.
Average Real GRDP of districts and cities in Java and Sumatra (in IDR Trillion)

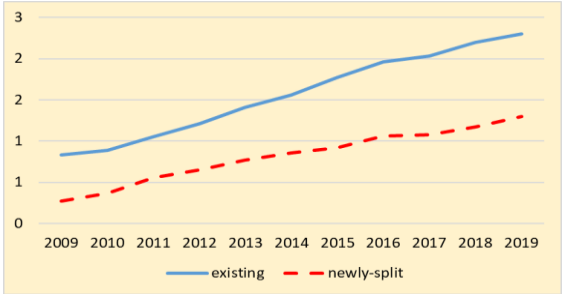

Figure 2.
Average districts and cities Government Expenditure in Java and Sumatra (in IDR Trillion)

Source: Statistics Indonesia and Ministry of Finance. Processed data

Economic growth in split (newly-split) districts and cities is lower than that in un-split (existing) regions. Rapid economic growth affects a high real GRDP increase as well. This can be inferred from the lower real GRDP in newly-split regions than that of existing regions. Even from year to year, the difference in real GRDP grows between the two (Figure 1).

The similar happens with government expenditure. Figure 2 shows that existing regions have higher government expenditure than those that are newly-split. Judging by the year-to-year development, there are indications that government expenditure and the real GRDP are related. As such, it is necessary to test whether it's Wagnerian or Keynesian that applies in newly-split and existing regions.

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The purpose of this study is to examine the effect of real GRDP on government expenditure or vice versa. The results of this study will reveal which theories apply in existing regions and newly-split ones; whether it is Wagner's law or Keynes' hypothesis or both.

The remainder of this paper discusses the empirical study of Wagner's law and the Keynesian hypothesis which is explained in section 2. The research method is presented in section 3. Then the research results and discussion are explained in section 4, followed by conclusions in section 5.

Wagner's Law

Adolph Wagner (Hindriks & Myles, 2006) who researched several European countries, Japan and the USA in the 19th century, explained the position of the government in the economy of these countries. Based on his research, Wagner revealed that there was an increase in the share of the public sector in GDP from year to year, and concluded that as the economy develops over time, the activities and functions of the government increase. Adolph Wagner formulated the law of increasing public expenditures which is popularly known as Wagner's hypothesis or Wagner's law.

Wagner's postulate states that in the long run there is causality from GDP to government expenditure(Gatsi et al., 2019; Govindaraju et al., 2011). In other words, an increase in national income leads to an increase in government expenditure. Wagner revealed that as the economy develops, the activities and functions of government also increase. Economic development that leads to the industrialization process will cause the share of government expenditure/national income to increase. In industrialized countries, the income per capita of the people continues to increase. The implication, according to Wagner, is that when per capita income increases, the share of government expenditure/national income also increases (Arestis et al., 2021).

According to Wagner, the increase in government activity from time to time was caused by three things. First, the government tends to increase its administrative and protective functions during the industrialization process to ensure the market operates smoothly. Second, some public services have high-income elasticity, such as education. This creates political pressure to allocate funds for public services and public welfare. Third, technological advances require large-scale projects but private funds are still lacking, so the government invests and creates monopoly as well as provides goods and services to the public through government funds (Eldemerdash & Ahmed, 2019).

Keynes' hypothesis

John Maynard Keynes stated that the postulate of government expenditure is part of aggregate demand. An increase in expenditure can increase aggregate demand, and create a multiplier effect, increasing employment and output. According to Keynes, the government can intervene to stimulate aggregate demand when the economy is down (Eldemerdash & Ahmed, 2019). Thus, according to Keynesian, government expenditure becomes an exogenous variable that affects GDP growth (Govindaraju et al., 2011).

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Government expenditure can form macroeconomic policy instruments to increase national income through a multiplier effect on aggregate demand and output levels. From the Keynesian point of view, increasing government expenditure is seen as an engine driving economic growth through a fiscal multiplier and an investment acceleration mechanism (Arestis et al., 2021).

Wagner's law and the Keynesian hypothesis are two different frameworks on the causal relationship between government expenditure and economic activity. According to Abbasov & Aliyev (2018), the Keynesian hypothesis states that government expenditure affects economic activity (government expenditure → economic growth). Meanwhile, Wagner's law states economic growth led to government expenditure (economic growth → government expenditure). These two hypotheses have been tested by many empirical studies with mixed results.

Empirical Study

Several studies have confirmed the relationship between government expenditure and GDP growth using Wagner's law and Keynesian views. In investigating the relationship between government expenditure and economic growth, previous studies used government expenditure on specific areas such as education expenditure, health expenditure, and infrastructure expenditure. In analyzing economic growth, proxies that are often used are GDP, GDP per capita, and economic growth. The proxies used in the previous studies will be described as follows.

As with the proxies, the analytical methods used to investigate whether Wagnerian or Keynesian applies also vary. The most frequently used method to test the validity of Wagner's law and Keynes' hypothesis is Granger causality. Several studies using the Granger causality method are Bayrakdar et al. (2015) who examined the relationship between government expenditure and GDP growth in Turkey, Paul & Furahisha (2017) who tested the validity of the Wagner's law or Keynesian hypothesis in Tanzania, Nwude & Boloupremo (2018) who investigated the applicability of Wagner's in Nigeria, Munir & Ali (2019) who analyzed Wagner's law in Pakistan. The results showed that an increase in GDP has led to an increase in government expenditure in the fields of subsidies, education, social, and economics. It was found that Wagner's law applies in Turkey, Nigeria, Tanzania (especially for development expenditure originating from domestic), and Pakistan.

Some studies expanded its observation scope to include several countries but it turns out that Wagner's law applies to only part of the area studied. One example is a study by Keho (2015), which tested the validity of Wagner's law in 9 African countries and found that Wagner's law only applies in Ghana. Another study by Nusair & Olson (2021) evaluated the validity of Wagnerian versus Keynesian in the Gulf Cooperation Council (GCC) country and found that Wagner's law only applies in Oman.

Another method used in research on the relationship between government expenditure and economic growth is ARDL as done by Mohammadi et al. (2008) who analyzed the relationship between real GNP and real total government expenditure in Turkey, Lamartina & Zaghini (2010) who analyzed the relationship between GDP per capita and total government expenditure in 23 developed countries, Antonis et al. (2013) who analyzed the causal relationship between government revenues and expenditures in Greece, and Wang et al. (2016) who examined the

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relationship between GDP and government expenditure in Romania. The results of these studies revealed that the economies in Turkey, Greece, and Romania are Wagnerian.

Another study was conducted in nine post-Soviet countries (Abbasov & Aliyev, 2018). This study analyzed the relationship between per capita real GDP and capita real government expenditure. This later revealed that Wagner's law applies only in four post-Soviet countries, namely Latvia, Lithuania, Georgia, and Ukraine.

In addition to Granger causality and ARDL, several researchers used other analytical methods. Jaén-garcía (2011) used the panel cointegration analysis method to analyze the long-term relationship of GDP per capita with government expenditure in 17 regions in Spain. Jaen-Garcia proved that Wagner's law applies in Spain.

Meanwhile, Eldemerdash & Ahmed (2019) applied the vector error correction model (VECM) to test Wagner's law and Keynesian proposition in Egypt. This study found that the economy in Egypt is Wagnerian.

Not all previous research proved that Wagner's law applies. Mohammadi & Ram (2015) did not obtain evidence of Wagner's law applying in Malaysia, the Philippines, Singapore & Thailand. This is parallel to the research conducted by Ibrahim & Bashir (2019), which found that Wagner's law does not apply in Sudan. Wagner's law does not apply in Nigeria either (Babajide et al., 2020).

The next part of this empirical study is Keynes' hypothesis. Which region can be considered as a Keynesian economy? The analytical methods and proxies used to find the validity of the Keynes hypothesis are explained as follows.

The Granger causality method is often used to test the validity of Keynes' hypothesis. Several studies using this method to evaluate the relationship between government expenditure and economic growth were conducted in Nigeria (Babatunde, 2018; Ighodaro & Oriakhi, 2010; Nasiru, 2012), Kuwait (Ebaid & Bahari, 2019), and Turkey (Arestis et al., 2021). These studies proved that the Keynes hypothesis holds in Nigeria, Kuwait, and Turkey.

Another study was conducted in nine African countries (Keho, 2015). Of the nine African countries studied, Keho stated that three of them are Keynesian economies, namely Gabon, Senegal, and South Africa. Likewise, Nusair & Olson (2021) examined the relationship between real GDP and government expenditure in six Gulf Cooperation Council (GCC) countries. This study concludes that Saudi Arabia and the UAE are Keynesian.

Meanwhile, Paul & Furahisha (2017) investigated the validity of the relationship between government expenditure and economic growth in Tanzania. This study used proxies in the form of three types of government expenditure (recurrent expenditure, development expenditure from domestic sources, and development expenditure from abroad) and GDP as a proxy for economic growth. The results of this study indicate that recurrent expenditure & development expenditure originating from foreign sources causes economic growth, and thus Tanzania's economy is Keynesian.

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Sedrakyan & Varela-Candamio (2019) also evaluated the Keynes hypothesis and Wagner's law in Armenia and Spain. In Armenia, this study proves that Keynes's hypothesis works; specifically, expenditure on defense, health, and education incites Armenia's economic growth. Likewise, in Spain, it is proven that Keynes's hypothesis applies, in which expenditure on health & economic affairs incites Spain's economic growth.

In addition to Granger causality, several previous studies have used the Autoregressive Distributed Lag (ARDL) method to test the Keynesian hypothesis. Govindaraju et al. (2011) tested Wagner's law and Keynes's hypothesis in Malaysia by using government expenditure (education sector) and GDP as variables, as well as capital stock and labor as control variables. This research proved that Keynes's hypothesis applies. Meanwhile, Abbasov & Aliyev (2018) examined the relationship between government expenditure and economic growth in nine post-Soviet countries. In this study, by analyzing real per capita government expenditure and real per capita GDP, it was found that the Keynesian hypothesis applies in Estonia, Azerbaijan, and Moldova.

Another study using the ARDL with the Unrestricted error correction model (UECM) also found that the Keynesian hypothesis applies in Turkey (Karahan & Colak, 2019). The results of his research show that government expenditure has a positive effect on economic growth in the short run. However, government expenditure has the opposite effect in the long run. A similar case occurred in Romania; a study by Wang et al. (2016) examined the relationship between government expenditure and economic growth and found that the Keynesian hypothesis applies in Romania in the short run.

Based on this, it is evident that in most areas, only either Wagner's law or Keynesian hypothesis applies. However, several previous studies have revealed that there are regions that experience both; this implies that Wagner's law and the Keynesian hypothesis are interconnected. In other words, there is a bidirectional relationship between Wagner's law and Keynes' hypothesis. This is explained by Abu-Eideh (2015) in Palestine, Paparas et al. (2019) in the UK, and Ghazy et al. (2020) in Egypt. These three studies revealed that there is bidirectional causality between government expenditure and economic growth in Palestine, UK, and Egypt.

Meanwhile, Abbasov & Aliyev (2018) used the ARDL method in their research in nine post-Soviet countries. They found that there was a bidirectional relationship between Wagner's law and Keynes' hypothesis in only two of the 9 countries studied namely Uzbekistan & Kyrgyz republic. On the other hand, Sedrakyan & Varela-Candamio (2019) who researched Armenia and Spain, stated that the bidirectional relationship only occurs in Spain.

In the studies above, it was explained that the variables used in testing Wagner's law and Keynes' hypothesis are only government expenditure and economic growth. There are other studies, in which other variables are used as control variables.

One example is a study by Islam (2001), which tested the validity of Wagner's Law in the USA by adding population density variable and dummy war occurrence. Based on the Granger

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method, the results of this study support Wagner's Law, in which population density harms government expenditure.

Another study by Tayeh & Mustafa (2011) analyzed the factors that influence government expenditure in Jordan. The variables studied were population, unemployment, inflation, a ratio of the number of government employees/labor force, previous year's government expenditure, budget deficit, exports, imports, and dummy assistance from the IMF (IMF intervention). The results revealed that population is negatively related to government expenditure, while inflation and unemployment rate are positively related to government expenditure. The same results were found by Okafor & Eiya (2011) who conducted their research in Nigeria using OLS; they found a positive influence of the population on government expenditure.

Meanwhile, Azolibe et al. (2020) evaluated the impact of GDP per capita, population, unemployment, and foreign aid on government expenditure in 10 African countries with dynamic OLS. Azolibe et. al found that GDP per capita does not affect government expenditure, while the population aged 0-14 years has a positive effect on government expenditure.

Other studies found the contrary; Drew et al. (2014) found that population has a negative effect on government expenditure per capita in Australia using the multiple regression method. Bernardelli et al., (2020), who evaluated the effect of population and population density on government expenditure, used new variables as control variables: main sector of the economy (agriculture, industry, or trade), distance from the capital, and the dummy of the metropolitan area. With panel data regression, this study revealed that population and population density have a negative effect on government expenditure. Regions that are considered metropolitan have more government expenditure than those that are not.

There have also been studies concerning the relationship between population and economic growth. Udo & Effiong (2014) examined the relationship between government expenditure and economic growth in Nigeria. This study used three control variables: the level of investment, population growth, and the money supply. By using Granger causality and multiple regression, the study found that population growth has a positive effect on economic growth in Nigeria.

Garza-Rodriguez et al. (2016) also examined the relationship between population and economic growth. By using the Granger causality, their study revealed that in Mexico, population affects GDP per capita and vice versa.

Similar research was done by Karim & Amin (2018), but with different results. Karim & Amin (2018) examined the relationship between population growth and economic growth in South Asian countries by using Granger causality and Vector ECM. The control variables used were life expectancy, urban population, and fertility rates. The results showed that population growth was not related to economic growth.

Oseni & Adekunle (2020) later evaluated the relationship between government expenditure and economic growth in Nigeria using the Engle method and Granger causality. By using real GDP as a proxy for economic growth, and money supply, population growth, and investment as the

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control variables, they found that government expenditure has a positive effect on real GDP, while population growth has a negative effect on real GDP.

Ahuja & Pandit (2020) did a similar study on a much larger scale; they examined the relationship between government expenditure and economic growth in 59 developing countries. This study used several control variables. The results revealed that government expenditure, investment, and government revenues have a positive effect on economic growth, in contrast to population growth, unemployment, and inflation which have a negative effect on economic growth.

Kutasi & Marton (2020) examined the effect of public expenditure on GDP growth in 25 European Union countries. The method used was GMM and panel data regression. The results showed that government expenditure and population growth have a negative effect on GDP per capita.

Abada & Manasseh (2020) also investigated the effect of government expenditure on economic growth in Nigeria using the OLS method. This study used real GDP as a proxy for economic growth, and total government expenditure as a proxy for the government. Their research revealed that government expenditure has a negative effect on economic growth.

Mahmoudinia et al. (2020) examined the relationship between population growth, GDP growth, and capital stock in OIC (Organization of Islamic Conference) countries by using a causality panel. In the long run, there is a positive effect of population growth on economic growth.

Mamun et al. (2020) examined the relationship between the aging population and economic growth in Bangladesh. The proxy for economic growth here is aggregate per capita GDP. The method applied is ARDL with UECM. By using the stock of gross capital formation as a control variable, this study found a relationship between the two. This relationship is from the aging population to per capita GDP.

Based on preceding studies, it is evident that population is a variable that affects government expenditure. The population is also a variable that affects economic growth. Therefore, the population is used as a control variable in this study.

2. Method

This study focuses on the relationship between government expenditure and economic growth, to see whether Wagner's law and Keynes' hypothesis apply in Sumatra and Java, especially since the enactment of Law No. 32/2004 on regional expansion. We will examine the applicability of these two hypotheses both in existing districts/cities (already existed before 2004) and in newly created districts/cities (becoming new districts/cities after 2004).

To test the applicability of Wagner's law and Keynes' hypothesis, based on the literature review that has been carried out, this study uses a proxy for total government expenditure as a proxy for government expenditure, and the real GRDP as a proxy for economic growth. The control variable used in this study is population size.

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The method used is panel data regression. It will cover the regencies and cities in Java and Sumatra in 2007-2019. Panel data regression is considered appropriate because this method can determine how much influence the independent variables have on government expenditure (Wagner's law) and the real GRDP (Keynes' hypothesis).

This study examines whether Wagner's law or Keynesian postulates or both occur in 22 new districts/cities (newly-split areas), and 242 existing districts/cities. Thus, 4-panel data regression models will be generated.

Baltagi (2005) suggested several advantages of panel data, such as the ability to control the heterogeneity of individuals and inspect data dynamics better. In addition, with the use of panel data, we can identify and measure certain effects that will be lost by only using cross-section data or only time-series data. Gujarati (2003) and Verbeek (2000) also stated that classical assumptions need to be tested in OLS regression, such as multicollinearity, heteroscedasticity, autocorrelation, and normality, are no longer needed in panel data regression.

The most appropriate panel data regression model was obtained based on panel regression model testing, which is the Chow test and Hausman test.

a. Wagner's law model

$$GEit = \alpha + \beta 1GRDPt - 1 + \beta 2Popit + \varepsilon it \quad (1)$$

b. Keynes' hypothesis model

$$GRDPit = \alpha + \beta 1GE + \beta 2Popit + \varepsilon it \quad (2)$$

In which GE is local government expenditure, GRDP is the real Gross Regional Domestic Product, GRDPt-1 is the previous-year real GRDP, Pop is the population size, β_i is the regression coefficient, t is time, i is district/city, and ð is an error term. The significance level used is a = 5%.

Wooldridge (2013) explained that there are three-panel data regression models: the common-effect model (CEM), the fixed-effect model (FEM), and the random-effect model (REM). To determine the most appropriate model out of 3, three tests are carried out. These tests are the Chow Test (used to choose between CEM or FEM), Hausman Test (used to choose between FEM or REM), and Lagrange Multiplier Test (used to choose REM or CEM). After the best model has been generated, hypothesis testing (F-test and t-test) is then carried out (Gujarati, 2003).

3. Results

Analysis of the validity of Wagner's law and Keynes' hypothesis are grouped into 2 groups, newly split districts/cities and existing districts/cities. Before we move to the test results and the regression model, we will first describe the data regarding government expenditure, real GRDP, and population, as seen in Table 1 (for existing districts/cities) and Table 2 (for newly split districts/cities).

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Table 1. Government Expenditure, real GRDP, and population in existing districts/cities.

Year	Government Expenditure (in IDR billion)			Real GRDP (in IDR trillion)			Population (in thousand)		
	mean	minimum	maximum	mean	minimum	maximum	mean	ninimum	maximum
2007	689.29	195.94	17,280.82	21.79	0.19	1,115.48	774	29	9,057
2008	760.77	240.38	15,956.52	22.83	0.18	1,230.96	741	29	9,146
2009	828.66	267.93	19,511.10	23.97	0.53	1,289.23	726	29	9,223
2010	891.89	231.57	21,552.89	21.83	0.51	1,075.18	743	30	9,588
2011	1,057.69	318.57	26,423.60	23.37	0.52	1,222.53	757	31	9,608
2012	1,210.65	296.78	31,558.71	24.81	0.57	1,296.69	769	32	9,862
2013	1,415.95	381.85	38,301.50	26.30	0.60	1,373.39	775	32	9,970
2014	1,567.60	406.61	37,799.66	27.75	0.64	1,454.56	782	33	10,074
2015	1,772.49	477.74	43,031.32	28.93	0.68	1,539.92	791	26	10,178
2016	1,960.86	547.65	47,128.81	32.21	0.72	1,635.36	799	33	10,277
2017	2,027.26	503.87	51,066.08	30.99	0.76	1,454.56	828	34	10,374
2018	2,206.39	617.10	71,169.64	31.97	0.77	1,567.58	820	34	10,467
2019	2,301.38	581.26	64,938.36	32.78	0.81	1,677.52	633	35	10,558

Source: Statistics Indonesia and Ministry of Finance, Indonesia (processed data)

Tabel 2. Government Expenditure, Real GRDP & population in newly split districts/cities

Year	Government Expenditure (in IDR billion)			Real GRDP (in IDR trillion)			Population (in thousand)		
	mean	minimum	maximum	mean	minimum	maximum	mean	minimum	maximum
2007	164.94	10.24	319.64	8.13	066	23.70	254	135	374
2008	271.38	65.38	584.60	10.94	0.82	25.35	444	64	1,531
2009	272.54	97.14	782.78	8.82	0.86	26.52	352	35	1,548
2010	376.53	106.63	1,010.27	8.30	0.78	30.52	326	37	1,514
2011	562.43	257.27	1,289.4	8.84	0.82	33.21	333	39	1,537
2012	651.49	275.42	1,743.19	9.43	0.88	36.09	338	39	1,563
2013	775.32	354.05	1,837.73	9.73	0.92	39.25	344	39	1,589
2014	865.88	370.82	3,128.93	8.50	0.97	42.41	353	40	1,609
2015	925.73	486.87	2,620.85	8.70	1.02	45.48	359	40	1,629
2016	1,061.57	563.08	2,888.57	9.10	1.07	48,55	365	41	1,648
2017	1,086.61	558.52	2,967.63	9.75	1.12	52.10	371	41	1,666
2018	1,171.60	598.25	3,271.44	10.22	1.78	53.25	376	42	1,696
2019	1.299.19	710.21	3,634.75	11.07	1.92	56.57	382	42	1,748

Source: Statistics Indonesia and Ministry of Finance, Indonesia (processed data)

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Table 1 presents the average development of government expenditure in existing regencies/cities that continued to increase. During 2007-2019, the average government expenditure grew by 233%. Government expenditures between regencies/cities vary widely, so there is a big difference between regencies/cities with maximum and minimum expenditure. In 2007, the difference between the highest and lowest government expenditure was IDR 17.28 trillion. Although this gap narrowed slightly in 2008, the gap has widened again up until 2019. Meanwhile, new districts/cities have lower average government expenditure (Table 2) but also experience greater growth. Government expenditure grew by 687% during 2007-2019. This rapidly growing expenditure was due to the low number of expenditures in 2007 when most of these regencies/cities were newly established so that very few activities and programs in public services were implemented. Over time, these new districts/cities were able to increase their capacity so that their expenditures increased rapidly. Meanwhile, the difference between the highest and lowest expenditures continues to increase from year to year, the same as the existing districts/cities.

This increase in the difference in expenditure from year to year, which is getting bigger in both existing and new districts/cities, shows the different abilities of local governments in obtaining revenues (which then become expenditures), in making government programs and activities, and in allocating their expenditures. In addition, the population is also a determining factor in the amount of expenditure as there are expenditures for fields directly related to the population, such as education and health expenditures.

The next variable is real GRDP. In existing regencies/cities, the average real income was IDR 21.79 trillion in 2007 (Table 1). Although it decreased in several years, it grew by 50.43% during 2007-2019. Judging from the difference between the highest and lowest real GRDP, it was evident that the difference between the highest and the lowest continues to grow from year to year. In the new districts/cities, real GRDP grew by 36.16% during 2007-2019. Table 2 shows that the difference in the real GRDP between regencies/cities also widened in 2019. This widening difference in the real GRDP indicates income inequality between existing and new regencies/cities.

Table 3. Testing the panel data regression model

Test	Existing districts/cities		Newly split districts/cities	
	Wagner's law	Keynes' Hypothesis	Wagner's law	Keynes' Hypothesis
Chow test	***	***	***	***
Hausman test	***	***	***	-
LM test	***	***	***	***

Source: Author's work

Note: Chow test: chi-square prob < 5%, H0 is rejected. It shows that the best model is FEM. Hausman test: period random > 5%, H0 is not rejected. It shows that the best model is REM.

LM test: Breush-pagan < 5%, H0 is rejected. It shows that the best model is REM

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Let's take a look at population size. Based on Table 1 and Table 2, it can be seen that the number of residents in the existing districts/cities is higher than the new ones. However, population growth in existing districts/cities is lower. From this information, it can be said that the population is getting more evenly distributed between the existing and new districts/cities. Meanwhile, for the dummy locations, of which districts/cities are in Java, there are 3 new districts/cities and 110 existing districts/cities. As for locations in Sumatra, there are 19 new regencies/cities and 132 existing regencies/cities.

Next, the panel data regression model test is conducted, as seen in Table 3. The model testing was carried out using the Chow test, Hausman test, and Lagrange Multiplier test. All model tests for the Wagner model in existing and new districts/cities show that H0 is rejected at $\alpha < 5\%$. Thus, the best model for proving Wagner's law is the fixed effect model for both existing and new regencies/cities.

Testing the Keynes model in only existing districts/cities shows that H0 is rejected at $\alpha < 5\%$ for all tests (Chow, Hausman, and LM test). This means that the best model for Keynes' hypothesis in the existing district is the Fixed Effect Model (FEM). Meanwhile, for the new districts/cities, the Keynes model test shows that H0 is not rejected in the Hausman test. Thus, the best model for Keynes' hypothesis in new districts/cities is the random effect model (REM).
Hypothesis testing (F test and t-test) for the validity of Wagner's law based on the best model is presented in Table 4. With the fixed effect model, the F test for existing and new districts/cities shows that H0 is rejected. Likewise, with the t-test. The previous year's real GRDP had a significant positive effect on government expenditure. This shows that Wagner's law applies in all areas of Java and Sumatra, both existing and new. However, the effect of previous-year real GRDP on government expenditure in new districts/cities is greater than that in existing districts/cities. This has been described previously, that the increase in the real GRDP in existing regencies/cities is accompanied by a much larger increase in government expenditure than in new regencies/cities so that although the real GRDP is smaller, government expenditure is higher in newly-split districts/cities.

Table 4. Regression model for Wagner's law (dependent variable is government expenditure)

Variables	Existing districts/cities (FEM)	Newly-split districts/cities (FEM)
C	9.739505***	0.052608
$GRDP_{t-1}$	0.485001***	1.096597***
Pop	0.252081***	-0.409744***
R^2	0.874256	0.996378
F-statistic	68.34873	38786.020
Prob.F-Statistic	0.000000	0.000000

Source: Author's work

Note: ***, **, * denotes significant level on $\alpha = 1\%, 5\%, 10\%$.

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Table 5. Regression model for Keynes Hypothesis (dependent variable is the real GRDP)

Variables	Existing city/districts (FEM)	Newly-split city/districts (REM)
C	7.625035***	0.011202
GE	0.416138***	0.628270***
Pop	0.836447***	0.994334***
R^2	0.986194	0.998710
F-statistic	702.2140	109507.4
Prob.F-Statistic	0.000000	0.000000

Source: Author's work

Note: ***, **, * denotes significant level on α = 1%, 5%, 10%.

In regards to the control variable, population size has a significant positive effect on government expenditure in existing, whereas it negatively affects government expenditure in new districts/cities, with greater impact in the new districts/cities.

The regression model discussed next is the Keynes hypothesis, which is shown in Table 5. The best model to explain the Keynes hypothesis in existing districts/cities is FEM, which revealed that government expenditure has a significant positive effect on the real GRDP. Meanwhile, with the random-effects model, it was found that government expenditure also has a significant positive effect on real GRDP in new districts/cities. Based on this, it is concluded that the Keynes hypothesis applies both in existing and newly-split districts/cities. As for the population control variable, this study found that there was a positive influence of the population on the real GRDP.

4. Discussion

This study found that Wagner's law applies in both new and existing districts/cities. The results of this study are in line with research conducted by Nusair & Olson (2021) and Wang et al. (2016) The proxy in this study is the same as the two studies, namely total expenditure & real GDP.

In Indonesia, including Java and Sumatra, the process of determining the amount of government expenditure is carried out a year in advance. District/city outputs contribute to determining the amount of expenditure. From the output, the government receives taxes either levied by the district/city government or taxes collected by the central government. From the taxes collected by the central government, districts/cities will receive transfer funds which will later be used for government expenditure. In addition, districts/cities with high real GRDP have more economic activities, so that the government provides public services to support the economy such as providing more infrastructure, as well as other supporting activities. This led to higher government expenditure in districts/cities with high real GRDP.

In regards to the population as a control variable, this study found that population has a positive effect on government expenditure in existing districts/cities. This study supports research conducted in Nigeria (Okafor & Eiya, 2011), the USA (Turner, 2014), 10 African countries (Azolibe et al., 2020), Australia (Drew et al., 2014), and Brazil (Bernardelli et al., 2020).

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A large population causes the government to provide a large number of public services. This is particularly the case in areas with a younger population, who need various public services such as education and health services. A large number of people in need of education increases the demand for school buildings, books, and teachers (and thus paying teacher salaries). The higher demand for education, the larger the government expenditure. This also holds for the health sector. A large population requires a large number of health facilities, so the government must allocate its expenditures to build infrastructure for health facilities such as health centers, hospitals, and laboratories. The government also provides more medicine, medical personnel such as doctors, midwives, nurses, and pharmacists if there are more people in the area.

By testing Keynes' hypothesis, it's revealed that both newly-split and existing districts/cities are Keynesian economies. The results of this study support research conducted in Nigeria (Babatunde, 2018; Ighodaro & Oriakhi, 2010; Nasiru, 2012), Malaysia (Govindaraju et al., 2011), Romania (Wang et al., 2016), Kuwait (Ebaid & Bahari, 2019), Turkey (Arestis et al., 2021; Karahan & Colak, 2019) and Armenia and Spain (Sedrakyan & Varela-Candamio, 2019).

The Keynesian economy applies in all districts/cities showing that government expenditure is useful to move the economy in a better direction. Government programs and activities in building infrastructure (such as roads and buildings), purchasing goods and services used in the implementation of government, and activities related to the community economy are proven to increase the real GRDP in all districts/cities.

As for the population control variable, this study found that there was a positive influence of the population on the real GRDP. The results of this study are parallel with studies conducted in Nigeria (Udo & Effiong, 2014), Mexico (Garza-Rodriguez et al., 2016), OIC countries (Mahmoudinia et al., 2020), and Bangladesh (Mamun et al., 2020).

In the newly-split districts/cities, the population is not too large, so the population density is still low. The increase in population still has an impact on improving the welfare of the community; the increasing population has a probability of increasing employment, which of course will increase output in the region.

5. Conclusion

The purpose of this study was to examine the effect of the real GRDP on government expenditure, or vice versa, with population size as a control variable. In other words, this study analyzes whether Wagner's law and Keynes's hypothesis apply in Java and Sumatra. By using panel data regression, it is evident that Wagner's law and Keynes' hypothesis apply in new and existing districts/cities. The population has a positive influence on increasing government expenditure and the real GRDP.

Wagner's law and Keynes' hypothesis have implications for the economic development of Java and Sumatra if the government is not careful in allocating its expenditures. Programs and activities that are reflected in appropriate government expenditure will encourage economic growth. The economy must be supported and maintained with appropriate regulations so that the business climate continues to be conducive. With a conducive and growing economy,

government expenditure will increase. The opposite will happen if the economy is stuck; this will reduce government expenditure which will then reduce economic activity. Therefore, a synergy between the government and the business world is needed to support each other so that the economy continues to develop.

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